THE CITY OF WINNIPEG

BID OPPORTUNITY

BID OPPORTUNITY NO. 177-2014

GWWD MILE 22.15 & 77.6 RAILWAY BRIDGE REPLACEMENTS AND MILE 41.3 BRIDGE REPAIR

TABLE OF CONTENTS

PART A - BID SUBMISSION

Form A: Bid 1
Form B: Prices 4
Form G1: Bid Bond and Agreement to Bond 10
Form G2: Irrevocable Standby Letter of Credit and Undertaking 12

PART B - BIDDING PROCEDURES

B1. Contract Title 1
B2. Submission Deadline 1
B3. Site Investigation 1
B4. Enquiries 1
B5. Confidentiality 1
B6. Addenda 2
B7. Substitutes 2
B8. Bid Components 3
B9. Bid 4
B10. Prices 4
B11. Qualification 5
B12. Bid Security 6
B13. Opening of Bids and Release of Information 6
B14. Irrevocable Bid 7
B15. Withdrawal of Bids 7
B16. Evaluation of Bids 7
B17. Award of Contract 8

PART C - GENERAL CONDITIONS

C0. General Conditions 1

PART D - SUPPLEMENTAL CONDITIONS

General

D1. General Conditions 1
D2. Scope of Work 1
D3. Access to Mile 77.6 Site 2
D4. Definitions 2
D5. Contract Administrator 2
D6. Contractor's Supervisor 3
D7. Ownership of Information, Confidentiality and Non Disclosure 3
D8. Notices 3
D9. Furnishing of Documents 4

Submissions

D10. Authority to Carry on Business 4
D11. Safe Work Plan 4
D12. Insurance 4
D13. Performance Security 5
D14. Subcontractor List 5
D15. Equipment List 5
D16. Detailed Work Schedule 5

Schedule of Work

D17. Commencement 6
D18. Substantial Performance 6
D19. Total Performance 7
D20. Liquidated Damages 7

Control of Work

D21. Job Meetings 7

D22. Prime Contractor – The Workplace Safety and Health Act (Manitoba) 8
D23. The Workplace Safety and Health Act (Manitoba) – Qualifications 8
D24. Authorized Work on Private Property 8
D25. GWWD Railway Operations 8

Measurement and Payment
D26. Invoices 8
D27. Payment 9
D28. Warranty 9

Form H1: Performance Bond 10
Form H2: Irrevocable Standby Letter of Credit 12

PART E - SPECIFICATIONS

E1. Applicable Specifications and Drawings 1
E2. Soils Investigation Report 2
E3. Environmental Protection Plan 3
E4. Site Work 12
E5. Site Office Facilities 14
E6. Protection of Existing Trees 15
E7. Water Obtained From the City 16
E8. Bridge Demolition 16
E9. Structural Excavation 17
E10. Backfill 18
E11. Silt Fence Barrier 22
E12. Erosion Control Blanket (ECB) 23
E13. Supplying and Driving Steel Piles 25
E14. Structural Concrete 31
E15. Reinforcing Steel 51
E16. Structural Steel 54
E17. Bearings 62
E18. Riprap 65
E19. Track Work 66
E20. Protection of Native Grass Area 71
E21. Timber struts 72

Appendices

Appendix A: AMEC Earth and Environmental Geotechnical Report

Appendix B: GWWD Rail Transportation Information

Appendix C: Regulatory Body Applications and Approvals

Appendix D: Mile 41.3 Sketches

PART B - BIDDING PROCEDURES

B1. CONTRACT TITLE

B1.1 GWWD MILE 22.15 & 77.6 BRIDGE REPLACEMENTS AND MILE 41.3 BRIDGE REPAIR

B2. SUBMISSION DEADLINE

B2.1 The Submission Deadline is 12:00 noon Winnipeg time, May 8 2014.

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 The Contract Administrator will be on site at Mile 77.6 on May 1 2014, 11:00 am for a non-mandatory meeting. The Contract Administrator will then proceed to Mile 41.3 and Mile 22.15 for subsequent Site meetings and viewing. Interested Bidders must first register 24 hours prior to the scheduled site meeting. All Bidders wishing to attend must show up with proper PPE gear, CSA steel toe boots, hard hat, high visible reflective vest and safety glasses.

B3.2 Further to C3.1, the Bidder may make an appointment to view the Site by contacting the Contract Administrator.

B3.3 The Bidder is advised that prior to bid closing, it is the responsibility of the Bidder to make him/her fully acquainted with the extent of the Work and the nature of the Site.

B3.4 The Bidder shall not be entitled to rely on any information or interpretation received at the Site investigation unless that information or interpretation is the Bidder's direct observation, or is provided by the Contract Administrator in writing.

B4. ENQUIRIES

B4.1 All enquiries shall be directed to the Contract Administrator identified in D5.1.

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

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

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

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

B5. CONFIDENTIALITY

B5.1 Information provided to a Bidder by the City or acquired by a Bidder by way of further enquiries or through investigation is confidential. Such information shall not be used or disclosed in any

way without the prior written authorization of the Contract Administrator. The use and disclosure of the confidential information shall not apply to information which:

(a) was known to the Bidder before receipt hereof; or

(b) becomes publicly known other than through the Bidder; or

(c) is disclosed pursuant to the requirements of a governmental authority or judicial order.

B5.2 The Bidder shall not make any statement of fact or opinion regarding any aspect of the Bid Opportunity to the media or any member of the public without the prior written authorization of the Contract Administrator.

B6. ADDENDA

B6.1 The Contract Administrator may, at any time prior to the Submission Deadline, issue addenda correcting errors, discrepancies or omissions in the Bid Opportunity, or clarifying the meaning or intent of any provision therein.

B6.2 The Contract Administrator will issue each addendum at least two (2) Business Days prior to the Submission Deadline, or provide at least two (2) Business Days by extending the Submission Deadline.

B6.3 Addenda will be available on the Bid Opportunities page at The City of Winnipeg, Corporate Finance, Materials Management Division website at http://www.winnipeg.ca/matmgt/bidopp.asp

B6.4 The Bidder is responsible for ensuring that he/she has received all addenda and is advised to check the Materials Management Division website for addenda regularly and shortly before the Submission Deadline, as may be amended by addendum.

B6.5 The Bidder shall acknowledge receipt of each addendum in Paragraph 10 of Form A: Bid. Failure to acknowledge receipt of an addendum may render a Bid non-responsive.

B7. SUBSTITUTES

B7.1 The Work is based on the Plant, Materials and methods specified in the Bid Opportunity.

B7.2 Substitutions shall not be allowed unless application has been made to and prior approval has been granted by the Contract Administrator in writing.

B7.3 Requests for approval of a substitute will not be considered unless received in writing by the Contract Administrator at least five (5) Business Days prior to the Submission Deadline.

B7.4 The Bidder shall ensure that any and all requests for approval of a substitute:

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

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

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

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

(e) certify that, in the case of a request for approval as an approved alternative, the substitute will adequately perform the functions called for by the general design, be similar in substance to that specified, is suited to the same use and capable of performing the same

function as that specified and can be incorporated into the Work, strictly in accordance with the proposed work schedule and the dates specified in the Supplemental Conditions for Substantial Performance and Total Performance.

B7.5 The Contract Administrator, after assessing the request for approval of a substitute, may in his/her sole discretion grant approval for the use of a substitute as an "approved equal" or as an "approved alternative", or may refuse to grant approval of the substitute.

B7.6 The Contract Administrator will provide a response in writing, at least two (2) Business Days prior to the Submission Deadline, only to the Bidder who requested approval of the substitute.

B7.7 The Bidder requesting and obtaining the approval of a substitute shall be entirely responsible for disseminating information regarding the approval to any person or persons he/she wishes to inform.

B7.8 If the Contract Administrator approves a substitute as an "approved equal", any Bidder may use the approved equal in place of the specified item.

B7.9 If the Contract Administrator approves a substitute as an "approved alternative", any Bidder bidding that approved alternative may base his/her Total Bid Price upon the specified item but may also indicate an alternative price based upon the approved alternative. Such alternatives will be evaluated in accordance with B16.

B7.10 No later claim by the Contractor for an addition to the Total Bid Price because of any other changes in the Work necessitated by the use of an approved equal or an approved alternative will be considered.

B7.11 Notwithstanding B7.2 to B7.10, and in accordance with B8.7 deviations inconsistent with the Bid Opportunity document shall be evaluated in accordance with B16.1(a).

B8. BID COMPONENTS

B8.1 The Bid shall consist of the following components:

(a) Form A: Bid;

(b) Form B: Prices;

(c) Bid Security

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

B8.2 Further to B8.1, the Bidder should include the written correspondence from the Contract Administrator approving a substitute in accordance with B7.

B8.3 All components of the Bid shall be fully completed or provided, and submitted by the Bidder no later than the Submission Deadline, with all required entries made clearly and completely, to constitute a responsive Bid.

B8.4 The Bid shall be submitted enclosed and sealed in an envelope clearly marked with the Bid Opportunity number and the Bidder's name and address.

B8.5 Samples or other components of the Bid which cannot reasonably be enclosed in the envelope may be packaged separately, but shall be clearly marked with the Bid Opportunity number, the Bidder's name and address, and an indication that the contents are part of the Bidder's Bid.

B8.6 Bidders are advised not to include any information/literature except as requested in accordance with B8.1.

B8.7 Bidders are advised that inclusion of terms and conditions inconsistent with the Bid Opportunity document, including the General Conditions, will be evaluated in accordance with B16.1(a).

B8.8 Bids submitted by facsimile transmission (fax) or internet electronic mail (e-mail) will not be accepted.

B8.9 Bids shall be submitted to:

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

B9. BID

B9.1 The Bidder shall complete Form A: Bid, making all required entries.

B9.2 Paragraph 2 of Form A: Bid shall be completed in accordance with the following requirements:

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

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

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

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

B9.3 If a Bid is submitted jointly by two or more persons, each and all such persons shall identify themselves in accordance with B9.2.

B9.4 In Paragraph 3 of Form A: Bid, the Bidder shall identify a contact person who is authorized to represent the Bidder for purposes of the Bid.

B9.5 Paragraph 12 of Form A: Bid shall be signed in accordance with the following requirements:

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

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

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

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

B9.6 The name and official capacity of all individuals signing Form A: Bid should be printed below such signatures.

B9.7 If a Bid is submitted jointly by two or more persons, the word "Bidder" shall mean each and all such persons, and the undertakings, covenants and obligations of such joint Bidders in the Bid and the Contract, when awarded, shall be both joint and several.

B10. PRICES

B10.1 The Bidder shall state a price in Canadian funds for each item of the Work identified on Form B: Prices.

B10.2 The quantities listed on Form B: Prices are to be considered approximate only. The City will use said quantities for the purpose of comparing Bids.

B10.3 The quantities for which payment will be made to the Contractor are to be determined by the Work actually performed and completed by the Contractor, to be measured as specified in the applicable Specifications.

B10.4 Payments to Non-Resident Contractors are subject to Non-Resident Withholding Tax pursuant to the Income Tax Act (Canada).

B11. QUALIFICATION

B11.1 The Bidder shall:

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

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

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

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

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

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

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

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

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

(d) the steel H-Pile installer must have at least five years of experience with installation of driven steel H-Piles;

(e) The track work Subcontractor must be experienced with the installation of similar railway track projects and must be familiar with the American Railway Engineering and Maintenance of Way Association (AREMA) Manual for Railway Engineering guidelines.

B11.4 Further to B11.3(c), the Bidder shall, within five (5) Business Days of a request by the Contract Administrator, provide proof satisfactory to the Contract Administrator that the Bidder/Subcontractor has a workplace safety and health program meeting the requirements of The Workplace Safety and Health Act (Manitoba), by providing:

(a) a copy of their valid Manitoba COR certificate and Letter of Good Standing (or Manitoba equivalency) as issued under the Certificate of Recognition (COR) Program administered by the Construction Safety Association of Manitoba or by the Manitoba Heavy Construction Association's WORKSAFELY™ COR™ Program; or

(b) a copy of their valid Manitoba SECOR™ certificate and Letter of Good Standing (or Manitoba equivalency) as issued under the Small Employer Certificate of Recognition Program (SECOR™) administered by the Construction Safety Association of Manitoba or by the Manitoba Heavy Construction Association's WORKSAFELY™ COR™ Program; or

(c) a report or letter to that effect from an independent reviewer acceptable to the City. (A list of acceptable reviewers and the review template are available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at http://www.winnipeg.ca/matmgt/.

B11.5 The Bidder shall submit, within three (3) Business Days of a request by the Contract Administrator, proof satisfactory to the Contract Administrator of the qualifications of the Bidder and of any proposed Subcontractor.

B11.6 The Bidder shall provide, on the request of the Contract Administrator, full access to any of the Bidder's equipment and facilities to confirm, to the Contract Administrator's satisfaction, that the Bidder's equipment and facilities are adequate to perform the Work.

B12. BID SECURITY

B12.1 The Bidder shall provide bid security in the form of:

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

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

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

B12.2 If the Bidder submits alternative bids, the bid security shall be in the amount of the specified percentage of the highest Total Bid Price submitted.

B12.3 All signatures on bid securities shall be original.

B12.4 The Bidder shall sign the Bid Bond.

B12.5 The Surety shall sign and affix its corporate seal on the Bid Bond and the Agreement to Bond.

B12.6 The bid security of the successful Bidder and the next two lowest evaluated responsive and responsible Bidders will be released by the City when a Contract for the Work has been duly executed by the successful Bidder and the performance security furnished as provided herein. The bid securities of all other Bidders will be released when a Contract is awarded.

B12.7 Where the bid security provided by the successful Bidder is in the form of a certified cheque or draft pursuant to B12.1(c), it will be deposited and retained by the City as the performance security and no further submission is required.

B12.8 The City will not pay any interest on certified cheques or drafts furnished as bid security or subsequently retained as performance security.

B12.9 The bid securities of all Bidders will be released by the City as soon as practicable following notification by the Contract Administrator to the Bidders that no award of Contract will be made pursuant to the Bid Opportunity.

B13. OPENING OF BIDS AND RELEASE OF INFORMATION

B13.1 Bids will be opened publicly, after the Submission Deadline has elapsed, in the office of the Corporate Finance Department, Materials Management Division, or in such other office as may be designated by the Manager of Materials.

B13.2 Bidders or their representatives may attend.

B13.3 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/default.stm

B13.4 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/default.stm

B13.5 The Bidder is advised that any information contained in any Bid may be released if required by City policy or procedures, by The Freedom of Information and Protection of Privacy Act (Manitoba), by other authorities having jurisdiction, or by law.

B14. IRREVOCABLE BID

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

B14.2 The acceptance by the City of any Bid shall not release the Bids of the next two lowest evaluated responsive Bidders and these Bidders shall be bound by their Bids on such Work until a Contract for the Work has been duly executed and the performance security furnished as herein provided, but any Bid shall be deemed to have lapsed unless accepted within the time period specified in Paragraph 11 of Form A: Bid.

B15. WITHDRAWAL OF BIDS

B15.1 A Bidder may withdraw his/her Bid without penalty by giving written notice to the Manager of Materials at any time prior to the Submission Deadline.

B15.2 Notwithstanding C23.3, the time and date of receipt of any notice withdrawing a Bid shall be the time and date of receipt as determined by the Manager of Materials.

B15.3 The City will assume that any one of the contact persons named in Paragraph 3 of Form A: Bid or the Bidder's authorized representatives named in Paragraph 12 of Form A: Bid, and only such person, has authority to give notice of withdrawal.

B15.4 If a Bidder gives notice of withdrawal prior to the Submission Deadline, the Manager of Materials will:

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

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

(c) if the notice has been given by any one of the persons specified in B15.4(a), declare the Bid withdrawn.

B15.5 A Bidder who withdraws his/her Bid after the Submission Deadline but before his/her Bid has been released or has lapsed as provided for in B14.2 shall be liable for such damages as are imposed upon the Bidder by law and subject to such sanctions as the Chief Administrative Officer considers appropriate in the circumstances. The City, in such event, shall be entitled to all rights and remedies available to it at law, including the right to retain the Bidder's bid security.

B16. EVALUATION OF BIDS

B16.1 Award of the Contract shall be based on the following bid evaluation criteria:

(a) compliance by the Bidder with the requirements of the Bid Opportunity, or acceptable deviation there from (pass/fail);

(b) qualifications of the Bidder and the Subcontractors, if any, pursuant to B11 (pass/fail);

(c) Total Bid Price;

(d) economic analysis of any approved alternative pursuant to B7.

B16.2 Further to B16.1(a), the Award Authority may reject a Bid as being non-responsive if the Bid is incomplete, obscure or conditional, or contains additions, deletions, alterations or other irregularities. The Award Authority may reject all or any part of any Bid, or waive technical requirements or minor informalities or irregularities, if the interests of the City so require.

B16.3 Further to B16.1(b), the Award Authority shall reject any Bid submitted by a Bidder who does not demonstrate, in his/her Bid or in other information required to be submitted, that he/she is responsible and qualified.

B16.4 Further to B17.1(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 adjusted, if necessary, as follows:

(a) if the lowest evaluated responsive Bid submitted by a responsible and qualified Bidder is within the budgetary provision for the Work, no adjustment will be made to the Total Bid Price; or

(b) if the lowest evaluated responsive Bid submitted by a responsible and qualified Bidder exceeds the budgetary provision for the Work, the Total Bid Prices of all responsive Bids submitted by responsible and qualified Bidders will be adjusted by progressively deducting Part C – GWWD Mile 41.3 Railway Bridge Repair and Part B – GWWD Mile 22.15 Railway Bridge Replacement in the order listed, until a Total Bid Price within the budgetary provision is achieved.

(c) Further to B17.1(a), in the event that a unit price is not provided on Form B: Prices, the City will determine the unit price by dividing the Amount (extended price) by the approximate quantity, for the purposes of evaluation and payment.

B17. AWARD OF CONTRACT

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

B17.2 The City will have no obligation to award a Contract to a Bidder, even though one or all of the Bidders are determined to be responsible and qualified, and the Bids are determined to be responsive.

B17.3 Without limiting the generality of B17.2, the City will have no obligation to award a Contract where:

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

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

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

(d) only one Bid is received; or

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

B17.4 Where an award of Contract is made by the City, the award shall be made to the responsible and qualified Bidder submitting the lowest evaluated responsive Bid, in accordance with B16.

B17.5 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.

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) The removal and replacement of a GWWD Mile 77.6 Railway Bridge over the Boggy River, and all related track work and site work as described in D2.2.

(b) The removal and replacement of a GWWD Mile 22.15 Railway Bridge over Cooks Creek, and All related track work and site work as described in D2.2.

(c) The repair of the timber bridge of GWWD Mile 41.3 Railway Bridge over the Brokenhead River.

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

(a) Mile 22.15

(i) Demolition and removal of existing timber bridge;
(ii) Supply and Installation of driven steel H-piles at the abutments and wingwalls;
(iii) Construction of two (2) cast-in-place concrete abutments and cast-in-place concrete wingwalls;
(iv) Supply and installation of bridge bearings
(v) Fabrication of the steel through plate girder superstructure;
(vi) Transportation and installation of the steel through plate girder superstructure;
(vii) Construction, lining, and surfacing new track on bridge approaches;
(viii) Construction and lining of new track on bridge;
(ix) Grading bridge embankments; and
(x) Site work and rip-rap installation.

(b) Mile 41.3

(i) Supply and Installation of driven steel H-piles at the wingwalls;
(ii) Supply and replace timber struts

(c) Mile 77.6

(i) Demolition and removal of existing timber bridge;
(ii) Supply and Installation of driven steel H-piles at the abutments and wingwalls;
(iii) Construction of two (2) cast-in-place concrete abutments and cast-in-place concrete wingwalls;
(iv) Supply and installation of bridge bearings
(v) Fabrication of the steel through plate girder superstructure;
(vi) Transportation and installation of the steel through plate girder superstructure;
(vii) Construction, lining, and surfacing new track on bridge approaches;
(viii) Construction and lining of new track on bridge;
(ix) Grading bridge embankments; and
(x) Site work and rip-rap installation.

D3. ACCESS TO MILE 77.6 SITE

D3.1 Access to Site

(a) To access the west side of the Boggy River, there are four options available and are as follows:

(i) The Contractor may construct a temporary span across the Boggy River north of the existing structure, south of the access limits restriction.

(ii) The Contractor may drive equipment down the rail line from Mile 73.7 McMunn Manitoba. To drive equipment down the rail line from Mile 73.7, the existing TPG at Mile 73.7 will need to be crossed.

(iii) The Contractor may use the rail line to ship equipment to site. The equipment would be loaded at McMunn on the GWWD flatbed railcar. Information on the GWWD flatbed railcar is located in Appendix B. The City of Winnipeg would provide shipping at the following rate structure:

- Traincrew (2 people) and locomotive is $75/hr and $100/hr after 8 hours. Minimum required user time of 8 hours.
- Traincrew booked time starts at 598 Plinguet Road and ends upon crew returning to 598 Plinguet Road.
- Rolling stock flat cars are $25/day per car.

(b) Access to the west side could be from a path off of Trans Canada Highway, approximate 2 kms west of PR 308. The path extends south to the City of Winnipeg GWWD right of way. Vehicles and construction equipment would need to cross the aqueduct and therefore protection is required. The proposed aqueduct protection would need to be submitted for review prior to implementation. The proposed plan shall be presented in drawing and written document format sealed by a professional Engineer registered in the Province of Manitoba.

D3.2 The access options are illustrated on Drawing 3 of 13 from the contract drawings, Mile 77.6.

D3.3 The contractor must submit an access plan illustrating the access route to the west side for review by the Contract Administrator. The plan must be submitted to the Contract Administrator, 7 days prior to mobilizing on site.

D4. DEFINITIONS

D4.1 When used in this Bid Opportunity:

(a) "**GWWD**" means Greater Winnipeg Water District;

(b) "**TPG**" means Through Plate Girder;

(c) "**FCM**" means Fracture Critical Member;

(d) "**PM**" means Primary Member.

D5. CONTRACT ADMINISTRATOR

D5.1 The Contract Administrator is Stantec Consulting Ltd., represented by:

Mike Boissonneault, P.Eng.
Senior Associate, Project Manager
100-1355 Taylor Ave. Winnipeg MB

Telephone No. 204 488-5742
Mobile No. 204 799-7474
Email mike.boissonneault@stantec.com

D5.2 At the pre-construction meeting, Mike Boissonneault, P.Eng., will identify additional personnel representing the Contract Administrator and their respective roles and responsibilities for the Work.

D5.3 Bids Submissions must be submitted to the address in B8.9.

D6. CONTRACTOR'S SUPERVISOR

D6.1 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.

D7. OWNERSHIP OF INFORMATION, CONFIDENTIALITY AND NON DISCLOSURE

D7.1 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.

D7.2 The Contractor shall not make any public announcements or press releases regarding the Contract, without the prior written authorization of the Contract Administrator.

D7.3 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.

D7.4 A Contractor who violates any provision of D7 may be determined to be in breach of Contract.

D8. NOTICES

D8.1 Except as provided for in C0.1, 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.

D8.2 All notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications to the City, except as expressly otherwise required in D8.3, D8.4 or elsewhere in the Contract, shall be sent to the attention of the Contract Administrator at the facsimile number identified in D5.1.

D8.3 Notwithstanding D21., all notices of appeal to the Chief Administrative Officer shall be sent to the attention of the Chief Financial Officer at the following facsimile number:

The City of Winnipeg
Chief Financial Officer

Facsimile No.: 204 949-1174

D8.4 All notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications required to be submitted or returned to the City Solicitor shall be sent to the following facsimile number:

The City of Winnipeg
Legal Services Department
Attn: Director of Legal Services

Facsimile No.: 204 947-9155

D9. FURNISHING OF DOCUMENTS

D9.1 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

D10. AUTHORITY TO CARRY ON BUSINESS

D10.1 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.

D11. SAFE WORK PLAN

D11.1 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.

D11.2 The Safe Work Plan should be prepared and submitted in the format shown in the City's template which is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at http://www.winnipeg.ca/matmgt/Safety/default.stm

D11.3 Notwithstanding B11.4 at any time during the term of the Contract, the City may, at its sole discretion and acting reasonably, require an updated COR Certificate or Annual Letter of good Standing. A Contractor, who fails to provide a satisfactory COR Certificate or Annual Letter of good Standing, will not be permitted to continue to perform any Work.

D12. INSURANCE

D12.1 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 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) all risks course of construction insurance in the amount of one hundred percent (100%) of the total Contract Price, written in the name of the Contractor and The City of Winnipeg, at all times during the performance of the Work and until the date of Total Performance.

D12.2 Deductibles shall be borne by the Contractor.

D12.3 The Contractor shall provide the City Solicitor with a certificate(s) of insurance, in a form satisfactory to the City Solicitor, at least two (2) Business Days prior to the commencement of any Work but in no event later than the date specified in C4.1 for the return of the executed Contract.

D12.4 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.

D13. PERFORMANCE SECURITY

D13.1 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.

D13.2 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.

D13.3 The Contractor shall provide the City Solicitor with the required performance security within seven (7) Calendar Days of notification of the award of the Contract by way of letter of intent and prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 for the return of the executed Contract.

D14. SUBCONTRACTOR LIST

D14.1 The Contractor shall provide the Contract Administrator with a complete list of the Subcontractors whom the Contractor proposes to engage (Form J: Subcontractor List) at least two (2) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 for the return of the executed Contract.

D15. EQUIPMENT LIST

D15.1 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 least two (2) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 for the return of the executed Contract.

D16. DETAILED WORK SCHEDULE

D16.1 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 C4.1 for the return of the executed Contract.

D16.2 All dates and time periods in the detailed work schedule shall be consistent with Form F: Work Schedule provided in the Contractor's Bid except that:

(a) if the actual date that the letter of intent is issued is later than the assumed date indicated in B12, the Contractor may adjust fixed dates proposed on Form F: Work Schedule, by not more than the difference between the aforementioned assumed and actual dates;

D16.3 The detailed work schedule shall consist of the following:

(a) a critical path method (C.P.M.) schedule for the Work;

(b) a Gantt chart for the Work based on the C.P.M. schedule;

(c) a daily manpower schedule for the Work;

all acceptable to the Contract Administrator.

D16.4 Further to D16.3(a), the C.P.M. schedule shall clearly identify the start and completion dates of all of the following activities/tasks making up the Work as well as showing those activities/tasks on the critical path:

D16.5 Further to D16.3(b), the Gantt chart shall show the time on a weekly basis, required to carry out the Work of each trade, or specification division. The time shall be on the horizontal axis, and the type of trade shall be on the vertical axis.

D16.6 Further to D16.3(c), the daily manpower schedule shall list the daily number of individuals on the Site for each trade.
R3B 1L1

SCHEDULE OF WORK

D17. COMMENCEMENT

D17.1 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.

D17.2 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 D10;
  (ii) evidence of the workers compensation coverage specified in C6.15;
  (iii) the Safe Work Plan specified in D11;
  (iv) evidence of the insurance specified in D12;
  (v) the performance security specified in D13;
  (vi) the Subcontractor list specified in D14;
  (vii) the equipment list specified in D15; and
  (viii) the detailed work schedule specified in D16.

(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.

D17.3 The Contractor shall commence the Work on the Site within seven (7) Working Days of receipt of the letter of intent.

D17.3 The Contractor shall not commence the Work on the Site before May 24 2014.

D17.4 The City intends to award this Contract by May 19 2014.

D17.5 If the actual date of award is later than the intended date, the dates specified for Commencement, Critical Stages, Substantial Performance, and Total Performance will be adjusted by the difference between the aforementioned intended and actual dates.

D18. SUBSTANTIAL PERFORMANCE

D18.1 The Contractor shall achieve Substantial Performance by August 30 2014.

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

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

D18.4 Substantial Performance is defined as the completion of all concrete works, installation of structural steel, all track works, and all other construction activities. Remaining work shall only include site cleanup and final grading. Substantial Performance shall not be considered to have been achieved until the GWWD Railway line is restored to a fully operational condition.

D19. TOTAL PERFORMANCE

D19.1 The Contractor shall achieve Total Performance by September 10, 2014.

D19.2 When the Contractor or the Contract Administrator considers the Work to be totally performed, the Contractor shall arrange, attend and assist in the inspection of the Work with the Contract Administrator for purposes of verifying Total Performance. Any defects or deficiencies in the Work noted during that inspection shall be remedied by the Contractor at the earliest possible instance and the Contract Administrator notified so that the Work can be reinspected.

D19.3 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.

D20. LIQUIDATED DAMAGES

D20.1 If the Contractor fails to achieve Substantial Performance or Total Performance in accordance with the Contract by the days fixed herein for same, the Contractor shall pay the City the following amounts per Working Day for each and every Working Day following the days fixed herein for same during which such failure continues:

(a) Substantial Performance – Five Thousand dollars ($5,000);

(b) Total Performance – Five Hundred dollars ($500).

D20.2 The amounts specified for liquidated damages in D20.1 are based on a genuine pre-estimate of the City's losses in the event that the Contractor does not achieve Substantial Performance or Total Performance by the days fixed herein for same.

D20.3 The City may reduce any payment to the Contractor by the amount of any liquidated damages assessed.

CONTROL OF WORK

D21. JOB MEETINGS

D21.1 Regular weekly job meetings will be held at the Site. These meetings shall be attended by a minimum of one representative of the Contract Administrator, one representative of the City and one representative of the Contractor. Each representative shall be a responsible person capable of expressing the position of the Contract Administrator, the City and the Contractor respectively on any matter discussed at the meeting including the Work schedule and the need to make any revisions to the Work schedule. The progress of the Work will be reviewed at each of these meetings.

D21.2 The Contract Administrator reserves the right to cancel any job meeting or call additional job meetings whenever he/she deems it necessary.

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

D22.1 Further to D6, 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).

D23. THE WORKPLACE SAFETY AND HEALTH ACT (MANITOBA) – QUALIFICATIONS

D23.1 Further to B11.4, the Contractor/Subcontractor must, throughout the term of the Contract, have a Workplace Safety and Health Program meeting the requirements of The Workplace Safety and Health Act (Manitoba). At any time during the term of the Contract, the City may, at its sole discretion and acting reasonably, require updated proof of compliance, as set out in B11.4.

D24. AUTHORIZED WORK ON PRIVATE PROPERTY

D24.1 The Contractor shall confine his Works to the right-of-way or easements as much as possible. Where Work is required to be done on or accessed through private property, the Contractor shall obtain written permission from the property owner and provide a copy to the Contract Administrator.

D25. GWWD RAILWAY OPERATIONS

D25.1 The Contractor is advised that the GWWD Railway will not be in operation between the date that the Contractor commences work on the Site and the date of Substantial Performance identified in D18.

D25.2 Any work remaining after the date of Substantial Performance must be carried out without interfering with GWWD Railway operations. No work or the situating of vehicles or equipment closer than 4 m to the nearest rail on the GWWD main line is allowed without prior consent of the GWWD Railway.

MEASUREMENT AND PAYMENT

D26. INVOICES

D26.1 Further to D13, the Contractor shall submit an invoice for each portion of Work performed :

The City of Winnipeg
Corporate Finance - Accounts Payable
4th Floor, Administration Building, 510 Main Street
Winnipeg MB R3B 1B9

Facsimile No.: 204 949-0864
Email: CityWpgAP@winnipeg.ca

D26.2 Invoices must clearly indicate, as a minimum:

(a) the City's purchase order number;

(b) date of delivery;

(c) delivery address;

(d) type and quantity of work performed;

(e) the amount payable with GST and MRST shown as separate amounts; and

(f) the Contractor's GST registration number.

D26.3 The City will bear no responsibility for delays in approval of invoices which are improperly submitted.

D26.4 Bids Submissions must be submitted to the address in B8.9

D27. PAYMENT

D27.1 Further to D13, the City may at its option pay the Contractor by direct deposit to the Contractor's banking institution.

D28. WARRANTY

D28.1 Notwithstanding D19, the warranty period shall begin on the date of Total Performance and shall expire two (2) years thereafter unless extended pursuant to D19 or D19.3, in which case it shall expire when provided for thereunder.

D28.2 Notwithstanding D19 or D28.1, the Contract Administrator may permit the warranty period for a portion or portions of the Work to begin prior to the date of Total Performance if:

(a) a portion of the Work cannot be completed because of unseasonable weather or other conditions reasonably beyond the control of the Contractor but that portion does not prevent the balance of the Work from being put to its intended use.

D28.3 In such case, the date specified by the Contract Administrator for the warranty period to begin shall be substituted for the date specified in D13.1 for the warranty period to begin.

D28.4 At least two (2) weeks prior to the expiration of the Warranty Period, or upon correction of all outstanding defects and deficiencies, whichever is later, the Contractor shall arrange, attend, and assist in the acceptance inspection of the Work. The Contract Administrator shall, on being satisfied that all outstanding defects and deficiencies in the Work have been corrected, issue a Certificate of Acceptance for the Work to be dated not earlier that two (2) years after the date of the Certificate of Total Performance, or the date that the Contractor corrects the final defects and deficiencies, whichever is the later, thereby terminating the Warranty Period. The Certificate of Acceptance will indicate acceptance of the due performance of the Contract.

FORM H1: PERFORMANCE BOND
(See D13)

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. 177-2014

GWWD MILE 22.15 & 77.6 BRIDGE REPLACEMENTS AND MILE 41.3 BRIDGE REPAIR

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 D13)

_____
(Date)

The City of Winnipeg
Legal Services Department
185 King Street, 3rd Floor
Winnipeg MB R3B 1J1

RE: PERFORMANCE SECURITY - BID OPPORTUNITY NO. 177-2014

GWWD MILE 77.6 AND MILE 22.15 RAILWAY BRIDGE REPLACEMENTS AND MILE 41.3 BRIDGE REPAIR.

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

_____ ,
(Name of Contractor)

_____
(Address of Contractor)

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

_____

_____ Canadian dollars.

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

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

Partial drawings are permitted.

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

_____
(Address)

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

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

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

_____ .
(Date)

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

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

This credit is subject to the Uniform Customs and Practice for Documentary Credit (2007 Revision), International Chamber of Commerce Publication Number 600.

_____
(Name of bank or financial institution)

Per: _____
(Authorized Signing Officer)

Per: _____
(Authorized Signing Officer)

PART E - SPECIFICATIONS

E1. APPLICABLE SPECIFICATIONS AND DRAWINGS

E1.1 These Specifications shall apply to the Work.

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

E1.3 *The City of Winnipeg Standard Construction Specifications* is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at http://www.winnipeg.ca/matmgt/Spec/Default.stm

E1.4 The version in effect three (3) Business Days before the Submission Deadline shall apply.

E1.5 Further to C0.1, Specifications included in the Bid Opportunity shall govern over *The City of Winnipeg Standard Construction Specifications*.

E1.6 The following are applicable to the Work:

E1.7 The following City of Winnipeg Standard Construction Specifications are particularly referred to:

Specification No.	Specification Title
CW 1120	Existing Services, Utilities and Structures
CW 1130	Site Requirements
CW 3130	Supply and Installation of Geotextile Fabrics
CW 3170	Earthwork and Grading
CW 3540	Topsoil and Finish Grading for Establishment of Turf Areas
CW 3615	Riprap

GWWD Mile 22.15 Railway Bridge Replacement:

Consultant Drawing No.	City Drawing No.	Drawing Name/Title
G003	D-13422	Cover Sheet & Drawing Index
G004	D-13423	General Notes
S101	D-13424	Site Plan
S102	D-13425	Site Access Plan
S103	D-13426	General Arrangement
S104	D-13427	Abutment Concrete Plan & Details
S105	D-13428	Abutment Reinforcing Plan & Details
S106	D-13429	Steel Layout & Connection Details
S107	D-13430	Steel Connection Details
S108	D-13431	Steel Girder Details
S109	D-13432	Steel Beam Details
S110	D-13433	Steel Plate and Angle Details
S111	D-13434	Bill of Materials
T101	D-13435	Track Work Plan & Details
T102	D-13436	Track Plan & Profiles

GWWD Mile 77.6 Railway Bridge Replacement:

Consultant Drawing No.	City Drawing No.	Drawing Name/Title
G005	D-13437	Cover Sheet & Drawing Index
G006	D-13438	General Notes
S201	D-13439	Site Plan

S202	D-13440	Site Access Plan
S203	D-13441	General Arrangement
S204	D-13442	Abutment Concrete Plan & Details
S205	D-13443	Abutment Reinforcing Plan & Details
S206	D-13444	Steel Layout & Connection Details
S207	D-13445	Steel Connection Details
S208	D-13446	Steel Girder Details
S209	D-13447	Steel Beam Details
S210	D-13448	Steel Angle Details
S211	D-13449	Steel Plate Details
S212	D-13450	Bill of Materials
T201	D-13451	Track Work Plan & Details

APPENDIX

APPENDIX A: AMEC EARTH AND ENVIRONMENTAL GEOTECHNICAL REPORT

APPENDIX B: GWWD RAIL TRANSPORTATION INFORMATION

APPENDIX C: REGULATORY BODY APPLICATIONS AND APPROVALS

APPENDIX D: MILE 41.3 SKETCH

E2. SOILS INVESTIGATION REPORT

E2.1 Further to C3.1, the following geotechnical reports are available for viewing at the office of the Contract Administrator;

(a) Agra Earth and Environmental (Now AMEC)
Geotechnical Investigation
Proposed GWWD Railway Bridge
Greater Winnipeg Water District
East Braintree, Manitoba
December 1995

(b) AMEC Earth and Environmental
Geotechnical Evaluation
Proposed GWWD Bridge
East Braintree, Manitoba
October 2006

(c) AMEC Environmental & Infrastructure
Draft Report Geotechnical Investigation
Greater Winnipeg Water District
Railway Bridge Mile 22.15
RM of Springfield, Manitoba
5 February 2014

(d) AMEC Environmental & Infrastructure
Draft Report Geotechnical Investigation
Greater Winnipeg Water District
Railway Bridge Mile 41.3
RM of Springfield, Manitoba
5 February 2014

E2.2 The soils information presented in the Geotechnical Reports and shown on the Drawings is primarily for design purposes and the City does not guarantee the information is free from errors or discrepancies.

E2.3 Further to C3.1, the Contractor shall make his own investigation as to the soil conditions which will be encountered in the Work. The City assumes no responsibility for failure or neglect on the part of the Contractor to determine the working conditions at the site.

E2.4 No test hole shall be drilled without the approval of the Contract Administrator.

E3. ENVIRONMENTAL PROTECTION PLAN

E3.1 The Contractor will plan and implement the Work of this Contract strictly in accordance with the requirements of this Environmental Protection Plan as herein specified.

E3.2 The Contractor is to strictly adhere to all Regulatory Approvals and Letters of Advice including DFO, Transport Canada, the City of Winnipeg Waterway Permit, and Manitoba Conservation. The documents available at the time of tender are presented in Appendix A and B for DFO and Transport Canada Navigable Waters, respectively.

E3.3 Transport Canada Navigable Waters approvals are expected prior to the close of the Bid Opportunity and will be provided to the Contractor upon receipt.

E3.4 The Contractor shall submit an Environmental Protection Plan which shall outline all environmental protection works to be utilized to complete the Works. This plan shall be submitted to the Contract Administrator at least seven (7) days prior to the commencement of any on Site work. This plan is to include such items as the location of stock piles for materials, refuelling of machinery and all items required by this Specification and the Regulatory Agencies.

E3.5 The Contractor is advised that at a minimum the following Acts, Regulations and By-laws apply to the Work and are available for viewing online at the applicable websites (www.canlii.ca and/or http://www.winnipeg.ca/CLKDMIS/) or at the office of the Contract Administrator.

E3.6 Federal

(a) Canadian Environmental Assessment Act (CEAA), c.37;

(b) Canadian Environmental Protection Act;

(c) Fisheries Act, c. F-14;

(d) Transportation of Dangerous Goods Act and Regulations, c. 34;

(e) Migratory Birds Convention Act and Regulations, c. 22;

(f) Species at Risk Act, c. 29;

(g) And any other applicable Acts, Regulations and By-laws;

(h) Applicable Fisheries and Oceans Canada Operational Statements for Manitoba for temporary stream crossings;

(i) The Department of Fisheries and Oceans Freshwater Intake End-of-Pipe Fish Screen Guidelines, DFO 1995;

(j) Fisheries and Oceans Policy for the Management of Fish Habitat 1986;

(k) Federal Policy on Wetland Conservation 1991;

(l) Transportation Association of Canada's Transportation Association of Canada National Guide to Erosion and Sediment Control on Roadway Projects, 2005.

E3.7 Provincial

(a) The Dangerous Goods Handling and Transportation Act, D12;

(b) The Endangered Species Act, c. E111;

(c) The Heritage Resources Act, c. H39.1;

(d) The Noxious Weeds Act, c. N110;

(e) The Nuisance Act, c. N120;

(f) The Public Health Act, c. P210;

(g) The Water Protection Act, c. W65;

(h) Workplace Safety and Health Act, c. W210;

(i) And current applicable associated regulations;

(j) And any other applicable Acts, Regulations, and By-laws;

(k) The *Manitoba Stream Crossing Guidelines for the Protection of Fish and Fish Habitat*, Manitoba Natural Resources and DFO, 1996.

E3.8 Municipal

(a) The City of Winnipeg Neighbourhood Liveability By-law No. 1/2008;

(b) The City of Winnipeg Traffic By-law No. 1573/77 and all amendments up to and including 55/2011;

(c) And any other applicable Acts, Regulations and By-laws.

(d) *City of Winnipeg Best Management Practices Handbook for Activities In and Around the City's Waterways and Watercourses,* City of Winnipeg, 2005

(e) *City of Winnipeg Motor Vehicle Noise Policies and Guidelines*

(f) Materials Handling and Storage

(i) Storage of construction materials and equipment will be confined within a fenced area or at a location approved by the Contract Administrator with environmental protection (e.g. silt fence) as appropriate.

(ii) Construction materials will not be deposited or stored on or near watercourses unless written acceptance from the Contract Administrator is received in advance.

(iii) Construction materials and debris will be tied down or secured if severe weather and high wind velocities are forecasted. Work shall be suspended during extreme high wind conditions.

(iv) Construction materials and debris will be prevented from entering watercourses. In the event that materials and/or debris inadvertently enter the land drainage system, the Contractor will be required to remove the material to an appropriate landfill or storage facility and restore the watercourse to its original condition.

(g) Fuel Handling and Storage

(i) The Contractor will obtain all necessary permits from Manitoba Conservation for the handling and storage of fuel products and shall provide copies to the Contract Administrator.

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

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

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

(v) Products transferred from the fuel storage area(s) to specific Work sites will not exceed the daily usage requirement.

(vi) When servicing requires the drainage or pumping of fuels, lubricating oils or other fluids from equipment, a groundsheet of suitable material (such as HDPE) and size will be spread on the ground to catch the fluid in the event of a leak or spill.

(vii) Wash, refuel and service machinery and store fuel and other materials for the machinery 100 m away from watercourses to prevent deleterious substances from entering the water.

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

(ix) The deposit of deleterious substances into water frequented by fish is prohibited under the Fisheries Act. The Contractor will take appropriate precautions to ensure that potentially deleterious substances (such as fuel, hydraulic fluids, oil, sediment, etc.) do not enter any water body.

(x) Machinery is to arrive on Site in a clean condition and is to be maintained free of fluid leaks.

(xi) A sufficient supply of materials, such as absorbent material and plastic oil booms, to clean up minor spills will be stored nearby on Site. The Contractor will ensure that additional material can be made available on short notice. Additionally, appropriate staff on site will be trained in proper handling of deleterious liquids (i.e. fueling) and trained on how to prevent and clean-up minor spills.

(h) Waste Handling and Disposal

(i) The construction area will be kept clean and orderly at all times and at the completion of construction.

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

(iii) The Contractor will, during and at the completion of construction, clean up the construction area and all resulting debris shall be deposited at a Waste Disposal Ground operating under the authority of Waste Disposal Grounds Regulation, Manitoba Regulation 150/91. Exceptions are liquid industrial and hazardous wastes which require special disposal methods.

(iv) On Site volumes of sewage and/or septage will be removed on a weekly basis.

(v) The Contractor will ensure sewage, septage and other liquid wastes generated on Site are handled and disposed of by a certified disposal contractor.

(vi) Indiscriminate dumping, littering, or abandonment will not take place.

(vii) No burning of waste or other materials is permitted.

(viii) The Contractor will use structurally suitable Site excavation material as fill within the project. Should excavated material exceed fill needs, the remainder would be stockpiled for use on other local projects.

(ix) Structurally unsuitable site excavation material will be removed by the Contractor.

(x) Waste storage areas will not be located so as to block natural drainage.

(xi) Runoff from a waste storage area will not be allowed to cause siltation of a watercourse.

(xii) Waste storage areas will be left in a neat and finished appearance and/or restored to their original condition to the satisfaction of the Contract Administrator.

(xiii) Equipment will not be cleaned near watercourses; contaminated water from onshore cleaning operations will not be permitted to enter watercourses.

(xiv) The Contractor will notify and receive written approval from the Contract Administrator prior to discharge from any dewatered areas. The discharge will be released into a well-vegetated area, filter bag, settling basin, or storm sewer system to remove suspended material and other deleterious substances from the discharge before it finds its way into any watercourse. Discharge from dewatering areas may require disposal via the sanitary sewer system or disposal truck in accordance with Construction Specifications, at the request of the Contract Administrator.

(xv) Flows will be dissipated so that dewatering discharges minimize erosion at the discharge point.

(i) Dangerous Goods/Hazardous Waste Handling and Disposal

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

(ii) The Contractor will be familiar with The Dangerous Goods Handling and Transportation Act and Regulations.

(iii) The Contractor will have on Site staff that is trained and certified in the handling of the dangerous/hazardous goods, when said dangerous/hazardous goods are being utilized on Site for the performance of the Work.

(iv) Different waste streams will not be mixed.

(v) Disposal of dangerous goods/hazardous wastes will be at approved hazardous waste facilities.

(vi) Liquid hydrocarbons will not be stored or disposed of in earthen pits on Site.

(vii) Used oils will be stored in appropriate drums, or tankage until shipment to waste oil recycling centres, incinerators, or secure disposal facilities approved for such wastes.

(viii) Used oil filters will be drained, placed in suitable storage containers, and buried or incinerated at approved hazardous waste treatment and disposal facilities.

(ix) Dangerous goods/hazardous waste storage areas will be located at least 100 m away from the high water line and be dyked.

(x) Dangerous goods/hazardous waste storage areas will not be located so as to block natural drainage.

(xi) Runoff from a dangerous goods/hazardous waste storage area will not be allowed to cause siltation of a watercourse.

(xii) Dangerous goods/hazardous waste storage areas will be left in a neat and finished appearance and/or restored to their original condition to the satisfaction of the Contract Administrator.

(j) Emergency Response

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

(ii) The Contractor will report all major spills of petroleum products or other hazardous substances with significant impact on the environment and threat to human health and safety (as defined in Table E3-1 below) to Manitoba Conservation, immediately after occurrence of the environmental accident, by calling the 24-hour emergency phone number (204) 945-4888.

(iii) The Contractor will designate a qualified supervisor as the on Site emergency response coordinator for the project. The emergency response coordinator will have the authority to redirect manpower in order to respond in the event of a spill.

(iv) The following actions will be taken by the person in charge of the spilled material or the first person(s) arriving at the scene of a hazardous material accident or the on Site emergency response coordinator.

- Notify emergency-response coordinator of the accident:
  - ♦ Identify exact location and time of the accident.
  - ♦ Indicate injuries, if any.
  - ♦ Request assistance as required by magnitude of accident [Manitoba Conservation 24-hour Spill Response Line (204) 945-4888, Police, Fire Department, Ambulance, company backup].
- Attend to public safety:
  - ♦ Stop traffic, roadblock/cordon off the immediate danger area.
  - ♦ Eliminate ignition sources.
  - ♦ Initiate evacuation procedures if necessary.
- Assess situation and gather information on the status of the situation, noting:
  - ♦ Personnel on Site.
  - ♦ Cause and effect of spill.
  - ♦ Estimated extent of damage.
  - ♦ Amount and type of material involved.
  - ♦ Proximity to waterways, sewers and manholes.
- If safe to do so, try to stop the dispersion or flow of spill material:
  - ♦ Approach from upwind.
  - ♦ Stop or reduce leak if safe to do so.

- ♦ Dyke spill material with dry, inert absorbent material or dry clay soil or sand.
- ♦ Prevent spill material from entering waterways and utilities by dyking.
- ♦ Prevent spill material from entering manholes and other openings by covering with rubber spill mats or dyking.

- Resume any effective action to contain, clean up, or stop the flow of the spilled product.
- The emergency response coordinator will ensure that all environmental accidents involving contaminants shall be documented and reported to Manitoba Conservation according to The Dangerous Goods Handling and Transportation Act Environmental Accident Reports Regulation 439/87.
- When dangerous goods are used on Site, materials for containment and cleanup of spill material (e.g., absorbent materials, plastic oil booms, and oversized recovery drums) shall be available on Site.
- Minor spills of such substances that may be contained on land with no significant impact on the environment may be responded to with in-house resources without formal notification to Manitoba Conservation.
- City emergency response, 9-1-1, shall be used if other means are not available.

Table E3.1 - Environmental Accident Reporting
Reportable Quantities of Spills that must be Reported to Manitoba Conservation [(204) 944-4888]

Classification	Hazard	Reportable Quantity or Level
1	Explosives	All
2.1	Compressed Gas (Flammable)	100 L*
2.2	Compressed Gas	100 L*
2.3	Compressed Gas (Toxic)	All
2.4	Compressed Gas (Corrosive)	All
3	Flammable Liquids	100 L
4	Flammable Solids	1 Kg
5.1 Packing Groups I and II	Oxidizer	1 Kg or 50 L
Packing Group III	Oxidizer	5 Kg or 50 L
5.2	Organic Peroxide	1 Kg or 1 L
6.1 Packing Group I	Acute Toxic	1 Kg or 1 L
Packing Groups II and III	Acute Toxic	5 Kg or 5 L
6.2	Infectious	All
7	Radioactive	Any discharge or level exceeding 10 m Sv/h at the package surface and 200 uSv/h at 1 m from the package surface
8	Corrosive	5 Kg or 5 L
9.1	Miscellaneous (except PCB Mixtures)	50 Kg
9.1	PCB Mixtures	500 grams
9.2	Aquatic Toxic	1 Kg or 1 L
9.3	Wastes (Chronic Toxic)	5 Kg or 5 L

* Container Capacity (refers to container water capacity)
Source: *Environmental Accident Reporting Regulation M.R. 439/87*

(k) Noise and Vibration

(i) Noise generating activities will be limited to the hours indicated in the City of Winnipeg Neighbourhood Liveability By-law No. 1/2008. The activities will generally be restricted to 7:00 a.m. to 7:00 p.m. weekdays with written permission of the Contract Administrator and the City of Winnipeg for any after-hours or weekend work required for special cases. No extended or alternative working hours/dates will be permitted for pile driving activities.

(ii) The Contractor will be responsible for scheduling Work to avoid potential noise problems and/or employ noise reduction measures to reduce noise to acceptable limits. The Contractor will also demonstrate to the Contract Administrator that Works to be performed during the night-time period, on Sundays, and Holidays will not exceed the approved limit.

(l) Dust and Emissions

(i) Construction vehicles and machinery will be kept in good working order by the Contractor through the use of inspection and maintenance.

(ii) The Contractor will minimize construction equipment idling times and turn off machinery, when feasible.

(iii) Dust control practices implemented by the Contractor during construction will include regular street cleaning and dampening of construction access roads and Works areas with water or approved chemicals at an adequate frequency to prevent the creation of dust.

(iv) Only water or chemicals approved by the Contract Administrator will be used for dust control. The use of waste petroleum or petroleum by-products is not permitted.

(v) The Contractor will ensure that trucks which are used to haul excavated material and backfill material to and from the Work site utilize tarpaulin covers during transport to prevent material from falling onto the street and creating dust.

(vi) Stockpiled soils will be wetted down or covered with tarpaulin covers to prevent the creation of dust, when appropriate.

(m) Erosion Control

(i) The Contractor will develop a sediment control plan prior to beginning construction in adherence with the Transportation Association of Canada National Guide to Erosion and Sediment Control on Roadway Projects, 2005 and to the satisfaction of the Contract Administrator.

(ii) Sediment control will be applied to all in water works to prevent the release or re-suspension of sediments to the watercourse. A turbidity curtain will be used to contain sediments from coffer dam construction and riprap placement, if warranted. This turbidity curtain should isolate as small an area as possible to complete the works, and should be completely removed once turbidity within the isolated area has returned to background levels.

(iii) The Contractor will inspect all sediment control structures daily during heavy construction activity in the areas of the structures and after a heavy rainfall to ensure their continued integrity.

(iv) Exposure of soils along drain slopes will be kept to the minimum practical amount, acceptable to the Contract Administrator.

(v) Effective sediment and erosion control measures (e.g., straw mulch, erosion control blankets, interceptor ditches) will be used both during construction and until vegetation is re-established to prevent sediment-laden runoff from entering Sturgeon Creek, wetlands and other watercourses.

(vi) All areas disturbed during construction will be landscaped and revegetated with native and/or introduced plant species in order to restore and enhance the Site and protect against soil erosion unless otherwise indicated.

(vii) The disturbed surface will be revegetated as soon as possible and done so as to create a dense root system in order to defend against soil erosion on the right-of-way and any other disturbed areas susceptible to erosion.

(viii) The loss of topsoil and the creation of excessive dust by wind during construction will be prevented by the addition of temporary cover crop, water or tackifier, if conditions so warrant.

(ix) The Contractor will routinely inspect all erosion and sediment control structures and immediately carry out any necessary maintenance. Several inspections will be performed during rainy days.

(x) Construction activities will be avoided during periods of high winds to prevent erosion and the creation of dust.

(n) Runoff Control

(i) Measures will be undertaken to ensure that runoff containing suspended soil particles is minimized from entering the land drainage system to the extent possible to the satisfaction of the Contract Administrator.

(ii) Areas that are heavily disturbed and vulnerable to erosion or gullying will be dyked to redirect surface runoff around the area prior to spring runoff.

(iii) Construction activities on erodible slopes will be avoided during spring runoff and heavy rain falls.

(iv) Soil and fill will not be stockpiled on immediate watercourse bank areas.

(o) Fish

(i) The Contractor will adhere to all of the protection measures below to adhere to the DFO No Net Loss Policy for fish habitat.

(ii) Any fish trapped within the isolated area will be captured and returned to the watercourse unharmed. Fish includes fin fish, crayfish and mussels (clams).

(iii) A buffer of vegetation will be maintained when working along waterways, where possible.

(iv) The duration of work and amount of disturbance to the bed and banks of the water body will be minimized.

(v) Use only clean rock for riprap, and haul it in from an appropriate land-based source. Avoid using poor quality limestone that breaks down quickly when exposed to the elements or acid generating rocks typical from metal mines. All rock will be clean and free of fine materials and of appropriate size to resist displacement during high flow events.

(vi) The rock is placed such that it does not constrict the channel or change the hydraulics in a way that might damage the bed and/or banks of the watercourse or interfere with fish passage.

(vii) Where grading of stream banks is required they are sloped by pulling material back from the water's edge. Stabilize any waste materials removed from the work site, above the ordinary high water mark, to prevent them from entering any water body. Spoil piles could be contained with silt fence, flattened, covered with biodegradable mats or tarps, and/or planted with preferably native grass or shrubs.

(viii) Shoreline vegetation will be retained to the greatest extent possible to maximize the stability of the banks.

(ix) Operate machinery from outside of the water and in a manner that minimizes disturbance to the banks of the water body.

(x) The intake of any pumps used in surface waters will be screened to meet the Department of Fisheries and Oceans' Freshwater Intake End-of-Pipe Fish Screening Guidelines (1995) and water withdrawal rates will not exceed 10% of the instantaneous stream flow at the time.

(p) Wildlife

(i) No clearing of trees, shrubs or vegetation is permitted between May 1 and July 31st of any year to protect nesting and breeding season for migratory birds and other wildlife, unless otherwise identified by a Project Biologist.

(ii) No one will disturb, move or destroy migratory birds' nests.

(iii) If a nest is encountered, work will cease in the immediate area and the Contract Administrator will be contacted for further direction.

(iv) In the event that species at risk are encountered during the project construction, all work will cease in the immediate area, the site will be made safe and the Contract Administrator will be contacted.

(q) Wetlands

(i) The Contractor will implement the following environmental protection measures to prevent the new loss of wetland functions, in accordance with the Federal Policy on Wetland Conservation:

- The Contractor will clearly mark wetland limits near the construction footprint prior to commencement of the Work and will remain marked throughout the construction period.
- Wetlands will not be disturbed without written permission from the Contract Administrator.
- Should additional wetlands be encountered during construction, construction in that area will halt until the area is properly marked.
- Construction equipment will avoid the marked wetland areas as much as possible, where feasible.
- The Contractor will not discharge water into adjacent wetlands without written permission from the Contract Administrator, having confirmed the quality of the water to be discharged and the capacity of the receiving wetland.
- Any fish located within the wetlands to be disturbed by the project will be captured and returned to a nearby watercourse unharmed.

(r) Vegetation

(i) The Contractor will clearly mark the disturbance limit prior to commencement of the Work and will remain marked throughout the construction period.

(ii) Vegetation will not be disturbed without written permission from the Contract Administrator.

(iii) The Contractor will protect plants or trees which may be at risk of accidental damage. Such measures may include protective fencing or signage and will be approved in advance by the Contract Administrator.

(iv) The Contractor will limit the removal of trees and snags (standing dead trees); surface disturbance and vegetation clearing.

(v) Herbicides and pesticide will not be used adjacent to any surface watercourse.

(vi) Trees or shrubs will not be felled into watercourses.

(vii) Areas where vegetation is removed during clearing, construction decommissioning activities, will be revegetated as soon as possible in accordance with the landscaping plans forming part of the Contract, or as directed by the Contract Administrator.

(viii) Trees damaged during construction activities will be examined by bonded tree care professionals. Viable trees damaged during construction activities will be pruned according to good practices by bonded tree care professionals.

(ix) Damaged trees which are not viable will be replaced at the expense of the Contractor.

(s) Landscaping

(i) Construction waste (excluding common construction gravel, sand, etc.) will be removed to a minimum depth of 600mm below final grade in all areas that are to be backfilled with suitable material and re-vegetated in accordance with the City of Winnipeg Standard Construction Specifications.

(ii) Topsoil will be stripped prior to construction and salvaged for use during landscaping. Surplus topsoil will be properly stockpiled for use in other projects.

(iii) The Contractor will adhere to the landscaping plan for the maintenance of initial stages and development stages of the plant community.

(t) Heritage Resources

(i) If heritage material is located during the construction and soil removal process, all Work will cease and the Contractor will immediately contact the Contract Administrator. The Historic Resource Branch, Manitoba Culture, Heritage, Tourism and Sport or the Project Archaeologist, will be contacted by the

Contract Administrator to determine the nature and extent of the archaeological material and to arrange for its recovery. The archaeological remains will be recovered by salvage excavation upon authorization by the Contract Administrator, having consulted with the Historic Resources Branch, Manitoba Culture, Heritage, Tourism and Sport.

(ii) The Contractor will be prepared to continue his Work elsewhere on the project while the Archaeologist investigates the find and determines its heritage value.

(iii) The Contractor is advised that he may be denied access to such areas of the project until such time as a thorough archaeological investigation is conducted or the find is deemed to have no heritage value.

(iv) Construction and excavation work will not resume until the Contract Administrator, having consulted with the Historic Resources Branch, Manitoba Culture, Heritage, Tourism and Sport, or the Project Archaeologist, authorizes a resumption of Work.

(v) If human remains are uncovered during the construction and soil removal process, all Work will cease and the Heritage Resources Branch, Manitoba Culture, Heritage, Tourism and Sport will be contacted by the Contract Administrator. The Historic Resources Branch will contact the City of Winnipeg Police.

(vi) If the human remains are not considered forensic, (i.e., no foul play suspected), they will be removed by the Historic Resources Branch, Manitoba, Culture, Heritage, Tourism and Sport or the Project Archaeologist and turned over to the Province.

(vii) If the human remains are considered forensic, the City of Winnipeg Police will be responsible for their removal.

(viii) Additional information may be obtained by contacting: Archaeological Assessment Services, Historic Resources Branch.

(u) Construction Traffic

(i) Workforce parking will be limited to the areas designated for such as detailed in the Contract Documents, or as otherwise may be directed by the Contract Administrator.

(ii) Large equipment will be equipped with flashing beacons and/or an audible “back up” warning device that is audible when the transmission is in reverse.

(iii) The Contractor will adhere to the Standard Provisions of the Standard Construction Specifications, and of the Manual of Temporary Traffic Control in Work Areas on City Streets of the City of Winnipeg Public Works Department.

(iv) The Contractor’s laydown area, construction Site and access road will be fenced and gated to secure the Site and materials and to discourage pedestrian entrance to construction areas and to control any potential hazard to the public, particularly children.

(v) For circumstances where the Contract Administrator has accepted Site access of special equipment or material, the Contractor will provide adequate flagmen for traffic control in the vicinity of any public buildings.

(v) Access

(i) The Contractor will maintain access to affected residential properties.

(ii) The Contractor will provide or maintain general and off-street access to any affected business during construction.

E3.9 Measurement and Payment

(a) Environmental Protection Plan will be considered incidental to E4, “Site Work”. No measurement and payment will be made within this section.

E4. SITE WORK

E4.1 Description

E4.2 This Specification shall cover all operations relating to the mobilization and demobilization of the Contractor to the Site and all related site work components, as specified herein below.

E4.3 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 hereinafter specified.

E4.4 Scope of Work

(a) The Work under this Specification shall include but not be limited to:
  (i) Mobilizing and demobilizing on-site Work facilities;
  (ii) Supplying, setting up, laying out, and removing site office facilities as detailed in E5, “Site Office Facilities”;
  (iii) Maintaining and removing any access roadways
  (iv) Complying with all Environmental regulations.
  (v) Office facilities
  (vi) Restoring all Site facilities
  (vii) Insurances

E4.5 Materials

E4.6 The Contractor shall be responsible for the supply, safe storage and handling of all materials as set forth in this Specification. All materials to be handled in a careful and workmanlike manner, to the satisfaction of the Contract Administrator.

E4.7 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.

E4.8 The Contractor’s Site supervisor is required to carry, at all times, a cellular telephone, with voice mail and email capabilities (iPhone, BlackBerry).

E4.9 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.

E4.10 Equipment

(a) All equipment shall be of a type acceptable to the Contract Administrator and shall be kept in good working order.

E4.11 Construction Methods

E4.12 Layout of On-Site Work Facilities

(a) The Contractor shall mobilize all on-site Work and other temporary facilities.

(b) Possible locations for the Contractor’s staging are shown on the Drawings. The Contractor shall coordinate with relevant parties to make arrangements for use of these areas.

(c) Upon completion of construction activities, the Contractor shall remove all on-site Work and other temporary facilities.

E4.13 Access Roadway

(a) The Contractor shall maintain any access roadway they install.

(b) The access road shall be maintained on a regular basis to provide continual unrestricted site access, to the satisfaction of the Contract Administrator.

(c) Upon completion of the Work, the area shall be restored to its original condition. The Limits of Work Area will be reviewed at the Pre-Construction Meeting. If the Contractor requests a Change in the Limits of the Work Area, they shall do so formally in writing at least ten (10) business days prior to mobilization. The Contract Administrator will respond within five (5) business days with a response; the Contract Administrator has the right to dismiss the request.

E4.14 Restoration of Existing Facilities

(a) Upon completion of the Work and demobilization, the Contractor shall restore existing facilities.

E4.15 Quality Control

E4.16 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.

(b) The Contractor shall be wholly responsible for the control of all operations incidental thereto, notwithstanding any inspection or acceptance 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.

E4.17 Access

(a) The Contractor shall allow the Contract Administrator free access to all parts of the Work at all times. The Contractor shall supply samples to the Contract Administrator or his inspector for testing purposes as required. There will be no charge to the City for samples taken.

(b) The intent of the Limits of the Work Area is to preserve existing trees and vegetation by minimizing removals.

E4.18 Measurement and Payment

(a) Method of Measurement

(i) Site Work, as defined herein this specification, is a Lump Sum pay item. No measurement will be made for this work.

(b) Basis of Payment

(i) Site Work will be paid for at the Contract Lump Sum Price for “Site Work”, which price shall be payment in full for performing all operations herein described and all other items incidental to the Work included in this Specification and accepted by the Contract Administrator.

(ii) Site Work will be paid for at a percentage of the Contract Lump Sum Price, measured as specified herein. These percentages shall be as follows:

(iii) The payment breakdown is as follows:

- 30% when the Contract Administrator is satisfied that construction has commenced.
- 60% when Substantial Performance has been met.
- 10% upon completion of the project.

(iv) The pay items are as follows:

- Mile 77.6 – “Site Work”
- Mile 22.15 – “Site Work”

E5. SITE OFFICE FACILITIES

E5.1 Description

(a) This Specification shall cover all operations relating to the supply of site office facilities, as specified herein.

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

E5.2 Materials

(a) 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.

(b) 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.

E5.3 Equipment

(a) All equipment shall be of a type acceptable to the Contract Administrator and shall be kept in good working order.

E5.4 Construction Methods

E5.5 Site Office Facilities

(a) The Contractor shall supply the Contract Administrator's, at Mile 22.15 and Mile 77.6, site office facilities meeting the following requirements:

(i) Either a field office for the exclusive use of the Contract Administrator, or inspector, or a separate area within the contractors trailer for the exclusive use of the Contract Administrator and or inspection staff;

(ii) The office shall be conveniently located within the site lay-down area near the Work site;

(iii) The office shall be suitable for all weather use. It shall be equipped with suitable heating and air conditioning systems, so that the interior room temperature can be maintained between 20 to 22ºC at any outside ambient temperature;

(iv) The facility shall be adequately lighted with fluorescent fixtures, and have a minimum of two wall outlets;

(v) The facility shall be furnished with either a drafting table and stool or desk and office chair, and one legal size filing cabinet for exclusive use by the Contract Administrator

(vi) Phone/fax machine for use by the Contract Administrator which may be shared with the contractor, if MTS connection is possible;

(vii) Mini or full size fridge for use by the Contract Administrator which may be shared with the contractor;

(viii) Microwave for use by the Contract Administrator which may be shared with the contractor;

(ix) Water cooler for use by the Contract Administrator which may be shared with the contractor. An extra jug of water must be on site at all times;

(x) A portable toilet shall be located near the field office building. The toilet shall have a locking door and may be shared with the contractor;

(xi) The site office building and the portable toilet shall be cleaned on a weekly basis. The Contract Administrator may request additional cleaning when he deems it necessary;

(xii) A minimum of one parking stall shall be made available for use by the Contract Administrator immediately adjacent to the site office; and

(xiii) All site office facilities and furnishings shall be approved by the Contract Administrator;

(b) The Contractor shall be responsible for all installation and removal costs, all operating costs, and the general maintenance of the site office facilities.

(c) The site office facilities shall be provided from the date of the commencement of the Work to the date of Total Performance unless otherwise approved in writing by the Contract Administrator.

E5.6 Measurement and Payment

(a) The supply of site office facilities will be considered incidental to E4, "Site Work." No measurement and payment will be made within this section.

E6. PROTECTION OF EXISTING TREES

E6.1 The Contractor shall take the following precautionary steps to prevent damage from construction activities:

(a) All trees will have a 3m radius protective zone calculated from the circumference at the base of the trunk which will remain free of digging, trenching, grade changes, stock piling of materials and soil compaction, except as minimum to construct berm or swales throughout the duration of the Contract. Protective fencing around these areas is required.

(b) Trees within and immediately adjacent to proposed construction and those identified to be at risk by the Contract Administrator are to be strapped with 25 x 100 x 2400 mm wood planks, or suitably protected as approved by the Contract Administrator. Do not use nails or other fasteners that penetrate the tree trunk. The width and length of strapping may be reduced to suit the tree being 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) where 1 inch diameter equals 1 foot measured from the outside edge of the trunk of the tree at 6 inches above grade. Where roots must be cut to facilitate excavation, they shall be pruned neatly at the face of excavation. They must be properly trimmed with sharp tools to prevent crushing or being pulled by construction equipment. No paint is required. All exposed roots must be mulched until the excavated area is filled with clean earth to avoid exposure to sunlight and desiccation.

(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.

(f) Repair, replace and maintain tree protection materials during construction until the Project completion.

(g) Carefully remove safety fencing and strapping material without harming the tree as soon as the construction and restoration Work is complete.

E6.2 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 designate.

E6.3 Measurement and Payment

(a) Protection of existing trees will be considered incidental to E4, "Site Work." No measurement and payment will be made within this section.

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. BRIDGE DEMOLITION

E8.1 Description

(a) This Specification shall cover all operations related to the demolition and removal of the existing bridge.

(b) The Work to be done by the Contractor under this Specification shall include the furnishings of all superintendence, overhead, labour, materials, equipment, tools, supplies, and all things necessary for and incidental to the satisfactory performance and completion of all work as hereinafter specified.

E8.2 Scope of Work

(a) The Work under this Specification shall involve the following:

(i) Removal of all existing components of the existing bridge;

(ii) Piles are to be removed completely or to a minimum of 600mm below the existing grade. In addition the requirements of E3, “Environmental Protection Plan” shall be strictly adhered to and shall govern;

(iii) All material from the demolished bridge shall be removed from Site by the Contractor in accordance with the Contractor’s Environmental Protection Plan; and

(iv) Excavation or any other works beyond the limits shown on the Drawings to facilitate the demolition of the existing bridge.

E8.3 Materials

(a) General

(i) The Contractor shall be responsible for design and construction works related to the demolition and removal of the existing bridges and is subject to the approval of the Contract Administrator.

E8.4 Submittals

(a) The Contractor shall prepare a demolition plan. The plan shall include the design and drawings, Sealed by an Engineer Registered in the Province of Manitoba, the sequence and methods to be used to demolish and remove the existing bridges. The demolition plan shall be in strict accordance with the Regulatory Approvals and Letters of Advice and E3, “Environmental Protection Plan.”

(b) The demolition plan shall indicate the sequence, machinery, methods and proposed access to accomplish the demolition of the existing bridges.

(c) The demolition plan shall be submitted a minimum of 14 days prior to the commencement of the demolition of either existing bridge.

E8.5 Measurement and Payment

(a) Method of Measurement

(i) Bridge Demolition, as defined in this Specification, is a Lump Sum pay item. No measurement will be made for this item of work.

(b) Basis of Payment

(i) Bridge Demolition will be paid for at the Contract Lump Sum Price for “Bridge Demolition”, which price shall be payment in full for performing all operations herein described and all other items incidental to the Work included in this Specification and accepted by the Contract Administrator.

(ii) Demolition of the existing bridges will be paid for at a percentage of the Contract Lump Sum Price for "Bridge Demolition" specified as follows:

(iii) 100% of this pay item will be paid upon the completion of the demolition of the bridge.

(iv) The pay items are as follows:

- Mile 77.6 – "Demolition and Removal of Existing Bridge"
- Mile 22.15 – "Demolition and Removal of Existing Bridge"

E9. STRUCTURAL EXCAVATION

E9.1 Description

(a) This Specification shall cover all operations related to excavation for the abutments and wingwalls.

(b) The work to be done by the Contractor under this Specification shall include the furnishings of all superintendence, overhead, labour, materials, equipment, tools, supplies, and all things necessary for and incidental to the satisfactory performance and completion of all work as hereinafter specified.

E9.2 Materials

(a) General

(i) Excavated material shall be unclassified excavation and shall include excavation and satisfactory disposal of all soil, rock, concrete, asphalt, wood piles, bridge timber, rubbish and all other material of whatever character which may be encountered, to the satisfaction of the Contract Administrator.

(ii) The Contractor shall be responsible for the excavation, stockpiling and removal of all materials as set forth in this Specification. Materials to be stockpiled shall be handled in careful and workmanlike manner, to the satisfaction of the Contract Administrator.

(iii) The Contractor shall be responsible for design, construction and removal of any temporary shoring deemed necessary by the Contractor to ensure the safety of the workers.

(b) Excavation

(i) Excavated material shall include the excavation and satisfactory disposal of all surplus concrete pavement, asphalt pavement, ballast, earth, gravel, sand, clay, silt and all other material of whatever character which may be encountered.

E9.3 Equipment

(a) All equipment shall be of a type acceptable to the Contract Administrator and shall be kept in good working order.

E9.4 Construction Methods

(a) Scope of Work

(i) Excavation: The excavation of material to a depth as shown on the Drawings for the abutments.

(ii) The limits for structural excavation works are as shown on the Drawings. The Contractor shall include construction access for all excavation works as the limits shown on the Drawings to not specifically include construction access requirements.

(iii) Off-site disposal of all excavated materials.

(iv) Dewatering and or precipitation removal of the excavations as may be required for construction of the structure in the dry.

E9.5 Survey Monuments

(a) The Contractor shall avoid damaging survey monument and shall take all necessary precautions to protect the same. The Contract Administrator at the sole expense of the Contractor will rectify any damage to the survey monuments.

E9.6 Measurement and Payment

(a) Method of Measurement

(i) Structural Excavation as defined in this Specification, is a Lump Sum pay item. No measurement will be made for this Work.

(b) Basis of Payment

(i) Structural Excavation will be paid for at the Contract Lump Sum Price for "Structural Excavation", which price shall be payment in full for performing all operations herein described and all other items incidental to the Work included in this Specification and accepted by the Contract Administrator. The pay items are as follows:

- Mile 77.6 – "Structural Excavation"
- Mile 22.15 – "Structural Excavation"

E10. BACKFILL

E10.1 Description

(a) This Specification shall cover all operations related to backfill work as herein specified and in the latest versions of City of Winnipeg Standard Construction Specifications CW 3170, and as shown on the Drawings.

(b) This Specification shall cover structural backfill behind abutments and wingwalls to the limits shown on the Drawings.

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

E10.2 Referenced Specifications and Drawings

(a) The latest version of the City of Winnipeg Standard Construction Specifications

(i) CW 3170 – Earthwork and Grading.

E10.3 Scope of Work

(a) The Work under this Specification shall involve Supplying and placing of backfilling suitable excavated site material and granular backfill at the abutments.

(b) The approximate limits of backfill are as shown on the Drawings.

E10.4 Submittals

(a) The Contractor shall submit to the Contract Administrator for review and approval, at least ten (10) Business Days prior to the commencement of any scheduled Work on the Site, a proposed schedule, including methods and sequence of operations.

E10.5 Materials

(a) General

(i) All materials supplied under this Specification shall be of type approved by the Contract Administrator, and shall be subject to inspection and testing by the Contract Administrator.

(ii) 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.

E10.6 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.

(b) 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.

(c) All material shall be accepted 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, so not conform to the Specification detailed herein, or are found to be defective in manufacture, or have become damaged in transit, storage or handling operation, then such material shall be rejected by the Contract Administrator and replaced by the Contractor at his own expense.

E10.7 Granular Backfill Material

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

(i) Not more than 50% shall pass the 4.75 mm sieve, and not more than 15% shall pass the 0.075 mm sieve.

(ii) The gravel shall be uniformly graded from coarse to fine and the maximum particles shall not exceed 150 mm in diameter.

E10.8 Suitable Site Backfill

(a) Suitable site material for backfill shall be clean clay, free of silt, organic matter, frost heaving clays and rubbish and may consist of material excavated on site or imported.

(b) Suitable site backfill material shall be approved by the Contract Administrator prior to placing.

E10.9 Geotextile Fabric

(a) The non-woven geotextile shall conform to:

(i) Mass 240 g/m2 min in accordance with ASTM D5261

(ii) Grab Tensile Strength 60 N min in accordance with ASTM D 4632

(iii) Mullen Burst Strength 2000 kPa min in accordance with ASTM D3786

(iv) The non-woven geotextile shall be Armtec 250 supplied by Armtec Construction Products and Century Petroleum Construction, Geotex 701 supplied by Specialty Construction or ProPex 4552 supplied by Brock White Company Canada or equal in accordance with B7 as accepted by the Contract Administrator.

E10.10 Equipment

(a) All equipment shall be of a type acceptable to the Contract Administrator and shall be kept in good working order.

E10.11 Construction Methods

(a) Backfilling

(i) All materials shall be accepted 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 Specification detailed herein, or are found to be defective in manufacture, or have become damaged in transit, storage, or handling operations, then such material shall be rejected by the Contract Administrator and replaced by the Contractor at his own expense.

(ii) Any backfill material that does not meet the gradation and/or compaction requirements of this Specification shall be removed and replaced by the Contractor at his own expense, to the satisfaction of the Contract Administrator.

(iii) Backfill materials shall be free of frozen lumps and shall be placed and compacted in an unfrozen state. Backfill shall not be placed on frozen subsoil.

(b) Geotextile Fabric

(i) Install geotextile fabric under all backfill material.

(ii) Unroll geotextile fabric as smooth as possible.

(iii) Install the geotextile fabric in the longest continuous practical length, free from tension, stress, folds, wrinkles and creases.

(iv) Install geotextile fabric in accordance with this Specification and procedures recommended by the manufacturer.

(v) Overlap joint a minimum of 600 millimetres and as indicated on the Drawings.

(vi) Install pins as required to hold geotextile fabric in place.

(vii) Cut or fold geotextile fabric to conform to curves.

(viii) Construction vehicles shall not be permitted directly on the geotextile fabric.

(ix) Remove or replace geotextile fabric improperly installed or damaged as directed by the Contract Administrator.

(c) Backfill Operations

(i) The Contract Administrator shall be notified at one (1) working day in advance of any backfilling operation. No backfill shall be placed against any concrete until approved by the Contract Administrator and in no case before the curing requirements of E14 “Structural Concrete” are met.

(ii) The geotextile fabric shall be placed prior to any backfilling operations.

(iii) The abutments shall be backfilled with backfill materials described below to the grade line as shown on the Drawings. Backfill materials shall be free of frozen lumps and shall be placed and compacted in an unfrozen state. Backfill shall not be placed on frozen subsoil.

(iv) The Contractor shall be required to provide necessary water or equipment during compaction of backfill material to achieve the required densities.

(v) The Contractor shall place backfill material in 150 mm lifts and shall compact each lift. The backfill shall be compacted to 100% Standard Proctor.

(d) Embankment Slope Backfill

(i) Backfill the embankment slopes where required producing the embankment grades shown on the Drawings. Use suitable Site backfill or clay backfill compacted to a minimum of 98% Maximum Standard Proctor Density.

(e) Erosion Control

(i) The Contractor shall perform the following erosion control works:

- Exposure of soils along river/creek slopes shall be kept to a minimum practical amount, acceptable to the Contract Administrator.
- Areas that are heavily disturbed and vulnerable to erosion or gullying shall be diked to redirect runoff around the area prior to spring runoff.
- 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 E11, “Silt Fence Barrier.” Erosion control blankets shall be supplied, placed, measured and paid for as per E12, “Erosion Control Blanket (ECB).” 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.
- 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.

- Within the limits of construction and where slopes are bare and erodible, the surface water runoff into the creek is to be intercepted by cut-off trenches constructed near the creek's edge to reduce the deposition of sediments in the creek.
- All erosion control necessary due to runoff from the roadway/sidewalk and embankment areas.

E10.12 Quality Control

(a) Inspection

(i) 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 operation 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 acceptance that may have previously been given. The Contract Administrator reserves the right to reject any materials or works, which are not in accordance with requirements of this Specification.

(b) Materials

(i) All material supplied and placed under this Specification shall be subject to testing and acceptance by the Contract Administrator in accordance with E10.5 and E10.7 of this Specification.

(c) Quality of Backfill Material

(i) The Standard Proctor Density for granular backfill material shall be determined at the optimum moisture content in accordance with standard laboratory Proctor Compaction Test Procedure. The field density of each backfill layer shall be 100% of the applicable Proctor Density, as specified in E10.7(a) of this Specification.

(ii) Quality control test will be used to determine the acceptability of each backfill layer, as place and compacted by the Contractor before any succeeding layer may be applied.

(iii) The filed density of the compacted layers shall be verified by Field Density Tests in accordance with ASTM Standard D155560-64, Test for Density of Solid in Place by the Sand-Cone Method, or equivalent as accepted by the Contract Administrator.

(iv) The frequency and number of tests to be made shall be as determined by the Contract Administrator. The Contract Administrator will select the Testing Agency.

(v) Holes made by removal of samples from the layer shall be promptly filled by the Contractor with appropriate material and thoroughly compacted so as to conform in every way with the adjoining compacted material.

(d) Access

(i) The Contractor shall allow the Contract Administrator free access to all parts of the Work at all times. The Contractor shall supply samples to the Contract Administrator or his inspector for testing purposes as required. There will be no charge to the City for samples taken.

(e) Corrective Action

(i) Any backfill material that does not meet the gradation and/or compaction requirements of the Specification shall be removed and replaced by the Contractor at his own expense, to the satisfaction of the Contract Administrator.

E10.13 Measurement and Payment

(a) Method of Measurement

(i) Supply and Place Granular Backfill, as defined in this Specification, is a Lump Sum pay item. No measurement will be made for this Work.

(b) Basis of Payment

(i) Backfill will be paid for at the Contract Unit Price for the "Items of Work" listed here below, which price shall be payment in full for performing all operations herein described and all other items incidental to the Work included in this Specification and accepted by the Contract Administrator. The pay items are as follows:

(ii) Items of Work:

- Mile 77.6:
  Mile 77.6 – "Supply and Place Granular Backfill"
  Mile 77.6 – "Suitable Site Backfill"
- Mile 22.15:
  Mile 22.15 – "Supply and Place Granular Backfill"
  Mile 22.15 – "Suitable Site Backfill"

E11. SILT FENCE BARRIER

E11.1 Description

(a) This Specification shall cover all operations relating to the work necessary for the supply, installation and maintenance of silt fence barriers, as herein specified.

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

E11.2 Materials

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

(b) The silt fence fabric shall be proposed by the Contractor and approved by the Contract Administrator.

(c) The stakes shall be of sufficient strength to satisfy silt fence barrier performance and maintenance requirements. The stakes shall be a minimum of 1.2 metres in length with a maximum spacing of 2.5 metres between stakes.

E11.3 Construction Methods

(a) The locations of the reinforced silt fence barriers will be dependent on site conditions, the Contractor's activities and methods of construction and on direction of the Contract Administrator.

(b) The different types of reinforced silt fence barriers are required under the following conditions:

(i) The sandbag reinforced silt barrier (frozen ground conditions) is required to isolate all works at or near the waterway during freezing/ice conditions.

(ii) The chained reinforced silt barrier.

(iii) Sandbag Reinforced Silt Barrier

(iv) Sandbags shall be filled with a type of sand as recommended by the sandbag supplier. When lying flat the filled sandbags shall measure not less than 250mm (width) by 450mm (length) by 180mm (height).

E11.4 Chained reinforced silt barrier

(a) Posts shall be spaced a maximum of 2.5 m apart, and shall be driven vertically into the ground to a minimum depth of 600 mm.

(b) A trench measuring approximately 200 mm wide by 200 mm deep shall be excavated along the entire line of stakes. The trench shall be on the side of the stakes where grading work is to be conducted.

(c) The geotextile from the silt fence shall extend into the trench a minimum of 300 mm. The prefabricated silt fence shall be installed without sags and have an overlap of 450 mm wherever its length is extended.

(d) The trench shall be backfilled and tamped to existing grade so as to hold the base of the geotextile firmly in place. The completed silt fence barrier shall have a minimum height of 600 mm above the ground surface.

E11.5 Maintenance

(a) All silt fences shall be inspected immediately after runoff event and at least daily during prolonged rainfall or runoff. Any required repairs shall be made immediately. The silt fence barriers shall be maintained in place, without gaps, and without undermining, so as to prevent sediment passage through or under the barrier. Silt fence barriers shall be maintained vertical without tears and without sagging and maintain a 450 mm overlap on seams.

(b) Accumulated sediment shall be removed at the direction of the Contract Administrator in a manner that avoids escape to the downstream side of the barriers. Sediment shall be removed to the level of the grade existing at the time of barrier installation and shall conform to the following:

(i) accumulated sediment shall be removed when it reaches a depth of one-half the height of the silt fence barrier;

(ii) accumulated sediment shall be removed as necessary to perform maintenance repairs;

(iii) accumulated sediment shall be removed immediately prior to the removal of the silt fence.

E11.6 Measurement and Payment

(a) Supplying and placing silt fence barrier will be considered incidental to E4, “Site Work”. No measurement and payment will be made within this section.

E12. EROSION CONTROL BLANKET (ECB)

E12.1 Description

(a) 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.

E12.2 Materials

(a) Erosion Control Blanket(ECB)

(i) 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 equal as accepted by the Contract Administrator, in accordance with B7, “Substitutes”.

(ii) 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 381mm centres (maximum) with degradable thread.

(iii) ECB shall have the following properties:

- Matrix 70% Straw Fibre (0.19kg/m2) and 30% Coconut Fibre (0.08kg/ m²).
- Netting top side heavyweight photodegradable with UV additives (1.47kg/100m²).

- Bottom side lightweight photodegradable minimum netting weight (0.73 kg/100m²).
- Degradable thread.

E12.3 Submittals

(a) 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.

E12.4 Construction Methods

(a) The Contractor shall supply all ECB materials required and store them on site. The installation and maintenance of all ECM will be as directed by the Contract Administrator.

(b) Actual alignment and location of the ECB may be adjusted in the field by the Contract Administrator.

(c) Erosion Control Blanket – Drainage Channel Installation

(i) In general excavate a trench 150mm deep by 150mm wide at the upstream end of the drainage channel and leave 300mm of ECB beyond the upslope portion of the trench. Anchor blanket with 200mm long staples in trench. 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 0.8 staples per square metre. Place blankets end over end in the downstream direction and secure overlaps with a double row of staples, staggered 10cm (minimum) apart. There shall be a minimum 10cm to 15cm overlap between blankets in the downstream direction.

(ii) 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.

(iii) Secure downstream edges of ECB as per manufacturer's specifications and detail drawings.

E12.5 Maintenance

(a) The areas covered with ECB shall be regularly inspected especially after severe rainfall or storm events, to check for blanket separation or breakage.

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

(c) 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.

E12.6 Measurement and Payment

(a) Supplying and placing Erosion Control Blanket will be considered incidental to E4, “Site Work”. No measurement and payment will be made within this section.

E13. SUPPLYING AND DRIVING STEEL PILES

E13.1 Description

(a) This specification shall cover all operations related to the supplying, handling, hauling, storing, supplying and installing pile tips, aligning and driving, splicing, cutting off of piles at the required elevations for the steel bearing piles;

(b) Steel piles, steel “H” piles, and “H” Piles shall be considered one and the same for the Drawings and this Specification.

(c) The work to be done by the Contractor under this Specification shall include the furnishings of all superintendence, overhead, labour, materials, equipment, tools, supplies, and all things necessary for and incidental to the satisfactory performance and completion of all work as hereinafter specified.

E13.2 References and Related Specifications

(a) All reference standards and related specifications shall be current issue or latest revision as of February 1, 2014.

(b) References

(i) AREMA, Manual for Railway Engineering

(ii) CAN/CSA G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel/ Structural Quality Steel

(iii) CSA W59, Welded Steel Construction (Metal Arc Welding)

(iv) AASHTO/AWS D1.5M/D1.5 Bridge Welding Code

(v) City of Winnipeg’s Approved Products List

E13.3 Scope of Work

(a) The work as hereinafter specified and as shown on the Drawings is including but not necessarily confined to the following:

(i) Supply and installation of steel piles.

(ii) Supply and installation of steel pile tips.

(iii) Splicing steel piles.

E13.4 Submittals

(a) The Contractor shall submit the following to the Contract Administrator:

(i) Copies of Mill Test Certificates showing chemical analysis and physical tests for piling material. Piling material without this certification will be rejected.

(ii) Details of the proposed pile driving system and manufacturer's specifications and catalogue for all mechanical hammers to be used to perform preconstruction wave equations analysis and determine adequacy of the driving system and hammer and the preliminary pile driving criteria.

(iii) Certificate of mass for gravity or drop hammers. If this certificate is not available, the gravity or drop hammers shall be weighed in the presence of the Contract Administrator. Hammers so weighed shall have the exact mass marked on them. Gravity hammers shall weigh at least 1.5 ton but in no case shall the mass of the hammer be less than the combined mass of the pile and pile cap.

(iv) Proof of certification for the welders conducting the Work (if applicable). All welders shall satisfy one of the following requirements:

- Welders qualified in accordance with the requirements of AASHTO/AWS D1.5M/D1.5,
- Valid Canadian Welding Bureau (CWB) Welding ticket, or
- Valid "Welder's Licence" as issued by the Mechanical and Engineering Division,

(v) Department of Labour and Manpower, Province of Manitoba, with a minimum of 5 years of experience welding on steel structures.

(vi) Welding procedures specific to the Work.

(vii) Detailed design notes and Shop Drawings for proposed splice connections and pile tip installations that are sealed, signed and dated by a Professional Engineer licensed to practice in the Province of Manitoba (if applicable).

E13.5 Materials

(a) Steel Bearing Piles

(i) Steel bearing piles shall conform to the requirements of CAN/CSA G40.21M, Grade 350W. All piles crushed excessively or bent through negligence or carelessness in driving operations shall be replaced by the Contractor at his own expense unless, at the discretion of the Contract Administrator, the damage is so slight that the pile can be repaired properly by the Contractor at his own expense.

(b) Pile Tips

(i) Pile tips shall conform to the requirements of CAN/CSA G40.21M, Grade 300W.Pile tips shall be Hard-Bite Point Model HP-77750-B.

(c) Splice Plates

(i) Splice Plates shall conform to the requirements of CAN/CSA G40.21M, Grade 350W.

(d) Welding Materials

(i) The Contractor is responsible for supplying all welding materials. All welding materials shall conform to the requirements of Welded steel construction (Metal Arc Welding) shall conform to the requirements and satisfy the testing procedures of CSA W59 and Welded Highway & Railway Bridges - AWS D1.1 of The American Welding Society & Addendum.

E13.6 Construction Methods

(a) Handling and Storage

(i) Piling shall be handled, hauled and stored in a manner that avoids damage to the piling materials. Loading and unloading shall be by crane, loader or other appropriate hoisting equipment.

(ii) The Contractor, in the handling and lifting of the piles, will not be permitted to drag them along the ground.

(iii) If piles are damaged due to the Contractor's handling operations, the Contractor shall, at his own expense, replace all damaged piles with piles meeting the requirements of this Specification and as shown on the Drawings.

(b) Location and Alignment

(i) The piles shall be driven in the positions shown on the Drawings or as directed by the Contract Administrator. Piles shall be driven vertically unless shown otherwise on the Drawings, and shall not deviate more than 2 percent out-of-plumb. Batter piles shall be driven to the batter specified, and shall not deviate more than 2 percent from the batter specified. Piles shall not be more than 75 mm off center measured at cut-off elevation.

(ii) Piles shall not be jacked or pulled into their final positions.

(c) Driving Steel Bearing Piles

(i) Piles shall be driven to the depths as shown on the Drawings or as directed by the Contract Administrator. All piles shall be driven to practical refusal which shall consist of three consecutive sets of 13 hammer blows per 25 mm of pile penetration. To minimize the risk of damage to the piles, the pile driving can be terminated if the penetration for a set of 13 hammer blows is less than 13 mm. The Contractor shall remove any surface and/or shallow depth obstructions to obtain the required penetration of the piles.

(ii) Pile driving equipment to be used by the Contractor shall be of such capacity that the required bearing and penetration shall be obtained without damage being done to the piles. The pies shall be driven using a hammer capable of delivering a minimum of 30 kJ at the pile head. The hammer energy is to be verified by the dynamic testing as outlined in this specification. Driving of all piles shall be continuous and without interruption until the pile has been driven to cut-off elevation or the refusal criteria has been met.

(iii) If the Contractor can demonstrate conclusively that special methods, other than providing a higher capacity hammer, are necessary to advance the pile to the required penetration, such supplementary methods will be subject to the Contract Administrator's approval.

(iv) Pile driver leads shall be used to support the piles while they are being driven and shall be braced to the supporting crane so as to hold the piles securely and accurately in the required position during driving. Leads shall be of sufficient length to be supported firmly on the ground. The use of hanging or swinging leads will not be allowed unless they can be held in a fixed position during the driving operations. Batter piles shall be driven with inclined leads.

(v) The heads of steel piles shall be squared and protected by a cap of a design approved by the Contract Administrator. The cap shall be designed to hold the axis of the pile in line with the axis of the hammer. The top of the cap shall have a timber shock block.

(vi) If upheaval does occur, the Contractor shall re-drive the lifted piles to the specified elevations. The Contractor shall excavate material that has boiled up during pile driving operations. The elevation of all piles previously driven or redriven shall be confirmed to detect uplift. If uplift of 5 mm or more occurs in any pile, that pile shall be redriven to its original elevation and thereafter to the required final driving resistance. If cavities remain around the piles after driving, the cavities shall be filled with sand or other approved material to the satisfaction of the Contract Administrator.

(vii) The Contractor shall ensure the safety of all personnel during pile driving operations. In particular, overhead protection shall be provided for all personnel located adjacent to the pile driving lead and under the pile driving hammer. The overhead protection shall be designed and constructed so as to safely withstand forces from falling debris or other matter.

(d) Pile Cut-Offs

(i) The piles shall be cut off level at the required elevations as specified on the Drawings or as directed by the Contract Administrator.

(e) Splicing Piles and Installing Pile Tips

(i) The Contractor shall splice piles and install pile tips in accordance with the Drawings, welding procedures, Shop Drawings and the following:

- The butting ends of the driven pile and its extension or the pile and the pile tip shall be cut square to give reasonable bearing between the mating surfaces.
- The butting surface shall be bevelled to facilitate a full penetration butt weld. Temporary clamping plates may be used as required.
- Before welding over previously deposited metal, the slag shall be removed. This requirement shall apply to successive layers, to successive beads, and to the cratered area when welding is resumed after any interruption.

- All butt welds shall have the root of the initial weld arc-air gouged, to sound metal and cleaned by grinding and wire brushing before welding is started from the second side.
- Material to be welded shall be preheated in accordance with CSA W59.
- The piles shall not have more than one splice per pile unless otherwise approved by the Contract Administrator. The location of the splice(s) shall be approved by the Contract Administrator.

E13.7 Dynamic Testing of Steel Piles

(a) Description

(i) The dynamic testing shall be performed to monitor and confirm hammer and driving system performance, assess pile installation stresses and integrity, as well as to evaluate pile capacity. The Contractor shall secure the services of a Dynamic Testing Consultant with demonstrated experience in similar projects. Dynamic testing shall be performed on at least 1 pile per bridge, or as required by the Dynamic Testing Consultant.

(b) Reference and Related Specifications

(i) All related Specifications and reference Standards shall be current issue or latest revision at the first date of tender advertisement.

- References

ASTM D-4945-00, “Standard Test Method for High Strain Dynamic Testing of Piles”.

Specifications for Supplying and Driving Steel Bearing Pile”.

(c) Submittal

(i) At least 14 days prior to driving the test piles, the Contractor shall submit specifications for the pile driving equipment to the Contract Administrator.

(d) Material

(i) Equipment and Personnel

- The dynamic testing work will be carried out using the Contractor’s pile driving equipment and the Pile Driving Analyzer (PDA) equipment provided by the Dynamic Testing Consultant.
- The PDA testing equipment shall conform to the requirement of ASTM D-4945-08, “Standard Test Method for High Strain Dynamic Testing of Piles”. An Engineer with documented experience shall operate the Pile Driving Analyzer in the field. An Engineer with at least five years related experience shall carry out the analysis of the PDA data and sign the engineering reports.
- The Contractor shall provide the pile driving equipment, operators, labor and power supply to the test pile locations for the duration of the dynamic testing. The Contractor shall provide a step ladder or other safe lifting means to enable attachment of cables to the pile head. The pile driving equipment shall be the same as that to be used for the pile driving work.

(e) Execution

(i) Construction Access

- The Dynamic Testing Consultant shall prepare and attach the gages to the pile after the pile has been driven to the depth identified by the Contract Administrator. Driving shall then continue using routine pile installation procedures. When the level of the gages is within 0.3 m of the ground surface, water surface, or a pile template, driving shall be halted to remove the gages from the pile. If additional driving is required, the pile shall be spliced and the gages shall be reattached to the head of the extension pile segment prior to the resumption of driving.
- The Contractor must take good care to ensure that no damage is done to the dynamic monitoring transducers, cables, or equipment.

(f) Dynamic Testing Program

(i) The selected piles shall be driven to attain static capacity of at least 2.0 times the pile design capacity. Adjustments to the preliminary driving criteria may be made by the Contract Administrator based upon the dynamic testing results.

(ii) All or part of the tested piles as determined by the Geotechnical Engineer shall be re-struck with dynamic testing. The re-strike driving sequence shall be performed with a warmed up hammer and shall consist of striking the piles for about 10 to 20 blows or until the pile penetrates an additional 50 mm, whichever occurs first.

(iii) The Contract Administrator may request additional piles to be dynamically tested if the hammer and/or driving system is replaced or modified, the pile type or installation procedures are modified, the pile capacity requirements are changed, unusual blow counts or penetrations are observed or any other piling behavior that differs from normal installation.

(g) Dynamic Testing Reports

(i) Within one day pile testing, the Dynamic Testing Consultant shall prepare a hand written daily field report summarizing the dynamic testing results. As a minimum, the daily reports shall include the calculated driving stresses, transferred energy, and estimated pile capacity at the time of testing. Variations from previous trends in the dynamic test data shall also be noted. Daily field reports shall be faxed or emailed to the Contract Administrator.

(ii) The Dynamic Testing Consultant shall prepare and submit a written report not later than 7 days after the test completion. This report shall include the results of dynamic test(s) and shall contain a discussion of the pile capacity obtained from the dynamic testing. The report shall also discuss hammer and driving system performance, driving stress levels, and pile integrity. CAPWAP analysis shall be performed on dynamic testing data obtained from the end of initial driving and the beginning of re-strike of all tested piles or as instructed by the Contract Administrator. CAPWAP analyses shall be performed by an Engineer with demonstrated experience.

E13.8 Quality Control / Quality Assurance

(a) Quality Control

(i) The Contractor shall provide a detailed survey of all of the pile locations and provide that to the Contract Administrator prior to cutting off any piles for that pile cap. The Contractor shall replace any piles, or add additional pile(s), for piles that do not meet the following tolerances: +/-2% out of alignment for battered piles, +/-2% out of plumb for vertical piles, and 75 mm off centre of the specified locations. Any modifications required to the pile cap, due to piles out of tolerance or due to required additional piles to compensate for out of tolerance piles, shall be carried out as detailed by the Contract Administrator at the Contractor’s own costs.

(ii) The Contractor shall replace any piles, or add additional pile(s), to compensate for piles that do not meet the specified refusal criteria. Any modifications required to the pile cap, required due to additional piles, shall be carried out as detailed by the Contract Administrator at the Contractor’s own costs.

(b) Quality Assurance

(i) All welds will be inspected visually by the Contract Administrator. The Contractor shall allow the Contract Administrator unhindered access to the piling and shall assist the Contract Administrator in carrying out any inspection, including suitable access.

(c) Pile Driving Records

(i) The Contractor shall keep a record of each and every pile driven. The records shall give the date, time, diameter, length, location, type, total depth of penetration, rate of penetration, number of blows per 300 mm, penetration of the last five blows, steam, air or diesel pressure and the kind and size of hammer used in driving. Any unusual phenomena shall be noted and recorded, especially if they indicate possible damage to the pile.

(ii) Energy output of driving equipment at the time of final set shall be carefully recorded by the Contractor, along with the final penetration readings, and reported immediately to the Contract Administrator. The required set per blow will be subject to acceptance by the Contract Administrator, in regard to the specified driving equipment and piles permitted.

E13.9 Measurement and Payment

(a) Method of Measurement

(i) Supplying Steel Piles

- Supplying steel piles will be measured on a length basis. The number of linear metres to be paid for shall be the total number of linear metres supplied as accepted by the Contract Administrator.

(ii) Driving Steel Piles

- Driving steel piles will be measured on a length basis. The number of linear metres to be paid for shall be the total number of linear metres installed as accepted by the Contract Administrator.

(iii) Pile Splice

- Steel Pile Splices will be measured on a unit basis. The total number of splices to be paid for shall be the total number of splices completed as accepted by the Contract Administrator.

(iv) Pile Driving Shoe

- Steel Pile Driving Shoe will be measured on a unit basis. The total number of splices to be paid for shall be the total number of driving shoes installed as accepted by the Contract Administrator.

(b) Basis of Payment

(i) Supplying Steel Piles

- Supplying Steel Piles shall be paid for at the Contract Unit Price per linear metre for the “Items of Work” listed below, measured as specified above, which price shall be payment in full for performing all operations herein described and all other items incidental to the Work included in this Specification and on the Drawings. The pay items are as follows:
    - Mile 77.6 – “Supply Steel Piles”
    - Mile 22.15 – “Supply Steel Piles”
    - Mile 43.1 – “Supply Steel Piles”

(ii) Driving Steel Piles

- Driving Steel Piles shall be paid for at the Contract Unit Price per linear metre for the “Items of Work” listed below, measured as specified above, which price shall be payment in full for performing all operations herein described and all other items incidental to the Work included in this Specification and on the Drawings. The pay items are as follows:
    - Mile 77.6 – “Driving Steel Piles”
    - Mile 22.15 – “Driving Steel Piles”
    - Mile 43.1 – “Driving Steel Piles”

(iii) Pile Splice

- Pile Splice shall be paid for at the Contract Unit Price for each of the “Items of Work” listed below, measured as specified above, which price shall be payment in full for performing all operations herein described and all other items incidental to the Work included in this Specification and on the Drawings. The pay items are as follows:
    - Mile 77.6 – “Pile Splice”

- Mile 22.15 – “Pile Splice”
- Mile 43.1 – “Pile Splice”

(iv) Pile Driving Shoe

- Pile Driving Shoe shall be paid for at the Contract Unit Price for each of the “Items of Work” listed below, measured as specified above, which price shall be payment in full for performing all operations herein described and all other items incidental to the Work included in this Specification and on the Drawings. The pay items are as follows:
  - Mile 77.6 – “Pile Driving Shoe”
  - Mile 22.15 – “Pile Driving Shoe”
  - Mile 43.1 – “Pile Driving Shoe”

E14. STRUCTURAL CONCRETE

E14.1 Description

(a) This Specification shall cover all operations relating to the preparation of Portland Cement structural concrete for, and all concreting operations related to, the construction of structural concrete works as specified herein and as shown on the Drawings.

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

E14.2 Referenced Specifications

(a) The latest edition and subsequent revisions of the following:

(i) ACI 309 – Guide for Consolidation of Concrete;

(ii) ACI 347 – Guide to Formwork for Concrete;

(iii) American Concrete Publication SP4 – Formwork for Concrete;

(iv) AREMA, Manual for Railway Engineering.

(v) ASTM A780 – Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings;

(vi) ASTM C131 – Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine;

(vii) ASTM C260 – Standard Specification for Air-Entraining Admixtures for Concrete;

(viii) ASTM C309 – Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete;

(ix) ASTM C457 – Standard Test Method for Microscopical Determination of Parameters of the Air-Void System in Hardened Concrete;

(x) ASTM C494 – Standard Specification for Chemical Admixtures for Concrete;

(xi) ASTM C1017 – Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete;

(xii) ASTM C1202 – Standard Test Method for Electrical Indication of Concrete’s Ability to Resist Chloride Ion Penetration;

(xiii) ASTM C1399 – Standard Test Method for Obtaining Average Residual-Strength of Fibre-Reinforced Concrete;

(xiv) ASTM C1609 – Standard Test Method for Flexural Performance of Fibre-Reinforced Concrete (Using Beam with Third Point Loading);

(xv) ASTM D1751 – Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types);

(xvi) CAN/CSA A23.1/A23.2 – Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete;

(xvii) CAN/CSA A3001 – Cementitious Materials for Use in Concrete;

(xviii) CAN/CSA G40.21 – General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel;

(xix) CAN/CSA G164-M92 – Hot Dip Galvanizing of Irregularly Shaped Articles;

(xx) CAN/CSA O121 – Douglas Fir Plywood;

(xxi) CAN/CSA-S6 – Canadian Highway Bridge Design Code;

(xxii) CAN/CSA S269.1 – False Work for Construction Purposes;

(xxiii) CAN/CSA S269.3 – Concrete Formwork;

(xxiv) ICRI Guideline No. 03732 – Selecting and Specifying Concrete Surface Preparation for Coatings, Sealers, and Polymer Overlays;

(xxv) Ministry of Transportation Ontario MTO Lab Test Method LS 609 – Petrographic Analysis of Coarse Aggregate; and

(xxvi) Ontario Provincial Standard Specification OPSS 1010 – Material Specification for Aggregates – Base, Sub-base, Select Subgrade, and Backfill Material.

E14.3 Scope of Work

(a) The Work under this Specification shall involve the following structural concrete Works for:

(i) Abutments

(ii) Wingwalls

E14.4 Submittals

(a) General

(i) The Contractor shall submit to the Contract Administrator for review and approval, at least ten (10) Business Days prior to the commencement of any scheduled Work on the Site, a proposed schedule, including methods and sequence of operations.

(ii) The Contractor shall submit to the Contract Administrator for review and approval, at least ten (10) Business Days prior to the commencement of any Work on Site, the proposed materials to be used.

(b) Concrete Mix Design Requirements

(i) The Contractor shall submit a concrete mix design statement to the Contract Administrator for each of the concrete types specified herein that reflects the specified performance properties of the concrete. The mix design statement shall contain all the information as outlines on the concrete mix design statement as shown on the Manitoba Ready Mix Concrete Association website (www.mrmca.com). In addition, the mix design statement must indicate the expected method of placement (buggies, chute, or pump) methods are to be used, the method of placement must include a clear description of the pumping methods (line, vertical drop, length of hose, etc.).

(ii) The Contractor shall submit directly, in confidence, to the City of Winnipeg, the concrete mix designs for each of the concrete types specified herein. The purpose of this confidential submission will be for record keeping purposes only. The concrete mix design shall contain a description of the constituents and proportions, and at the minimum the following:

- Cementitious content in kilograms per cubic metre or equivalent units, and type of cementitious materials;
- Designated size, or sizes, of aggregates, and the gradation;
- Aggregate source location(s);
- Weights of aggregates in kilograms per cubic metre or equivalent units. Mass of aggregates is saturated surface dry basis;
- Maximum allowable water content in kilograms per cubic metre or equivalent units and the water/cementitious ratio;

- The limits for slump;
- The limits for air content;
- Quantity of other admixtures; and
- The dosage and type of synthetic fibres.

(iii) The concrete mix design statements must be received by the Contract Administrator a minimum of ten (10) Business Days prior to the scheduled commencement of concrete placement for each of the concrete types. The concrete mix designs must be received by the City of Winnipeg a minimum of five (5) Business Days prior to the scheduled commencement of concrete placement for each the concrete types.

(iv) The mix design statement shall also include the expected slump measurement for each concrete type. The tolerances for acceptance of slump measurements in the field, by the Contract Administrator, shall be in accordance with the requirements of the CAN/CSA A23.1 Clause 4.3.2.3.2.

(v) Any change in the constituent materials of any approved mix design shall require submission of a new concrete mix design statement, mix design, and mix design test data. If, during the progress of the Work, the concrete supplied is found to be unsatisfactory for any reason, including poor workability, the Contract Administrator may require the Contractor to make any necessary adjustments and associated resubmissions.

(c) Concrete Mix Design Test Data

(i) The Contractor shall submit to the Contract Administrator for review and approval, at least twenty (20) Business Days prior to the scheduled commencement of concrete placement, test data showing that the concrete to be supplied will meet the performance criteria stated in this Specification for each concrete type.

(ii) The Contractor shall submit at a minimum, the test data to prove that the minimum compressive strength, flexural strength for Fibre Reinforced Concrete (FRC) only, air content, and slump of the concrete to be supplied meets or exceeds the performance criteria. In addition, test data shall be submitted to support requirements for post-cracking residual strength index (Ri) and fibre dispersion in accordance with the requirements of the Canadian Highway Bridge Design Code (CHBDC) CAN/CSA-S6, Section 15, Fibre Reinforced Structures, Clause 16.6. Testing for Ri of concrete shall be completed in accordance with E14.4(e)(i)

(iii) Testing for air void system shall be completed in accordance with E14.14(e)(iii).

(iv) Testing for rapid chloride permeability shall be completed in accordance with E14.14(e)(iv)

(v) All tests shall be based on the concrete samples taken from the point of discharge into the formwork. For example, at the concrete chute from the delivery truck if being placed by buggies, or at the end of the pump line should the Contractor choose to pump the concrete into place.

(d) Aggregates

(i) The Contractor shall furnish, in writing to the Contract Administrator for review and approval, at least twenty (20) Business Days prior to the scheduled commencement of concrete placement, the location of the sources where aggregate will be obtained in order that some may be inspected and tentatively accepted by the Contract Administrator. Changes in the source of aggregate supply during the course of the Contract shall not be permitted without notification in writing to and the expressed approval of the Contract Administrator.

(ii) The Contractor shall submit to the Contract Administrator for review and approval recent test information on sieve analysis of fine and coarse aggregates in accordance with CSA Standard Test Method A23.2-2A.

(iii) The Contractor shall submit to the Contract Administrator for review and approval recent test information on tests for organic impurities in fine aggregates for concrete, in accordance with CSA Standard Test Method A23.2-7A.

(iv) The Contractor shall submit to the Contract Administrator for review and approval recent test information on relative density and absorption of coarse aggregate, in accordance with CSA Standard Test Methods A23.2-12A.

(v) The Contractor shall submit to the Contract Administrator for review and approval recent test information on petrographic examination of aggregates for concrete, in accordance with CSA Standard Test Methods A23.2-15A. The purpose of the petrographic analysis is to ensure the aggregates provided are of the highest quality for use in the production of concrete and will produce a durable overlay. An acceptable aggregate will have an excellent rating as judged by an experienced petrographer, with a (weighted) petrographic number typically in the range of 100 to 120.

(vi) The Contractor shall submit to the Contract Administrator for review and approval recent test information on resistance to degradation of large-size coarse aggregate by abrasion and impact in the Los Angeles Machine, in accordance with CSA Standard Test Method A23.2-16A.

(vii) The Contractor shall submit to the Contract Administrator for review and approval recent test information on potential alkali reactivity of cement aggregate combinations (mortar bar method), in accordance with CSA Standard Test Method A23.2-27A.

(viii) The Contractor shall submit to the Contract Administrator copies of all material quality control test results.

(e) Notification of Ready Mix Supplier

(i) The Contractor shall submit to the Contract Administrator the name and qualifications of the Ready Mix Concrete Supplier that he is proposing to use, at least twenty (20) Business Days prior to the scheduled commencement of concrete placement. The Contract Administrator will verify the acceptability of the Supplier and the concrete mix design requirements. Acceptance of the Supplier and the concrete mix design(s) by the Contract Administrator does not relieve or reduce the responsibility of the Contractor or Supplier from the requirements of this Specification.

(f) Temporary False Work, Formwork and Shoring Works

(i) The Contractor shall submit to the Contract Administrator for review and approval, at least twenty (20) Business Days prior to the scheduled commencement of concrete placement, detailed design calculations and Shop Drawings for any temporary Works, including false work, formwork, and shoring, that are sealed, signed and dated by a Professional Engineer licensed to practice in the Province of Manitoba.

(g) Design Requirements

(i) All forms shall be of wood, metal or other materials as approved by the Contract Administrator.

(ii) The false work, formwork, and shoring for these Works shall be designed by a Professional Engineer registered in the Province of Manitoba. False work shall be designed according to the requirements of the requirements of the CAN/CSA S269.1. The Shop Drawings shall bear the Professional Engineer's seal. Shop Drawings submitted without the seal of a Professional Engineer will be rejected. The submission of such Shop Drawings to the Contract Administrator shall in no way relieve the Contractor of full responsibility for the safety and structural integrity of the formwork and shoring.

(iii) The false work, formwork, and shoring for these Works shall be designed to safely support all vertical and lateral loads until such loads can be supported by the concrete all in accordance with the requirements of CAN/CSA S269.3.

(iv) The loads and lateral pressures outlined in Part 3, Section 102 of ACI 347 and wind loads as specified by the Manitoba Building Code shall be used for design. Additional design considerations concerning factors of safety for formwork elements and allowable settlements outlined in Section 103 of the above reference shall apply.

(v) As a minimum, the following spacings shall apply, for studding and waling:

(vi) 20-mm plywood: studding 400 mm centre to centre (max.),

(vii) Walers 760 mm centre to centre (max.)

(viii) Forms shall be designed and constructed so that the completed Work will be within minus 3 mm or plus 6 mm of the dimensions shown on the Drawings.

(ix) Formwork shall be designed to provide camber, where applicable, to maintain the specified tolerance to compensate for anticipated deflections in the formwork due to the weight and pressure of the fresh concrete, due to construction loads.

(x) Slots, recesses, chases, sleeves, inserts, bolts, hangers, and other items shall be accommodated in the design, in coordination and cooperation with the trade concerned. No openings in structural members are to be shown on the Shop Drawings without the prior written approval of the Contract Administrator.

(xi) Shores shall be designed with positive means of adjustment (jacks or wedges). All settlement shall be taken up before or during concreting as required.

(xii) Mud sills of suitable size shall be designed beneath shores, to be bedded in sand or stone, where they would otherwise bear on soil. The soil below shores must be adequately prepared to avoid settlement during or after concreting. Shores must not be placed on frozen ground.

(xiii) Shores shall be braced 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.

(xiv) All exposed edges shall be chamfered 20 mm unless otherwise noted on the Drawings.

(xv) Formwork shall be designed to have sufficient strength and rigidity so that the resultant finished concrete conforms to the shapes, lines, and dimensions of the members shown on the Drawings.

(xvi) Forms shall be designed to be sufficiently tight to prevent leakage of grout or cement paste.

(h) Shop Drawings shall show design loads, type, and number of equipment to be used for placing the concrete, method of construction, method of removal, type and grade of materials, and any further information that may be required by the Contract Administrator. The Contractor shall not proceed with any Work on site until the Shop Drawings have been reviewed and approved in writing by the Contract Administrator.

(i) For timber formwork and false work, the Shop Drawings shall specify the type and grade of lumber and show the size and spacing of all members. The Shop Drawings shall also show the type, size and spacing of all ties or other hardware, and the type, size and spacing of all bracing.

E14.5 Materials

(a) General

(i) 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.

(b) Handling and Storage of Materials

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

(ii) 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 and all subsequent revisions of CAN/CSA-A23.1.

(c) Concrete

(i) Concrete materials susceptible to frost damage shall be protected from freezing.

(ii) Concrete shall have nominal compressive strengths (f'c) and meet the requirements for hardened concrete as specified in the following Table E14.1.

TABLE E14.1
REQUIREMENTS FOR HARDENED CONCRETE

Type of Concrete	Location	Nominal Compressive Strength MPa	Class of Exposure	Air Content Category	Max Aggregate Size	Special Requirements	Minimum Post Residual Cracking Index
Type 1	Abutments and Wingwalls	35 @ 28 Days	C-1	1	20 mm	Synthetic Fibers	0.15

(d) Working Base Concrete

(i) Working base concrete shall be placed in the locations as shown on the Drawings.

(ii) Working base shall be concrete meeting the requirements of CSA A 23.1 latest edition, for S-2 class of exposure, except as follows:

- 20 MPa at 28 days

(e) Aggregates

(i) General

- All aggregates shall be handled to prevent segregation and inclusion of any foreign substances, and to obtain uniformity of materials. The two sizes of coarse and fine aggregates, and aggregates secured from different sources, shall be piled in separate stockpiles. The site of the stockpiles shall be cleaned of all foreign materials and shall be reasonably level and firm or on a built up platform. If the aggregates are placed directly on the ground, material shall not be removed from the stockpile within 150 mm of the ground level. This material shall remain undisturbed to avoid contaminating the aggregate being used with the ground material.
- The potential for deleterious alkali-aggregate reactivity shall be assessed in accordance with CSA Standard Test Method A23.2-27A. Current (less than 18 months old) test data evaluating the potential alkali-silica reactivity of aggregates tested in accordance with CSA Standard Test Method A23.2-1 4A or CSA A23.2-25A is required.
- Petrographic analysis when performed shall be in accordance with MTO (Ministry of Transportation Ontario) Lab Test Method LS 609. The (weighted) petrographic number shall not exceed 130.

(ii) Fine Aggregate

- Fine aggregate shall meet the grading requirements of CAN/CSA A23.1, Table 10, FA1, be graded uniformly and not more than 3% shall pass a 75 um sieve. 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.
- Tests of the fine aggregate shall not exceed the limits for standard requirements prescribed in CAN/CSA A23.1, Table 12.

(iii) Coarse Aggregate – Standard

- The maximum nominal size of coarse aggregate shall be 20 mm and meet the grading requirements of CAN/CSA A23.1, Table 11, Group I. Coarse aggregate shall be uniformly graded and not more than 2% shall pass a 75 um sieve. 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; shall have a minimum of two fractured faces; and shall have an absorption not exceeding 3%.

- 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, an excess of thin particles or any other extraneous material.
- Course aggregate when tested for abrasion in accordance with the requirements of the ASTM C131 shall not have a loss greater than 30%.
- Tests of the coarse aggregate shall not exceed the limits for standard requirements prescribed in CAN/CSA A23.1, Table 12, for concrete exposed to freezing and thawing.

(f) Admixtures

(i) Air-entraining admixtures shall conform to the requirements of ASTM C260.

(ii) Chemical admixtures shall conform to the requirements of ASTM C494 or C1017 for flowing concrete.

(iii) 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.

(g) Cementitious Materials

(i) Cementitious materials shall conform to the requirements of CAN/CSA A3001 and shall be free from lumps.

(ii) Should the Contractor choose to include a silica fume admixture in the concrete mix design, the substitution of silica fume shall not exceed 8% by mass of cement.

(iii) Should the Contractor choose to include fly ash in the concrete mix design, the fly ash shall be Class CI or F and the substitution shall not exceed 30% by mass of cement.

(iv) 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 the formation of lumps, shall not be used in the Work.

(h) Water

(i) Water to be used for all operations in the Specification, including mixing and curing of concrete or grout, surface texturing operations, and saturating the substrate shall conform to the requirements of CAN/CSA A23.1 and shall be free of oil, alkali, acidic, organic materials or deleterious substances. The Contractor shall not use water from shallow, stagnant or marshy sources.

(i) Synthetic Fibres

(i) The synthetic fibres shall consist of 100% virgin polypropylene high performance macro fibres, or equal as accepted by the Contract Administrator, in accordance with B7. The dosage shall be designed by the Contractor to meet the requirements for post-cracking residual strength index (Ri) and fibre dispersion in accordance to CHBDC CAN/CSA S6, “Fibre-Reinforced Structures”, Clause 16.6.

(j) Formwork

(i) Formwork materials shall conform to CAN/CSA A23.1, and American Concrete Publication SP4, “Formwork for Concrete.”

(ii) 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-M1978, a minimum of 20 mm thick.

(iii) Where form liner is not being used, form sheeting shall be Douglas Fir, overlay form liner type conforming to CAN/CSA “O121”. Approved Manufacturers are “Evans” and “C-Z.”

(iv) Boards used for formwork shall be fully seasoned and free from defects such as knots, warps, cracks, etc., which may mark the concrete surface.

(v) 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 nonrusting material or galvanized steel; and they shall not stain, blemish, or spall the concrete surface for the life of the concrete.

(vi) Forms for exposed surfaces that do not require a form liner may be either new plywood or steel as authorized by the Contract Administrator.

(vii) Studding shall be spruce or pine and shall have such dimensions and spacing that they shall withstand without distortion all the forces to which the forms shall be subjected.

(viii) Walers shall be spruce or pine, with minimum dimensions of 100 mm x 150 mm. Studding shall be spruce or pine, with minimum dimensions of 50 x 150.

(ix) Stay-in-place formwork or false work is not acceptable and shall not be used by the Contractor unless specifically shown on the Drawings.

(k) Form Coating

(i) Form coating shall be "Sternson C.R.A." by Sternson, "SCP Strip Ease" by Specialty Construction Products, or equal as accepted by the Contract Administrator, in accordance with B7, “Substitutes”.

(l) Form Coating

(i) Form coating shall be "Sternson C.R.A." by Sternson, "SCP Strip Ease" by Specialty Construction Products, or equal as accepted by the Contract Administrator, in accordance with B7, “Substitutes”.

(m) Permeable Formwork Liner

(i) Formwork liner shall be Texel Drainaform, Hydroform, or equal as accepted by the Contract Administrator, in accordance with B7, “Substitutes”. This formwork liner shall be used on all exposed substructure and superstructure formed surfaces, except soffit surfaces, or where a normal form finish is specified.

(n) Curing Compound

(i) Curing compound shall conform to the requirements of ASTM C309, either Type D with fugitive dye or Type 2.

(ii) Type 2 shall only be used on surfaces that will not be exposed to view.

(o) Curing Blankets

(i) Curing blankets for wet curing shall be 100 percent polyester, 3 mm thick, white in colour. An approved product is “Mirafi Geotextile P150”. Alternately, a 10 oz burlap, 5 mil polyethylene, curing blanket white in colour shall be used; “Curelap” manufactured by Midwest Canvas, together with a second layer of burlap, or equal as accepted by the Contract Administrator, in accordance with B7, “Substitutes”.

(p) Bonding Agents

(i) Latex Bonding Agent

- Latex bonding agent shall be Acryl-Stix, SikaCem 810, or equal as accepted by the Contract Administrator, in accordance with B7, “Substitutes”. Polyvinyl acetate-based latexes will not be permitted. Planicrete AC by MAPEI is approved for use as a latex bonding agent on concrete greater than 28 days in age.

(q) Epoxy Adhesive

(i) Epoxy adhesive for bonding concrete to steel shall be one of the following approved products: Sternson ST432 or ST433, Dural Duralbond, Capper Capbond E, Sikadur 32 Hi-bond, Concressive 1001 LPL, Meadows Rezi-Weld 1000, or equal as accepted by the Contract Administrator, in accordance with B7, “Substitutes”.

(r) Epoxy Grout

(i) Epoxy grout shall be one of the following approved products: Sternson Talygrout 100, Sika Sikadur 42, CPD Epoxy Grout by Specialty Construction Products,

Meadows Rezi-Weld EG-96, or equal as accepted by the Contract Administrator, in accordance with B7, “Substitutes”.

(s) Cementitious Grout

(i) Cementitious grout shall be nonshrink and non-metallic. Approved products are Sternson M-bed Standard, Specialty Construction Products CPD Non-Shrink Grout, Sika 212 Non-Shrink Grout, or equal as accepted by the Contract Administrator, in accordance with B7, “Substitutes”. The minimum compressive strength of the grout at 28 days shall be 40 MPa.

(t) Patching Mortar

(i) Patching mortar shall be made of the same material and of approximately the same proportions as used for the concrete, except that the coarse aggregate shall be omitted and the mortar shall consist of not more than 1 part cement to 2 parts sand by damp loose volume. White Portland Cement shall be substituted for a part of the grey Portland Cement on exposed concrete in order to produce a colour matching the colour of the surrounding concrete, as determined by a trial patch. The quantity of mixing water shall be no more than necessary for handling or placing.

(u) Flexible Joint Sealant

(i) Flexible joint sealant for all horizontal, vertical, and sloping joints shall be guaranteed non-staining, grey polyurethane, accepted by the Contract Administrator and applied in strict accordance with the details shown on the Drawings and the Manufacturer's instructions including appropriate primers if recommended. Approved products are Vulkem 116 by Mameco, Sonolastic NP1 by Sonneborn, Sikaflex-1a by Sika, Bostik 915 by Bostik, or equal as accepted by the Contract Administrator, in accordance with B7, “Substitutes”.

(v) Fibre Joint Filler

(i) Fibre joint filler shall be rot-proof and of the preformed, nonextruding, resilient type made with a bituminous fibre such as Flexcell and shall conform to the requirements of t ASTM D1751 or equal as accepted by the Contract Administrator, in accordance with B7, “Substitutes”.

(w) Precompressed Foam Joint Filler

(i) Precompressed expanding filler shall be compressed to 20% of its expanded width and be a polyurethane foam, impregnated throughout with a latex modified asphalt. Approved products are “Emseal DSM System” by Emseal Corporation. Manufacturer’s recommended primer and top coat are to be used.

(x) Low Density Styrofoam

(i) Low density Styrofoam shall be the type accepted by the Contract Administrator, in accordance with B7, “Substitutes”.

(y) Backup Rod

(i) Backup rod shall be pre-formed compressible polyethylene, urethane, neoprene, or vinyl foam backer road, extruded into a closed cell form and oversized 30 to 50%.

(z) Screed Bases and Chairs

(i) Screed bases shall be Hilti HAS 304 stainless steel threaded rods, or equal as accepted by the Contract Administrator, in accordance with B7, “Substitutes”.

(ii) Screed chairs shall be Mega Screed as supplied by Brock White Canada Company, or equal as accepted by the Contract Administrator, in accordance with B7, “Substitutes”.

(aa) Dampproofing

(i) Dampproofing materials shall be applied to all buried concrete surfaces in contact with the soil to within 300 mm of Finished Ground Elevation, with the exception of those surfaces cast directly against the soil or in contact with prefabricated drainage composite. Dampproofing materials shall be mineral colloid emulsified asphalt complying with Canadian General Standards Board Specification No. 37.16-M89. Acceptable product is Bakelite/Flintguard 710-11 Foundation Coating as

manufactured by Bakor, Elsro Fibrated Foundation Coating, Insulmastic 7103 Fibered Waterproofing, or equal as accepted by the Contract Administrator, in accordance with B7, “Substitutes”.

(ii) All damaged concrete, including tie holes to be filled with non-shrink grout prior to application of dampproofing.

(iii) Primer for dampproofing shall be asphalt primer, penetrating type conforming to CGSB 37-GP-9Ma. Acceptable products are Bakor Penetrating 910-01 Asphalt Primer as manufactured by Bakor Inc., Elsro Asphalt Primer No. 510, Insulmastic 7501 C/B Roof & Foundation Primer, or equal as accepted by the Contract Administrator, in accordance with B7, “Substitutes”.

(bb) Miscellaneous Materials

(i) Benchmark Plugs

- Benchmark plugs shall be supplied by the City. Installation by the Contractor shall be considered incidental to these Works. Installation locations shall be shown on all Drawings.

E14.6 Equipment

(a) General

(i) All equipment shall be of a type acceptable to the Contract Administrator and shall be kept in good working order.

(b) Vibrators

(i) 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.

(ii) The Contractor shall use rubber coated vibrators for consolidating concrete containing epoxy-coated reinforcing steel and stainless steel reinforcing.

(iii) The Contractor shall have standby vibrators available at all times during the pour.

E14.7 Construction Methods

(a) General

(i) It is intended that this Section cover all construction Work associated with Structural Concreting operations.

(ii) Rate of application shall be the rate required to meet the requirements of ASTM C309 for the texture of concrete the curing compound is being applied to.

E14.8 Temporary False Work, Formwork, and Shoring

(a) Construction Requirements

(i) Temporary false work, formwork, and shoring shall satisfy all requirements of the Navigable Waters Protection Program.

(ii) All forms shall be of wood, metal or other materials as approved by the Contract Administrator.

(iii) The false work, formwork, and shoring for these Works shall be erected, and braced, as designed, and maintained to safely support all vertical and lateral loads until such loads can be supported by the concrete. All proposed fastening shall be as shown on the accepted Shop Drawings.

(iv) 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.

(v) Formwork shall be cambered, where necessary to maintain the specified tolerance to compensate for anticipated deflections in the formwork due to the weight and pressure of the fresh concrete, due to construction loads.

(vi) 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 Shop Drawings without the prior written approval of the Contract Administrator.

(vii) Shores shall be provided with positive means of adjustment (jacks or wedges). All settlement shall be taken up before or during concreting as required.

(viii) 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 settlement during or after concreting. Shores must not be placed on frozen ground.

(ix) Shores shall be braced 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.

(x) All exposed edges shall be chamfered 20 mm unless otherwise noted on the Drawings.

(xi) Formwork shall have sufficient strength and rigidity so that the resultant finished concrete conforms to the shapes, lines, and dimensions of the members shown on the Drawings.

(xii) Forms shall be constructed so as to be sufficiently tight to prevent leakage of grout or cement paste.

(xiii) Form panels shall be constructed so that the contact edges are kept flush and aligned.

(xiv) Forms shall be clean before use. Plywood and other wood surfaces shall be sealed against absorption of moisture from the concrete by a field applied form coating or a factory applied liner as accepted by the Contract Administrator.

(xv) Where prefabricated panels are used, care shall be taken to ensure that adjacent panels remain flush. Where metal forms are used, all bolts and rivets shall be counter sunk and well ground to provide a smooth, plane surface.

(xvi) Form accessories to be partially or wholly embedded in the concrete, such as ties and hangers, shall be commercially manufactured types. 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 30 mm in diameter. All fittings for metal ties shall be of such design that, upon their removal, the cavities which are left will be of the smallest possible size. Torch cutting of steel hangers and ties will not be permitted. Cavities shall be filled with cement mortar and the surface left sound, smooth, even and uniform in colour.

(xvii) 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.

(xviii) It shall be permissible to use the forms over again where possible to a maximum of three uses, 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.

(xix) Where required by the Contract Administrator, the Contractor shall cast test panels not using less than two panels of representative samples of the forms he proposes for reuse and shall strip them after forty-eight (48) hours for the Contract Administrator to judge the type of surface produced.

(xx) 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, incidental to the Work of this Specification, and the entire site shall be left in a neat and clean condition.

E14.9 Concrete Construction Joints

(a) Concrete construction joints shall be located only where shown on the Drawings or as otherwise directed in writing by the Contract Administrator. Concrete construction joints shall be formed at right angles to the direction of the main reinforcing steel. All reinforcing steel shall be continuous across the joints.

(b) Forms shall be re-tightened and all reinforcing steel shall be thoroughly cleaned at the joint prior to concreting.

(c) After the forms are stripped off the construction joint, the entire face of the joint, including the reinforcing steel, shall be thoroughly cleaned down to sound concrete and the surface roughened.

(d) Refer to, E14.7 (a) for the requirements to prepare the hardened concrete at a construction joint for receiving new concrete.

E14.10 Permeable Formwork Liner

(a) Permeable formwork liner shall be used on all exposed surfaces, except on soffit surfaces, or surfaces where a normal an architectural form finish is specified.

(b) The permeable formwork liner shall be used for only one (1) application.

(c) The supply, setup, application, and removal of permeable formwork liner shall be considered incidental to the placement of structural concrete, and no separate measurement or payment shall be made for this Work.

E14.11 Benchmarks

(a) The Contractor shall install benchmark plugs supplied by the Contract Administrator at such locations on the structure as may be directed by the Contract Administrator.

E14.12 Supply of Structural Concrete

(a) All structural concrete shall be supplied from a plant certified by the Manitoba Ready Mix Concrete Association. The Contractor, upon request from the Contract Administrator, shall furnish proof of this certification.

(b) All mixing of concrete must meet the provisions of CAN/CSA A23.1, Clause 5.2, Production of Concrete.

(c) Time of Hauling

(i) The maximum time allowed for all types of concrete to be delivered to the Site of the Work, including the time required to discharge, shall not exceed 120 minutes after batching. Batching of all types of concrete is considered to occur when any of the mix ingredients are introduced into the mixer, regardless of whether or not the mixer is revolving. For concrete that includes silica fume and fly ash, this requirement is reduced to 90 minutes.

(ii) Each batch of concrete delivered to the Site shall be accompanied by a time slip issued at the batching plant, bearing the time of batching. In hot or cold weather, or under conditions contributing to quick stiffening of the concrete, a time less than 120 and/or 90 minutes may be specified by the Contract Administrator. The Contractor will be informed of this requirement 24 hours prior to the scheduled placing of concrete.

(iii) To avoid the reduction of delivery and discharge time in hot weather, the Contractor will be allowed to substitute crushed ice for a portion of the mixing water provided the specified water/cementitious ratio is maintained. All of the ice shall be melted completely before discharging any of the concrete at the delivery point.

(iv) Unless otherwise noted in Table E14.5, “Requirements for Hardened Concrete”, no retarders shall be used.

(v) The concrete, when discharged from truck mixers or truck agitators, shall be of the consistency and workability required for the job without the use of additional mixing water. If the slump of the concrete is less than that designated by the mix design statement, then water can be added on site provided the additional water meets the requirements of CAN/CSA A23.1 5.2.4.3.2. If additional water is to be added on site,

it must be done under the guidance of the Contractor's designated quality control person. The Contractor shall certify that the addition of water on site does not change the Mix Design for the concrete supplied. Any other water added to the concrete without such control will be grounds for rejection of the concrete by the Contract Administrator.

(vi) A record of the actual proportions used for each concrete placement shall be kept by the Contractor and a copy of this record shall be submitted to the City of Winnipeg upon request.

(d) Delivery of Concrete

(i) The Contractor shall satisfy himself that the Concrete Supplier has sufficient plant capacity and satisfactory transporting equipment to ensure continuous delivery at the rate required. The rate of delivery of concrete during concreting operations shall be such that the development of cold joints will not occur. The methods of delivering and handling the concrete shall facilitate placing with a minimum of re-handling, and without damage to the structure or the concrete.

(e) Concrete Placement Schedule

(i) The Contractor shall submit to the Contract Administrator the proposed concrete placement schedule for all concrete placements for review and approval. If, in the opinion of the Contract Administrator, the volume of the placement is deemed larger than can be placed with the facilities provided, the Contractor shall either:

- Limit the amount to be placed at any time (using adequate construction joints);
- Augment his facilities and Plant in order to complete the proposed placement;
- In the case of continuous placing, provide additional crews and have adequate lighting to provide for proper placing, finishing, curing and inspecting;

(ii) The Contractor shall adhere strictly to the concrete placement schedule, as approved by the Contract Administrator.

(f) Preparation for Concreting Against Hardened Concrete

(i) All hardened concrete against which new concrete is to be placed shall be prepared in the following manner:

(ii) Concrete shall be removed to sound concrete or to the limits as shown on the Drawings, whichever is greater. The resulting surface shall be roughened to remove latent cement and miscellaneous debris.

(iii) All existing surfaces and exposed reinforcing steel are to be sandblasted to reveal a clean substrate and kept clean until concrete placement. Sandblasting shall be followed by a high pressure water wash to remove all residues.

(iv) Immediately prior to placing new concrete, bonding grout shall be thoroughly brushed onto the entire surface of the existing hardened concrete in a thin and even coating that will not run or puddle.

(g) Placing Structural Concrete

(i) The Contractor shall notify the Contract Administrator at least one (1) Working day prior to concrete placement so that an adequate inspection may be made of formwork, shoring, reinforcement, and related Works. No concrete pour shall be scheduled without the prior written approval of the Contract Administrator.

(ii) 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. All equipment and processes are subject to acceptance by the Contract Administrator.

(iii) Concrete shall be conveyed from the mixer to the place of final deposit by methods which will prevent segregation and a marked change in consistency.

(iv) Runways for concrete buggies and all pumping equipment shall be supported directly by the formwork and not on reinforcement.

(v) 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.

(vi) Formwork liners shall be cooled immediately prior to placing concrete by spraying with cold water.

(vii) Placing of concrete, once started, shall be continuous. No concrete shall be placed on concrete which 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 accepted by the Contract Administrator.

(viii) When the Contractor chooses to pump the concrete, the operation of the pump shall produce a continuous flow of concrete without air pockets. The equipment shall be arranged such that vibration is not transmitted to freshly placed concrete that may damage the concrete. When pumping is completed, the concrete remaining in the pipeline, if it is to be used, shall be ejected in such a manner that there will be no contamination of the concrete or separation of the ingredients.

(ix) Concrete shall be placed as nearly as possible in its final position. Rakes or mechanical vibrators shall not be used to transport concrete.

(x) The maximum free drop of 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. The Contractor shall obtain the Contract Administrator's acceptance, prior to pouring concrete, of all placing operations.

(xi) All concrete, during and immediately after depositing, shall be consolidated by mechanical vibrators so that the concrete is thoroughly worked around the reinforcement, around embedded items, and into the corners of forms, eliminating all air or stone pockets which may cause honeycombing, pitting, or planes of weakness. Mechanical vibrators shall have a minimum frequency of 7000 revolutions per minute immersed.

(xii) 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. The vibrators shall be inserted vertically and withdrawn out of the concrete slowly. Spare vibrators in good working condition shall be kept on the job site during all placing operations.

(xiii) Concrete shall not be placed during rain or snow unless adequate protection is provided for formwork and concrete surfaces, to the satisfaction of the Contract Administrator.

(h) Finishing of Concrete Surfaces

(i) Finishing Operations for Unformed Surfaces

(ii) The Contractor shall ensure that sufficient personnel are provided for the finishing of the concrete surfaces. In the event that the depositing, vibrating, and screeding operations progress faster than the concrete finishing, the Contractor shall reduce the rate of concrete placement or cease the depositing of concrete until the exposed area of unfinished concrete has been satisfactorily minimized. The Contract Administrator's judgement in this matter shall be final and binding on the Contractor. All loads of concrete that exceed the 120 minute discharge time limit during the delay, while the finishing operations catch up, shall be rejected.

- Type 1 Finish – Exposed Formed Surfaces
    - o A permeable formwork liner finish shall be applied to all exposed formed surfaces including all exposed concrete surfaces not included in Type 2 and Type 3 finishes.

- Exposed surfaces imply all surfaces exposed to view including surfaces to 300 mm below finish grade elevations.
- All surfaces to receive a formwork liner finish shall be formed using an approved permeable formwork liner.
- The surfaces shall be patched as specified in this Specification.

- Type 2 Finish – Unformed Surfaces
  - All unformed concrete surfaces shall be finished as outlined hereinafter.
  - Screeding of all unformed concrete surfaces shall be performed by the sawing movement of a straightedge along wood or metal strips or form edges that have been accurately set at required elevations.
  - 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.
  - After screeding, the concrete shall not be worked further until ready for floating. Floating shall begin when the water sheen has disappeared. Concrete surfaces after floating shall have a uniform, smooth, granular texture.
- Type 3 Finish - Surfaces Below Finished Grade
  - All surfaces below 300 mm below finished grade except underside of footings shall be patched in accordance with the requirements of Sections E14.5 (t) “Patching Mortar” and E14.5 (p) “Bonding Agents” of this Specification.
  - All surfaces below 300 mm below finish grade shall receive dampproofing in accordance with E14.5 (aa), “Dampproofing” of this Specification.
- Working Base Concrete Finish
  - During placing, concrete working base shall be vibrated, screeded and floated.
  - The supply, set up, operation, and finishing of working base concrete shall be considered incidental to the placement of working base concrete, and no separate measurement or payment shall be made for this Work.

(i) General Curing Requirements

(i) Refer to, “Cold Weather Concreting” for cold weather curing requirements and , “Hot Weather Concreting” of this Specification for hot weather curing requirements.

(ii) Concrete shall be protected from the harmful effects of sunshine, drying winds, surface dripping, running water, vibration, and mechanical shock. No machinery shall travel in the vicinity of freshly placed concrete for a period of 24 hours. Concrete shall be protected from freezing until at least 24 hours after the end of the curing period.

(iii) Changes in temperature of the concrete shall be uniform and gradual and shall not exceed 3°C in one hour or 20°C in 24 hours.

(iv) The use of curing compound shall not be allowed on concrete areas that are to receive additional concrete, dampproofing, a waterproofing membrane, or an asphalt or concrete overlay.

(v) Freshly finished concrete shall have either a curing compound applied, or shall be moist cured by immediately applying wet curing blankets to the exposed concrete surface immediately following finishing operations for at least seven (7) consecutive days thereafter. Construction joints shall be cured by means of wet curing blankets only. Water shall be applied as necessary to keep the concrete and curing blankets

saturated. The Contractor must ensure the concrete and curing blankets are kept saturated with water for the entire seven (7) days.

(vi) 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. Formed surfaces shall receive, immediately after stripping and patching, the same curing as finished surfaces.

(vii) The abutment and sleeper footing concrete shall be moist cured in accordance with (e) above.

(viii) Curing compound shall be applied at the rate specified by the manufacturer for the accepted product. The compound must be applied uniformly.

(ix) Where curing compound is permitted, and following the completion of finishing operations, the surface shall be sprayed with an initial coating of curing compound, as per the manufacturer's recommendations. As soon as initial set has occurred, the surface shall receive a second roller-applied application of curing compound, to the satisfaction of the Contract Administrator.

(j) Form Removal

(i) The Contractor shall notify the Contract Administrator at least one (1) Working Day prior to form removal. The Contractor shall not commence any form removal operations without the prior written acceptance of the Contract Administrator.

(ii) All forms shall remain in place and the concrete shall not be loaded for a minimum of seven (7) Calendar Days after initial concrete placement, unless otherwise authorized by the Contract Administrator in writing.

(iii) Notwithstanding the above, the minimum strength of in-place concrete prior to removal of vertical forms shall be 70% percent of the 28 day strength, with the added provision that the member shall be of sufficient strength to safely carry its own weight, together with super-imposed construction loads.

(iv) Field-cured test specimens representative of the cast-in-place concrete being stripped shall be tested as specified in this Specification to verify the concrete strength.

(k) Patching of Formed Surfaces

(i) The Contractor shall notify the Contract Administrator at least one (1) Working Day prior to removal of forms. Immediately after forms have been removed and before the Contractor commences any surface finishing or concrete patching operations, all newly exposed concrete surfaces shall be inspected by the Contract Administrator.

(ii) Any repair or surface finishing started before this inspection may be rejected and required to be removed.

(iii) Patching of formed surfaces shall take place within 24 hours of formwork removal.

(iv) All formed concrete surfaces shall have bolts, ties, struts, and all other timber or metal parts not specifically required for construction purposes cut back 75 mm from the surface before patching.

(v) Minor surface defects caused by honeycomb, air pockets greater than 5 mm in diameter, voids left by strutting, and tie holes shall be repaired by removing the defective concrete to sound concrete, dampening the area to be patched, then applying bonding grout followed by patching mortar. Bonding grout shall be well brushed onto the area immediately prior to patching. When the bonding grout begins to lose the water sheen, the patching mortar shall be thoroughly trowelled into the repair area to fill all voids. It shall be struck off slightly higher than the adjacent concrete surface and left for one hour before final finishing to facilitate initial shrinkage of the patching mortar. It shall be touched up until it is satisfactory to the Contract Administrator. The patch shall be cured as specified in this Specification. The final colour shall match the surrounding concrete.

(vi) Concrete shall be cast against forms which will produce plane surfaces with no bulges, indentations, or protuberances other than those shown on the Drawings. All objectionable fins, projections, offsets, streaks, or other surface imperfections on the concrete surface shall be removed by means acceptable to the Contract Administrator. Cement washes of any kind shall not be used.

(vii) The arrangement of panel joints shall be kept to a minimum. Panels containing worn edges, patches, or other defects which will impair the texture of concrete surfaces shall not be used.

(l) Cold Weather Concreting

(i) The requirements of CAN/CSA A23.1 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.

(m) Hot Weather Concreting

(i) The requirements of this section shall be applied during hot weather, i.e., air temperatures forecast to go higher than 27°C during placing.

(ii) Concrete at discharge shall be at as low a temperature as possible, preferably as low as 15°C, but not above 25°C. Concrete containing silica fume shall be between 10°C minimum and 18°C maximum at discharge. Aggregate stockpiles should be cooled by water sprays and sun shades.

(iii) The Contractor shall use cold water and/or ice in the mix to keep the temperature of the fresh concrete down, if required. Ice may be substituted for a portion of the mixing water; provided 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 water sprays.

(v) Sun shades 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 acceptance is necessary before the Contractor may use admixtures such as retardants to delay setting, or water reducing agents to maintain Workability and strength, and these must appear in the Mix Design Statement submitted to the Contract Administrator.

(viii) Hot weather curing shall follow immediately after the finishing operation.

(n) Hot-Weather Curing

(i) When the air temperature is at or above 25°C, curing shall be accomplished by fog misting and by using saturated absorptive fabric, in order to achieve cooling by evaporation.

(ii) 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.

(o) Job Preparation

(i) When the air temperature is forecast to rise to 25°C or higher during the placing period, provisions shall be made by the Contractor for protection of the concrete in place from the effects of hot and/or drying weather conditions. Under severe drying conditions, the formwork, reinforcement, and concreting equipment shall be protected from the direct rays of the sun or cooled by mist fogging and evaporation, to the satisfaction of the Contract Administrator.

(p) Concrete Temperature

(i) The temperature of the concrete as placed shall be as low as practicable and in no case greater than the following temperatures, as shown in Table E14.2, “Acceptable Concrete Temperatures”, for the indicated size of the concrete section.

(ii)

TABLE E14.2: ACCEPTABLE CONCRETE TEMPERATURES		
THICKNESS OF SECTION, M	TEMPERATURES °C	
	MINIMUM	MAXIMUM
Less than: 1 1.2	 10 5	 27 25

E14.13 Cleanup

(a) The Contractor shall cleanup equipment and construction debris on at least a daily basis to the satisfaction of the Contract Administrator.

E14.14 Concrete Quality

(a) Inspection

(i) 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.

(ii) The Contractor shall be wholly responsible for the control of all operations incidental thereto, notwithstanding any inspection or acceptance 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.

(iii) Quality Assurance testing shall be undertaken by the Contract Administrator. Quality Control testing shall be undertaken by the Contractor.

(b) Access

(i) The Contractor shall allow the Contract Administrator free access to all parts of the Work at all times. The Contractor shall supply samples to the Contract Administrator or his inspector for testing purposes as required. There will be no charge to the City for samples taken.

(c) Materials

(i) All materials supplied under this Specification shall be subject to inspection and testing by the Contract Administrator or by the Quality Assurance Testing Laboratory designated by the Contract Administrator. There shall be no charge to the City of Winnipeg for any materials taken by the Contract Administrator for testing purposes.

(ii) All materials shall conform to the latest edition and all subsequent revisions of CAN/CSA A23.1.

(iii) All testing of materials shall conform to the latest edition and all subsequent revisions of CAN/CSA A23.2.

(iv) All materials shall be submitted to the Contract Administrator for acceptance at least twenty (20) Business Days prior to its scheduled incorporation into any construction. 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 material shall be rejected by the Contract Administrator and replaced by the Contractor at his own expense.

(d) Quality Assurance and Quality Control

(i) The Contract Administrator shall be afforded full access for the inspection and control and assurance 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.

(ii) The Contract Administrator reserves the right to reject concrete in the field that does not meet the Specifications.

(iii) The Contractor shall provide, without charge, the samples of concrete and the constituent materials required for Quality Assurance tests and provide such assistance and use of tools and construction equipment as is required.

(iv) Quality Assurance and Control tests will be used to determine the acceptability of the concrete supplied by the Contractor.

(v) The Contractor will be required to undertake Quality Control tests, of all concrete supplied. All test results are to be copied to the Contract Administrator immediately after the tests have been performed.

(vi) The frequency and number of concrete Quality Control tests shall be in accordance with the requirements of CAN/CSA A23.1. An outline of the quality tests is indicated below.

(e) Concrete Testing

(i) Slump tests shall be made in accordance with CSA Standard Test Method A23.2-5C, "Slump of Concrete". If the measured slump falls outside the limits in E14.4 (c), “Concrete Mix Design Requirements” of this Specification, a second test shall be made. In the event of a second failure, the Contract Administrator reserves the right to refuse the use of the batch of concrete represented.

(ii) Air content determinations shall be made in accordance with CSA Standard Test Method A23.2-4C, "Air Content of Plastic Concrete by the Pressure Method". If the measured air content falls outside the limits in E14.4 (c), “Concrete Mix Design Requirements” of this Specification, a second test shall be made at any time within the specified discharge time limit for the mix. In the event of a second failure, the Contract Administrator reserves the right to reject the batch of concrete represented.

(iii) The air-void system shall be proven satisfactory by data from tests performed in accordance with the latest edition and all subsequent revisions of ASTM Standard Test Method C457. The spacing factor, as determined on concrete cylinders moulded in accordance with CSA Standard Test Method A23.2-3C, shall be determined prior to the start of construction on cylinders of concrete made with the same materials, mix proportions, and mixing procedures as intended for the project. If deemed necessary by the Contract Administrator to further check the air-void system during construction, testing of cylinders may be from concrete as delivered to the job Site and will be carried out by the Contract Administrator. The concrete will be considered to have a satisfactory air-void system when the average of all tests shows a spacing factor not exceeding 230 microns with no single test greater than 260 microns.

(iv) Rapid chloride permeability testing shall be performed in accordance with ASTM C1202.

(v) Testing for post-cracking residual strength index (Ri) of FRC shall be tested as follows. One set of five concrete beam specimens, 100 mm by 100 mm by 350 mm long, shall be tested to failure using the same test set up in ASTM C1609-10. The average of the peak loads is the cracking load of the concrete (Pcr), and shall be provided to the Contract Administrator. A second set of five concrete beam specimens shall be tested to failure in accordance with ASTM C1399-07. The average of the peak loads during the reloading is the post cracking load of the concrete (Ppcr). The Ri is equal to the ratio of Ppcr over Pcr. The Contractor shall submit a summary of the results of all post-cracking residual strength index tests, including all load defection curves. Tests conducted in accordance to ASTM C1399-07 will be considered invalid by the Contract Administrator if the initial crack in the specimen has occurred after 0.5mm deflection. Specimens shall be sampled in accordance with (f).

(vi) Samples of concrete for test specimens shall be taken in accordance with CSA Standard Test Method A23.2-1C, "Sampling Plastic Concrete".

(vii) Test specimens shall be made and cured in accordance with CSA Standard Test Method A23.2-3C, "Making and Curing Concrete Compression and Flexure Test Specimens".

(viii) Compressive strength tests at twenty-eight (28) days shall be the basis for acceptance of all concrete supplied by the Contractor. For each twenty-eight (28) day strength test, the strength of two companion standard-cured test specimens shall be determined in accordance with CSA Standard Test Method A23.2-9C, "Compressive Strength of Cylindrical Concrete Specimens", and the test result shall be the average of the strengths of the two specimens. A compressive strength test at seven (7) days shall be taken, the strength of which will be used only as a preliminary indication of the concrete strength, a strength test being the strength of a single standard cured specimen.

(ix) Compressive strength tests on specimens cured under the same conditions as the concrete Works shall be made to check the strength of the in-place concrete so as to determine if the concrete has reached the minimum allowable working compressive strength as specified in Table E14.1 of this Specification and also to check the adequacy of curing and/or cold weather protection. At least two (2) field-cured test specimens shall be taken to verify strength of the in-place concrete. For each field cured strength test, the strength of field-cured test specimens shall be determined in accordance with CSA Standard Test Method A23.2-9C, "Compressive Strength of Cylindrical Concrete Specimens", and the test result shall be the strength of the specimen.

(f) Corrective Action

(i) 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. The Contractor shall, at his own expense, correct such Work or replace such materials found to be defective under this Specification in an acceptable manner to the satisfaction of the Contract Administrator.

E14.15 Heating and Hoarding

(a) The heating and hoarding of concrete, if required, will be considered incidental to supply and placement of structural concrete. No measurement and no separate payment will be made for this work.

E14.16 Measurement and Payment

(a) Method of Measurement

(i) Supplying and placing structural concrete will be measured on a volume basis. The measurement for concrete shall be the total number of cubic metres as measured from the contract drawings. No deductions will be made for chamfers, reinforcing steel, bolts or voids of seventy five (75) mm in diameter or less. All formwork materials, and accessories are incidental to the supply and placement of structural concrete.

(b) Basis of Payment

(i) Concrete shall be paid for at the Contract Unit Price per cubic metre for the “Items of Work” listed here below, 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 and accepted by the Contract Administrator.

(ii) Items of Work:

- Mile 77.6:
  - Mile 77.6 – Supply and Place Structural Concrete for Abutments
  - Mile 77.6 – Supply and Place Structural Concrete for Wingwalls
- Mile 22.15:
  - Mile 22.15 – Supply and Place Structural Concrete for Abutments
  - Mile 22.15 – Supply and Place Structural Concrete for Wingwalls

E15. REINFORCING STEEL

E15.1 Description

(a) This Specification shall cover all operations relating to the supply, fabrication, and placement of black reinforcing steel, and associated bar accessories, as specified herein and as shown on the Drawings.

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

E15.2 Referenced Specifications and Drawings

(a) The latest edition and subsequent revisions of the following:

(i) ASTM A615M – Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement;

(ii) ASTM C881 – Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete;

(iii) CAN/CSA A23.1/A23.2 – Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete;

(iv) CAN/CSA G30.18 – Billet-Steel Bars for Concrete Reinforcement;

(v) Reinforcing Steel Institute of Canada – Reinforcement Steel Manual of Standard Practice.

E15.3 Scope of Work

(a) The Work under this Specification shall involve supplying and placing all black steel reinforcing, as shown on the Drawings for the following Works:

(i) Concrete Abutments

(ii) Concrete Wingwalls

E15.4 Submittals

(a) The Contractor shall submit to the Contract Administrator for review and approval, at least ten (10) Business Days prior to the commencement of any scheduled Work on the Site, a proposed schedule, including methods and sequence of operations.

(b) The Contractor shall submit to the Contract Administrator for review and approval, at least twenty (20) Business Days prior to the scheduled commencement of any fabrication, the qualifications of the Contractor, and the qualifications of Operators, the Shop Drawings including bar lists, and the mill certificates.

(c) Shop Drawings shall be submitted in accordance with the latest edition of the Reinforcement Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada (RSIC).

E15.5 Materials

(a) General

(i) 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.

(ii) 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.

(b) Handling and Storage of Materials

(i) 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 and all subsequent revisions of CAN/CSA-A23.1, “Storage of Materials”, except as otherwise specified herein.

(ii) Bundles of reinforcing steel shall be identified by tags containing bar marks.

(iii) The Contractor shall handle and store the reinforcing steel in a manner that ensures it is not damaged or contaminated with dirt or other materials.

(iv) The reinforcing steel shall not be placed directly on the ground. Timber pallets shall be placed under the reinforcing steel to keep them free from dirt and mud and to provide easy handling.

(c) Reinforcing Steel

(i) Reinforcing steel shall be deemed to include all reinforcing bars, tie-bars, and dowels.

(ii) Black steel as shown on the Drawings and shall conform to the requirements of CAN/CSA G30.18, Grade 400W.

(iii) If, in the opinion of the Contract Administrator, any reinforcing steel provided for the concrete Works exhibit flaws in manufacture or fabrication, such material shall be immediately removed from the site and replaced with acceptable reinforcing steel.

(iv) All reinforcing steel shall be straight and free from paint, oil, millscale, and injurious defects. Rust, surface seams, or surface irregularities will not be cause for rejection, provided that the minimum dimensions, cross sectional area, and tensile strength are not less than the requirements of ASTM A615M.

(d) Bar Accessories

(i) Bar accessories shall be of types suitable for each type of reinforcing and acceptable to the Contract Administrator. They shall be made from a non-rusting material, and they shall not stain, blemish, or spall the concrete surface for the life of the concrete.

(ii) Bar chairs, bolsters, and bar supports shall be made from cementitious material. No plastic or PVC, or galvanized bar supports shall be used.

(iii) The use of pebbles, pieces of broken stone or brick, plastic, metal pipe, and wooden blocks, will not be permitted.

(iv) Placing of bar supports shall be done to meet the required construction loads.

(v) Tie wire shall be the following:

- Black, soft-annealed 1.6 mm diameter wire for black steel reinforcing; or
- Nylon-, epoxy-, or plastic-coated wire for black steel reinforcing;

(vi) 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. The supplying and installation of bar accessories shall be deemed to be incidental to the supplying and placing of reinforcing steel.

(e) Bonding Agent/Grout

(i) Epoxy resin shall conform to the requirements of ASTM C881. Type I or Type IV, Grade 3 epoxy shall be used for bonding reinforcing steel into hardened concrete. An approved product is Hilti RE500 or equal, as approved by the Contract Administrator in accordance with B7 “Substitutes”.

(ii) An aggregate filler may be used in accordance with manufacturer's directions when the drilled hole is sized for the head of a stud rather than a shaft only.

E15.6 Equipment

(a) General

(i) All equipment shall be of a type acceptable to the Contract Administrator and shall be kept in good working order.

E15.7 Construction Methods

(a) Fabrication of Reinforcing Steel

(i) All reinforcing steel shall be fabricated in accordance with the latest edition of the Reinforcement Steel Manual of Standard Practice by the RSIC, to the lengths and shapes as shown on the Drawings.

(b) Placing and Fastening of Reinforcing Steel

(i) 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 so 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.

(ii) 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 has been deposited on the steel from previous pouring operations before additional concrete may be placed. Intersecting bars shall be tied positively at each intersection.

(iii) Reinforcing steel shall be placed to provide a clear space between the reinforcing bars as shown on the Drawings to accurately place preformed holes where necessary.

(iv) 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.

(v) Heating of reinforcing steel shall not be permitted without prior acceptance by the Contract Administrator.

(vi) Reinforcing steel shall be placed within the tolerances specified in CAN/CSA A23.1.

(vii) The Contractor shall supply and place all necessary support accessories to ensure proper placement of reinforcing steel. All reinforcement shall be accurately placed in the positions shown on the Drawings, and firmly tied and chaired before placing the concrete.

(viii) Distances from the forms shall be maintained by means of stays, spacers, or other approved supports. Spacers and supports for holding reinforcing steel at the required location and ensuring the specified concrete cover over the reinforcing steel shall be as specified in E15.5 (d), “Bar Accessories”.

(ix) Welding or tack welding is not permitted.

(x) Unless otherwise shown on the Drawings, the minimum distance between bars shall be 40 mm.

(c) Splicing

(i) Splices shall only be provided as shown on the Drawings. Splices other than as shown on the Drawings will not be permitted without the written approval of the Contract Administrator.

(ii) For lapped splices, the bars shall be placed in contact and wired together in such a manner as to maintain a clearance of not less than the required minimum clear distance to other bars, and the required minimum distance to the surface of the concrete. In general, suitable lap lengths shall be supplied as detailed on the Drawings. If this information is not detailed on the Drawings, a minimum of thirty-five (35) bar diameters lap length shall be provided.

(iii) Welded splices shall not be permitted.

E15.8 Quality Control

(a) Inspection

(i) 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.

(ii) The Contractor shall be wholly responsible for the control of all operations incidental thereto, notwithstanding any inspection or acceptance 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.

(iii) A minimum of one (1) Business Day advance notice shall be given to the Contract Administrator prior to the pouring of any concrete to allow for inspection of the reinforcing steel.

(iv) After all reinforcing steel has been placed, a final inspection shall be made prior to the placement of concrete to locate any damage or deficiencies. All visible damage or any deficiencies shall be repaired to the satisfaction of the Contract Administrator before concrete is placed.

(b) Access

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

E15.9 Quality Assurance

(a) Testing

(i) Quality Assurance testing shall be used to determine the acceptability of the reinforcing steel supplied by the Contractor.

(ii) The Contractor shall provide, without charge, the samples of reinforcing steel required for Quality Assurance Tests and provide such assistance and use of tools and construction equipment as is required.

E15.10 Measurement and Payment

(a) Method of Measurement

(i) Reinforcing Steel shall be measure on a mass basis. The measurement for the rock anchors shall be the total mass of reinforcing steel placed and accepted by the Contract Administrator as computed from shop drawings and shipping tickets.

(b) Basis of Payment

(i) Reinforcing Steel shall be paid at the Contract Unit Price per kilogram as measured above, for the “Items of Work” listed here below, which price shall be payment in full for performing all operations herein described and all other items incidental to the Work included in this Specification and accepted by the Contract Administrator.

- Items of Work:
  - Mile 77.6 – “Supply and place reinforcing steel”
  - Mile 22.15 – “Supply and place reinforcing steel”

E16. STRUCTURAL STEEL

E16.1 Description

(a) This Specification shall cover the supply, fabrication, and placement of structural steel; including supply and erection of girders and beams, intermediate bracing, stiffeners, high tensile bolts, bearings, anchor bolts for bearings, welding of sole plates to girder flanges, splice plates and bolted connections, as specified herein and as shown on the Drawings.

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

E16.2 Referenced Specifications and Drawings

(a) The latest edition and subsequent revisions of the following:

(i) AREMA Manual for Railway Engineering.

(ii) CAN/CSA G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel/ Structural Quality Steel

(iii) CSA W59, Welded Steel Construction (Metal Arc Welding)

(iv) AASHTO/AWS D1.5M/D1.5 Bridge Welding Code

(v) City of Winnipeg's Approved Products List

E16.3 Scope of Work

(a) The Work under this Specification shall involve supplying and installation of structural steel, as shown on the Drawings for the following Works:

(b) Structural Steel for Bridge Superstructure

E16.4 Submittals

(a) The Contractor shall submit to the Contract Administrator for review and approval, at least ten (10) Business Days prior to the commencement of any scheduled Work on the Site, a proposed schedule, including methods and sequence of operations.

(b) The Contractor shall submit to the Contract Administrator for review and approval, at least twenty (20) Business Days prior to the scheduled commencement of any fabrication, the qualifications of the Contractor, and the qualifications of Operators, the Shop Drawings including bills of materials, and the mill certificates.

E16.5 Qualifications

(a) All work shall be performed by a firm certified by the Canadian Welding Bureau to the requirements of CSA W47.1 in Division 1 or Division 2.1.

(b) Steel fabrication shall be done by an established firm having at least five years of C.W.B. approval and experience in heavy structural steel work.

(c) Welding operators employed on the work shall be currently qualified by the C.W.B. Qualification is to have been issued within two years of the commencement of fabrication.

E16.6 Shop Drawings

(a) The Contractor shall submit to the Contract Administrator complete Shop Drawings for all steel components.

(b) Shop Drawings shall clearly indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and any other information necessary for the completion of the work. Shop Drawings shall indicate cross-references to the Drawings and Specifications.

(c) Shop Drawings not stamped, signed and dated will be returned without being reviewed and will be considered rejected.

(d) Any adjustments made on the shop drawings by the Contract Administrator are not intended to change the contract price. If it is deemed that such adjustments affect the value of the work, the contractor should clearly state such in writing prior to proceeding with the work, and should not proceed with the work until authorized to do so by the Contract Administrator.

(e) If upon review by the Contract Administrator no errors or omissions in compliance with the contract documents are discovered or if only minor corrections are made, fabrication and installation of the work may proceed upon the approval of the Contract Administrator. However, if shop drawings are rejected for any reason, the shop drawings will be returned for corrections and resubmission. The corrected shop drawings are to be re-submitted through the same procedure indicated above before fabrication and installation of the work may proceed.

(f) All shop drawings shall be in metric units.

(g) Any work done by the Contractor before receiving reviewed Shop Drawings is done at his or her own risk.

(h) The review of the Shop Drawings by the Contract Administrator is for the sole purpose of ascertaining conformance with the general design concept. This review does not mean that the Contract Administrator approves the design or details inherent in the shop drawings, the responsibility for which remains with the Contractor submitting same, and such review does not relieve the Contractor of his or her own responsibility for errors or omissions in the Shop Drawings or of his or her responsibility for meeting all the requirements of the contract documents. The Contractor is responsible for determination and correlation of dimensions at the jobsite, for information that pertains solely to fabrication processes or to techniques of construction and installation and for coordination of the Work of all subcontractors.

E16.7 Materials

(a) Structural Steel

(i) All Steel shall conform to CSA G40.21M, Grade 350AT (Category 3).

(b) Structural Bolts, Nuts and Washers

(i) High Strength Bolts shall conform to ASTM A325 Type 3 atmospheric corrosion resistant. Nuts shall conform to ASTM A563 Grade C3 or DH3 heavy hex nuts.

(ii) Washers shall conform to ASTM F436, Type 3 hardened steel washers.

E16.8 Storage

(a) Structural steel, either plain or fabricated, shall be stored at the bridge shop or elsewhere above the ground upon platforms, skids or other supports.

(b) Structural steel shall be kept free from dirt and other foreign matter and shall be protected as far as practical from corrosion.

(c) Long members shall be supported on skids placed near enough together to prevent injury from deflection.

E16.9 Marking

(a) Prior to fabrication, all steel shall be marked for identification by heat number and specification by a marking system approved by the Contract Administrator.

E16.10 Preparation

(a) Prior to being used in fabrication ensure all structural steel is straight and free from kinks or bends. The flatness tolerance of plate in excess of 1 metre wide is to be in accordance with the tolerance of the finished product as stated herein.

(b) If straightening is necessary, do so by methods which will not injure the metal. Do not heat the steel unless permission is given by the Contract Administrator. Sharp kinks and beds will be cause for rejection of the steel.

(c) Visually inspect edges of all plates. Do not use plates found to include laminations. Prepare the edges of plates or sections which are to be welded together by sawing, shearing, flamecutting, machining, chipping or arc air gouging to the details shown on the shop drawings. Ensure surfaces and edges to be welded are smooth, uniform and free from fins, tears, cracks and other defects which would adversely affect the quality or strength of the weld. Also ensure surfaces to be welded are free from loose scale, slag, rust, grease, moisture or other material which will prevent proper welding. Mill scale that withstands vigorous wire brushing, a light film of drying oil or a thin rust inhibitive coating may remain, except remove all mill scale from the surfaces on which flange-to-web welds are to be made by submerged arc welding or by shielded metal arc welding with low hydrogen electrodes. Ensure surfaces within 50 mm or any weld location are free from any paint or other material which would prevent proper welding or produce objectionable fumes while welding.

(d) Trim edges of material thicker than specified in the following list, as required to produce a satisfactory welding edge wherever a weld along the edge is to carry calculated stresses:

(i) Sheared edges of material thicker than 12 mm.

(ii) Rolled edges of plates (other than Universal Mill Plates) thicker than 9 mm.

(iii) Toes of angles or rolled shapes (other than wide flange sections) thicker than 16 mm.

(iv) Universal Mill Plates or edges of flanges of wide flange section thicker than 25 mm.

(e) Edges to be welded may be prepared by oxygen cutting, providing a smooth and regular surface free from cracks and notches is secured and providing that an accurate profile is secured by the use of a mechanical guide. Do free hand cutting only where approved by the Contract Administrator.

(f) Preheat all flange plates prepared by flame cutting in accordance with the Clause E16.12 stated herein.

(g) In all oxygen cutting, adjust and manipulate the cutting flame to avoid cutting beyond the prescribed lines. Roughness of cut surfaces are to conform to the United States Standards Institute surface roughness value of 1,000 (USAI B46.1, Surface Texture). Remove roughness exceeding this value by machining or grinding.

(h) Occasional gouges will be tolerated only at the discretion of the Contract Administrator. Repair in accordance with the Contract Administrator's instructions.

(i) Edge Preparation, Non-Welded Edges:

(i) Cut steel to size by sawing, shearing, flame cutting or machining. Mark all steel after cutting by a method agreed to by the Contract Administrator so that its specification may be immediately identified.

(ii) Plane to a depth of 6 mm all sheared edges more than 16 mm in thickness.

(iii) Any flame cutting is to conform to specifications noted above for edges of plates to be welded.

(iv) Give special attention to the cutting of flange plates. Occasional gouges not in excess of 6 mm deep will be accepted in areas of low stress at the discretion of the Contract Administrator. Repair or remove such gouges in accordance with the Contract Administrator's instructions.

(v) Grind edges of flame cut flange plates to a radium of 2 mm. Fillet re-entrant cuts to a radium of not less than 19 mm.

(j) Holes for Bolts

(i) All holes for high tensile bolts are to be either punched, sub-punched and reamed or drilled and are to be 2 mm in excess of the nominal bolt diameter, except where oversize or slotted holes are called for on the Drawings. Holes for splices in webs and flanges of main girders are to be either sub-punched and reamed or drilled full size.

(ii) Ensure punched holes are clean cut without torn or ragged edges. The diameter of the die is not to exceed the diameter of the punch by more than 2 mm. If a punched hole must be enlarged to admit a high tensile bolt, do so by reaming.

(iii) Ensure reamed holes are cylindrical and perpendicular to the member. Where practicable, reamers are to be directed by mechanical means. Reaming is to be done with twist drills.

(iv) Drilling is to be done with twist drills. Burrs on the outside surfaces are to be removed.

(v) Poor matching of holes will be cause for rejection.

E16.11 Assembly

(a) The shop assembly of the various components of the weldments to be performed in accordance with AWS D1.5.

(b) Tack welding is to be done by qualified operators using the smallest size weld required to hold the components of the assembly together. Tack welds are not to be less than 50 mm in length and are to be incorporated in the final weld.

(c) Tack welds are to be made with 4 mm maximum size electrodes and are subject to the preheat requirements stated herein.

E16.12 Preheat

(a) Do not weld when the temperature of the base metal is lower than –20°C. At temperatures below 0°C preheat the steel to a temperature of at least 10°C in excess of that stated in Table E16-1.

(b) Apply preheat to all steel to be welded so that the steel within 75 mm of the weld is heated to the temperature shown in Table E16-1.

(c) Apply preheat in such a manner that moisture from the heating equipment does not penetrate the joint.

(d) For all welding processes, maintain preheat and interpass temperatures during welding at temperatures not less than stated in Table E16-1.

TABLE E16-1

Thickness of Thickest Part at Point of Welding	CSA 350 A G40.21M CSA 350 AT G40.21M
Less than 19 mm	21°C
19 mm to 30 mm	66°C
38 mm to 64 mm	107°C
Over 64 mm	150°C

(e) Preheat temperature is not to exceed 200°C but there is no limit on interpass temperature.

(f) Preheat requirements for tack welds are to conform to the above table except where single pass tack welds are used and are to be incorporated and consumed in a weld made by the submerged arc and the gas metal arc processes, preheat if necessary.

E16.13 Welding

(a) Do welding by the manual shielded metal arc, gas shielded metal arc or submerged arc processes in accordance with the approved procedures and AWS D1.5.

(b) All flange and web butt welds and all stiffener to web fillet welds shall be made by an approved semi or fully automatic submerged arc process. All Flange to web fillet welds shall be made by an approved fully automatic submerged arc process.

(c) Perform welding under cover and, in the case of gas metal arc welding, weld in an area that is free from wind or draft.

(d) Where the submerged arc or gas metal arc processes are to be used, the Contract Administrator may order that:

(i) A preliminary test run of the approved procedure be made over the length of the joint to prove that the disposition of the equipment, the handling of hoses and the method and accuracy of travel are satisfactory.

(ii) Each operator make a weld specimen not less than 1.2 m length for fillet welds and 150 mm in length for butt welds. Steel of the same specification and thickness as that to be used in the work shall be used in the specimen welds. No welding is to be done on the work until such a specimen is satisfactory to the Contract Administrator.

(e) Extend butt welds beyond the edges of the parts to be joined by means of start and run-off tabs providing sufficient thickness to avoid the weld burning through and with a joint preparation similar to that on the main material. For manual shielded metal arc welding, ensure the width of the tabs are not less than the thickness of the thicker part being joined or 75 mm; whichever is greater. For submerged arc welding the width of the tabs are not to be less than 75 mm. Carry each weld pass far enough beyond the edge of the parts being joined to ensure welds in the joint. Remove tabs upon completion and cooling of the weld without damage to the parent plate and the end of the weld made smooth and flush with the edges of the abutting parts.

(f) In gas metal arc welding ensure the equipment is capable of sustaining a gas flow rate of from 30 to 45 c.f.h. Limit gas welding to light structural elements only.

E16.14 Quality

(a) The quality and details of welds is to meet the requirements of AWS D1.5.

(b) Ensure welds do not have cracks, inadequate penetration, lack of fusion and other defects exceeding the limits in size and frequency of occurrence as specified in AWS D1.1, Subsection 9.25. Fusion type defects referred to in 9.25 are to be interpreted as slag inclusions and similar generally elongated defects.

(c) Ensure welding equipment is in good working order. All equipment is to be inspected by the Contract Administrator.

E16.15 Shop Assembly

(a) The field connections of main girders shall be assembled in the shop and then shall have their sub-size holes reamed to specified size while the connections are assembled,

(b) Each assembly, including alignment, accuracy of holes, and fit of milled joints, is to be approved by the Contract Administrator before reaming is commenced or before an N/C drilled check assembly is dismantled.

(c) Progressive Truss or Girder Assembly:

(i) Progressive Girder Assembly will consist of assembling initially for each plate girder at least three continuous shop sections. Successive assemblies shall consist of not less than two sections or panels of the previous assembly (repositioned if necessary and adequately pinned to assure accurate alignment) plus one or more sections or panels added at the advancing end. In the case of structures longer than 46 m, each assembly shall be not less than 46 m long regardless of the length of individual continuous panels or sections. At the option of the fabricator, sequence of assembly may start from any location in the structure and proceed in one or both directions so long as the preceding requirements are satisfied.

(d) Assemblies consisting of less than three shop sections or panels shall require approval of the Contract Administrator.

E16.16 Tolerances

(a) Dimensions of the completed floor beams or girders are to conform to the following tolerances:

(b) Deviation from Specified Camber at Centre of Girder: □(0.2L + 3) mm where L = span (m).

(c) Lateral Deviation Between Centreline of Web and Centreline of Flange: 3mm.

(d) Deviation from Flatness of Girder Webs Measured Between Flanges or Between Stiffeners: 6 mm.

(e) Combined Warpage and Tilt of Flanges of Girders, Determined by Measuring the Offset Between the End of the Flange Plate and the Flange Pate at the Centre of the Web Plate: +/- 3mm.

(f) Curvature of Stiffeners Normal to the Vertical Plane:

(i) intermediate stiffeners: +/- 6 mm.

(ii) bearing stiffeners: +/- 3 mm.

(iii) diaphragm stiffeners: +/- 6 mm.

(g) The Maximum Deviation From the Specified Length Measured on Centreline of Web: +/- 6 mm.

(h) Normal tolerance for fitting between hole groups will be +/- 3 mm.

E16.17 Bearing Surfaces

(a) The surface finish of bearing and base plates and other bearing surfaces that come into contact with each other or with concrete are to conform to the following requirements:

(i) Sliding Surfaces, Pins and Pin Holes: to ASA125.

(ii) Milled Ends of Compression Members, Stiffeners and Fillers, Contact Surfaces of Bearing Sole Plates and Girder Flanges: to ASA500.

(iii) Surface Bearings on Concrete, Permissible Variation in Flatness 3 mm in 1 m: (ignore lead sheet, etc.): to ASA2000.

(iv) Contact Surfaces of bearing base plates: ANSI 250.

(b) To ensure uniform contact with bearing, flanges of beams and girders in that area are not to be out of square with the vertical axis of the beam or girder.

(c) Ensure sole plates and rocker plates have full contact with the flanges of the beams of girders.

(d) In planing the surfaces of bearing members ensure the cut of the tool is in the direction of expansion or rotation.

(e) Stress relieve members that are built up by welding in accordance with the provisions of the American Welding Society.

E16.18 Unacceptable Work

(a) Correct any work found to be unacceptable in accordance with AWS D1.1, AWS D1.5, or any part of this specification.

(b) Do not proceed with repairs until the procedure is reviewed by the Contract Administrator.

(c) Repair and retest costs will be borne by the Contractor

E16.19 Execution

(a) Completed Girders

(i) Store completed girders in an upright and shored position on skids above the ground.

(b) Shop Assembly

(i) Assemble the parts accurately as shown on the Drawings. Install bolts for stability of connections and shop assembly/inspection purposes. Bolts used for shop assembly shall not be used in field assembly.

(ii) Notify the Contract Administrator 48 hours prior to commencing shop assembly.

(iii) Bridge to be assembled in full for final shop inspection.

(c) Shipping

(i) Load structural members on trucks or cars in such a manner to avoid being excessively stressed, deformed or otherwise damaged during transportation and loading.

(d) Delivery

(i) Arrange with appropriate authorities an acceptable route and schedule to ensure quick and safe delivery of steel work.

(e) Handling/Storage

(i) Place material to be stored on skids above the ground. Keep clean and properly drained. Support long members on skids placed near enough to prevent damage from deflection.

(f) Falsework

(i) Erect falsework in accordance with the reviewed shop drawings.

(ii) Arrange for a professional structural engineer responsible for falsework design to inspect erected falsework and certify, in writing, that it is in accordance with the design.

(g) Field Assembly

(i) Assemble the parts accurately as shown on the Drawings and follow any match marks. Do not hammer or distort members which will result in damage to the member. Clean bearing surfaces and surfaces in permanent contact before the members are assembled.

(ii) Ensure field connections have one half of the holes filled with bolts and cylindrical erection pins (half bolts and half pins) before final bolting. Fitting up bolts are to be the same nominal diameter as the high tensile bolts and cylindrical erection pins are to be 1 mm larger.

(h) Straightening

(i) Straighten plates and angles or other shapes by methods that will not produce fracture or other injury. Do not heat metal unless permitted by the Contract Administrator in which case, do not heat to a temperature higher than that producing a “dark cherry red” colour. After heating, cool the metal as slowly as possible.

(ii) Following the straightening of a bend or buckle, inspect the surface of the metal for evidence of fracture and if necessary, replace or repair to the satisfaction of the Contract Administrator.

(i) Bolting

(i) Bolt field connections with high tensile bolts except where machine bolts are called for on the drawings. Bolting with high tensile bolts shall be carried out in accordance with the appropriate clauses of the current edition of AREMA.

(j) Misfits

(i) The correction of minor misfits involving harmless amounts of reaming, cutting and chipping will be considered, at the discretion of the Contract Administrator, a legitimate part of erection. However, correct any error in shop fabrication which prevents the proper assembling and fitting up of parts by the moderate use of drift pins or by a moderate amount of reaming and slight chipping or cutting as determined by the Contract Administrator.

(k) Substructure

(i) Protect substructure during erection of the structural steel by the Contractor. Protect all concrete surfaces and corners liable to damage with wood blocking, sacking or other means to prevent damage and chipping of concrete due to wire ropes, swing loads or other activities. Repair any such damage to the satisfaction of the Contract Administrator.

(ii) The erection of structural steel and attachment to the substructure piers and abutments shall be done so that, during erection, there are no forces applied to cause over-stressing of the piers and abutments.

E16.20 Measurement and Payment

(a) Method of Measurement

(i) Supply Structural Steel

- Supply of structural steel will be measured on a mass basis. The mass to be paid for shall be the total number of kilograms of structural steel supplied in accordance with this Specification, accepted by the Contract Administrator, as computed from the Drawings or the approved shop drawings.

(ii) Erect Structural Steel

- Erection of structural steel will be measured on a mass basis. The mass to be paid for shall be the total number of kilograms of structural steel erected in accordance with this Specification, accepted by the Contract Administrator.

(b) Basis of Payment

(i) Supply Structural Steel

- The supply of structural steel shall be paid for at the Contract Unit Price per kilogram for "Supply Structural Steel" measured as specified herein, which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the work included in this Specification. Items of Work are as follows:
  - Mile 77.6 – "Supply structural steel"
  - Mile 22.15 – "Supply structural steel"

(ii) Erect Structural Steel

- The erection of structural steel shall be paid for at the Contract Unit Price per kilogram for "Erect Structural Steel" measured as specified herein, which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the work included in this Specification. Items of Work are as follows:
  - Mile 77.6 – "Install structural steel"
  - Mile 22.15 – "Install structural steel"

E17. BEARINGS

E17.1 Description

(a) This Specification shall cover the supply and installation of the bearings, steel plates and retaining plates for the proposed bridge.

(b) The work to be done under this specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all things necessary for and incidental to the satisfactory performance and completion of all work as hereinafter specified.

E17.2 Referenced Specifications and Drawings

(a) The latest edition and subsequent revisions of the following:

(i) AREMA Manual for Railway Engineering.

(ii) CAN/CSA G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel/ Structural Quality Steel

(iii) CSA W59, Welded Steel Construction (Metal Arc Welding)

(iv) AASHTO/AWS D1.5M/D1.5 Bridge Welding Code

(v) City of Winnipeg's Approved Products List

E17.3 Scope of Work

(a) The Work under this Specification shall involve the following:

(i) Supply and installation of bearing pads at the abutments

E17.4 Material

(a) General

(i) 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.

(ii) 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.

(b) Materials

(i) Bearing Pads

- The bridge bearing pads shall be supplied and installed by the Contractor as shown on the Drawings.
- Bearing pads shall be Laminated Elastomeric pads as shown on the Drawings, such as Goodco, or equal as accepted by the Contract Administrator, in accordance with B7, “Substitutes”.
- The elastomeric compound shall be 100 percent virgin polyisoprene (natural rubber), virgin crystallization-resistant polychloroprene (neoprene), or cast polyurethane meeting the requirements of AREMA (2013), Table 15-5-4
- Bearing pads shall have Shore A hardness of 60 Durometer.
- Steel reinforcement for reinforced elastomeric bearings shall be rolled from mild steel sheet conforming to ASTM A1011 (A1011M), Grade 36; or ASTM A1008 (A1008M), Grade D.

(c) Steel Components

(i) Steel components such as external loading plates, retaining plates, and high strength bolts shall meet the requirements of E16 “Structural Steel”

(d) Bearing Leveling Pads

(i) Levelling pads shall be laminated fabric rubber such as Fabreeka, Sorbtex or equal as accepted by the Contract Administrator, in accordance with B7, “Substitutes”.

(e) Anchor Bolts, Nuts and Washers

(i) Anchor bolts shall be hot dip galvanized , and shall meet the requirements of ASTM F1554, Grade 105

(ii) Nuts shall conform to ASTM A563 Grade D, Type 1, Hot Dip Galvanized

(iii) Washers shall conform to ASTM F436, Type 1, Hot Dip Galvanized

(f) Grout

(i) Grout for anchor bolts shall be non-metallic, non-shrink grout such as Sika 212 or equal as accepted by the Contract Administrator, in accordance with B7, “Substitutes”.

(ii) The minimum compressive strength of the grout at 28 days shall be 40 MPa.

(g) Elastomeric Shims

(i) Elastomeric shims shall be neoprene, with a Shore A hardness of 60 Durometer and be 2mm and 3mm thick

(h) Adhesive

(i) The adhesive for bonding the shims shall be a long lasting, high strength, cold applied, air cured, water and heat resistant material specifically formulated for bonding neoprene and shall meet the following requirements:

Property	Requirement	ASTM Test Procedure
Adhesion	5.25 kN/m	D429, Method B
Hardness	50±5 Shore A points	D2240
Tensile Strength, min.	12.4 MPa	D412
Elongation before breaking, min.	750%	D412

E17.5 Equipment

(a) All equipment shall be of a type approved by the Contract Administrator and shall be kept in good working order.

E17.6 Fabrication

(a) Shop drawings showing details of bearings, completed with laminated bearing pads and steel bearing plates shall be provided to the Contract Administrator for approval. Submission of shop drawings to the Contract Administrator in no way relieves the Contractor of his responsibility for the fabrication quality and accuracy and proper installation of the bearing pads as indicated herein this Specification and on the Drawings.

E17.7 Guarantee

(a) Fabrication Guarantee

(i) The bearing supplier shall provide a written guarantee stating that they will perform satisfactorily within the design range of movement and under the design loads for a period of five (5) years from the issuance of the Total Performance Certificate, provided that the bearings have been properly installed. The supplier shall state that they have reviewed the installation procedures and find it in accordance with their recommendations. The supplier shall guarantee the replacement of the bearings at no cost to the City in the event that the bearings do not perform satisfactorily within the design range of movement and under the design loads.

(b) Installation Guarantee

(i) The Contractor shall ensure that the bearings are installed in such a manner that will not void the fabrication guarantee.

(ii) The Contractor shall guarantee in writing, the performance of the bearings for a period of five (5) years from the date of issuance of the Total Performance Certificate. Provided in the guarantee for the replacement of the bearings at no cost to the City in the event that the bearings do not perform satisfactorily in the range of design movement and under the design loads.

E17.8 Construction Methods

(a) Bearings

(i) The bearings, complete with bearing retainer assemblies shall be installed by the Contractor prior to placing the girders.

(ii) Before erection of the bearings, the Contractor shall satisfy himself that the location of substructure units and elevations of bridge seats are in accordance with the plans and specifications. All discrepancies discovered by the Contractor shall be brought immediately to the attention of the Contract Administrator.

(iii) Workmanship and finish shall be in accordance with plans and specifications and shall conform to the best practices of bridge construction. The parts shall be assembled as shown on the plans and all match marks shall be observed. The material shall be handled carefully so that no parts will be bent, broken or otherwise damaged.

(iv) The elastomeric bearings shall bear uniformly on all surfaces under full dead load. If uniform bearing is not present, the gaps beneath the bearing shall be filled with elastomeric shims. The Contractor, in the presence of the Contract Administrator, shall measure the gaps to determine the limits of the areas requiring shims.

(v) The Contractor shall raise the superstructure and install shims as required to provide uniform bearing of the bearings. The individual shims shall be bonded to the elastomer portion of the bearing with adhesive applied over the entire shim interface. The surface preparation, application and curing of the adhesive shall be in accordance with the manufacturers recommendations. If shims in excess of 3mm are required, multiple shims shall be bonded together. Shimming of areas that vary in thickness shall be done by stepping the shims.

E17.9 Quality Control

(a) All workmanship and all materials furnished and supplied under this Specification are subject to the close and systematic inspection by the Contract Administrator. 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 the specification.

E17.10 Measurement and Payment

(a) Supply and place bearings will be measured on a unit basis and will be paid for at the Contract Unit Price per unit for the "Items of Work" listed here below, which price shall be payment in full for performing all operations herein described and all other items incidental to the Work included in this Specification and accepted by the Contract Administrator.

(b) Items of Work:

(i) Mile 77.6 – "Supply and Place Bridge Bearings"

(ii) Mile 22.15 – "Supply and Place Bridge Bearings"

E18. RIPRAP

E18.1 General

(a) Riprap shall be random stone riprap and supplied and installed in accordance with Specification CW 3615, except as specified herein.

E18.2 Materials

(a) Rock

(i) The Contractor shall supply quarried rock, or quarried limestone which is dense, durable, sound, resistant to the action of water and frost, and suitable in all respects for the purpose intended. Stone rip-rap shall be free from sod, roots, organic material and debris prior to placement. Individual pieces of stone shall be free of defects such as seams or cracks that would cause rapid or excessive deterioration or degradation. The Contract Administrator shall approve the rock for riprap prior to placing.

(ii) Quarried limestone shall have a maximum Los Angeles Abrasion Loss of 32% (ASTM C535) and a maximum Magnesium Sulphate Soundness Loss of 13% (ASTM C88).

(iii) The stone rip-rap shall be well graded having a full range and even distribution of sizes and shall conform to the following gradation:

Size (mm)	
450	100%
250	15-50%
150	0-15%

E18.3 Geotextile Fabric

(a) Geotextile fabric shall be non-woven and conform to the requirements of CW 3130 Clause 2.5.

E18.4 Construction Methods

(a) Place a layer of the geotextile fabric under the riprap and anchor the upstream and downstream end of rock filled trenches as shown on the Drawings. The inlet and outlet proposed riprap are to blend into the existing riprap.

(b) Place the rock riprap carefully on the geotextile fabric so that it does not tear.

E18.5 Measurement and Payment

(a) Method of Measurement

(i) Supply and placement of riprap and geotextile fabric will be measured on a volume basis and will be paid for at the Contract Unit Price per cubic metre for "Random Stone Riprap and Geotextile", which price shall be payment in full for performing all operations herein described and all other items incidental to the Work included in this Specification and accepted by the Contract Administrator.

(b) Basis of Payment

(i) Supply and placement of riprap and geotextile fabric will be measured by surface area of riprap placed and accepted by the Contract Administrator multiplied by the specified depth as indicated on the Drawings.

(ii) Items of Work:

- Mile 77.6 – "Supply and Place Stone Rip-Rap"
- Mile 22.15 – "Supply and Place Stone Rip-Rap"

E19. TRACK WORK

E19.1 General

(a) Description

(i) Comply with General Conditions, Supplementary Conditions, Addenda thereto, specifications and Drawings.

(ii) All track work will comply with the CP's current Standard Practice Circulars and Redbook of Track Requirements.

(iii) Site must be kept in a neat and tidy condition.

(b) Scope of Work

(i) The work to be done under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all things necessary for and incidental to the satisfactory performance and completion of all work as hereinafter specified and as shown on the Drawings including but not necessarily confined to the following:

(ii) Remove existing No. 7 turnout and replace with standard 100 lb. track.

(iii) Supply and install new No. 9, 115 lb. LH hand throw turnout equipped with RBM frog.

(iv) Remove portion of siding track and make connections between turnout and existing track using 100 lb. step down rails.

(v) Dispose of excess material.

(vi) Perform surfacing and lining of track and turnout.

(c) Coordination With Others

(i) The Contractor shall coordinate and schedule work with the Contract Administrator.

(ii) The Contractor shall coordinate with other contractors as required.

(d) References

(i) Canadian Pacific, Standard Practice Circulars (SPC) – Track

(ii) Canadian Pacific, Redbook of Track Requirements

(iii) Canadian Pacific Track Safety Rules

(iv) AREMA Manual for Railway Engineering

(v) Material and Equipment Specification Section 01600

E19.2 Materials

(a) All track materials shall be supplied by the Contractor and shall conform to current AREMA specifications for the material being supplied.

(b) Reuse of any track material generated from track and turnout removals will be at the discretion of the Contract Administrator.

(c) Contractor to supply 115 lb. No.9, LH turnout as per CP drawing T-14-100-14 equipped for hand throw operation and RBM frog.

(d) Rail - New or number one relay 100 lb. or heavier rail, free of defects shall be used for bolted track construction and as step down rails.

(e) Ties – Cross ties for track construction shall be new, minimum 6" x 8" x 8' treated hardwood with anti-splitting devices as necessary. Cross ties on horizontal curves that are more then 3 degrees shall be 6" x 8" x 8'6" treated hardwood with anti-splitting devices as necessary. All ties shall be treated by the rueping process with net retention of 8 lbs. per cubic foot of mixture of 50% creosote and 50% petroleum or 7 lbs. 70% creosote and 30% tar solution. Switch ties shall be new 7" x 9" treated hardwood with anti-splitting devices

(f) Ballast – Prepared ballast shall consist of crushed stone composed of hard and durable particles free from injurious amounts of deleterious substance. The type and graduation of ballast material shall comply with AREMA Specification Grade 4.

(g) Sub-ballast – Pit run or granular and relatively free of clay and other debris.

(h) Joint Bars – New bars shall be used with new rail and approved second hand bars on relay rail. The bars must be the correct size and drilling to match the rail used.

(i) Compromise Bars – Whenever two rails of different weight or section are jointed together, a new or second hand compromise joint of the proper design and dimensions for the rail, must be used. Welded or homemade compromise joints will not be accepted. Rails differing in weight by more than 25 lbs. shall not be jointed together.

(j) Tie Plates – Double shouldered for 100 lb. rail, new or second hand 7" x 10" or larger plates must be used. Plates must have the correct punching to fit the base of rail used. Tie plates with slotted holes will not be permitted.

(k) Rail Anchors – Rail anchors shall be new or reconditioned and be "Fair" or equal and of a drive on type so that they can be applied and removed without a special tool.

(l) Spikes – Shall be new 5/8"x 6" cut spikes.

E19.3 Handling and Storage of Materials

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

(b) All ballast materials, ties and rails shall be handled and stored in a careful and workmanship like manner, to the satisfaction of the Contract Administrator.

(c) Ballast shall be handled at the producing plant in such a manner that it is kept clean and free from segregation.

E19.4 Testing of Ballast

(a) All ballast materials included 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.

The Contractor shall not commence construction until all materials have been accepted by the Contract Administrator. If, in the opinion of the Contractor Administrator, such materials in whole or in part, do not conform to the Specification detailed herein, or are found to be defective in manufacture, or have become damaged in transit, storage or handling operations, then such material shall be rejected by the Contract Administrator and replaced by the Contractor at his own expense.

E19.5 Construction Methods

(a) Location of Work Site

(i) The location of the work and the estimated work planned for the site is shown in the Contract Drawings.

(ii) Prior to commencing track work, the Contractor shall ensure that all buried railway cables and utilities have been field verified as to location and are noted on a working drawing and flagged on the ground.

(b) Surveying

(i) The Contractor shall supply all surveying of lines and levels, including the initial centreline, in order to complete the project as shown on the Drawings and as specified in these Specifications.

(ii) Upon completion of the work, the Contractor shall perform an as-built survey and provide the Contract Administrator with a drawing showing all details as constructed.

(c) Removals

(i) The Contractor shall supply all labour, tools and equipment for the removal of existing track to facilitate installation of the turnouts as specified on Contract Documents.

(ii) All salvaged track material gained from track removal shall remain the property of the City of Winnipeg, and shall be moved from the site to the location defined by the City at the expense of the Contactor.

(iii) Ties shall be disposed of in accordance with all applicable regulations.

(d) Construction of Bolted Rail Track

(i) The Contractor shall supply all labour, tools and equipment for the construction of bolted rail track as specified on Contract Documents and as shown on the Contract Drawings.

(ii) Sub-ballast – If required, sub-ballast placed on top of the finished grade shall be constructed to 95% compaction.

(iii) Ballasting shall be performed in accordance with SPC 7 – Ballast and SPC 23 – Surfacing and Lining. The ballast section shall be a minimum of 225 below bottom of tie. The ballast shall also extend (level) 300mm beyond the ends of the ties before breaking to a maximum 2:1 slope. All tie cribs shall be filled to top of tie. If track centers are less than 5.5 m centre to centre, the entire space between the tracks shall be filled to top of tie with ballast. Track section shall comply with CP drawing PSSTD-003.

(iv) The City of Winnipeg has available more than 2000 cubic metres of ballast available for use for this project. The ballast is located in their Ross yard near Mile 41. The contractor is required to load and transport the ballast to Site and place the ballast.

(v) Wood ties shall be spaced at 60 ties per 30m, 500 centres

(vi) Rail shall be laid in accordance with SPC No. 10 – Laying Bolted Rail. All rail shall be in standard 39’ lengths unless tying into a switch, scale or other obstruction in which case no rail shall be shorter than 18 ft. Rail joints shall be staggered at half rails when possible but in no case less than 12 ft. If it is not possible to avoid a joint less than 12 ft., then that joint must be field welded.

(vii) Spiking – Track shall be spiked in accordance with SPC 18 – Spiking. Rail shall be fully spiked promptly after laying. Spikes shall be set vertically and square with the rail, and so driven as to allow about 1/8" space between underside of head and rail base. On tangent, four spikes shall be used on each tie; on curves, two degrees to eight degrees, six spikes, one on the outside and two on the inside of each rail; and on curves above eight degrees, eight spikes, two on the outside and two on the inside of each rail shall be used. Spikes shall not be placed less than two inches from the edge of the tie. The spikes shall be staggered so that the outside spikes in each tie will be near the same edge of that tie, and the inside spikes will be near the opposite edge, with the position of the spikes the same on all ties. Refer to Track Spiking Patterns, Plan R-14-4-8 (rev. May 25, 2001).

(viii) Rail anchoring patterns for plain track and turnouts on wood ties shall be in accordance with SPC No. 19 – Rail Anchors, 12 per 39 ft. rail; box anchoring shall be used on all tracks. Additional rail anchors or change in anchor pattern may be required on some installations.

(ix) Connection of rail ends shall be in accordance with SPC No. 14 – Rail Joint Maintenance.

(x) Cutting and drilling of rail shall be performed as needed for the construction of bolted rail track.

(xi) Tolerance for gauge shall be -0, + ¼".

(e) Construction of Turnouts

(i) The Contractor shall supply all labour, tools and equipment for the construction of turnouts as specified on Contract Documents.

(ii) Turnout shall be constructed in accordance with CP Plan No. T-14-100-14 and SPC 20 – Turnouts

(iii) Turnout construction shall include removal, dismantling and stockpiling of existing track materials to facilitate turnout installation.

(iv) Sub-ballast – If required, sub-ballast placed on top of the finished grade shall be constructed to 95% compaction.

(v) Ballasting shall be performed in accordance with SPC 7 – Ballast and SPC 23 – Surfacing and Lining. The ballast section shall be a minimum of 9" below bottom of tie. The ballast shall also extend (level) 1 ft. beyond the ends of the ties before breaking to a maximum 2:1 slope. All tie cribs shall be filled to top of tie. If track centers are less than 5.5 m (18 ft.) center to center, the entire space between the tracks shall be filled to top of tie with ballast. Track section shall comply with CP drawing PSSTD-003.

(vi) Points, rods, and switch stand shall be properly adjusted in accordance with CP standard plans and SPCs.

(vii) Connections between 115 lb. turnout and existing 85 lb. standard track shall be completed using 100# step down rails and compromise joints. All spike holes shall be plugged.

(viii) Tolerance for gauge in turnouts shall be +/- 0".

(f) Ballasting and Lifting Track

(i) The Contractor shall supply all labour, tools and equipment for unloading, spreading, lifting, tamping, lining and regulating the ballast.

(ii) Ballasting shall be performed in accordance with SPC 7 - Ballast and SPC No. 23 – Surfacing and Lining.

(iii) A tamper and ballast regulator shall be used for all ballasting and surfacing operations.

(iv) Ballasting shall be performed in lifts not exceeding 100 millimeters (4").

(v) Before commencing ballasting or surfacing, the Contractor shall line the track to within twenty-five (25) millimeters of final horizontal alignment, and ties shall be spaced in accordance with CP SPCs and this specification.

(vi) The Contractor shall lift, line, and tamp the track to within fifty (50) millimeters of final top of rail elevations, in preparation for final surfacing.

(g) Final Surfacing

(i) The Contractor shall supply all labour, tools and equipment to bring the track to final grade lines after ballasting.

(ii) Final surfacing shall be in accordance SPC 23 – Surfacing and Lining

(iii) The Contractor shall not commence final surfacing until authorization is given by the Contract Administrator.

(iv) The Contractor shall shape the ballast section in conformance with the Contract Drawings and shall include any ballasting required to fill tie cribs and shoulders.

(v) The Contractor shall remove excess ballast and spillage from culverts, ditch lines, or other locations and as instructed by the Contract Administrator.

(vi) Final tolerance for rail surface shall be +/- ½".

(vii) Signs: Place or replace all signs required as a result of new track construction or the regarding of existing track.

E19.6 Quality Control

(a) Inspection

(i) All workmanship and materials furnished and supplied, or salvaged for re-use, 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 acceptance that may have previously been given. The Contract Administrator reserves the right to reject any materials or works which are not in accordance with the requirements of this Specification.

(b) Access

(i) The Contract Administrator shall be afforded full access for the inspection and control testing of constituent materials both at the site of work and at any plant used for production of the materials to determine whether the material is being supplied and placed in accordance with this Specification.

(c) Materials

(i) All material supplied and placed under this Specification shall be subject to testing and acceptance by the Contract Administrator in accordance with this Specification.

(d) Corrective Action

(i) Any ballast or track material that does not meet the requirements of this Specification shall be removed and replaced by the Contractor at his own expense, to the satisfaction of the Contract Administrator.

E19.7 Method of Measurement

(a) Dismantle, Sort and Stockpile Existing Track

(i) Dismantling, sorting and stockpiling existing track shall be measured on a length basis. The total length to be paid for shall be the total number of track metres of track dismantled, including dismantling of existing turnout, sorted and stockpiled in accordance with this Specification.

(b) Place Ballast

(i) Placement of ballast shall be measured on a volume basis. The total volume to be paid for shall be the total number of cubic metres of ballast supplied and placed in accordance with this Specification and accepted by the Contract Administrator.

(c) Construct, Line and Surface New Track

(i) Construction, lining and surfacing of new track shall be measured on a length basis. The total length to be paid for shall be the total number of track metres of new track constructed, lined and surfaced in accordance with this Specification and accepted by the Contract Administrator.

(d) Construct and Line New Track on Bridge

(i) Construction and lining of new track on the bridge shall be paid for on a lump sum basis, and no measurement will be made for this work.

E19.8 Basis of Payment

(a) Track dismantling, grading and track construction will be paid for at the Contract Unit Price or Lump Sum Price for the "Items of Work" listed in E19.7, 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.

(b) Items of Work

(i) For Mile 77.6

- Mile 77.6 - Dismantle, Sort and Stockpile Existing Track
- Mile 77.6 - Place Ballast
- Mile 77.6 - Supply Bridge Ties
- Mile 77.6 - Supply Transition Ties
- Mile 77.6 - Supply Approach Ties
- Mile 77.6 - Construct, Line and Surface New Track
- Mile 77.6 - Construct and Line New Track on Bridge

(ii) For Mile 22.15

- Mile 22.15 - Dismantle, Sort and Stockpile Existing Track
- Mile 22.15 – Place Ballast
- Mile 22.15 - Supply Bridge Ties
- Mile 22.15 - Supply Transition Ties
- Mile 22.15 - Supply Approach Ties
- Mile 22.15 - Construct, Line and Surface New Track
- Mile 22.15 - Construct and Line New Track on Bridge
- Mile 22.15 - Supply and Install turnout

E20. PROTECTION OF NATIVE GRASS AREA

E20.1 Description

(a) Further to E3, "Environmental Protection Plan," this specification will cover the protection of native grass areas along riverbanks.

E20.2 Construction Methods

(a) The Contractor will mark required limits of work along riverbanks to retain and minimize damage of native grass areas and limits will remain marked throughout the construction period.

(b) Vegetation will not be disturbed without written permission from the Contract Administrator.

(c) The Contractor will protect plants or trees which may be at risk of accidental damage. Such measures may include protective fencing or signage and will be approved in advance by the Contract Administrator.

(d) The Contractor will limit surface disturbance and vegetation clearing.

(e) Areas where vegetation is removed during clearing, construction decommissioning activities, will be revegetated as soon as possible as directed by the Contract Administrator.

(f) Any re-vegetation will require a 150 mm topsoil layer to be placed as well as erosion controls between the bank and the water.

(g) Damaged native grass areas which are not viable will be replaced at the expense of the Contractor.

E20.3 Materials

(a) Where damaged native grass areas need to be replaced the Contractor will contact the City Naturalist at the address below to determine the requirements for planting and or re-seeding the area.

Naturalist Service Branch
City of Winnipeg
5006 Roblin Boulevard
Winnipeg, MB R3R 0G7
Phone: (204)986-7234

(b) Topsoil

(i) Topsoil placed will be in accordance with Clause 5.2 of CW 3540.

E20.4 Measurement and Payment

(a) Protection of native grass area will not be measured. Damaged native grass areas by the Contractor will be repaired and replaced at the expense of the Contractor. No measurement and payment will be made within this section.

E21. TIMBER STRUTS

E21.1 Description

(a) This section specifies requirements for the supply, delivery and installation of the timber struts as noted on the drawings.

(b) The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, fasteners, stain, equipment, tools, supplies, and all things necessary for and incidental to the satisfactory performance and completion of all Work as hereinafter specified

E21.2 Materials

(a) General

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

(ii) All materials supplied under this Specification shall be of a type accepted by the Contract Administrator, and shall be subject to inspection and testing by the Contract Administrator.

(iii) All timber materials shall be supplied and installed in accordance with CSA-086.

(iv) Field cut members, damaged or drilled members shall receive one coat of end cut pressure treatment. End cut touch-up shall be Wolman Green End Cut manufactured by U.S.E. Hickson Productions Ltd.

(b) Timber Struts

(i) The timber struts shall be Spruce/Pine/Fir (SPF) No1/2 or better. The proposed struts shall be incised pressure treated with Alkaline Copper Quaternary (ACQ) preservative. The struts shall be 305mm x 305mm.

(ii) The timber shall be in accordance with NLGA Standard Grading Rules for Canadian Lumber.

(c) Pressure Treating

(i) The ACQ Wood Preservative shall be in accordance with CSA-080

(d) Certification

(i) For products treated with preservative by pressure impregnation submit following information certified by authorized signing officer of treatment plant:

Information listed in AWPA M2 applicable to specified treatment.

Moisture content after drying following treatment with preservative.

Acceptable types of paint, stain and clear finishes that may be used over treated materials to be finished after treatment.

(e) Fasteners

(i) The timber struts shall be installed with ASTM A307 galvanised Lag Screws complete with washers.

(ii) Lag screws shall be installed, one per hole in the steel stringers.

(iii) Predrilling up to 60% of the lag screw diameter is permitted.

(iv) Lag screws shall be install with a wrench, not driven with a hammer.

(v) Lag screws and washers shall be Hot Dip Galvanized. Zinc platted are not acceptable.

E21.3 Scope of Work

(a) The works involved with timber repair shall include:

(i) The supply and installation of PT timber struts.

(ii) Supply and installation of connection brackets.

(iii) Supply and installation of fasteners.

(iv) Supply and application of end cut as required.

E21.4 Quality Control

(a) Inspection

(i) 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.

(ii) The Contractor shall be wholly responsible for the control of all operations incidental thereto notwithstanding any inspection or acceptance 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.

E21.5 Method and Payment

(a) Method of Measurement

(i) Supply and Installation of Timber Struts

- The supply and installation of the Pressure Treated Timber Struts will be paid for on a Lump Sum basis. No measurement will be made for this item.

(b) Basis of Payment

(i) Supply and Installation of Timber Struts

- The supply and installation of the PT Timber Struts will be paid for at the Contract Unit Price per unit for “Timber Struts”, measured as specified herein, which price shall be payment in full for performing all operations herein described and all other items incidental to the work included in this Specification.

(ii) Supply and Installation of Timber Struts

- The supply and installation of the Timber Struts will be paid for at the Contract Unit Price per unit for “Timber Struts”, measured as specified herein, which price shall be payment in full for performing all operations

herein described and all other items incidental to the work included in this Specification.