THE CITY OF WINNIPEG

BID OPPORTUNITY

BID OPPORTUNITY NO. 775-2017

2018 REGIONAL STREET RENEWAL PROJECT – MCPHILLIPS STREET RECONSTRUCTION AND UNDERPASS STRUCTURAL IMPROVEMENTS – LOGAN AVENUE TO JARVIS AVENUE

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PART B - BIDDING PROCEDURES

B1. CONTRACT TITLE

B1.1 2018 Regional Street Renewal Project – McPhillips Street Reconstruction and Underpass Structural Improvements – Logan Avenue to Jarvis Avenue

B2. SUBMISSION DEADLINE

B2.1 The Submission Deadline is 12:00 noon Winnipeg time, April 10, 2018.

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. ENQUIRIES

B3.1 All enquiries shall be directed to the Contract Administrator identified in D3.1.

B3.2 If the Bidder finds errors, discrepancies or omissions in the Bid Opportunity, or is unsure of the meaning or intent of any provision therein, the Bidder shall notify the Contract Administrator of the error, discrepancy or omission, or request a clarification as to the meaning or intent of the provision at least five (5) Business Days prior to the Submission Deadline.

B3.3 Responses to enquiries which, in the sole judgment of the Contract Administrator, require a correction to or a clarification of the Bid Opportunity will be provided by the Contract Administrator to all Bidders by issuing an addendum.

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

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

B4. CONFIDENTIALITY

B4.1 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.

B4.2 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.

B5. ADDENDA

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

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

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

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

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

B6. SUBSTITUTES

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

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

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

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

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

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

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

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

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

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

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

B6.6.1 The Contract Administrator will issue an Addendum, disclosing the approved materials, equipment, methods and products to all potential Bidders. The Bidder requesting and obtaining the approval of a substitute shall be responsible for disseminating information regarding the approval to any person or persons he/she wishes to inform.

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

B6.8 If the Contract Administrator approves a substitute as an "approved alternative", any Bidder bidding that approved alternative may base his/her Total Bid Price upon the specified item but may also indicate an alternative price based upon the approved alternative. Such alternatives will be evaluated in accordance with B17.

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

B7. BID COMPONENTS

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

(a) Form A: Bid;

(b) Form B: Prices, hard copy;

(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;

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

B7.3 All components of the Bid shall be fully completed or provided, and submitted by the Bidder no later than the Submission Deadline, with all required entries made clearly and completely.

B7.4 The Bid shall be submitted enclosed and sealed in an envelope clearly marked with the Bid Opportunity number and the Bidder's name and address.

B7.4.1 Samples or other components of the Bid which cannot reasonably be enclosed in the envelope may be packaged separately, but shall be clearly marked with the Bid Opportunity number, the Bidder's name and address, and an indication that the contents are part of the Bidder's Bid.

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

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

B7.6 Bidders are advised that inclusion of terms and conditions inconsistent with the Bid Opportunity document, including the General Conditions, will be evaluated in accordance with B17.1(a).

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

B7.8 Bids shall be submitted to:

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

B8. BID

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

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

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

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

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

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

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

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

B8.4 Paragraph 13 of Form A: Bid shall be signed in accordance with the following requirements:

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

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

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

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

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

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

B9. PRICES

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

B9.1.1 For the convenience of Bidders, and pursuant to B7.4.2 and B17.4.2, an electronic spreadsheet Form B: Prices in Microsoft Excel (.xls) format is available along with the Adobe PDF documents for this Bid Opportunity on the Bid Opportunities page at the Materials Management Division website at http://www.winnipeg.ca/matmgt/

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

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

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

B10. DISCLOSURE

B10.1 Various Persons provided information or services with respect to this Work. In the City's opinion, this relationship or association does not create a conflict of interest because of this full

disclosure. Where applicable, additional material available as a result of contact with these Persons is listed below.

B10.2 The Persons are:

(a) N/A

B11. CONFLICT OF INTEREST AND GOOD FAITH

B11.1 Bidders, by responding to this Bid Opportunity, declare that no Conflict of Interest currently exists, or is reasonably expected to exist in the future.

B11.2 Conflict of Interest means any situation or circumstance where a Bidder or employee of the Bidder proposed for the Work has:

(a) other commitments;

(b) relationships;

(c) financial interests; or

(d) involvement in ongoing litigation;

that could or would be seen to:

(i) exercise an improper influence over the objective, unbiased and impartial exercise of the independent judgment of the City with respect to the evaluation of Bids or award of the Contract; or

(ii) compromise, impair or be incompatible with the effective performance of a Bidder's obligations under the Contract;

(e) has contractual or other obligations to the City that could or would be seen to have been compromised or impaired as a result of its participation in the Bid Opportunity process or the Work; or

(f) has knowledge of confidential information (other than confidential information disclosed by the City in the normal course of the Bid Opportunity process) of strategic and/or material relevance to the Bid Opportunity process or to the Work that is not available to other bidders and that could or would be seen to give that Bidder an unfair competitive advantage.

B11.3 In connection with its Bid, each entity identified in B11.2 shall:

(a) avoid any perceived, potential or actual Conflict of Interest in relation to the procurement process and the Work;

(b) upon discovering any perceived, potential or actual Conflict of Interest at any time during the Bid Opportunity process, promptly disclose a detailed description of the Conflict of Interest to the City in a written statement to the Contract Administrator; and

(c) provide the City with the proposed means to avoid or mitigate, to the greatest extent practicable, any perceived, potential or actual Conflict of Interest and shall submit any additional information to the City that the City considers necessary to properly assess the perceived, potential or actual Conflict of Interest.

B11.4 Without limiting B11.3, the City may, in its sole discretion, waive any and all perceived, potential or actual Conflicts of Interest. The City's waiver may be based upon such terms and conditions as the City, in its sole discretion, requires to satisfy itself that the Conflict of Interest has been appropriately avoided or mitigated, including requiring the Bidder to put into place such policies, procedures, measures and other safeguards as may be required by and be acceptable to the City, in its sole discretion, to avoid or mitigate the impact of such Conflict of Interest.

B11.5 Without limiting B11.3, and in addition to all contractual or other rights or rights at law or in equity or legislation that may be available to the City, the City may, in its sole discretion:

(a) disqualify a Bidder that fails to disclose a perceived, potential or actual Conflict of Interest of the Bidder or any of its employees proposed for the Work;

(b) require the removal or replacement of any employees proposed for the Work that has a perceived, actual or potential Conflict of Interest that the City, in its sole discretion, determines cannot be avoided or mitigated;

(c) disqualify a Bidder or employees proposed for the Work that fails to comply with any requirements prescribed by the City pursuant to B11.4 to avoid or mitigate a Conflict of Interest; and

(d) disqualify a Bidder if the Bidder, or one of its employees proposed for the Work, has a perceived, potential or actual Conflict of Interest that, in the City's sole discretion, cannot be avoided or mitigated, or otherwise resolved.

B11.6 The final determination of whether a perceived, potential or actual Conflict of Interest exists shall be made by the City, in its sole discretion.

B12. QUALIFICATION

B12.1 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.

B12.2 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

B12.3 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).

B12.4 Further to B12.3(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) Written confirmation of a safety and health certification meeting SAFE Work Manitoba's SAFE Work Certified Standard (e.g., COR™ and SECOR™) or

(i) 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

(ii) 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

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

B12.5 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.

B12.6 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.

B13. BID SECURITY

B13.1 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.

B13.1.1 If the Bidder submits alternative bids, the bid security shall be in the amount of the specified percentage of the highest Total Bid Price submitted.

B13.1.2 All signatures on bid securities shall be original.

B13.1.3 The Bidder shall sign the Bid Bond.

B13.1.4 The Surety shall sign and affix its corporate seal on the Bid Bond and the Agreement to Bond.

B13.2 The bid security of the successful Bidder and the next two lowest evaluated responsive and responsible Bidders will be released by the City when a Contract for the Work has been duly executed by the successful Bidder and the performance security furnished as provided herein. The bid securities of all other Bidders will be released when a Contract is awarded.

B13.2.1 Where the bid security provided by the successful Bidder is in the form of a certified cheque or draft pursuant to B13.1(c), it will be deposited and retained by the City as the performance security and no further submission is required.

B13.2.2 The City will not pay any interest on certified cheques or drafts furnished as bid security or subsequently retained as performance security.

B13.3 The bid securities of all Bidders will be released by the City as soon as practicable following notification by the Contract Administrator to the Bidders that no award of Contract will be made pursuant to the Bid Opportunity.

B14. OPENING OF BIDS AND RELEASE OF INFORMATION

B14.1 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.

B14.1.1 Bidders or their representatives may attend.

B14.1.2 Bids determined by the Manager of Materials, or his/her designate, to not include the bid security specified in B13 will not be read out.

B14.2 Following the submission deadline, the names of the Bidders and their Total Bid Prices (unevaluated, and pending review and verification of conformance with requirements) will be available on the Closed Bid Opportunities (or Public/Posted Opening & Award Results) page at The City of Winnipeg, Corporate Finance, Materials Management Division website at http://www.winnipeg.ca/matmgt/

B14.3 After award of Contract, the name(s) of the successful Bidder(s), their address(es) 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/

B14.4 The Bidder is advised that any information contained in any Bid may be released if required by The Freedom of Information and Protection of Privacy Act (Manitoba), by other authorities having jurisdiction, or by law or by City policy or procedures (which may include access by members of City Council).

B15. IRREVOCABLE BID

B15.1 The Bid(s) submitted by the Bidder shall be irrevocable for the time period specified in Paragraph 11 of Form A: Bid.

B15.2 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.

B16. WITHDRAWAL OF BIDS

B16.1 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.

B16.1.1 Notwithstanding C23.3, the time and date of receipt of any notice withdrawing a Bid shall be the time and date of receipt as determined by the Manager of Materials.

B16.1.2 The City will assume that any one of the contact persons named in Paragraph 3 of Form A: Bid or the Bidder's authorized representatives named in Paragraph 13 of Form A: Bid, and only such person, has authority to give notice of withdrawal.

B16.1.3 If a Bidder gives notice of withdrawal prior to the Submission Deadline, the Manager of Materials will:

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

(b) open the Bid to identify the contact person named in Paragraph 3 of Form A: Bid and the Bidder's authorized representatives named in Paragraph 13 of Form A: Bid; and

(c) if the notice has been given by any one of the persons specified in B16.1.3(b), declare the Bid withdrawn.

B16.2 A Bidder who withdraws his/her Bid after the Submission Deadline but before his/her Bid has been released or has lapsed as provided for in B15.2 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.

B17. EVALUATION OF BIDS

B17.1 Award of the Contract shall be based on the following bid evaluation criteria:

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

(b) qualifications of the Bidder and the Subcontractors, if any, pursuant to B12 (pass/fail);

(c) Total Bid Price;

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

B17.2 Further to B17.1(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.

B17.3 Further to B17.1(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.

B17.4 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.

B17.4.1 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.

B17.4.2 The electronic Form B: Prices and the formulas imbedded in that spreadsheet are only provided for the convenience of Bidders. The City makes no representations or warranties as to the correctness of the imbedded formulas. It is the Bidder's responsibility to ensure the extensions of the unit prices and the sum of Total Bid Price performed as a function of the formulas within the electronic Form B: Prices are correct.

B18. AWARD OF CONTRACT

B18.1 The City will give notice of the award of the Contract or will give notice that no award will be made.

B18.2 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.

B18.2.1 Without limiting the generality of B18.2, 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.

B18.3 Where an award of Contract is made by the City, the award shall be made to the responsible and qualified Bidder submitting the lowest evaluated responsive Bid, in accordance with B17.

B18.3.1 Following the award of contract, a Bidder will be provided with information related to the evaluation of his/her Bid upon written request to the Contract Administrator.

PART C - GENERAL CONDITIONS

C0. GENERAL CONDITIONS

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

C0.1.1 The *General Conditions for Construction* are available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at http://www.winnipeg.ca/matmgt/gen_cond.stm

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

PART D - SUPPLEMENTAL CONDITIONS

GENERAL

D1. GENERAL CONDITIONS

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

D2. SCOPE OF WORK

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

(a) Roadway Reconstruction
  (i) McPhillips Street from Logan Avenue to Jarvis Avenue

(b) Underground Works
  (i) McPhillips Street from Logan Avenue to Jarvis Avenue

(c) Structural Works
  (i) McPhillips Underpass

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

(a) Pavement Reconstruction
  (i) Excavation of existing median and construction of temporary asphalt median crossover;
  (ii) Excavation of existing pavement and pavement structure to new structure depth;
  (iii) Adjustment of drainage inlets, water valves and manholes;
  (iv) Compaction of sub grade;
  (v) Placement of geotextile and geogrid;
  (vi) Placement of sub-base and base course materials;
  (vii) Placement of cellular concrete and structural sidewalk between retaining walls;
  (viii) Construction of plain dowelled concrete roadway ;
  (ix) Construction of new curb and barriers (various types);
  (x) Renewal of sidewalk and miscellaneous concrete slabs;
  (xi) Placement of tie-in asphalt overlay for side street and private approaches;
  (xii) Removal of temporary crossovers and construction of new median; and
  (xiii) Boulevard restoration, top soil and sodding.

(b) Underground Works
  (i) Install land drainage sewer using trenchless and in a trench methods;
  (ii) Connect to and repair sewer segments as required; and
  (iii) Install catch basins and catch basin leads.

(c) Structural Works
  (i) Remove structural sidewalk and excavate between retaining walls;
  (ii) Remove sidewalk retaining wall ends as required for new traffic barriers;
  (iii) Construct new concrete traffic barriers;
  (iv) Backfill structural sidewalk excavation with cellular concrete;
  (v) Construct new structural sidewalk;
  (vi) Repair face of existing retaining well as required;
  (vii) Install bike height pedestrian handrail;
  (viii) Construct new concrete medians and barriers; and
  (ix) Install median aluminium barrier.

D3. CONTRACT ADMINISTRATOR

D3.1 The Contract Administrator is Dillon Consulting Limited, represented by:

Taran J Peters, P.Eng
Project Manager

Telephone No. 204-453-2301 ext. 4031
Email Address tpeters@dillon.ca

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

D3.3 Bids Submissions must be submitted to the address in B7.

D4. CONTRACTOR'S SUPERVISOR

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

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

D5. OWNERSHIP OF INFORMATION, CONFIDENTIALITY AND NON DISCLOSURE

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

D5.2 The Contractor shall not make any public announcements or press releases regarding the Contract, without the prior written authorization of the Contract Administrator.

D5.3 The following shall be confidential and shall not be disclosed by the Contractor to the media or any member of the public without the prior written authorization of the Contract Administrator;

(a) information provided to the Contractor by the City or acquired by the Contractor during the course of the Work;

(b) the Contract, all deliverables produced or developed; and

(c) any statement of fact or opinion regarding any aspect of the Contract.

D5.4 A Contractor who violates any provision of D5 may be determined to be in breach of Contract.

D6. NOTICES

D6.1 Except as provided for in C23.2.2, all notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications to the Contractor shall be sent to the address or facsimile number identified by the Contractor in Paragraph 2 of Form A: Bid.

D6.2 All notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications to the City, except as expressly otherwise required in D6.3 D6.4 or elsewhere in the Contract, shall be sent to the attention of the Contract Administrator at the facsimile number identified in D3.1.

D6.3 Notwithstanding C21, all notices of appeal to the Chief Administrative Officer shall be sent to the attention of the Chief Financial Officer at the following:

The City of Winnipeg
Attn: Chief Financial Officer
Office of the Chief Administrative Officer
Susan A. Thompson Building
2nd Floor, 510 Main Street
Winnipeg MB R3B 1B9

D6.4 All notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications required to be submitted or returned to the City Solicitor shall be sent to the following facsimile number:

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

Facsimile No.: 204-947-9155

D6.5 Bids Submissions must not be submitted to this facsimile number. Bids must be submitted in accordance with B7.

D7. FURNISHING OF DOCUMENTS

D7.1 Upon award of the Contract, the Contractor will be provided with five (5) complete sets of the Bid Opportunity. If the Contractor requires additional sets of the Bid Opportunity, they will be supplied to him/her at cost.

SUBMISSIONS

D8. AUTHORITY TO CARRY ON BUSINESS

D8.1 The Contractor shall be in good standing under The Corporations Act (Manitoba), or properly registered under The Business Names Registration Act (Manitoba), or otherwise properly registered, licensed or permitted by law to carry on business in Manitoba, or if the Contractor does not carry on business in Manitoba, in the jurisdiction where the Contractor does carry on business, throughout the term of the Contract, and shall provide the Contract Administrator with evidence thereof upon request.

D9. SAFE WORK PLAN

D9.1 The Contractor shall provide the Contract Administrator with a Safe Work Plan at least five (5) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 for the return of the executed Contract.

D9.2 The Safe Work Plan shall be prepared and submitted in the format shown in the City's template which is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at http://www.winnipeg.ca/matmgt/safety/default.stm

D10. INSURANCE

D10.1 The Contractor shall provide and maintain the following insurance coverage:

(a) commercial general liability insurance, in the amount of at least five million dollars ($5,000,000.00) inclusive, with the City and Canadian Pacific Railway Company 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, sudden and accidental pollution liability, broad form property damage cover and products

and completed operations, to remain in place at all times during the performance of the Work and throughout the warranty period;

(b) Automobile Liability Insurance covering all motor vehicles, owned, leased 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 (1) accident or occurrence;

(c) Contractor's pollution liability (CPL) insurance in the amount of at least two million dollars ($2,000,000) per occurrence and five million dollars ($5,000,000) aggregate insuring against claims covering third-party injury and property damage claims, and including a cross liability clause, clean-up costs, transported cargo as a result of pollution conditions arising suddenly or gradually from the Contractor operations and completed operations. Such policy to the name the City and Canadian Pacific Railway Company as additional insureds and remain in place for a minimum of twelve (12) months following Total Performance.

D10.2 Deductibles shall be borne by the Contractor.

D10.3 The Contractor shall provide the City Solicitor with a certificate(s) of insurance, in a form satisfactory to the City Solicitor, at least two (2) Business Days prior to the commencement of any Work but in no event later than the date specified in the C4.1 for the return of the executed Contract.

D10.4 The Contractor shall require each of its Sub-Contractors to provide comparable insurance to that set for under D10.1 (a) and (b).

D10.5 The Contractor shall not cancel, materially alter, or cause each policy to lapse without providing at least thirty (30) Calendar Days prior written notice to the Contract Administrator.

D11. PERFORMANCE SECURITY

D11.1 The Contractor shall provide and maintain performance security until the expiration of the warranty period in the form of:

(a) a performance bond of a company registered to conduct the business of a surety in Manitoba, in the form attached to these Supplemental Conditions (Form H1: Performance Bond), in the amount of fifty percent (50%) of the Contract Price; or

(b) an irrevocable standby letter of credit issued by a bank or other financial institution registered to conduct business in Manitoba and drawn on a branch located in Winnipeg, in the form attached to these Supplemental Conditions (Form H2: Irrevocable Standby Letter of Credit), in the amount of fifty percent (50%) of the Contract Price; or

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

D11.1.1 Where the performance security is in the form of a certified cheque or draft, it will be deposited by the City. The City will not pay any interest on certified cheques or drafts furnished as performance security.

D11.2 If the bid security provided in his/her Bid was not a certified cheque or draft pursuant to B13.1(c), the Contractor shall provide the City Solicitor with the required performance security within seven (7) Calendar Days of notification of the award of the Contract by way of letter of intent and prior to the commencement of any Work on the Site and in no event later than the date specified in the C4.1 for the return of the executed Contract.

D12. SUBCONTRACTOR LIST

D12.1 The Contractor shall provide the Contract Administrator with a complete list of the Subcontractors whom the Contractor proposes to engage (Form J: Subcontractor List) at or prior to a pre-construction meeting, or at least two (2) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in the C4.1 for the return of the executed Contract.

D13. EQUIPMENT LIST

D13.1 The Contractor shall provide the Contract Administrator with a complete list of the equipment which the Contractor proposes to utilize (Form K: Equipment List) at or prior to a pre-construction meeting, or at least two (2) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in the C4.1 for the return of the executed Contract.

D14. DETAILED WORK SCHEDULE

D14.1 The Contractor shall provide the Contract Administrator with a detailed work schedule at least two (2) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in the General Conditions for the return of the executed Contract.

D14.2 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.

Meeting the requirements of the Contract.

D14.3 Further to D14.2(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:

D14.4 Further to D14.2(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.

SCHEDULE OF WORK

D15. COMMENCEMENT

D15.1 The Contractor shall not commence any Work until he/she is in receipt of a letter of intent from the Award Authority authorizing the commencement of the Work.

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

(a) the Contract Administrator has confirmed receipt and approval of:

(i) evidence of authority to carry on business specified in D8;

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

(iii) the twenty-four (24) hour emergency response phone number specified in D4.2.

(iv) the Safe Work Plan specified in D9;

(v) evidence of the insurance specified in D10;

(vi) the performance security specified in D11;

(vii) the subcontractor list specified in D12;

(viii) the equipment list specified in D13; and

(ix) the detailed work schedule specified in D14.

(b) the Contractor has attended a pre-construction meeting with the Contract Administrator, or the Contract Administrator has waived the requirement for a pre-construction meeting.

D15.3 The Contractor shall not commence the Work on the Site before May 22, 2018 due to the McPhillips water main renewal. Should this Work be completed earlier, the Contractor will be permitted to commence prior to May 22, 2018. The Contractor shall commence the Work on Site no later than May 25, 2018, or as directed by the Contract Administrator and weather permitting.

D15.4 The City intends to award this Contract by May 8, 2018.

D15.4.1 If the actual date of award is later than the intended date, the dates specified for Critical Stages, Substantial Performance, and Total Performance will be adjusted by the difference between the aforementioned intended and actual dates.

D16. WORKING DAYS

D16.1 Notwithstanding to C1.1(jj);

D16.1.1 Saturdays shall count as a Working Day.

D16.2 Further to C1.1(jj);

D16.2.1 The Contract Administrator will determine daily if a Working Day has elapsed and will record his/her assessment. On a weekly basis the Contract Administrator will provide the Contractor with a record of the Working Days assessed for the preceding week. The Contractor shall sign each report signifying that he/she agrees with the Contract Administrator's determination of the Working Days assessed for the report period.

D16.2.2 Work done to restore the Site to a condition suitable for Work, shall not be considered "work" as defined in the definition of a Working Day.

D16.2.3 When the Work includes two (2) or more major types of Work that can be performed under different atmospheric conditions, the Contract Administrator shall consider all major types of Work in determining whether the Contractor was able to work in assessing Working Days.

D17. RESTRICTED WORK HOURS

D17.1 Further to clause 3.10 of CW 1130, the Contractor shall require written permission forty-eight (48) hours in advance from the Contract Administrator for any work to be performed between 2000 hours and 0700 hours, or on Sundays, Statutory Holidays and or Civic Holidays.

D18. WORK BY OTHERS

D18.1 Work by others on or near the Site will include but not necessarily be limited to:

(a) BellMTS
  (i) Relocate aerial lines on existing wood poles on the east side of McPhillips, south of the underpass to underground.
  (ii) Miscellaneous adjustments of manholes and supply of lifter rings.

(b) Manitoba Hydro
  (i) Removal of existing wood poles on the east side of McPhillips, south of the underpass and new street light installation will be taking place throughout the limits of the project.
  (ii) Temporary removal and relocation of existing street lights throughout the project limits.
  (iii) Miscellaneous adjustments of Hydro manhole frame and supply of lifter rings.
  (iv) Manitoba Hydro Gas safety watch during excavation near gas lines.

(c) City of Winnipeg Traffic Services

(i) Removal and installation of new traffic signage and line painting.

(d) KGS

(i) Watermain renewal in the Northbound lanes of McPhillips Street from Logan Avenue to Higgins Aveneue and then across the Northbound and Southbound lanes of McPhillips Street to the west side at Higgins Avenue.

D19. SEQUENCE OF WORK

D19.1 Further to C6.1, the sequence of work shall be as follows:

D19.1.1 The Work shall be divided into four (4) stages.. Stages are further subdivided into major items of work.

D19.1.2 **Stage 1** – Curb Lanes Closed

(a) Removal of west sidewalk hand rail and w-beam guardrail;

(b) Remove existing west structural sidewalk and excavate as required; and

(c) Complete northbound and southbound underground work as required.

D19.1.3 **Stage 2** – Southbound Lanes of McPhillips Street

(a) **Stage 2A** – Reconstruction of Southbound Lanes

(i) Remove existing structural sidewalk and excavate as required;
(ii) Excavate existing southbound lanes and remaining sidewalk;
(iii) Complete proposed sewer installs and repairs;
(iv) Excavate and place fill material as required;
(v) Construct new granular road structure;
(vi) Plane existing asphalt at tie-ins;
(vii) Pave new concrete roadway, curb and sidewalk;
(viii) Place new concrete traffic barriers;
(ix) Place cellular concrete between retaining walls as required;
(x) Place bike height pedestrian handrails through underpass;
(xi) Reinstall aluminium balanced barrier at centre pier;
(xii) Boulevard grading, seeding and sodding for the west boulevard;
(xiii) Placement of asphalt overlay for tie-ins, temporary ramps and private approaches.
(xiv) Excavate existing median and place granular base; and
(xv) Pave temporary asphalt crossover;

(b) **Stage 2B** – Staged Reconstruction at Logan Avenue

(i) Excavate existing southbound lanes and remaining sidewalk;
(ii) Excavate and place fill material as required;
(iii) Construct new granular road structure;
(iv) Plane existing asphalt at tie-ins;
(v) Pave new concrete roadway, curb and sidewalk;

D19.1.4 **Stage 3** –Northbound Lanes on McPhillips Street

(a) Remove existing structural sidewalk and excavate as required;

(b) Excavate existing northbound lane, shoulder and sidewalk;

(c) Complete proposed sewer installs and repairs;

(d) Excavate and place fill material as required;

(e) Construct new granular road structure;

(f) Pave new concrete roadway, curb and sidewalk;

(g) Place new concrete traffic barriers;

(h) Place cellular concrete between retaining walls as required;

(i) Plane existing asphalt at tie-ins;

(j) Place bike height pedestrian handrails through underpass;

(k) Reinstall aluminium balanced beam at centre pier;

(l) Boulevard grading, seeding and sodding for the east boulevard; and

(m) Placement of asphalt overlay for tie-ins and private approaches.

D19.1.5 **Stage 4** – Median Construction

(a) Excavate existing median, including existing crossovers;

(b) Complete proposed sewer installs and repairs;

(c) Place granular sub-base and base course; and

(d) Pave new concrete roadway;

(e) Pour new median; and

(f) Placement of asphalt overlay adjacent to new median, as required.

D19.1.6 Immediately following the completion of the asphaltic concrete works of Stage 2 and 3, the Contractor shall clean up the Site and remove all plant, surplus material, waste and debris, other than that left by the City or other Contractors.

D19.1.7 It should be noted that multiple crews as well as multiple disciplines (ie underground crews working in one (1) area while structural crews work in another) will be required to complete the work within the allocated number of Working Days.

D20. SUBSTANTIAL PERFORMANCE

D20.1 The Contractor shall achieve Substantial Performance within one hundred and thirty five (135) consecutive Working Days of the commencement of the Work as specified in D15.

D20.2 When the Contractor considers the Work to be substantially performed, the Contractor shall arrange, attend and assist in the inspection of the Work with the Contract Administrator for purposes of verifying Substantial Performance. Any defects or deficiencies in the Work noted during that inspection shall be remedied by the Contractor at the earliest possible instance and the Contract Administrator notified so that the Work can be re-inspected.

D20.3 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.

D21. TOTAL PERFORMANCE

D21.1 The Contractor shall achieve Total Performance within one hundred and forty (140) consecutive Working Days of the commencement of the Work as specified in D15.

D21.2 When the Contractor or the Contract Administrator considers the Work to be totally performed, the Contractor shall arrange, attend and assist in the inspection of the Work with the Contract Administrator for purposes of verifying Total Performance. Any defects or deficiencies in the Work noted during that inspection shall be remedied by the Contractor at the earliest possible instance and the Contract Administrator notified so that the Work can be re-inspected.

D21.3 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.

D22. LIQUIDATED DAMAGES

D22.1 If the Contractor fails to achieve Substantial Performance in accordance with the Contract by the day fixed herein for Substantial Performance, the Contractor shall pay the City two thousand five hundred ($2500) per Working Day for each and every Working Day following the day fixed herein for Substantial Performance during which such failure continues.

D22.2 The amount specified for liquidated damages in D22.1 is based on a genuine pre-estimate of the City's damages in the event that the Contractor does not achieve Substantial Performance by the day fixed herein for same.

D22.3 The City may reduce any payment to the Contractor by the amount of any Liquidated Damages assessed.

D22.1 If the Contractor fails to achieve Total Performance in accordance with the Contract by the day fixed herein for Total Performance, the Contractor shall pay the City seven hundred dollars ($700) per Working Day for each and every Working Day following the day fixed herein for Total Performance during which such failure continues.

D22.2 The amount specified for Liquidated Damages in D22.1 is based on a genuine pre-estimate of the City's damages in the event that the Contractor does not achieve Total Performance by the day fixed herein for same.

D22.3 The City may reduce any payment to the Contractor by the amount of any liquidated damages assessed.

D23. SCHEDULED MAINTENANCE

D23.1 The Contractor shall perform the following scheduled maintenance in the manner and within the time periods required by the Specifications:

(a) Reflective Crack Maintenance (during two (2) year warranty period) as specified in CW3250-R7;

(b) Sodding (maintenance period) as specified in CW 3510-R9.

D23.2 Determination of Substantial Performance and Total Performance shall be exclusive of scheduled maintenance identified herein. All scheduled maintenance shall be completed prior to the expiration of the warranty period. Where the scheduled maintenance cannot be completed during the warranty period, the warranty period shall be extended for such period of time as it takes the Contractor to complete the scheduled maintenance.

CONTROL OF WORK

D24. LAYOUT OF WORK

D24.1 Structural Work

D24.1.1 The Contract Administrator shall provide the basic centrelines and a benchmark for construction of the structural Work.

D24.1.2 The Contractor shall be responsible for the true and proper laying out of the Work and for the correctness of the location, levels, dimensions, and alignment of all aspects of the Work. He shall provide all required instruments and competent personnel for performing all layouts.

D24.1.3 The Contract Administrator shall be notified at least two (2) Business Days prior to any Work being commenced in order to have the option to check and review all elevations and layouts at their discretion.

D24.1.4 Should any error appear or arise in location, levels, dimensions, and/or alignments during the course of the Work, the Contractor shall promptly rectify such errors to the satisfaction of the Contract Administrator, at his own expense.

D24.1.5 The Contractor shall carefully protect and preserve all benchmarks, stakes, and other items of the basic data supplied by the Contract Administrator. Any such benchmarks or stakes removed or destroyed by the Contractor, without the consent of the Contract Administrator, shall be replaced by the Contract Administrator at the expense of the Contractor.

D25. JOB MEETINGS

D25.1 Regular weekly job meetings will be held at the Site. These meetings shall be attended by a minimum of one (1) representative of the Contract Administrator, one (1) representative of the City and one (1) 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.

D25.2 The Contract Administrator reserves the right to cancel any job meeting or call additional job meetings whenever he/she deems it necessary.

D26. PRIME CONTRACTOR – THE WORKPLACE SAFETY AND HEALTH ACT (MANITOBA)

D26.1 Further to C6.24, the Contractor shall be the Prime Contractor and shall serve as, and have the duties of the Prime Contractor in accordance with The Workplace Safety and Health Act (Manitoba).

D27. THE WORKPLACE SAFETY AND HEALTH ACT (MANITOBA) – QUALIFICATIONS

D27.1 Further to B12.4, 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 B12.4.

MEASUREMENT AND PAYMENT

D28. PAYMENT

D28.1 Further to C12, the City may at its option pay the Contractor by direct deposit to the Contractor's banking institution.

WARRANTY

D29. WARRANTY

D29.1 Notwithstanding C13.2, the warranty period shall begin on the date of Total Performance and shall expire two (2) years thereafter unless extended pursuant to C13.2.1 or C13.2.2, in which case it shall expire when provided for thereunder.

FORM H1: PERFORMANCE BOND
(See D11)

KNOW ALL MEN BY THESE PRESENTS THAT

_____
(hereinafter called the "Principal"), and

_____ ,
(hereinafter called the "Surety"), are held and firmly bound unto **THE CITY OF WINNIPEG** (hereinafter called the "Obligee"), in the sum of

_____

_____ dollars ($_____.____)

of lawful money of Canada to be paid to the Obligee, or its successors or assigns, for the payment of which sum the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS the Principal has entered into a written contract with the Obligee for

BID OPPORTUNITY NO. 775-2017

2018 Regional Street Renewal Project – McPhillips Street Reconstruction and Underpass Structural Improvements – Logan Avenue to Jarvis Avenue
which is by reference made part hereof and is hereinafter referred to as the “Contract”.

NOW THEREFORE the condition of the above obligation is such that if the Principal shall:

(a) carry out and perform the Contract and every part thereof in the manner and within the times set forth in the Contract and in accordance with the terms and conditions specified in the Contract;
(b) perform the Work in a good, proper, workmanlike manner;
(c) make all the payments whether to the Obligee or to others as therein provided;
(d) in every other respect comply with the conditions and perform the covenants contained in the Contract; and
(e) indemnify and save harmless the Obligee against and from all loss, costs, damages, claims, and demands of every description as set forth in the Contract, and from all penalties, assessments, claims, actions for loss, damages or compensation whether arising under "The Workers Compensation Act", or any other Act or otherwise arising out of or in any way connected with the performance or non-performance of the Contract or any part thereof during the term of the Contract and the warranty period provided for therein;

THEN THIS OBLIGATION SHALL BE VOID, but otherwise shall remain in full force and effect. The Surety shall not, however, be liable for a greater sum than the sum specified above.

AND IT IS HEREBY DECLARED AND AGREED that the Surety shall be liable as Principal, and that nothing of any kind or matter whatsoever that will not discharge the Principal shall operate as a discharge or release of liability of the Surety, any law or usage relating to the liability of Sureties to the contrary notwithstanding.

IN WITNESS WHEREOF the Principal and Surety have signed and sealed this bond the

_____ day of _____ , 20____ .

SIGNED AND SEALED
in the presence of:

_____
(Witness as to Principal if no seal)

_____
(Name of Principal)

Per: _____ (Seal)

Per: _____

_____
(Name of Surety)

By: _____ (Seal)
(Attorney-in-Fact)

FORM H2: IRREVOCABLE STANDBY LETTER OF CREDIT
(PERFORMANCE SECURITY)
(See D11)

_____
(Date)

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

RE: PERFORMANCE SECURITY – BID OPPORTUNITY NO. 775-2017

2018 Regional Street Renewal Project – McPhillips Street Reconstruction and Underpass Structural Improvements – Logan Avenue to Jarvis Avenue

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 thirty (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)

FORM J: SUBCONTRACTOR LIST
(See D12)

2018 Regional Street Renewal Project – McPhillips Street Reconstruction and Underpass Structural Improvements – Logan Avenue to Jarvis Avenue

Portion of the Work	Name	Address
SURFACE WORKS:		
Supply of Materials:		
Concrete		
Cellular Concrete		
Asphalt		
Base Course & Sub-Base		
Sod		
Aluminum Pedestrian Handrail		
Installation/Placement:		
Concrete		
Cellular Concrete		
Asphalt		
Base		
Structural Traffic Barriers		
Aluminum Pedestrian Handrail		
UNDERGROUND WORKS:		
Supply of Materials:		
Catchbasins/Manholes		
Connecting Pipe		
Installation/Placement:		
Catchbasins/Manholes		
Connecting Pipe		
Sewer Televising		

FORM K: EQUIPMENT
(See D13)

2018 Regional Street Renewal Project – McPhillips Street Reconstruction and Underpass Structural Improvements – Logan Avenue to Jarvis Avenue

1. Category/type: Excavation and Grading

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

2. Category/type: Concrete Paving Operations

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

3. Category/type: Asphalt Paving

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

FORM K: EQUIPMENT
(See D13)

2018 Regional Street Renewal Project – McPhillips Street Reconstruction and Underpass Structural Improvements – Logan Avenue to Jarvis Avenue

4. Category/type:

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

5. Category/type:

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

6. Category/type:

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

PART E - SPECIFICATIONS

GENERAL

E1. APPLICABLE SPECIFICATIONS AND DRAWINGS

E1.1 These Specifications shall apply to the Work.

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

E1.2.1 *The City of Winnipeg Standard Construction Specifications* is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at http://www.winnipeg.ca/matmgt/Spec/Default.stm

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

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

E1.3 The following Drawings are applicable to the Work:

Drawing No.	Drawing Name/Title	Drawing (Original) Sheet Size
GE-001	Cover Sheet	A1
GE-002	Drawing List	A1
GE-003	Removals (1 of 2)	A1
GE-004	Removals (2 of 2)	A1
CT-001	Control Line Geometry and Joint Layout (1 of 2)	A1
CT-002	Control Line Geometry and Joint Layout (2 of 2)	A1
CT-003	McPhillips Street – Start to Sta. 0+270 (Plan-Profile)	A1
CT-004	McPhillips Street – Sta. 0+270 to 0+430 (Plan)	A1
CT-005	McPhillips Street – Sta. 0+270 to 0+430 (SB Profile)	A1
CT-006	McPhillips Street – Sta. 0+270 to 0+430 (NB Profile)	A1
CT-007	McPhillips Street – Sta. 0+430 to 0+563 (Plan)	A1
CT-008	McPhillips Street – Sta. 0+430 to 0+563 (SB Profile)	A1
CT-009	McPhillips Street – Sta. 0+430 to 0+563 (NB Profile)	A1
CT-010	McPhillips Street – Sta. 0+563 to End (Plan)	A1
CT-011	McPhillips Street – Sta. 0+560 to End (SB Profile)	A1
CT-012	McPhillips Street – Sta. 0+560 to End (NB Profile)	A1
CT-013	Traffic Detour - Stage 1	A1
CT-014	Traffic Detour - Stage 2A	A1
CT-015	Traffic Detour - Stage 2B	A1
CT-016	Traffic Detour - Stage 3	A1
CT-017	Traffic Detour - Stage 4	A1
CT-018	Sections (1 of 3)	A1
CT-019	Sections (2 of 3)	A1
CT-020	Sections (3 of 3)	A1
CT-021	Details	A1
CS-001	Underpass Structural Work General Notes	A1
CS-002	Proposed Structural Works and Construction Stages	A1
CS-003	West Side Removals (1 of 2)	A1
CS-004	West Side Removals (2 of 2)	A1
CS-005	East Side Removals (1 of 2)	A1
CS-006	East Side Removals (2 of 2)	A1
CS-007	Removals – Sections and Details	A1
CS-008	West Side Reconstruction (1 of 2)	A1
CS-009	West Side Reconstruction (2 of 2)	A1
CS-010	East Side Reconstruction (1 of 2)	A1
CS-011	East Side Reconstruction (2 of 2)	A1

Drawing No.	Drawing Name/Title	Drawing (Original) Sheet Size
CS-012	Parapet Wall Reinforcing Details	A1
CS-013	Subway Retaining Wall Repairs	A1
CS-014	Sidewalk Retaining Wall – Section and Details	A1
CS-015	Underpass - Median Reconstruction 1 of 2	A1
CS-016	Underpass - Median Reconstruction 2 of 2	A1
CS-017	Underpass - Median Reinforcing Layout	A1
CS-018	Underpass - Median Aluminum Barrier Layout	A1
CS-019	Underpass - Median Aluminum Barrier Standard Details	A1
CS-020	Aluminum Pedestrian Handrail Layout	A1
CS-021	Aluminum Pedestrian Handrail Details (1 of 5)	A1
CS-022	Aluminum Pedestrian Handrail Details (2 of 5)	A1
CS-023	Aluminum Pedestrian Handrail Details (3 of 5)	A1
CS-024	Aluminum Pedestrian Handrail Details (4 of 5)	A1
CS-025	Aluminum Pedestrian Handrail Details (5 of 5)	A1
CS-026	Reinforcing Steel Schedule	A1
CU-001	LDS Construction at Underpass	A1
CU-002	Combined Sewer Renewal	A1

E2. GEOTECHNICAL REPORT

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

E3. OFFICE FACILITIES

E3.1 The Contractor shall supply office facilities meeting the following requirements:

(a) The field office shall be for the exclusive use of the Contract Administrator.

(b) The building shall be conveniently located near the site of the Work.

(c) The building shall have a minimum floor area of 20 square metres, a height of 2.4 m with two (2) windows for cross ventilation and a door entrance with a suitable lock.

(d) The building shall be suitable for all weather use. It shall be equipped with an electric heater and air conditioner so that the room temperature can be maintained between either six teen degrees Celsius (16 ^{o}C) to eighteen degrees Celsius (18^{o}C) or twenty-four degrees(24^{o}C) Celsius to twenty five degrees Celsius (25^{o}C).

(e) The building shall be adequately lighted with fluorescent fixtures and have a minimum of three (3) wall outlets.

(f) The building shall be furnished with one (1) desk, one (1) drafting table, one (1) meeting table, one (1) stool, one (1) legal size filing cabinet and a minimum of eight (8) chairs.

(g) A portable toilet shall be located near the field office building. The toilet shall have a locking door and be for the exclusive use of the Contract Administrator and other personnel from the City.

(h) The field office building and the portable toilet shall be cleaned on a weekly basis immediately prior to each site meeting. The Contract Administrator may request additional cleaning when he/she deems it necessary.

E3.2 The Contractor shall be responsible for all installation and removal costs, all operating costs, and the general maintenance of the office facilities.

E3.3 The office facilities will be provided from the date of the commencement of the Work to the date of Total Performance.

E4. PROTECTION OF EXISTING TREES

E4.1 The Contractor shall take the following precautionary steps to prevent damage from construction activities to existing boulevard trees within the limits of the construction area:

(a) The Contractor shall not stockpile materials and soil or park vehicles and equipment on boulevards within 2 metres of trees.

(b) Trees identified to be at risk by the Contract Administrator are to be strapped with 25 x 100 x 2400 mm wood planks, or suitably protected as approved by the Contract Administrator.

(c) Excavation shall be performed in a manner that minimizes damage to the existing root systems. Where possible, excavation shall be carried out such that the edge of the excavation shall be a minimum of 1.5 times the diameter (measured in inches), with the outcome read in feet, from the closest edge of the trunk. Where roots must be cut to facilitate excavation, they shall be pruned neatly at the face of excavation.

(d) Operation of equipment within the dripline of the trees shall be kept to the minimum required to perform the work required. Equipment shall not be parked, repaired, refuelled; construction materials shall not be stored, and earth materials shall not be stockpiled within the driplines of trees. The dripline of a tree shall be considered to be the ground surface directly beneath the tips of its outermost branches. The Contractor shall ensure that the operations do not cause flooding or sediment deposition on areas where trees are located.

(e) Work on-site shall be carried out in such a manner so as to minimize damage to existing tree branches. Where damage to branches does occur, they shall be neatly pruned.

E4.2 All damage to existing trees caused by the Contractor's activities shall be repaired to the requirements and satisfaction of the Contract Administrator and the City Forester or his/her designate.

E4.3 No separate measurement or payment will be made for the protection of trees.

E4.4 Except as required in clause E4.1(c) and E4.1(e), Elm trees shall not be pruned at any time between April 1 and July 31.

E5. TRAFFIC CONTROL

E5.1 Further to clauses 3.6, 3.7 and 3.8 of CW 1130:

(a) Where directed by the Contract Administrator, the Contractor shall construct and maintain temporary asphalt ramps to alleviate vertical pavement obstructions such as manholes and planing drop-offs to the satisfaction of the Contract Administrator. Payment shall be in accordance with CW3410.

(b) In accordance with the Manual of Temporary Traffic Control on City Streets (MTTC), the Contractor ("Construction Agency" in the manual) shall be responsible for placing, maintaining and removing the appropriate temporary traffic control devices as specified by the MTTC or by the Traffic Management Branch of the City of Winnipeg Public Works Department. The Contractor shall bear all costs associated with the placement of temporary traffic control devices by their own forces or subcontractor.

E5.2 Notwithstanding E5.1, in accordance with the MTTC, the Contract Administrator shall make arrangements with the **Traffic Services Branch of the City of Winnipeg** to place, maintain, and remove all **regulatory signs** and traffic control devices authorized and/or required by the Traffic Management Branch in the following situations:

(a) Parking restrictions,

(b) Stopping restrictions,

(c) Turn restrictions,

(d) Diamond lane removal,

(e) Full or directional closures on a Regional Street,

(f) Traffic routed across a median,

(g) Full or directional closure of a non-regional street where there is a requirement for regulatory signs (turn restrictions, bus stop relocations, etc.) to implement the closure.

(h) Approved Designated Construction Zones with a temporary posted speed limit reduction. Traffic Services will be responsible for placing all of the advance signs and 'Construction Ends' (TC-4) signs. The Contractor is still responsible for all other temporary traffic control including but not limited to barricades, barrels and tall cones.

E5.2.1 An exception to E5.2 is the 'KEEP RIGHT/KEEP LEFT' sign (RB-25 / RB-25L) which shall be supplied, installed, and maintained by the Contractor at their own expense.

E5.2.2 Further to E5.2, where the Contract Administrator has determined that the services of the Traffic Services Branch are required, the City shall bear the costs associated with the placement of temporary traffic control devices by the Traffic Services Branch of the City of Winnipeg in connection with the works undertaken by the Contractor.

E6. TRAFFIC MANAGEMENT

E6.1 See the applicable traffic staging Contract Drawings for details and order of the Contract traffic management.

E6.2 Further to clause E5.2 of this Bid Opportunity, the Traffic Services Branch will be responsible for all cross-over signage, poly post delineation of north-south traffic in northbound and southbound lanes, and any regulatory signage (stop, do not enter, no left turns, etc.).

E6.3 Further to clause 3.7 of CW 1130:

(a) Single lane closures on intersecting and/or adjoining Regional Streets shall only be permitted during non-peak periods when required for construction activities when approved by the Traffic Management Branch. Storage/parking of materials, equipment or vehicles is not permitted on Regional Streets at any time unless approved by the Contract Administrator, in consultation with the Traffic Management Branch.

E6.4 Maintain a minimum of one (1) lane of traffic northbound and one (1) lane of traffic southbound at all times during construction times, including during paving and milling operations. When no work is being performed on site, non-essential lane closures will not be permitted.

E6.5 Where left turn lanes exist at Logan Avenue and Jarvis Avenue intersections, an additional lane to accommodate the left turn storage lane shall be maintained at all times.

E6.6 All cross-streets must be accessible at all times during construction. Staging of approaches should be completed with partial openings allowing access.

E6.7 Flag persons may be necessary to maintain the flow of traffic during certain work operations.

E6.8 Should the Contractor be unable to maintain pedestrian or vehicular access to a business, he/she shall review the planned disruption with the business and the Contract Administrator, and take reasonable measures to minimize the impact. The Contractor shall provide a minimum of twenty-four (24) hours notification to the affected residence or business and the Contract Administrator, prior to disruption of access.

E6.9 Winnipeg Transit access to be maintained by utilizing temporary bus stops. Should the Contractor be unable to maintain bus stops or side street bus routes, it shall be reviewed with the Contract Administrator at least forty-eight (48) hours in advance to see if modifications can be made.

E6.10 North-south pedestrian access along McPhillips must be maintained at all times by keeping the sidewalk open on the side that is not under construction. A minimum of one (1) pedestrian crossing in the (east-west) direction must be maintained at each of the Logan Avenue and Jarvis Avenue intersections at all times. Sidewalk closures at intersections will not be permitted when no construction work is occurring in the area.

E6.11 Maintain all cross-overs for the duration of the project.

E6.12 Staged roadway reconstruction required in the vicinity of Logan Avenue and Jarvis Avenue for cross-overs.

E6.13 Maintain positive drainage during all stages.

E6.14 Left turns are prohibited in northbound and southbound directions in the construction zone. Left turn lanes must be maintained at Logan and Jarvis at all times.

E6.15 Cross streets at cross overs operate as right in right out only.

E6.16 Ambulance/emergency vehicle access must be maintained at all times.

E6.17 Alterations to the staging shown in the Contract Drawings must be presented and approved in writing by the Contract Administrator at least three (3) days prior to implementing change.

E7. REFUSE AND RECYCLING COLLECTION

E7.1 While access to refuse and/or recycling collection vehicles is restricted, on collection day(s) the Contractor shall move all of the affected property owners refuse and/or recycling materials to a nearby common area, prior to an established time, in accordance with E7.2 to permit the normal collection vehicles to collect the materials. Immediately following recycling collection the Contractor shall return recycling receptacles to the addresses marked on the receptacles.

E7.2 Collection Schedule:

McPhillips Street Northbound from Logan Avenue to Jarvis Avenue.

Collection Day(s):	**Thursday A**
Collection Time:	**07:00 – 18:00**
Common Collection Area:	**To de determined, if required**

McPhillips Street Southbound from Logan Avenue to Underpass.

Collection Day(s):	**Friday B**
Collection Time:	**07:00 – 18:00**
Common Collection Area:	**To be determined, if required**

McPhillips Street Southbound from Underpass to Jarvis Avenue.

Collection Day(s):	**Wednesday B**
Collection Time:	**07:00 – 18:00**
Common Collection Area:	**To be determined, if required**

E7.3 No measurement or payment will be made for the work associated with this specification.

E8. PEDESTRIAN SAFETY

E8.1 During the project, in locations where deep excavations for underground works cannot be backfilled in that Working Day as well as open excavations adjacent to pedestrian facilities, a temporary snow fence shall be installed.

E8.2 The Contractor shall be responsible for maintaining the snow fence in a proper working condition. No measurement for payment shall be made for this work.

E9. WATER OBTAINED FROM THE CITY

E9.1 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.

E10. SURFACE RESTORATIONS

E10.1 Further to clause 3.3 of CW 1130, when Total Performance is not achieved in the year the Contract is commenced, the Contractor shall temporarily repair any Work commenced and not completed to the satisfaction of the Contract Administrator. The Contractor shall maintain the temporary repairs in a safe condition as determined by the Contract Administrator until permanent repairs are completed. The Contractor shall bear all costs associated with temporary repairs and their maintenance.

E11. OPERATING CONSTRAINTS FOR WORK IN CLOSE PROXIMITY TO FEEDERMAINS

E11.1 Description

E11.1.1 This Section details operating constraints for all Work to be carried out in close proximity to feedermains. Close proximity shall be deemed to be any construction activity within a 5 metres offset from the centreline of the feedermain.

E11.1.2 Additional considerations and requirements for working around the McPhillips feedermain are contained in Appendix 'B'..

E11.2 General Considerations for Work in Close Proximity to Feedermains

E11.2.1 Feedermains are a critical component of the City of Winnipeg Regional Water Supply System and Work in close proximity to the pipeline shall be undertaken with an abundance of caution. The pipe cannot be taken out of service to facilitate construction and inadvertent damage caused to the pipe would likely have catastrophic consequences.

E11.2.2 Work around feedermains shall be planned and implemented to minimize the time period that Work is carried out in close proximity to the pipe and to ensure that the pipeline is not subjected to excessive construction related loads, including excessive vibrations and/or concentrated or asymmetrical lateral loads during backfill placement.

E11.2.3 Large diameter pressure pipe generally has limited ability to withstand increased earth and live loading. Therefore, every precaution must be undertaken to ensure that applied loading during all phases of construction is minimized in accordance with the procedures outlined in E11.3. Prestressed pipe typically fails in a non-ductile mode and has the potential to cause extensive consequential damage to infrastructure if failure should occur.

E11.3 Physical Pipe Protection

E11.3.1 Identify the location and elevation of the pipes by soft excavation (hydro vac or hand digging) prior to construction

E11.3.2 Works carried out near the pipes should not subject the pipes to:

(a) Excessive loads from vehicles or material stockpiles;

(b) Excessive vibrations;

(c) Concentrated or asymmetrical loading; and

(d) Drop-loading or impact.

E11.3.1 Construct structural crossings across the pipe in areas of limited cover. These crossings should consist of either:

(a) Bridging over the pipe, with no load bearing on the surface overtop or within the zone around the top of the pipe.

(b) On-ground surfacing such as timber mats, steel plates or concrete protection slabs to distribute the loading over a larger area. Rubber landscape protection mats are not suitable protection.

E11.3.2 Utilize operational controls where the pipes have sufficient soil cover and pipes are not subject to excessive live and impact loading from vehicles.

E11.3.3 Do not impart excessive vibration loads on the pipes or that would cause settlement of the soil around or below the pipe.

(a) No large vibratory equipment shall be used overtop or within 5.0 m measured horizontally on either side of the pipes.

(b) Compact pavement subgrade, subbase and base materials by static methods without vibration or with smaller approved equipment such as hand held plate packers or smaller roller equipment.

E11.3.4 Excavate around pipes with smooth edge excavation equipment, soft excavation or hand digging.

E11.3.5 Do not dump materials within 5.0 m of the pipes. Instead, dump elsewhere and carefully blade into place.

E11.4 Operational Controls

E11.4.1 Arrange pipe crossings to cross perpendicular to the pipe to minimize the length of pipe impacted. Confine equipment and vehicles to these designated crossing locations.

E11.4.2 Avoid driving along the pipe. Paving operations working on granular soil subgrades such as including trimming and paving operations should be configured to cross perpendicular to the pipe wherever possible.

E11.4.3 Subgrade, subbase and base construction shall be kept in a rut free condition at all times. Construction equipment is prohibited from crossing pipelines if the grade is insufficient to support the equipment without rutting.

E11.4.4 Materials must not be stockpiled overtop or within 5.0 m of the pipe centerline.

E11.4.5 Do not park vehicles overtop of the pipe.

E11.4.6 Vehicles must come to a complete stop before crossing pipes, proceed slowly over pipes. Install stop signs or provide flagmen to ensure vehicles stop where directed by the Contract Administrator.

E11.4.7 Ensure all parties entering the worksite and especially delivery vehicles are made aware of the pipe.

E11.5 No separate measurement or payment will be made for feedermain protection, and will be considered incidental to the Works of the project.

E12. SIGN SUPPORT CLAMPS

E12.1 The Contractor shall install all new sign support clamps at the locations shown on the Drawings or as directed by the Contract Administrator. The City shall supply all sign support clamps.

E12.2 All costs in connection with the installation of sign support clamps are incidental to the Contract.

E13. ROADWAY EXCAVATION

E13.1 Roadway cannot be removed until the adjacent structural sidewalk is removed and excavated.

E14. MONOLITHIC CURB AND 100 MM CONCRETE SIDEWALK WITH BLOCK-OUTS FOR INTERLOCKING PAVING STONES

E14.1 Description

E14.1.1 Further to the latest version of the City of Winnipeg Standard Construction Specification CW 3325, this Specification shall cover the:

(a) Installation of concrete monolithic curb and sidewalk and 100 mm sidewalk where block-outs for interlocking paving stones are required.

(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 and Drawings

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

(i) CW 3310 – Portland Cement Concrete Pavement; and

(ii) CW 3325 – Portland Cement Concrete Sidewalk.

E14.3 Materials and Equipment

E14.3.1 General

(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.

(c) Concrete mix design shall comply with Clause 6.2a) of the latest version of the CW 3310.

(d) All other materials as per Clause 5 of the latest version of the CW 3310.

E14.3.2 Equipment

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

E14.4 Construction Methods

E14.4.1 Construction shall take place in accordance with the Drawings and CW 3310 and CW 3325.

E14.4.2 Blockouts for all indicator strip paving stones in sidewalk to be constructed as shown on the Drawings. All forming is incidental to the unit price Bid for the specification.

E14.4.3 Verify dimensions of unit pavers prior to construction of the blockouts. Gaps between pavers and concrete pavement in excess of 6 mm (1/4") will be rejected.

E14.4.4 Meet existing grades and slopes unless otherwise indicated on the Drawings. Notify the Contract Administrator where this requirement will not result in positive drainage.

E14.4.5 Thickened sidewalk or thickened edge of sidewalk will be incidental to the unit price bid for the monolithic curb and sidewalk.

E14.4.6 Removal of any existing paving stone shall be incidental to the Work.

E14.5 Measurement and Payment

E14.5.1 Construction of Monolithic Curb and Sidewalk

(a) Constructing the concrete sidewalk shall be paid for at the Contract Unit Price per square metre for "Monolithic Curb and Sidewalk with Paving Stone Blockout" or "100 mm Concrete Sidewalk with Paving Stone Blockout", measured as specified herein, performed in accordance with this Specification and accepted by the Contract Administrator, which price shall be paid in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work.

The area to be paid for shall be the total number of square metres of sidewalk measured from the face of the curb to all sidewalk extremities, constructed in accordance with this Specification and as measured and accepted by the Contract Administrator.

E15. INTERLOCKING PAVING STONES

E15.1 Description

E15.1.1 Further to the latest version of the City of Winnipeg Standard Construction Specification CW 3335, this Specification shall cover the:

(a) Supplying and installing of interlocking paving stones (unit pavers) used in paving pattern/fields and as indicator strips; and

(b) Supplying and installing of sand setting bed.

E15.1.2 The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all other things necessary or and incidental to the satisfactory performance and completion of all Work as hereinafter specified.

E15.1.3 Referenced Specifications and “Drawings

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

(i) CW 3330 – Installation of Interlocking Paving Stones.

E15.2 Materials And Equipment

E15.2.1 General

(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.

E15.2.2 Interlocking Paving Stones

(a) Concrete interlocking paving stones (unit pavers) for indicator strips or equivalent in accordance with B6, supplied by:

Barkman Concrete
www.barkmanconcrete.com

http://www.barkmanconcrete.com/images/uploads/resources/specs_catalogue_2017OCT.pdf

(b) As shown on the Drawings and as follows:

(i) Charcoal Holland Paver 60 x 210 x 210 mm.

(c) Concrete interlocking paving stones (unit pavers) for indicator strips shall be clay brick pavers conforming to CAN3-A231.2, Precast Concrete Pavers. Further to CAN3-A231.2.6.1.1, where concrete pavers are shipped for installation before the pavers are twenty eight (28) days old, the average compressive strength of these pavers at the time of delivery to the work site shall be not less than 40 MPA.

E15.2.3 Sand

(a) Clean brick sand as joint filler.

(b) Clean brick sand as minimum 13 mm depth setting bed.

(c) Bedding sand shall be fine aggregate as specified in Specification CW 3330.

E15.3 Equipment

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

E15.4 Construction Methods

E15.4.1 Installation of Indicator Strip Paving Stones in Blockouts

(a) Paving stones shall be installed in formed concrete blockouts in accordance with CW 3330, set in locations and patterns as shown on the Drawings. Spaces between joints shall not exceed 3 mm, and shall be uniform and consistent while maintaining true patterns as indicated on the Drawings.

(b) Contractor to verify the exact dimensions of pavers prior to construction of blockouts in concrete sidewalk.

(c) Remove and dispose of existing paving stones in existing sidewalks. Any removal and/or disposal shall be incidental to the Work within this Specification.

(d) Install concrete sidewalk complete with blockouts for paving stones as specified on the Drawings.

(e) Install sand bed to minimum 13 mm depth as shown on the Drawings.

(f) Do not compact setting bed prior to installation of pavers.

(g) Spread only sufficient area which can be covered with pavers same day.

(h) Remove adjacent pavers in patterns as required to ensure that bricks do not require cutting to fit existing paving pattern.

(i) Where paving pattern is interrupted by vertical structural elements, pavers must be saw cut and fit true and hand tight.

(j) Commence installation of pavers against edge to obtain straightest possible course for installation.

(k) Pavers shall be cut with a saw only, to obtain true even undamaged edges. Chipped pavers are unacceptable.

(l) Crews shall work on installed pavers, not on sand layer.

(m) Spread and fine grade brick sand over paving surface and sweep into joints, in several directions. Sand is incidental to the price for supply and installation of pavers.

(n) Compact pavers with vibratory plate compactor having mass of at least 113 kg. Compaction is incidental to the price for supply and installation of paving stone.

(o) Sweep remaining sand over all paving areas until joints are full and remove excess from Site.

(p) Remove cracked, chipped, broken or otherwise damaged paving materials from Site immediately.

(q) Upon completion, clean in accordance with manufacture's recommendations.

E15.5 Measurement And Payment

E15.5.1 Interlocking Paving Stones

(a) Interlocking paving stone work will be measured on an area basis and will be paid for at the Contract Unit Price per square metre for "Interlocking Paving Stones", 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. The area to be paid for shall be the installed area of paving stones.

(i) Charcoal Holland Paver 60 x 210 x 210 mm.

E16. OPEN EXCAVATION

E16.1 The Contractor shall schedule their operations to minimize the length of time an excavated area immediately adjacent to traffic on the existing roadway is left open.

E16.2 The Contractor shall excavate only an amount to allow enough time for the sub-grade to be prepared properly and sub base placed (but not necessarily compacted) by the end of the following Working Day.

E16.3 The Contractor will not be permitted to leave an excavation area that is immediately adjacent to traffic on the existing roadway open for the weekend.

E17. HYDRO EXCAVATION

E17.1 Description

(a) This specification covers the removal of earthen material immediately adjacent to underground utilities infrastructure by means of high pressure water spray, and the recovery of evacuated material by vacuum type means or equivalent method as approved by the Contract Administrator.

E17.2 Equipment

(a) Hydro Excavation unit shall be capable of maintaining a minimum working pressure of 10,000 psi, at a rate of 10 to 12 gallons per minute. Unit should be adjustable, so as to provide adequate pressure to remove earthen material identified by the Contract Administrator.

(b) Spray head shall be equipped with a rotating nozzle, in order to provide a wider path of cut.

E17.3 Construction Methods

E17.3.1 Hydro-Removal of Earthen Material

(a) Earthen material adjacent to utility entity shall be sprayed with high pressure water so as to remove all such material identified by the Contractor Administrator.

E17.3.2 Recovery of Excavated Material

(a) The recovery of excavated material shall be done using a vacuum type method, or other type of method approved by the Contract Administrator.

(b) The recovery of material shall follow immediately behind the excavation, to avoid excavated areas from filling with excavated material.

(c) The use of mechanical sweepers will not be allowed.

(d) Dispose of material in accordance with Section 3.4 of CW 1130.

E17.3.3 Backfill of Hydro Excavated Hole

(a) The Contractor shall be responsible for the backfill of the hydro excavated hole upon the completion of the Work described herein, to the approval of the Contract Administrator.

E17.4 Measurement and Payment

(a) Hydro Excavation of earthen material will be measured on an hourly basis and paid for at the Contract Unit Price per hour for “Hydro Excavation”. The hours to be paid for will be the total number of house of Hydro Excavation in accordance with this Specification, accepted and measured by the Contract Administrator.

E18. CANADIAN PACIFIC RAILWAY (CPR)

E18.1 Description

E18.1.1 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 other things necessary or and incidental to the satisfactory performance and completion of all the Work as herein after specified.

E18.2 Scope of Work

E18.2.1 The Contractor is responsible to contact Canadian Pacific Railway (CPR) and obtain all required permissions, clearances and/or safety watches to complete the Work. Mubbasher Malik, mubbasher_malik@cpr.ca, may be the contact for CPR.

E18.2.2 No measurement or payment will be made for this item of Work.

E18.2.3 Contractor shall comply with *Minimum Safety Requirements for Contractors Working on CP Property* as outlined in Appendix 'C'.

E19. TREE REMOVALS

E19.1 Description

E19.1.1 This specification shall amend the City of Winnipeg Standard Construction specification CW 3010 "Clearing and Grubbing", and shall cover the removal of trees as specified on the Contract Drawings. The City of Winnipeg, Forestry Branch must be contacted prior to removing any trees.

E19.2 Construction Methods

E19.2.1 Remove only trees marked and confirmed for removal in the field by the Contract Administrator.

E19.2.2 Remove trees in accordance with CW 3010.

E19.2.3 The Contractor shall arrange for any Elmwood to be disposed of by the City of Winnipeg.

E19.3 Measurement and Payment

E19.3.1 Removal of trees will be measured on a unit basis and paid for at the Contract Unit Price per unit item of "Tree Removal". The number to be paid for will be the total number of trees removed in accordance with this specification and accepted by the Contract Administrator.

E20. CRASH ATTENUATION BARRELS

E20.1 Description

E20.1.1 The Work covered under this item shall include all operations related to the supply, fabrication, delivery and installation of the new Crash Attenuation Barrels and associated materials in accordance with NCHRP Report 350.

E20.1.2 The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies, and all things necessary for and incidental to the satisfactory performance and completion of the Work as hereinafter specified. All materials supplied under this Specification shall be subject to inspection and acceptance by the Contract Administrator.

E20.1.3 Site specific requirements for installation of Crash Attenuation Barrels will be in accordance with drawings CT-014, CT-015, CT-016 and CT-021. General supply, loading, hauling, unloading, storing and installing is as per Manufacturer's recommended procedures.

E20.1.4 The Crash Attenuation Barrel manufacturer product data sheet shall be submitted to the Contract Administrator for approval prior to supply and installation.

E20.2 Materials

E20.2.1 Materials shall be supplied in accordance with the manufacturer's product manual and in accordance with NCHRP Report 350.

E20.2.2 The Contractor shall be responsible for the supply, safe storage and handling of all materials set forth in this specification.

E20.2.3 Crash Attenuation Barrels or equivalent in accordance with B6, supplied by:

(a) Big Sandy Impact Attenuator Sand Barrels by TrafFix Devices Inc.

https://www.traffixdevices.com/products/attenuators/big-sandy#specifications

(b) Fitch Sand Barrel System by Quixote Transportation Safety Inc.

http://www.energyabsorption.com/products/products_universal_barrels.asp

E20.2.4 Sand required for the barrels shall contain a minimum of five percent (5%) rock salt (NaCl), by weight.

E20.3 Construction Methods

E20.3.1 The Crash Attenuation Barriers shall be installed in accordance with the manufacturer's installation manual.

E20.3.2 The Contractor shall be responsible for loading, and unloading as well as storing of the crash attenuation barrels. The Contractor shall supply all necessary equipment for loading, hauling, unloading, and storing of the components.

E20.3.3 Prior to commencing installation of the protection at a location, the Contractor shall verify that it can be installed in strict accordance with the Drawings. Should there be a conflict between a proposed location and any facility the Contract Administrator shall be notified immediately.

E20.3.4 Barrels shall be relocated by the Contractor between Stage 2B and Stage 3. Relocation shall include all necessary equipment, materials, labour, safe storage and related operations required to relocate the barrels to the satisfaction of the Contract Administrator.

E20.3.5 Crash Attenuation Barrels are to be salvaged and delivered to city yards as directed by the Contract Administrator after the detour is removed.

E20.4 Measurement and Payment

E20.4.1 Supply and installation of Crash Attenuation Barrels, and all related appurtenances will be measured on a unit basis and paid for per barrel at the Contract Unit Price in accordance with this Specification, accepted and measured by the Contract Administrator.

E20.4.2 The unit price for "Supply and Place Crash Attenuation Barrels" will be payment in full for the supply and delivery of the barrels to site, placement and filling of barrels, relocation of barrels and all related operations as herein described and all other items incidental to the work included, accepted and measured by the Contract Administrator.

E20.4.3 Relocation of barrels between stages shall be considered incidental to the Work.

E21. MOBILIZATION AND DEMOBILIZATION

E21.1 Description

E21.1.1 This Specification shall cover all operations relating to the mobilization and demobilization of the Contractor to the Site, as specified herein.

E21.1.2 The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies, and all things necessary for and incidental to the satisfactory performance and completion of all works hereinafter specified.

E21.2 Scope of Work

E21.2.1 The Work under this Specification shall include but not be limited to:

(a) Mobilizing and demobilizing on-site Work facilities;

(b) Supplying, setting up, laying out, and removing site office facilities as detailed in E3, "Office Facilities";

(c) Supplying and installing secure chain link fencing around the site;

(d) Maintaining and removing any access roadways; and

(e) Restoring all Site facilities.

E21.3 Materials

E21.3.1 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.

E21.3.2 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.

E21.3.3 The Contractor's Site supervisor is required to carry, at all times, a cellular telephone, with voicemail.

E21.3.4 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 not covered by other prices.

E21.4 Equipment

E21.4.1 All equipment shall be of a type acceptable to the Contract Administrator and shall be kept in good working order.

E21.5 Construction Methods

E21.5.1 Layout of On-Site Work Facilities

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

(b) The Contractor shall coordinate with relevant parties to make arrangements for use of these areas.

(c) The Contractor is responsible for coordination and obtaining approvals for any staging or laydown areas.

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

E21.5.2 Restoration of Existing Facilities

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

E21.6 Quality Control

E21.6.1 Inspection

(a) All workmanship and all materials furnished and supplied under this Specification are subject to close and systematic inspection and testing by the Contract Administrator including all operations from the selection and production of materials through to the 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.

E21.6.2 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/her inspector for testing purposes as required. There shall be no charge to the City for samples taken.

E21.7 Measurement and Payment

E21.7.1 Mobilization and demobilization shall not be measured and shall be paid for at the Contract Lump Sum Price for "Mobilization and Demobilization", 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.

Mobilization and demobilization shall be paid for at a percentage of the Contract Lump Sum Price, measured as specified herein. These percentages shall be as follows:

(a) Thirty percent (30%) when the Contract Administrator is satisfied that construction has commenced;

(b) Sixty percent (60%) during construction; and

(c) Ten percent (10%) upon completion of the project.

E22. CONCRETE REMOVAL

E22.1 Description

E22.1.1 This Specification shall cover all operations relating to the removal and disposal of concrete as specified herein and as shown on the Drawings. This Specification shall cover concrete removal Works, including all necessary staging, demolition, removal, salvaging, transporting, unloading, stockpiling, dismantlement, and disposal of applicable materials.

E22.1.2 The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies, and all things necessary for and incidental to the satisfactory performance and completion of all Works as hereinafter specified.

E22.2 Scope of Work

E22.2.1 The Work under this Specification shall generally include the following items of work:

(a) Removing and disposing of existing concrete as shown on the Drawings or as otherwise directed by the Contract Administrator on Site. Removals are identified as follows:

(i) Type 1 – Structural Concrete Sidewalk;

(ii) Type 2 – Concrete Sidewalk;

(iii) Type 3 – Sidewalk Retaining Wall (Complete Removal) and Structural Concrete Sidewalk;

(iv) Type 4 – CPR Subway Retaining Wall (Complete Removal at Southwest End);

(v) Type 5 – CPR Subway Retaining Wall Cap;

(vi) Type 6 – CPR Pedestal Notching; and

(vii) Type 7 – Sidewalk Retaining Wall Footing Notching

(b) Removing concrete with appropriate equipment satisfactory to the Contract Administrator.

(c) Providing saw cuts where necessary to limit the extent of demolition.

(d) Repairing any over demolition and reinforcing damage to the satisfaction of the Contract Administrator.

(e) Disposal of the removed material at an appropriate off-site disposal centre.

E22.3 Submittals

E22.3.1 The Contractor shall submit a proposed Construction Method Statement including schedule, methods, and sequence of removal operations to the Contract Administrator for review and approval at least ten (10) Business Days prior to the commencement of any scheduled removal works on Site. This Submission shall clearly identify all removal equipment to be used for the works as well as identify the disposal site for the removed material.

E22.4 Materials

E22.4.1 General

(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.

E22.5 Equipment

E22.5.1 General

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

E22.6 Construction Methods

E22.6.1 General

(a) Concrete shall be removed to the limits shown on the Drawings. Any unsound concrete detected beyond the removal extents depicted in the Drawings shall be reported to the Contract Administrator immediately. Removals beyond the limits shown on the Drawings shall only proceed as directed by and in the presence of the Contract Administrator.

(b) The Contractor shall prevent movement, settlement, or damage of existing structures to remain, services, paving, trees, landscaping and adjacent grades. If the safety of the new structure and/or existing structures or services appears to be endangered during structural removal operations, the Contractor shall cease operations and notify the Contract Administrator immediately.

(c) The Contractor shall provide flagmen, guards, barricades, railings, and necessary warning lights, and whenever necessary, warning signs and lights at the excavations, temporary sidewalks, removals, and/or other construction, to secure the safety of workmen and the public. The safety precautions shall comply with all Provincial Statutes applicable to the Work. The Contractor shall provide all other protective measures as may be required by any law in force in Manitoba and the Canada Labour Code.

(d) The Contractor shall be fully responsible for ensuring the public safety in all areas, and shall be held responsible for any loss or damage caused due to neglect by the Contractor or his employees.

(e) Under no circumstances shall the Contractor close any portion of existing roadways or walkways to traffic without prior written approval of the Contract Administrator, except as shown on the Drawings. If any existing roadway is to be closed to traffic in no case shall the Contractor commence any construction operations until such time as all the signs, barricades, and flashers have been erected to the satisfaction of the Contract Administrator.

(f) Remove concrete and other removal items with appropriate equipment satisfactory to the Contract Administrator. The Contractor shall take all necessary precautions to ensure that material does not fall onto any active roadways or sidewalks during removal operations.

(g) In no case shall the Contractor be permitted to use removal equipment, or other equipment or methods which may cause damage to any remaining structural elements or to any new construction. In the event that any element is damaged, the Contractor shall repair such element at his own expense to the satisfaction of the Contract Administrator.

(h) The Contractor shall only use methods of concrete removal that shall not damage the existing structure to remain or new structures.

(i) Provide sawcuts where necessary to limit the extent of demolition.

(j) Repair any over demolition and reinforcing steel damage to the satisfaction of the Contract Administrator.

E22.6.2 Type 1 – Structural Concrete Sidewalk

(a) The concrete sidewalk identified as a Type 1 Removal is assumed to be 150 mm thick structural (reinforced) concrete sidewalk. The Contractor shall exercise great care removing the structural sidewalk to avoid any damage to buried utilities (particularly on the west side). Of note, there exists a concrete utility vault immediately northwest of the underpass structure and a 610 mm diameter combined sewer running behind the west sidewalk retaining wall in the southwest quadrant.

(b) The Contractor shall carefully remove the existing light standards located in the areas of Type 1 Removals and coordinate with Manitoba Hydro for reinstallation of the existing light standards and/or new light standards. The Contractor shall coordinate with Manitoba Hydro to either protect the existing street lighting cable beneath the structural sidewalk or remove and reinstall new conduit and cable. The Contractor is advised that in these areas, the light standards sit on sidewalk retaining wall pilasters. The salvaged and/or new light standards are to be installed in the same locations.

(c) The Contractor shall exercise care to avoid any damage to the adjacent sidewalk retaining wall and CPR subway retaining wall during removal of the structural sidewalk.

E22.6.3 Type 2 – Concrete Sidewalk

(a) The concrete sidewalk identified as a Type 2 Removal is assumed to be standard City of Winnipeg unreinforced concrete sidewalk. The limits of the removal paid for under this payment item are as shown on the Drawings (extending from the end of the sidewalk retaining wall to the end of the proposed concrete parapet wall – concrete sidewalk beyond this limit is paid under a different pay item). The Contractor shall exercise great care removing the sidewalk to avoid any damage to buried utilities.

(b) The Contractor shall carefully remove the existing light standards located in the areas of Type 2 Removals and coordinate with Manitoba Hydro for reinstallation of the existing light standards and/or new light standards. The Contractor shall coordinate with Manitoba Hydro to either protect the existing street lighting cable beneath the sidewalk or remove and reinstall new conduit and cable.

(c) The Contractor shall exercise care to avoid any damage to the adjacent CPR subway retaining wall during removal of the sidewalk.

E22.6.4 Type 3 – Sidewalk Retaining Wall (Complete Removal) and Structural Concrete Sidewalk

(a) The portion of sidewalk retaining wall and associated structural sidewalk shall be removed to the underside of the footing or 1m below grade (whichever is less). The sidewalk retaining wall shall be cleanly removed to the limits shown on the Drawings.

E22.6.5 Type 4 – CPR Subway Retaining Wall (Complete Removal at Southwest End)

(a) The deteriorated portion of CPR subway retaining wall identified for removal on the Drawings shall be cleanly removed to the underside of the footing (where practicably possible) or to a minimum 300 mm below the underside of the proposed structural sidewalk/parapet wall. It is expected that at the south limit of the wall, complete removal will be possible while at the north limit of the removal, partial removal maybe be necessary to avoid a significant excavation behind the wall.

(b) The existing chain link fencing above and behind of the CPR subway retaining wall shall be removed to the post nearest the removal limit. Removal of this fencing is considered incidental to the work.

(c) The Contractor shall exercise great care when removing the wall, particularly with respect to the Manitoba Hydro vault and duct located closely behind the structure. The Contractor is advised that existing cover to the duct line is minimal. Protection of the vault and duct to the satisfaction of Manitoba Hydro is considered incidental to this work.

(d) Contractor is advised that the subway retaining wall concrete is not believed to be reinforced and great care shall be exercised to limit the removal to the minimum amount required as per the Drawings; any over removal will be required to be repaired by the Contractor to the satisfaction of CPR and the Contract Administrator.

E22.6.6 Type 5 – CPR Subway Retaining Wall Cap

(a) The deteriorated portion of the CPR subway retaining wall cap shall be removed to the limits identified by the Contract Administrator on site. The Contractor is advised that removal of the chain link fencing above and behind the subway retaining wall may need to be temporarily removed to complete this work. The Contractor shall reinstate the chain link fencing to the existing condition upon completion of the cap repairs.

(b) The top of the subway retaining wall shall be roughened and prepared in accordance with ICRI Guideline No. 03732, CSP 6 (Medium Scarification) prior to placement of the cap repair concrete.

(c) Contractor is advised that the subway retaining wall concrete is not believed to be reinforced and great care shall be exercised to limit the removal to the minimum amount required as per the Drawings; any over removal will be required to be repaired by the Contractor to the satisfaction of CPR and the Contract Administrator.

E22.6.7 Type 6 – CPR Pedestal Notching

(a) Removal of CPR pedestal concrete is required to accommodate the proposed lowered roadway. The Contractor shall notch the existing CPR pedestals as shown on the Drawings. Pneumatic hammers (15 kg, 35 pound class maximum) or other methods acceptable to the Contract Administrator may be used to complete the works.

(b) Contractor is advised that the pedestal concrete is not believed to be reinforced and great care shall be exercised to limit the removal to the minimum amount required as per the Drawings; any over removal will be required to be repaired by the Contractor to the satisfaction of CPR and the Contract Administrator.

E22.6.8 Type 7 – Sidewalk Retaining Wall Footing Notching

(a) Removal of a portion of the sidewalk retaining wall footings may be required to accommodate the proposed lowered roadway. The Contractor shall notch the existing sidewalk retaining wall footings if required as shown on the Drawings. Pneumatic hammers (15 kg, 35 pound class maximum) or other methods acceptable to the Contract Administrator may be used to complete the works.

(b) Contractor is advised that the sidewalk retaining wall footing is not believed to be reinforced and great care shall be exercised to limit the removal to the minimum amount required as per the Drawings; any over removal will be required to be repaired by the Contractor to the satisfaction of the Contract Administrator.

E22.6.9 Details of Existing Structure

(a) The applicable details and structure dimensions of the existing structures are shown on the Drawings for information only in establishing the methods and limits of Work.

(b) The accuracy of this information is not guaranteed and the Contractor must verify all information before commencing Work.

E22.6.10 Waste Handling and Disposal of Removed Materials

(a) Wherever practical, the Contractor shall recycle disposed materials.

(b) The Contractor shall promptly haul all removed materials indicated for disposal, off and away from the site. No storage of any materials on-site shall be allowed without written approval from the Contract Administrator. It shall be the Contractor's responsibility to find suitable disposal areas away from the site.

E22.7 Quality Control

E22.7.1 Inspection

(a) All workmanship and all materials furnished and supplied under this Specification are subject to close and systematic inspection and testing by the Contract Administrator including all operations from the selection and production of materials through to final acceptance of the specified Work.

(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.

E22.7.2 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 shall be no charge to the City for samples taken.

E22.8 Measurement and Payment

E22.8.1 Concrete Removals

(a) Type 1 – Structural Concrete Sidewalk

(i) Type 1 concrete removals shall be measured on an area basis and paid for at the Contract Unit Price per square metre for the "Type 1 – Structural Concrete Sidewalk", which price shall be paid 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 and accepted by the Contract Administrator.

(b) Type 2 – Concrete Sidewalk

(i) Type 2 concrete removals shall be measured on an area basis and paid for at the Contract Unit Price per square metre for the "Type 2 – Concrete Sidewalk", which price shall be paid 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 and accepted by the Contract Administrator.

(c) Type 3 – Sidewalk Retaining Wall (Complete Removal) and Structural Concrete Sidewalk

(i) Type 3 concrete removals shall not be measured and shall be paid for at the Contract Lump Sum Price for "Type 3 – Sidewalk Retaining Wall (Complete Removal) and Structural Concrete Sidewalk", 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.

(d) Type 4 – CPR Subway Retaining Wall (Complete Removal at Southwest End)

(i) Type 4 concrete removals shall not be measured and shall be paid for at the Contract Lump Sum Price for "Type 4 – CPR Subway Retaining Wall (Complete Removal at Southwest End) and Structural Concrete Sidewalk", 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.

(e) Type 5 – CPR Subway Retaining Wall Cap

(i) Type 5 concrete removals shall be measured on a linear meter basis and paid for at the Contract Unit Price per linear metre for the "Type 5 – CPR Subway Retaining Wall Cap", which price shall be paid 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 and accepted by the Contract Administrator.

(f) Type 6 – CPR Pedestal Notching

(i) Type 6 concrete removals shall not be measured and shall be paid for at the Contract Lump Sum Price for "Type 6 – CPR Pedestal Notching", 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.

(g) Type 7 – Sidewalk Retaining Wall Footing Notching

(i) Type 7 concrete removals shall be measured on a linear meter basis and paid for at the Contract Unit Price per linear metre for the "Type 7 – Sidewalk Retaining Wall Footing Notching", which price shall be paid 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 and accepted by the Contract Administrator.

E23. STRUCTURAL EXCAVATION

E23.1 Description

E23.1.1 This Specification shall cover all operations relating to the clearing, grubbing, and structural excavation for the sidewalk, concrete parapet wall works, or other structural works requiring structural excavation as specified herein or on the Drawings.

E23.1.2 The Works 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.

E23.2 Scope of Work

E23.2.1 The Work under this Specification shall involve:

(a) Excavating all material required to construct the structural works;

(b) Limits of the structural excavation are as identified on the Drawings;

(c) The design, fabrication, erection, and removal of all temporary shoring, and such temporary protective measures as may be required to construct the Structural Works:

(i) Off-site disposing of excavated material; and

(ii) Dewatering of all excavations, as required, to construct the Works.

E23.3 Submittals

E23.3.1 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 operation.

E23.3.2 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 the Site, detailed design calculations and Shop Drawings for all shoring that is signed, sealed, and dated by a Professional Engineer experienced in shoring design and licensed to practice in the Province of Manitoba.

E23.3.3 The Professional Engineer who designed the shoring system shall inspect the shoring system during construction, and certify, in writing to the Contract Administrator, that construction is in conformance with the approved design.

E23.4 Materials

E23.4.1 General

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

E23.4.2 Excavation

(a) Excavated material shall be unclassified excavation and shall include the excavation and satisfactory disposal of all cleared and grubbed materials, surplus concrete pavement, asphalt pavement, earth, gravel, sandstone, loose detached rock, shale, rubbish, cemented gravel or hard pan, disintegrated stone, rock in ledge or mass formation wet or dry, trees, shrubs, or all other material of whatever character which may be encountered.

(b) All excavated material 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.

E23.5 Equipment

E23.5.1 All equipment shall be of a type acceptable to the Contract Administrator and shall be kept in good working order.

E23.6 Construction Methods

E23.6.1 Excavation

(a) Prior to commencing any excavation Works, underground clearances shall be obtained from all applicable utilities by the Contractor. Due care and caution shall be taken by the Contractor to work around all identified underground utilities. Specifically, the Contractor shall exercise great care working in the vicinity of the Manitoba Hydro ducts and combined sewer running behind the west sidewalk retaining wall and the high pressure gas line running in front (underneath the existing roadway) of the west sidewalk retaining wall as shown on the Drawings.

(b) Any shored excavations shall be made in a manner such that all Works may be properly constructed to the required depths and without reduction of dimensions as show on the Drawings.

(c) The dimensions of any shored excavation shall be such as to give sufficient clearances for the construction of forms and their subsequent removal and the construction of cut-off trenches and/or sumps to permit the pumping of water outside the limits of the excavations.

(d) Excavations shall be completed to the elevations required to construct the Works or to such other elevations as may be directed by the Contract Administrator in the field. Excavation sequence shall be done in a “top down” direction, in order to maintain stability. The dimensions of excavation shall be such as to give sufficient clearances for the construction of forms and their subsequent removal.

(e) All material shall be brought to the surface by approved method, and shall be disposed of away from the Site. Shored excavations shall be dewatered and maintained dewatered so that the material is excavated in its natural state. The bottom of the excavation shall be kept free from excessive moisture or free-flowing water.

E23.7 Excavated Material

E23.7.1 All excavated material shall become the property of the Contractor and shall be removed from the Site.

E23.8 Quality Control

E23.8.1 Inspection

(a) After each excavation is complete, the Contractor shall notify the Contract Administrator to inspect the excavation.

(b) 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.

(c) The Contractor shall be wholly responsible for the Control of all operations incidental thereto, notwithstanding and 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.

E23.8.2 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 shall be no charge to the City for samples taken.

E23.9 Measurement and Payment

E23.9.1 Structural excavation shall not be measured and 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.

E24. STRUCTURAL BACKFILL

E24.1 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 3110 and CW 3170, 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, supply, and all things necessary for and incidental to the satisfactory performance and completion of all work as hereinafter specified.

E24.2 Referenced Specifications and Drawings

(a) The latest version of the City of Winnipeg Standard Construction Specifications
  (i) CW 3110 – Subgrade, Sub-Base, and Base Construction;
  (ii) CW 3170 – Earthwork and Grading; and
  (iii) CW 3310 – Portland Cement Concrete Pavement Works.

E24.3 Scope of Work

(a) The Work under this Specification shall involve:
  (i) Supplying and placing backfill suitable excavated site material, clay, granular backfill and free draining backfill for all structural works. CW 3110 shall be applicable to all sidewalk works; and
  (ii) Supplying and placing structural backfill for all other elements required to construct the Works.

E24.4 Materials

E24.4.1 General

(a) 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.

(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.

E24.4.2 Handling and Storage of Materials

(a) All materials shall be handled and stored in a careful and workmanlike manner, to the satisfaction of the Contract Administrator.

(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.

E24.4.3 Granular Backfill

(a) Granular Base Material

(i) Granular base material shall be in accordance with CW 3110 Base Course Material.

E24.4.4 Geotextile Fabric

(a) The non-woven geotextile shall conform to CW 3130.

E24.5 Equipment

E24.5.1 All equipment shall be of a type acceptable to the Contract Administrator and shall be kept in good working order.

E24.6 Construction Methods

E24.6.1 Backfilling

(a) 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.

(b) 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.

(c) 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.

E24.6.2 Geotextile Fabric

(a) Install geotextile fabric under all backfill material.

(b) Unroll geotextile fabric as smooth as possible.

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

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

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

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

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

(h) Construction vehicles shall be permitted directly on the geotextile fabric.

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

E24.6.3 Backfill Operations

(a) 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.

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

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

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

E24.7 Quality Control

E24.7.1 Inspection

(a) All workmanship and materials furnished and supplied under this Specification are subject to close and systematic inspection and testing by the Contract Administrator including all operation 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 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.

(c) The Contractor shall be required to retain a qualified third-party testing company to undertake Quality Assurances tests. All test results are to be copied to the Contract Administrator immediately after the tests have been performed.

(d) All backfilling work shall take place under the supervision of the Contract Administrator. The Contractor shall notify the Contract Administrator when backfilling work is to take place.

(e) The frequency and number of tests to be made shall be subject to approval by the Contract Administrator.

E24.7.2 Materials

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

E24.7.3 Quality of Backfill Material

(a) 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 as specified in the applicable City of Winnipeg Standard Construction Specifications.

(b) Quality control test shall be used to determine the acceptability of each backfill layer, as placed and compacted by the Contractor before any succeeding layer may be applied. Every 150 m depth of placed material shall be tested. A minimum of three (3) locations shall be tested per control test. The location of the tests shall be chosen by the Contract Administrator. The Contract Administrator, at their sole discretion may require more than three (3) tests if the area tested is 50 m^2 or larger. The number of tests to be complete shall be determined by the Contract Administrator.

(c) 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.

(d) The Contractor shall pay for the costs for the testing. The Contract Administrator shall select the Testing Agency.

(e) 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.

E24.7.4 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 shall be no charge to the City for samples taken.

E24.7.5 Corrective Action

(a) 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.

E24.8 Measurement and Payment

E24.8.1 Structural Backfill shall be measured on a volume basis and paid for at the Contract Unit Price per cubic metre for "Structural Backfill – Base Course", 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

E24.8.2 Supply and placement of geotextile fabric shall be paid in accordance with CW 3130 and Installation of Subdrains shall be paid in accordance with CW 3120

E25. SUPPLY AND PLACE CELLULAR CONCRETE

E25.1 Description

E25.1.1 This Specification shall cover the supply and installation of cellular concrete backfill, as specified herein and as shown on the Drawings.

E25.1.2 The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment tools, supplies, and all other things necessary or incidental to the satisfactory performance and completion of all Work as hereinafter specified.

E25.2 References

E25.2.1 CAN/CSA A3001, Cementitious Materials for Use in Concrete;

E25.2.2 CSA A23.1, Concrete Materials and Methods of Concrete Construction;

E25.2.3 ASTM C869, Standard Specification for Foaming Agents Used in Making Preformed Foam for Cellular Concrete;

E25.2.4 ASTM C796, Standard Test Method for Foaming Agents for Use in Producing Cellular Concrete Using Preformed Foam; and

E25.2.5 ASTM C495-99a, Standard Test Method for Compressive Strength of Lightweight Insulating Concrete.

E25.3 Scope of Work

E25.3.1 The Scope of Work under this Specification shall involve:

(a) Supplying and installing cellular concrete backfill to the dimensions as specified herein and on the Drawings;

(b) Providing specialized batching, mixing, and placing equipment on-site;

(c) Preparing the site and existing surface for installation of cellular concrete backfill; and

(d) Designing, supplying and installing formwork for cellular concrete backfill (if required).

E25.4 Qualification

E25.4.1 The Contractor is to submit the qualifications of the Subcontractor that is to produce and place the cellular concrete for review and approval by the Contract Administrator.

E25.4.2 The approved Subcontractor producing and placing cellular concrete shall have a record of experience and quality of work that is satisfactory to the Contract Administrator, and shall be capable of developing a mix design, batching, mixing, handling, and placing cellular concrete. The Subcontractor shall be certified by the manufacturer of the foaming agent and regularly engaged in the production and placement of cellular concrete. The Subcontractor shall have an adequate number of fully qualified workers who are thoroughly trained and experienced in the production and placement of cellular concrete.

E25.5 Equipment

E25.5.1 The specialized batching, mixing, and placing equipment shall be automated and certified for the purpose by the manufacturer of the cellular concrete material. Dry-mix equipment must be able to receive bulk cement and produce over 100 cubic metres per hour on site, continuously, from one (1) piece of equipment, and pump through hoses or pipes up to a flat lineal distance of 1000 metres. Bulk cement shall be weighed on a scale that operates within a tolerance of one (1) and one-half percent (1.5%) per batch. Wet-mix equipment must be able to receive slurry on site into the equipment and process it continuously during ready-mix supply, and pump through hoses or pipes up to a flat lineal distance of 200 metres.

E25.5.2 Cellular concrete must be pumped by a positive displacement pump (Peristaltic or similar). A foam generator shall be used to continuously produce pre-formed foam, which shall be injected and mixed with the cementitious slurry downstream of the positive displacement slurry pump. The equipment shall be calibrated to produce a precise and predictable volumetric rate of foam with stable uniform microbubbles.

E25.6 Materials and Testing

E25.6.1 Cellular concrete shall be CEMATRIX CMEF-400 lightweight engineered fill, or equal as accepted by the Contract Administrator, in accordance with B6 "Substitutes", with the following properties:

(a) Minimum unconfined compressive strength at twenty-eight (28) days of 0.4MPa; and

(b) Wet cast density of 400 kg/m^3 (+/- ten percent (10%)).

E25.6.2 Portland cement shall conform to the requirements of CSA Standard CAN/CSA A3001, Type GU or HE. Supplementary cementing materials shall conform to the requirements of CSA Standard CAN/CSA A3001.

E25.6.3 Mixing water shall conform to the requirements of CSA Standard A23.1. Water of questionable quality shall not be used unless proven to produce specimens whose twenty-eight (28) day compressive strength is at least ninety percent (90%) of those made with known acceptable water and an identical material mix.

E25.6.4 Foaming agents shall conform to the requirements of ASTM C869 when tested in accordance with the provisions of ASTM C796. CEMATRIX CF-1 or PROVOTON foaming agents shall be used, or equal as accepted by the Contract Administrator, in accordance with B6 "Substitutes". The Subcontractor shall be pre-qualified and approved in writing by the foaming agent manufacturer, referencing this Project. A copy of the written approval is to be submitted to the Contract Administrator prior to the commencement of the work.

E25.6.5 The fresh cellular concrete density shall be measured and recorded once per production run, or once for every 50 cubic metres, or once per thirty (30) minutes, whichever is more frequent. The density shall be maintained within +/- ten percent (10%) of the design density.

E25.6.6 Cellular concrete samples must be captured, cured, and tested to verify the compressive strength requirement is satisfied. One (1) sample is comprised of one (1) set of six (6) cellular concrete cylinders. One (1) sample should be taken for each placement, or every 100 m^3, whichever is more frequent. Cylinders are cast in 75 mm by 150 mm cylindrical

plastic molds. The sample mold must be lined with "freezer paper" with the plastic side against the cellular concrete. Cellular concrete cylinders shall be cured and tested as per ASTM C495-99a, modified to represent the field curing conditions for geotechnical applications.

E25.7 Subgrade Conditions and Site Preparation

E25.7.1 The subgrade shall be cleared of vegetation, soft, wet, muddy, loose soil and other deleterious material, and graded and compacted to the lines and grades shown on the relevant drawings. The prepared subgrade shall be good competent level ground with nominal compaction to provide a firm base. The placement area shall be free of standing water during placement of cellular concrete and until backfill is placed on top of the cellular concrete. Snow and ice must be removed from the area prior to placement.

E25.8 Installation

E25.8.1 The Quality Control and Quality Assurance Manual Cematrix Cellular Concrete, Document Number: QCS-007, Last Updated: September 29, 2011, shall apply to the work.

E25.8.2 Any items to be fully or partially encased in the cellular concrete shall be properly set and stable prior to the installation of the cellular concrete.

E25.8.3 Where required, formwork should be designed and installed to withhold cellular concrete, and may require lining with poly sheeting or similar impermeable membrane to prevent leakage. The sheet drain system on the side of the steel sheet piles shall also be lined with poly sheeting.

E25.8.4 Cellular concrete may be placed during freezing conditions, provided measures are taken to prevent damage to the cellular concrete until sufficient strength has been attained. Care should be taken to avoid freezing before initial set. Cellular concrete must not be placed during heavy or prolonged precipitation.

E25.8.5 Once mixed, the cellular concrete shall be conveyed promptly to the location of placement without excessive handling.

E25.8.6 The Contractor shall determine the maximum lift thickness based on density and any other considerations that may impact placement. Cellular concrete shall be cast in a formed area within one (1) to two (2) hours, to permit an undisturbed setting.

E25.8.7 Finished surface elevation shall be with +1- 25 mm of the design grades shown on the Drawings. Cellular Concrete can be placed with a maximum slope of one percent (1%). Slopes greater than one percent (1%) will require profiling by creating steps for the Cellular Concrete with formwork.

E25.8.8 Loading of, or traffic on, the cellular concrete shall be prevented until the material has attained sufficient strength to withstand the loads with no damage. Backfill can commence with cellular concrete supports foot traffic without leaving an indentation.

E25.9 Measurement and Payment

E25.9.1 Cellular concrete shall be measured on a volume basis and paid for at the Contract Unit Price per cubic metre for "Supply and Place Cellular Concrete" 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, accepted and measured by the Contract Administrator.

E26. REMOVE AND SALVAGE ALUMINUM BALANCED BARRIER

E26.1 Description

E26.1.1 This specification shall cover operations related to the removal and salvaging of aluminum balanced barriers as specified herein and as shown on the drawings.

E26.1.2 The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies, and all other things necessary for and incidental to the satisfactory completion of all Work as hereinafter specified.

E26.2 Reference Specifications and Drawings

E26.2.1 The latest version of the City of Winnipeg Standard Construction Specifications:

(a) Clause 9.6 of CW 3650 – Installation of Aluminum Balanced Barrier.

E26.3 Scope of Work

E26.3.1 Removal and temporary storage of aluminum balance barrier to be reused for the proposed median installation through the underpass. Excess salvaged aluminum balance barrier will require relocation to the City of Winnipeg Storage Yard designated by the Contract Administrator located within the City of Winnipeg city limits. The Contractor is required to make arrangements with the City Yard for delivery of the salvaged aluminum balanced barrier.

E26.3.2 The Contractor shall provide all equipment to get barrier to City and off load it at the requested location(s) as directed by the City.

E26.4 Measurement and Payment

E26.4.1 Notwithstanding CW 3650, removal and salvaging of the existing aluminum barrier shall be measured on a linear meter basis and paid for at the Contract Unit Price per linear metre for “Remove and Salvage Aluminum Balance Barrier”, 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.

E27. INSTALLATION OF ALUMINUM BALANCE BARRIER

E27.1 Description

E27.1.1 This specification shall cover operations related to the installation of salvaged or new aluminum balanced barriers as specified herein and as shown on the Drawings.

E27.1.2 The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies, and all other things necessary for and incidental to the satisfactory completion of all Work as hereinafter specified.

E27.2 Reference Specifications and Drawings

E27.2.1 The latest version of the City of Winnipeg Standard Construction Specifications

(a) Clause 9.3-9.5 of CW 3650 – Installation of Aluminum Balanced Barrier

E27.3 Scope of Work

E27.3.1 Installation of salvaged or new aluminum balance barrier (posts and rails) adjacent the CPR underpass central pedestal as shown on the Drawings. The work shall be completed in accordance with CW 3650.

E27.4 Measurement and Payment

E27.4.1 Notwithstanding CW 3650, installation of aluminum balance barrier shall be measured on a linear meter basis and paid for at the Contract Unit Price per linear metre for “Installation of Aluminum Balance Barrier”, 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.

E28. SUPPLY AND INSTALL ALUMINUM TWO RAIL BICYCLE GUARD ON CONCRETE PARAPET WALL

E28.1 Description

E28.1.1 This Specification shall cover all operations relating to the supply and installation of the aluminum two (2) rail bicycle guard as specified herein and as shown on the Drawings.

E28.1.2 The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, equipment, tools, supplies, and all other things necessary for and incidental to the satisfactory completion of all Work as hereinafter specified.

E28.2 Referenced Specifications and Drawings

E28.2.1 The latest edition and subsequent revisions of the following:

(a) ASTM B209 – Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate;

(b) ASTM B221 – Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes;

(c) ASTM B276 - Standard Specification for Stainless Steel Bars and Shapes;

(d) ASTM D1187 - Standard Specification for Asphalt-Base Emulsions for use as Protective Coatings and Metal;

(e) CAN/CSA W47.2 – Certification of Companies for Fusion Welding of Aluminum;

(f) CAN/CSA W59.2 – Welded Aluminum Construction; and

(g) CAN/CSA S157 – Strength Design in Aluminum.

E28.3 Scope of Work

E28.3.1 The Work under this Specification shall involve:

(a) Supplying and installing the aluminum two (2) rail bicycle guard; and

(b) Supplying and installing miscellaneous steel items and other items associated with the Work.

E28.4 Submittals

E28.4.1 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 proposed Shop Drawings showing all fabrication details of the aluminum two (2) rail bicycle guard. Fabrication shall take place as shown on the Drawings.

E28.4.2 The Contractor shall submit to the Contract Administrator for review and approval, at least ten (10) Business Days prior to the scheduled commencement of any fabrication, the operator's qualifications detailed in E28.8, "Quality Control" and mill certificates.

E28.4.3 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 proposed welding procedures and welding consumable certificates. The Contractor shall submit copies of the welding procedures which he intends to use, for examination and acceptance by the Contract Administrator.

(a) The Contractor shall submit copies of the welding procedures which he intends to use, for examination and acceptance by the Contract Administrator.

(b) Such procedures shall be accompanied by documentary proof that they have been qualified previously by the Canadian Welding Bureau at the plant where the Work is to be carried out.

(c) The procedures shall include the following information: joint type, welding process, welding position, base metal specification, welding consumable specification and size,

preheat requirements, amperage and voltage requirements, speed, polarity, and welding equipment, including a description of travel for automatic welding.

E28.5 Materials

E28.5.1 General

(a) The Contractor shall be responsible for the supply, safe storage and handling of all materials set forth in this Specification. All materials supplied under this Specification shall be subject to inspection and acceptance by the Contract Administrator.

E28.5.2 Handling and Storage of Materials

(a) All materials shall be handled and stored in a careful and workmanlike manner, to the satisfaction of the Contract Administrator.

E28.5.3 Material For The Aluminum Two Rail Bicycle Guard

(a) Extruded Shapes or Drawn Tubing for Rails and Posts: shall conform to the latest edition and all subsequent revisions of CAN/CSA Aluminum Alloy and Temper HA.5 SG 11 R-T6 (ASTM B221 Alloy 6351-T6), or HA.7 GA 11 M-T6 (ASTM B221 Alloy 6061-T6).

(b) Aluminum sheet, bar, support pin, angle, and plate shall conform to the latest edition and all subsequent revisions of ASTM B221- Alloy 5083, ASTM B209 Alloy 6061-T6 or Alloy 6351-T6.

(c) Bolts and cap screws, nylon lock nuts, and washers – stainless steel conforming to ASTM A276, Type 316.

E28.5.4 Bituminous Paint

(a) Bituminous paint shall be an alkali-resistant coating and conform to the requirements of ASTM D1187. Supply of bituminous paint shall be considered incidental to the supply of aluminum two (2) rail bicycle guard.

E28.5.5 Anchorage System

(a) The rail anchorage system is specified and paid for in accordance with E30, "Supply and Place Structural Concrete".

E28.5.6 Aluminum Shims

(a) Aluminum shims shall conform to ASTM Standard B221, Alloy 6061-T6, and shall be supplied as required to facilitate the installation of the rail posts as shown on the Drawings. Supply of shims will be considered incidental to the supply of aluminum two (2) rail bicycle guard.

E28.5.7 Aluminum Filler Alloys for Welded Construction

(a) Aluminum filler alloys for welded construction shall be one (1) of the following: ER4043, ER5183, ER5356, ER5554, ER5556, or ER5654.

E28.6 Equipment

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

E28.7 Construction Methods

E28.7.1 Layout

(a) Before fabrication and/or installation of the aluminum two (2) rail bicycle guard, the Contractor shall satisfy himself of all required aluminum rail and enclosure section dimensions, by field measurements.

E28.7.2 Fabrication

(a) General

(i) No fabrication shall commence until permission to do so has been received from the Contract Administrator.

(ii) All fabrication shall be carried out in accordance with this Specification and the Drawings.

(iii) The Fabricator shall fabricate the entire aluminum two (2) rail bicycle guard in sections, to permit the installation of the rail sections onto the concrete.

(iv) The punching of identification marks on the members will not be allowed.

(v) Any damage to members during fabrication shall be drawn to the attention of the Contract Administrator in order that the Contract Administrator may accept remedial measures.

(vi) Dimensions and fabrication details which control the field matching of parts shall receive very careful attention in order to avoid field adjustment.

(vii) Components of the railings and enclosures shall be joined by means of bolt, cap screws, and welds as called for on the Drawings.

(b) Sample Panel

(i) The Contractor shall be required to supply one (1) completely fabricated rail sample panel, including at least two (2) posts, prior to proceeding with the fabrication of the remainder. The sample, once accepted, shall be identifiable for the duration of the Project, but may be incorporated into the rail system. It shall become the standard for acceptance of all aluminum two (2) rail bicycle guard works.

(c) Cutting

(i) Material 13 mm thick or less may be sheared, sawn, or cut with a router. Materials more than 13 mm thick shall be sawn or routed. Cut edges shall be true and smooth and free from excessive burrs or ragged breaks. Re-entrant cuts shall be avoided whenever possible. If used, they shall be filleted by drilling prior to cutting. Flame cutting of aluminum alloys is not permitted.

(d) Welding

(i) Welded construction shall conform to the requirements of the latest edition and all subsequent revisions of CAN/CSA W59.2, Welded Aluminum Construction and W47.2, Certification of Companies for Fusion Welding of Aluminum.

(ii) Welding will be done by qualified welders using the Metal Inert Gas (MIG) process. All areas to be welded should be thoroughly cleaned with a suitable solvent followed by wire brushing if surfaces are heavily oxidized. The size of fillet for equal leg fillet welds is defined as the leg length of the largest isosceles right angle triangle which can be inscribed within the fillet weld section. Welds must penetrate into the root corner. All butt welds should have full penetration to ensure maximum strength. Defective welds should be repaired by chipping out the defective area and rewelding. Particular care must be paid to the elimination of craters and cold starts.

(iii) Welders and procedure should be qualified as agreed between the Contract Administrator and the Fabricator. The minimum requirements for mechanical test results of joints butt welded with Alcan 56S filler alloy shall be 259 MPa for Alcan D45S-H1 1A and 165 MPa for Alcan B51S-T4 alloy. In addition to the mechanical tests, soundness tests should be made as follows:

(iv) Guided Bend Test: All bend tests should be fully guided through an angle of 1800. Root, face, and side bend tests in Alcan D54S parent alloy welded in Alcan 56S filler wire require a bend radius of 2T where T is the thickness of the material. For Alcan B51S parent alloy welded with 56S filler wire, a bend radius of 4T is required. Root bend and face bend specimens on material 10 mm thick and less should be 305 mm long and a minimum of 25 mm in width and cut from a plate having a minimum butt weld length of 450 mm. No test piece should be taken within 25 mm of the ends of the weld. Side bend tests should be carried out on material over 10 mm in thickness.

(v) Specimens should be 10 mm in width. Longitudinal edges should be given in 2 mm radius. There should be no crack greater than 3 mm in length. If a crack starts from an edge, the specimen should be disregarded.

(vi) Fracture Test: The butt-welded joint shall have a notch not exceeding 2 mm in depth sawn on the four (4) sides of the weld bend and the weld broken. Inspection of the fracture should reveal no gas pockets or inclusions greater than 2 mm in diameter and the area lost due to scattered gas, porosity or voids should not exceed three percent (3%) of the area under inspection.

(e) Bolting

(i) Bolt holes in 10 mm or thinner material may be drilled or punched to finished size. In material thicker than 10 mm, the holes shall be drilled to finished size or subpunched smaller than the normal diameter of the fastener and reamed to size.

(ii) The finished diameter of the holes shall be not more than seven percent (7%) greater than the nominal diameter of the fastener, except:

- Slotted holes for expansion purposes shall be provided as required on the Drawings.
- Holes for anchor bolts may be up to 50 percent greater than the nominal bolt diameter with a maximum of 13 mm greater than the nominal bolt diameter.
- Holes shall not be drilled in such a manner as to distort the metal, but holes only slightly misaligned may be reamed to render a reasonable fit.

(iii) In all bolts, the finished shank shall be long enough to provide full bearing, and washers shall be used under the nuts to give full grip when the nuts are tightened.

E28.7.3 Installation of Aluminum Two Rail Bicycle Guard

(a) The aluminum two (2) rail bicycle guard shall be brought on-site and accurately installed as shown on the Drawings.

(b) The rails shall be set true to the line and grade as shown on the Drawings or as required by the Contract Administrator.

(c) The material shall be carefully handled so that no parts will be bent, broken or otherwise damaged. Hammering which will injure or distort the member is not permitted. The Contractor shall report to the Contract Administrator any corrective measures.

(d) Except where shown on the Drawings, field welding shall not be permitted unless acceptable to the Contract Administrator. The rail posts shall be set on aluminum shims, as required, to achieve the correct elevation and grade. Additional aluminum shims shall be installed as required to achieve the correct elevation and grade. The surface of the bottom shim that is in contact with concrete shall be separated with a minimum of (2) coats of bituminous paint. A minimum 3 mm aluminum shim shall be installed under each post.

E28.8 Quality Control

(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 Work. The Contractor shall be wholly responsible for the control of all operations incidental thereto notwithstanding any inspecting 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.

(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.

E28.8.1 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.

E28.8.2 Testing

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

E28.9 Measurement and Payment

E28.9.1 Aluminum Two Rail Bicycle Guard

(a) Supplying and Installing the aluminum two (2) rail bicycle guard shall be measured on a length basis and paid for at the Contract Unit Price per metre for "Supply and Install Aluminum Two (2) Rail Bicycle Guard on Concrete Parapet Wall", which price shall be paid 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, accepted and measured by the Contract Administrator.

E29. ALUMINUM PEDESTRIAN HANDRAIL

E29.1 Description

E29.1.1 This Specification shall cover all operations relating to the removal and salvaging of the existing aluminum pedestrian handrail and supply and installation of new aluminum pedestrian handrail posts and panels as specified herein and as shown on the Drawings.

E29.1.2 The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies, and all other things necessary for and incidental to the satisfactory completion of all Work as hereinafter specified.

E29.2 Referenced Specifications and Drawings

E29.2.1 The latest edition and subsequent revisions of the following:

(ii) ASTM B209 – Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate;

(iii) ASTM B221 – Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes;

(iv) ASTM B276 - Standard Specification for Stainless Steel Bars and Shapes;

(v) ASTM D1187 - Standard Specification for Asphalt-Base Emulsions for use as Protective Coatings and Metal;

(vi) CAN/CSA W47.2 – Certification of Companies for Fusion Welding of Aluminum;

(vii) CAN/CSA W59.2 – Welded Aluminum Construction; and

(viii) CAN/CSA S157 – Strength Design in Aluminum.

E29.3 Scope of Work

E29.3.1 Confirmation of all field dimensions prior to preparation of shop drawings and fabrication of new components;

E29.3.2 Removal and salvaging of existing aluminum pedestrian handrail;

E29.3.3 Supply of new aluminum pedestrian handrail posts;

E29.3.4 Supply of new aluminum bicycle rails;

E29.3.5 Supply of new aluminum pedestrian handrail panels; and

E29.3.6 Installation of aluminum pedestrian handrail.

E29.3.7 Any unused components of the salvaged aluminum pedestrian handrail shall be delivered by the Contractor to the City of Winnipeg Storage Yard designated by the Contract Administrator located within the City of Winnipeg city limits. The Contractor is required to make arrangements with the City Yard for delivery of the salvaged aluminum pedestrian handrail.

E29.4 Submittals

E29.4.1 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 proposed Shop Drawings showing all fabrication details of the aluminum pedestrian handrail and artwork. Fabrication shall take place as shown on the Drawings.

E29.4.2 The Contractor shall submit to the Contract Administrator for review and approval, at least ten (10) Business Days prior to the scheduled commencement of any fabrication, the operator's qualifications detailed in E8.8, "Quality Control" and mill certificates.

E29.4.3 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 proposed welding procedures and welding consumable certificates. The Contractor shall submit copies of the welding procedures which he intends to use, for examination and acceptance by the Contract Administrator.

E29.4.4 The Contractor shall submit copies of the welding procedures which he intends to use, for examination and acceptance by the Contract Administrator.

E29.4.5 Such procedures shall be accompanied by documentary proof that they have been qualified previously by the Canadian Welding Bureau at the plant where the Work is to be carried out.

E29.4.6 The procedures shall include the following information: joint type, welding process, welding position, base metal specification, welding consumable specification and size, preheat requirements, amperage and voltage requirements, speed, polarity, and welding equipment, including a description of travel for automatic welding.

E29.5 Materials

E29.5.1 General

(a) This Specification shall cover all operations relating to the removal and installation of existing and new aluminum pedestrian handrails, 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.

E29.5.2 Handling and Storage of Materials

(a) All materials shall be handled and stored in a careful and workmanlike manner, to the satisfaction of the Contract Administrator.

E29.5.3 Material for the Aluminum Pedestrian Handrail

(a) Extruded Shapes or Drawn Tubing for Rails and Posts: shall conform to the latest edition and all subsequent revisions of CAN/CSA Aluminum Alloy and Temper HA.5 SG 11 R-T6 (ASTM B221 Alloy 6351-T6), or HA.7 GA 11 M-T6 (ASTM B221 Alloy 6061T6).

(b) Aluminum sheet, bar, support pin, angle, and plate shall conform to the latest edition and all subsequent revisions of ASTM B221- Alloy 5083, ASTM B209 Alloy 6061-T6 or Alloy 6351-T6.

(c) Bolts and cap screws, nylon lock nuts, and washers - stainless steel conforming to ASTM A276, Type 316.

E29.5.4 Bituminous Paint

(a) Bituminous paint shall be an alkali-resistant coating and conform to the requirements of ASTM D1187. Supply of bituminous paint shall be considered incidental to the supply of aluminum pedestrian handrail.

E29.5.5 Handrail Anchorage System

(a) The pre-set handrail anchorage units are specified, measured and paid for in accordance with E30, “Supply and Place Structural Concrete”.

(b) The anchor bolts drilled into the retaining wall and parapet are to be Hilti Hit HY 200 Max adhesive and HAS 316 SS Rods with stainless steel nut and washer. Pre-set anchorage units shall be used unless otherwise allowed by the Contract Administrator in writing.

E29.5.6 Aluminum Shims

(a) Aluminum shims shall conform to ASTM Standard B221, Alloy 6061-T6, and shall be supplied as required to facilitate the installation of the rail posts as shown on the Drawings. Supply of shims shall be considered incidental to the supply of aluminum pedestrian handrail.

E29.5.7 Aluminum Filler Alloys for Welded Construction

(a) Aluminum filler alloys for welded construction shall be one (1) of the following: ER4043, ER5183, ER5356, ER5554, ER5556, or ER5654.

E29.6 Equipment

E29.6.1 All equipment shall be of a type acceptable to the Contract Administrator and shall be in good working order.

E29.7 Construction Methods

E29.7.1 Layout

(a) Before fabrication and/or installation of the aluminum pedestrian handrail the Contractor shall satisfy himself of all required aluminum rail and enclosure section dimensions, by field measurements

(b) The Contractor shall complete field measurements of the existing handrails to be reinstalled to ensure the pre-set anchors are placed accordingly. Any modifications to the existing railing to be reinstalled to facilitate the reinstallation shall be considered incidental to Remove and Reinstall Aluminum Pedestrian Handrail.

E29.7.2 Fabrication

(a) General

(i) No fabrication shall commence until permission to do so has been received from the Contract Administrator.

(ii) All fabrication shall be carried out in accordance with this Specification and the Drawings.

(iii) The Contractor shall fabricate the required aluminum pedestrian handrail in sections, to permit the installation of the rail sections onto the concrete.

(iv) The punching of identification marks on the members shall not be allowed.

(v) Any damage to members during fabrication shall be drawn to the attention of the Contract Administrator in order that the Contract Administrator may accept remedial measures.

(vi) Dimensions and fabrication details which control the field matching of parts shall receive very careful attention in order to avoid field adjustment.

(vii) Components of the railings and enclosures shall be joined by means of bolt, cap screws, and welds as called for on the Drawings.

(b) Sample Panel

(i) The Contractor shall be required to supply one (1) completely fabricated handrail sample panel, including at least two (2) posts to the Contract Administrator and receive acceptance of the sample panel from the Contract Administrator prior to proceeding with the fabrication of the remainder. The sample, once accepted, shall be identifiable for the duration of the Project, but may be incorporated into the rail system. It shall become the standard for acceptance of all aluminum pedestrian handrail panels.

(c) Cutting

(i) Material 13 mm thick or less may be sheared, sawn, or cut with a router. Materials more than 13 mm thick shall be sawn or routed. Cut edges shall be true and smooth and free from excessive burrs or ragged breaks. Re-entrant cuts shall be avoided whenever possible. If used, they shall be filleted by drilling prior to cutting. Flame cutting of aluminum alloys is not permitted.

(d) Welding

(i) Welded construction shall conform to the requirements of the latest edition and all subsequent revisions of CAN/CSA W59.2, Welded Aluminum Construction and W47.2, Certification of Companies for Fusion Welding of Aluminum.

(ii) Welding shall be done by qualified welders using the Metal Inert Gas (MIG) process. All areas to be welded should be thoroughly cleaned with a suitable solvent followed by wire brushing if surfaces are heavily oxidized. The size of fillet for equal leg fillet welds is defined as the leg length of the largest isosceles right angle triangle which can be inscribed within the fillet weld section. Welds must penetrate into the root corner. All butt welds should have full penetration to ensure maximum strength. Defective welds should be repaired by chipping out the defective area and re-welding. Particular care must be paid to the elimination of craters and cold starts.

(iii) Welders and procedure should be qualified as agreed between the Contract Administrator and the Contractor. The minimum requirements for mechanical test results of joints butt welded with Alcan 56S filler alloy shall be 259 MPa for Alcan D45S-H1 1A and 165 MPa for Alcan B51S-T4 alloy. In addition to the mechanical tests, soundness tests should be made as follows:

¨ Guided Bend Test: All bend tests should be fully guided through an angle of 1800. Root, face, and side bend tests in Alcan D54S parent alloy welded in Alcan 56S filler wire require a bend radius of 2T where T is the thickness of the material. For Alcan B51S parent alloy welded with 56S filler wire, a bend radius of 4T is required. Root bend and face bend specimens on material 10 mm thick and less should be 305 mm long and a minimum of 25 mm in width and cut from a plate having a minimum butt weld length of 450 mm. No test piece should be taken within 25 mm of the ends of the weld. Side bend tests should be carried out on material over 10 mm in thickness.

¨ Specimens should be 10 mm in width. Longitudinal edges should be given in 2 mm radius. There should be no crack greater than 3 mm in length. If a crack starts from an edge, the specimen should be disregarded.

¨ Fracture Test: The butt-welded joint shall have a notch not exceeding 2 mm in depth sawn on the four (4) sides of the weld bend and the weld broken. Inspection of the fracture should reveal no gas pockets or inclusions greater than 2 mm in diameter and the area lost due to scattered gas, porosity or voids should not exceed three (3%) of the area under inspection.

(e) Bolting

(i) Bolt holes in 10 mm or thinner material may be drilled or punched to finished size. In material thicker than 10 mm, the holes shall be drilled to finished size or subpunched smaller than the normal diameter of the fastener and reamed to size.

(ii) The finished diameter of the holes shall be not more than seven percent (7%) greater than the nominal diameter of the fastener, except:

- Slotted holes for expansion purposes shall be provided as required on the Drawings.
- Holes for anchor bolts may be up to fifty percent (50%) greater than the nominal bolt diameter with a maximum of 13 mm greater than the nominal bolt diameter.
- Holes shall not be drilled in such a manner as to distort the metal, but holes only slightly misaligned may be reamed to render a reasonable fit.

(iii) In all bolts, the finished shank shall be long enough to provide full bearing, and washers shall be used under the nuts to give full grip when the nuts are tightened.

E29.7.3 Installation of Aluminum Pedestrian Handrail

(a) The aluminum pedestrian handrail shall be accurately installed as shown on the Drawings.

(b) The rails shall be set true to the line and grade as shown on the Drawings or as required by the Contract Administrator.

(c) The material shall be carefully handled so that no parts shall be bent, broken or otherwise damaged. Hammering which shall injure or distort the member is not permitted. The Contractor shall report to the Contract Administrator any corrective measures.

(d) Except where shown on the Drawings, field welding shall not be permitted unless acceptable to the Contract Administrator. The rail posts shall be set on aluminum shims, as required, to achieve the correct elevation and grade. Additional aluminum shims shall be installed as required to achieve the correct elevation and grade. A minimum 3 mm aluminum shim shall be installed under each post.

E29.8 Quality Control

E29.8.1 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 Work. The Contractor shall be wholly responsible for the control of all operations incidental thereto notwithstanding any inspecting 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.

E29.8.2 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.

E29.9 Access

E29.9.1 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 shall be no charge to the City for samples taken.

E29.10 Testing

E29.10.1 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.

E29.11 Measurement and Payment

E29.11.1 Aluminum Pedestrian Handrail

(a) Removal and Salvage of Existing Aluminum Pedestrian Handrail

(i) Removal and salvage of the existing aluminum pedestrian handrail shall be measured on a length basis and shall be paid for at the Contract Unit Price per linear metre for the "Remove and Salvage Aluminum Pedestrian Handrail", 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) Supply of New Handrail Posts

(i) Supply of new aluminum handrail posts shall not be measured and shall be paid for at the Contract Lump Sum Price for "Supply New Handrail Posts", 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.

(c) Supply of New Bicycle Rail

(i) Supply of new aluminum bicycle rail shall be measured on a length basis and shall be paid for at the Contract Unit Price per linear metre for the "Supply New Bicycle Rail", 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.

(d) Supply of New Handrail Panels

(i) Supply of new aluminum handrail panels shall be measured on a length basis and shall be paid for at the Contract Unit Price per linear metre for the "Supply New Handrail Panels", 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.

(e) Installation of Aluminum Handrail

(i) Installation of the salvaged and/or new aluminum pedestrian handrail components shall be measured on a length basis and shall be paid for at the Contract Unit Price per linear metre for the "Install Aluminum Pedestrian Handrail", 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.

E30. SUPPLY AND PLACE STRUCTURAL CONCRETE

E30.1 Description

E30.1.1 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.

E30.1.2 The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies, and all things necessary for and incidental to the satisfactory performance and completion of all work as hereinafter specified.

E30.2 Referenced Specifications and Drawings

E30.2.1 The latest edition and subsequent revisions of the following:

E30.2.2 ACI 309 – Guide for Consolidation of Concrete;

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

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

(c) ASTM A123 – Standard Specification for Zinc (Hot Dipped Galvanized) Coatings on Iron and Steel Products;

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

E30.3 Scope of Work

E30.3.1 The work under this Specification shall involve the following structural concrete Works:

(a) 150mm thick reinforced sidewalk;

(b) Median slab (between CPR Pedestals);

(c) Median traffic barrier (including footing); and

(d) Parapet walls including integral structural sidewalk

E30.3.2 The Work under this Specification shall include the supply and placement of the aluminum railing pre-set anchor units as specified herein or on the Drawings.

E30.4 Submittals

E30.4.1 General

(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 ten (10) Business Days prior to the commencement of any Work on Site, the proposed materials to be used.

E30.4.2 Concrete Mix Design Requirements

(a) 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.).

(b) The Supplier 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 shall 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:

(i) Cementitious content in kilograms per cubic metre or equivalent units, and type of cementitious materials;

(ii) Designated size, or sizes, of aggregates, and the gradation;

(iii) Aggregate source location(s);

(iv) Weights of aggregates in kilograms per cubic metre or equivalent units. Mass of aggregates is saturated surface dry basis;

(v) Maximum allowable water content in kilograms per cubic metre or equivalent units and the water/cementitious ratio;

(vi) The limits for slump;

(vii) The limits for air content;

(viii) Quantity of other admixtures; and

(ix) The dosage and type of synthetic fibres.

(c) 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.

(d) 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.

(e) 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.

E30.4.3 Concrete Mix Design Test Data

(a) Concrete

(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 shall meet the performance criteria stated in this Specification for each concrete type.

(ii) Testing for air void system shall be completed in accordance with E30.8.5(c)

(iii) 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.

(b) 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 shall 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 shall produce a durable overlay. An acceptable aggregate shall 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.

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

E30.4.4 Notification of Ready Mix Supplier

(a) 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 shall 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.

E30.4.5 Temporary False Work, Formwork and Shoring Works

(a) 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.

(b) 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 shall 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. All proposed fastening methods to the existing bridge must be submitted to the Contract Administrator for review and approval.

(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.

- 20 mm plywood: studding 400 mm centre to centre (max.); and
- Walers 760 mm centre to centre (max).

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

(vii) 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.

(viii) 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 prior written approval of the Contract Administrator.

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

(x) 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.

(xi) Shores shall be braced horizontally in two (2) directions and diagonally in the same two (2) vertical planes so that they can safely withstand all dead and moving loads to which they shall be subjected.

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

(xiii) 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.

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

(c) 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. False work must be designed to carry all loads associated with construction of overhangs including deflection due to dead loads, placement of concrete, hoarding, construction live loads, and any other loads that may occur.

(d) 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.

E30.5 Materials

E30.5.1 General

(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.

E30.5.2 Handling and Storage of Materials

(a) All materials shall be handled and stored in a careful and workmanlike manner, to the satisfaction of the Contract Administrator. Storage of materials shall be in accordance with the latest edition and all subsequent revisions of CAN/CSA-A23.1.

E30.5.3 Concrete

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

(b) Concrete shall have nominal compressive strengths (f'c) and meet the requirements for hardened concrete (Type 3) as specified in the following Table E30.1. Requirements for concrete Types 1 and 2 as shown on the Drawings are provided in E31 "Partial Depth Sidewalk Retaining Wall Repairs" and E25 "Supply and Place Cellular Concrete" respectively.

Table E30.1: Requirements for Hardened Concrete (Type 3)

Nominal Compressive Strength (MPa)	Class of Exposure	Air Content Category	Max Aggregate Size
35 @ 28 Days	C-1	1	20 mm

E30.5.4 Aggregates

(a) General

(i) All aggregates shall be handled to prevent segregation and inclusion of any foreign substances, and to obtain uniformity of materials. The two (2) 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.

(ii) The potential for deleterious alkali-aggregate reactivity shall be assessed in accordance with CSA Standard Test Method A23.2-27A. Current (less than eighteen (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.

(iii) 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.

(b) Fine Aggregate

(i) Fine aggregate shall meet the grading requirements of CAN/CSA A23.1, Table 10, FA1, be graded uniformly and not more than three percent (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.

(ii) Test of the fine aggregate shall not exceed the limits for standard requirements prescribed in CAN/CSA A23.1, Table 12.

(c) Coarse Aggregate – Standard

(i) 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 two percent (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 (2) fractured faces; and shall have an absorption not exceeding three percent (3%).

(ii) 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.

(iii) Course aggregate when tested for abrasion in accordance with the requirements of the ASTM C131 shall not have a loss greater than thirty percent (30%).

(iv) 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.

E30.5.5 Admixtures

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

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

(c) All admixtures shall be compatible with all other constituents. The addition of calcium chloride, accelerators and air-reducing agents, shall not be permitted, unless otherwise approved by the Contract Administrator.

E30.5.6 Cementitious Materials

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

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

(c) 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 thirty percent (30%) by mass of cement.

(d) Cementitious materials shall be stored in a suitable weather-tight building that shall protect these materials from dampness and other destructive agents. Cementitious materials that have been stored for a length of time resulting in the hardening, or the formation of lumps, shall not be used in the Work.

E30.5.7 Water

(a) 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.

E30.5.8 Formwork

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

(b) 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.

(c) 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”.

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

(e) No formwork accessories shall 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.

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

(g) 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.

(h) 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 mm x 150 mm.

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

E30.5.9 Form Coating

(a) 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 B6, “Substitutes”.

E30.5.10 Permeable Formwork Liner

(a) Formwork liner shall be Texel Drainaform, Hydroform, or equal as accepted by the Contract Administrator, in accordance with B6, “Substitutes”. This formwork liner shall be used on all exposed formed surfaces.

E30.5.11 Curing Compound

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

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

E30.5.12 Curing Blankets

(a) 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 B6, “Substitutes”.

E30.5.13 Bonding Agents

(a) Latex Bonding Agent

(i) Latex bonding agent shall be Acryl-Stix, SikaCem 810, or equal as accepted by the Contract Administrator, in accordance with B6, “Substitutes”. Polyvinyl acetate-based latexes shall not be permitted. Planicrete AC by MAPEI is approved for use as a latex bonding agent on concrete greater than twenty-eight (28) days in age.

(b) Latex Bonding Agent

(i) The grout for bonding the structural deck concrete to the precast concrete girders shall be mixed in an agitating hopper slurry pump and shall consist of the following constituents, by weight:

- 1 part water;
- 1 part latex bonding agent; and
- 1 ½ parts Type GUSF Portland cement.

(ii) The consistency of the bonding grout shall be such that it can be brushed on the existing concrete surface in a thin, even coating that shall not run or puddle in low spots.

E30.5.14 Epoxy Adhesive

(a) Epoxy adhesive for bonding concrete to steel shall be one (1) of the following approved products: Sterns 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 B6, “Substitutes”.

E30.5.15 Epoxy Grout

(a) Epoxy grout shall be one (1) 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 B6, “Substitutes”.

E30.5.16 Cementitious Grout

(a) 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 B6, “Substitutes”. The minimum compressive strength of the grout at twenty-eight (28) days shall be 40 MPa.

E30.5.17 Patching Mortar

(a) Patching mortar shall be made of the same material and of approximately the same proportions as used for the concrete, except that the coarse aggregate shall be omitted and the mortar shall consist of not more than one (1) part cement to two (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.

E30.5.18 Flexible Joint Sealant

(a) 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 B6, “Substitutes”.

E30.5.19 Fibre Joint Filler

(a) 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 ASTM D1751 or equal as accepted by the Contract Administrator, in accordance with B6, “Substitutes”.

E30.5.20 Precompressed Foam Joint Filler

(a) Precompressed expanding filler shall be compressed to twenty percent (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.

E30.5.21 Low Density Styrofoam

(a) Low density Styrofoam shall be the type accepted by the Contract Administrator, in accordance with B6, “Substitutes”.

E30.5.22 Backup Rod

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

E30.5.23 Dampproofing

(a) 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 B6, “Substitutes”.

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

(c) 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 B6, "Substitutes".

E30.5.24 Pre-set Anchor Units and Ferrule inserts

(a) Anchor units for the aluminum pedestrian handrail shall be National Concrete Accessories Type DGR-1, stainless steel or equal as accepted by the Contract Administrator, in accordance with B6 "Substitutes".

(b) Anchor units for the galvanized pedestrian handrail on the parapet walls shall be National Concrete Accessories Type SGR-1, galvanized steel or equal as accepted by the Contract Administrator, in accordance with B6 "Substitutes".

E30.6 Equipment

E30.6.1 General

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

E30.6.2 Vibrators

(a) The Contractor shall have sufficient numbers of internal concrete vibrators and experienced operators on site to properly consolidate all concrete in accordance with ACI 309. The type and size of vibrators shall be appropriate for the particular application, the size of the pour, and the amount of reinforcing and shall conform to standard construction procedures.

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

E30.7 Construction Methods

E30.7.1 General

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

(b) 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.

E30.7.2 Temporary False Work, Formwork, and Shoring

(a) Construction 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 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.

(iii) 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.

(iv) 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.

(v) 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.

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

(vii) 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.

(viii) Shores shall be braced horizontally in two (2) directions and diagonally in the same two (2) vertical planes so that they can safely withstand all dead and moving loads to which they shall be subjected.

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

(x) 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.

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

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

(c) Forms for the concrete barriers shall be accordingly aligned to each other and to the geometry shown on the Drawings so as to provide a smooth, continuous barrier. Any misalignments in the barrier shall be cause for rejection and removal of same. No snap ties within the barriers shall be placed below 250 mm above the top of the upper lift elevation

(d) 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

(e) 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.

(f) 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 shall be of the smallest possible size. Torch cutting of steel hangers and ties shall not be permitted. Formwork hangers for exterior surfaces of decks and curbs shall be an acceptable break-back type with surface cone, or removable threaded type. Cavities shall be filled with cement mortar and the surface left sound, smooth, even and uniform in colour.

(g) Formwork shall be constructed to permit easy dismantling and stripping and such that removal shall not damage the concrete. Provision shall be made in the formwork for shores to remain undisturbed during stripping where required.

(h) It shall be permissible to use the forms over again where possible to a maximum of three (3) 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.

(i) Where required by the Contract Administrator, the Contractor shall cast test panels not using less than two (2) 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.

(j) 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.

E30.7.3 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, E29.7.8, “Preparation for Concreting Against Hardened Concrete”, for the requirements to prepare the hardened concrete at a construction joint for receiving new concrete.

E30.7.4 Traffic Barrier Joints

(a) Finishing of Concrete Barrier Joints

(i) The installation of the fibre joint filler, the backup rod, and the flexible joint sealant shall be undertaken as shown on the Drawings.

(ii) Furnish fibre joint filler for each joint in a single piece for the required depth and width for each joint, unless otherwise approved by the Contract Administrator. If permitted, multiple pieces shall be fastened together for a given joint by butting ends and securing in place by stapling or other positive fastening methods. Polyethylene bond breaker tap shall be installed between joint fillers and sealants. Expansion board caps shall be adhered to fibre joint filler prior to closing barrier formwork. These caps shall be used to position and secure backup rod in place prior to flexible joint sealing operations.

(iii) The flexible joint sealant at the barrier joints shall be installed as per the Manufacturer’s recommendations and shall be tooled smooth, after installation, to provide a clean, uniform finish and a properly sealed joint.

(iv) The supply and installation of flexible joint sealant and fibre joint fillers shall be considered incidental to the Work, and no additional measurement or payment shall be made for this Work

E30.7.5 Pre-set Anchor Units and Ferrule Inserts

(a) All anchor units and ferrule inserts shall be installed as shown on the Drawings.

(b) All anchor units and ferrule inserts shall be held securely in place so as not to become displaced during concrete placement operations.

(c) The Contractor shall coordinate the installation of aluminum pedestrian handrail posts as described in E29 “Aluminum Pedestrian Handrail”.

E30.7.6 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.

E30.7.7 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 one hundred and twenty (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 ninety (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 one hundred and twenty (120) and/or ninety (90) minutes may be specified by the Contract Administrator. The Contractor shall be informed of this requirement twenty-four (24) hours prior to the scheduled placing of concrete.

(iii) To avoid the reduction of delivery and discharge time in hot weather, the Contractor shall 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 E30.1, “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 Suppliers’ designated quality control person. The Supplier 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 shall 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 Supplier and a copy of this record shall be submitted to the City 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 shall 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; and
- 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.

E30.7.8 Preparation for Concreting Against Hardened Concrete

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

(i) 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.

(ii) 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.

(iii) 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 shall not run or puddle

(iv) For the Bridge traffic and median barriers, during concreting of the structural deck, the top surface of the concrete shall be roughened using a small rake running longitudinally between barrier dowels.

E30.7.9 Placing Structural Concrete

(a) General

(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, joints, and related Works. No concrete pour shall be scheduled without the prior written approval of the Contract Administrator.

(b) Placing Structural Concrete

(i) 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.

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

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

(iv) 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.

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

(vi) 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.

(vii) 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 shall be no contamination of the concrete or separation of the ingredients.

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

(ix) 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.

(x) 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.

(xi) 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.

(xii) 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.

(xiii) Before any concrete is placed for the approach slabs the Bridge structural deck or the sidewalk slab, the Contractor shall demonstrate to the satisfaction of the Contract Administrator before each pour that all necessary adjustments have been made to provide the required camber, crown, slab thickness, and concrete cover. This demonstration may be carried out by means of an attachment securely fastened to the finisher's strike-off machine and moving the machine and the strike-off across the deck over the reinforcing steel with a minimum 3 mm clearance between the steel and attachment.

E30.7.10 Finishing of Concrete Surfaces

(a) Finishing Operations for Unformed Surfaces

(i) The Contractor shall ensure that sufficient personnel are provided for the finishing of the slab 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.

(b) Type 1 Finish – Exposed Formed Surfaces

(i) A permeable formwork liner finish shall be applied to all exposed formed surfaces including all exposed concrete surfaces not included in Type 2, Type 3, Type 4 finishes, but excluding soffit surfaces where an architectural form finish is specified.

(ii) Exposed surfaces imply all surfaces exposed to view including surfaces to 300 mm below finish grade elevations.

(iii) All surfaces to receive a formwork liner finish shall be formed using an approved permeable formwork liner.

(iv) The surfaces shall be patched as specified in this Specification.

(c) Type 2 Finish – Unformed Surfaces – Retaining Wall, Traffic Barriers

(i) All unformed concrete surfaces shall be finished as outlined hereinafter.

(ii) 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.

(iii) 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.

(iv) 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.

(d) Type 3 Finish – Unformed Surfaces – Sidewalks and Paths

(i) All unformed concrete surfaces shall be finished in accordance with Section 9.5 of CW 3310.

(e) Type 4 Finish – Surfaces Below Finished Grade

(i) All surfaces below 300 mm below finished grade except underside of footings shall be patched in accordance with the requirements of Sections E30.5.17 “Patching Mortar”, E30.5.13 “Bonding Agents”, and E30.7.13 “Patching of Formed Surfaces” of this Specification.

(ii) All surfaces below 300 mm below finish grade shall receive dampproofing in accordance with E30.5.23, “Dampproofing” of this Specification.

E30.7.11 General Curing Requirements

(a) Refer to E30.7.14 “Cold Weather Concreting” for cold weather curing requirements and E30.7.15, “Hot Weather Concreting” of this Specification for hot weather curing requirements

(b) 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 twenty-four (24) hours. Concrete shall be protected from freezing until at least twenty-four (24) hours after the end of the curing period.

(c) Changes in temperature of the concrete shall be uniform and gradual and shall not exceed three degrees Celsius (3°C) in one (1) hour or twenty degrees Celsius (20°C) in twenty-four (24) hours.

(d) 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.

(e) 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.

(f) Care shall be exercised to ensure that the polyester curing blanket is well drained and that it is placed as soon as the surface shall 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.

(g) For curing of barriers, parapet walls and retaining walls, formwork shall remain in place for seven (7) consecutive days following concreting. The top surface of the concrete surface shall be moist cured during this timeframe.

(h) The structural sidewalk slabs shall be moist cured in accordance with E30.7.11).

(i) Curing compound shall be applied at the rate specified by the Manufacturer for the accepted product. The compound must be applied uniformly.

(j) 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.

E30.7.12 Form Removal

(a) 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.

(b) All forms shall remain in place and the concrete shall not be loaded for a minimum of seven (7) days after initial concrete placement, unless otherwise authorized by the Contract Administrator in writing.

(c) Notwithstanding the above, the minimum strength of in-place concrete prior to removal of vertical forms shall be seventy percent (70%) of the twenty-eight (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.

(d) 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.

E30.7.13 Patching of Formed Surfaces

(a) 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.

(b) Any repair or surface finishing started before this inspection may be rejected and required to be removed.

(c) Patching of formed surfaces shall take place within twenty-four (24) hours of formwork removal.

(d) 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.

(e) 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 (1) 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.

(f) Concrete shall be cast against forms which shall 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.

(g) The arrangement of panel joints shall be kept to a minimum. Panels containing worn edges, patches, or other defects which shall impair the texture of concrete surfaces shall not be used.

E30.7.14 Cold Weather Concreting

(a) 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 five degrees

Celsius (5°C) during placing or curing. Should heating and hoarding be required, it will be paid in accordance with E30.9.5.

E30.7.15 Hot Weather Concreting

(a) General

(i) The requirements of this section shall be applied during hot weather, i.e., air temperatures forecast to go higher than twenty-seven degrees Celsius (27°C) during placing.

(ii) Concrete at discharge shall be at as low a temperature as possible, preferably as low as fifteen degrees Celsius (15°C), but not above twenty-five degrees Celsius (25°C). Concrete containing silica fume shall be between ten degrees Celsius (10°C) minimum and eight teen degrees Celsius (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 finished operation.

(b) Hot-Weather Curing

(i) When the air temperature is at or above twenty-five degrees Celsius (25°C), curing shall be accomplished by fog misting and by using saturated absorptive fabric, in order to achieve cooling by evaporation. Note that fog misting is mandatory for all structural deck and median slab pours at all temperatures.

(ii) Mass concrete shall be water cured for the basic curing period when the air temperature is at or above twenty degrees Celsius (20°C), in order to minimize the temperature rise of the concrete.

(c) Job Preparation

(i) When the air temperature is forecast to rise to twenty-five degrees Celsius (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.

(d) 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 30.2, “Acceptable Concrete Temperatures”, for the indicated size of the concrete section.

Table E30.2: Acceptable Concrete Temperatures

Thickness of Section (Meters)	Temperatures °C	
	Minimum	Maximum
Less than:		
1	10	27
1.2	5	25

E30.7.16 Cleanup

(a) The Contractor shall cleanup equipment and construction debris on at least a daily basis to the satisfaction of the Contract Administrator.

E30.8 Concrete Quality

E30.8.1 Inspection

(a) All workmanship and all materials furnished and supplied under this Specification are subject to close and systematic inspection and testing by the Contract Administrator including all operations from the selection and production of materials through to final acceptance of the specified Work.

(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.

(c) Quality Assurance testing shall be undertaken by a third-party testing company, acceptable to the Contract Administrator, retained and paid for by the Contractor. Quality Control testing shall be undertaken by the Contractor.

E30.8.2 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 shall be no charge to the City for samples taken.

E30.8.3 Materials

(a) 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.

(b) All materials shall conform to the latest edition and all subsequent revisions of CAN/CSA A23.1.

(c) All testing of materials shall conform to the latest edition and all subsequent revisions of CAN/CSA A23.2.

(d) 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.

E30.8.4 Quality Assurance and Quality Control

(a) 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.

(b) The Contract Administrator reserves the right to reject concrete in the field that does not meet the Specifications.

(c) 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.

(d) Quality Assurance and Control tests shall be used to determine the acceptability of the concrete supplied by the Contractor.

(e) The Contractor shall 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.

(f) 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.

E30.8.5 Concrete Testing

(a) 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 E29.4.2, “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.

(b) 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 E29.4.2, “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.

(c) 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 shall be carried out by the Contract Administrator. The concrete shall 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.

(d) Rapid chloride permeability testing shall be performed in accordance with ASTM C1202.

(e) Samples of concrete for test specimens shall be taken in accordance with CSA Standard Test Method A23.2-1C, "Sampling Plastic Concrete”.

(f) 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 (2) 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 (2) specimens. A compressive strength test at seven (7) days shall be taken, the strength of which shall be used only as a preliminary indication of the concrete strength, a strength test being the strength of a single standard cured specimen.

(g) 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 E30.1 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.

E30.8.6 Corrective Action

(a) If the results of the tests indicate that the concrete is not of the specified quality, the Contract Administrator shall have the right to implement additional testing, as required, to further evaluate the concrete, at the Contractor's expense. 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.

E30.9 Measurement and Payment

E30.9.1 Structural Concrete

(a) 150 Thick Structural Sidewalk

(i) Supply and placement of 150 Thick Structural Sidewalk shall be measured on an area basis and shall be paid for at the Contract Unit Price per square metre for “150 Thick Structural Sidewalk”, 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) CPR Subway Retaining Wall Cap Repair

(i) Supply and placement of concrete for the CPR Subway Retaining Wall Cap Repair shall be measured on a length basis and shall be paid for at the Contract Unit Price per lineal metre for “CPR Subway Retaining Wall Cap”, 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.

(c) Supply and placement of remainder of structural concrete shall not be measured and shall be paid for the Contract Lump Sum Price for the Items of Work listed below in E30.9.2, 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.

E30.9.2 Items of Work:

(a) Structural concrete:

(i) Median Slab (Between CPR Pedestals); and

(ii) Median Traffic Barrier (Including Footing).

E30.9.3 Parapet Walls (Including Structural Sidewalk)Pre-Set Anchor Units

(a) Supplying and installing pre-set anchor units shall not be measured and shall be considered incidental to the Work included in this Specification and accepted by the Contract Administrator.

E30.9.4 Epoxied Anchors for Handrail Posts

(a) Supplying and installation epoxied anchors for the aluminum handrail posts shall not be measured and shall be considered incidental to the Aluminum Pedestrian Handrail works specified in E28.

E30.9.5 Heating and Hoarding

(a) Heating and hoarding required for structural concrete works shall be measured on a volume basis and shall be paid for at the Contract Unit Price per cubic meter for “Heating and Hoarding”, 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.

E31. PARTIAL DEPTH SIDEWALK RETAINING WALL REPAIRS

E31.1 Description

E31.1.1 The Work covered under this item shall include all operations relating to the shallow refacing (surface repairs) of the newly exposed sidewalk retaining walls as shown on the Drawings (where required) and in the locations as directed by the Contract Administrator.

E31.1.2 The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies, and all things necessary for and incidental to the satisfactory performance and completion of all Work as hereinafter specified.

E31.2 Materials

E31.2.1 General

(a) Unless otherwise listed herein, materials shall be in accordance with E30 “Supply and Place Structural Concrete”.

E31.2.2 Concrete

(a) The Contractor shall be responsible for the design and performance of all concrete mixes supplied under this specification. Either ready mix concrete or proprietary repair mortars, where applicable, may be used having the following minimum properties in accordance with CSA A23.1:

(i) Class of Exposure : C-1;

(ii) Compressive Strength @ 28 days = 35 MPa;

(iii) Maximum Aggregate Size = 10mm;

(iv) Air Content: Category 1 per Table 4 of latest CSA A23.1; and

(v) Slump Flow = 550-600mm

(b) The concrete mix shall meet the latest edition CSA A23.1 Cl. 8.9.2 Low Shrinkage requirements.

(c) The concrete mix shall have an electrical conductivity less than 15,000 ohm-cm.

(d) Mix design for ready mix concrete shall be submitted to Contract Administrator at least two (2) weeks prior to concrete placing operations.

(e) The workability of the concrete mix shall be consistent with the Contractor’s placement operations.

(f) Any proposed proprietary repair mortar shall be subject to the approval of the Contract Administrator and must meet or exceed the properties of the ready mix concrete.

(g) The temperature of all types of concrete shall be between fifteen degrees Celsius (15˚C) and twenty-five degrees Celsius (25˚C) at discharge. Temperature requirements for concrete containing silica fume shall be between ten degrees Celsius (10˚C) and eighteen degrees Celsius (18˚C) at discharge unless otherwise approved by the Contract Administrator.

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

(i) Concrete repair material shall be compatible with the concrete substrate and the Contractor’s method of placement. The Contractor may choose to use a proprietary repair mortar subject to the approval of the Contract Administrator.

E31.3 Equipment

E31.3.1 General

(a) Equipment shall be in accordance with E30 “Supply and Place Structural Concrete”.

E31.4 Construction Methods

E31.4.1 General

(a) The Contractor may consider form and pour, pressure grouting or low velocity spraying as application methods for girder end concrete repairs. Other methods shall be subject to the approval of the Contract Administrator.

E31.4.2 Removal of Existing Concrete and Concrete Surface Preparation

(a) Concrete removal shall generally be in accordance with E22 Concrete Removals.

(b) All areas requiring repair shall have their perimeters sawcut to a depth of 20 mm. The only exception to sawcutting will be in areas where there is no room for a concrete saw.

(c) Remove all concrete in the repair area to a minimum depth of:

(i) 20 mm beyond the exposed rebar;

(ii) 6 mm larger than the largest size aggregate in the repair material beyond the exposed rebar;

(iii) to the depth of delamination; or

(iv) whichever is greater.

(d) Concrete removal may be undertaken by mechanical means with chipping hammers of appropriate size so as not to damage the substrate concrete or by other means as accepted by the Contract Administrator.

(e) Clean all resulting concrete and steel surfaces by grit-blasting. All unsound and stained concrete shall be fully removed. Exposed rebar shall be cleaned to a near-white condition.

(f) If recommended by the mortar/grout manufacturer's directions, pre-wet the patch surfaces for the duration recommended.

E31.4.3 Form Work and Shoring

(a) Formwork and shoring shall be in accordance with E30 "Supply and Place Structural Concrete".

E31.4.4 Formliner

(a) Formliner shall be used on all exposed formed surfaces.

E31.4.5 Bonding New Concrete to Existing Concrete

(a) The Contractor is responsible to create a bond between the new mortar/concrete and the existing substrates. This may be done by either the application of a suitable bonding agent or grout or by using a self-bonding mortar or concrete. The Contract Administrator will check all repaired areas for bond using a hammer "sounding" method after form removal. Place mortar or concrete by trowelling, pumping, spraying, or into forms ensuring that all entrapped air is removed.

(b) Should a bonding grout be used, it shall be applied immediately before concrete placement. It shall be thoroughly brushed onto the existing hardened concrete surface in a thin and even coating that will not puddle.

E31.4.6 Mixing and Placing Concrete

(a) Mixing and placing concrete shall be in accordance with E30 "Supply and Place Structural Concrete". Where proprietary repair mortars are used, they shall be prepared in accordance with the manufacturer's instructions.

E31.4.7 General Curing

(a) Concrete Curing shall be in accordance with E30 "Supply and Place Structural Concrete". Where proprietary repair mortars are used, they shall be cured in accordance with the manufacturer's instructions.

(b) Refer to E30 “Supply and Place Structural Concrete”.for cold weather and hot weather curing requirements, respectively.

E31.4.8 Form Removal

(a) Form Removal shall be in accordance with E30 “Supply and Place Structural Concrete”.

E31.4.9 Patching of Formed Surfaces

(a) Patching of Formed Surfaces shall be in accordance with E30 “Supply and Place Structural Concrete”.

E31.4.10 Cold Weather Concreting

(a) Cold Weather Concreting shall be in accordance with E30 “Supply and Place Structural Concrete”.

E31.4.11 Hot Weather Concreting

(a) Hot Weather Concreting shall be in accordance with E30 “Supply and Place Structural Concrete”.

E31.5 Measurement and Payment

E31.5.1 Partial Depth Sidewalk Retaining Wall Repairs

(a) Partial depth sidewalk retaining wall repairs shall be measured on an area basis and shall be paid for at the Contract Unit Price per square metre for “Partial Depth Sidewalk Retaining Wall Repairs”, 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.

E32. ABANDONMENT OF DRAINAGE INLETS IN SIDEWALK PEDESTAL

E32.1 Description

E32.1.1 This Specification shall cover all operations relating to the abandonment of the existing sidewalk pedestal drainage inlets (consisting of removal of the drainage inlets and infill of the drainage inlet voids with concrete) as specified herein and as shown on the Drawings.

E32.1.2 The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies, and all other things necessary for and incidental to the satisfactory completion of all Work as hereinafter specified

E32.2 Referenced Specifications and Drawings

(a) E22 Concrete Removal;

(b) E30 Supply and Place Structural Concrete; and

(c) E33 Reinforcing Steel.

E32.3 Scope of Work

(a) The work under this Specification shall involve the following drainage inlets Works:

(i) Removal and disposal of the existing drainage inlets; and

(ii) Filling of the existing drainage inlet voids with structural concrete.

E32.4 Submittals

E32.4.1 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.

E32.5 Materials

E32.5.1 General

(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.

E32.5.2 Concrete

(a) The Contractor shall coordinate the supply and placement of concrete including supply and placement of all epoxied dowels as described in E30 “Supply and Place Structural Concrete”.

E32.5.3 Reinforcing Steel

(a) The Contractor shall coordinate the supply and placement of reinforcing steel as described in E33 “Reinforcing Steel”.

E32.6 Equipment

E32.6.1 General

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

E32.7 Construction Methods

E32.7.1 Drainage Inlets and surrounding concrete shall be removed to the limits shown on the Drawings. Any unsound concrete detected beyond the removal extents depicted in the Drawings shall be reported to the Contract Administrator immediately. Removals beyond the limits shown on the Drawings shall only proceed as directed by and in the presence of the Contract Administrator.

E32.7.2 Removal limits shall be approved by the Contract Administrator. Portions of drainage inlets not required to be removed shall remain.

E32.7.3 Care shall be taken when removing the drainage inlets to not damage the remaining sidewalk pedestal walls.

E32.8 Measurement and Payment

E32.8.1 Abandonment of Drainage Inlets in Sidewalk Pedestal

(a) Abandoning drainage inlets shall not be measured and will be paid for at the Contract Lump Sum Price for “Abandon Drainage Inlets in Sidewalk Pedestal”, which price shall be paid 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 and accepted by the Contract Administrator

E33. REINFORCING STEEL

E33.1 Description

E33.1.1 This Specification shall cover all operations relating to the supply, fabrication, and placement of concrete reinforcement, and associated bar accessories, as specified herein and as shown on the Drawings.

E33.1.2 The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies, and all things necessary for and incidental to the satisfactory performance and completion of all Work as hereinafter specified.

E33.2 Referenced Specifications and Drawings

E33.2.1 The latest edition and subsequent revisions of the following:

(a) ASTM A955M – Standard Specification for Deformed and Plain Stainless-Steel Bars for Concrete Reinforcement;

(b) ASTM A615M – Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement;

(c) ASTM C881 – Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete;

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

(e) CAN/CSA G30.18 – Billet-Steel Bars for Concrete Reinforcement; and

(f) Reinforced Steel Institute of Canada – Reinforcement Steel Manual of Standard Practice.

E33.3 Scope of Work

E33.3.1 The Work under this Specification shall involve supplying and placing all black and low carbon chromium reinforcing, as shown on the Drawings for the Works.

E33.3.2 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 schedule Work on the Site, a proposed schedule, including methods and sequence of operations.

E33.4 Materials

E33.4.1 General

(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.

E33.4.2 Handling and Storage of Materials

(a) All materials shall be handled and stored in a careful and workmanlike manner, to the satisfaction of the Contract Administrator. Storage of materials shall be in accordance with the latest edition and all subsequent revisions of CAN/CSA-A23.1, “Storage of Materials”, except as otherwise specified herein.

(b) Bundles of reinforcing steel shall be identified by tags containing bar marks.

(c) 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.

(d) 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.

E33.4.3 Reinforcing Steel

(a) Reinforcing steel shall be deemed to include all reinforcing bars, tie-bars, dowels and sleeves of any material as shown on the Drawings.

(b) Black steel as shown on the Drawings and shall conform to the requirements of CAN/CSA G30.18, Grade 400W.

(c) Low carbon chromium steel, as shown on the Drawings, shall conform to the requirements of ASTM A 615, Grade 75 and ASTM A 1035 CM Grade 100. MMFX ChromX 4000 is an approved product.

(d) Reinforcing deformations shall conform to the requirements of ASTM A615M. All hooks and bends shall be bent using pin diameters and dimensions recommended by RSIC.

(e) 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.

(f) All reinforcing steel shall be straight and free from paint, oil, millscale, and injurious defects. Rust, surface seams, or surface irregularities shall not be cause for rejection, provided that the minimum dimensions, cross sectional area, and tensile properties of a hand-wire-brushed specimen are not less than the requirements of CAN/CSA G30.18, ASTM A 615 and ASTM A 1035.

E33.4.4 Bar Accessories

(a) 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.

(b) Bar chairs, bolsters, and bar supports shall be made from cementitious material. No plastics or PVC, or galvanized bar supports shall be used.

(c) The use of pebbles, pieces of broken stone or brick, plastic, metal pipe, and wooden blocks, shall not be permitted.

(d) Placing of bar supports shall be done to meet the required construction loads.

(e) Tie wire shall be the following:

(i) Black annealed wire;

(ii) Nylon-, epoxy-, or plastic-coated wire.

(f) Bar accessories shall include bar chairs, spacers, clips, wire ties, wire (16 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.

E33.4.5 Mechanical Splices

(a) Mechanical splices shall meet the requirements of the reinforcing steel manufacturer. The proposed mechanical splice shall be submitted to the Contract Administrator for acceptance.

E33.4.6 Bonding Agent/Grout

(a) Epoxy resin shall be 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 V3 or equal, as approved by the Contract Administrator in accordance with B6 “Substitutes”.

(b) 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.

(c) Bonding agents for bonding reinforcing steel into holes in hardened concrete other than epoxy resin may be permitted provided that they develop a minimum pullout resistance of 50 kN within forty-eight (48) hours after installation.

E33.5 Equipment

E33.5.1 General

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

E33.6 Construction Methods

E33.6.1 Fabrication of Reinforcing Steel

(a) 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) Black and low carbon chromium steel reinforcing shall be bent to the proper shape in a plant that has suitable devices for bending as recommended in Reinforcing Steel Institute of Canada (RSIC) Manual of Standard Practice.

(c) Black steel reinforcement bars shall be bent at temperatures between ten degrees Celsius (10ºC) and one hundred degrees Celsius (100ºC).

(d) Heating shall not be used as an aid in bending of low carbon chromium steel reinforcing. The equipment used in the plant shall not cause any surface contamination or damage to the surface of the bars. Bar cutting shall be done by shearing or with a water-cooled saw. Torch cutting shall not be permitted.

E33.6.2 Placing and Fastening of Reinforcing Steel

(a) General

(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) Splices in reinforcing steel shall be made only where indicated on the Drawings. Prior acceptance by the Contract Administrator shall be obtained where other splices must be made. Welded splices shall not be permitted.

(iv) 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.

(v) Reinforcing steel shall not be straightened or re-bent in a manner that shall injure the metal. Bars with bends not shown on the Drawings shall not be used.

(vi) Heating of reinforcing steel shall not be permitted without prior acceptance by the Contract Administrator.

(vii) Reinforcing steel shall be placed within the tolerances specified in CAN/CSA A23.1.

(viii) 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.

(ix) 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 E33.4.4, "Bar Accessories".

(x) Welding or tack welding is not permitted.

(xi) Unless otherwise shown on the Drawings, the minimum distance between bars shall be 40 mm.

(xii) Bars shall be tied at all intersections, except where spacing is less than 250 mm in each direction, when alternate intersections may be tied.

E33.6.1 Splicing

(a) General

(i) Splices shall only be provided as shown on the Drawings. Splices other than as shown on the Drawings shall 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.

E33.7 Quality Control

E33.7.1 Inspection

(a) All workmanship and all materials furnished and supplied under this Specification are subject to close and systematic inspection and testing by the Contract Administrator including all operations from the selection and production of materials through to final acceptance of the specified Work.

(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 and materials or Works, which are not in accordance with the requirements of this Specification.

(c) A minimum of one (1) Business Day advance notice shall be given to the Contract Administrator prior to the placing of any concrete to allow for inspection of the reinforcing steel.

(d) 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.

E33.7.2 Access

(a) 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.

E33.8 Quality Assurance

E33.8.1 Testing

(a) Quality Assurance testing shall be used to determine the acceptability of the reinforcing steel supplied by the Contractor.

(b) The Contractor shall provide, without charge, the samples of reinforcing steel required for Quality Assurance Tests and provide such assistance and use of tools and construction equipment as is required.

E33.9 Measurement and Payment

E33.9.1 Supplying and placing reinforcing steel shall be measured on a mass basis and shall be paid for at the Contract Unit Price per kilogram 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.

E33.9.2 Items of Work:

(a) Supply and Place Reinforcing Steel:

(i) Supply Low Carbon Chromium Reinforcing Steel

(ii) Place Reinforcing Steel

E33.9.3 Notwithstanding E33.9.1and E33.9.2supplying and placing reinforcing steel for the 150 mm thick structural concrete sidewalk shall not be measured and shall be considered incidental to the Contract Unit Price per square metre for “150 Thick Structural Sidewalk”, paid in accordance with E30.9.1(a)(i).

E34. DRILLING AND PLACING DOWELS

E34.1 Description

E34.1.1 This Specification shall cover all operations related to drilling and preparation of dowel holes, supply and placing epoxy grout and installation of the applicable anchorages.

E34.1.2 Dowels shall include the following post-installed anchorages and reinforcing bars:

(a) Threaded rods for attachment of the aluminum pedestrian handrail to the CPR sidewalk pedestal; and

(b) Reinforcing dowels for CPR subway retaining wall modifications.

E34.2 Materials

E34.2.1 Epoxy grout shall be Hilti HIT-RE 500-V3 or equivalent as approved by the Contract Administrator. The epoxy grout shall be suitable for horizontal, vertical or overhead dowel grouting application as required.

E34.3 Construction Methods

E34.3.1 The Contractor shall drill and place dowels at the locations and in accordance with the details shown on the Drawings. Holes for dowels shall be drilled.

E34.3.2 Dowel hole diameters shall be in accordance with the recommendations of the epoxy adhesive grout manufacturer.

E34.3.3 All holes shall be thoroughly cleaned prior to the installation of grout and dowels.

E34.3.4 The epoxy adhesive grout shall be prepared, placed and cured in accordance with the recommendations of the epoxy adhesive grout manufacturer

E34.4 Measurement and Payment

E34.4.1 Drilling and placing dowels will not be measured and will be considered incidental to the Contract prices for:

(a) “Install Aluminum Pedestrian Handrail” for threaded rods installed in the CPR sidewalk pedestal; and

(b) “Supply and Place Structural Concrete” for reinforcing dowels installed for CPR subway wall modification works.

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.

APPENDIX ‘A’

GEOTECHNICAL REPORT

Stantec Consulting Ltd.
500–311 Portage Avenue, Winnipeg MB R3B 2B9

October 16, 2017
File: 123313342

Attention: Ms. Tina Sontag
Dillon Consulting Limited
1558 Willson Place
Winnipeg, Manitoba
R3T 0Y4

Dear Tina,

Reference: Geotechnical Investigation for Street Renewal on McPhillips Street from Jarvis Avenue to Logan Avenue – Winnipeg, Manitoba

On September 26, 27, and October 2 2017, a total of eleven core samples were recovered and seven testholes were drilled from the northbound and southbound, curb and median lanes of McPhillips Street from Jarvis Avenue to Logan Avenue. The purpose of the geotechnical investigation was to determine the thickness of the pavement structure and observe the soil conditions to a depth of 2.1 m. The testhole locations are shown in Figure 1. Upon completion of the work, the testholes were backfilled with gravel and clay cutttings, the upper four inches were repaired with cold mix asphalt. The testhole locations, pavement structure thickness and laboratory test results are summarized on Table 1 and 2. Testhole logs, photographs of the core samples and the laboratory test reports are also attached to this report.

The following changes were made to the original scope of work:

- Testhole 1 was terminated at depth of 0.9 m due to unmarked abandoned Manitoba Hydro line. This was determined once only crushed limestone was encountered and was terminated for safety.
- Testhole 5 was changed from a full depth testhole to just a core sample due to underground utilities.
- Testhole 6 was terminated at depth of 0.75 m after refusal on unknown material/object. The area was cleared for utilities prior to drilling but due to the uncertainty of the material/object encountered the testhole was terminated for safety.
- Testhole 7 was terminated at depth of 0.45 m after refusal on unknown material/object. The area was cleared for utilities prior to drilling but due to the uncertainty of the material/object encountered the testhole was terminated for safety.
- Testhole 8 was moved from the southbound median lane across to the northbound median lane due to underground utilities. The testhole was terminated at depth of 0.9 m due to unmarked abandoned Manitoba Hydro line. This was determined once only crushed limestone was encountered and was terminated for safety.

Reference: Geotechnical Investigation for Street Renewal on McPhillips Street from Jarvis Avenue to Logan Avenue – Winnipeg, Manitoba

- Testhole D was to be a core sample but due to the work Manitoba Hydro was doing in the area it was deleted. The testhole couldn't be moved due to the work area and the lanes closed for traffic control by Manitoba Hydro.

We appreciate the opportunity to assist you on this project. Please contact the undersigned if you have any questions regarding our report.

Regards,

STANTEC CONSULTING LTD.

Prepared by:

Lee Boughton
Geotechnical Technologist
Phone: (204) 944-3795
lee.boughton@stantec.com

Reviewed by:

German Leal, P. Eng
Associate, Geotechnical Engineering
Phone: (204) 928-4005
german.leal@stantec.com

Attachment: Geotechnical Investigation on McPhillips Street from Jarvis Avenue to Logan Avenue

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Street Renewal on McPhillips Street from Jarvis Avenue to Logan Avenue

Geotechnical Investigation for
Street Renewal on McPhillips Street
from Jarvis Avenue to Logan Avenue

Stantec

Prepared for:
Dillon Consulting Limited
1558 Willson Place
Winnipeg, Manitoba
R3T 0Y4

Prepared by:
Stantec Consulting Ltd.
500-311 Portage Avenue
Winnipeg, MB
R3B 2B9

October 16, 2017

TABLE 1
MCPHILLIPS STREET
FROM JARVIS AVENUE TO LOGAN AVENUE
GEOTECHNICAL INVESTIGATION

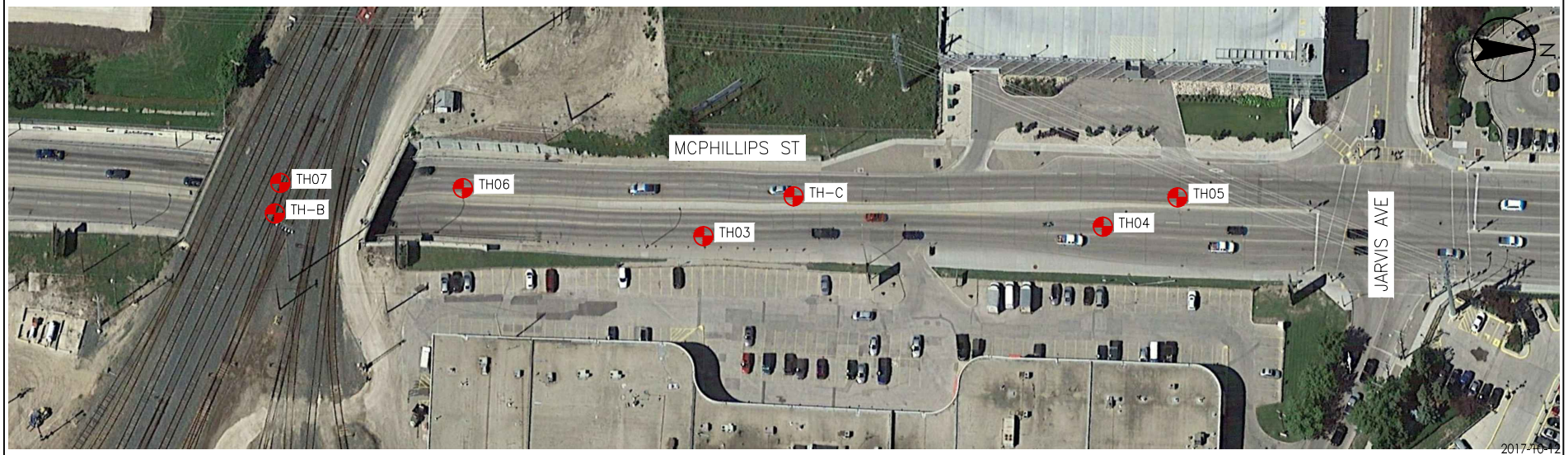
Testhole ID	Testhole Location	Pavement Surface		Pavement Structure Material		Sample Description	Sample Depth (m)	Moisture Content (%)	Particle Size Analysis				Atterberg Limits		
		Type	Thickness (mm)	Type	Thickness (mm)				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit	Plastic Limit	Plasticity Index
TH01	McPhillips Street Northbound median lane, 80 m north of Logan Avenue 1 m east of curb	Asphalt	60	Crushed Limestone	<655*	-	-	-	-	-	-	-	-	-	-
		Concrete	205												
TH02	McPhillips Street Northbound median lane, 255 m north of Logan Avenue 1 m east of curb	Asphalt	200	Crushed Limestone	275	Clay	0.7	42	0.3	1.1	13.5	85.1	95	27	68
		Concrete	145												
TH03	McPhillips Street Northbound outer lane, 155 m south of Jarvis Avenue 1 m west of curb	Asphalt	150	Crushed Limestone	315	Fill	0.7	26	8.3	13.1	16.4	62.2	84	22	62
		Concrete	145												
TH04	McPhillips Street Northbound median lane, 62 m south of Jarvis Avenue 4 m east of curb	Asphalt	115	Crushed Limestone	640	-	-	-	-	-	-	-	-	-	-
		Concrete	270												
TH05	McPhillips Street Southbound median lane, 42 m south of Jarvis Avenue 1 m west of curb	Asphalt	135	Crushed Limestone	N/A*	-	-	-	-	-	-	-	-	-	-
TH06	McPhillips Street Southbound median lane, 212 m south of Jarvis Avenue 1 m west of curb	Asphalt	265	Crushed Limestone	335*	-	-	-	-	-	-	-	-	-	-
		Concrete	175												
TH07	McPhillips Street Southbound median lane, 256 m south of Jarvis Avenue 1 m west of curb	Asphalt	310	Crushed Limestone	170*	-	-	-	-	-	-	-	-	-	-
TH08	McPhillips Street Northbound median lane, 45 m north of Logan Avenue 1 m east of curb	Asphalt	70	Crushed Limestone	<635*	-	-	-	-	-	-	-	-	-	-
		Concrete	220												

Note:
1. TH01 was terminated at depth of 0.9 m due to unmarked abandoned Manitoba Hydro line. This was determined once only crushed limestone was encountered and was terminated for safety.
2. TH05 was changed from a full depth testhole to just a core sample due to underground utilities. Thickness of pavement structure material is N/A as only core samples were taken and not the depth of the crushed limestone.
3. TH06 was terminated at depth of 0.75 m after refusal on unknown material/object. The area was cleared for utilities prior to drilling but due to the uncertainty of the material/object encountered the testhole was terminated for safety.
4. TH07 was terminated at depth of 0.45 m after refusal on unknown material/object. The area was cleared for utilities prior to drilling but due to the uncertainty of the material/object encountered the testhole was terminated for safety.
5. TH08 was moved from the southbound median lane across to the northbound median lane due to underground utilities. The testhole was terminated at depth of 0.9 m due to unmarked abandoned Manitoba Hydro line. This was determined once only crushed limestone was encountered and was terminated for safety.

TABLE 2
MCPHILLIPS STREET
FROM JARVIS AVENUE TO LOGAN AVENUE

Testhole ID	Core Location	Pavement Surface		Pavement Surface	
		Type	Thickness (mm)	Type	Thickness (mm)
TH05*	McPhillips Street Southbound median lane, 42 m south of Jarvis Avenue 1 m west of curb	Asphalt	135	-	-
TH-A	McPhillips Street Northbound median lane, 145 m north of Logan Avenue 1 m east of curb	Asphalt	150	-	-
TH-B	McPhillips Street Northbound median lane, 330 m north of Logan Avenue 1 m east of curb	Asphalt	260	-	-
TH-C	McPhillips Street Northbound median lane, 135 m souththh of Jarvis Avenue 1 m east of curb	Asphalt	200	Concrete	90
TH-D*	N/A	-	-	-	-

Note: 1. TH05 was changed from a full depth testhole to just a core sample due to underground utilities. Thickness of pavement structure material is N/A as only core samples were taken and not the depth of the crushed limestone.
2. TH-D was to be a core sample but due to the work Manitoba Hydro was doing in the area it was deleted. The testhole couldn't be moved due to the work area and the lanes closed for traffic control by Manitoba Hydro.



2017-10-12
123313342

ORIGINAL SHEET - ISO 8.5x11 H - v17.05

Z:\123313342 McPhillips\13342_fhlp.dwg ISO_8x11_HORIZ
2017/10/12 5:59 PM By: Boughton, Lee

Stantec

Stantec Consulting Ltd.
Suite 500, 311 Portage Avenue
Winnipeg MB Canada R3B 2B9
Tel. 204.489.5900 Fax. 204.453.9012
www.stantec.com

Legend

TESTHOLE

Notes

IMAGE SOURCE:
GOOGLE EARTH

Client/Project

DILLON CONSULTING LTD.

STREET RENEWAL ON MCPHILLIPS STREET FROM JARVIS AVENUE TO LOGAN AVENUE - WINNIPEG, MANITOBA

Figure No.

123313342

Title

TESTHOLE LOCATION PLAN

TH1 TESTHOLE RECORD

CLIENT Dillion Consulting PROJECT No. 123313342

PROJECT Street Renewals McPhillips Street from Jarvis to Logan DATUM Geodetic NORTHING 5530733

LOCATION McPhillips Street from Jarvis to Logan ELEVATION EASTING 631349

DRILLING DATE October 2, 2017 DRILLING CO. Maple Leaf Drilling DRILLING METHOD 125 mm SSA

DEPTH (m)	SOIL TYPE	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	AS		Asphalt			
	CO		Concrete			
	GW		Crushed Limestone - 20 mm max aggregate size	GS		5
				GS		4
1			• TESTHOLE LOCATION: 80 m North of McPhillips Street and Logan Avenue, northbound median lane, 1 m east of curb. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole terminated at depth of 0.9 m. • Testhole was terminated at depth of 0.9 m due to unmarked abandoned Manitoba Hydro line. This was determined once only crushed limestone was encountered and was terminated for safety.			
2						
3						

□ Insitu Shear Vane (kPa) ■ Torvane on Samples (kPa)

△ Pocket Penetrometer (kPa)

50kPa 100kPa 150kPa 200kPa

W_P W W_L Moisture Content & Atterberg Limits

● Standard Penetration Test, blows/0.3m

10 20 30 40 50 60 70 80 90

DEPTH (ft): 0, 2, 4, 6, 8, 10

Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test

Piezometer Backfill Type: Bentonite Drill Cuttings Sand Slough

Logged by: Lee Boughton

Reviewed by: German Leal

Stantec

TH2 TESTHOLE RECORD

CLIENT Dillion Consulting PROJECT No. 123313342

PROJECT Street Renewals McPhillips Street from Jarvis to Logan DATUM Geodetic NORTHING 5530908

LOCATION McPhillips Street from Jarvis to Logan ELEVATION EASTING 631359

DRILLING DATE October 2, 2017 DRILLING CO. Maple Leaf Drilling DRILLING METHOD 125 mm SSA

DEPTH (m)	SOIL TYPE	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	AS		Asphalt			
	CO		Concrete - sandstone and mortar			
	GW		Crushed Limestone - 20 mm max aggregate size	GS		7
				GS		8
	CH		grey fat CLAY (CH) - some silt,trace fine to coarse sand	GS		42
1			Particle Size Analysis at 0.7 m: 0.3% Gravel, 1.1% Sand, 13.5% Silt, 85.1% Clay	GS		41
				GS		44
				GS		43
2				GS		45
			• TESTHOLE LOCATION: 255 m North of McPhillips Street and Logan Avenue, northbound median lane, 1 m east of curb. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole terminated at depth of 2.1 m.			
3						

□ Insitu Shear Vane (kPa) ■ Torvane on Samples (kPa)

△ Pocket Penetrometer (kPa)

50kPa 100kPa 150kPa 200kPa

W_P W W_L Moisture Content & Atterberg Limits

● Standard Penetration Test, blows/0.3m

10 20 30 40 50 60 70 80 90

DEPTH (ft): 0 2 4 6 8 10

Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test

Piezometer Backfill Type: Bentonite Drill Cuttings Sand Slough

Logged by: Lee Boughton

Reviewed by: German Leal

Stantec

TH3 TESTHOLE RECORD

CLIENT Dillion Consulting PROJECT No. 123313342

PROJECT Street Renewals McPhillips Street from Jarvis to Logan DATUM Geodetic NORTHING 5531077

LOCATION McPhillips Street from Jarvis to Logan ELEVATION EASTING 631370

DRILLING DATE October 2, 2017 DRILLING CO. Maple Leaf Drilling DRILLING METHOD 125 mm SSA

DEPTH (m)	SOIL TYPE	SOIL DESCRIPTION	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	AS	Asphalt			
	CO	Concrete - sandstone and mortar			
	GW	Crushed Limestone - 20 mm max aggregate size	GS		8
			GS		12
	FL	FILL: grey clay - some silt, trace gravel, trace fine to coarse sand	GS		26
		Particle Size Analysis at 0.70 m: 8.3% Gravel, 13.1% Sand, 16.4% Silt, 62.2% Clay			
1		- mottled brown and grey below 0.9 m	GS		39
	CH	grey fat CLAY (CH) - some silt, trace fine to coarse sand	GS		44
			GS		45
2			GS		45
		• TESTHOLE LOCATION: 155 m North of McPhillips Street and Jarvis Avenue, northbound outer lane, 1 m west of curb. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole terminated at depth of 2.1 m.			
3					

□ Insitu Shear Vane (kPa) ■ Torvane on Samples (kPa)
△ Pocket Penetrometer (kPa)
50kPa 100kPa 150kPa 200kPa
W_P W W_L Moisture Content & Atterberg Limits
● Standard Penetration Test, blows/0.3m
10 20 30 40 50 60 70 80 90

DEPTH (ft): 0, 2, 4, 6, 8, 10

Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test

Piezometer Backfill Type: Bentonite Drill Cuttings Sand Slough

Logged by: Lee Boughton
Reviewed by: German Leal

Stantec

TH4 TESTHOLE RECORD

CLIENT Dillion Consulting PROJECT No. 123313342

PROJECT Street Renewals McPhillips Street from Jarvis to Logan DATUM Geodetic NORTHING 5531170

LOCATION McPhillips Street from Jarvis to Logan ELEVATION EASTING 631368

DRILLING DATE October 2, 2017 DRILLING CO. Maple Leaf Drilling DRILLING METHOD 125 mm SSA

DEPTH (m)	SOIL TYPE	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	AS		Asphalt			
	CO		Concrete			
			Crushed Limestone - 20 mm max aggregate size	GS		8
	GW			GS		5
1				GS		18
	FL		FILL: grey fat clay - silty, trace fine to coarse sand	GS		28
				GS		18
	CH		grey fat CLAY (CH) - some silt, trace fine to coarse sand	GS		32
2				GS		38
3			• TESTHOLE LOCATION: 62 m South of McPhillips Street and Jarvis Avenue, northbound median lane, 4 m east of curb. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole terminated at depth of 2.1 m.			

☐ Insitu Shear Vane (kPa) ■ Torvane on Samples (kPa)
△ Pocket Penetrometer (kPa)
50kPa 100kPa 150kPa 200kPa
W_P W W_L Moisture Content & Atterberg Limits
● Standard Penetration Test, blows/0.3m
10 20 30 40 50 60 70 80 90

DEPTH (ft): 0 2 4 6 8 10

Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test

Piezometer Backfill Type: Bentonite Drill Cuttings Sand Slough

Logged by: Lee Boughton
Reviewed by: German Leal

Stantec

TH6 TESTHOLE RECORD

CLIENT Dillion Consulting PROJECT No. 123313342

PROJECT Street Renewals McPhillips Street from Jarvis to Logan DATUM Geodetic NORTHING 5531020

LOCATION McPhillips Street from Jarvis to Logan ELEVATION EASTING 631358

DRILLING DATE October 2, 2017 DRILLING CO. Maple Leaf Drilling DRILLING METHOD 125 mm SSA

DEPTH (m)	SOIL TYPE	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	AS		Asphalt			
	CO		Concrete - sandstone and mortar			
	GW		Crushed Limestone - 10 mm max aggregate size	GS		8
				GS		9
1			• TESTHOLE LOCATION: 212 m South of McPhillips Street and Jarvis Avenue, southbound median lane, 1 m west of curb. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole refused at depth of 0.75 m. • Testhole was terminated at depth of 0.75 m after refusal on unknown material/object. The area was cleared for utilities prior to drilling but due to the uncertainty of the material/object encountered the testhole was terminated for safety.			
2						
3						

☐ Insitu Shear Vane (kPa) ■ Torvane on Samples (kPa)

△ Pocket Penetrometer (kPa)

50kPa 100kPa 150kPa 200kPa

W_P W W_L Moisture Content & Atterberg Limits

● Standard Penetration Test, blows/0.3m

10 20 30 40 50 60 70 80 90

DEPTH (ft): 0, 2, 4, 6, 8, 10

Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test

Piezometer Backfill Type: Bentonite Drill Cuttings Sand Slough

Logged by: Lee Boughton

Reviewed by: German Leal

Stantec

TH7 TESTHOLE RECORD

CLIENT Dillion Consulting PROJECT No. 123313342

PROJECT Street Renewals McPhillips Street from Jarvis to Logan DATUM Geodetic NORTHING 5530976

LOCATION McPhillips Street from Jarvis to Logan ELEVATION EASTING 631357

DRILLING DATE October 2, 2017 DRILLING CO. Maple Leaf Drilling DRILLING METHOD 125 mm SSA

DEPTH (m)	SOIL TYPE	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	AS		Asphalt			
	GW		Crushed Limestone - 20 mm max aggregate size	GS		14

• TESTHOLE LOCATION: 256 m South of McPhillips Street and Jarvis Avenue, southbound median lane, 1 m west of curb.
• No groundwater seepage or soil sloughing was observed during or upon completion of drilling.
• Testhole refused at depth of 0.45 m.
• Testhole was terminated at depth of 0.45 m after refusal on unknown material/object. The area was cleared for utilities prior to drilling but due to the uncertainty of the material/object encountered the testhole was terminated for safety.

☐ Insitu Shear Vane (kPa) ■ Torvane on Samples (kPa)
△ Pocket Penetrometer (kPa)

50kPa 100kPa 150kPa 200kPa

W_P W W_L Moisture Content & Atterberg Limits

● Standard Penetration Test, blows/0.3m

10 20 30 40 50 60 70 80 90

DEPTH (ft) 0 2 4 6 8 10

Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test

Piezometer Backfill Type: Bentonite Drill Cuttings Sand Slough

Logged by: Lee Boughton

Reviewed by: German Leal

Stantec

TH8 TESTHOLE RECORD

CLIENT Dillion Consulting PROJECT No. 123313342

PROJECT Street Renewals McPhillips Street from Jarvis to Logan DATUM Geodetic NORTHING 5530697

LOCATION McPhillips Street from Jarvis to Logan ELEVATION EASTING 631347

DRILLING DATE October 2, 2017 DRILLING CO. Maple Leaf Drilling DRILLING METHOD 125 mm SSA

DEPTH (m)	SOIL TYPE	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	AS		Asphalt			
	CO		Concrete			
	GW		Crushed Limestone - 20 mm max aggregate size	GS		5
				GS		5
1			• TESTHOLE LOCATION: 45 m North of McPhillips Street and Logan Avenue, northbound median lane, 1 m east of curb. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole terminated at depth of 0.9 m. • Testhole was terminated at depth of 0.9 m due to unmarked abandoned Manitoba Hydro line. This was determined once only crushed limestone was encountered and was terminated for safety.			
2						
3						

□ Insitu Shear Vane (kPa) ■ Torvane on Samples (kPa)
△ Pocket Penetrometer (kPa)

50kPa 100kPa 150kPa 200kPa

W_P W W_L Moisture Content & Atterberg Limits

● Standard Penetration Test, blows/0.3m

10 20 30 40 50 60 70 80 90

DEPTH (ft): 0 2 4 6 8 10

Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test

Piezometer Backfill Type: Bentonite Drill Cuttings Sand Slough

Logged by: Lee Boughton

Reviewed by: German Leal

Stantec

Photo 1 - TH01 Core

Photo 2 – TH02 Core

Photo 3 – TH03

Photo 4 – TH04

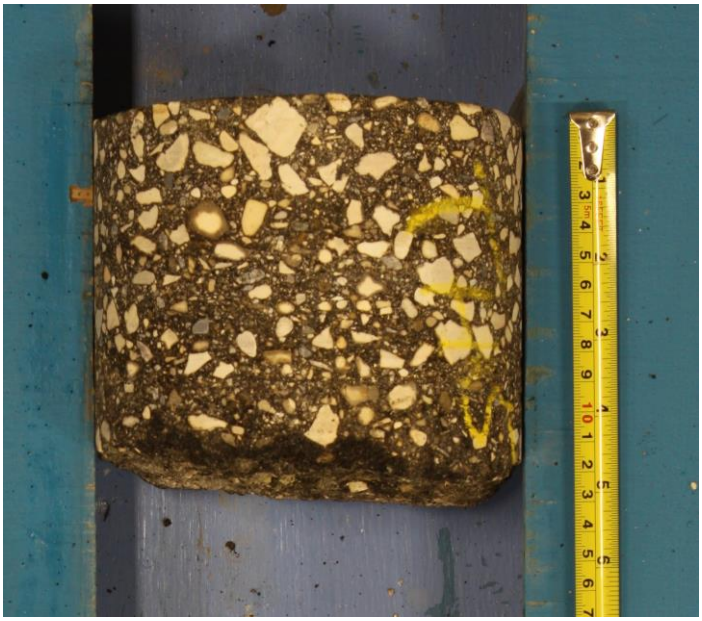


Photo 5 – TH05

Photo 6 – TH06

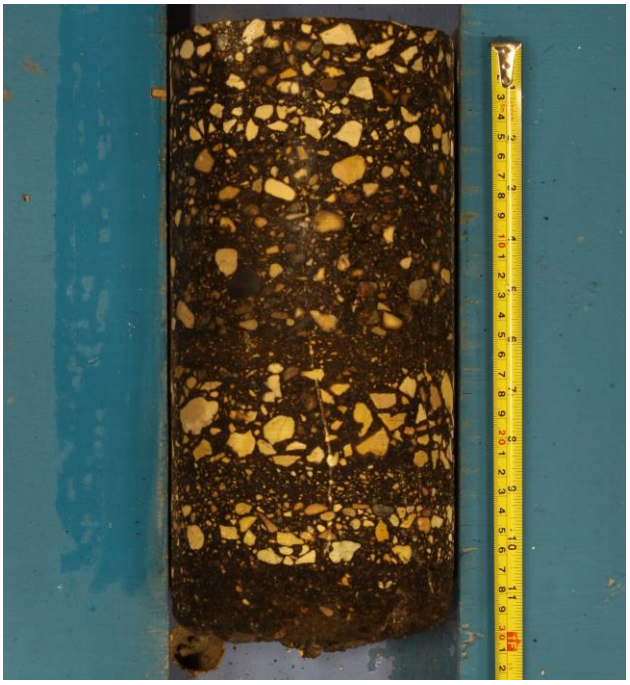


Photo 7 – TH07

Photo 8 – TH08

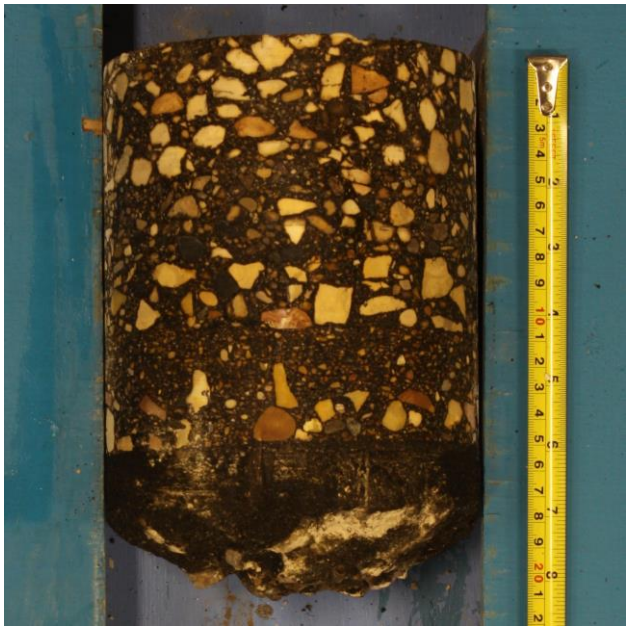


Photo 9 – TH-A

Photo 10 – TH-B

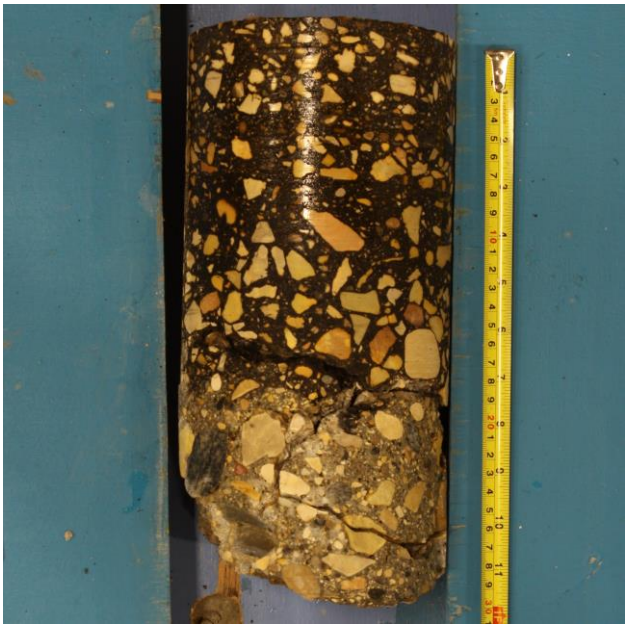


Photo 11 – TH-C

LABORATORY
199 Henlow Bay
Winnipeg MB R3Y 1G4
Tel: (204) 488-6999

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS
ASTM D4318

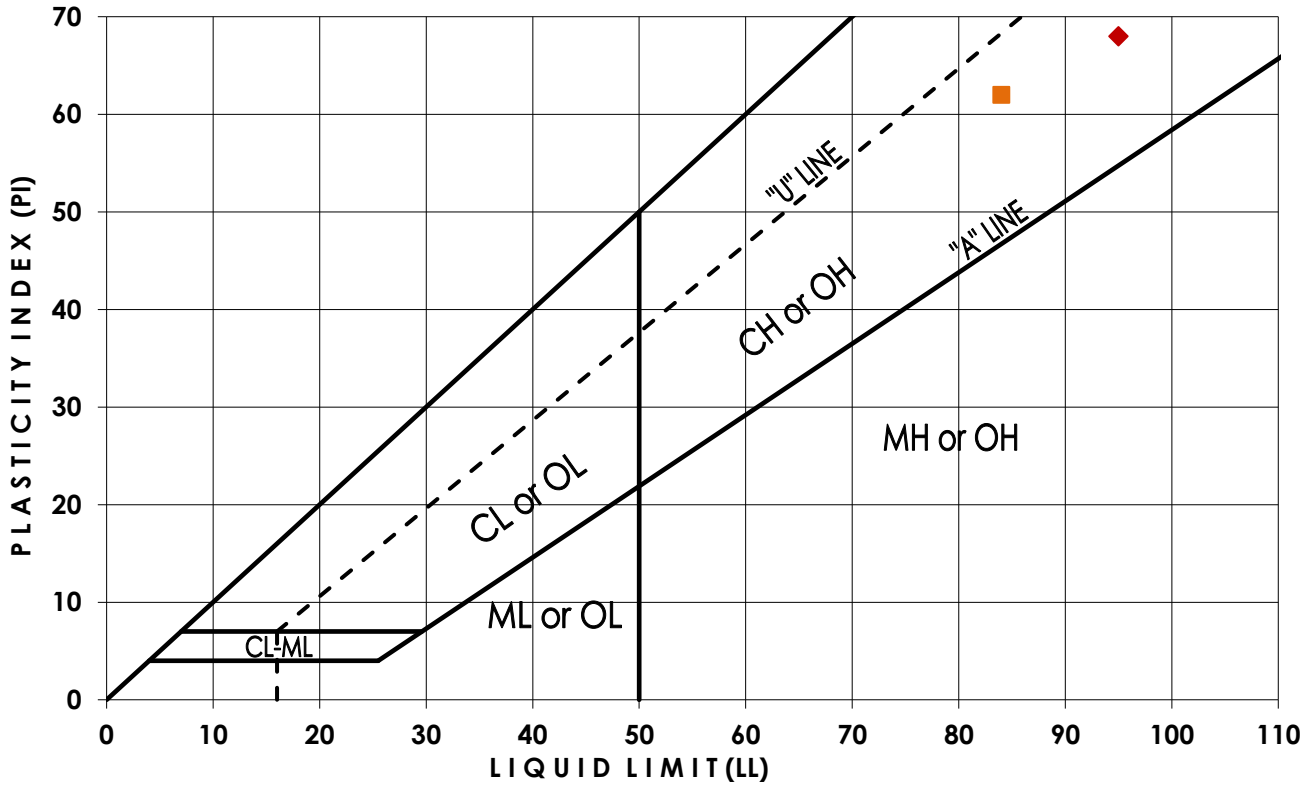
Dillon Consulting Limited
1558 Willson Place
Winnipeg, Manitoba
R3T 0Y4

Project No.: 123313342
Project Name: Street Renewal on McPhillips Street from Jarvis Avenue to Logan Avenue

Date Samples Received: October 3, 2017
Tested By: Nestor Abarca, C. Tech

Symbol	Testhole No.	Depth (m)	Liquid Limit	Plastic Limit	Plasticity Index	USCS
◆	TH2	0.7	95	27	68	
■	TH3	0.7	84	22	62	

Plasticity Chart



Reviewed By: German E. Leal, B.Sc., P. Eng.
Date Reviewed: October 12, 2017

LABORATORY
199 Henlow Bay
Winnipeg MB R3Y 1G4
Tel: (204) 488-6999

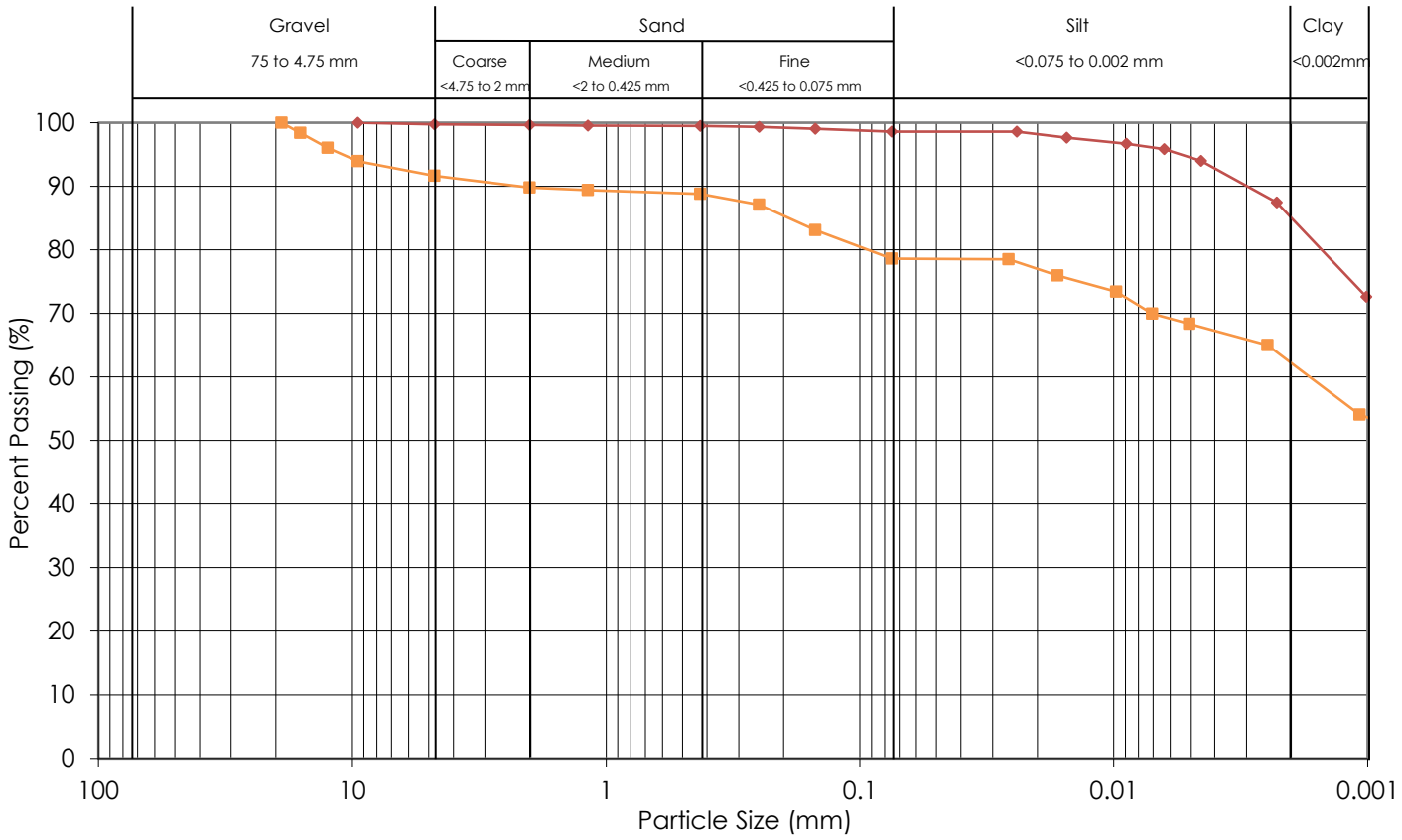
PARTICLE SIZE ANALYSIS

ASTM D422

Dillon Consulting Limited
1558 Willson Place
Winnipeg, Manitoba
R3T 0Y4

Project No.: 123313342
Project Name: Street Renewal on McPhillips Street from Jarvis Avenue to Logan Avenue

Date Samples Received: October 3, 2017
Tested By: Tabea Kleineberg, M.Sc., GIT



Symbol	Sample ID	Gravel, % 75 to 4.75 mm	Sand, %			Silt, % <0.075 to 0.002 mm	Clay, % <0.002 mm	Colloids, % < 0.001 mm
			Coarse <4.75 to 2.0 mm	Medium <2.0 to 0.425 mm	Fine <0.425 to 0.075 mm			
◆	TH2 - 0.7 m	0.3	0.1	0.1	0.9	13.5	85.1	72.5
■	TH3 - 0.7 m	8.3	1.9	1.0	10.2	16.4	62.2	53.6

Reviewed By: German E. Leal, B.Sc., P. Eng.
Date Reviewed: October 12, 2017

APPENDIX ‘B’

MCPHILLIPS FEEDERMAIN

Contractors carrying out pavement construction or working in close proximity to the Large Diameter Watermain shall meet the following conditions and technical requirements.

1. Pre-work, Planning and General Execution

   a. No work shall commence at the site until the construction method statement has been approved, a pre-construction meeting has been held and the Large Diameter Watermain location has been clearly delineated in the field including centreline alignment, outside limits of the pipe and top elevation of the pipe.
   b. The Contractor shall ensure that all work crew members understand and observe the requirements of this specification. Prior to commencement of onsite work, the Contractor shall jointly conduct an orientation meeting with the Contract Administrator and with all superintendents, foremen and heavy equipment operators to make all workers on site fully cognizant of the limitations of altered loading on the Large Diameter Watermain, the ramifications of inadvertent damage to the Large Diameter Watermain and the constraints associated with work in close proximity to the Large Diameter Watermain.
   c. For transverse crossings of the Large Diameter Watermain in support of the pavement construction activities, designate crossing locations just beyond the construction site and confine equipment crossing the Large Diameter Watermain at those locations. Reduce equipment speeds to levels that minimize impact loadings.
   d. For construction work activities either longitudinally or transverse to the alignment of the Large Diameter Watermain, work only with the equipment and in the manner stipulated in the approved construction method statement and the requirements noted herein.
   e. Subgrade, sub base and base course construction shall be kept in a rut free condition at all times. Construction equipment is prohibited from crossing the Large Diameter Watermain if the grade is insufficient to support the equipment without rutting.
   f. Granular material, construction material, soil or other material shall not be stockpiled on the Large Diameter Watermain or within 5 metres of the Large Diameter Watermain centreline.
   g. Stage construction such that the Feedermain is not subjected to significant asymmetrical loading at any time.
   h. Where work is in proximity to the Large Diameter Watermain, utilize construction practices and procedures that do not impart excessive vibration loads on the Large Diameter Watermain or that would cause settlement of the subgrade below the Large Diameter Watermain.

2. Demolition and Excavation

   a. Concrete demolition and removal within 3 metres horizontally of the Large Diameter Watermain shall be completed by saw cutting and removal, or use of hand held jackhammers. Use of machine mounted concrete breakers above the Large Diameter Watermain shall not be permitted.

b. Where there is less than 2.5 metres of cover over the Large Diameter Watermain, offset the excavator or excavation equipment from the Large Diameter Watermain, a minimum of 2.5 metres from Large Diameter Watermain centerline, to carry out excavation.
c. Where there is less than 1.6 metres of earth cover over the Large Diameter Watermain and further excavation is required either adjacent to or over the Large Diameter Watermain, utilize only smooth edged excavation buckets, soft excavation or hand excavation techniques.
d. Excavated materials intended for reuse shall not be dumped directly on the Large Diameter Watermain but shall be carefully bladed into place.

3. Subgrade Construction

a. Subgrade compaction shall be limited to static compaction methods.
b. Stage work activities to minimize the time period that unprotected subgrade is exposed to the environment and protect the subgrade against the impacts of adverse weather if subbase/base course construction activities are not sequential with excavation.

4. Subbase and Base Course Construction

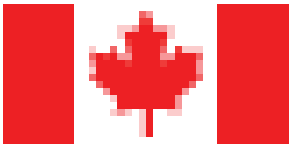
a. Subbase or base course materials shall not be dumped directly on top of the Large Diameter Watermain but shall be carefully bladed into place.
b. Subbase compaction shall be either carried out by static methods without vibration or with smaller equipment such as hand held plate packers or smaller roller equipment.

APPENDIX ‘C’

CPR MINIMUM SAFETY REQUIREMENTS

CANADIAN PACIFIC

MINIMUM SAFETY REQUIREMENTS FOR CONTRACTORS WORKING ON CP PROPERTY IN CANADA



Effective September 15, 2010

No job on our Railway will ever be so important that we can't take the time to do it safely.

Work Smart, Stay Safe

Initialed by

_____

_____

Table of Contents

Introduction

At Canadian Pacific, safety is an integral part of the way we do business. We expect everyone working on Canadian Pacific's property to be unconditionally committed to safety. Safety must be given top priority and will take precedence over deadlines, production schedules, and all other considerations.

1 Application

1.1 Application

1.1.1 These Minimum Safety Requirements apply to all Contractors and other persons performing Work or otherwise providing services to Canadian Pacific on CP Property in Canada.

1.1.2 These Minimum Safety Requirements cannot be waived or altered, in whole or in part, without a prior risk assessment specific to the Work being conducted and written consent has been provided by Manager In Charge.

1.1.3 Notwithstanding the foregoing, these Minimum Safety Requirements do not apply to other federally certified railway companies, and provincial railway companies who come under federal jurisdiction through various agreements with Transport Canada, and who only operate trains on CP Property under various trackage or interchange agreements. However, these companies may be subject to CP's Minimum Requirements For Third Party Railway Operators on CP Property.

1.1.4 Further notwithstanding the foregoing, these Minimum Safety Requirements may not apply to Work or services provided in CP Property in Canada that are Office Premises, in which case, CP's Minimum Safety Requirements For Contractors Working In CP's Office Premises may apply.

2 Definitions and Interpretation

2.1 Definitions

2.1.1 In these Minimum Safety Requirements, the following capitalized terms shall have the ascribed meaning below:

(a) "**Applicable Legislation**" means all applicable legislation, regulations, by-laws, codes, rules, standards, policies, procedures, promulgated by any federal, provincial, and municipal governmental body, including those of its agencies, having authority over CP and, or Contractor in relation to the Work in the matter of health and safety of the person, property and, or the environment;

(b) "**Canadian Pacific**" or "**CP**" means Canadian Pacific Railway Company, and its subsidiaries and affiliates, and includes each of their respective directors, officers, employees, agent, and representatives;

(c) "**CP Personnel**" means CP's employees, agents, and representatives;

(d) "**CP Property**" means any building, facility, yard, track, right of way or other property owned or controlled by CP;

(e) "**Contractor**" means the company or person, and their respective employees and authorized agents, representative and subcontractors who are providing goods or services to CP;

(f) "**Contractor Personnel**" means the Contractor's employees, and authorized agents, representative and subcontractors;

(g) "**Co-mingled Work**" means Work where Contractor Personnel works directly with or in proximity (time or space) to CP Personnel;

(h) "**Foul of Track**" means being in proximity to a track such that the individual or equipment could be struck by a moving train or track unit, or in any case within 4 feet (1.2 meters) of the outside of the nearest rail;

(i) "**Hazardous Materials**" means any substance, which is hazardous to persons or property and includes, without limiting the generality of the foregoing:

(i) radioactive, explosive, poisonous, or toxic substances;

(ii) any substance that if added to any water, would degrade or alter the quality of the water to the extent that it is detrimental to its use by man or by any animal, or plant;

(iii) any solid, liquid, gas or odour or combination of any of them that, if emitted into the air, would create or contribute to the creation of a condition of the air that endangers the health, safety, or welfare of persons, or the health of animal life, or causes damage to plant life or to property; and

(iv) substances declared to be hazardous, toxic or dangerous under any law or regulation now or hereafter enacted by any governmental authority having jurisdiction.

(j) "**Manager in Charge**" means a CP manager as designated or otherwise identified by CP as being responsible for overseeing the Work to be performed, such Manager in Charge may include, but is not limited to Local CP Management, Regional Superintendents, Division Engineers, and Project Managers.

(k) "**Mobile Equipment**" means any motorized and self-propelled equipment, excluding Railway Equipment and highway vehicles, but including, for example, forklifts, tractors, cranes, ATVs, mules, motorized scissor lifts, and similar equipment that are not designed to operate or move on railway tracks;

(l) "**Office Premises**" means any building, facility, or portion thereof, or other premises, whether owned or controlled by CP, which is used solely for clerical or administrative purposes and which does not contain heavy equipment or machinery, as designated by CP from time to time;

(m) "**Railway Equipment**" means trains, locomotives, railcars, track units, hi-rail vehicles and any other equipment designed to operate or move on railway tracks;

(n) "**Safety Management Plan**" means a documented plan which set out how Work is to be conducted in a safe manner, as required by Applicable Legislation and may also be referred to as Occupational Health and Safety Program, or Safety Management System;

(o) "**Work**" means the provision of products and services and related activities;

(p) "**Work Site**" means any CP Property where CP Personnel or Contractor Personnel are present, or permitted to be present, while engaged in any Work, including any Railway Equipment, Mobile Equipment and highway vehicles operated by or used to convey a person engaged in such Work.

2.2 Interpretation & Application

2.2.1 Where legislation is referred to in these Minimum Safety Requirements, it shall include all amendments and replacements thereto as promulgated from time to time.

2.2.2 Where standards, such as those of the Canadian Standards Association, are referred to in these Minimum Safety Requirements, they shall include all amendments and replacements thereof from time to time.

2.2.3 Where there is any ambiguity, inconsistencies, or omissions between or among any agreements with CP, expressed or implied; any Applicable Legislations; any applicable CP policies and practices; and any applicable industrial standards and practices, Contractor and Contractor Personnel shall adhere to that which is most stringent and current.

3 Contractor Compliance & Responsibilities

3.1 General Compliance

3.1.1 Contractor shall be fully and solely responsible for ensuring the safety and health of Contractor Personnel and for ensuring that its Work and other activities do not compromise the health and safety of CP Personnel or any other party, the protection of the environment, the protection of CP's property and those of any other party, and do not interfere with the safety of CP's railway operations.

3.1.2 Contractor shall comply with and shall ensure all of Contractor Personnel are trained and qualified to safely perform the Work and that they comply with all Applicable Legislation pertaining to the protection against fire, safety, health, and environmental hazards, and with any licence, permits, authorizations issued by the respective authority.

3.1.3 Contractor shall comply with and shall ensure all of Contractor Personnel comply with all terms and conditions of all agreements, expressed or implied, between Contractor and CP, and all applicable CP policies and practices.

3.1.4 Contractor shall provide Contractor Personnel, at its own expense, any and all safety equipment required to protect against injuries during the performance of the Work and shall ensure that Contractor Personnel are knowledgeable of and utilize safe practices in performing the Work.

3.1.5 The Contractor shall have a copy of the following documents at the Work Site at all times, and shall produce them as and when requested by CP:

(a) These Minimum Safety Requirements for Contractors Working on CP Property;

(b) Licenses, Certifications, permits, training records or other documents required by Applicable Legislation or these Minimum Safety Requirements;

(c) Contractor's Safety Management Plan;

(d) Contractor's Emergency Information Sheet (see Attachment A); and

(e) Any additional documents required by Contract or by agreement with Manager In Charge.

3.2 Compliance Assurance

3.2.1 CP reserves the right to observe, inspect, test and audit Contractor and Contractor Personnel for compliance with all requirements herein, and to demand and receive all relevant records, documentation, and materials evidencing compliance, at any time, and from time to time.

3.2.2 Failure of the Contractor or Contractor Personnel to comply with any applicable provisions herein may be considered a material breach, and in addition to all other remedies available, CP may without prejudice:

(a) take over control of that Work or activity;

(b) order the Work to stop; and/or

(c) order Contractor Personnel to leave CP Property.

3.2.3 Upon the earlier of the completion of the Work, the expiration of the applicable agreement, or the request of a Manager In Charge, Contractor and Contractor Personnel shall return all identification, badges, access cards, and decals, issued or provided by CP to the Manager In Charge.

4 Safety Management Plans

4.1 General Requirements

4.1.1 Prior to starting any Work on CP Property, the Contractor must have a written Safety Management Plan that identifies:

(a) all Applicable Legislation, rules, policies and work practices in relation to the Work being performed;

(b) specific hazards that are associated with the Work being performed for CP, for example:

(i) Construction, maintenance or inspections of buildings;

(ii) Working on or adjacent to railway tracks;

(iii) Maintenance or inspection or railway tracks, crossings or signal systems;

(iv) Operating Railway Equipment on CP tracks; or

(v) Co-mingled Work with CP Personnel; and

(c) methods of verifying compliance.

4.1.2 The Contractor will provide Manager In Charge with a copy of this Safety Management Plan on reasonable request.

5 Safety Training

5.1 Minimum Training & Qualifications

5.1.1 At its sole cost and expense, Contractor shall ensure that all Contractor Personnel be fully trained and qualified for the Work they will be performing. Contractors and Contractor Personnel shall meet, or exceed, all Applicable Legislation requirements relating to training and qualification.

5.1.2 Additionally, Contractor Personnel training and qualification shall meet or exceed all applicable industry standards.

5.2 Proof of Training & Qualification

5.2.1 Contractor Personnel shall at all times have proof of such training and qualifications and shall produce them as and when requested by the Manager In Charge.

5.2.2 CP reserves the right to inspect qualification certificates, licenses, training records and/or Work-history records for any Contractor Personnel, and, or to be provided with copies thereof, on reasonable request.

6 Safety Orientation

6.1 General Requirements

6.1.1 Prior to beginning Work, all Contractor Personnel shall participate in CP authorized safety orientation, including on-site orientation presented by the Manager In Charge or designate.

6.1.2 Any time the scope of Work, location, condition or supervision changes, Contractor Personnel may be required to attend additional safety orientation sessions.

6.1.3 In recognition of the successful completion of such safety orientation CP will provide Contractor Personnel with an identification card, or other form of proof of completion as determined by CP from time to time. This identification authorizes the Contractor Personnel access to CP Property for the purposes of conducting Work. The identification card or other form of proof issued by CP shall be worn or be made visible at all times, or produced upon request and cannot be transferred under any circumstances.

7 Safety Job Briefing

7.1.1 Contractor Personnel shall attend all Job Briefings as and when conducted. Contractor Personnel shall be solely and fully responsible for understanding the content of the Job Briefing, and at a minimum shall:

(a) have an understanding of the scope of Work to be performed and an appreciation of the nature of the location, environment, and conditions where such Work is to be performed;

(b) be aware of specific or unusual hazardous condition, existing or potential and the control measures required to protect against, control, mitigate, or where possible, avoid said hazard; and

(c) have an emergency response plan/evacuation procedures.

7.1.2 Where Co-Mingled Work is being performed, job briefings must include both CP Personnel and Contractor Personnel, and any other third parties. The job briefing shall identify nature and extent of the interaction between the Work being performed by Contractor Personnel, and those performed by CP Personnel or other third parties. Contractor Personnel shall inform CP Personnel, and any other third parties of known or potential unsafe conditions and hazards that may be created by, resulting from, or inherent in their Work and the corresponding preventative, mitigation, and/or control measures at all job briefings prior to commencing Work, or as soon as Contractor Personnel becomes aware of such conditions.

7.1.3 In all situations, all Contractor Personnel are expected to:

(a) continually identify hazards and assess risk of hazards and to continually and clearly communicate all hazards to the Manager In Charge and to all other parties that may be affected at job briefings, and at any other time as and when appropriate or necessary;

(b) take actions that are within their assigned responsibility to eliminate or control hazards

and risks; and

(c) immediately notify their supervisor or the Manager In Charge of hazards that pose unacceptable risk that they are unable to eliminate or control.

7.1.4 Where Contractor Personnel are unable to eliminate or control a hazard, Contractor Personnel shall take interim measures to protect people, property, equipment and the environment until the hazard can be properly assessed and appropriate corrective actions taken.

8 Applicable Legislation

8.1 General Requirements

8.1.1 Contractor and Contractor Personnel shall be solely responsible for identifying and complying with all Applicable Legislation. CP is governed by federal legislations and therefore, Contractors and Contractor Personnel providing Work to CP are likewise required to comply with all Applicable Legislations. At a minimum, Contractor and Contractor Personnel shall comply with the federal legislations set out below which list is intended solely for general guidance, and not as a comprehensive list of all Applicable Legislation.

8.1.2 Additionally, the Railway Association of Canada (RAC) is an industry association which can provide support and guidance on matters related to railway safety and the transportation of dangerous goods.

8.2 Transportation of Dangerous Goods

8.2.1 When Work involves the handling or transportation of dangerous goods, that Work must comply with the federal *Transportation of Dangerous Goods Act*, (TDG). Contractor shall be solely responsible for ensuring that all Contractor Personnel who handles, offers for transport and/or transports dangerous goods by any transportation mode be trained and holds a valid training certificate or is working under the direct supervision of someone who is trained and holds a valid training certificate. The training must be based on the Work that the person is expected to perform and the DG that the person is expected to handle, offer for transport or transport.

8.3 Canada Labour Code

8.3.1 Where Work is being performed that may create a risk to the health and safety of CP Personnel, Contractor Personnel must comply with Part II of the *Canada Labour Code*.

8.3.2 Additionally, Contractor and Contractor Personnel shall comply with all applicable provisions of the Occupational Health and Safety Regulations (COHS) which are intended to prevent accidents and injuries to employees working for federally regulated companies. Compliance with these regulations may extend to Contractors, depending on the type of Work being done and their proximity to CP Personnel (i.e. Co-mingled Work). Alternatively, provincial occupational health & safety regulations will govern Contractors.

8.4 Railway Safety Act

8.4.1 The *Railway Safety Act* (RSA) governs all federally certified railways in Canada and some provincial railways through various agreements with Transport Canada. The RSA addresses all

matters relating to the construction, alteration, operation, inspection and maintenance of railway works and railway equipment, and contains training and qualification requirements for certain types of Work. When applicable, Contractor and Contractor Personnel shall perform Work in accordance with the RSA, as if directly bound by it.

8.5 Environmental Protection Act

8.5.1 Where Work is being performed that may impact the environment, that Work must comply with all applicable federal and provincial environmental acts and regulations. Some examples of applicable legislations includes the Canadian Environmental Protection Act; Fisheries Act, Navigable Waters Protection Act; Species at Risk Act; Migratory Birds Convention Act; and all corresponding Regulations. Provincial requirements are normally set out in a general Environmental Protection Act which is complemented by numerous regulations addressing more specific areas of concern.

9 Security

9.1 Access to CP Property

9.1.1 All Contractor Personnel must have the following identification in their possession at all times while on CP Property, and present them for review to any Manager In Charge, other CP managers and employees, Police Officer, security guard, or regulatory officer upon request:

(a) photo identification (e.g. driver's license);

(b) proof of employment document or card;

(c) identification card, or other proof of safety orientation issued by CP;

(d) access pass, issued and signed by a CP manager, where Work requires Contractor Personnel to ride in any locomotive or other non-passenger rolling stock;

(e) security identification card, where required by CP; and

(f) building access pass, where required by CP or by a third party having control of the premises.

9.1.2 Contractor shall conduct such background check as is necessary to ensure that Contractor Personnel do not pose a security risk to CP, such security risk includes the risk of the commission of terrorist activities, sabotage, vandalism, theft, and violence. CP reserves the right, at all times, to require that Contractor undertake certain security training and/or perform background checks of Contractor Personnel, prior to allowing such Contractor Personnel to enter onto CP Property.

9.2 Security Awareness

9.2.1 Each Contractor shall have a security awareness program that educates Contractor Personnel to:

(a) understand the railway security challenges, rules and procedures;

(b) monitor and report any suspicious persons, activities or objects; and

(c) stay alert to the environment.

9.2.2 On request CP can make available a copy of CP's Railway Security Awareness program for use by Contractor Personnel.

9.3 Firearms & Explosives

9.3.1 Firearms (loaded or empty) are not permitted on CP Property, except for Police officers and other designated government officials when authorized to do so.

9.3.2 No explosives will be permitted on CP Property without written approval by the Manager In Charge.

9.4 Reporting

9.4.1 Contractor Personnel must report any security concern, security incident, criminal activity (known or suspected), suspicious happenings and/or suspicious persons on CP Property to the Manager In Charge or to CP Police Services in accordance with Section 18.

10 Personal Conduct

10.1 Drug and Alcohol Prohibition

10.1.1 Entry onto CP Property when in possession of, or under the influence of alcohol, intoxicants, narcotics, or controlled substances is strictly prohibited.

10.1.2 Additionally, Contractor Personnel shall be free of any condition which may in any way adversely affect alertness, concentration, responsiveness, or the ability react calmly and responsibly to safety hazards.

10.1.3 CP reserves the right to request drug tests for Contractor Personnel as and where permitted by law.

10.2 Inappropriate Behavior

10.2.1 CP is committed to maintaining a Work environment that supports the dignity of all individuals. No person working at CP may be subjected to any form of discrimination or harassment, including sexual harassment.

10.2.2 Acts or threats of violence are unacceptable at all times on CP Property. Uttering of threats or committing acts of violence will result in the removal of the responsible Contractor Personnel from CP Property, termination of the Contract, and/or criminal charges.

10.2.3 Horseplay, practical jokes, fighting or any other activity that may create a safety hazard will not be tolerated.

10.3 Electronic Entertainment and Communication Devices

10.3.1 The use of personal entertainment devices, including portable audio and video devices such as compact DVD, CD, and game players, I-pods & MP3 players, is prohibited:

(a) while Working on CP Property;

(b) while transporting CP Personnel, whether on and off CP Property; and

(c) while operating any CP highway vehicles, Railway Equipment or Mobile Equipment, whether on and off CP Property.

10.3.2 The use electronic communication devices, including radio, cell phones, Blackberries, walkie-talkies, PDAs, GPS navigation units, Palm Pilots, portable computers and similar devices, is prohibited:

(a) while operating a highway vehicle, unless it is stopped and parked in a safe location;

(b) while operating or assisting in the operation of any Railway Equipment or Mobile Equipment;

(c) while operating power tools, equipment or machinery;

(d) when Foul of Track for any reason; or

(e) whenever use of such a device creates an unsafe condition.

10.3.3 Notwithstanding the foregoing, radios, walkie-talkies, GPS units, and other communication devices authorized by CP Manager in Charge may be used solely for the conduct of business

where not prohibited by municipal or provincial legislation, and any electronic communication device may be used when it is necessary to communicate an emergency condition.

10.4 Smoking

10.4.1 Smoking is prohibited on all CP Property, and in or on all highway vehicles, Railway Equipment, and Mobile Equipment, except for CP designated outdoor smoking areas.

11 Personal Protection

11.1 Work Clothing

11.1.1 The Contractor must ensure that Contractor Personnel wear clothing that meets Applicable Legislation and is suitable to perform the Work safely.

11.2 Personal Protective Equipment (PPE)

11.2.1 The Contractor shall ensure that Contractor Personnel wear personal protective equipment required by Applicable Legislation, regulations, codes and industry standards as necessary to protect against personal injuries while on Railway property. All personal protective equipment shall be approved by the Canadian Standards Associations (CSA) or by the American National Standards Institute (ANSI), and shall be in good condition and be properly fitted.

11.2.2 The following mandatory personal protective equipment ("PPE") shall be supplied by the Contractor at its own expense, and shall be worn at all times by Contractor Personnel while on CP Property:

(a) safety hard hat, meeting CSA standard Z94.1;

(b) safety boots with protective toe caps and soles, meeting CSA standard, Z195 (Green Triangle - Grade 1);

(c) safety glasses with permanently attached side shields, meeting CSA standard Z94.3;

(d) high visibility fluorescent outerwear with retro reflective striping (meeting CSA standard Z96 preferred), with such high visibility fluorescent outwear not covered by other clothing or equipment, except where necessary for safety reasons such as where fall protection or pole climbing equipment is being used; and

(e) any other PPE as required by Applicable Legislation, CSA standard, or otherwise required to protect Contractor Personnel from injuries.

11.2.3 In addition to the foregoing minimum requirements, the following table contains further recommendations in relation to specific types of PPE:

Type of Protection	Additional Recommendations
Hard Hats	Have hi-visibility characteristics which are not obscure by markings or decals

Type of Protection	Additional Recommendations
Safety Eyewear	Tinted safety eyewear must meet Canadian Military Spec. J if operating Railway Equipment Transition lenses are discouraged and should be worn with caution when working in changing light conditions Personal sunglasses are discouraged and must not be worn when operating Railway Equipment
Safety Footwear	Have defined heels Be laced and tied securely for ankle support
High-Visibility Apparel	Lime-green is recommended when working on, or near tracks, or when performing Co-mingled Work

11.2.4 Contractor and Contractor Personnel shall be solely and fully responsible for assessing the risks related to the Work and determining whether additional PPE may be required such as:

(a) Nomex or Proban fire-retardant protective gear when performing certain TDG Work and or handling certain Hazardous Materials or performing specialized Work.

(b) hearing protection when working in any area where noise exposure levels:

(i) are consistently greater than 84 dBA (Lex, 8);

(ii) exceed 115 dBA at any time; and

(iii) any other Work areas where posted, or so notified by CP management.

(c) respiratory protection where Contractor Personnel may be exposed to occupational dusts/particulates, fumes, mists, gases and vapors, in which case, in which case Contractors must have a written Respiratory Protection Program that meets or exceeds Applicable Legislation;

(d) additional eye and face protection meeting CSA standard Z94.3 (i.e. face shields, impact/splash goggles, welding/cutting goggles and welding helmets); and

(e) fall protection systems and equipment meeting appropriate CSA standards as required by Applicable Legislation and appropriate for the related fall hazards.

12 Railway Track Protection

12.1 Contractor's Responsibilities for the Protection of Railway Traffic and Property

12.1.1 Where the Work Site is in close proximity to, or is located on, above, or below railway tracks, special attention, care and precautions shall be taken to ensure the safety of all Contractor Personnel, CP Personnel, all other third parties and to protect CP's property and railway operations.

12.1.2 Contractor shall ensure that Contractor Personnel is made aware of all unique and inherent hazards in working near, on, above or below railway tracks and shall ensure that all Contractor Personnel are fully trained and equipped to work safely.

12.1.3 Contractor Personnel shall at all times remain alert to the movement of trains, rolling stock and other Railway Equipment.

12.1.4 Contractor Personnel shall be especially alert in yards and terminal areas as

(a) Railway Equipment that appears to be stationary may be moving;

(b) the rate of movement of Railway Equipment may be faster than it appears;

(c) Railway Equipment change tracks often; and

(d) movements may be occurring simultaneously on adjacent tracks

12.2 50 Feet Clearance Requirement

12.2.1 All Work shall be performed as far away from railway tracks as possible.

12.2.2 Unless authorized by CP, Contractor Personnel, equipment, and vehicles are not permitted to be within 50 feet of the closest track centerline.

12.2.3 In the event Work must be carried out within 50 of the closet track centerline, written authorization must is obtained from the Manager in Charge, and Contractor Personnel must still remain at the maximum practicable distance from all railway tracks at all times.

12.2.4 When crossing tracks, Contractor Personnel shall ensure a minimum of 50 feet (approximately 15 metres) separation between standing Railway Equipment, stay at least 15 feet away from the end of the nearest equipment, and look both ways before crossing tracks, and if clear, walk at a right angle to the tracks.

12.3 Flagging Protection

12.3.1 When the Work requires Contractor Personnel to be within 50 feet (approximately 15 metres) of any railway tracks, Contractor or Contractor Personnel shall notify and obtain the written approval of the Manager In Charge in advance of the intended start date, and when approved, shall only perform Work strictly in accordance with all terms and conditions of that approval.

12.3.2 Unless otherwise indicated by the Manager In Charge, proper protection against the movement of trains, rolling stock and other Railway Equipment shall be deemed required at all times whenever Work or Contractor Personnel must be within 50 feet (approximately 15 metres) of the closet track centerline. Protection may be provided only by a qualified CP employee through use of a flag person, Canadian Railway Operating Rules (CROR) Track Occupancy Protection (TOP), mechanical blue flag protection or other protection methods designated by the Manager In Charge.

12.3.3 Where CP determines that flagging is required, then Work must be strictly conducted under the direction of a CP flag person or such other person designated by the Manager In Charge.

12.3.4 Contractor Personnel shall ensure that there is clear communication at all times between Contractor Personnel and any CP flag person. Contractor Personnel shall ensure that they are aware of:

(a) flagging distance limits;

(b) time limits; and

(c) any adjacent tracks where movement of Railway Equipment may still occur.

12.3.5 Contractor Personnel shall not assume that a train movement is being stopped or cleared unless clear communication is received directly from the CP flag person.

12.3.6 A job briefing between the CP flag person and all Contractor Personnel must occur before beginning any Work on or Foul of Track.

12.3.7 Blue flag protection is used to indicate that CP or Contractor Personnel are working on, under or between Railway Equipment and movement of trains or other Railway Equipment is prohibited. Blue flags must not be tampered with or obstructed. Blue flags can only be removed by the person or group of persons who originally applied it. Application, use, and removal of blue flags, when appropriate, may only be done under the authorization and guidance of the Manager in Charge.

12.3.8 Red flag protection is used to indicate that CP or Contractor Personnel are working on or Foul of Track, or the track is out of service and movement of trains or other Railway Equipment is prohibited. Red flags must not be tampered with or obstructed. Application, use, and removal of red flags, when appropriate, may only be done under the authorization and guidance of the Manager in Charge.

12.4 Working on or near Tracks

12.4.1 When authorized to perform Work Foul of Track or otherwise be near railway tracks, Contractor Personnel shall ensure at Contractor Personnel, equipment, and vehicles are kept as far away from railway tracks as practicable, and shall at all times:

(a) be alert to train movements and shall expect the movement of trains, engines, cars, or other mobile Railway Equipment at any time, on any track, and in any direction, even if they appear to be stationary or in storage;

(b) not rely on others to protect them from train movement;

(c) stay at least 15 feet (approximately 5 metres) away from the ends of Railway Equipment when crossing the track;

(d) ensure a minimum of 50 feet (approximately 15 metres) separation prior to crossing between Railway Equipment;

(e) look both ways before crossing tracks, and if clear, walk at a right angle to them.

(f) never climb on, under or between Railway Equipment;

(g) be aware of the location of structures or obstructions where track clearances are close;

(h) not stand on the track in front of an approaching engine, car or other equipment;

(i) when possible, stand at least 20 feet back from the track(s) when there is a passing movement of trains, engines, cars, or other mobile Railway Equipment, to prevent injury from flying debris or loose rigging and shall observe the train as it passes and be prepared to take evasive action in the event of an emergency;

(j) not stand on or between adjacent tracks in multiple track territory when a train is passing;

(k) not walk, stand or sit on the rails, between rails or on the end of ties, unless absolutely necessary. As the rail surface can be extremely slippery, personnel must step over the rails when crossing tracks. Personnel shall also be aware railway ties can also be slippery and that railway ballast can shift while walking on top of it. Situational awareness and use of proper footwear is important;

(l) not remain in a vehicle that is within 50 feet of a passing train unless specifically authorized, or where this is not possible, park the vehicle as far away from the tracks as possible and walk to as safe a distance whenever trains pass.

(m) keep away from track switches as remotely operated switch points can move

unexpectedly with enough force to crush ballast rock. Personnel shall stay away from any other railway devices they are unsure of. Personnel shall not disturb or foul the ballast at any time.

12.5 Equipment on or near tracks

12.5.1 Contractor Personnel shall not be Foul of Track with any piece of equipment without a CP flag person or other authorized track protection;

12.5.2 Contractor Personnel shall not move equipment across the tracks except at established road crossings, or unless under the protection and authorization of a CP flagperson and only if the Work Site has been properly prepared for such a move. Tracked equipment will require a CP flagperson any time railroad tracks are crossed.

12.5.3 Contractor Personnel shall not move equipment across railroad bridges or through tunnels, except as expressly authorized and only under such conditions as stipulated by the Manager in Charge.

12.5.4 Contractor Personnel shall move equipment away from the tracks at least 50 feet, or where not possible, park the equipment as far away from the tracks as possible, and walk to a safe a distance whenever trains pass.

12.5.5 Buckets, shovels, and loads on cranes must be lowered to the ground to rest, and cranes without a load must have their load line tightened or retracted to prevent movement, whenever there are passing trains.

12.6 Railway Signs, Signals, Flags and other Communication Infrastructure

12.6.1 Signs, signals and flags shall not be obstructed, removed, relocated, disabled or altered in any way without proper authorization and qualification.

12.6.2 Only qualified Contractor Personnel who are authorized by CP are permitted to operate switches, derails, electric track mechanisms, signal and communication systems or other track control appliances.

12.6.3 Railway pole lines carry electric power and should be treated as any other power lines.

12.7 Excavation

12.7.1 Before starting excavation operations, the Contractor shall ascertain that there are no underground wires, fiber optic cables, pipelines or other utilities which could be damaged or, if present, that such installations are properly protected. Fiber optic cables are present on most segments of the right-of-way. Prior to commencing any excavation, the Contractor shall contact the proper authority to obtain the necessary permit and to locate and protect such cables or other underground utilities.

12.7.2 Excavations shall not be left unattended unless they are properly protected; and the Manager In Charge shall be notified.

13 Workplace Hazardous Materials Information System (WHMIS)

13.1 General Requirements

13.1.1 If at any time Contractor's Work involves the use, handling, storage, or disposal of Hazardous Materials ("Handling of Hazardous Materials"), Contractor Personnel must inform the Manager in Charge.

13.1.2 Contractors shall ensure that all Contractor Personnel are fully trained in the Handling of Hazardous Materials and that Contractor and Contractor Personnel are in full compliance with all Applicable Legislation, and as directed by the Manager In Charge.

13.1.3 Contractor Personnel shall have appropriate processes, systems and controls in place to prevent or otherwise mitigate potential environmental, health and safety risks associated with the Handling of Hazardous Materials.

13.2 Access to MSDS Documents

13.2.1 Prior to beginning any Work that may expose CP Personnel to Hazardous Materials, Contractor or Contractor Personnel shall:

(a) provide a copy of the respective Material Safety Data Sheet (MSDS) to the Manager In Charge; and

(b) keep a copy of the MSDS at the Work Site and shall such that it is readily available at all times.

13.3 Hazardous Material Incident or Spill

13.3.1 In the event of a hazardous material incident or spill, the Contractor must:

(a) ensure that no Contractor or CP Personnel have or will be exposed;

(b) take all reasonable actions to contain the spill;

(c) respond in accordance with its emergency response plan; and

(d) notify CP immediately in accordance with Section 18.

14 Operation of Highway Vehicles

14.1 Highway Vehicles

14.1.1 The following requirements apply to all highway vehicles, whether operated on CP Property; or used to transport CP Personnel.

14.2 Regulations and Inspection

14.2.1 Before using a highway vehicle, Contractor Personnel shall:

(a) complete a pre-trip inspection;

(b) maintain an inspection log;

(c) ensure periodic inspections are completed at official testing locations;

(d) ensure the vehicle is maintained and in safe operating conditions at all times; and

(e) ensure the vehicle is in compliance with applicable motor vehicle regulations and license requirements.

14.2.2 Vehicle maintenance, inspection records and logs must be made available to the Manager In

Charge on request.

14.3 Vehicle Operator Requirements

14.3.1 Operation of highway vehicles is restricted to those Contractor Personnel who are licensed, qualified and authorized to do so. Such Contractor Personnel shall be responsible for the safety of all passengers at all time. For greater certainty, such Contractor Personnel shall:

(a) hold a valid license for the class of vehicle being operated, in accordance with local provincial requirements, and

(b) strictly comply with all posted traffic signs, signals, and all shall obey all Applicable Legislations; and

(c) maintain the required driver log, and make the log available to the Manager In Charge on request, and

(d) comply with the requirements on the use of electronic devices as set out in Section 11.

14.4 Driving on CP Property

14.4.1 In addition to the requirements set out above, while on CP Property, Contractor Personnel shall:

(a) travel only on designated roadways unless otherwise instructed;

(b) keep daytime running lights on (if so equipped);

(c) not exceed 25 km/h (15 mph) unless otherwise posted;

(d) come to a full stop at all blind corners, rail and roadway crossings;

(e) yield the right of way to all Mobile Equipment and other non-highway equipment or service vehicles;

(f) not operate vehicles (or any internal combustion equipment) inside buildings or enclosed structures unless adequate ventilation is provided;

(g) not park Foul of Track unless on-track protection is provided;

(h) not leave vehicles running unnecessarily;

(i) park only in pre-determined or designated areas;

(j) always use the parking brake (or wheel chocks) when leaving an unoccupied vehicle running; and

(k) where safe and practicable, back vehicles into marked parking spaces to avoid reverse collisions when exiting.

14.4.2 All Contractor Personnel who will be operating a highway vehicle or Mobile Equipment in any CP intermodal facilities must complete a Driver Safety Orientation program prior to first entry, and from time to time thereafter as directed by the Manager In Charge.

14.5 Seat Belts

14.5.1 Seat belts must always be worn while operating or riding in any equipped vehicle unless Contractor Personnel is actively engaged in inspections requiring said Contractor Personnel to be free of such restraint, and then only when the vehicle is operating at less than 25 km/h (15 mph).

14.6 Loads

14.6.1 Contractor Personnel shall ensure vehicles are loaded according to weight and dimensional requirements as authorized by provincial regulations and permits, and properly load and secure tools, material, equipment and freight to avoid shifting, falling, leaking or otherwise escaping from vehicles during operation.

14.7 Riding in CP Vehicles

14.7.1 Contractor Personnel are prohibited from operating or riding in any CP vehicles unless authorized to do so, or in case of emergency.

15 Tools, Equipment and Machinery

15.1 General Safety Requirements Respecting All Tools, Equipment and Machinery

15.1.1 Contractor Personnel shall ensure that all tools, equipment, and machinery used be:

(a) in compliance with all Applicable Legislations

(b) in good working order, properly serviced and maintained;

(c) safe for their proposed use and used only for purposes specified by the manufacturer;

(d) if mobile, equipped with appropriate safety devices (e.g. lights, horns, back-up alarms, safety beacons), and prevented from moving through use of the hand brake, wheel blocking, wheel chocking and/or a derail where applicable.

15.1.2 Use of CP tools by Contractor Personnel is prohibited unless specifically authorized by local CP management.

15.2 Lockout – Hazardous Energy Control

15.2.1 Contractor Personnel shall employ such hazardous energy lockout procedure as required to eliminate the accidental or unexpected start-up, energizing, or release of stored (residual) energy during maintenance, repair and/or servicing activities.

15.2.2 All tools, equipment and machinery must be made safe and isolated from all energy sources rendering the machine, equipment, or process inoperative prior to performing maintenance, repair or servicing related tasks.

15.2.3 No Contractor Personnel can remove any CP applied lock or tag, including bad-order tag.

15.2.4 Notwithstanding the foregoing, if Contractor's Work may create an energy hazard to any CP Personnel, then all affected parties must follow the requirements set forth in CP's Lockout – Hazardous Energy Control Policy and Code of Practice.

15.2.5 If CP Personnel and Contractors are jointly performing maintenance, repair or servicing activities on the same machine, equipment or using the same energy source, then they must apply a multi-lock hasp and individual locks and tags (as per CP's Lockout – Hazardous Energy Control Policy and Code of Practice).

15.3 Electrical Safety Requirements

15.3.1 In addition to the hazardous energy control lockout requirements above, all electrical Work must comply with Applicable Legislation, CSA and National Fire Protection Association (NFPA)

requirements.

15.3.2 Contractor Personnel Working on electrical systems must:

(a) if in proximity to CP Personnel, inform them of:

(i) existing or potential electrical hazards;

(ii) any specific additional personal protective equipment that may be required;

(iii) applicable safe Work practices;

(iv) applicable emergency and evacuation procedures; and

(v) apply lock out procedures as per section above on Lockout – Hazardous Energy.

(b) have practices, procedures and training that comply with:

(i) Applicable sections of CSA-Z462 Workplace Electrical Safety Standards;

(ii) Canadian Electrical Code Parts 1 and 2; and

(iii) Any other Applicable Legislation; and

(c) not operate or allow cranes or other mobile equipment to approach closer to any live electrical power line than is permitted by CSA Z150 Standards for mobile cranes.

15.4 Lifting Devices

15.4.1 All lifting devices, including but not limited to jacks, cranes, cables, slings and hooks shall:

(a) meet Applicable Legislation governing design, inspection, maintenance and operation;

(b) be safety certified and labeled or tagged with load capacity limits where required;

(c) have sufficient capacity for the planned lift;

(d) have sufficient footing or support area to properly distribute the load during a lift.

15.5 Welding and Torch Cutting

15.5.1 When welding or torch cutting, Contractor Personnel shall:

(a) be properly trained and qualified;

(b) ensure that all closed containers have been properly purged;

(c) direct flame or sparks away from other Workers, equipment and flammable material;

(d) have a fire extinguisher readily available;

(e) keep compressed gas and oxygen cylinders stored in a secure, vertical position, with regulators removed and caps applied, labeled properly and located in vented cabinets or other designated locations.

15.6 Explosive Actuated Tools

15.6.1 Only Contractor Personnel who are qualified and licensed in accordance with Applicable Legislation, and authorized by CP, may use explosives or explosive actuated tools.

15.7 Unattended Equipment or Machinery

15.7.1 Tools, Equipment and Machinery shall not be left unattended at any time and shall not be stored on CP Property, unless expressly permitted pursuant to a written agreement with CP or by the Manager In Charge in writing, and where so permitted, Contractor shall ensure that:

(a) storage shall be restricted to the designated area, or as otherwise specified by CP.

(b) all such tools, equipment and machinery shall be secured in a safe position well clear of all tracks to prevent accidental contact with trains and moving equipment and to not restrict train crew sightlines;

(c) as much as possible, tools, equipment and machinery shall be stored in locations out of public view.

16 Emergency Response

16.1 Emergency Response Plan

16.1.1 The Contractor must maintain a current emergency response plan and make it available to CP on request. Emergency response plans must include at a minimum:

(a) contractor reporting procedures in the event of an incident or spill;

(b) emergency response contacts and phone numbers, including phone numbers for CP incident reporting and local CP managers (See Attachment A); and

(c) containment measures to be taken in the event of an incident or spill.

16.2 Initial Response

16.2.1 Initial response to any emergency condition must follow the following sequence:

(a) protect the safety and security of all individuals and communities

(b) provide environmental protection and mitigation

(c) conduct incident investigation & evidence preservation

(d) restore railway operations

16.3 First Aid

16.3.1 Contractor Personnel must have sufficient First Aid qualified personnel and the required First Aid kit and any other required First Aid equipment at the Work Site, suitable for the crew size, nature of Work being performed and location, all of which shall, at a minimum, comply with Part II of the Canada Labour Code.

16.4 Fire Protection

16.4.1 The Contractor must have appropriate fire extinguishers, suitable in type, size and quantity having regards to the nature of Work and Applicable Legislation, readily available at all times on:

(a) the Work Site; and

(b) all Contractor equipment, machinery and highway vehicles.

16.4.2 Contractor Personnel shall ensure that all necessary precautions are taken to prevent fires, including the following:

(a) storing flammable material (e.g. paper, rubbish, sawdust, oily or greasy rags, etc.) in proper containers;

(b) storing and transporting fuel, gasoline or other flammable liquids in approved containers. Use of unapproved containers is prohibited;

(c) proper disposal of flammable material daily;

(d) prevent static electricity when dispensing or transferring flammable liquids by using proper grounding and bonding techniques;

(e) avoid using cutting or welding torches during the last one-half hour of shifts, if possible;

(f) taking special precautions with fusees, including:

(i) store and transport in approved containers;

(ii) do not allow fusees to come in contact with any combustible material, including railway ties or wooden timbers; and

(iii) fully extinguish fusees before leaving the location where used;

(g) promptly advise CP management of any fire on CP Property; and

(h) fully extinguish or provide protection for any fire prior to leaving the Work Site.

16.4.3 Contractors Working on the CP right-of-way where a high risk of fire exists (e.g. during rail grinding, rail welding) must have:

(a) appropriate fire prevention and suppression plans (including emergency numbers for CP, local firefighters and fire control districts); and

(b) additional fire fighting equipment and trained Contractor Personnel on site, as required by Applicable Legislation.

17 Reportable Accidents, Incidents and Injuries

17.1 Reportable Injuries

17.1.1 Reportable injuries include any personal injury to:

(a) Contractor Personnel;

(b) any CP Personnel; or

(c) to any third party on CP Property.

17.2 Reportable Accidents

17.2.1 Reportable accidents include any occurrence that results in:

(a) damage to railway tracks, right of way, buildings or other CP Property;

(b) damage to Railway Equipment;

(c) damage to CP highway vehicles;

(d) release of dangerous goods;

(e) spill or loss of transported commodities; and

(f) a threat to the environment.

17.3 Reportable Incidents

17.3.1 Reportable incidents include:

(a) unintended movement of Railway Equipment;

(b) failure to provide track protection for Workers when required;

(c) movement of Railway Equipment beyond authorized limits;

(d) operation of Railway Equipment by an unqualified person;

(e) unauthorized handling of a track switch;

(f) damage, vandalism or tampering with any railway signals, structures or railway safety device;

(g) seepage, leakage, spills of, or other contamination from, Hazardous Materials;

(h) actual, threaten or suspected security related incidents;

(i) slides, washouts or other on-track obstructions; or

(j) any occurrence that may disrupt the movement of trains or affect safe rail operations.

18 Reporting

18.1 Emergency Reporting

18.1.1 In the case of an emergency, Contractor Personnel must call:

(a) 911, where this emergency response system exists, or

(b) the local police, fire or emergency department; and

(c) in all cases, also the CP Police Services Communication Center at toll free 1-800-716-9132 from any Canadian or U.S. location.

18.2 Accident, Incident, Injury Reporting

18.2.1 When an accident, incident or injury occurs on CP Property, the Contractor must:

(a) immediately report it to the Manager In Charge or to the NMC; and

(b) follow instructions given to protect the scene.

18.2.2 CP does not report Contractor Personnel injuries to WCB. Such WCB reporting remains the Contractor's responsibility.

18.3 Information to Report

18.3.1 Information required with the initial report includes:

(a) type of incident;

(b) date and time of occurrence;

(c) location (mileage, subdivision, building, yard or other physical description);

(d) identity of person(s) involved or injured (company & name);

(e) description of any dangerous goods or Hazardous Materials involved;

(f) type & unit number of any Railway Equipment or vehicle involved;

(g) description of occurrence, damage and/or injury, and cause if known;

(h) description of any emergency response;

(i) name and contact information of person making the report; and

(j) such other information that CP may require.

18.4 Environmental Incidents and Spills

18.4.1 In the event of an environmental incident or spill that could have a negative impact on the environment, the Contractor must immediately:

(a) report the incident to the NMC, the Manager In Charge, and the designated CP Contact as per the governing agreement relating to the Work;

(b) take all reasonable actions to contain the spill;

(c) respond in accordance with its emergency response plan; and

(d) provide CP with the following information;

(i) description of location and surrounding area, including any sensitive environmental areas nearby (e.g., rivers, parks, sewers);

(ii) type and quantity of substance released;

(iii) cause of spill or deposit, if known; and

(iv) details of any immediate action taken or action proposed to be taken to contain spill and recover substance.

18.5 Additional Contractor Requirements

18.5.1 Contractor and Contractor Personnel must:

(a) ensure an appropriate emergency response is initiated;

(b) protect any evidence until released by CP Manager In Charge;

(c) cooperate fully with any CP investigation;

(d) cooperate with any investigating government agency; and

(e) notify CP if information is requested by any investigating government agency.

19 Contractor & Contractor Personnel Acknowledgement

19.1 Acknowledgement

19.1.1 Contractor and Contractor Personnel who Work on CP Property shall be deemed to have read and understood the content of these Minimum Safety Requirements For Contractors While Working On CP Property, as amended from time to time, and to agree to be bound by them.

19.1.2 These Minimum Safety Requirements For Contractors While Working On CP Property are subject to change without prior notice. The most current version of these Minimum Safety Requirements can be viewed at www.cpr.ca or by contacting the Manager In Charge.

NOTES:

Work Smart, Stay Safe

20 Attachment A - Emergency Information Sheet

EMERGENCY CONTACT INFORMATION		
EMERGENCY CONTACTS	PHONE	LOCATION
CP Calgary Network Management Center	1-800-795-7851	West of and including Mactier, Ontario.
CP Montreal Operations Centre	1-800-363-3277	East of Mactier, Ontario plus southern Ontario
CP Police Services	1-800-716-9132	
CP Railway Traffic Controller Radio Channel		
Local Police Services		
Local Fire Services:		
Local EMS		
Hospital		
Physician		
Aircraft Service, (if applicable):		
Watercraft Service, (if applicable):		
Other Emergency Services		

Emergency Evacuation Route

(Describe nearest evacuation assembly location OR Provide sketch on back)

Initialed by

_____

_____

WORK SITE INFORMATION		
	PHONE	LOCATION
Work Site Location Name		
Railway Subdivision & Mileage		
Address, Number and Street		
Nearest Town		
CP Manager in Charge		
Emergency Site Access Route (Describe route from nearest emergency services location in detail including access roads & physical landmarks OR provide sketch on back.)		
Contractor Supervisor		
Site Telephone		
Certified First Aid Attendant		
Location of First Aid Supplies at Site		
Location of Fire Extinguishing Equipment:		
Location of WHIMS data sheets		
UTILITY INFORMATION		
UTILITIES CONTACT	PHONE	LOCATION
Natural Gas:	( )	
Electrical:	( )	
Fiber Optic Line:	( )	
Water & Sewer:	( )	
Telephone:	( )	
Cable System:	( )	
Qualified employee(s) in:	( )	
Confined Space Entry, (if applicable):	( )	
Equipment requirements for Confined Space Entry, (if applicable):	( )	
Other:		