



**THE CITY OF WINNIPEG**

# **BID OPPORTUNITY**

**BID OPPORTUNITY NO. 250-2012**

**2012 REGIONAL AND LOCAL STREETS PROGRAM, FORT STREET  
RECONSTRUCTION AND STREETSCAPING, GRAHAM AVENUE TO PORTAGE  
AVENUE**

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## **PART B - BIDDING PROCEDURES**

### **B1. CONTRACT TITLE**

- B1.1 2012 REGIONAL AND LOCAL STREETS PROGRAM, FORT STREET RECONSTRUCTION AND STREETSCAPING, GRAHAM AVENUE TO PORTAGE AVENUE

### **B2. SUBMISSION DEADLINE**

- B2.1 The Submission Deadline is 12:00 noon Winnipeg time, July 6, 2012.
- 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. ADDENDA**

- B4.1 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.
- B4.2 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.
- B4.2.1 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>
- B4.2.2 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.
- B4.3 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.

## **B5. SUBSTITUTES**

- B5.1 The Work is based on the Plant, Materials and methods specified in the Bid Opportunity.
- B5.2 Substitutions shall not be allowed unless application has been made to and prior approval has been granted by the Contract Administrator in writing.
- B5.3 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.
- B5.4 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.
- B5.5 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.
- B5.6 The Contract Administrator will provide a response in writing, at least two (2) Business Days prior to the Submission Deadline, only to the Bidder who requested approval of the substitute.
- B5.6.1 The Bidder requesting and obtaining the approval of a substitute shall be entirely responsible for disseminating information regarding the approval to any person or persons he/she wishes to inform.
- B5.7 If the Contract Administrator approves a substitute as an "approved equal", any Bidder may use the approved equal in place of the specified item.
- B5.8 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 B14.
- B5.9 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.
- B5.10 Notwithstanding B5.2 to B5.9, in accordance with B6.6, deviations inconsistent with the Bid Opportunity document shall be evaluated in accordance with B14.1(a).

## **B6. BID COMPONENTS**

B6.1 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;

B6.2 Further to B6.1, the Bidder should include the written correspondence from the Contract Administrator approving a substitute in accordance with B5.

B6.3 All components of the Bid shall be fully completed or provided, and submitted by the Bidder no later than the Submission Deadline, with all required entries made clearly and completely, to constitute a responsive Bid.

B6.4 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.

B6.4.1 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.

B6.4.2 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.

B6.5 Bidders are advised not to include any information/literature except as requested in accordance with B6.1.

B6.6 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 B14.1(a).

B6.7 Bids submitted by facsimile transmission (fax) or internet electronic mail (e-mail) will not be accepted.

B6.8 Bids shall be submitted to:

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

## **B7. BID**

B7.1 The Bidder shall complete Form A: Bid, making all required entries.

B7.2 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.

B7.2.1 If a Bid is submitted jointly by two or more persons, each and all such persons shall identify themselves in accordance with B7.2.

B7.3 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.

B7.4 Paragraph 12 of Form A: Bid shall be signed in accordance with the following requirements:

- (a) if the Bidder is a sole proprietor carrying on business in his/her own name, it shall be signed by the Bidder;
- (b) if the Bidder is a partnership, it shall be signed by the partner or partners who have authority to sign for the partnership;
- (c) if the Bidder is a corporation, it shall be signed by its duly authorized officer or officers and the corporate seal, if the corporation has one, shall be affixed;
- (d) if the Bidder is carrying on business under a name other than his/her own, it shall be signed by the registered owner of the business name, or by the registered owner's authorized officials if the owner is a partnership or a corporation.

B7.4.1 The name and official capacity of all individuals signing Form A: Bid should be printed below such signatures.

B7.5 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.

## **B8. PRICES**

B8.1 The Bidder shall state a price in Canadian funds for each item of the Work identified on Form B: Prices.

B8.1.1 For the convenience of Bidders, and pursuant to B6.4.2 and B14.4.3, an electronic spreadsheet Form B: Prices in Microsoft Excel (.xls) format is available along with the Adobe PDF documents for this Bid Opportunity on the Bid Opportunities page at the Materials Management Division website at <http://www.winnipeg.ca/matmgt/>

B8.2 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.

B8.3 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.

B8.4 Payments to Non-Resident Contractors are subject to Non-Resident Withholding Tax pursuant to the Income Tax Act (Canada).

## **B9. QUALIFICATION**

B9.1 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.

- B9.2 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>
- B9.3 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);
- B9.4 Further to B9.3(c), the Bidder shall, within five (5) Business Days of a request by the Contract Administrator, provide proof satisfactory to the Contract Administrator that the Bidder/Subcontractor has a workplace safety and health program meeting the requirements of The Workplace Safety and Health Act (Manitoba), by providing:
- (a) a valid COR certification number under the Certificate of Recognition (COR) Program administered by the Manitoba Construction Safety Association or by the Manitoba Heavy Construction Association's Safety, Health and Environment Program; or
  - (b) a report or letter to that effect from an independent reviewer acceptable to the City. (A list of acceptable reviewers and the review template are available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at <http://www.winnipeg.ca/matmgt/>)
- B9.5 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.
- B9.6 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.

## **B10. BID SECURITY**

- B10.1 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.
- B10.1.1 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.
- B10.1.2 All signatures on bid securities shall be original.
- B10.1.3 The Bidder shall sign the Bid Bond.



- B10.1.4 The Surety shall sign and affix its corporate seal on the Bid Bond and the Agreement to Bond.
- B10.2 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.
- B10.2.1 Where the bid security provided by the successful Bidder is in the form of a certified cheque or draft pursuant to B10.1(c), it will be deposited and retained by the City as the performance security and no further submission is required.
- B10.2.2 The City will not pay any interest on certified cheques or drafts furnished as bid security or subsequently retained as performance security.
- B10.3 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.

## **B11. OPENING OF BIDS AND RELEASE OF INFORMATION**

- B11.1 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.
- B11.1.1 Bidders or their representatives may attend.
- B11.1.2 Bids determined by the Manager of Materials, or his/her designate, to not include the bid security specified in B10 will not be read out.
- B11.2 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/>
- B11.3 After award of Contract, the name(s) of the successful Bidder(s) and the Contract amount(s) will be available on the Closed Bid Opportunities (or Public/Posted Opening & Award Results) page at The City of Winnipeg, Corporate Finance, Materials Management Division website at <http://www.winnipeg.ca/matmgt/>
- B11.4 The Bidder is advised that any information contained in any Bid may be released if required by City policy or procedures, by The Freedom of Information and Protection of Privacy Act (Manitoba), by other authorities having jurisdiction, or by law.

## **B12. IRREVOCABLE BID**

- B12.1 The Bid(s) submitted by the Bidder shall be irrevocable for the time period specified in Paragraph 11 of Form A: Bid.
- B12.2 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.

## **B13. WITHDRAWAL OF BIDS**

- B13.1 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.

- B13.1.1 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.
- B13.1.2 The City will assume that any one of the contact persons named in Paragraph 3 of Form A: Bid or the Bidder's authorized representatives named in Paragraph 12 of Form A: Bid, and only such person, has authority to give notice of withdrawal.
- B13.1.3 If a Bidder gives notice of withdrawal prior to the Submission Deadline, the Manager of Materials will:
- (a) retain the Bid until after the Submission Deadline has elapsed;
  - (b) open the Bid to identify the contact person named in Paragraph 3 of Form A: Bid and the Bidder's authorized representatives named in Paragraph 12 of Form A: Bid; and
  - (c) if the notice has been given by any one of the persons specified in B13.1.3(b), declare the Bid withdrawn.
- B13.2 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 B12.2 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.

#### **B14. EVALUATION OF BIDS**

- B14.1 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 B9 (pass/fail);
  - (c) Total Bid Price;
  - (d) economic analysis of any approved alternative pursuant to B5.
- B14.2 Further to B14.1(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.
- B14.3 Further to B14.1(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.
- B14.4 Further to B14.1(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.
- B14.4.1 If there is any discrepancy between the Total Bid Price written in figures, the Total Bid Price written in words and the sum of the quantities multiplied by the unit prices for each item, the sum of the quantities multiplied by the unit prices for each item shall take precedence.
- B14.4.2 Further to B14.1(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.
- B14.4.3 The electronic Form B: Prices and the formulas imbedded in that spreadsheet are only provided for the convenience of Bidders. The City makes no representations or warranties as to the correctness of the imbedded formulas. It is the Bidder's responsibility to ensure the extensions of the unit prices and the sum of Total Bid Price performed as a function of the formulas within the electronic Form B: Prices are correct.

**B15. AWARD OF CONTRACT**

- B15.1 The City will give notice of the award of the Contract or will give notice that no award will be made.
- B15.2 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.
- B15.2.1 Without limiting the generality of B15.2, 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.
- B15.3 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 B14.
- B15.3.1 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](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) Pavement Reconstruction
  - (i) Fort Street from Graham Avenue to Portage Avenue
- (b) Streetscaping
  - (i) Fort Street from Graham Avenue to Portage Avenue
- (c) Sewer and Watermain Repairing
  - (i) Fort Street from Graham Avenue to Portage Avenue

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

- (a) Pavement Reconstruction
  - (i) Removal of existing concrete pavement and curbs
  - (ii) Excavation
  - (iii) Installation of catchbasins and sewer service pipe
  - (iv) Installation of subdrains
  - (v) Compaction of existing subgrade
  - (vi) Placement of separation geotextile fabric
  - (vii) Placement of subbase and base course material
  - (viii) Adjustment of existing appurtenances
  - (ix) Construction of 250 mm plain dowelled concrete pavement and 200 mm reinforced concrete pavement approaches
  - (x) Construction of barrier curb (150 and 180 mm) and modified barrier curb (150 and 180mm)
  - (xi) Placement of asphalt overlay tie-ins and approaches
- (b) Streetscaping
  - (i) Removal of sidewalk and interlocking paving stones
  - (ii) Construct 100 mm concrete sidewalk
  - (iii) Interlocking paving stones (adjustment of existing stones and installation of new stones)
  - (iv) Tree planting (and Silva cells)
- (c) Sewer and Watermain Repairs
  - (i) 300 mm sewer repair
  - (ii) 150 mm water service repair

### **D3. CONTRACT ADMINISTRATOR**

D3.1 The Contract Administrator is Morrison Hershfield Limited, represented by:

Wayne Jaworski, C.E.T.  
Principal and Senior Project Manager

Telephone No. 204 977-8370

Facsimile No. 204 487-7470

D3.2 At the pre-construction meeting, Wayne Jaworski 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 B6.8

### **D4. CONTRACTOR'S SUPERVISOR**

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

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

### **D5. OWNERSHIP OF INFORMATION, CONFIDENTIALITY AND NON DISCLOSURE**

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

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

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

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

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

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

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

### **D6. NOTICES**

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

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

- D6.3 All notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications required to be submitted or returned to the City Solicitor shall be sent to the following facsimile number:

The City of Winnipeg  
Legal Services Department  
Attn: Director of Legal Services  
  
Facsimile No.: 204-947-9155

#### **D7. FURNISHING OF DOCUMENTS**

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

#### **SUBMISSIONS**

#### **D8. AUTHORITY TO CARRY ON BUSINESS**

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

#### **D9. SAFE WORK PLAN**

- D9.1 The Contractor shall provide the Contract Administrator with a Safe Work Plan at least five (5) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 for the return of the executed Contract.
- D9.2 The Safe Work Plan shall be prepared and submitted in the format shown in the City's template which is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at <http://www.winnipeg.ca/matmgt/safety/default.stm>

#### **D10. INSURANCE**

- D10.1 The Contractor shall provide and maintain the following insurance coverage:
- (a) commercial general liability insurance, in the amount of at least two million dollars (\$2,000,000.00) inclusive, with The City of Winnipeg added as an additional insured, with a cross-liability clause, such liability policy to also contain contractual liability, unlicensed motor vehicle liability, non-owned automobile liability, broad form property damage cover and products and completed operations, to remain in place at all times during the performance of the Work and throughout the warranty period;
  - (b) if applicable, Automobile Liability Insurance covering all motor vehicles, owned and operated and used or to be used by the Contractor directly or indirectly in the performance of the Work. The Limit of Liability shall not be less than \$2,000,000 inclusive for loss or damage including personal injuries and death resulting from any one accident or occurrence;
  - (c) an all risks Installation Floater carrying adequate limits to cover all machinery, equipment, supplies and/or materials intended to enter into and form part of any installation.
- D10.2 Deductibles shall be borne by the Contractor.

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

D10.4 The Contractor shall not cancel, materially alter, or cause each policy to lapse without providing at least thirty (30) Calendar Days prior written notice to the Contract Administrator.

## **D11. PERFORMANCE SECURITY**

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

- (a) a performance bond of a company registered to conduct the business of a surety in Manitoba, in the form attached to these Supplemental Conditions (Form H1: Performance Bond), in the amount of fifty percent (50%) of the Contract Price; or
- (b) an irrevocable standby letter of credit issued by a bank or other financial institution registered to conduct business in Manitoba and drawn on a branch located in Winnipeg, in the form attached to these Supplemental Conditions (Form H2: Irrevocable Standby Letter of Credit), in the amount of fifty percent (50%) of the Contract Price; or
- (c) a certified cheque or draft payable to "The City of Winnipeg", drawn on a bank or other financial institution registered to conduct business in Manitoba, in the amount of fifty percent (50%) of the Contract Price.

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

D11.2 If the bid security provided in his/her Bid was not a certified cheque or draft pursuant to B10.1(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. DETAILED WORK SCHEDULE**

D13.1 The Contractor shall provide the Contract Administrator with a detailed work schedule at least two (2) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in the General Conditions for the return of the executed Contract.

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

- (a) a Gantt chart for the Work acceptable to the Contract Administrator.

D13.3 Further to D13.2(a), 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**

### **D14. COMMENCEMENT**

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

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

- (a) the Contract Administrator has confirmed receipt and approval of:
  - (i) evidence of authority to carry on business specified in D8;
  - (ii) evidence of the workers compensation coverage specified in C6.15;
  - (iii) the 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 detailed work schedule specified in D13.
- (b) the Contractor has attended a pre-construction meeting with the Contract Administrator, or the Contract Administrator has waived the requirement for a pre-construction meeting.

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

D14.4 The City intends to award this Contract by July 23, 2012.

D14.4.1 If the actual date of award is later than the intended date, the dates specified for Substantial Performance and Total Performance will be adjusted by the difference between the aforementioned intended and actual dates.

### **D15. WORKING DAYS**

D15.1 Further to C1.1(gg);

D15.1.1 The definition of a Working Day shall be amended to include Saturdays.

D15.1.2 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.

D15.1.3 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.

D15.1.4 When the Work includes two 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.

### **D16. RESTRICTED WORK HOURS**

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

### **D17. WORK BY OTHERS**

- (a) Watermain renewal by others (Bid Opportunity 131-2012);

- (b) MTS – adjustment of manholes;
- (c) Manitoba Hydro – adjustment of manholes and new street-lighting;
- (d) Manitoba Hydro Gas Division – lowering and/or rock wrapping of underground main and services as required;
- (e) City of Winnipeg Geomatics Branch – various work on survey monuments;
- (f) City of Winnipeg Traffic Services – installation of signage and line painting.
- (g) Winnipeg Transit – possible work at bus stops.
- (h) Winnipeg Parking Authority – relocation of parking pay stations, as required.
- (i) Artis (360 Main Street) – will be conducting repairs to their parkade.
- (j) Yoga Public (280 Fort Street)- will be doing building repairs and construction of parking lot and approach.

D17.2 The Contract Administrator will attempt to arrange and coordinate work to be performed by others so that such Work does not interfere with the Work and schedule of the Contractor. Where work by others interferes, as determined by the Contract Administrator, with the Contractor's planned Work, the Contractor shall modify his plans and do other Work. Unless the Contract Administrator determines that there was no opportunity for the Contractor to do a similar amount of work, no consideration will be made to extending the Contract Time.

D17.3 The City of Winnipeg Water and Waste Department has scheduled a watermain renewal on Fort Street (Bid Opportunity 131-2012). It is anticipated that this Work will be completed by July 15, 2012. The Contractor shall not begin any Work in the affected areas until Work by Water and Waste is completed and is instructed of such by the Contract Administrator.

#### **D18. SEQUENCE OF WORK**

D18.1 Further to C6.1, the recommended sequence of work is provided in Appendix 'B'.

D18.2 Generally, the recommended sequence of work is as follows:

- (a) Install two new sets of catch basins and sewer service pipes with connections to the existing sewer
- (b) Complete sewer and watermain repairs with traffic split in two outside lanes;
- (c) Construct two westerly lanes with traffic in the two existing most easterly lanes;
- (d) Construct outside east lanes with traffic in two new most westerly lanes;
- (e) Complete construction of second east lane with traffic split in two outside lanes;
- (f) Complete west boulevard streetscaping with traffic in two most easterly lanes and pedestrians in dedicated inside west lane;
- (g) complete east boulevard streetscaping with traffic in two most westerly lanes and pedestrians in dedicated inside east lane where necessary.

#### **D19. SUBSTANTIAL PERFORMANCE**

D19.1 The Contractor shall achieve Substantial Performance within fifty-five (55) consecutive Working Days of the commencement of the Work as specified in D14.

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

D19.3 The date on which the Work has been certified by the Contract Administrator as being substantially performed to the requirements of the Contract through the issue of a certificate of Substantial Performance is the date on which Substantial Performance has been achieved.

## **D20. TOTAL PERFORMANCE**

D20.1 The Contractor shall achieve Total Performance within sixty (60) consecutive Working Days of the commencement of the Work as specified in D14.

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

D20.3 The date on which the Work has been certified by the Contract Administrator as being totally performed to the requirements of the Contract through the issue of a certificate of Total Performance is the date on which Total Performance has been achieved.

## **D21. LIQUIDATED DAMAGES**

D21.1 If the Contractor fails to achieve Substantial Performance or Total Performance in accordance with the Contract by the days fixed herein for same, the Contractor shall pay the City the following amounts per Working Day for each and every Working Days following the days fixed herein for same during which such failure continues:

- (a) Substantial Performance – three thousand dollars (\$3,000);
- (b) Total Performance – one thousand dollars (\$1,000).

D21.2 The amounts specified for liquidated damages in D21.1 are based on a genuine pre-estimate of the City's losses in the event that the Contractor does not achieve Substantial Performance or Total Performance by the days fixed herein for same.

D21.3 The City may reduce any payment to the Contractor by the amount of any liquidated damages assessed.

## **D22. SCHEDULED MAINTENANCE**

D22.1 The Contractor shall perform the following scheduled maintenance in the manner and within the time periods required by the Specifications:

- (a) Maintenance of Trees, as specified in E18.

D22.2 Determination of Substantial Performance and Total Performance shall be exclusive of scheduled maintenance identified herein. All scheduled maintenance shall be completed prior to the expiration of the warranty period. Where the scheduled maintenance cannot be completed during the warranty period, the warranty period shall be extended for such period of time as it takes the Contractor to complete the scheduled maintenance.

## **D23. ACCELERATED COMPLETION**

D23.1 Description

D23.1.1 This specification shall cover the accelerated completion of this contract.

D23.2 Acceleration of Work

D23.2.1 At no risk to the City, the Contractor at his own initiative, means, and expense, may undertake to complete the Works of this Contract to facilitate the safe reopening of the entire Site to traffic and pedestrians in advance of the date of Substantial Performance as specified in D19.

- D23.2.2 Reopening of the entire Site shall occur when all Work items listed in D2 are complete, including streetscaping and Site cleanup.
- D23.2.3 In recognition of the fact that an early completion of the Works is of benefit to the City, the City will compensate the Contractor for said early completion on a per diem unit price basis, as hereinafter set out, provided that the City will not be liable to pay for any period of acceleration in excess of ten (10) Working Days.
- D23.2.4 It is noted that certain delays of the Work are normal, due to Site conditions, necessary layout and dimensional changes. The Contract Administrator will attempt to resolve each situation as soon as possible. The Contractor is advised that no extension to the number of Working Days listed in D19 will be given for events of this sort which cause construction delay and are resolved within 48 hours of the requirement of change becoming known to both the Contractor and the Contract Administrator.
- D23.3 Method of Measurement
- D23.3.1 Subject to clause D23.3 hereof, accelerated completion will be measured on a unit basis per diem. The number of days to be paid for will be the total number of Working Days with which all of the Work is complete and the Site is safely reopened to vehicular and pedestrian traffic in advance of the number of Working Days specified herein for Substantial Performance in D19 with all specified Works listed in D2 completed and acceptable to the Contract Administrator.
- D23.4 Basis of Payment
- D23.4.1 Subject to clause D23.2.3 hereof, accelerated completion will be paid for at the Unit Price per diem specified hereinafter for "Accelerated Completion" which price shall be payment in full for performing all operations undertaken and all other items incidental to the Work included in this Specification. Unit Price per diem = Three thousand dollars (\$3,000).
- D23.4.2 Payment for this item is not identified on Form B: Prices, and shall not be included thereon. If accelerated completion does occur as specified herein, then payment will be made for this item as an addition to the Contract.

## **CONTROL OF WORK**

### **D24. JOB MEETINGS**

- D24.1 Regular weekly job meetings will be held at the Site. These meetings shall be attended by a minimum of one representative of the Contract Administrator, one representative of the City and one representative of the Contractor. Each representative shall be a responsible person capable of expressing the position of the Contract Administrator, the City and the Contractor respectively on any matter discussed at the meeting including the Work schedule and the need to make any revisions to the Work schedule. The progress of the Work will be reviewed at each of these meetings.
- D24.2 The Contract Administrator reserves the right to cancel any job meeting or call additional job meetings whenever he/she deems it necessary.

### **D25. PRIME CONTRACTOR – THE WORKPLACE SAFETY AND HEALTH ACT (MANITOBA)**

- D25.1 Further to C6.24, the Contractor shall be the Prime Contractor and shall serve as, and have the duties of the Prime Contractor in accordance with The Workplace Safety and Health Act (Manitoba).

## **MEASUREMENT AND PAYMENT**

### **D26. PAYMENT**

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

## **WARRANTY**

### **D27. WARRANTY**

- D27.1 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.
- D27.2 Notwithstanding C13.2 or D27.1, the Contract Administrator may permit the warranty period for a portion or portions of the Work to begin prior to the date of Total Performance if:
- (a) a portion of the Work cannot be completed because of unseasonable weather or other conditions reasonably beyond the control of the Contractor but that portion does not prevent the balance of the Work from being put to its intended use.
- D27.2.1 In such case the date specified by the Contract Administrator for the warranty period to begin shall be substituted for the date specified in C13.2 for the warranty period to begin.

**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. 250-2012

2012 REGIONAL AND LOCAL STREETS PROGRAM, FORT STREET RECONSTRUCTION AND  
STREETSCAPING, GRAHAM AVENUE TO PORTAGE 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. 250-2012

2012 REGIONAL AND LOCAL STREETS PROGRAM, FORT STREET RECONSTRUCTION AND  
STREETSCAPING, GRAHAM AVENUE TO PORTAGE 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 30 days prior to the present or any future expiry date, we notify you in writing that we elect not to consider this Standby Letter of Credit to be renewable for any additional period.

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

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

\_\_\_\_\_  
(Name of bank or financial institution)

Per: \_\_\_\_\_  
(Authorized Signing Officer)

Per: \_\_\_\_\_  
(Authorized Signing Officer)

**FORM J: SUBCONTRACTOR LIST**  
(See D12)

2012 REGIONAL AND LOCAL STREETS PROGRAM, FORT STREET RECONSTRUCTION AND  
STREETSCAPING, GRAHAM AVENUE TO PORTAGE AVENUE

<u>Portion of the Work</u>	<u>Name</u>	<u>Address</u>
<b>SURFACE WORKS:</b>		
<b>Supply of Materials:</b>		
Concrete		
Asphalt		
Base Course / Sub-Base		
Geotextile		
Geogrid		
Interlocking Paving Stones		
Trees		
Silva Cells		
Tree Guards		
Tree Grate		
<b>Installation/Placement:</b>		
Concrete		
Asphalt		
Base Course / Sub-Base		
Interlocking Paving Stones		
Trees		
<b>UNDERGROUND WORKS:</b>		
<b>Supply of Materials:</b>		
Catchbasins		
Frames & Covers		
Sewer Service Pipe		
<b>Installation/Placement:</b>		
Catchbasin		
Sewer Service Pipe (in a Trench)		
Sewer Service Pipe (Trenchless)		
<b>OTHERS:</b>		

## PART E - SPECIFICATIONS

### GENERAL

#### E1. APPLICABLE SPECIFICATIONS AND DRAWINGS

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

<u>Drawing No.</u>	<u>Drawing Name/Title</u>	<u>Drawing (Original) Sheet Size</u>
P-3335-0	Cover Sheet and Location Plan	A1
P-3335-1	Horizontal and Vertical Alignment – Sta 0+100 to Sta 0+170	A1
P-3335-2	Horizontal and Vertical Alignment – Sta 0+170 to Sta 0+280	A1
P-3335-3	Horizontal and Vertical Alignment – Sta 0+280 to Sta 0+312	A1
P-3335-4 (L1)	Streetscaping - General Layout	A1
P-3335-5 (L2)	Streetscaping - General Layout and Planting Plan	A1
P-3335-6 (L3)	Streetscaping - General Layout	A1
P-3335-7 (L4)	Streetscaping – Details	A1
10123	300 CS Point Repair – 3 <sup>rd</sup> MH N of Graham Av to 2 <sup>nd</sup> MH N of Graham Av	11 x 17
10124	300 CS Point Repair – 3 <sup>rd</sup> MH N of Graham Av to 4 <sup>th</sup> MH N of Graham Av	11 x 17
F-01	Construction Staging – Stage 1A	11 x 17
F-02	Construction Staging – Stage 1B	11 x 17
F-03	Construction Staging – Stage 1C	11 x 17
F-04	Construction Staging – Stage 2A	11 x 17
F-05	Construction Staging – Stage 2B	11 x 17
F-06	Construction Staging – Stage 2C	11 x 17
F-07	Construction Staging – Stage 3A	11 x 17
F-08	Construction Staging – Stage 4A	11 x 17

#### 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:
- The field office shall be for the exclusive use of the Contract Administrator.
  - The building shall be conveniently located near the site of the Work.

- (c) The building shall have a minimum floor area of 25 square metres, a height of 2.4m with two 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 16-18°C or 24-25°C.
  - (e) The building shall be adequately lighted with fluorescent fixtures and have a minimum of three wall outlets.
  - (f) The building shall be furnished with one desk, one drafting table, table 3m x 1.2m, one stool, one four drawer legal size filing cabinet and a minimum of 12 chairs.
  - (g) A portable toilet shall be located near the field office building. The toilet shall have a locking door 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.
  - (i) The Contractor shall provide four (4) parking stalls located near the field office for the exclusive use of the Contract Administrator and other personnel from the City.
- 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 2400mm wood planks, or suitably protected as approved by the Contract Administrator.
  - (c) Excavation shall be performed in a manner that minimizes damage to the existing root systems. Where possible, excavation shall be carried out such that the edge of the excavation shall be a minimum of 1.5 times the diameter (measured in inches), with the outcome read in feet, from the closest edge of the trunk. Where roots must be cut to facilitate excavation, they shall be pruned neatly at the face of excavation.
  - (d) Operation of equipment within the drip-line 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 drip-lines of trees. The drip-line 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 and 3.7 of CW 1130:

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

#### **E6. TRAFFIC MANAGEMENT**

E6.1 Further to clause 3.7 of CW 1130:

- E6.1.1 Maintain a minimum of two lanes of traffic during all times. The Contractor may reduce the number of lanes of traffic to one on Saturdays and Sundays and during the week (Monday to Friday) between 6 p.m. and 1 a.m. only.
- E6.1.2 Intersecting street and private approach access shall be maintained at all times.
- E6.1.3 Should the Contractor be unable to maintain pedestrian or vehicular access to a residence or business, he/she shall review the planned disruption with the business or residence and the Contract Administrator, and take reasonable measures to minimize the impact. The Contractor shall provide a minimum of 24 hours notification to the affected residence or business and the Contract Administrator, prior to disruption of access.
- E6.1.4 Pedestrian and ambulance/emergency vehicle access must be maintained at all times.

#### **E7. REFUSE AND RECYCLING COLLECTION**

- E7.1 If access to refuse and/or recycling collection vehicles is restricted, the Contractor shall move all of the affected property owners refuse and/or recycling materials to a nearby common area 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 No measurement or payment will be made for the work associated with this specification.

#### **E8. WATER OBTAINED FROM THE CITY**

- E8.1 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.

#### **E9. SURFACE RESTORATIONS**

- E9.1 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.

## **E10. INFRASTRUCTURE SIGNS**

E10.1 The Contractor shall obtain infrastructure signs from the Traffic Services Sign Shop at 421 Osborne Street. The Contractor shall mount each sign securely to a rigid backing material approved by the Contract Administrator. The Contractor shall fasten each sign to a suitable support and erect and maintain one sign at each street as directed by the Contract Administrator. When the Contract Administrator considers the Work on the street complete, the Contractor shall remove and dispose of the signs and supports. No measurement for payment will be made for performing all operations herein described and all other items incidental to the work described

## **E11. SUPPLY AND INSTALL DETECTABLE WARNING SURFACE TILES**

### DESCRIPTION

E11.1 This specification covers the supply and installation of detectable warning surface tiles in sidewalk ramps and multi-use path ramps.

### SPECIFICATIONS AND DRAWINGS

E11.2 Referenced Standard Construction Specifications and Standard Details

- (a) CW 3235 - Renewal of Existing Miscellaneous Concrete Slabs
- (b) CW 3240 - Renewal of Existing Curbs
- (c) CW 3310 - Portland Cement Concrete Pavement Works
- (d) CW 3325 - Portland Cement Concrete Sidewalk
- (e) SD-229C - Curb Ramp for Concrete Pavement
- (f) SD-229D - Curb Ramp for Asphalt Overlay

E11.3 SDE Drawings

- (a) SDE-229A - Curb Ramp Layout for Intersections
- (b) SDE-229AA - Detectable Warning Surface Tile in Curb Ramps for Intersections, Layout Option 1
- (c) SDE-229AC – 300x300 Detectable Warning Surface Tile, Layout Option 3
- (d) SDE-229AD – 300x300 Detectable Warning Surface Tile, Layout Option 3 DETAIL
- (e) SDE-229AE – Curb Ramp for Pedestrian Corridor with a Traffic Control Device
- (f) SDE-229AF – Detectable Warning Surface Tile Orientation for Offset Intersections
- (g) SDE-229BB – Detectable Warning Surface Tile in Curb Ramps for Medians
- (h) SDE-229E - Curb Ramp Depressed Curb

### MATERIALS

E11.4 Acceptable Detectable Warning Surface Tile product is:

- (a) 610 x 1220mm (2'x 4') Cast in Place (Federal Yellow).
- (b) 300 x 300mm (1'x1') Cast in Place (Federal Yellow).

Manufacturer - ADA Solutions Inc.,  
Supplier -  
Brock White Canada  
879 Keewatin Street  
Winnipeg, Manitoba

Attention: Bernie Giesbrecht  
Ph: 204-479-8089

or

Manufacturer - Armor Tile Tactile Systems  
Supplier –  
Alsip's Building Products  
1 Cole Avenue  
Winnipeg, Manitoba

Attention: Jason Alsip  
Ph. 204-667-3330

- E11.4.1 Detectable warning surface tiles shall be Federal Yellow (USA); or Safety Yellow (Canada).
- E11.4.2 Detectable warning surface tiles shall be cast in place type with ribs. (Anchored type is not allowed)
- E11.4.3 Truncated domes on detectable warning surface tiles shall be in accordance with ADA Accessibility Guidelines (ADAAG).

#### CONSTRUCTION METHODS

- E11.5 Selection of Layout Options
  - E11.5.1 Select the appropriate design layout for detectable warning surface tiles according to the following prioritized order:
  - E11.5.2 Layout Option One – Install detectable warning surface tiles in accordance with SDE-229A and SDE-229AA.
  - E11.5.3 If two 610mm x 1220mm tiles would physically overlap each other, or would be within 150mm of each other, or if one tile would lie within the circulation path towards the other tile, then install the detectable warning surface tiles according to the following order, Layout Option Two(2) or Three(3).
  - E11.5.4 Layout Option Two – Separate the tiles by moving either one or both tiles along the curb line in opposite directions, in accordance with this Specification, and keeping the ramp and pedestrian road crossing as perpendicular to the road as is possible, as directed by the Contact Administrator.
  - E11.5.5 Layout Option Three – Install detectable warning surface tiles in accordance with SDE-229AC and SDE-229AD.
- E11.6 General
  - E11.6.1 Construct curb ramps, sidewalk ramps and multi-use paths in accordance with the referenced Standard Construction Specifications, Standard Details, and SDE drawings.
  - E11.6.2 Detectable warning surface tile shall not be placed at private approaches or alleys.
  - E11.6.3 All curb ramps opposite each other shall have the same width.
  - E11.6.4 Construct the lip of the depressed curb in accordance with SDE – 229E.
  - E11.6.5 Construct ramp slopes in accordance with SD-229C and SD-229D. Use a ramp slope with preference for a slope as close to 5% maximum as possible.

- E11.6.6 Construct flare and curb taper slopes according to the following:
- a) If the curb taper is within a grassed area, construct the curb taper 900mm in length.
  - b) When the flare and curb taper are in a full width sidewalk and the sidewalk area at the top of the ramp is <1500mm in width, construct the flare and curb taper at 5% slope to allow safe passage for wheelchairs in this area.
  - c) When the flare and curb taper are in a full width sidewalk and the sidewalk area at the top of the ramp is 1500mm in width, construct the flare and curb taper at 10% slope.
- E11.6.7 Install the detectable warning surface tile in accordance with E11.10.
- E11.6.8 Trim the corner of the tile at curb radii in accordance with SDE-229AA and SDE-229AD.
- E11.6.9 Install the detectable warning surface tiles as shown on the referenced drawings or as directed by the Contract Administrator.
- E11.6.10 Orient the detectable warning surface tiles perpendicular to the crossing direction.
- E11.6.11 Locate gratings, access covers and other appurtenances outside of the sidewalk ramps, depressed curbs, rest areas, and gutters in front of the depressed curbs, as directed by the Contact Administrator.
- E11.7 Medians and Refuge Islands
- E11.7.1 Where the distance from back of curb to back of curb is 1.32m or greater, install one detectable warning surface tile 50mm from the back of each curb.
- E11.7.2 Where the distance from back of curb to back of curb is less than 1.32m, place the tiles 50mm from the back of curb and cut the tile(s) to fill the remaining area between the curbs.
- E11.8 2.0m Wide Depressed Curb for Multi-use Paths
- E11.8.1 Construct a curb ramp with a 2.0m depressed curb at high volume collector and regional street intersections in accordance with SDE-229E, in accordance with Public Works Department guidelines and as directed by the Contract Administrator.
- E11.8.2 Construct the concrete ramp 2.0m wide and a minimum of 1.50m deep from back of curb.
- E11.8.3 Construct the curb ramp in accordance with SD-229C and SD229D.
- E11.8.4 Install one 610mm x 1220mm tile centered to the 2.0m wide depressed curb. The part of the tile nearest the curb must be 50mm from the back of curb similar to tile placement in SDE-229AA.
- E11.9 3.5m Wide Depressed Curb for Multi-use Paths
- E11.9.1 Construct a curb ramp with a 3.5m depressed curb at low volume collector and residential street intersections in accordance with SDE-229E, in accordance with Public Works Department guidelines and as directed by the Contact Administrator.
- E11.9.2 Construct the concrete ramp 3.5m wide and a minimum of 1.50m deep from back of curb.
- E11.9.3 Construct the curb ramp in accordance with SD-229C and SD229D.
- E11.9.4 Install two (2) tiles in each concrete ramp, one (1) on each side for each direction. Place the short edge of each tile 150mm from the edge of the concrete ramp, with both tiles in line with each other transversely across the concrete ramp. The tile(s) nearest the curb must be 50mm from back of curb similar to tile placement in SDE-229AA.
- E11.9.5 Saw cut the middle of the concrete slab, perpendicular to the curb and to a depth of D/4. Cut additional sawcuts as directed by the Contract Administrator.

## INSTALLATION INSTRUCTIONS

- E11.10 Installation Instructions for Cast In Place Inline Dome Detectable/Tactile Warning Surface Tile



- (a) During Cast In Place Detectable/Tactile Warning Surface Tile installation procedures, ensure adequate safety guidelines are in place and that they are in accordance with the applicable industry and government standards.
- (b) The specifications of the structural embedment flange system and related materials shall be in strict accordance with the contract documents and the guidelines set by their respective manufacturers. Do not set Cast In Place tiles in asphaltic concrete.
- (c) The physical characteristics of the concrete shall be consistent with the contract specifications. An overly wet mix will cause the tile to float. Under these conditions, suitable weights such as 2 concrete blocks or sandbags (12 kg) shall be placed on each tile.
- (d) Prior to placement of the Cast In Place Detectable/Tactile Warning Surface Tile system, the contract drawings shall be reviewed.
- (e) Pour and finish the concrete using typical mason's tools, however, 12 kg weights, and a large non-marring rubber mallet are specific to the installation of the Cast In Place Detectable/Tactile Warning Surface Tile system. A vibrating mechanism can be employed, if desired. The vibrating unit should be fixed to a soft base such as wood, at least 300mm square.
- (f) The factory-installed plastic sheeting must remain in place during the entire installation process to prevent the splashing of concrete onto the finished surface of the tile. Remove the plastic sheeting after the concrete has set.
- (g) When preparing to set the tile, it is important that NO concrete be removed in the area to accept the tile. It is imperative that the installation technique eliminates any air voids under the tile. Holes in the tile perimeter allow air to escape during the installation process. Concrete will flow through the large holes in each embedment flange on the underside of the tile. This will lock the tile solidly into the cured concrete.
- (h) Drill additional 6mm vent holes in the ribs under the tile as required to help seat the tile in the concrete.
- (i) The concrete shall be poured and finished true and smooth to the required dimensions and slope prior to the tile placement. The tile shall be placed in accordance with the contract drawings.
- (j) The Cast In Place Detectable/Tactile Warning Surface Tiles shall be tamped (or vibrated) into the fresh concrete to ensure that the surface of the truncated domes are flush to the adjacent concrete surface. Embedment of the tile so the top of the truncated domes are flush with the adjacent concrete will reduce the possibility of damage due to snow clearing operations. The embedment process should not be accomplished by stepping on the tile as this may cause uneven setting which can result in air voids under the tile surface.
- (k) While concrete is workable, a 3/8" radius edging tool shall be used to create a finished edge of concrete, a steel trowel shall then be used to finish the concrete around the tile's perimeter.
- (l) During and after the tile installation and the concrete curing stage, it is imperative that there is no walking, leaning or external force placed on the tile that may rock the tile causing a void between the underside of tile and concrete.
- (m) Following tile placement, review installation tolerances to contract drawings and adjust tile before the concrete sets. Two suitable weights of 12kg each shall be placed on each tile as necessary to ensure solid contact of the underside of tile to concrete.
- (n) If required, individual tiles can be bolted together using ¼ inch or equivalent hardware. This can help to ensure that adjacent tiles are flush to each other during the installation process. Tape or caulking can be placed on the underside of the bolted butt joint to ensure that concrete does not rise up between the tiles during installation. Any protective plastic wrap which was peeled back to facilitate bolting or cutting, should be replaced and taped to ensure that the tile surface remains free of concrete during the installation process.
- (o) Following the concrete curing stage, protective plastic wrap is to be removed from the tile surface by cutting the plastic with a sharp knife, tight to the concrete/tile interface. If

concrete bled under the plastic, a soft brass wire brush will clean the residue without damage to the tile surface.

- (p) Tiles can be cut using a continuous rim diamond blade in a circular saw or mini-grinder. Use of a straightedge to guide the cut is advisable where appropriate.
- (q) Bolt 300mm x 300mm tiles together prior to placing in plastic concrete. This ensures that the surface of the tiles are flush with each other.

#### MEASUREMENT AND PAYMENT

E11.11 Detectable Warning Surface Tiles shall be measured on a unit basis and paid for at the Contract Unit Price per unit for the "Items of Work" listed here below. The number of units to be paid for shall be the total number of detectable warning surface tiles supplied and installed in accordance with this specification, accepted and measured by the Contract Administrator.

Detectable Warning Surface Tiles:

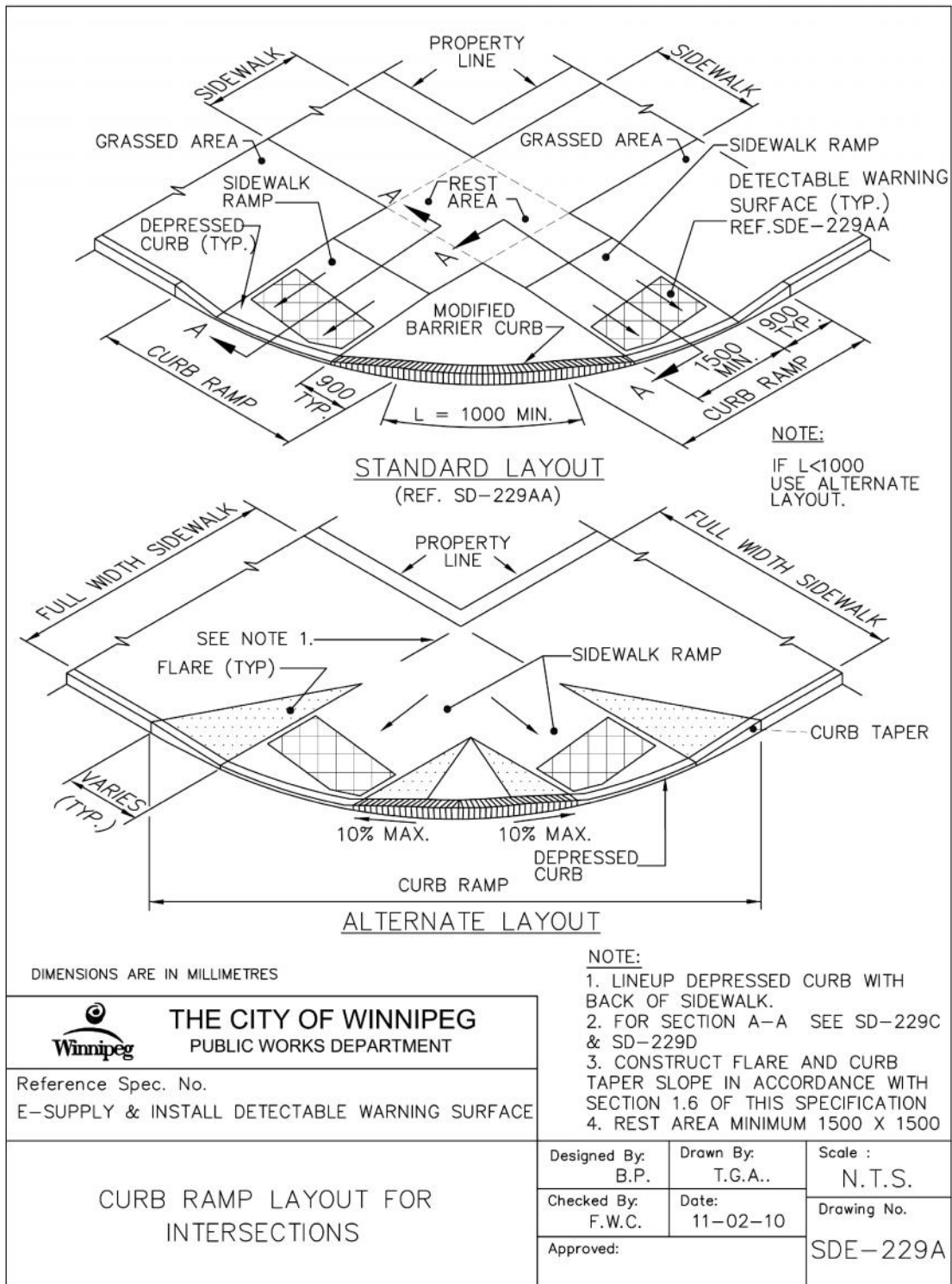
- i) 300mm x 300mm tiles
- ii) 610mm x 1220mm tiles

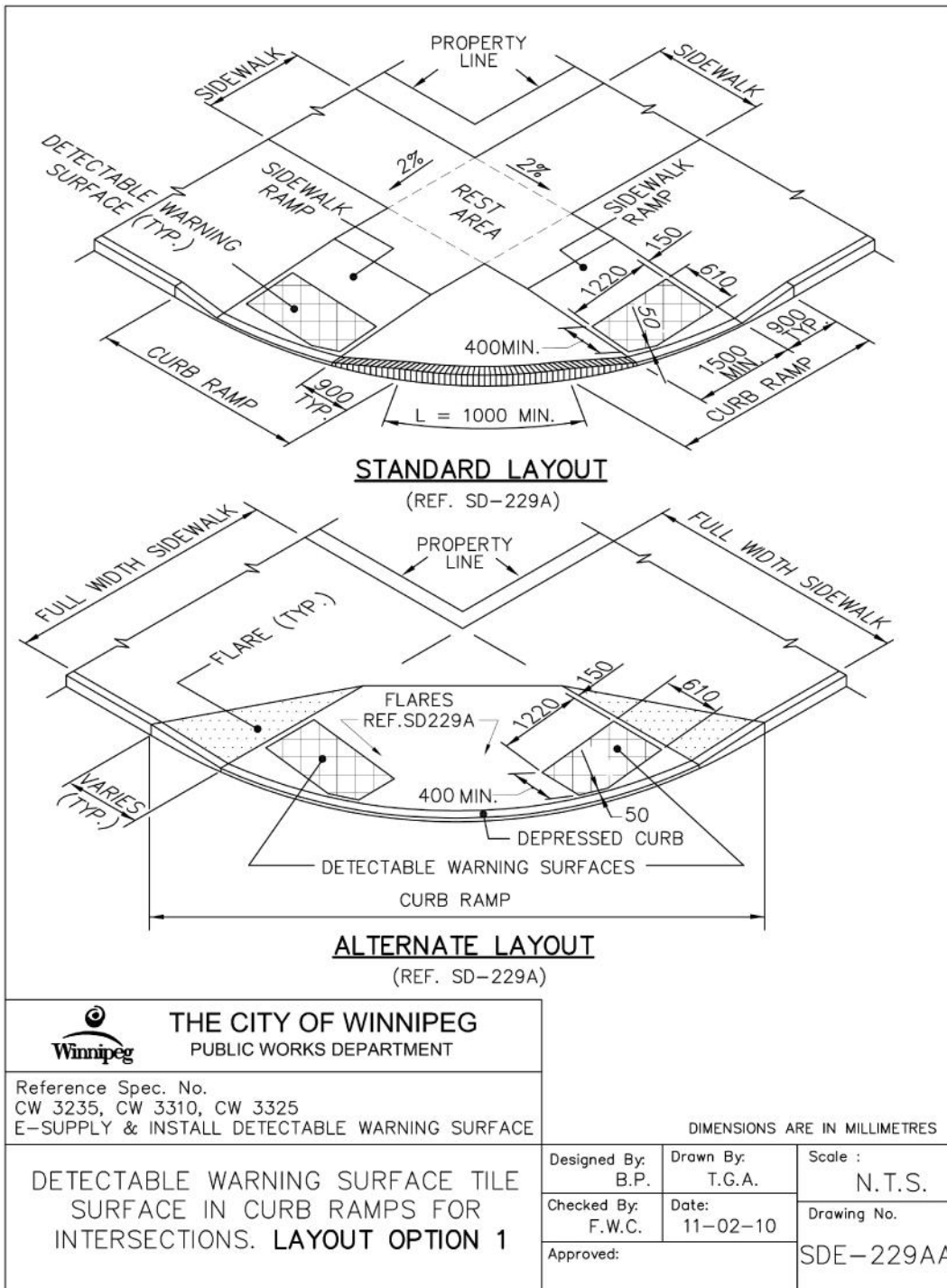
E11.12 The area under the detectable warning surface tile is part of the concrete sidewalk ramp and will be paid in accordance with CW 3235 or CW 3325.


E11.13 The concrete sidewalk ramp and the concrete ramp for multi-use paths will be paid as 100mm sidewalk in accordance with CW 3235 or CW 3325.

E11.14 Curb ramp will be paid in accordance with CW 3240 or CW 3310.

#### DRAWINGS





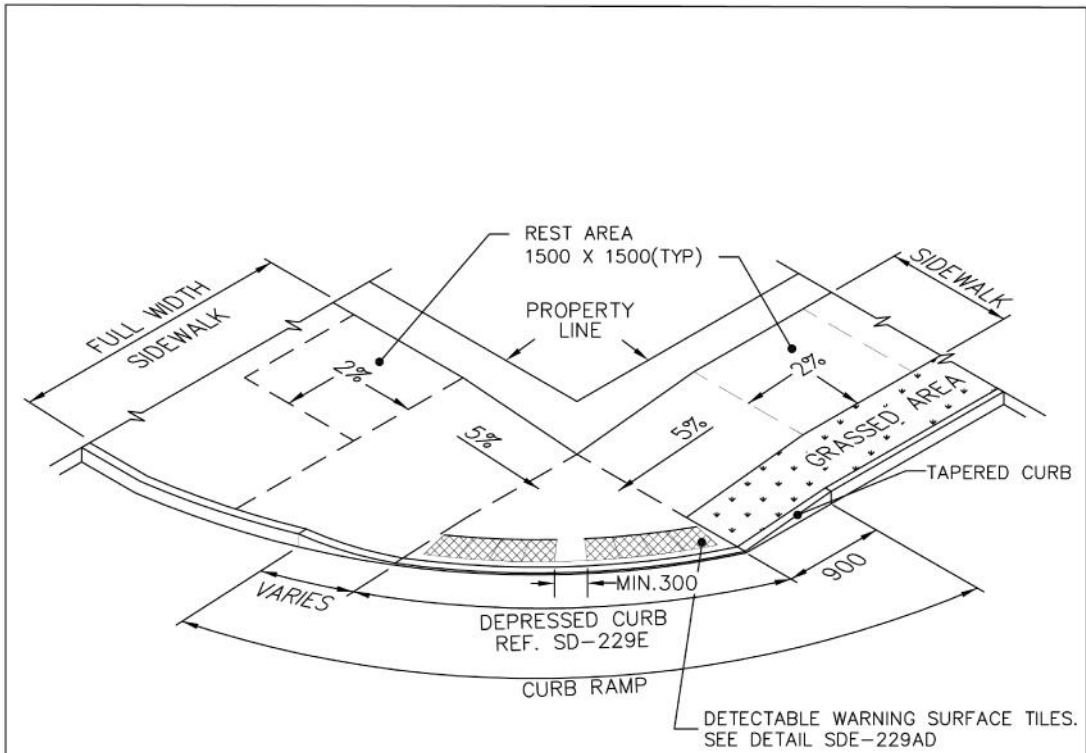
 **THE CITY OF WINNIPEG**  
 PUBLIC WORKS DEPARTMENT

Reference Spec. No.  
 CW 3235, CW 3310, CW 3325  
 E-SUPPLY & INSTALL DETECTABLE WARNING SURFACE

DIMENSIONS ARE IN MILLIMETRES

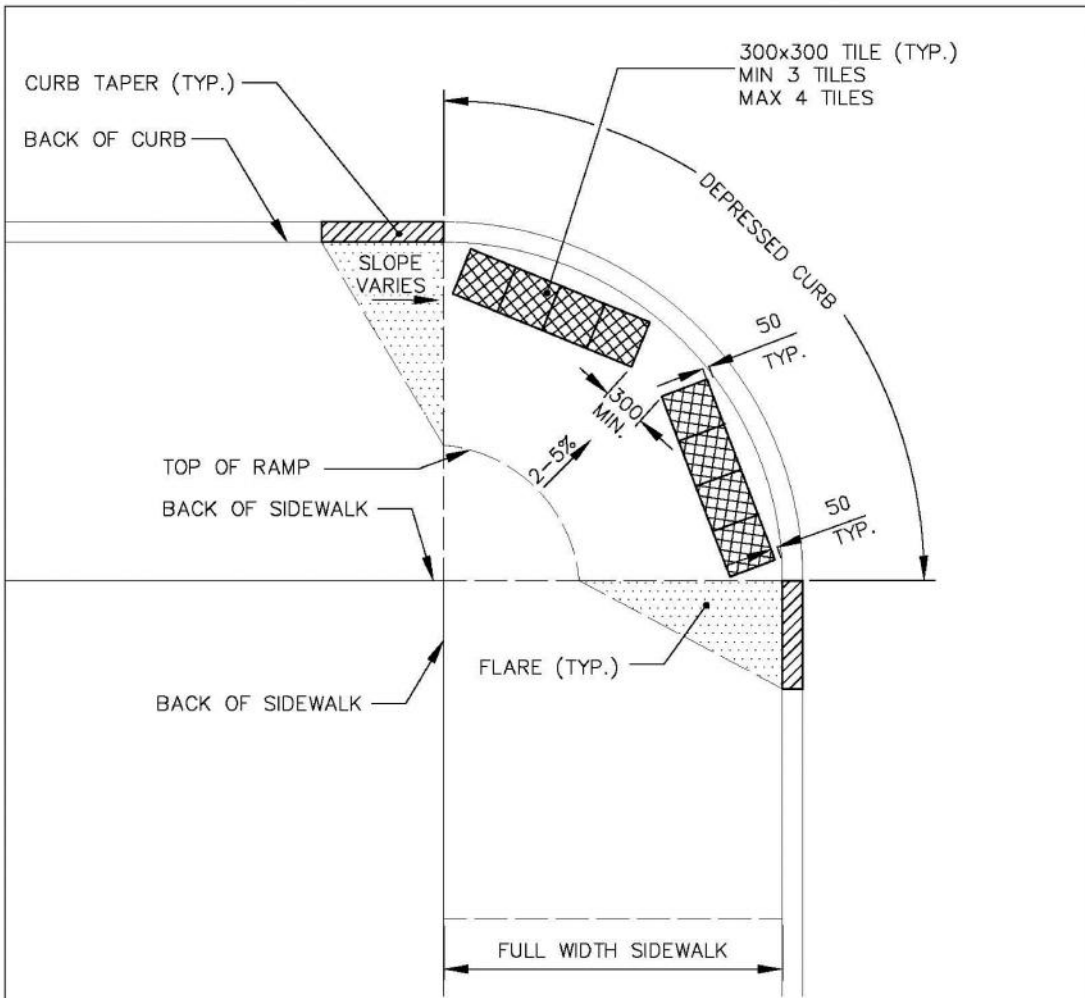
Designed By: B.P.	Drawn By: T.G.A.	Scale: N.T.S.
Checked By: F.W.C.	Date: 11-02-10	Drawing No.
Approved:		SDE-229AA

DETECTABLE WARNING SURFACE TILE  
 SURFACE IN CURB RAMPS FOR  
 INTERSECTIONS. **LAYOUT OPTION 1**



**NOTES:**  
 1. PLACE 300x300 DETECTABLE WARNING SURFACE TILES IN ACCORDANCE WITH "SELECTION OF LAYOUT OPTIONS" IN THIS SPECIFICATION.

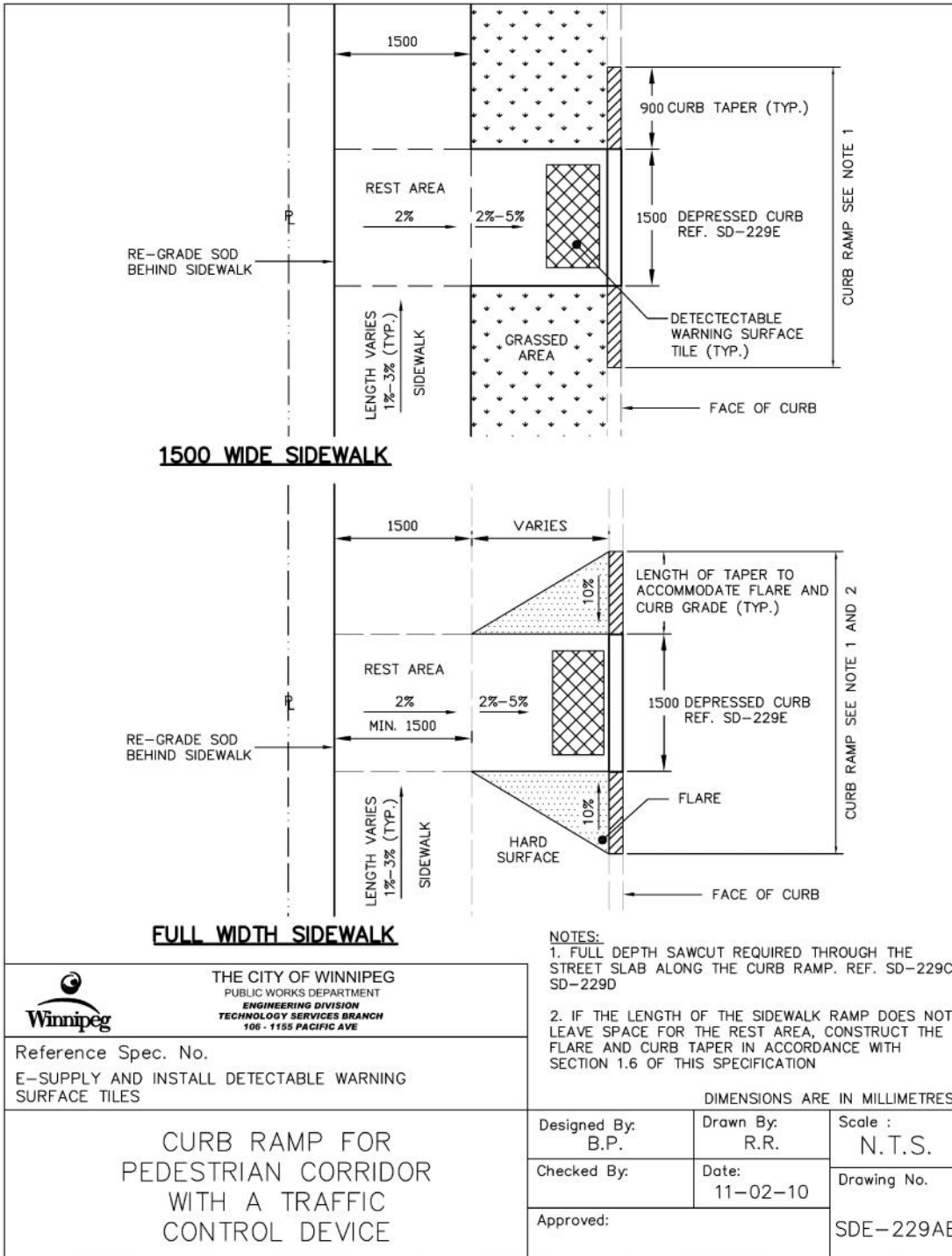
 <b>THE CITY OF WINNIPEG</b> PUBLIC WORKS DEPARTMENT	DIMENSIONS ARE IN MILLIMETRES		
	Reference Spec. No. E-SUPPLY AND INSTALL DETECTABLE WARNING SURFACE TILES	Designed By: B.P.	Drawn By: R.R.
<b>300 X 300 mm DETECTABLE WARNING SURFACE TILE LAYOUT OPTION 3</b>	Checked By:	Date: 11-02-10	Drawing No.
	Approved:	SDE-229AC	




NOTES:  
 1. WHEN THE SIDEWALK AREA AT THE TOP OF THE RAMP IS  $\geq 1500\text{mm}$  OR  $< 1500\text{mm}$  IN WIDTH, CONSTRUCT THE SLOPE OF THE CURB RAMP AND THE CURB TAPER IN ACCORDANCE WITH SECTION 1.6 OF THIS SPECIFICATION.

 <p>THE CITY OF WINNIPEG                  PUBLIC WORKS DEPARTMENT                  ENGINEERING DIVISION                  TECHNOLOGY SERVICES BRANCH                  106 - 1155 PACIFIC AVE</p>	Reference Spec. No.	
	E-SUPPLY AND INSTALL DETECTABLE WARNING SURFACE TILES	
<p>300x300mm DETECTABLE WARNING SURFACE TILE LAYOUT OPTION 3 DETAIL</p>		

DIMENSIONS ARE IN MILLIMETRES		
Designed By: B.P.	Drawn By: R.R.	Scale : N.T.S.
Checked By:	Date: 11-02-10	Drawing No.
Approved:		SDE-229AD

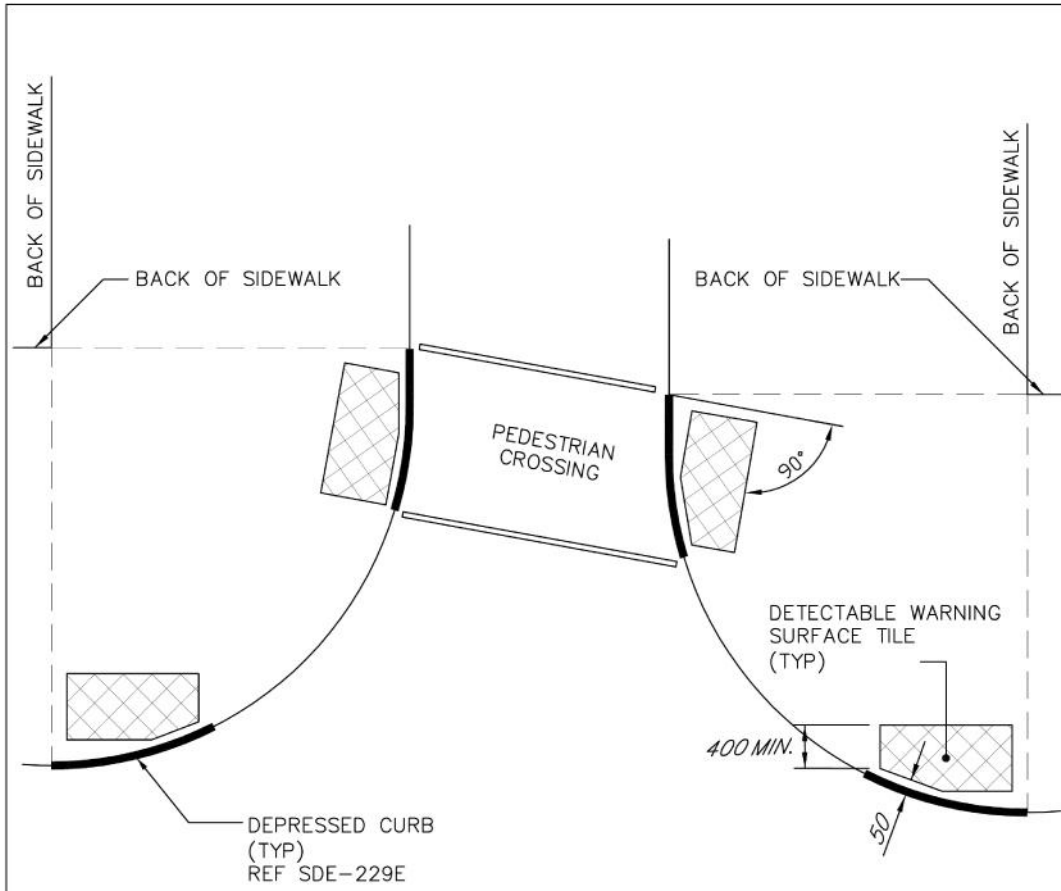


 THE CITY OF WINNIPEG  
 PUBLIC WORKS DEPARTMENT  
 ENGINEERING DIVISION  
 TECHNOLOGY SERVICES BRANCH  
 106 - 1155 PACIFIC AVE

Reference Spec. No.  
 E-SUPPLY AND INSTALL DETECTABLE WARNING SURFACE TILES

**CURB RAMP FOR PEDESTRIAN CORRIDOR WITH A TRAFFIC CONTROL DEVICE**

Designed By: B.P.	Drawn By: R.R.	Scale : N.T.S.
Checked By:	Date: 11-02-10	Drawing No.
Approved:	SDE-229AE	

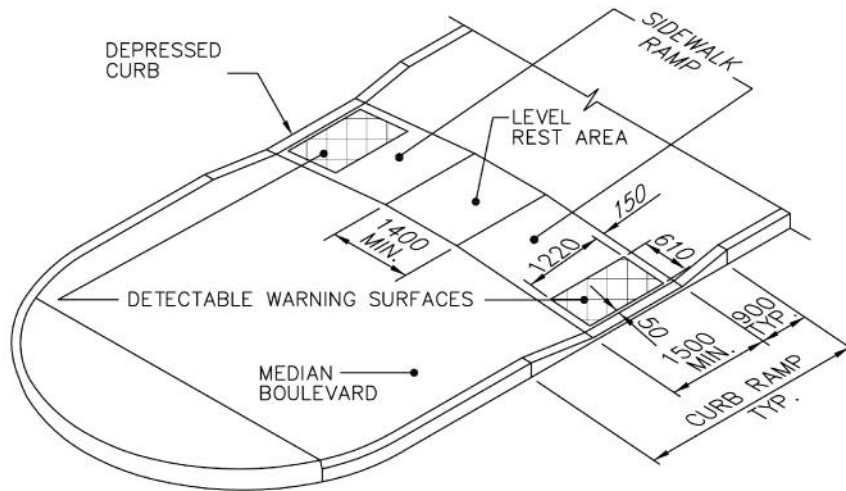


**NOTES:**

1. LOCATE END OF DEPRESSED CURB IN LINE WITH PROJECTED BACK OF SIDEWALK.
2. CONSTRUCT FLARES IN ACCORDANCE WITH SDE-229A

 <b>THE CITY OF WINNIPEG</b> PUBLIC WORKS DEPARTMENT			
Reference Spec. No. CW 3235, CW 3310, CW 3325 E-SUPPLY & INSTALL DETECTABLE WARNING SURFACE TILES			
DIMENSIONS ARE IN MILLIMETRES			
DETECTABLE WARNING SURFACE TILE ORIENTATION FOR OFFSET INTERSECTIONS	Designed By: B.P.	Drawn By: T.G.A.	Scale: N.T.S.
	Checked By: F.W.C.	Date: 11-02-10	Drawing No.
	Approved:		SDE-229AF



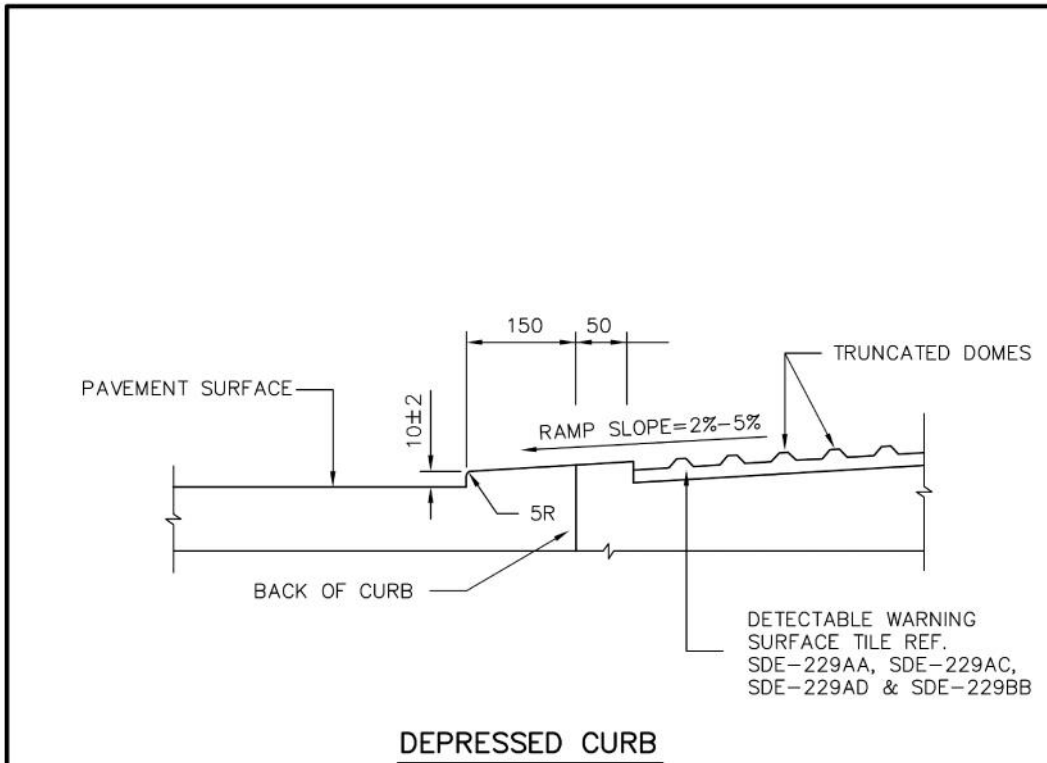


**MEDIAN SIDEWALK CROSSING**  
 (REF. SD-229B)

**NOTE:**


- FOR NARROW MEDIANS AND REFUGE ISLANDS < 1.32m IN WIDTH, PLACE DETECTABLE WARNING SURFACE FULL WIDTH, MAINTAINING 50mm SPACING FROM BACK OF CURB.

 <b>THE CITY OF WINNIPEG</b> PUBLIC WORKS DEPARTMENT		DIMENSIONS ARE IN MILLIMETRES		
Reference Spec. No. CW 3235, CW 3310, CW 3325 E-SUPPLY & INSTALL DETECTABLE WARNING SURFACE				
DETECTABLE WARNING SURFACE TILE IN CURB RAMPS FOR MEDIANS		Designed By: B.P.	Drawn By: T.G.A.	Scale : N.T.S.
		Checked By: F.W.C.	Date: 11-02-10	Drawing No.
		Approved:		SDE-229BB



NOTES:

- 1) SIDEWALK RAMP SURFACE SHALL BE GIVEN A PARALLEL TEXTURED BROOM FINISH.
- 2) INSTALL DETECTABLE WARNING SURFACE SO THAT THE TOP OF THE TRUNCATED DOMES ARE FLUSH WITH THE SURFACE FO THE ADJACENT SIDEWALK.

 <b>THE CITY OF WINNIPEG</b> PUBLIC WORKS DEPARTMENT		DIMENSIONS ARE IN MILLIMETRES		
Reference Spec. No. CW 3235, CW 3310, CW 3325 E-SUPPLY & INSTALL DETECTABLE WARNING SURFACE				
<b>CURB RAMP          DEPRESSED CURB</b>		Designed By: B.P.	Drawn By: T.G.A.	Scale : <b>N.T.S.</b>
		Checked By: F.W.C.	Date: 11-02-10	Drawing No.
		Approved:		<b>SDE-229E</b>

## **E12. ADJUSTMENT OF EXISTING HYDRO MANHOLES**

E12.1 For Manitoba Hydro manhole elevation changes and adjustments, the Contractor shall contact Jayson Witt, Manitoba Hydro Construction Project Co-ordinator at (204) 803-1165, a minimum of two (2) weeks prior to the required work.

## **E13. RESTORATION OF WATERMAIN RENEWAL WORK**

E13.1 Description

E13.1.1 This Specification shall cover the maintenance of temporary patches constructed during the watermain renewal described in D17 "Work by Others".

E13.2 Construction Methods

E13.2.1 Responsibility of Contractor

- (i) Upon commencement of construction activities in each phase, it shall be the responsibility of the Contractor to maintain temporary pavement and sidewalk patches left in-place by the watermain Contractor until permanent restoration occurs.

E13.2.2 Maintenance of Patches

- (i) The Contractor shall maintain all temporary pavement in pavement open to traffic and sidewalk patches to the satisfaction of the Contract Administrator. This shall include the addition of patching material as directed by the Contract Administrator.

E13.3 Method of Measurement

E13.3.1 Maintenance of Patches

- (i) Measurement will be made for the maintenance of temporary patches in accordance with CW 3410.

## **E14. COMBINED SEWER EXTERNAL POINT REPAIRS**

E14.1 Combined sewer repairs shall be performed in accordance with CW 2130 and televised in accordance with CW 2145.

E14.2 If it is determined in the field that the combined sewer repair lengths are greater than 3m in any location, notify the Contract Administrator. Upon the approval of the Contract Administrator, SD-022B shall apply to the repair work.

E14.3 The Contractor shall supply a sewage flow control plan to the Contract Administrator 24 hours prior to excavation for the sewer repair.

E14.4 Post repair video inspection of the sewers to take place within 48 hours of completion of the sewer repairs and in the presence of the Contract Administrator.

E14.5 Measurement and Payment

- (a) This Work will be paid for at the Contract Unit Prices for "Sewer Repair – Up to 3m Long (SD-022A).
- (b) If the repair becomes a SD-022B repair, the additional sewer installed will be paid for as meters of sewer supplied and installed and approved by the Contract Administrator at the price provided for "Additional Sewer Installed". All required materials to change the repair to a SD-022B repair shall be included in this price.

## **E15. LARGE DIAMETER WATER SERVICE REPAIRS**

- E15.1 Large diameter water service (sprinkler service) repair shall be performed in accordance with CW 2110, and disinfection procedures in accordance with CW 2125.
- E15.2 Further to CW 2125:
- (a) Flushing and hydrostatic leakage testing of the large diameter water service repair is not required;
  - (b) Chlorination residual and bacteriological testing of the large diameter water service repair is not required.
- E15.3 Construction methods
- (a) Excavate to existing top of water service / sewer;
  - (b) Cut existing water service pipe square to the pipe axis and remove the required length of water service as directed by the Contract Administrator;
  - (c) Complete the combined sewer repair;
  - (d) Install new water service above the sewer using vertical bends if necessary as directed by the Contract Administrator;
  - (e) Backfill in accordance with CW 2030 and SD-002.
- E15.4 If vertical bends are used, vertical thrust blocks shall be installed as per SD-005 where indicated on the Drawings.
- E15.5 The Contractor shall use mechanical joint restraints on the watermain bends.
- E15.6 Disinfection of the water service repair shall be as per CW 2125, Section 3.3.16, and performed in the presence of the Contract Administrator.
- E15.7 Measurement and Payment
- (a) Large diameter water service repairs shall be paid for at the Contract Unit Price for the individual components of the water service repair supplied and installed in accordance with this specification, accepted and measured by the Contract Administrator.
  - (b) No additional payment will be made if it is determined that this Work must be completed after hours or at night due to traffic routing and staging concerns.
  - (c) Disinfection of the water service repair shall be considered incidental to the repair and no additional payment will be made.
  - (d) Thrust blocks and mechanical restraints shall be considered incidental to the installation of the bends and no additional payment will be made.

## **E16. STREET TREE PLANTING MEDIUM**

- E16.1 General
- (a) This Specification covers the supply and installation of planting medium for street tree planting on downtown and regional streets.
- E16.2 Materials
- E16.2.1 Topsoil:
- (a) Mixture of particulates, microorganisms and organic matter which provides suitable medium for supporting intended plant growth.
  - (b) Soil texture to be based on The Canadian System of Soil Classification, to consist of 20 to 70% sand, minimum clay, and contain 2 to 20% organic matter by weight.
  - (c) Contain no toxic elements or growth inhibiting materials.

- (d) Finished surface free from debris over 50mm diameter and coarse vegetative material occupying more than 2% of soil volume.
- (e) Consistency: friable when moist.
- (f) (Fertility: major soil nutrients in following amounts:
  - (i) Nitrogen (N): 20 to 40 micrograms of phosphate per gram of planting medium
  - (ii) Phosphorus (P): 40 to 50 micrograms of phosphate per gram of planting medium
  - (iii) Potassium (K): 75 to 110 micrograms of potassium per gram of planting medium
  - (iv) Calcium, magnesium, sulphur and micro-nutrients present in balanced ratios to support germination and/or establishment of intended vegetation.
  - (v) PH value: 6.5 to 8.0
  - (vi) Conductivity value less than 2.5 dS/m

E16.2.2 Peatmoss:

- (a) Derived from partially decomposed species of sphagnum mosses.
- (b) Elastic and homogeneous, brown in colour.
- (c) Free of wood and deleterious material which could inhibit growth.
- (d) Shredded particle minimum size: 5mm

E16.2.3 Sand

- (a) Sand to be washed silica sand, medium to coarse textured.

E16.2.4 Organic matter

- (a) Organic matter to be compost Category A, in accordance with CCME PN1340, unprocessed organic matter, such as rotted manure, hay, straw, bark residue or sawdust, meeting the organic matter, stability and contaminant requirements.

E16.2.5 Fertilizer

- (a) Fertilizer to be industry-accepted standard medium containing nitrogen, phosphorous, potassium and any other micro-nutrients suitable to the specific plant species or application.

E16.2.6 Source Quality Control

- (a) Advise Contract Administrator of sources of topsoil to be utilized with sufficient lead time for testing.
- (b) Soil testing by recognized testing facility for pH, N, K, organic matter and conductivity value.
- (c) Testing of planting medium will be carried out by testing laboratory designated by Contract Administrator. Soil sampling, testing, and analysis to be in accordance with Provincial standards.
- (d) Contractor to incorporate soil amendments to planting medium only as recommended by the soil test lab.

E16.2.7 Planting Medium Mix Proportions

- (a) Mix thoroughly, crush and screen topsoil and soil amendments in following proportions: 4 way mix of 45% topsoil, 35% peatmoss, 15% sand and 5% organic matter by volume.

E16.3 Construction Methods

E16.3.1 Inspection and Approval of Planter/Planting Pit

- (a) Verify that planter/planting pit's waterproofing, rigid insulation and drainage medium are in place and approved by Contract Administrator prior to commencement of work.

- (b) Ensure geotextile is properly laid and joints are overlapped as recommended by the manufacturer. Obtain approval before proceeding.

E16.3.2 Installing Planting Medium

- (a) Place planting medium in uniform layers not exceeding 150mm unless otherwise specified.
- (b) Spread planting medium to minimum depths after settlement as indicated on the Drawings.
- (c) Manually spread planting medium around trees and other obstacles.
- (d) Apply fertilizer in amount as recommended by soil test lab based on test results.
- (e) Incorporate fertilizer into 50mm depth of planting medium by racking.

E16.3.3 Finish Surface

- (a) Rake to eliminate rough spots and low areas.
- (b) Consolidate planting medium to require bulk density using equipment approved by Contract Administrator. Leave exposed surfaces smooth, uniform and firm against deep foot imprinting.

E16.3.4 Placing of Mulch

- (a) Place mulch as indicated in the Drawings and planting specifications.

E16.3.5 Acceptance

- (a) Contract Administrator will inspect planting medium in place and determine acceptance of material, depth of planting and finish grading.

E16.3.6 Surplus Material

- (a) Dispose of unused materials off site in accordance with good waste management practices.

E16.4 Measurement and Payment

E16.4.1 Measurement

- (a) No measurement will be made for street tree planting medium as it is to be considered part of the supply and installation of Silva Cells.

E16.4.2 Basis for Payment

- (a) No separate payment will be made for street tree planting medium.

**E17. SILVA CELLS**

E17.1 General

E17.1.1 The following generally describes the scope of this Section:

- (a) Excavate and grade pit
- (b) Temporarily support MTS duct bank
- (c) Supply and install granular drainage course
- (d) Supply and install perforated drainage pipe where required
- (e) Supply and install Silva Cell base
- (f) Supply and install Silva Cells
- (g) Supply and install geotextile and geogrid
- (h) Supply and install root barrier where required
- (i) Supply and install planting soil
- (j) Supply and install backfill
- (k) Supply and install mulch
- (l) Supply and install tree grate and tree guards

## E17.2 Materials

### E17.2.1 Silva Cells

- (a) Silva Cell Frames: 400mm x 600mm x 1200mm (16 inches x 24 inches x 48 inches). Manufacturer: DeepRoot Partners, L.P. (Deep Root); 530 Washington Street, San Francisco, CA 94111; 415.781.9700; 800.458.7668; fax 415.781.0191; [www.deeproot.com](http://www.deeproot.com).
- (b) Silva Cell Deck: 5cm x 600mm x 1200mm (2 inches x 24 inches x 48 inches). Deck to include manufactured installed galvanized steel tubes.
- (c) Silva Cell Strongback: 400mm x 600mm x 150mm (24 inches x 48 inches x 6 inches) modified Silva Cell Frame units designed to stiffen and align the frames as planting soil and backfill material is placed. Strongbacks are to be removed prior to placing decks. They are to be reused as the work progresses.
- (d) Silva Cell Deck Screws: Manufacturer's supplied stainless steel screws to attach decks to frames.

### E17.2.2 Anchoring Spikes

- (a) Anchoring Spikes to be 10" (250mm) long X 19/64" (8mm) diameter, spiral, galvanized timber spikes. Utilize 4 nails in each frame on the first layer of Silva Cells to anchor the frames to the aggregate subbase.

### E17.2.3 Drain Lines

- (a) To City of Winnipeg standard specification CW3120, Installation of Subdrains.

### E17.2.4 Inspection Riser and Cap

- (a) Inspection riser shall consist of a rigid, schedule 40 non-perforated PVC pipe, 4 inches in diameter. Cut slots in the bottom to allow water access for inspection risers that extend to the sub base aggregate.
- (b) Cap shall be PVC solid threaded cleanout or removable inlet grate designed to fit standard PVC schedule 40 pipefittings.

### E17.2.5 Geogrid

- (a) Miragrid 2XT as manufactured by Ten Cate Nicolon, Norcross, GA, or approved equal, [www.tcmirafi.com](http://www.tcmirafi.com)

### E17.2.6 Geotextile

- (a) Geotextile shall be non woven polypropylene geotextile, Mirafi 180 N as
- (b) manufactured by Ten Cate Nicolon, Norcross, GA, or approved equal, delivered in
- (c) 12 feet (3600mm) wide rolls min., with the following properties:
  - (i) Grab tensile strength: 370 lb.
  - (ii) Grab tensile elongation: 50%
  - (iii) Mullen burst strength: 380 psi
  - (iv) Puncture strength : 130 lb.
  - (v) Apparent opening size: US sieve 80 (0.180 mm)
  - (vi) Water flow rate: 95 gpm/SF

### E17.2.7 Root Barrier

- (a) Root Barrier to be Nilex Deep root UB 48, 48" x 24" panels or approved equal.

### E17.2.8 Aggregate Sub Base (Below Cell Frame)

- (a) Sub base material in accordance with CW3110.

### E17.2.9 Aggregate Base Course (Above Cell Deck)

- (a) Base course material in accordance with CW3110.

- E17.2.10 Backfill Material (Adjacent to Silva Cells)
- (a) Backfill Material to be supplied In accordance with CW2030, Backfill class as determined by Contract Administrator.
- E17.2.11 Planting medium
- (a) Refer to Section E16 Street Tree Planting Medium.
- E17.2.12 Mulch
- (a) Wood chip mulch composed of woodchips from hardwood trees, free of bark, branches, and leaves varying in size from 6-20 mm thick.
- E17.2.13 Tree grate
- (a) Tree Grate to be Urban Accessories, Jamison T-Grate, 5'x5', cast iron, natural finish; as supplied by Playworks, (780) 453-6903, contact: Selena Nichols.
- E17.2.14 Tree Guard
- (a) Tree Guard to be manufactured as per drawings (colour: black)
- E17.2.15 Product Certificates
- (a) Certificates shall be provided for each type of manufactured product, from manufacturer, and complying with the following:
    - (i) Manufacturer's certified analysis for standard products.
    - (ii) Silva Cell manufacturer's letter of review and approval of the project, plans, details and specifications for compliance with product installation requirements.
- E17.3 Quality Control
- E17.3.1 Compaction testing results
- (a) Submit results of all compaction testing required by the specifications including the bulk density test of the mock up and installed soil, and the compaction testing log of penetrometer and moisture meter readings to the Contract Administrator for approval.
- E17.3.2 Qualification Data
- (a) Submit documentation of the qualifications of the Silva Cell installer sufficient to demonstrate that the installer meets the requirements of paragraph "Quality Assurance".
- E17.4 Construction Method
- E17.4.1 Layout Approval
- (a) Prior to the start of work, layout and stake the limits of excavation and horizontal and vertical control points sufficient to install the Silva Cells and required drainage features in the correct locations.
- E17.4.2 Soil Installation Mock Up and Compaction Evaluation:
- (a) Prior to the installation of Silva Cells, construct a mock up of the complete installation at the site. The installation of the mock up shall be in the presence of the Contract Administrator. The mock up shall be a minimum of 100 square feet in area and include the complete Silva Cell system installation with sub base compaction, drainage installation, Base course aggregate and geotextile as required, geogrids, backfill, planting soil with compaction, decks, and top geotextile. The mock up area may remain as part of the installed work at the end of the project provided that it remains in good condition and meets all the conditions of the Specifications.
- E17.4.3 Excavation
- (a) When warranties are required, verify with Owner's counsel that special warranties stated in this article are not less than remedies available to Owner under prevailing local laws. Excavate to the depths and shapes indicated on the drawings. Base of



excavation shall be smooth soil, level and free of lumps or debris. Do not over-excavate existing soil beside or under the limits of excavation required for the installation. If soil is over-excavated, install compactable fill material in lifts not more than 8 inches (200mm) deep and compact to the required density. Confirm that the depth of the excavation is accurate to accommodate the depths and thickness of materials required throughout the extent of the excavation. Confirm that the width and length of the excavation is a minimum of 6 inches (150mm), in all directions, beyond the edges of the Silva Cells.

#### E17.4.4 Temporary Support of MTS Lines

- (a) The Contractor shall design and install structural support for the existing cables, duct banks, pipes and conduit across the excavation to maintain service for the duration of the project.
- (b) If required, because the cable and/or conduit is too low, raise the cable and/or conduit sufficiently to clear the top of the silva cell.
- (c) Prepare drawings and procedure notes showing in detail how the support for each cable, duct bank, pipe and conduit shall be accomplished. These drawings and notes shall be sealed by a professional engineer licensed to practice in Manitoba. Submit five (5) copies of these temporary works drawings and notes to the Contract Administrator for review at least five (5) working days before the Work to take place. These drawings and notes will be reviewed by both the Contract Administrator and the Utility Company.
- (d) Following installation of the silva cell, remove the supports and restore the cables, duct banks, pipes and conduit to the satisfaction of the responsive Utility Company and the Contract Administrator.
- (e) Backfill each cable, duct bank, pipe and conduit as directed by the Contract Administrator to the satisfaction of each Utility company.
- (f) Ensure that the Utility Companies are notified at least 48 hours in advance of each critical stage of Work and that they are afforded full access for inspection.

#### E17.4.5 Sub Grade Compaction

- (a) Compact subgrade below the Silva Cells to a minimum of 95% of maximum dry density at optimum moisture content in accordance with ASTM D 698 Standard Proctor Method.
- (b) Proof compact the subgrade with a minimum of three passes of a suitable vibrating compacting machine or apply other compaction forces as needed to achieve the required subgrade compaction rate. Apply additional compaction forces at optimum water levels.

#### E17.4.6 Installation of Geotextile Over Sub Grade

- (a) Install geotextile over the compacted subgrade material with a minimum joint overlap of 18 inches (450mm) between sections of material.

#### E17.4.7 Installation of Drain Lines

- (a) Layout the location of all drains lines. Adjust the alignments to conform to the final locations of sleeves and risers. Do not locate drain lines within 6 inches (150mm) of the edge of any Silva Cell post. Ensure positive drainage toward intended outfalls.
- (b) Excavate a trench a minimum of 12 inches (300mm) wide to a depth required to provide positive drainage from the high points of the system to the outfall or connection point to storm sewer. Eliminate dips or rises that will trap water. Minimum slope shall be 1%.
- (c) Install the perforated drain lines as indicated on the Drawing. All connections and splices shall use the manufacturer's standard splice and fitting connections. Joints shall be secure.
- (d) Place perforated pipe with drain slots on the bottom side of the pipe.

#### E17.4.8 Installation of Inspection Risers

- (a) Install 4" solid P.V.C. inspection risers to grade. Install manufacturer's PVC solid "T's," elbows, and reducers. Use the proper sized "T's" and reducers. Extend risers into sub base aggregate and or make connections to drain lines where indicated on the Drawings. Where inspection risers are indicated to be placed on top of the Silva Cell Deck, assemble riser and fittings to dimensions requires such that the rim of the riser is flush with the paving. Set the rim top with a slope consistent with the slope of the pavement.
- (b) Adjust the location of the riser such that the center of the riser falls along the centerline of one of the ribbed sots in the deck. Cut the deck geotextile with an X cut and insert the riser through the geotextile.
- (c) Make a geotextile collar secured to the riser with zip ties that over lap the surrounding geotextile a minimum of 12-inches. Secure in place with tape.
- (d) Brace all risers while backfill and paving is being installed to secure its location and elevation.
- (e) Install clean-out caps on top of each riser flush to grade.

#### E17.4.9 Installation of Aggregate Sub Base

- (a) Install aggregate sub base to the depths indicated on the Drawings, under the first layer of Silva Cell frames.
- (b) Compact aggregate sub base layer to a minimum of 95% of maximum dry density at optimum moisture content in accordance with ASTM D 698 Standard Proctor Method.
- (c) Compact the subgrade with a minimum of three passes of a suitable vibrating compacting machine or apply other compaction forces as needed to achieve the required subgrade compaction rate.
- (d) Grade surface in a plane parallel to the grades of the paving above. The tolerance for dips and bumps in the aggregate under Silva Cells shall be a 3/8-inch (9mm) deviation from the plane in 10 feet (3m) and 1/8-inch (3mm) in 4 feet (1200mm).
- (e) The grade and elevations of the base under the Silva Cells shall be approved by the Contract Administrator prior to proceeding with the installation of the Silva Cells.

#### E17.4.10 Root barrier

- (a) Install root barrier along roadway edge of tree pit where required.

#### E17.4.11 Installation of Silva Cells

- (a) Identify the outline layout of the structure and the edges of paving around tree planting areas on the floor of the excavation, using spray paint or chalk line. The layout shall be calculated to include shift in layout locations due to depth and the slope of the Cells.
- (b) Lay out the first layer of Silva Cell frames on the sub base. Verify that the layout is consistent with the required locations and dimensions of paving edges to be constructed over the Silva Cells.
- (c) Check each Silva Cell frame unit for damage prior to placing in the excavation. Any cracked or chipped unit shall be rejected.
- (d) Place frames no less than 1 inch (25mm) and no more than 3 inches (75mm) apart. Assure that each frame sits solidly on the surface of the sub base. Frames shall not rock or bend over any stone or other obstruction protruding above the surface of the sub base material. Frames shall not bend into dips in the sub base material.
- (e) The maximum tolerance for deviations in the plane of the sub base material under the bottom of the horizontal beams of each Silva Cell frame shall be 1/4 inch (6mm) in 4 feet (1200mm). Adjust sub base material including larger pieces of aggregate under each frame to provide a solid base of support.

- (f) Anchor each Silva Cell into sub base with four-10 inch (250mm) spikes, driven through the molded holes in the Cell frame base to maintain cell spacing and layout during the installation of planting soil and backfill.
- (g) For applications over waterproofed structures, develop a spacing system consistent with requirements of the waterproofing system. Do not use anchoring nails that will come within 150mm of any waterproofing material. Submit spacing system procedure for approval by the waterproofing provider.
- (h) Install the second layer of Silva Cell frames on top of the first layer. Comply with manufacturer's requirements to correctly register and connect the Cell frames together.
- (i) Register each frame on top of the lower frame post. Rotate each frame registration arrow in the opposite direction from the frame below to assure that connector tabs firmly connect. Each frame shall be solidly seated on the one below.
- (j) Build layers as stacks of frames set one directly over the other. Do not set any frame half on one Cell frame below and half on an adjacent frame.
- (k) Install Strongbacks on top of the Silva Cell frames prior to installing planting soil and backfill. Strongbacks are required only during the installation and compaction of the planting soil and backfill. Strongbacks should be moved as the work progresses across the installation, and prior to the installation of Silva Cell decks.

#### E17.4.12 Installation of Planting Medium and Geogrid

- (a) Install planting soil, geogrid curtain and backfill as indicated on the Drawings. The process of installation requires that these three materials be installed and compacted together in several alternating operations to achieve correct compaction relationships within the system.
- (b) Geogrid curtains are required between the edge of the Silva Cells and any soils to be compacted to support paving beyond the area of Silva Cells. Do not place geogrid curtains between the edge of the Cells and any planting area adjacent to the Cells.
- (c) Pre-cut the geogrid to allow for 6 inches (150mm) minimum under lapping below backfill, and 12 inches (300mm) minimum overlapping top of Silva Cell stack.
- (d) Where cell layout causes a change direction in the plane of the geogrid, slice the top and bottom flaps of the material so that it lies flat on the top of the cell deck and aggregate base course along both planes.
- (e) Provide a minimum of 300mm (12 inch) overlaps between different sheets of geogrid.
- (f) Place the geogrid in the space between the Silva Cell frames and the sides of the excavation. Attach the geogrid to the Silva Cell frames using 3/16 inch x 12-inch (5x300mm) zip ties. Attach with zip ties at every cell and at Cell Deck.
- (g) Install no more than two layers of Silva Cell frames before beginning to install planting soil and backfill.
- (h) Compact the planting soil within the Silva Cell frames and the backfill material outside the frames in alternating lifts until the desired elevations and density is achieved in both soils.
- (i) Install and compact backfill material in the space between the Silva Cells and the sides of the excavation in lifts that do not exceed 8 inches (200mm).
- (j) Compact backfill to 95% of maximum dry density using a powered mechanical compactor. Use a pneumatic compacting tool or narrow foot jumping jack compactor for spaces less than 12 inches (300mm) wide and a 12-inch wide jumping jack compactor or larger equipment in wider spaces.
- (k) Maintain the geogrid curtain between the Silva Cells frames and the backfill material.
- (l) Install backfill in alternating lifts with the planting soil inside the Silva Cells. Fill the first layer or layers of frames with planting medium, specified in Section E16 Street Tree Planting Medium. Install in lifts that do not exceed 8 inches (200mm).

(m) Lightly compact the soil to a maximum dry density of 85% inside the frames at each lift to remove air pockets and settle the soil within the frames. If the planting soil becomes overly compacted, remove the soil and reinstall. Use hand tools or other equipment that does not damage the Silva Cell frames.

**(n) Do not walk directly on horizontal beams of the frames.**

(o) Work soil under the horizontal frame beams of the second level of Cell frames and between columns eliminating air pockets and voids. Fill each frame such that there is a minimum of 10 inches (250mm) of soil over the top of horizontal frame beams before beginning compaction. The top 1-2 inches (25-50mm) of each frame post should remain exposed above the soil to allow the placement of the next frame or deck.

#### E17.4.13 Installation of Third Silva Cell Layer

- (a) After the first two layers of Silva Cell frames have been installed, filled with planting soil and backfilled, proceed to install the third layer of Silva Cells frames where indicated on the Drawings. Comply with manufacturer's requirements to correctly register and connect the cell frames together. Remove the strongbacks.
- (b) Sweep any soil from tops before adding the next layer of frames. Install strongbacks on top of third layer of Silva Cells.
- (c) Continue to install and compact the planting soil within the Silva Cell frames and the backfill material outside the frames in alternating lifts until the desired elevations and density is achieved in both soils.

#### E17.4.14 Preparation for Installing Silva Cell Decks

- (a) When using mulch, add a final layer of planting soil as required to bring the planting soil level to not more than 3 inches (75mm) below the bottom of the Silva Cell Deck when installed. When using air space rather than compost, the planting soil shall be brought to level not more than 1 inch (25mm) below the bottom of the Silva Cell Deck when installed.
- (b) Obtain final approval by the Contract Administrator of soil installation prior to installation of the Silva Cell deck.
- (c) Remove strongbacks after planting soil and backfill has been compacted to the top of the entire set of Silva Cells.
- (d) Install 3 inches (75mm) of mulch, or leave 1-inch (25mm) air space, below Silva Cell Deck as indicated on the Drawings.

#### E17.4.15 Silva Cell Deck Installation

- (a) Install the Silva Cell Decks over the top of each frame stack. Clean dirt from the tops of the Silva Cell frame columns. Register the deck and make connections as recommended by the manufacturer to secure the deck to the top of the Silva Cell Frame.
- (b) Secure each deck at the four corners with screw fasteners as recommended by the manufacturer. Assure that each deck is seated firmly on the frame top with all connectors attached.
- (c) Install and compact remaining backfill material such that the soil outside the limits of the Silva Cells is flush with the top of the installed deck.

#### E17.4.16 Installation of Geotextile, Geogrid, Inspection Riser and Aggregate Over the Deck

- (a) Overlap geogrid over the top of the Silva Cell Decks, with minimum of 12 inches (300mm) overlap.
- (b) Place geotextile over the top of the deck where indicated on the Drawings, extending beyond the outside edge of the excavation by at least 18 inches (450mm). Any joints must be overlapped by a minimum of 18 inches (450mm).

- (c) Cut geotextile a minimum of 20 percent larger than the size of the deck area to be covered to accommodate for required conforming of the geotextile and stone to the deck contours.
- (d) Install 4-inch (100mm) diameter inspection risers above geotextile.
- (e) Install the aggregate base course over the geotextile immediately after completing the installation of the fabrics and inspection risers. Work the aggregate from one side of the deck to the other to assure that the fabric and aggregate conforms to the cell deck contours. Do not apply aggregate in several positions at the same time.
- (f) Load the aggregate from equipment that is outside the limits of the excavated area. Use small, low impact material mover such as a concrete buggy or Georgia Buggy to move aggregate over the cells. Work over material already in place. Never allow any motorized equipment of any size to operate directly on the Silva Cell Deck. For large or confined areas, where aggregate cannot easily be placed from the edges of the excavated area, obtain approval for the installation procedure and types of equipment to be used in the installation from the Silva Cell manufacturer.
- (g) Compact aggregate base course, in lifts not to exceed 6" in depth, to 95% of maximum dry density. Utilize a roller or plate compactor with a maximum weight of 1000 pounds. Make sufficient passes with the compacting equipment to attain the required compaction.

E17.4.17 Installation of Paving

- (a) Place paving material over Silva Cell system as per drawings and specifications.
- (b) Take care when placing paving or other backfill on top of Silva Cell system not to damage the system components.

E17.4.18 Installation of Planting Soil and Mulch within the Tree Planting Area

- (a) Prior to planting trees, install additional planting soil, to the depths indicated, within the tree opening adjacent to paving supported by Silva Cells.
- (b) Remove all rubble, derbies, dust and silt from the top of the planting soil that may have accumulated after the initial installation of the planting soil within the Silva Cells.
- (c) Assure that the planting soil under the tree root ball is compacted to approximately 85-90% to prevent settlement of the root ball. The planting soil within the tree opening shall be the same soil as in the adjacent Silva Cells.
- (d) Cover the planting soil finished grade with mulch or tree grate as indicated on the Drawings.

E17.4.19 Repair of Cut Geotextile

- (a) In the event that any geotextile over subgrade or the Silva Cell decks must be cut during or after installation, repair the seam with a second piece of geotextile that overlaps the edges of the cut by a minimum of 12-inches in all directions prior to adding aggregate material.

E17.4.20 Tree Grates

- (a) Where indicated on the Drawings, install tree grate as per drawings and manufacturer's specifications.

E17.4.21 Tree Guards

- (a) Where indicated on the Drawings, install tree guards as per drawings and manufacturer's specifications.

E17.4.22 Protection

- (a) Ensure that all construction traffic is kept away from the limits of the Silva Cells until the final surface materials are in place. No vehicles shall drive directly on the Silva Cell deck or aggregate base course.

- (b) Provide fencing and other barriers to keep vehicles from entering into the area with Silva Cell supported pavement.
- (c) Maintain a minimum of 4 inches (100mm) of aggregate base course over the geotextile material during construction.
- (d) When vehicle must cross Silva Cells that does not have final paving surfaces installed, use construction mats designed to distribute vehicle loads to levels that would be expected at the deck surface once final paving has been installed. Use only low impact track vehicles with a maximum surface pressure under the vehicle of 4 pounds per square inch, on top of the mats over Silva Cells prior to the installation of final paving. Acceptable construction mats include: Mud-Traks as distributed by SEV Sales, Charlotte, NC 28216, 800 762 8267 or approved alternate. Mat strength shall be as required for the vehicle loading application.

#### E17.4.23 Clean Up

- (a) Perform cleanup during the installation of work and upon completion of the work. Maintain the site free of soil and sediment, free of trash and debris. Remove from site all excess soil materials, debris, and equipment. Repair any damage to adjacent materials and surfaces resulting from installation of this work.

#### E17.5 Measurement and Payment

##### E17.5.1 Measurement

- (a) Tree Well Concrete Curb will be measured on a linear meter basis. The amount to be paid for shall be the total number of linear metres constructed in accordance with this Specification and as accepted by the Contract Administrator.
- (b) Silva Cell trenches shall be measured on an area basis. The amount to be paid for shall be the total number of square metres constructed in accordance with this Specification and as accepted by the Contract Administrator.
- (c) Tree Grates will be measured on a per unit basis. The amount to be paid for shall be the actual number of tree grates installed in accordance with this Specification and as accepted by the Contract Administrator.
- (d) Tree Guards will be measured on a per unit basis. The amount to be paid for shall be the actual number of tree grates installed in accordance with this Specification and as accepted by the Contract Administrator.
- (e) No measurement will be made for Work associated with the temporary support of MTS ducts.

##### E17.5.2 Basis of Payment

- (a) Payment for the work shall be paid for at the contract unit price for the "Items of Work" listed below, which price shall include all costs of labour and material supply, including excavation, drains, base material, tree planting medium, backfill, and all other items incidental to the Work included in this specification.

###### Items of Work:

- i) Tree Well Concrete Curb
  - ii) Silva Cell Trench
  - iii) Tree Grates
  - iv) Tree Guards
- (b) Utility works will not be paid for. The price shall be included in "Silva Cells" and will be payment in full for performing all operations herein described and all other items incidental to the Work included in this Specification.

## **E18. TREE PLANTING**

### **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 for and incidental to the satisfactory performance and completion of all Work as shown on the Drawings and as hereinafter specified, including, but not necessarily confined to the following:

(a) Supply and Installation of trees.

### **E18.1.2 Reference**

(a) Install trees in accordance with the Canadian Standards for Nursery Stock Current Edition, published by the Canadian Nursery Trades Association, except where specified otherwise.

### **E18.1.3 Source Quality Control**

- (a) All plant material shall be randomly inspected at the source upon request of the Contract Administrator.
- (b) Trees are to be grown in nurseries under proper cultural practices as recommended by the Canadian Nursery Trades Association.
- (c) Only those trees that have been grown for at least the four (4) previous years in local Manitoba nurseries located in an Agriculture Canada Plant Hardiness Zone designation of 2(a or b) or 3(a or b) and within a 250 kilometre radius of Winnipeg, will be accepted. Trees that have grown in plant hardiness zones 1 and 4 or greater will be rejected.

### **E18.1.4 Maintenance**

- (a) The Contractor shall be responsible for the maintenance of the trees for a period of one (1) year from the date of Substantial Performance. Any areas planted after September 15th, the maintenance period will commence on May 15th of the following year or such date as mutually agreed upon by all parties.
- (b) Water to ensure soil moisture conditions for optimum growth and health of plant material. Ensure watering techniques do not cause erosion.
- (c) Reform damaged watering saucers.
- (d) Remove weeds bi-monthly.
- (e) Replace or re-spread damaged, missing or disturbed mulch.
- (f) For non-mulched areas, cultivate monthly to keep top layer of soil friable.
- (g) If required to control insects, fungus and disease, use appropriate control methods in accordance with Federal, Provincial and Municipal regulations. Obtain product approval from Contract Administrator prior to application.
- (h) Apply fertilizer as directed by manufacturer's specifications.
- (i) Remove dead, broken or hazardous branches from plant material.
- (j) Keep trunk protection and tree supports in proper repair and adjustment.
- (k) Remove trunk protection, tree supports and level watering saucers at end of warranty period.
- (l) Remove and replace dead plants and plants not in healthy growing condition. Make replacements in same manner as specified for original plantings.
- (m) Submit monthly written reports to Contract Administrator identifying:
  - (i) Maintenance work carried out.
  - (ii) Development and condition of plant material.

- (iii) Preventative or corrective measures required which are outside Contractor's responsibility.

#### E18.1.5 Warranty

- (a) The Contractor shall, at his/her expense, warrant the Work against any and all defects or deficiencies resulting from insect infestation, disease and mechanical damage due to improper handling, installation or maintenance, for a period of two (2) years for trees and one (1) year for shrubs and perennials from the date of the Total Performance. Nursery stock damaged by vandalism or reasons beyond the control of the Contractor shall be replaced by the client.
- (b) End-of-Warranty inspection will be conducted by the Contract Administrator.
- (c) The Contract Administrator reserves the right to request material replacement or extend the Contractor's Maintenance responsibilities for an additional one (1) year if, at the end of the Warranty Period, leaf development and growth are not sufficient to ensure future survival of the plant material.

#### E18.1.6 Replacements

- (a) During the Maintenance Period, the Contractor shall remove from Site any plant material that has died or failed to grow satisfactorily as determined by the Contract Administrator and replace as per Specifications within a maximum ten (10) day period from notification.
- (b) Defective plants shall be replaced within three (3) days of notification to the Contractor.
- (c) The Contractor shall extend Maintenance and Warranty on replacement tree for a period equal to the original Maintenance and Warranty Periods.
- (d) The Contractor shall continue such replacement, Maintenance and Warranty until tree is acceptable.

### E18.2 Materials

#### E18.2.1 Miscellaneous Materials

- (a) Water shall be potable and free of minerals which may be detrimental to plant growth.
- (b) Stakes shall be metal T-Bar, steel, 40x40x5x2440mm.
- (c) Guying Wire shall be 3mm diameter multi-strand galvanized steel cable.
- (d) Guying Collar shall be plastic tube, 13mm diameter, nylon reinforced.
- (e) Trunk Protection shall be plastic perforated spiraled strip.
- (f) Fertilizer shall be a slow release formulation of low nitrogen and high phosphorus e.g. 10-50-12. Apply quantities at rates stated by product manufacturer.
- (g) Planting Soil shall be as per specification E16 Street Tree Planting Medium
- (h) Root Ball Burlap shall be 150 g Hessian burlap, biodegradable.
- (i) Wire Baskets shall be horticultural accepted product designed to carry the weight and to contain a burlap-covered root ball. Minimum diameter basket size is to conform to the same minimum diameter of the tree root ball for the respective minimum tree caliper sizes.

#### E18.2.2 Plant Material

- (a) Nomenclature of specified trees is to conform to the International Code of Nomenclature for Cultivated Plants and is to be in accordance with the approved scientific names given in the latest edition of the Standardized Plant Names.
- (b) Trees are to be characteristically developed for their species and structurally sound, well branched, healthy and vigorous and densely foliated when in leaf. The tree is to have a healthy, well developed, fibrous root system which may be verified through a



testing procedure that destructively samples one or more randomly selected root balls.

- (c) Trees are to have been root pruned regularly, but not later than one growing season prior to arrival on Site. The Contractor may be required to furnish documentation to the client on their root-pruning program. Trees in excess of 75mm caliper are to have been half root pruned during each of two successive growing seasons, the latter at least, one growing season prior to arrival on Site.
- (d) All parts of the trees, especially the lower branches, are to be moist and show live, green cambium tissue when cut.
- (e) Trees are to have only one, sturdy, reasonably straight and vertical trunk, and a well balanced crown with fully developed leader.
- (f) Trees are to be free of disease, insect infestation, rodent damage, sun scald, frost cracks, abrasions, unhealed scars, scars exceeding 5cm in diameter, major forks or crooks in the trunk, broken branches, or angled leaders. Trees having the above defects will not be accepted by the Contract Administrator.
- (g) Trees having a leader which has developed at a sharp angle to the trunk as a result of pruning or trunk damage will not be accepted.
- (h) Trees exhibiting suppressed, weakly developed branches due to competition from other closely spaced trees in the nursery will not be accepted. Trees exhibiting dead branches will not be accepted.
- (i) Any tree that has come out of dormant stage and is too far advanced will not be accepted unless prior approval obtained. Approval is required for any tree which has been held in cold storage.
- (j) Balled and burlapped trees in excess of a 3m height must have been dug with large firm ball. Roots in root balls must be comprised of 75% fibrous and feeder root systems. Secure root balls with burlap, heavy twine and rope. For trees 75mm or more in caliper, wrap ball in double layer of burlap and drum lace with minimum 10mm diameter rope. Protect root balls against sudden changes in temperature and exposure to heavy rainfall.
- (k) Tree spade dug trees are to be dug with mechanized digging equipment with hydraulic spade. Lift root ball from hole, place in wire basket designed for purpose and lined with burlap. Tie basket to ball with heavy rope. Take care not to injure trunk of tree with wire basket ties or rope.
- (l) Use of collected or native trees is not permitted.

### E18.2.3 Tree Quantity and Size

- (a) Trees are to be planted at the quantities and caliper listed on the Plant Lists which are shown on the drawings. Any variation from the specified quantity is to be clearly identified on the Schedule of Prices. Any variations to species, size or caliper of specified trees will require a request for approval from the Contract Administrator.
- (b) Any changes in planting locations will be determined on-site by the Contract Administrator.
- (c) The Contractor shall supply trees as indicated in the Schedule of Prices and PLANT LISTS.
- (d) Trees are to conform to the measurements specified in the on drawing PLANT LISTS, except that trees larger than specified may be used if approved by the Contract Administrator.
- (e) Trees are to be measured when the branches are in their normal position. Height dimensions specified are to refer to the main body of the tree and not from branch tip to root base. Where trees have been measured by caliper or diameter, reference is to be made to the diameter of the trunk measured 15cm above the ground as the tree stands in the nursery prior to lifting. Caliper of tree shall be appropriately designed on a permanently fixed tag on one of the branches.

#### E18.2.4 Shipment and Pre-Planting Care

- (a) Coordinate shipping of trees and excavation of holes to ensure minimum time lapse between digging and planting.
- (b) Tie branches of trees securely, and protect trees against abrasion, exposure and extreme temperature change during transit. Avoid binding of trees with rope or wire which would damage bark, break branches or destroy natural shape of tree. Give full support to root ball of trees during lifting.
- (c) Cover tree foliage with tarpaulin, and protect bare roots by means of dampened straw, peat moss, saw dust or other acceptable material to prevent loss of moisture during transit and storage.
- (d) Remove broken and damaged roots with sharp pruning shears. Make clean cuts, and cover cuts over 10mm diameter with a tree wound dressing.
- (e) Keep roots moist and protected from sun and wind. Heel-in trees which cannot be planted immediately in shaded areas and water well.

#### E18.3 Construction Methods

##### E18.3.1 Workmanship

- (a) Location of trees will be staked out or painted on Site by the Contractor. Locations shall be approved by the Contract Administrator prior to installation.
- (b) Coordinate operations. Keep Site clean and planting holes drained. Immediately remove soil or debris spilled onto street pavement, grass or sidewalk.

##### E18.3.2 Planting Time

- (a) Plant deciduous trees during dormant period before buds have broken. Trees noted for spring planting only, must be planted in dormant period.
- (b) Plant only under conditions that are conducive to health and physical conditions of trees.
- (c) Provide planting schedule to Contract Administrator. Extending planting operations over long period using limited crew will not be accepted.
- (d) The Contractor must obtain all above and below ground clearances from all the utilities as well as the appropriate District Operations Branch in a timely manner so as not to jeopardize the schedule of the complete tree planting Contract.

##### E18.3.3 Excavation

- (a) Refer to specification E17 Silva Cells.
- (b) Excavate planting pits as indicated by stakes or paint marks.
- (c) Protect bottom of excavations against freezing.
- (d) Remove water which enters excavations prior to planting. Ensure source of water is not ground water and notify Contract Administrator.

##### E18.3.4 Installation

- (a) Planting shall be done during periods of suitable weather conditions and in accordance with locally accepted practice.
- (b) Trees are to be planted within forty eight (48) hours of excavation from the nursery.
- (c) No tree pit is to be left open at the end of the Contractor's Work Day. Planting program is to be planned to ensure that all approved trees delivered to the Site at designated planting locations are installed and thoroughly watered the same day as delivery.
- (d) With balled and burlapped root balls and root balls in wire baskets, burlap shall be loosened and cut away from the top 1/3 without disturbing root ball. Wire shall be cut away and removed from the top 1/3 of the root ball. Burlap or rope shall not be pulled from under root ball. Non-biodegradable wrapping shall be removed.

- (e) After inserting the tree and tamping the root system with topsoil in layer of 150mm, water shall be poured in until the pit is thoroughly soaked. Filling of the hole shall then be completed and the fill-in soil shall be packed firmly around the roots, leaving a concave surface for convenient watering. After filling, the planting shall be watered at frequent intervals.
- (f) Each tree is to have an earth saucer at its base having a diameter as large as the excavation with a 10cm lip formed at the perimeter of the saucer to retain water.
- (g) All nursery stock shall be set plumb in the centre of pits and at levels as shown on the planting details after settlement has taken place.
- (h) Nursery stock shall be faced to give the best appearance or relationship to adjacent structure and to the approval of the The City of his representative. Trees shall be placed equal to depth they were originally growing in nursery.

#### E18.3.5 Fertilizing

- (a) When planting is completed, give surface of planting saucer dressing of fertilizer meeting the requirements of Specification. Mix fertilizer thoroughly with top layer of planting soil and water in well.

#### E18.3.6 Trunk Protection

- (a) Install trunk protection on trees as indicated.
- (b) Install trunk protection prior to installation of tree supports when used.

#### E18.3.7 Pruning

- (a) The Contractor shall provide a licensed Manitoba Certified Arborist for each work crew or work site.
- (b) Employ clean sharp tools and make cuts flush with branch collars. Remove dead and injured branches.

#### E18.3.8 Watering

- (a) Trees are to be watered during the planting procedure as described previously, and once a week thereafter, or more frequently if required, during the growing season.
- (b) A complete record is to be kept of each series of waterings for all planted trees noting: 1) location, and 2) date of watering. This record shall be sent bi-weekly to Scatliff+Miller+Murray Inc. - Fax: (204) 927-3443.
- (c) Apply 40 litres of water per 25mm caliper per application using deep root feeder or low/pressure nozzle and hose. The water stream must not gouge out a hole in the soil and mulch.

#### E18.4 Method of Measurement

- E18.4.1 Installation of trees, shrubs and perennials shall be measured on a per unit basis. The amount to be paid for shall be the total number of trees, shrubs and perennials supplied and installed in accordance with this Specification and the Construction Drawings, and as acceptable to the Contract Administrator.

#### E18.5 Basis of Payment

- E18.5.1 Payment for Installation of trees, shrubs and perennials shall be paid for at the Contract Unit Prices for the "Items of Work" listed below. This price shall be payment in full for supplying all labour, equipment and materials, and performing all operations herein described and all other items incidental to the Work included in this Specification and accepted by the Contract Administrator.

Item of Work:

- (a) American Elm (c/w warranty)

## **E19. INSTALLATION OF INTERLOCKING PAVING STONES**

### DESCRIPTION

#### E19.1 General

- E19.1.1 This specification shall cover the installation of interlocking paving stones on concrete sidewalk.
- E19.1.2 Referenced Standard Construction Specifications
  - (a) CW 3325 – Portland Cement Concrete Sidewalk
  - (b) CW 3335 – Installation of Interlocking Paving Stones on a Lean Concrete Base

### MATERIALS

#### E19.2 Interlocking Paving Stones

- E19.2.1 Paving stones shall be Barkman Concrete Holland Stone Pavers (100 x 200 and 200 x 200). All pavers to be "Charcoal" in colour.
- E19.2.2 Paving stones shall conform to the requirements of CAN3-A231.2, Precast Concrete Pavers.
- E19.2.3 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.

#### E19.3 Other Materials

- E19.3.1 Bedding sand shall be in accordance with CW 3335.
- E19.3.2 Concrete sidewalk to be in accordance with CW 3325.

### CONSTRUCTION METHOD

#### E19.4 Installation of Paving Stones

- E19.4.1 Construct 100 mm concrete sidewalk in accordance with CW 3325
- E19.4.2 Install paving stones on concrete sidewalk with bedding sand in accordance with the Drawings.

### MEASUREMENT OF PAYMENT

#### E19.5 Supply and Installation of Paving Stones

- E19.5.1 Supply and installation of interlocking paving stones shall be measured on an area basis. The amount to be paid for shall be the total number of square metres of paving stones supplied and installed in accordance with this Specification and the Drawings and accepted by the Contract Administrator. Supply and Installation of Paving Stones shall be paid for at the Contract Unit Price for "Interlocking Paving Stones", which price shall be payment in full for the supply of all materials and for performing all operations required to complete the work as specified.
  - E19.5.2 No measurement or payment will be made for bedding sand. Bedding sand shall be included in the price paid for "Interlocking Paving Stones".
- #### E19.6 100 mm Concrete Sidewalk
- E19.6.1 Supply and installation of 100 mm concrete sidewalk shall be in accordance with CW 3325.

## **E20. REMOVAL OF EXISTING INTERLOCKING PAVING STONES**

### DESCRIPTION

#### E20.1 General

- (a) This specification shall cover the removal and disposal of existing interlocking paving stones.

### MEASUREMENT OF PAYMENT

- E20.2 The removal of existing paving stones including disposal will be measured on an area basis. The area to be paid for shall be the total number of square metres removed and disposed of from the specified area. Removal of existing paving stones will be paid for at the Contract Unit Price for "Removal of Existing Interlocking Paving Stones", which price shall be payment in full for the supply of all materials and for performing all operations required to complete the work as specified.

## **E21. SITE FURNISHINGS – BIKE RACKS**

#### E21.1 General

- E21.1.1 This specification shall cover the supply and installation of bike racks. The Contractor shall furnish all superintendence, overhead, labour, materials, equipment, tools, supplies and all other things necessary for and incidental to the satisfactory performance and completion of all Work as shown on the Drawings and as specified herein.

- E21.1.2 All materials supplied under this specification shall be of a type approved by the Landscape Architect, and shall be subject to inspection and testing by the Landscape Architect.

#### E21.2 Materials

##### E21.2.1 Bicycle Racks

- (a) Bicycle Racks shall be:
- (i) Dero Hoop Rack As manufactured by Dero Bike Racks, surface mount, powder coated colour: black
  - (ii) Contact: Playgrounds-R-U's, 632-7000 – Jodi McLean

##### E21.2.2 Hardware

- (a) Mounting hardware shall be stainless steel or cadmium plated. All site furnishings shall include the supply of maintenance kits for care and cleaning. Maintenance kits shall include maintenance manuals, complete manufacturer's parts lists, touch-up paint, an extra of each bolt, washer and any other hardware utilized, and all special tools necessary for assembly and maintenance.

#### E21.3 Construction Method

##### E21.3.1 General

- (a) All fabrication cuts, drill holes and weld joints shall be sprayed with a corrosion resistant coating prior to powder coating. The bottom end of the posts is to be sealed with a moisture barrier.
- (b) All powder coating finishes shall meet or exceed ASTM standards for hardness, adhesion, impact and salt spray resistance.
- (c) Smooth all cut edge and weld joints prior to hot dip galvanizing and ensure that all tubing is free from burrs, cracks, defects and other imperfections
- (d) All hardware shall be tamper-proof in design and requiring special tools. It shall be either carbon steel plated with zinc/nickel and iridescent chromate finish or stainless steel. All necessary hardware and tools shall be provided.

(e) Bumper Stops shall be pinned in place as per manufacturer's specifications.

E21.3.2 Site Furnishings Installation

(a) Site furnishings shall be located and installed in accordance with the Drawings and installed plumb and true to correct elevations.

(b) All posts and other vertical items shall

E21.4 Measurement and Payment

E21.4.1 Measurement

(a) Installation of Bike Racks will be measured on a per unit basis.

E21.4.2 Basis of Payment

(a) Payment for the work shall be paid for at the contract unit price for the "Items of Work" listed below, which price shall include all costs of labour and material supply, including site preparation, bike rack supply and installation, and all materials required for installation.

Items of Work:

i) Bike Racks