THE CITY OF WINNIPEG

BID OPPORTUNITY

BID OPPORTUNITY NO. 1-2014

2014 REGIONAL STREET RENEWAL PROGRAM – PEMBINA HIGHWAY FROM MARKHAM ROAD TO UNIVERSITY CRESCENT REHABILITATION / ACTIVE TRANSPORTATION CORRIDOR AND ASSOCIATED WORKS

TABLE OF CONTENTS

PART A - BID SUBMISSION

Form A: Bid 1
Form B: Prices 4
Form G1: Bid Bond and Agreement to Bond 11
Form G2: Irrevocable Standby Letter of Credit and Undertaking 13

PART B - BIDDING PROCEDURES

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

PART C - GENERAL CONDITIONS

C0. General Conditions 1

PART D - SUPPLEMENTAL CONDITIONS

General

D1. General Conditions 1
D2. Scope of Work 1
D3. Contract Administrator 2
D4. Contractor's Supervisor 2
D5. Ownership of Information, Confidentiality and Non Disclosure 3
D6. Notices 3
D7. Furnishing of Documents 3

Submissions

D8. Authority to Carry on Business 3
D9. Safe Work Plan 4
D10. Insurance 4
D11. Performance Security 4
D12. Subcontractor List 5
D13. Detailed Work Schedule 5

Schedule of Work

D14. Commencement 5
D15. Working Days 6
D16. Restricted Work Hours 6
D17. Work By Others 6
D18. Sequence of Work 7
D19. Substantial Performance 9
D20. Total Performance 9
D21. Liquidated Damages 9
D22. Scheduled Maintenance 9
D23. Accelerated Completion 10

Control of Work
D24. Job Meetings 10
D25. Prime Contractor – The Workplace Safety and Health Act (Manitoba) 11
D26. The Workplace Safety and Health Act (Manitoba) – Qualifications 11

Measurement and Payment
D27. Payment 11

Warranty
D28. Warranty 11

Form H1: Performance Bond 12
Form H2: Irrevocable Standby Letter of Credit 14
Form J: Subcontractor List 16

PART E - SPECIFICATIONS

General
E1. Applicable Specifications and Drawings 1
E2. Office Facilities 2
E3. Protection Of Existing Trees 2
E4. Traffic Control 3
E5. Traffic Management 3
E6. Water Obtained From the City 4
E7. Surface Restorations 4
E8. Infrastructure Signs 4
E9. Supply and Installation of Pavement Repair Fabric 4
E10. Salt Tolerant Grass Seeding 5
E11. Tree Removal 6
E12. Monolithic Curb and 100mm Concrete Sidewalk with Block-outs for Interlocking Paving Stones 6
E13. Unit Paver Insert for Bus Stop 7
E14. Cast-In-Place Concrete Foundations 9
E15. Electrical Works 17
E16. Removal, Salvage and Reinstallation of Existing Aluminum Balanced Barrier 18
E17. Soft Excavation to Expose Underground Utilities 20
E18. Supply and Installation of Inlaid Longitudinal Lane Line Marking Tape 21

PART B - BIDDING PROCEDURES

B1. CONTRACT TITLE

B1.1 2014 REGIONAL STREET RENEWAL PROGRAM – PEMBINA HIGHWAY FROM MARKHAM ROAD TO UNIVERSITY CRESCENT REHABILITATION / ACTIVE TRANSPORTATION CORRIDOR AND ASSOCIATED WORKS

B2. SUBMISSION DEADLINE

B2.1 The Submission Deadline is 12:00 noon Winnipeg time, April 9, 2014.

B2.2 Bids determined by the Manager of Materials to have been received later than the Submission Deadline will not be accepted and will be returned upon request.

B2.3 The Contract Administrator or the Manager of Materials may extend the Submission Deadline by issuing an addendum at any time prior to the time and date specified in B2.1.

B3. ENQUIRIES

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

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

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

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

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

B4. CONFIDENTIALITY

B4.1 Information provided to a Bidder by the City or acquired by a Bidder by way of further enquiries or through investigation is confidential. Such information shall not be used or disclosed in any way without the prior written authorization of the Contract Administrator. The use and disclosure of the confidential information shall not apply to information which:

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

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

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

B4.2 The Bidder shall not make any statement of fact or opinion regarding any aspect of the Bid Opportunity to the media or any member of the public without the prior written authorization of the Contract Administrator.

B5. ADDENDA

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

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

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

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

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

B6. SUBSTITUTES

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

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

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

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

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

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

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

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

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

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

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

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

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

B6.8 If the Contract Administrator approves a substitute as an “approved alternative”, any Bidder bidding that approved alternative may base his/her Total Bid Price upon the specified item but may also indicate an alternative price based upon the approved alternative. Such alternatives will be evaluated in accordance with B15.

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

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

B7. BID COMPONENTS

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

(a) Form A: Bid;

(b) Form B: Prices, hard copy;

(c) Bid Security

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

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

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

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

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

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

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

B7.6 Bidders are advised that inclusion of terms and conditions inconsistent with the Bid Opportunity document, including the General Conditions, will be evaluated in accordance with B15.1(a).

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

B7.8 Bids shall be submitted to:

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

B8. BID

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

B9. PRICES

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

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

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

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

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

B10. QUALIFICATION

B10.1 The Bidder shall:

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

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

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

B10.2 The Bidder and any proposed Subcontractor (for the portion of the Work proposed to be subcontracted to them) shall:

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

B10.3 The Bidder and/or any proposed Subcontractor (for the portion of the Work proposed to be subcontracted to them) shall:

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

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

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

B10.4 Further to B10.3(c), the Bidder shall, within five (5) Business Days of a request by the Contract Administrator, provide proof satisfactory to the Contract Administrator that the Bidder/Subcontractor has a workplace safety and health program meeting the requirements of The Workplace Safety and Health Act (Manitoba), by providing:

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

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

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

B10.5 The Bidder shall submit, within three (3) Business Days of a request by the Contract Administrator, proof satisfactory to the Contract Administrator of the qualifications of the Bidder and of any proposed Subcontractor.

B10.6 The Bidder shall provide, on the request of the Contract Administrator, full access to any of the Bidder's equipment and facilities to confirm, to the Contract Administrator's satisfaction, that the Bidder's equipment and facilities are adequate to perform the Work.

B11. BID SECURITY

B11.1 The Bidder shall provide bid security in the form of:

(a) a bid bond, in the amount of at least ten percent (10%) of the Total Bid Price, and agreement to bond of a company registered to conduct the business of a surety in

Manitoba, in the form included in the Bid Submission (Form G1: Bid Bond and Agreement to Bond); or

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

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

B11.1.1 If the Bidder submits alternative bids, the bid security shall be in the amount of the specified percentage of the highest Total Bid Price submitted.

B11.1.2 All signatures on bid securities shall be original.

B11.1.3 The Bidder shall sign the Bid Bond.

B11.1.4 The Surety shall sign and affix its corporate seal on the Bid Bond and the Agreement to Bond.

B11.2 The bid security of the successful Bidder and the next two lowest evaluated responsive and responsible Bidders will be released by the City when a Contract for the Work has been duly executed by the successful Bidder and the performance security furnished as provided herein. The bid securities of all other Bidders will be released when a Contract is awarded.

B11.2.1 Where the bid security provided by the successful Bidder is in the form of a certified cheque or draft pursuant to B11.1(c), it will be deposited and retained by the City as the performance security and no further submission is required.

B11.2.2 The City will not pay any interest on certified cheques or drafts furnished as bid security or subsequently retained as performance security.

B11.3 The bid securities of all Bidders will be released by the City as soon as practicable following notification by the Contract Administrator to the Bidders that no award of Contract will be made pursuant to the Bid Opportunity.

B12. OPENING OF BIDS AND RELEASE OF INFORMATION

B12.1 Bids will be opened publicly, after the Submission Deadline has elapsed, in the office of the Corporate Finance Department, Materials Management Division, or in such other office as may be designated by the Manager of Materials.

B12.1.1 Bidders or their representatives may attend.

B12.1.2 Bids determined by the Manager of Materials, or his/her designate, to not include the bid security specified in B11 will not be read out.

B12.2 Following the submission deadline, the names of the Bidders and their Total Bid Prices (unevaluated, and pending review and verification of conformance with requirements) will be available on the Closed Bid Opportunities (or Public/Posted Opening & Award Results) page at The City of Winnipeg, Corporate Finance, Materials Management Division website at http://www.winnipeg.ca/matmgt/

B12.3 After award of Contract, the name(s) of the successful Bidder(s) and the Contract amount(s) will be available on the Closed Bid Opportunities (or Public/Posted Opening & Award Results) page at The City of Winnipeg, Corporate Finance, Materials Management Division website at http://www.winnipeg.ca/matmgt/

B12.4 The Bidder is advised that any information contained in any Bid may be released if required by City policy or procedures, by The Freedom of Information and Protection of Privacy Act (Manitoba), by other authorities having jurisdiction, or by law.

B13. IRREVOCABLE BID

B13.1 The Bid(s) submitted by the Bidder shall be irrevocable for the time period specified in Paragraph 11 of Form A: Bid.

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

B14. WITHDRAWAL OF BIDS

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

B14.1.1 Notwithstanding C23.3, the time and date of receipt of any notice withdrawing a Bid shall be the time and date of receipt as determined by the Manager of Materials.

B14.1.2 The City will assume that any one of the contact persons named in Paragraph 3 of Form A: Bid or the Bidder's authorized representatives named in Paragraph 12 of Form A: Bid, and only such person, has authority to give notice of withdrawal.

B14.1.3 If a Bidder gives notice of withdrawal prior to the Submission Deadline, the Manager of Materials will:

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

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

(c) if the notice has been given by any one of the persons specified in B14.1.3(b), declare the Bid withdrawn.

B14.2 A Bidder who withdraws his/her Bid after the Submission Deadline but before his/her Bid has been released or has lapsed as provided for in B13.2 shall be liable for such damages as are imposed upon the Bidder by law and subject to such sanctions as the Chief Administrative Officer considers appropriate in the circumstances. The City, in such event, shall be entitled to all rights and remedies available to it at law, including the right to retain the Bidder's bid security.

B15. EVALUATION OF BIDS

B15.1 Award of the Contract shall be based on the following bid evaluation criteria:

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

(b) qualifications of the Bidder and the Subcontractors, if any, pursuant to B10 (pass/fail);

(c) Total Bid Price;

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

B15.2 Further to B15.1(a), the Award Authority may reject a Bid as being non-responsive if the Bid is incomplete, obscure or conditional, or contains additions, deletions, alterations or other irregularities. The Award Authority may reject all or any part of any Bid, or waive technical requirements or minor informalities or irregularities, if the interests of the City so require.

B15.3 Further to B15.1(b), the Award Authority shall reject any Bid submitted by a Bidder who does not demonstrate, in his/her Bid or in other information required to be submitted, that he/she is responsible and qualified.

B15.4 Further to B15.1(c), the Total Bid Price shall be the sum of the quantities multiplied by the unit prices for each item shown on Form B: Prices.

B15.4.1 Further to B15.1(a), in the event that a unit price is not provided on Form B: Prices, the City will determine the unit price by dividing the Amount (extended price) by the approximate quantity, for the purposes of evaluation and payment.

B15.4.2 The electronic Form B: Prices and the formulas imbedded in that spreadsheet are only provided for the convenience of Bidders. The City makes no representations or warranties as to the correctness of the imbedded formulas. It is the Bidder's responsibility to ensure the extensions of the unit prices and the sum of Total Bid Price performed as a function of the formulas within the electronic Form B: Prices are correct.

B16. AWARD OF CONTRACT

B16.1 The City will give notice of the award of the Contract or will give notice that no award will be made.

B16.2 The City will have no obligation to award a Contract to a Bidder, even though one or all of the Bidders are determined to be responsible and qualified, and the Bids are determined to be responsive.

B16.2.1 Without limiting the generality of B16.2, the City will have no obligation to award a Contract where:

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

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

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

(d) only one Bid is received; or

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

B16.3 Where an award of Contract is made by the City, the award shall be made to the responsible and qualified Bidder submitting the lowest evaluated responsive Bid, in accordance with B15.

B16.3.1 Following the award of contract, a Bidder will be provided with information related to the evaluation of his/her Bid upon written request to the Contract Administrator.

PART C - GENERAL CONDITIONS

C0. GENERAL CONDITIONS

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

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

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

PART D - SUPPLEMENTAL CONDITIONS

GENERAL

D1. GENERAL CONDITIONS

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

D2. SCOPE OF WORK

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

(a) Pavement Widening
  (i) Pembina Highway Southbound (Boulevard) – University Crescent to Chancellor Drive
  (ii) Pembina Highway Southbound (Center Median) – Chancellor Drive to Markham Road
  (iii) Pembina Highway Northbound (Boulevard) – Markham Road to Chancellor Drive
  (iv) Pembina Highway Northbound (Center Median) – Thatcher Drive to University Crescent

(b) Asphalt Resurfacing and Associated Works – Pavement Rehabilitation
  (i) Pembina Highway Southbound - University Crescent to Markham Road

(c) Bus Stop Improvements
  (i) Pembina Highway Southbound – Chancellor Drive to Markham Road
  (ii) Pembina Highway Northbound – Markham Road to Chancellor Drive

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

(a) Pavement Widening
  (i) Removal of existing curb
  (ii) Excavation of boulevard
  (iii) Compaction of existing sub-grade
  (iv) Placement of separation geotextile fabric
  (v) Placement and compaction of sub-base and base course material
  (vi) Adjustment of existing boulevard and center median structures
  (vii) Installation of catch pits/catch basin and drainage connection/sewer service pipe
  (viii) Renewal of existing concrete approaches as required
  (ix) Construction of 200mm concrete pavement (reinforced)
  (x) Relocation of existing guard rail
  (xi) Construction of monolithic concrete splash strip utilizing slip form paver(150mm reveal height)
  (xii) Construction of monolithic concrete median slab, safety median, concrete median slab and monolithic concrete bullnose
  (xiii) Construction of asphalt overlay(average thickness 100mm)
  (xiv) Supply and installation of inlaid longitudinal lane line marking tape
  (xv) Boulevard restoration

(b) Asphalt Resurfacing and Associated Works – Pavement Rehabilitation
  (i) Renewal of existing sidewalks as required
  (ii) Installation of detectable warning surface tiles
  (iii) Planing of existing asphalt and at intersections as required
  (iv) Removal of existing curb

(v) Removal of existing bullnose and median slab
(vi) Installation of catch pits and drainage connection pipe
(vii) Sewer service(CB lead) repair – Up to 3m long
(viii) Full depth concrete repairs of existing slabs and joints
(ix) Adjustment of existing pavement and boulevard structures
(x) Renewal of existing curbs as required
(xi) Construction of monolithic concrete splash strip utilizing slip form paver(150mm reveal height)
(xii) Construction of monolithic concrete median slab, safety median, concrete median slab and monolithic concrete bullnose
(xiii) Construction of asphalt overlay(average thickness 100mm)
(xiv) Supply and installation of inlaid longitudinal lane line marking tape
(xv) Boulevard restoration

(c) Bus Stop Improvements
(i) Removal of existing curb and sidewalk
(ii) Abandon T-Man Sign foundation, Kiosk foundation and Flag foundation
(iii) Excavation of boulevard
(iv) Placement and compaction of base course
(v) Adjustment of existing boulevard structures
(vi) Relocate electrical works for Bus Stop T-Man Sign and CBS Bus Stop Shelter
(vii) Construction of Bus Stop T-Man Sign foundation, Information Kiosk foundation and Bus Stop Flag foundation
(viii) Construction of monolithic concrete curb and sidewalk with block-outs for interlocking paving stones
(ix) Installation of directional tiles
(x) Installation of interlocking paving stones
(xi) Boulevard Restoration

D3. CONTRACT ADMINISTRATOR

D3.1 The Contract Administrator is:

Derek Teperto, C.E.T.
Technologist III
106-1155 Pacific Avenue, Winnipeg, Manitoba, R3E 3P1

Telephone No. 204 232-9527
Facsimile No. 204 986-5302

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

D3.3 Bids Submissions must be submitted to the address in B7.8

D4. CONTRACTOR'S SUPERVISOR

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

D4.2 At least two (2) business days prior to the commencement of any Work on the site, the Contractor shall provide the Contract Administrator with a phone number where the supervisor

identified in D4.1 or an alternate can be contacted twenty-four (24) hours a day to respond to an emergency.

D5. OWNERSHIP OF INFORMATION, CONFIDENTIALITY AND NON DISCLOSURE

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

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

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

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

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

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

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

D6. NOTICES

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

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

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

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

Facsimile No.: 204-947-9155

D7. FURNISHING OF DOCUMENTS

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

SUBMISSIONS

D8. AUTHORITY TO CARRY ON BUSINESS

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

D9. SAFE WORK PLAN

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

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

D10. INSURANCE

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

(a) commercial general liability insurance, in the amount of at least two million dollars ($2,000,000.00) inclusive, with The City of Winnipeg added as an additional insured, with a cross-liability clause, such liability policy to also contain contractual liability, unlicensed motor vehicle liability, non-owned automobile liability, broad form property damage cover and products and completed operations, to remain in place at all times during the performance of the Work and throughout the warranty period;

(b) if applicable, Automobile Liability Insurance covering all motor vehicles, owned and operated and used or to be used by the Contractor directly or indirectly in the performance of the Work. The Limit of Liability shall not be less than $2,000,000 inclusive for loss or damage including personal injuries and death resulting from any one accident or occurrence;

(c) an all risks Installation Floater carrying adequate limits to cover all machinery, equipment, supplies and/or materials intended to enter into and form part of any installation.

D10.2 Deductibles shall be borne by the Contractor.

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

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

D11. PERFORMANCE SECURITY

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

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

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

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

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

D11.2 If the bid security provided in his/her Bid was not a certified cheque or draft pursuant to B11.1(c), the Contractor shall provide the City Solicitor with the required performance security within seven (7) Calendar Days of notification of the award of the Contract by way of letter of intent and prior to the commencement of any Work on the Site and in no event later than the date specified in the C4.1 for the return of the executed Contract.

D12. SUBCONTRACTOR LIST

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

D13. 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 not commence the Work on the Site before May 20, 2014, and shall commence the Work on Site no later than June 2, 2014, as directed by the Contract Administrator and weather permitting.

D14.4 The City intends to award this Contract by May 9, 2014.

D15. WORKING DAYS

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

D15.1.1 The Contract Administrator will determine daily if a Working Day has elapsed and will record his/her assessment. On a weekly basis the Contract Administrator will provide the Contractor with a record of the Working Days assessed for the preceding week. The Contractor shall sign each report signifying that he/she agrees with the Contract Administrator's determination of the Working Days assessed for the report period.

D15.1.2 Work done to restore the Site to a condition suitable for Work, shall not be considered "work" as defined in the definition of a Working Day.

D15.1.3 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 Saturdays, Sundays, Statutory Holidays and or Civic Holidays.

D16.2 The following work hour restrictions shall also apply:

(a) Pembina Highway(Southbound) - maintain a minimum of two lanes of traffic during peak traffic hours, between 15:30 to 17:30, Monday to Friday.

(b) Pembina Highway(Northbound) - maintain a minimum of two lanes of traffic during peak traffic hours, between 07:00 to 09:00, Monday to Friday.

(c) June 9, 2014 (Winnipeg Blue Bombers Home Game) – maintain a minimum of two lanes of traffic on Pembina Highway(Southbound & Northbound), between 15:30 hours to 20:00 hours, Monday.

(d) June 26, 2014 (Winnipeg Blue Bombers Home Game) – maintain a minimum of two lanes of traffic on Pembina Highway(Southbound & Northbound), between 15:30 hours to 20:00 hours, Thursday.

(e) July 3, 2014 (Winnipeg Blue Bombers Home Game) – maintain a minimum of two lanes of traffic on Pembina Highway(Southbound & Northbound), between 15:30 hours to 20:00 hours, Thursday.

(f) July 17, 2014 (Winnipeg Blue Bombers Home Game) – maintain a minimum of two lanes of traffic on Pembina Highway(Southbound & Northbound), between 15:30 hours to 20:00 hours, Thursday.

(g) August 7, 2014 (Winnipeg Blue Bombers Home Game) – maintain a minimum of two lanes of traffic on Pembina Highway(Southbound & Northbound), between 15:30 hours to 20:00 hours, Thursday.

(h) August 22, 2014 (Winnipeg Blue Bombers Home Game) – maintain a minimum of two lanes of traffic on Pembina Highway(Southbound & Northbound), between 15:30 hours to 20:00 hours, Friday.

D17. WORK BY OTHERS

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

(a) City of Winnipeg Transit – Remove and reinstall transit shelters, benches, T-Man Sign, Information Kiosk and Bus Stop Flag;

(b) City of Winnipeg Traffic Signals Branch – Installation of loops and signals plant;

(c) City of Winnipeg Graffiti/Festive Lighting Branch – Soda blasting lane lines;

(d) City of Winnipeg Traffic Services Branch – Traffic signage and line painting;

(e) City of Winnipeg Urban Forestry Branch – Review tree conditions;

(f) City of Winnipeg Geomatics Branch – Various works on survey monuments;

(g) MTS – Adjusting MTS manhole frames;

(h) SHAW – Relocating SHAW pedestal;

(i) Manitoba Hydro – Temporary overhead street lighting cables, moving of poles/bases and repair/relocation of underground street lighting cable.

D18. SEQUENCE OF WORK

D18.1 Further to C6.1, the sequence of work shall be as follows:

D18.1.1 The Work shall be divided into Stages . Each Stage shall be subdivided into major items of work.

D18.1.2 **Pembina Highway from University Crescent to Markham Road**

(a) **Stage I – Median Lane and Left Turn Lanes Pavement Rehabilitation/Pavement Widening – Pembina Highway Southbound from University Crescent to Markham Road and Pembina Highway Northbound from Markham Road to University Crescent**

(i) Planing of existing asphalt and concrete where required;

(ii) Removal of existing curb;

(iii) Excavation of boulevard;

(iv) Sewer service(CB lead) repair – Up to 3m long;

(v) Placement of separation geotextile fabric;

(vi) Placement and compaction of sub-base and base course material;

(vii) Construction of 200mm concrete pavement (reinforced);

(viii) Concrete pavement slab and joint work and adjustments to pavement structures and appurtenances;

(ix) Relocation of existing guard rail;

(x) Construction of monolithic concrete splash strip;

(xi) Construction of monolithic concrete median slab, safety median, concrete median slab and monolithic concrete bullnose;

(xii) Curb renewals;

(xiii) Installation of detectable warning surface tiles;

(xiv) Placing topsoil and finish grading;

(xv) Placing of scratch course of asphalt(southbound); and

(xvi) Placing of final lift of asphalt(northbound).

(b) Placing the topsoil and finished grading of all boulevard and median areas shall be completed prior to commencing construction of the asphaltic concrete overlay, including the scratch course.

(c) **Stage II – Gutter Lane Pavement Rehabilitation/Pavement Widening/Bus Stop Improvements – Pembina Highway Southbound from University Crescent to Markham Road and Pembina Highway Northbound from Markham Road to Chancellor Drive**

(i) Planing of existing asphalt and concrete where required;

(ii) Removal of existing curb;

(iii) Abandon T-Man Sign foundation, Kiosk foundation and Flag foundation;

(iv) Excavation of boulevard;

(v) Placement of separation geotextile fabric;

(vi) Placement and compaction of sub-base and base course material;

(vii) Construction of 200mm concrete pavement (reinforced);
(viii) Installation of catch pits/catch basin and drainage connection/sewer service pipe;
(ix) Concrete pavement slab and joint work and adjustments to pavement structures and appurtenances;
(x) Relocate electrical works for Bus Stop T-Man Sign and CBS Bus Stop Shelter;
(xi) Construction of Bus Stop T-Man Sign foundation, Information Kiosk foundation and Bus Stop Flag foundation;
(xii) Renewal of existing concrete sidewalk;
(xiii) Installation of detectable warning surface tiles;
(xiv) Construction of monolithic concrete curb and sidewalk with block-outs for interlocking paving stones;
(xv) Installation of directional tiles;
(xvi) Installation of interlocking paving stones;
(xvii) Construction of monolithic concrete splash strip;
(xviii) Construction of monolithic concrete bullnose;
(xix) Curb renewals and concrete boulevard works;
(xx) Placing topsoil and finish grading;
(xxi) Placing of scratch course of asphalt(southbound);
(xxii) Placing of final lift of asphalt(northbound); and
(xxiii) Supply and installation of inlaid longitudinal lane line marking tape(northbound).

(d) Placing the topsoil and finished grading of all boulevard and median areas shall be completed prior to commencing construction of the asphaltic concrete overlay, including the scratch course.

(e) **Stage III – Center Lane Pavement Rehabilitation – Pembina Highway Southbound from University Crescent to Markham Road**
(i) Planing of existing asphalt and concrete where required;
(ii) Concrete pavement slab and joint work and adjustments to pavement structures and appurtenances; and
(iii) Placing of scratch course of asphalt.

(f) **Stage IV – All Lanes – Pembina Highway Southbound from University Crescent to Markham Road**
(i) Placing final lift of asphalt on Stage I, Stage II and Stage III;
(ii) Supply and installation of inlaid longitudinal lane line marking tape; and
(iii) Laying of sod and/or seeding (if not done with placing of topsoil).

D18.1.3 The Contractor will be required to contact Manitoba Hydro at 204-480-5900 to arrange for a Safety Watch when excavating within three meters of the gas main. Safety Watch must be provided by Manitoba Hydro and the City shall bear all costs associated with the Safety Watch.

D18.1.4 All asphaltic concrete work shall be performed using a lane-at-a-time method (see E5 for minimum requirements of traffic lanes to be left open at various times).

D18.1.5 At the end of any day, there shall be no drop-off along any longitudinal joint, except the longitudinal joint between the gutter and approaches.

D18.1.6 Immediately following the completion of the asphaltic concrete works and installation of inlaid longitudinal lane line markings, the Contractor shall clean up the Site and remove all plant, surplus material, waste and debris, other than that left by the City or other Contractors.

D19. SUBSTANTIAL PERFORMANCE

D19.1 The Contractor shall achieve Substantial Performance within seventy (70) 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 seventy-five (75) 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 Total Performance in accordance with the Contract by the days fixed herein for same, the Contractor shall pay the City the following amounts per Working Day for each and every Working Day following the days fixed herein for same during which such failure continues:

(a) Total Performance – three thousand dollars ($3000.00).

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 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) Sodding maintenance as specified in CW 3510-R9;

(b) Seeding maintenance as specified in CW 3520-R7, E10;

(c) Reflective Crack Maintenance as specified in CW 3250-R7.

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

D23. ACCELERATED COMPLETION

D23.1 Description

D23.1.1 This Specification shall cover the accelerated completion of Pembina Highway from Markham Road to University Crescent.

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 number of Working Days specified for the Total Performance in D20.

D23.2.2 Reopening of the entire Site shall occur when all Work items listed in D18 are complete, including boulevard grading, topsoil, seed and Site cleanup.

D23.2.3 In recognition of the fact that an early completion of the Works in D18 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 on road rehabilitation 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 D20 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 D23.2.3 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 D18 is completed and safely reopened to vehicular and pedestrian traffic in advance of the number of Working days specified herein for Total Performance in D20, with all specified Works listed in D18 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 ($3000.00).

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 or location agreed to by the Contract Administrator and the Contractor. These meetings shall be attended by a minimum of one representative of the Contract Administrator and one representative of the Contractor. Each representative shall be a responsible person capable of expressing the position of the Contract Administrator 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).

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

D26.1 Further to B10.4, the Contractor/Subcontractor must, throughout the term of the Contract, have a Workplace Safety and Health Program meeting the requirements of The Workplace Safety and Health Act (Manitoba). At any time during the term of the Contract, the City may, at its sole discretion and acting reasonably, require updated proof of compliance, as set out in B10.4.

MEASUREMENT AND PAYMENT

D27. PAYMENT

D27.1 Further to C12, the City may at its option pay the Contractor by direct deposit to the Contractor's banking institution.

WARRANTY

D28. WARRANTY

D28.1 Warranty is as stated in C13.

D28.2 Notwithstanding C13.2, the warranty period shall begin on the date of Total Performance and shall expire four (4) years thereafter for inlaid longitudinal lane line marking tape unless extended pursuant to C13.2.1 or C13.2.2, in which case it shall expire when provided for thereunder.

FORM H1: PERFORMANCE BOND
(See D11)

KNOW ALL MEN BY THESE PRESENTS THAT

_____
(hereinafter called the "Principal"), and

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

_____

_____ dollars ($_____.____)

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

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

BID OPPORTUNITY NO. 1-2014

2014 REGIONAL STREET RENEWAL PROGRAM – PEMBINA HIGHWAY FROM MARKHAM ROAD TO UNIVERSITY CRESCENT REHABILITATION / ACTIVE TRANSPORTATION CORRIDOR AND ASSOCIATED WORKS
which is by reference made part hereof and is hereinafter referred to as the “Contract”.

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

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

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

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

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

_____ day of _____ , 20____ .

SIGNED AND SEALED
in the presence of:

_____
(Witness as to Principal if no seal)

_____
(Name of Principal)

Per: _____ (Seal)

Per: _____

_____
(Name of Surety)

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

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

_____
(Date)

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

RE: PERFORMANCE SECURITY – BID OPPORTUNITY NO. 1-2014

2014 REGIONAL STREET RENEWAL PROGRAM – PEMBINA HIGHWAY FROM MARKHAM ROAD TO UNIVERSITY CRESCENT REHABILITATION / ACTIVE TRANSPORTATION CORRIDOR AND ASSOCIATED WORKS

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

_____ ,
(Name of Contractor)

_____
(Address of Contractor)

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

_____

_____ Canadian dollars.

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

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

Partial drawings are permitted.

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

_____
(Address)

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

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

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

_____ .
(Date)

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

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

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

_____
(Name of bank or financial institution)

Per: _____
(Authorized Signing Officer)

Per: _____
(Authorized Signing Officer)

FORM J: SUBCONTRACTOR LIST
(See D12)

2014 REGIONAL STREET RENEWAL PROGRAM – PEMBINA HIGHWAY FROM MARKHAM ROAD TO UNIVERSITY CRESCENT REHABILITATION / ACTIVE TRANSPORTATION CORRIDOR AND ASSOCIATED WORKS

Portion of the Work	Name	Address
SURFACE WORKS:		
Supply of Materials:		
Geotextile Fabrics		
Sub-base and Base Course Material		
Concrete		
Asphalt		
Topsoil, Sod and Seed		
Interlocking Paving Stones		
Inlaid Longitudinal Lane Line Marking Tape		
Installation and Placement:		
Geotextile Fabrics		
Sub-base and Base Course Material		
Concrete		
Asphalt		
Topsoil, Sod and Seed		
Interlocking Paving Stones		
Joint Sealant		
Barrier Posts and Barrier Rails		
Inlaid Longitudinal Lane Line Marking Tape		

FORM J: SUBCONTRACTOR LIST
(See D12)

2014 REGIONAL STREET RENEWAL PROGRAM – PEMBINA HIGHWAY FROM MARKHAM ROAD TO UNIVERSITY CRESCENT REHABILITATION / ACTIVE TRANSPORTATION CORRIDOR AND ASSOCIATED WORKS

Portion of the Work	Name	Address
UNDERGROUND WORKS:		
Supply of Materials:		
Pre-cast Concrete Catch Pits/Catch Basin/Risers		
Drainage Connection/Sewer Service Pipes		
Catch Pit/Catch Basin/Manhole Frames, Covers, Boxes and Lifter Rings		
Watermain Valves/Service Boxes		
Installation and Placement:		
Pre-cast Concrete Catch Pits/Catch Basin/Risers		
Drainage Connection/Sewer Service Pipes		
Catch Pit/Catch Basin/Manhole Frames, Covers, Boxes and Lifter Rings		
Watermain Valves/Service Boxes		
Bus Stop T-Man Sign Foundation, Information Kiosk Foundation and Bus Stop Flag Foundation		
Electrical		

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*.

Drawing No.	Drawing Name/Title	Drawing (Original) Sheet Size
	Cover Sheet	A1
P-3353-1	Pembina Highway from Markham Road to University Crescent – Rehabilitation / Active Transportation Corridor and Associated Works from Sta. 1+00 to Sta. 1+50	A1
P-3353-2	Pembina Highway from Markham Road to University Crescent – Rehabilitation / Active Transportation Corridor and Associated Works from Sta. 1+50 to Sta. 3+00	A1
P-3353-3	Pembina Highway from Markham Road to University Crescent – Rehabilitation / Active Transportation Corridor and Associated Works from Sta. 3+00 to Sta. 4+50	A1
P-3353-4	Pembina Highway from Markham Road to University Crescent – Rehabilitation / Active Transportation Corridor and Associated Works from Sta. 4+50 to Sta. 6+00	A1
P-3353-5	Pembina Highway from Markham Road to University Crescent – Rehabilitation / Active Transportation Corridor and Associated Works from Sta. 6+00 to Sta. 7+50	A1
P-3353-6	Pembina Highway from Markham Road to University Crescent – Rehabilitation / Active Transportation Corridor and Associated Works from Sta. 7+50 to Sta. 9+00	A1
P-3353-7	Pembina Highway from Markham Road to University Crescent – Rehabilitation / Active Transportation Corridor and Associated Works from Sta. 9+00 to Sta. 10+50	A1
P-3353-8	Pembina Highway from Markham Road to University Crescent – Rehabilitation / Active Transportation Corridor and Associated Works from Sta. 10+50 to Sta. 11+75	A1
P-3353-9	Pembina Highway from Markham Road to University Crescent – Rehabilitation / Active Transportation Corridor and Associated Works – Pembina Highway/University Crescent Intersection	A1

Drawing No.	Drawing Name/Title	Drawing (Original) Sheet Size
P-3353-10	Pembina Highway from Markham Road to University Crescent – Rehabilitation / Active Transportation Corridor and Associated Works – Miscellaneous Details 1 of 3	A1
P-3353-11	Pembina Highway from Markham Road to University Crescent – Rehabilitation / Active Transportation Corridor and Associated Works – Miscellaneous Details 2 of 3	A1
P-3353-12	Pembina Highway from Markham Road to University Crescent – Rehabilitation / Active Transportation Corridor and Associated Works – Miscellaneous Details 3 of 3	A1
P-3353-13	Pembina Highway from Markham Road to University Crescent – Rehabilitation / Active Transportation Corridor and Associated Works – Inlaid Longitudinal Lane Line Markings	A1

E2. OFFICE FACILITIES

E2.1 The Contractor shall supply office facilities meeting the following requirements:

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

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

(c) The building shall have a minimum floor area of 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^{o}C or 24-25^{o}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, one table 3m x 1.2m, one stool and a minimum of 8 chairs.

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

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

E2.2 The Contractor shall be responsible for all installation and removal costs, all operating costs, and the general maintenance of the office facilities.

E2.3 The office facilities will be provided from the date of the commencement of the Work to the date of Substantial Performance.

E2.4 On a one time basis, where directed by the Contract Administrator, the Contractor shall relocate the office facilities to a location more convenient for the remaining Work.

E3. PROTECTION OF EXISTING TREES

E3.1 The Contractor shall take the following precautionary steps to prevent damage from construction activities to existing boulevard trees within the limits of the construction area:

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

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

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

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

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

E4. TRAFFIC CONTROL

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

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

(b) In accordance with the Manual of Temporary Traffic Control in Work Areas on City Streets, the Contractor ("Agency" in the manual) shall make arrangements with the Traffic Services Branch of the City of Winnipeg to place all temporary regulatory signs. The Contractor shall bear all costs associated with the placement of temporary traffic control devices by the Traffic Services Branch of the City of Winnipeg in connection with the works undertaken by the Contractor.

E5. TRAFFIC MANAGEMENT

E5.1 Further to clause 3.7 of CW 1130:

E5.1.1 Maintain a minimum of two lanes of traffic southbound and two lanes of traffic northbound during their respective construction times.

E5.1.2 Maintain a minimum of two lanes of traffic southbound and two lanes of traffic northbound for the 2014 Winnipeg Blue Bombers Home Game dates as specified for the Restricted Work Hours in D16.

E5.1.3 Where left turn lanes exist, an additional lane to accommodate the left turn storage lane shall be maintained at all times.

E5.1.4 Westbound/Eastbound traffic at Chancellor Drive and Pembina Highway intersection must be maintained during construction to allow for one lane of traffic in the westbound direction and one lane of traffic in the eastbound direction. When no work is being performed in the intersection and providing it is safe for vehicles, west and east lane closures in the intersection will not be permitted.

E5.1.5 West/East traffic at Markham Road and Pembina Highway intersection must be maintained during construction to allow for one lane of traffic in each direction to go straight through

and to turn left. When no work is being performed in the intersection and providing it is safe for vehicles, west and east lane closures in the intersection will not be permitted.

E5.1.6 Intersecting street and private approach access shall be maintained at all times.

E5.1.7 Should the Contractor be unable to maintain pedestrian or vehicular access to a residence or business, he/she shall review the planned disruption with the business or residence and the Contract Administrator, and take reasonable measures to minimize the impact. The Contractor shall provide a minimum of 24 hours notification to the affected residence or business and the Contract Administrator, prior to disruption of access.

E5.1.8 Pedestrian and ambulance/emergency vehicle access must be maintained at all times.

E5.1.9 Winnipeg Transit service shall be maintained at all times.

E6. WATER OBTAINED FROM THE CITY

E6.1 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.

E7. SURFACE RESTORATIONS

E7.1 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.

E8. INFRASTRUCTURE SIGNS

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

E9. SUPPLY AND INSTALLATION OF PAVEMENT REPAIR FABRIC

DESCRIPTION

E9.1 General

E9.1.1 This specification covers the supply and installation of pavement repair fabric.

E9.1.2 Referenced Standard Construction

(a) CW 3130 – Supply and Installation of Geotextile Fabrics.

MATERIALS

E9.2 Storage and Handling

E9.2.1 Store and handle material in accordance with Section 2 of CW 3130.

E9.3 Pavement Repair Fabric

E9.3.1 Pavement repair fabric will be Glas Grid Road Reinforcement Mesh - Style 8501 or approved equal.

CONSTRUCTION METHODS

E9.4 General

E9.4.1 Install pavement repair fabric at random locations as directed by the Contract Administrator.

E9.4.2 The extent of the placement limits and quantities required will be determined by the Contract Administrator and provided 48 hours prior to the placement of asphalt.

E9.4.3 Proceed with installation upon completion and acceptance of the asphalt levelling course.

E9.4.4 Install fabric in accordance with the manufacturer's specifications and recommendations.

E9.4.5 Only construction equipment required to place the final asphalt surface course will be allowed to travel on the exposed fabric.

E9.4.6 Replace damaged or improperly placed fabric.

E9.4.7 Ensure temperature of the asphalt material does not exceed the melting point of the fabric.

MEASUREMENT AND PAYMENT

E9.5 Pavement Repair Fabric

E9.5.1 The supply and installation of the pavement repair fabric will be measured on an area basis and paid for at the Contract Unit Price per square metre for "Pavement Repair Fabric". The area to be paid for will be the total number of square metres of pavement repair fabric supplied and installed in accordance with this specification, accepted and measured by the Contract Administrator.

E10. SALT TOLERANT GRASS SEEDING

DESCRIPTION

E10.1 Further to CW 3520 and CW3540, this specification shall cover sub-grade preparation and the supply and placement of Salt Tolerant Grass Seed.

MATERIALS

E10.2 Salt Tolerant Grass Seed

E10.2.1 Salt Tolerant Grass Seed for regional and collector boulevards, medians and interchange areas shall be a mixture composed of:

(a) Seventy percent (70%) Fults or Nuttals Alkaligrass (Puccinellia spp.), twenty percent (20%) Audubon or Aberdeen Creeping Red Fescue and ten percent (10%) Perennial Ryegrass.

EQUIPMENT

E10.3 Scarification equipment shall be suitable for the area being scarified, shall be capable of scarifying the sub-grade to the specified depth and shall be accepted by the Contract Administrator. For confined areas a toothed bucket may be acceptable. For larger areas tilling equipment may be required.

CONSTRUCTION METHODS

E10.4 Preparation of Existing Grade

E10.4.1 Prior to placing topsoil, in areas to be seeded greater in width than 600mm, prepare the existing sub-grade by scarifying to a minimum depth of 75mm and to a maximum depth of 100mm to the satisfaction of the Contract Administrator.

E10.4.2 Scarification shall consist of breaking up and loosening the sub-grade. No scarification shall occur within the edge of a tree canopy (or drip line).

E10.5 Salt Tolerant Grass Seeding

E10.5.1 Salt Tolerant Grass Seed shall be sown at a rate of 2.2 kilograms per 100 square meters.

MEASUREMENT AND PAYMENT

E10.6 Supply, placement and maintenance of Salt Tolerant Grass Seed will be paid for at the Contract Unit Price per square metre for "Salt Tolerant Grass Seeding", measured as specified herein, which price shall be payment in full for supplying all materials and for completing all operations herein described and all other items incidental to the work included in this Specification. Payment for Salt Tolerant Grass Seeding shall be in accordance with the following:

(a) Sixty five (65%) percent of quantity following supply and placement.

(b) Remaining thirty five (35%) percent of quantity following termination of the Maintenance Period.

E11. TREE REMOVAL

E11.1 Further to CW 3010 – Clearing and Grubbing, tree removal including the roots shall be measured on a unit basis for the number of trees removed in accordance with CW 3010. Payment shall be at the Contract Unit Price bid for “Tree Removal” measured as specified herein for the total number of trees removed in accordance with this Specification, accepted and measured by the Contract Administrator.

E12. MONOLITHIC CURB AND 100MM CONCRETE SIDEWALK WITH BLOCK-OUTS FOR INTERLOCKING PAVING STONES

GENERAL

E12.1 Further to Specification CW 3325 the Contractor shall construct the proposed Monolithic Curb and 100mm Concrete Sidewalk with Block-outs for Interlocking Paving Stones with a minimum 100mm depth of concrete below pavers. The “block-outs” shall be constructed utilizing forming techniques capable of accommodating the proposed paving stones to the dimensions and tolerances as confirmed with interlocking paving stone manufacturer.

E12.2 A 50mm levelling course of Base Course Material will be used for the Monolithic Curb and 100mm Concrete Sidewalk with Block-outs for Interlocking Paving Stones.

E12.3 The concrete sidewalk shall be poured such that the “block-outs” and remaining sidewalk act as a monolithic section.

E12.4 All costs in connection with the additional forming and placement of concrete as a result of the “block-outs”, shall be included in the Contract Unit Price for Monolithic Curb and 100mm Concrete Sidewalk with Block-outs for Interlocking Paving Stones.

E12.5 Where concrete sidewalk is to be poured up to adjacent buildings, an approved bond breaker shall be supplied and installed from the base of the concrete slab up to the concrete surface. Cost of the bond breaker shall be included in the Contract Unit Price for Monolithic Curb and 100mm Concrete Sidewalk with Block-outs for Interlocking Paving Stones.

MEASUREMENT AND PAYMENT

E12.6 Construction of Monolithic Curb and 100mm Concrete Sidewalk with Block-outs for Interlocking Paving Stones will be measured on an area basis and paid for at the Contract Unit Price per square metre for “Monolithic Curb and 100mm Concrete Sidewalk with Block-outs for Interlocking Paving Stones”. The area to be paid for will be the total number of square metres constructed of Monolithic Curb and 100mm Concrete Sidewalk with Block-outs for Interlocking

Paving Stones in accordance with this Specification, accepted and measured by the Contract administrator.

E12.7 The supply, placement and compaction of Base Course Material for Monolithic Curb and 100mm Concrete Sidewalk with Block-outs for Interlocking Paving Stones shall be included in the cost of Monolithic Curb and 100mm Concrete Sidewalk with Block-outs for Interlocking Paving Stones and no separate measurement and payment will be made.

E13. UNIT PAVER INSERT FOR BUS STOP

DESCRIPTION

E13.1 Further to CW 3330 this Specification shall cover the:

(a) Supply and installation of interlocking paving stones (unit pavers),

(b) Supply and installation of sand setting bed,

(c) Supply and installation of grout.

E13.2 The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all other things necessary or and incidental to the satisfactory performance and completion of all Work as hereinafter specified.

MATERIALS

E13.3 Concrete interlocking paving stones (unit pavers) shall be Holland Stone Pavers and Cycle Pavers, supplied by Barkman Concrete, contact Wayne Wiebe, phone 667-3310, as shown on the Drawings and as follows:

(a) Blue Holland Stone 105 x 210 x 60mm

(b) Charcoal Holland Stone 105 x 210 x 60mm

(c) Natural Holland Stone 105 x 210 x 60mm

(d) Yellow Cycle Paver 305 x 605 x 100mm

E13.4 Contractor to provide the Contract Administrator a colour sample of the Cycle Paver prior to production.

E13.5 Sand:

(a) Clean brick sand as joint filler,

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

E13.6 Grout:

(a) Grout as specified hereinafter shall be used for grouting paving stone and brick in areas indicated on the drawings. The grout shall have a compressive strength of 25 MPA at 28 days, determined on 50 mm cubes stored and tested in accordance with ASTM C109, and shall consist of normal Portland cement, sand and water.

(b) The water-cement ratio shall be kept in the range of 0.45 to 0.55.

(c) The grout shall have between 3% and 5% entrained air.

(d) Acryl-Stik or approved equal to be used in grout at approximately 4 litres Acryl-Stik to 3 litres water.

(e) Admixtures to be used in the grout shall be supplied in accordance with the requirements of the City of Winnipeg Standard CW 3310.

(f) The grout shall be of a consistency suitable for the application intended as approved by the Contract Administrator.

(g) The Contractor shall provide the Contract Administrator with a mix design statement certifying the constituent materials and mix proportions that will be used in the grout for approval prior to construction.

CONSTRUCTION METHODS

E13.7 Interlocking paving stones shall be installed in block out in concrete sidewalk or on granular base as per the Drawings.

E13.8 If cutting of existing concrete sidewalk is required, this shall be incidental to the pay item described in this specification.

E13.9 Install sand setting bed for pavers on granular base as shown on the Drawings.

E13.10 Contractor to verify the exact dimensions of pavers and panels prior to construction of block outs in concrete sidewalk.

E13.10.1 Install concrete sidewalk as specified on Drawings.

E13.10.2 Install sand bed to minimum 13mm depth as specified on Drawings. Adjust depth of pavers under areas to be re-levelled to ensure surface of pavers is flush with adjacent paving.

E13.10.3 Do not compact setting bed prior to installation of pavers.

E13.10.4 Spread only sufficient area which can be covered with pavers same day.

E13.10.5 Lay pavers on sand bed hand tight.

E13.10.6 In areas where pavers are to be grouted in place clean existing concrete, install grout bed and then place pavers on grout.

E13.10.7 Grout between pavers as required ensuring stability.

E13.10.8 Remove adjacent pavers in bands as required to ensure that bricks do not require cutting on straight bands.

E13.10.9 Where paving pattern is interrupted by vertical structural elements pavers must be sawcut and fit true and hand tight.

E13.10.10 Commence installation of pavers against edge to obtain straightest possible course for installation.

E13.10.11 Pavers shall be cut with a saw only, to obtain true even undamaged edges. Chipped pavers are unacceptable.

E13.10.12 Crews shall Work on installed pavers, not on sand layer.

E13.10.13 Spread and fine grade brick sand over paving surface and sweep into joints, in several directions. Sand is incidental to the price for supply and installation of pavers.

E13.10.14 Place plywood sheet on top of Yellow Broadway Paver before compaction to protect ridges. Ridges on Yellow Broadway Paver to be flush with top of sidewalk. Compact all pavers with vibratory plate compactor having mass of at least 113kg. Compaction is incidental to the price for supply and installation of paving stone.

E13.10.15 Sweep remaining sand over all paving areas and remove from Site.

E13.10.16 Replace at no extra cost all whole or cut stones marked as unacceptable.

E13.10.17 Remove cracked, chipped, broken or otherwise damaged paving materials from Site immediately.

E13.10.18 Upon completion, clean in accordance with manufacturer's recommendations.

MEASUREMENT AND PAYMENT

E13.11 Measurement and payment for the supply and installation of “Interlocking Paving Stones” shall be as per City of Winnipeg Specification CW 3330.

E14. CAST-IN-PLACE CONCRETE FOUNDATIONS

E14.1 Description

(a) The Work covered under this Item shall include all concreting operations related to construction of cast-in-place concrete foundations in accordance with this Specification and as shown on the Drawings.

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

E14.2 Materials

E14.2.1 General

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

E14.2.2 Handling and Storage of Materials

(a) All materials shall be handled and stored in a careful and workmanlike manner, to the satisfaction of the Contract Administrator. Storage of materials shall be in accordance with CSA Standard A23.1-04.

E14.2.3 Testing and Approval

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

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

E14.2.4 Patching Mortar

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

E14.2.5 Cement

(a) Cement shall be Type HS or HSb, high-sulphate-resistant hydraulic cement, conforming to the requirements of CSA Standard A23.1-04.

E14.2.6 Concrete

(a) General

(i) Concrete repair material shall be compatible with the concrete substrate.

(b) The Contractor shall be responsible for the design and performance of all concrete mixes supplied under this specification. Either ready mix concrete or proprietary repair mortars, where applicable, may be used having the following minimum properties in accordance with CSA A23.1-04:

(i) Class of Exposure: S-1

(ii) Compressive Strength @ 56 days = 35 MPa

(iii) Water / Cementing Materials Ratio = 0.4

(iv) Air Content: Category 2 per Table 4 of CSA A23.1-04 (4-7%)

(v) Cement – shall be as specified in E14.2.5

(c) Mix design for ready mix concrete shall be submitted to Contract Administrator at least two weeks prior to concrete placing operations.

(d) The workability of each concrete mix shall be consistent with the Contractor's placement operations. Self compacting concrete may be used for the foundations.

(e) Any proposed proprietary repair mortar shall be subject to the approval of the Contract Administrator and must meet or exceed the properties of the ready mix concrete.

(f) The temperature of all types of concrete shall be between 15˚C and 25˚C at discharge. Temperature requirements for concrete containing silica fume shall be between 10˚C and 18˚C at discharge unless otherwise approved by the Contract Administrator.

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

E14.2.7 Aggregate

(a) The Contractor shall be responsible for testing the fine and coarse aggregates to establish conformance to these specifications, and the results of these tests shall be provided to the Contract Administrator if requested. All aggregates shall comply with CSA A23.1.

(b) Coarse Aggregate

(i) The maximum nominal size of coarse aggregate shall be sized to suit the Contractor's mix design. Gradation shall be in accordance with CSA A23.1, Table 11, Group 1. The coarse aggregate shall satisfy the Standard Requirements specified in CSA A23.1, Table 12, "Concrete Exposed to Freezing and Thawing".

(ii) Coarse aggregate shall consist of crushed stone or gravel or a combination thereof, having hard, strong, durable particles free from elongation, dust, shale, earth, vegetable matter or other injurious substances. Coarse aggregate shall be clean and free from alkali, organic or other deleterious matter; and shall have an absorption not exceeding 2.25%.

(iii) The aggregate retained on the 5 mm sieve shall consist of clean, hard, tough, durable, angular particles with a rough surface texture, and shall be free from organic material, adherent coatings of clay, clay balls, and excess of thin particles or any other extraneous material.

(iv) Coarse aggregate when tested for abrasion in accordance with ASTM C131 shall not have a loss greater than 30%.

(v) Tests of the coarse aggregate shall not exceed the limits for standard for requirements prescribed in CSA A23.1, Table 12, for concrete exposed to freezing and thawing.

(c) Fine Aggregate

(i) Fine aggregate shall meet the grading requirements of CSA A23.1, Table 10, Gradation FA1.

(ii) Fine aggregate shall consist of sand, stone, screenings, other inert materials with similar characteristics or a combination thereof, having clean, hard, strong,

durable, uncoated grains free from injurious amounts of dust, lumps, shale, alkali, organic matter, loam, or other deleterious substances.

(iii) Tests of the fine aggregate shall not exceed the limits for standard requirements prescribed in CSA A23.1, Table 12.

E14.2.8 Cementing Materials

(a) Cementing materials shall conform to the requirements of CSA A3001.

(b) Silica Fume

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

(c) Fly Ash

(i) Fly ash shall be Type C1 or Type F and shall not exceed 25% by mass of cement.

(d) Cementitious materials shall be stored in a suitable weather-tight building that shall protect these materials from dampness and other destructive agents. Cementitious materials that have been stored for a length of time resulting in the hardening or formation of lumps shall not be used in the Work.

E14.2.9 Admixtures

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

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

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

(d) Appropriate low range water reducing and/or superplasticizing admixtures shall be used in concrete containing silica fume. Approved retarders or set controlling admixtures may be used for concrete containing silica fume.

(e) An aminocarboxylate based migrating corrosion inhibitor admixture shall be used in concrete that will be used as a repair material that will either be in contact with or adjacent to reinforcing steel in existing concrete. Proposed admixtures shall be subject to the approval of the Contract Administrator.

E14.2.10 Water

(a) Water used for mixing concrete shall be clean and free from injurious amounts of oil, acid, alkali, organic matter, or other deleterious substances. It shall be equal to potable water in physical and chemical properties.

E14.2.11 Concrete Supply

(a) Concrete shall be proportioned, mixed, and delivered in accordance with the requirements of CSA A23.1, except that the transporting of ready mixed concrete in non-agitating equipment will not be permitted unless prior written approval is received from the Contract Administrator.

(b) Unless otherwise directed by the Contract Administrator, the discharge of ready mixed concrete shall be completed within 120 minutes after the introduction of the mixing water to the cementing materials and aggregates.

(c) The Contractor shall maintain all equipment used for handling and transporting the concrete in a clean condition and proper working order.

E14.2.12 Reinforcing Steel

(a) Reinforcing steel shall be deemed to include all reinforcing bars, tie-bars, and dowels.

(b) All reinforcing steel shall conform to the requirements of CSA Standard G30.18, Grade 400 W, Billet-Steel Bars for Concrete Reinforcement. All reinforcing steel shall be new deformed billet steel bars. All bars, including ties, shall be hot-dip galvanized

in accordance with CSA Standard G164 for a minimum net retention of 600 g/m^2. Reinforcing steel supply and installation will be incidental to construction of concrete foundation and no separate payment will be made.

E14.2.13 Anchor Bolts, Nuts, and Washers

(a) Anchor bolts, nuts, and washers shall be supplied by the Contract Administrator.

(b) Anchor bolt supply and installation will be incidental to construction of concrete foundation and no separate payment will be made.

E14.2.14 Anchor Bolt Templates

(a) Anchor bolt templates shall be supplied by the Contract Administrator.

(b) Anchor bolt templates will be incidental to construction of new concrete foundation and no separate payment will be made.

E14.2.15 Fibre Joint Filler

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

E14.2.16 Anti-Graffiti Coating

(a) Anti-graffiti coating shall be “Professional Water Sealant & Anti-Graffiti System” or approved equivalent by Contract Administrator.

E14.2.17 Waterproofing Membrane

(a) Waterproofing membrane shall be “Sonoshield HLM 5000 R” or approved equivalent by the Contract Administrator.

E14.2.18 Miscellaneous Materials

(a) Miscellaneous materials shall be of the type specified on the Drawings or approved by the Contract Administrator.

E14.3 Construction Methods

E14.3.1 Location and Alignment of Foundations

(a) Foundation construction shall not commence until the Contractor has obtained clearance from the appropriate Utility Authorities.

(b) Foundations shall be placed in the positions shown on the Drawings and as directed by the Contract Administrator in the field.

(c) The deviation of the axis of any finished foundation shall not differ by more than 1 percent from the vertical.

E14.3.2 Buried Utilities

(a) The Contractor shall exercise extreme caution when constructing the foundations in the vicinity of existing buried utilities and buildings. The Drawings show the approximate locations of existing buried utilities. The Contractor shall be responsible for obtaining the exact location of the buried utilities from the appropriate Utility Authorities prior to installing the foundations.

(b) The proposed locations of the foundations may be changed by the Contract Administrator if they interfere with the buried utilities.

(c) The Contractor shall be responsible for all costs that may be incurred for repair/rectification of any damage caused to the existing buried utilities as a result of the Contractor's operations in constructing cast-in-place concrete foundations, as determined by the Contract Administrator.

E14.3.3 Excavation

(a) The Contractor is responsible for determining the excavation method at each foundation location.

(b) Excavations for foundations shall be made with equipment designed to remove a core of the diameter shown on the Drawings, or hydro-jet excavation to a depth to bypass and/or expose adjacent utilities.

(c) Upon reaching the required elevation, the bottom of the excavation shall be cleaned as directed by the Contract Administrator in the field.

(d) All excavated material from the foundations shall be promptly hauled away from the Site to an approved disposal area as located by the Contractor.

(e) Upon completion of the cleaning out of the bottom to the satisfaction of the Contract Administrator, the reinforcement and anchor bolts shall be set in place and the concrete poured immediately. Under no circumstances shall a hole be left to stand open after boring has been completed.

E14.3.4 Sleeving

(a) Timber or steel sleeving shall be used to temporarily line the bore to prevent bulging or caving of the walls and to protect men at work in the bore.

(b) The sleeving shall be designed by the Contractor and constructed to resist all forces that may tend to distort it.

(c) The sleeving shall be withdrawn as the concrete is placed in the bore. The sleeving shall extend at least 1 m below the top of the freshly deposited concrete at all times.

(d) The clearance between the face of the bore hole and the sleeving shall not exceed 75 mm.

E14.3.5 Inspection of Bores

(a) Concrete shall not be placed in a bore until the bore has been inspected and approved by the Contract Administrator.

(b) The Contractor shall have available suitable light for the inspection of each bore throughout its entire length.

(c) All improperly set sleeving, bore, or bottom shall be corrected to the satisfaction of the Contract Administrator.

E14.3.6 Placing Reinforcing Steel

(a) Reinforcement shall be:

(i) Placed in accordance with the details shown on the Drawings,

(ii) Rigidly fastened together, and

(iii) Lowered into the bore intact before concrete is placed.

(b) Spacers shall be utilized to properly locate the reinforcing steel cage in the bore.

E14.3.7 Placing Anchor Bolts

(a) The anchor bolts shall be aligned with a steel template supplied by the Contract Administrator matching the bolt holes in the sign structure base plate. **Extreme care shall be used in this operation to ensure bolts are aligned properly.** Placement of anchor bolts without the steel template will not be permitted.

(b) The threaded portion of the anchor bolts projecting above the top surface of foundation shall be coated with oil, before the concrete is poured, to minimize the fouling of threads splattered by concrete residue.

E14.3.8 Placing Metal Bases

(a) Contractor to install metal bases as supplied by the Contract Administrator following curing of concrete foundations.

(b) Metal bases are to be installed plumb, level, and flush to the concrete foundation. Contractor to use stainless steel washers to level bases as required.

E14.3.9 Forms

(a) Forms for exposed surfaces that require an "ordinary surface finish" shall be made of good quality plywood, or an approved equivalent, or uniform thickness, with or without a form liner.

(b) Architectural concrete form liner shall be as specified on the Plans or equivalent as approved by the Engineer.

(c) Permeable formwork liner shall be Drainoform, Zemdrail II, or equivalent as approved by the Engineer.

(d) Formwork materials shall conform to CSA Standard CAN/CSA-A23.1, and American Concrete Publication SP:4, "Formwork for Concrete".

(e) No "stay-in-place" formwork or falsework is permitted.

(f) Form sheeting plywood to be covered with form liner or to be directly in contact with soil shall be exterior Douglas Fir, concrete form grade, conforming to CSA Standard O121-M1978, a minimum of 20 mm thick.

(g) Where form liner is not being used, form sheeting shall be Douglas Fir, overlay form liner type conforming to CSA Standard O121-M1978. Approved manufacturers are "Evans" and "C-Z".

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

(i) No formwork accessories will be allowed to be left in place within 50 mm of the surface following form removal. Items to be left in place, must be made from a non-rusting material or galvanized steel; and they shall not stain, blemish, or spall the concrete surface for the life of the concrete.

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

(k) Studding shall be spruce or pine and shall have such dimensions and spacing that they shall withstand distortion from all the forces to which the forms will be subjected. Minimum dimensions shall be 50 mm x 150 mm.

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

(m) All forms are incidental to these Works and must be removed by the Contractor once adequate strength and curing of the concrete has been achieved.

(n) The forms shall be sufficiently rigid to prevent lateral or vertical distortions from the loading environment to which they shall be subjected. Forms shall be set to the design grades, lines, and dimensions, as shown on the Drawings.

E14.3.10 Placing Concrete

(a) Care shall be taken to ensure that anchor bolts are vertically aligned and that anchor bolts and conduits are properly positioned prior to placement of concrete.

(b) Concrete shall not have a free fall of more than 2.0 m and shall be placed so that the aggregates will not separate or segregate. The slump of the concrete shall not exceed 110 mm. The concrete shall be vibrated throughout the entire length of the foundation.

(c) Concrete shall be placed to the elevations as shown on the Drawings. The top surface of the foundation shall be finished smooth and even with a hand float.

(d) The shaft shall be free of water prior to placing of concrete. Concrete shall not be placed in or through water unless authorized by the Contract Administrator.

E14.3.11 Protection of Newly Placed Concrete

(a) Newly laid concrete threatened with damage by rain, snow, fog, or mist shall be protected with a tarpaulin or other approved means.

E14.3.12 Construction Joints

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

(b) In lieu of shear keys, the Contractor may roughen the surface as follows. The surface shall be rough, with a minimum amplitude of 6 mm. Acceptable procedures to obtain this rough surface are as follows:

(i) By removing the mortar from between the larger aggregate particles with a water jet and soft brush when the concrete is in a semi-hardened state (green-cut).

(ii) By first applying a chemical retarder to the surface and then removing the mortar from the larger aggregate particles with a water jet and brush.

(c) The face of joints shall be cleaned of all laitance and dirt, after which the cementitious grout or an approved bonding agent shall be applied. Forms shall be retightened, and all reinforcing steel shall be thoroughly cleaned at the joint prior to concreting.

E14.3.13 Curing Concrete

(a) The top of the freshly finished concrete foundations shall be covered and kept moist by means of wet polyester blankets immediately following finishing operations and shall be maintained at above 10ºC for at least seven (7) consecutive days thereafter.

(b) After the finishing is completed, the surface shall be promptly covered with a minimum of a single layer of clean, damp polyester blanket.

(c) Concrete shall be protected from the harmful effects of sunshine, drying winds, surface dripping or running water, vibration, and mechanical shock. Concrete shall be protected from freezing until at least twenty-four hours after the end of the curing period.

(d) Changes in temperature of the concrete shall be uniform and gradual and shall not exceed 3º in one hour or 20º in twenty-four hours.

E14.3.14 Form Removal

(a) Forms shall not be removed for a period of at least 24 hours after the concrete has been placed. Removal of forms shall be done in a manner to avoid damage to, or spalling of, the concrete.

(b) The minimum strength of concrete in place for safe removal of forms shall be 20 MPa.

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

E14.3.15 Patching of Formed Surfaces

(a) Immediately after forms around top of foundation have been removed, but before any repairing or surface finishing is started, the concrete surface shall be inspected by the Contract Administrator. Any repair of surface finishing started before this inspection may be rejected and required to be removed.

(b) All formed concrete surfaces shall have bolts, ties, struts, and all other timber or metal parts not specifically required for construction purposes cut back fifty (50) mm from the surface before patching.

(c) Minor surface defects caused by honeycomb, air pockets greater than 5 mm in diameter, and voids left by strutting, and tie holes shall be repaired by removing the

defective concrete to sound concrete, dampening the area to be patched and then applying patching mortar. A slurry grout consisting of water and cement shall be well-brushed onto the area to be patched. When the slurry grout begins to lose the water sheen, the patching mortar shall be applied. It shall be struck-off slightly higher than the surface and left for one hour before final finishing to permit initial shrinkage of the patching mortar and it shall be touched up until it is satisfactory to the Contract Administrator. The patch shall be cured as specified in this Specification, and the final colour shall match the surrounding concrete.

E14.3.16 Cold Weather Concreting

(a) Protection of concrete shall be considered incidental to its placement. The temperature of the concrete shall be maintained at or above 10ºC for a minimum of three (3) days or till the concrete has reached a minimum compressive strength of 20 MPa, by whatever means are necessary. Concrete damaged as a result of inadequate protection against weather conditions shall be removed and replaced by the Contractor at his own expense. Also, concrete allowed to freeze prior to the three (3) days will not be accepted for payment.

E14.3.17 Anti-Graffiti Coating

(a) Anti-graffiti coating shall be applied to all planter walls shown on the drawings or identified by the Contract Administrator.

(b) The anti-graffiti coating shall be applied according to manufactures specifications.

(c) Maintain anti-graffiti coating on all vertical concrete surfaces for a period of two (2) years.

E14.3.18 Waterproofing

(a) Waterproofing membrane shall be applied to all new concrete planter interior walls and existing concrete columns within the planters which will come into contact with planting soil, as identified on the drawings or by the Contract Administrator. The waterproofing membrane shall be roller applied according to manufactures specifications.

E14.3.19 Quality Control

(a) All workmanship and all materials furnished and supplied under this Specification are subject to close and systematic inspection and testing by the Contract Administrator, including all operations from the selection and production of materials, through to final acceptance of the Work. The Contractor shall be wholly responsible for the control of all operations incidental thereto notwithstanding any inspection or approval that may have been previously given. The Contract Administrator reserves the right to reject any materials or Works that are not in accordance with the requirements of this Specification.

(b) The Contractor shall be responsible for making a thorough inspection of materials to be supplied under this Contract. All material shall be free of surface imperfections and other defects.

E14.4 Measurement and Payment

E14.4.1 Construction of Cast-in-Place Concrete Foundations

(a) Construction of cast-in-place concrete foundations will be measured on a unit basis and will be paid for at the Contract Unit Price per foundation for the “Items of Work” listed here below for concrete foundations constructed in accordance with this Specification and accepted by the Contract Administrator.

(i) Items of Work:

Cast-in-Place Concrete Foundations

(a) Bus Stop T-Man Sign Foundation
(b) Information Kiosk Foundation
(c) Bus Stop Flag Foundation

E15. ELECTRICAL WORKS

GENERAL PROVISIONS

E15.1 Refer also to Drawings.

E15.2 Disconnect all signs on Site to be relocated or removed. Coordinate with Transit and site works contractors for timing of work and site access requirements.

E15.3 All sites to be left in a safe manner for installation of new Work.

E15.4 Furnish all labour, new material, equipment and services for the complete installation of the electrical Work as shown on the plans and specified. Complete system to operate to total satisfaction of the responsible professional engineer.

E15.5 Conform with all Codes and pay all permits and Fees. Upon completion, present a “Certificate of Approval” for electrical Work from the Inspection Department.

E15.6 Examine the Site and local conditions affecting the Work under this contract.

E15.7 Install all Work promptly and in advance of concrete pouring and/or construction.

E15.8 The Contractor shall be responsible to make good all “Cutting and Patching” required by his section of the Contract. Include all trenching, backfilling and surface repair. Contractor to push wires where possible at all locations.

E15.9 All Work shall be executed in a first class and workmanlike manner. All supports, hangers, and securing devices shall be solid and substantial. All Work shall be laid out neatly in its mechanical appearance. It shall be logically arranged for simplicity of installation and accessibility.

E15.10 Provide corrected “as-built” drawings on completion of the project. All underground services shall be indicated on as-builts and dimensioned.

E15.11 Provide shop drawings for approval of all major electrical items. Provide three (3) copies of manufacturers maintenance instructions bound in hard covered book for each piece of major electrical equipment.

E15.12 Identify circuits/equipment with lamacoid nameplates.

E15.13 All electrical apparatus shall be properly grounded according to the latest edition of the “Canadian Electrical Code”

E15.14 All equipment, wiring, conduit, grounding, seals, etc., shall be in compliance with the latest edition of the “Canadian Electrical” and local “Codes”. Wiring in finished grade shall be in rigid PVC conduits, complete with ground conductor.

E15.15 Wiring shall be copper, RWU-90, insulated, minimum #12 AWG.

E15.16 Wire and connect to signs where indicated. Provide lockable, weatherproof disconnect switches for each sign as shown on the drawings. Locate as directed on Site.

E15.17 Co-ordinate disconnection, reconnection and installation with Manitoba Hydro and City of Winnipeg. Installation to conform with all utility requirements.

E15.18 Obtain all permits and inspections. Provide copies of all paperwork to the Contract Administrator prior to completion of the Work.

E15.19 Installation of signs will be provided by Transit. Coordinate for electrical connection requirements and timing of installation.

E15.20 Provide ground rod and grounding connections to suit Manitoba Hydro and City of Winnipeg Inspection Department.

E15.21 All distribution equipment to be weather proof.

E15.22 The Contractor shall carefully examine all drawings relating to the Work, to be certain that the Work under this Contract can be carried out and, prior to the submission of his/her Bid in accordance with B4, report at once to the Contract Administrator any defect, discrepancy, omission or interference affecting the work of this section or the guarantee of same.

E15.23 The Contractor shall be responsible for any damage caused the City or their Contractors by improperly carrying out this contract.

E15.24 The Contractor shall guarantee the satisfactory operation of all work and apparatus included and installed under this section for a period of twelve (12) calendar months after the final acceptance of the project.

MEASUREMENT AND PAYMENT

E15.25 Electrical Work for each location will be measured and paid on a lump sum basis which price shall be payment in full for completing all operations herein described and all other items incidental to the Work included in this Specification.

E16. REMOVAL, SALVAGE AND REINSTALLATION OF EXISTING ALUMINUM BALANCED BARRIER

DESCRIPTION

E16.1 General

E16.1.1 Further to CW 3650, this Specification covers the removal, salvage and reinstallation of existing aluminum balanced barrier as specified on the Contract Drawing or as directed by the Contract Administrator. The Work to be done under this Specification shall include the furnishings 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 specified.

E16.1.2 Referenced Standard Construction Specifications:

(a) CW 3650 – Installation of Aluminum Balanced Barrier

MATERIALS

E16.2 Handling and Storage of Materials

E16.2.1 The Contractor shall be responsible for the safe storage and handling of all materials set forth in this Specification.

E16.2.2 Any damaged or missing material or components resulting from handling and storage operations shall be replaced at the Contractor's expense, to the satisfaction of the Contract Administrator.

E16.3 Aluminum Balanced Barrier

E16.3.1 Replacement components for the aluminum rail installation will be supplied by the City of Winnipeg, unless deemed by the Contract Administrator that the Contractor did not use acceptable removal procedures resulting in excessive damage to aluminum rail components.

E16.4 Aluminum Balanced Barrier Components

E16.4.1 Salvaged barrier railing, splicing bars and clamp bars deemed to be in good condition based on the pre-removal inspection shall be used for reinstallation.

E16.4.2 Splice bars and clamp bars with cap screws broken into them due to the Contractor's removal operation shall be deemed in good condition. The Contractor has the option to drill out and re-tap the holes or replace with new material at his expense.

E16.4.3 Salvaged barrier posts deemed to be in good condition after they are removed from the ground and cleaned shall be used for reinstallation.

E16.4.4 Should there not be sufficient salvaged material in good condition available on site, the Contractor shall be responsible for picking up the material from the City Bridge Yard located at 849 Ravelston Avenue. Contact Mike Terleski, C.E.T. at 204-794-8510 or 204-986-5004 to arrange a suitable time and date for pick up.

E16.5 Granular Backfill Material

E16.5.1 Granular backfill material shall conform to the requirements of Section 5.5 of CW 3650. Crushed limestone base course is not allowed for use.

E16.6 Alkali-resistant Bituminous Paint

E16.6.1 Alkali-resistant bituminous paint shall conform to the requirements of Section 5.6 of CW 3650.

CONSTRUCTION METHODS

E16.7 Pre-Removal Inspection

E16.7.1 Prior to the removal and dismantling of the aluminum balanced barrier, the Contractor and Contract Administrator shall jointly inspect the barrier taking note of any damage above ground level and determining which components cannot be used for reinstallation.

E16.7.2 The layout and location of the barrier posts, railing and rail splices shall be recorded by the Contractor for locations requiring reinstallation. Generally, the barrier rail splice location for top and bottom rails shall be staggered at alternate post locations, 300 mm past the barrier post in the direction of adjacent traffic. If the existing installations do not conform to this layout, the Contract Administrator will provide a revise layout prior to reinstallation. Additional rails, posts, splice bars and clamp bars will be supplied by the City of Winnipeg if sufficient salvaged material is not available on site.

E16.8 Removal of Aluminum Balance Barrier

E16.8.1 Further to Section 9.6 of CW 3650, removal of the barrier railing components shall be undertaken in a careful and workmanlike manner. Materials damaged through negligent operations shall be replaced by the Contractor at his own expense.

E16.8.2 A minimum of 48 hours prior to commencement of dismantling operations, the Contractor shall spray all the existing cap screws with an anti-seize compound or penetrating oil to the satisfaction of the Contract Administrator.

E16.8.3 All cap screws shall be initially loosened with a hand wrench to limit the number of broken cap screws in clamp bars and splice bars. Once loosened, the bolts may be removed with an impact wrench unless otherwise directed by the Contract Administrator.

E16.9 Inspection and Preparation of Barrier Posts

E16.9.1 After barrier posts are removed, all posts shall be thoroughly cleaned to the satisfaction of the Contract Administrator.

E16.9.2 The Contract Administrator will inspect the cleaned posts and determine the ones that can be used for reinstallation.

E16.9.3 All new and existing posts shall be coated with alkali-resistant bituminous paint in accordance to Section 9.4 of CW 3650.

E16.10 Reinstallation of Aluminum Balanced Barrier

E16.10.1 The reinstallation of aluminum balanced barrier shall be at the locations shown on the Drawings or as directed by the Contract Administrator.

E16.10.2 The installation and acceptance of the barrier shall be in accordance with Section 9 of CW 3650.

E16.11 Salvaging of Existing Aluminum Balanced Barrier

E16.11.1 Further to Section 9.6 of CW 3650, all damaged, corroded or unused aluminum rail, post and components shall be delivered to the City Bridge Yard located at 849 Ravelston Avenue. Contact Mike Terleski, C.E.T. at 204-794-8510 or 204-986-5004 to arrange a suitable time and date for delivery.

E16.11.2 Further to Section 5.2 of CW 3650, the salvaged material shall be properly placed in the City Bridge Yard at location determined by City personnel in a manner accepted by the City.

E16.12 Measurement and Payment

E16.12.1 Removal, Salvage and Reinstallation of Existing Aluminum Balanced Barrier will be measured and paid for in accordance with City of Winnipeg Standard Construction Specification CW 3650.

E16.12.2 Delivery of damaged, corroded or unused aluminum balanced barrier material to City Bridge Yard shall be included in payment for Removal, Salvage and Reinstallation of Existing Aluminum Barrier and no further payment shall be made.

E17. SOFT EXCAVATION TO EXPOSE UNDERGROUND UTILITIES

DESCRIPTION

E17.1 This specification covers the soft excavation to expose underground utilities to determine the depth of the underground utility and whether it will interfere with the excavation, pavement widening and sewer Works on Pembina Highway.

E17.2 At various locations on Pembina Highway, a 200mm diameter high pressure gas pipeline runs along the length of the median boulevard of Pembina Highway from Markham Road to University Crescent.

METHODS

E17.3 Prior to commencement of excavation, pavement widening and sewer Works in median boulevard of Pembina Highway, the Contractor shall use soft digging or hand excavation to expose the 200mm diameter high pressure gas pipeline along the median.

E17.4 Locations of soft digging to expose the underground utilities will be every 25 meters and as required between median openings.

E17.5 The Contractor shall follow all procedures for working around the high pressure gas pipelines as required by Manitoba Hydro.

MEASUREMENT AND PAYMENT

E17.6 Soft digging of earthen material to expose underground utilities will be measured on an hourly basis and paid for at the Contract Unit Price per hour for “Soft Excavation to Expose Underground Utilities”. The hours to be paid for will be the total number of hours of soft digging in accordance with this Specification, accepted and measured by the Contract Administrator.

E18. SUPPLY AND INSTALLATION OF INLAID LONGITUDINAL LANE LINE MARKING TAPE

DESCRIPTION

E18.1 This specification covers the supply and installation of inlaid longitudinal lane line marking tape in asphaltic concrete overlay for Pembina Highway from Markham Road to University Crescent.

GENERAL

E18.2 Drawing and Manuals

(a) Drawing P-3353-13 – Inlaid Longitudinal Lane Line Markings

(b) Attached Manual; 3M Stamark™ Tapes Pavement Surface Preparation and Application Techniques

(c) Attached Manual; 3M Stamark™ Pavement Marking Tape – Application Guidelines for Pavement Markings in Grooved Pavement Surfaces

E18.3 Material

E18.3.1 PB 380I ES - 3M™ Stamark™ High Performance Tape Series 380I ES (white)

E18.3.2 Surface Preparation Adhesive P-50 for 3M™ Stamark™ Pavement Marking Tape

E18.4 Source

E18.4.1 3M Canada Company

Available from:

Guardian Traffic Services
982 Powell Avenue
Winnipeg, Manitoba, R3H 0H6
Ph: 204-233-1600

E18.5 Preparation and Installation

E18.5.1 Soda blasting of existing painted lane lines by City of Winnipeg Graffiti/Festive Lighting Branch on Pembina Highway(northbound) from Markham Road to University Crescent.

E18.5.2 Prepare the asphaltic concrete overlay surface in accordance with Manufacturer's pavement surface preparation and application techniques manual (attached).

E18.5.3 Groove asphaltic concrete overlay and install pavement marking tape in accordance with Manufacturer's installation manual (attached).

MEASUREMENT AND PAYMENT

E18.6 Supply and installation of inlaid longitudinal lane line marking tape will be measured on a length basis and paid for at the Contract Unit Price per metre for "Supply and Installation of Inlaid Longitudinal Lane Line Marking Tape". The length to be paid for will be the total number of metres of inlaid longitudinal lane line marking tape supplied and installed in accordance with this specification, accepted and measured by the Contract Administrator.

E18.7 Preparation and grooving of existing asphaltic concrete overlay for inlaid longitudinal lane line marking tape shall be included in the cost of "Supply and Installation of Inlaid Longitudinal Lane Line Marking Tape" and no separate measurement and payment will be made.

MANUALS

Stamark™ Tapes Pavement Surface Preparation and Application Techniques

Information Folder 5.7 **November 2009**

Replaces IF 5.7 dated March 2009

Introduction 2
Product Application Requirements 3
Adhesive Series of Stamark Tapes 3
Inlay Application of Long Lines 4
Inlay Application of Transverse Markings 6
Overlay Application of Long Lines 8
Overlay Application of Transverse Markings 11
Storage 15
Removal 15
Health and Safety 15
Caution 15
Appendix A. Pavement Surface Types 16
Appendix B. Surface Preparation Adhesives 17
Appendix C. Road Type Surface Preparation Adhesive Application Recommendations 18
Literature Reference 18

Introduction

This information folder contains pavement surface preparation requirements and application procedures for 3M™ Stamark™ Pavement Marking Tapes. It is important that users be completely knowledgeable of all application requirements and procedures prior to product application. Instructions contained in this folder must be followed for material replacement provisions to be considered valid. Material replacement provisions are described in the appropriate product bulletins.

It is the responsibility of the installer to contact the 3M sales representative or 3M technical service representative whenever there is a question regarding application procedures or conditions.

3M™ Stamark™ Tape General Product Summary

Stamark tapes are durable, reflective pavement marking tapes used to mark asphalt and concrete surfaces. Stamark high performance tape is available in white or yellow, standard widths and roll sizes, and A series (unlinered), L series (linered) or N series (no liner and no adhesive). It is also available in legend and symbol patterns. Below is a summary of each series of Stamark tape along with recommendations for appropriate uses.*

3M™ Stamark™ High Performance Wet Reflective Tape Series 380WR ES, 380WR-5ES, 380AW, and 380AW-5

Stamark high performance wet reflective tape is a durable pavement marking tape, highly retroreflective under both wet and dry conditions. Stamark Series 380WR ES and 380AW tape utilizes specially designed optics to provide wet and dry performance. Stamark Series 380AW tape can be used as an inlay marking on new asphalt or as an overlay marking on most asphalt and concrete pavement surfaces in good condition. Series 380WR-5 ES and 380AW-5 consists of standard white pavement marking tape with a 1-1/2 inch wide black edge to provide contrast on light colored asphalt or portland cement concrete surfaces.

3M™ Stamark™ High Performance Tape Series 390, 390-5, 380IES and 380I-5 ES

Stamark high performance tape is a durable, conformable pavement marking providing a high degree of retroreflectivity and durability. This pavement marking tape is manufactured with a patterned surface that presents a near vertical profile to the motorist to maximize retroreflectance and a pliant polymer conformance layer for long term durability. Recommended for a wide variety of uses including long line, gore areas, and intersections (low to medium shear, light truck traffic only) for inlay, grooved and overlay applications. Series 390-5 and 380I-5 ES consists of standard white pavement marking tape with a 1-1/2 inch wide black edge to provide contrast on light colored asphalt or portland cement concrete surfaces.

3M™ Stamark™ Pavement Marking Tape Series 270 ES

Stamark pavement marking tape is manufactured with a polymer conformance layer for durability and a patterned surface for reflectivity. Recommended for a wide variety of uses including intersection and longitudinal markings.

* See Information Folder 3.2 for information on 3M™ Stamark™ Removable Pavement Marking Tapes.

3M™ Stamark™ Pavement Marking Tape Series 310

Stamark pavement marking tape combines 3M's technology in beads, topcoats and adhesives which results in a pavement marking solution with good durability, retroreflectivity and appearance. Recommended for lane and edge lines on roads with medium to low traffic volumes, and is avaiable in symbols and legends.

Overlay Product Application Requirements

The following general requirements apply to all Stamark tape applications:

- Temperatures
  Air and surface Temperature: Minimum 40°F (4°C) and rising.

  Overnight Air Temperature: Minimum 40°F (4°C) the night before tape application is recommended. If the temperature falls below 40° F, inspect the pavement surface for visible signs of moisture (dew, frost, etc.).
- Overlay applications must be completed within the seasonal start and end dates for a particular region as indicated in the 3M Climate Guide for 3M™ Stamark™ Pavement Marking Tapes.

3M Climate Guide Season	Surface Preparation Adhesive P-50 (or E-44T) Required?
Within Seasonal Start and End Dates	*IS NOT* Required
Outside Seasonal Start and End Dates	*IS* Required

(Note: Regions not covered in the Climate Guide must follow minimum temperature requirements.)

- **The pavement surface must be clean and dry. No rainfall within 24 hours prior to application. Other visible signs of moisture (dew or frost) cannot be present.**
- Butt splices must be used; do not overlap tape ends.
- Traffic must be kept off of pavement surfaces coated with a surface preparation adhesive prior to tape application.

Adhesive Series of Stamark Tapes

"A" Series: Tapes with pressure sensitive adhesive.

"A" Series tapes are shipped on a roll with a release agent top coating on the pavement marking surface. The adhesive on the back of the tape is ready for placement on the road surface once the tape is peeled from the roll.

"L" Series: Tapes with liner and pressure sensitive adhesive.

"L" Series tapes are available in both long line pavement markings as well as all symbols and legends. "L" Series tapes are shipped with a liner on the adhesive backing of the tape to allow for ease of handling prior to placement on the road surface. The liner is removed just before placement on the pavement.

"N" Series: Tapes with no liner and no pressure sensitive adhesive.

"N" Series tapes are manufactured with no adhesive backing on the tape. Application of "N" series tapes must be made using 3M™ Stamark™ Contact Cement E-44T with a three-coat system, including one coat of E-44T on the tape back surface and two coats on the pavement.
(See Appendix B for more information.)

A 3M Traffic Safety Systems Division technical service representative can be contacted at 1-800-553-1380 in the U.S. or at 1-800-265-1840 in Canada; when prompted, select technical service and then select pavement marking products.

Product Application

3M™ Stamark™ tapes can be applied by an inlay application (embedding pavement marking tape into fresh asphalt) or by an overlay application (applying tape on existing surface). The tapes can also be overlaid on a grooved surface. Refer to IF 5.18 for more information about a grooved application

Inlay Application of Long Lines

Including edge, lane and channelizing lines

Stamark tapes with pressure sensitive adhesive (A Series) can be applied on fresh asphalt before the finishing roller passes over the surface. Inlaying is the process of embedding pavement marking tape into the road surface. This is done by rolling over the applied tape with a steel-drum finishing roller while the asphalt is still warm. ***(See Figure 1.)***

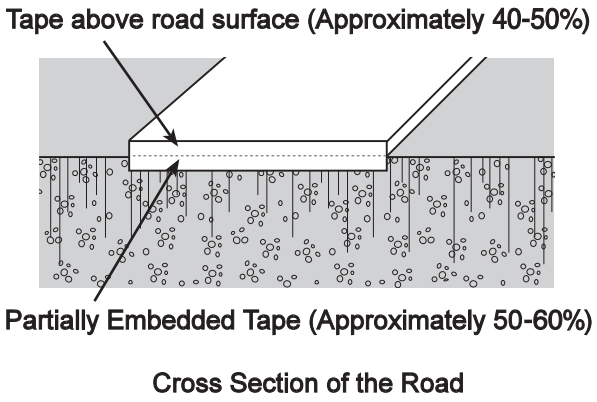


Figure 1.

PROCEDURE

1. Pave a lane.
Lanes should be paved so that the tape will not be placed on the asphalt seams between lanes. Generally, the width of the first lane should be approximately 12 inches (30.5 cm) short of center (for example, a 12-foot [3.7 m] wide lane should be paved at 11 feet [3.3 m] wide). The second pass will then be paved 13 feet (4.0 m) wide, for a total road width of 24 feet (7.3 m). Center line markings will then be applied on a fresh, warm mat during paving of the adjacent lane, at least 4 inches (10 cm) from the asphalt seam.

2. Compact the fresh asphalt.

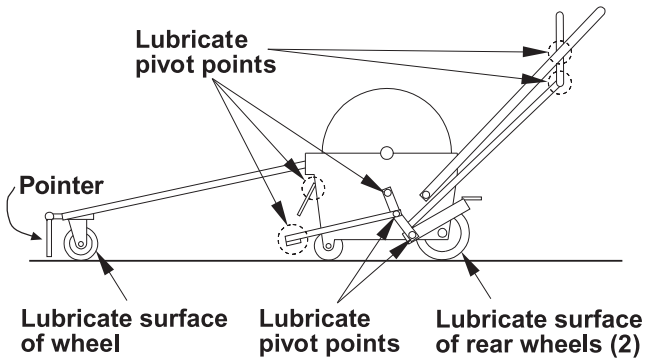
3. Premark the road.
Use 200-250 feet (60-70 m) of sash, chain or thin wire cable as a guide for long line applications or snap chalk lines on the asphalt. For skip line application, mark the skip sequence on a sash chain or with chalk or paint to be followed by the pointer on a tape applicator. ***(See Figure 2.)***
Example: A sash chain marked to the proper skip sequence with 1-inch (2.5 cm) spiral key rings.

4. Test the asphalt surface.
The pavement surface must be soft enough to allow the marking to be inlaid by the steel-drum finishing roller (a ten-ton finishing roller is recommended).

Generally, the desired surface temperature will be between 130°F (54°C) and 160°F (71°C). Using a surface thermometer, test the temperature of the asphalt surface. There is no minimum air temperature requirement for an inlay tape application; however, be advised that cooler air temperatures will result in faster cooling of the asphalt reducing the application window.

Note: If you are using a stiffer mix, rubber-based mix (rubberized asphalt), Superpave, OGFC (Open Grade Friction Course) or SMA (Stone Matrix Asphalt), you may need to increase the temperature at which the tape is recessed with a finishing roller to reach the desired amount of embedment into the surface. Inlay the tape with the finishing roller while the surface temperature is warm enough to get approximately 50 to 60 percent of the tape's thickness below the asphalt surface. Do not exceed 180°F (83°C).

5. Lubricate the tape applicator.
Prepare the Manual Highway Tape Applicator for use. Spray the rear rubber wheels, front wheel, and pivot points of the tape applicator with 3M™ 5-way Penetrant, WD-40™ or equivalent light oil spray. The rear wheels and pointer wheel should be sprayed regularly to avoid asphalt build-up. *Note: Wheels may also be wrapped with duct tape. Replace regularly to avoid buildup.* ***(See Figure 2.)***



Manual Highway Tape Applicator

Figure 2.

Inlay Application of Long Lines *(continued)*

6. Procedure for Threading Tape If Using the Manual Highway Tape Applicator.

Load the tape and thread over the 2-inch (5.08 cm) diameter roll, adhesive side up. (Figure 3) Feed the tape in between the side frame connecting rod and the 2 inch aluminum roller, then through the CLAMP to the CUTTER PLATE. Adjust the GUIDE BARS at the sides of the tape rolls to hold them securely in position.

DO NOT thread tape over the 1/2 inch diameter side frame connecting rod. This will create excessive unwind tension and stretching of the tape.

Caution: Do not activate the cutting knife with the foot pedal while threading tape!

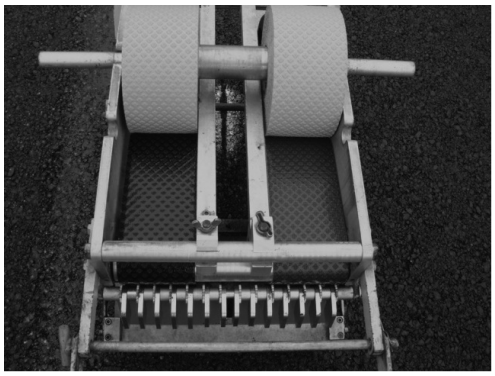


Figure 3

7. Apply the tape.

Apply the tape using the Manual Highway Tape Applicator (MHTA). Make sure you do not apply the tape any closer than 4 inches (10.16 cm) from the asphalt seam. ***(See Figure 4.)***

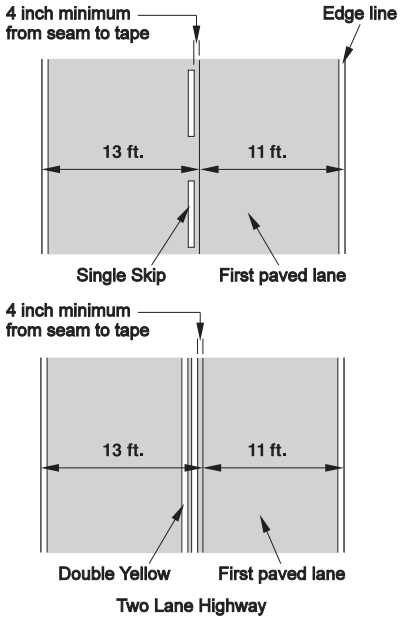


Figure 4.

If pavement markings are applied using the manual highway tape applicator, the weight of the tape applicator roller will be adequate to cause the adhesive to tack with the fresh asphalt prior to rolling with the steel-drum roller. If pavement markings are placed by hand (i.e., shorter, individual skip marks), walk on the tape first to tack the adhesive on the asphalt and then roll the tape using one pass with a Roller Tamper Cart RTC-2 with 50-100 lb. (45 kg) prior to rolling with a steel-drum finishing roller.

8. Press the tape into the pavement.

Using a tandem steel-drum finishing roller (no vibration), slowly roll over the tape to press (inlay) it into the warm pavement surface. The tape should always be rolled (first pass) in the same direction it was applied. The speed of the finishing roller should be kept to a minimum (between 2 and 3 mph [3 and 5 kmh]) when rolling over the tape during the first pass. Use a minimum amount of water to clean and lubricate the steel drums during the inlay operation. ***(See Figure 5.)***

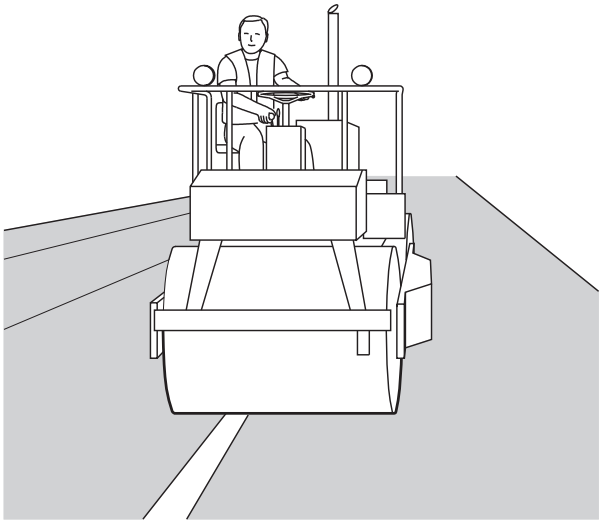


Figure 5.

Note: For best inlay results the weight of the steel-drum roller should be greater than 110 PLI (Pounds per Lineal Inch) of drum width.

$$PLI = \frac{\text{Total weight of roller (pounds)}}{\text{Total length of drums (inches)}}$$

Typically, a 3-5 ton 42 inch wide roller will apply over 140 PLI.

Inlay Application of Long Lines *(continued)*

Under normal conditions, two passes of the finishing roller is required to inlay the tape. Some stiffer asphalt mixes may need three passes with the finishing roller while the asphalt is still warm in order to inlay the tape properly. An inlay is considered successful when approximately 50 to 60 percent of the tape's thickness is below the asphalt surface. ***(See Figure 1 on page 4.)***

Note: If the tape wrinkles or distorts severely in front of the roller, the mat temperature may be too hot or the roller speed may be too fast. Allow the surface to cool slightly and retry. ***Do not remove the inlaid tape*** *since removal of the tape will remove the asphalt.*

9. Repeat Steps 1-8 until the road is fully marked.

10. Open the road to traffic.

As soon as the inlay operations are complete and the asphalt has cooled to temperatures that support vehicles without surface damage, the road may be opened to traffic.

Note: Tape pattern is important for visibility performance. An improper inlay may cause tape pattern flattening. A measured increase of applied tape width greater than 1/8 inch (3mm) may be an indication that pattern flattening has occurred.

Inlay Application of Transverse Markings

Including crosswalks, stopbars, gore markings, symbols and legends

3M™ Stamark™ Pavement Marking Tapes with pressure sensitive adhesive (A Series [no liner] and L Series [with liner; also includes precut symbols and legends known as SMS-L Series]) can be applied on fresh asphalt before the finishing roller has passed over the surface. Inlaying is the process of embedding the pavement marking tape into the road surface. This is done by rolling over the applied tape with a finishing roller while the asphalt is still warm. ***(See Figure 6.)***

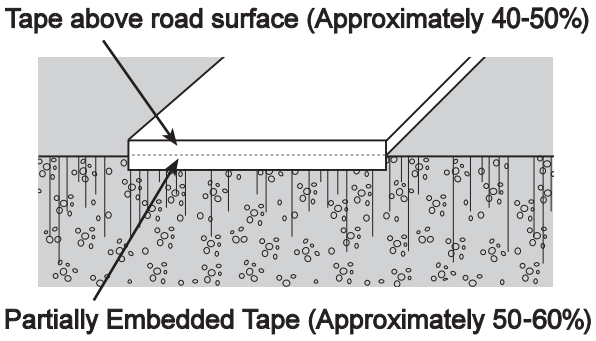


Figure 6.

PROCEDURE

1. Pave a lane. ***(See Step 1 on Page 4.)***

2. Compact the fresh asphalt.

3. Premark the road. Using chalk or keel, outline the area where the marking will be applied.

4. Test the asphalt surface.

The pavement surface must be soft enough to allow the marking to be inlaid by the steel-drum finishing roller.

Generally, the desired surface temperature will be between 130°F (54°C) and 160°F (71°C). Using a surface thermometer, test the temperature of the asphalt surface. There is no minimum air temperature requirement for an inlay tape application; however, be advised that cooler air temperatures will result in faster cooling of the asphalt reducing the application window.

Note: If you are using a stiffer mix, rubber-based mix (rubberized asphalt), Superpave, OGFC (Open Grade Friction Course) or SMA (Stone Matrix Asphalt), you may need to increase the temperature at which the tape is recessed with a finishing roller to reach the desired amount of embedment into the surface. Inlay the tape with the finishing roller while the surface temperature is warm enough to get approximately 50 to 60 percent of the tape's thickness below the asphalt surface. Do not exceed 180°F (83°C).

5. Apply the tape.

Apply the tape by hand.

Cut the tape approximately 12 inches (30.5 cm) short of the asphalt seam or edge. Once the adjacent lane is paved, the tape should meet the end of the tape placed in the first paved lane. Do not overlap the material. Use butt splices. ***(See Figure 7.)***

After the next length of tape is placed and butt-spliced with the tape placed during paving of the first lane, the tape will not be inlaid through the 12-inch wide area between the seam and butt splice. To prevent tape loss in snowplow regions from this small area of tape overlay, use a utility

knife to score a relief cut across the width of the tape just outside the seam and into the inlay area. ***(See Figure 7.)***

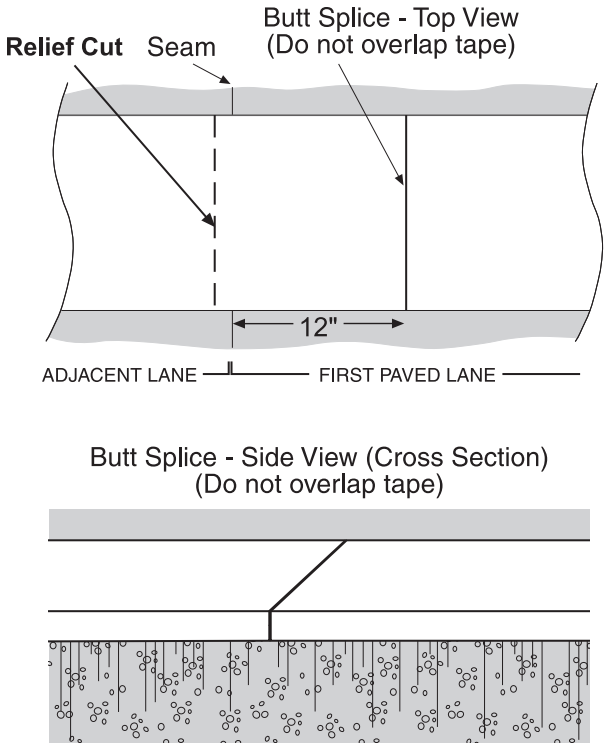


Figure 7.

For material with liner (L Series), including legends and symbols:

Position the marking and peel back the liner. Refer to IF 5.8 for Liner removal techniques. Press the exposed tape down. Slowly remove the rest of the liner as the tape is carefully guided into place.

6. Tamp the tape.

Use a Roller Tamper Cart RTC-2 loaded with **100 pounds (45 kg)** (two standard 50-pound weights) to get initial tack of the tape to the asphalt. This tamping of the tape should always be done in the same direction as the marking was applied (lengthwise, not crosswise). **Start in the center of the marking**, then work toward the edges of the tape to remove trapped air. Make sure all the edges of the tape are thoroughly tamped. Do not twist or turn the tamper cart on the tape. One pass over each area is sufficient. ***(See Figure 8.)***

If the tape folds or distorts in front of tamper center, remove one 50 lb weight and continue tamping.

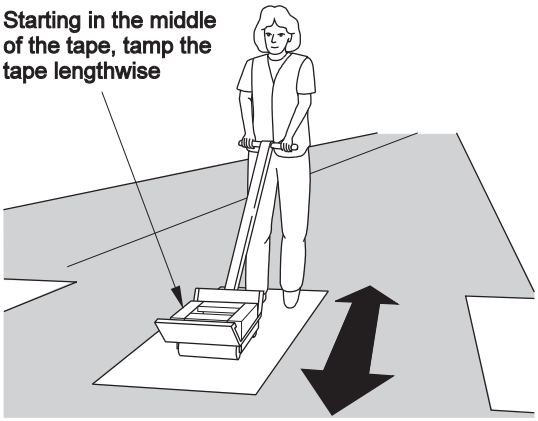


Figure 8.

7. Press the tape into the pavement.

Using a tandem steel-drum finishing roller with no vibration, slowly roll over the tape to press (inlay) it into the warm pavement surface. Roll back and forth in a straight line over the same section of tape before moving over to the next section. The speed of the finishing roller should be kept to a minimum (between 2 and 3 mph [3 and 5 kph]) when rolling over the tape. Use a minimum amount of water to clean and lubricate the steel drums during the inlay operation. ***(See Figure 9.)***

Note: For best inlay results the weight of the steel-drum finishing roller should be greater than 110 (Pounds per Lineal Inch) PLI of drum width.

$$PLI = \frac{\text{Total weight of roller (pounds)}}{\text{Total length of drums (inches)}}$$

Use a smaller roller (3-5 ton) for intersection markings if one is available. Smaller rollers are generally more maneuverable and allow the markings to be inlaid more efficiently. It may be possible to inlay intersection markings in a longitudinal direction to the markings if the roller is small and the operator is experienced.

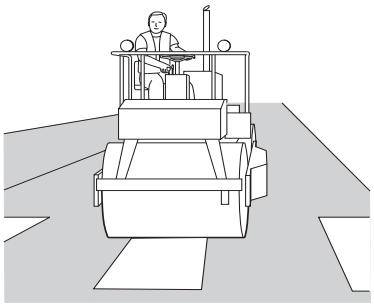


Figure 9.

Inlay Application of Transverse Markings *(continued)*

Under normal conditions, two passes back and forth of the finishing roller are required to inlay the tape. Some stiffer asphalt mixes may need three passes with the finishing roller while the asphalt is still warm in order to inlay the tape properly. An inlay is considered successful when approximately 50 to 60 percent of the tape's thickness is below the asphalt surface.

Note: *If the tape wrinkles or distorts severely in front of the roller, the mat temperature may be too hot or the roller speed may be too fast. Allow the surface to cool slightly and retry.* ***Do not remove the inlaid tape*** *since removal of the tape will remove the asphalt.*

8. Repeat Steps 1-7 until the road is fully marked.

9. Open the road to traffic.

As soon as the inlay operations are complete and the asphalt has cooled to temperatures that support vehicles without surface damage, the road may be opened to traffic.

Note: Tape pattern is important for visibility performance. An improper inlay may cause tape pattern flattening. A measured increase of applied tape width greater than 1/8 inch (3mm) may be an indication that pattern flattening has occurred.

Overlay Application of Long Lines

Including edge, lane and channelizing lines

PROCEDURE

This procedure explains how to apply tape to a concrete or asphalt surface in the form of edge, lane, and channelizing lines. Before you begin, make sure your environment meets all the product application requirements on page 3.

3M™ Stamark™ Surface Preparation Adhesive P-50 is generally the recommended surface preparation adhesive for long line pavement marking tape application, except in a few specific applications.

Use this chart to determine the proper tape and type of surface preparation adhesive to use.
(See Appendix B for application coverage guidelines)

Long line application	Recommended Tape Series	Asphalt 0-3 days old	Asphalt 4-10 days old	Asphalt >10 days old	Concrete (b)
Edge Line	A	None	P-50	P-50	P-50
Center or Lane Line	A	None	P-50	P-50	P-50
Channelization Line	A	None	P-50	P-50	P-50
Edge Line at High Vehicle Crossover Location (a)	A or N	None	None	P-50 (c)	P-50 (c)

Notes:

a. Examples could include edge lines across high volume road access points or high volume crossover traffic through a median area with edge lines.

b. New concrete surfaces open to traffic less than 90 days must have the curing compound removed prior to application of surface preparation adhesive and pavement markings.

c. P-50 is the only Surface Preparation Adhesive recommended for use with Series 380AW, 390, 380WR ES, 380I ES, 310 or 270 ES tapes on long line applications.

Overlay Application of Long Lines *(continued)*

1. Determine road surface conditions.

a. If surface is new concrete open to traffic less than 90 days, remove curing compound by sandblasting, shotblasting, light grinding, or hydroblasting.

b. If markings exist on the roadway, remove markings from the surface by sandblasting or grinding. A minimum of 90 percent of the road surface under the existing markings must be exposed prior to tape application.

c. Applying Stamark Tape over longitudinal joints is not recommended. Premature tape failure can occur as joints can shift and degrade over time. Concrete joints that are wider or deeper than normal can prevent the tape from conforming to the road surface. As joint maintenance is required, the markings can be damaged by maintenance equipment and joint fillers. If application over any joint is necessary, cut the tape 1 inch (2.54cm) away from the joint on both sides.

2. Clean the road.

Clean the surface of the road where the tape will be applied. Clean the surface using a high pressure, high velocity compressed air blower with minimum 185 cfm airflow and 120 psi at the air nozzle. There should be no more than 50 feet of 3/4-inch ID hose from the compressor to the air nozzle and the air nozzle should be no less than 1/2-inch ID. The compressor should also be equipped with a moisture and oil trap. It is recommended that the air nozzle be no more than 2 feet from the ground. A street sweeper or pick-up broom may also be effective to remove larger or adhered debris, but will require a final pass with the air compressor to completely clean the surface. The road surface must be dry.

3. Premark the road. ***(See Step 3 on Page 4.)***

4. Determine if surface preparation adhesive (P-50) is required. Refer to product bulletin for tape to be applied.

a. If no adhesive is required, go to Step 7.

b. If adhesive is required, go to Step 5.

Note: If you have any questions, contact 3M Technical Services at 1-800-553-1380. Follow the automatic prompt to reach technical service to determine if surface preparation adhesive is needed.

5. Apply the adhesive (P-50 only).

Using a Spray Applicator PS-14, apply a thin, uniform coat of P-50 adhesive to the pavement. The adhesive should extend at least 1 inch (2.5 cm) beyond the premarked area where the edges of the tape will be applied. ***(See Figure 10.)*** The PS-14 applicator is designed to spray a 6-inch (15.2 cm) wide pattern for application of 4-inch (10.2 cm) wide tape. The typical wet thickness is 6-7 mil.

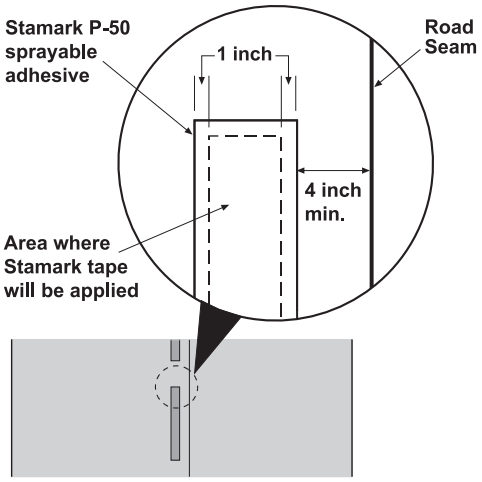


Figure 10.

Adjust the arm of the PS-14 applicator up or down so that the spray pattern is 6 inches (15.2 cm) wide. ***(See Figure 11.)***

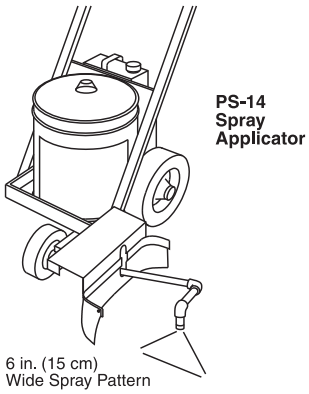


Figure 11.

Note: If you are using tape wider than 4 inches, **spray multiple passes, overlapping the previous pattern by 1-2"**. Allow additional time for overlapped areas to set. See Appendix B to determine the amount of adhesive that is needed to cover a specific area.

6. Allow the adhesive to set.

Allow the P-50 to set. P-50 is set when it feels tacky but is no longer in liquid form and has a matte finish rather than a glossy wet appearance. P-50 dries quickly (to a set state) under most circumstances. Typical time for P-50 to set is 2 to 3 minutes under optimal conditions of 70°F (21°C) and medium to low humidity levels.

Overlay Application of Long Lines *(continued)*

7. Procedure for Threading Tape If Using the Manual Highway Tape Applicator.

Load the tape and thread over the 2-inch (5.08 cm) diameter roll, adhesive side up. (Figure 12) Feed the tape in between the side frame connecting rod and the 2 inch aluminum roller, then through the CLAMP to the CUTTER PLATE. Adjust the GUIDE BARS at the sides of the tape rolls to hold them securely in position.

DO NOT thread tape over the 1/2 inch diameter side frame connecting rod. This will create excessive unwind tension and stretching of the tape.

Caution: Do not activate the cutting knife with the foot pedal while threading tape!

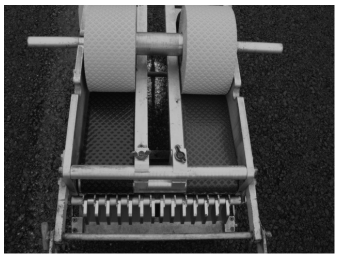


Figure 12

8. Apply the tape.

Note: This list is not inclusive and other tape application equipment has been used successfully to apply 3M Stamark tapes. Please contact 3M Technical Service if there are questions about equipment not specifically listed above.

If there is a crack in the pavement or if the tape is to be applied over a bridge expansion joint, lay the tape over the crack or joint, then cut the tape one inch away from the crack or joint on each side. ***(See Figure 13.)***

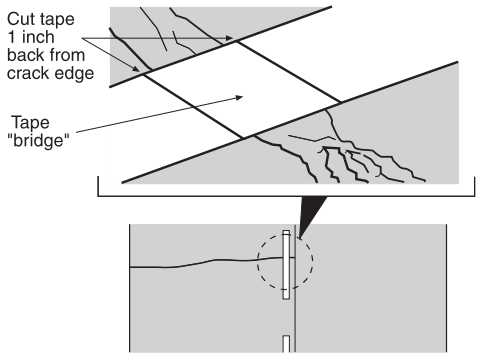


Figure 13.

9. Tamp the tape. VERY IMPORTANT!

Tamp the tape thoroughly with the RTC-2 tamper cart with a minimum **200-pound (90-kg)** load, or slowly drive over the tape a minimum of three times with a vehicle. The vehicle must be equipped with a pointing device to aid in keeping the vehicle on the tape, making three passes forward over the tape. Use a vehicle tire on long line markings only. **TAMPING IS MOST IMPORTANT!** When using the RTC-2 tamper cart ***(See Figure 8, Page 7)***:

- Do not twist or turn the tamper cart on the tape.
- Make a minimum of six passes (three passes back and forth) over each part of the tape.
- Make sure all edges are firmly adhered.

10. Open the road to traffic.

Overlay Application of Transverse Markings

Including crosswalks, stopbars, gore markings, symbols and legends

PROCEDURE

This procedure explains how to apply tape to a concrete or asphalt surface in the form of crosswalks, stopbars, gore markings, symbols and legends. Before you begin, make sure your environment meets all the product application requirements on page 3.

Use this chart to determine the proper tape and type of surface preparation adhesive to use.
(See Appendix B for application coverage guidelines)

Notes: High shear exposures may require the use of E-44T contact cement. Refer to appendix C for guidelines.

Transverse Marking Application	Recommended Tape Series	Asphalt 0-3 days old	Asphalt 4-10 days old	Asphalt >10 days old	Concrete (a)
Crosswalks	A, L or N	None	None	E-44T (b) or P-50 (f)	E-44T (b) or P-50 (f)
Stop Bars	A, L or N	None	None	E-44T (b) or P-50 (f)	E-44T (b) or P-50 (f)
Symbols & Legends	L or N	None	P-50	E-44T (b) or P-50 (f)	E-44T (b) or P-50 (f)
Gore Markings in Minimal Traffic Area (c)	A or N	None	P-50 (e)	P-50 (f)	P-50 (f)
Gore Markings in Heavy Traffic Area (d)	A or N	None	None	E-44T (b) or P-50 (f)	E-44T (b) or P-50 (f)

a. New concrete surfaces open to traffic less than 90 days must have the curing compound removed prior to application of surface preparation adhesive and pavement markings.

b. Three-coat E-44T method required for N-series tape application (roller applied).

c. Gore markings in minimal traffic areas include gores at highway on-ramps and off-ramps where minimal traffic crosses over the pavement markings.

d. Gore markings in heavy traffic areas include hatched median areas along urban roadways where high levels of traffic cross over the pavement marking.

e. P-50 may be used for gore areas with minimal to no cross-over traffic..

f. P-50 and E-44T are the only Surface Preparation Adhesives (roller applied) recommended for use with Series 380AW, 390, 380WR ES, 380I ES, 310 and 270 ES tapes for transverse marking application.

See Appendix C for guidance on the use of E-44T based on road type.

Overlay Application of Transverse Markings *(continued)*

1. Determine road surface conditions.

a. If surface is new concrete open to traffic less than 90 days, remove curing compound by light grinding, sandblasting, shotblasting or hydroblasting.*

b. If markings exist on the roadway, remove markings from the surface by hydroblasting, sandblasting or grinding. A minimum of 90 percent of the road surface under the existing markings must be exposed prior to tape application.

**Note: Hydroblasting requires a 24 hour waiting period before tape application*

2. Clean the road.

Clean the surface of the road where the tape will be applied. Clean the surface using high velocity, high pressure compressed air blower with minimum 185 cfm airflow and 120 psi at the air nozzle (recommended). The road surface must be dry.

3. Premark the road. Layout the area where the marking will be applied.

4. Determine if surface preparation adhesive is required. ***(See table on page 3.) For additional information on application refer to the product bulletin and information folder for the tape being applied.***

a. If no adhesive is required, go to Step 11.

b. If adhesive is required, go to Step 5.

5. Stir the adhesive. (E-44T only.)

Stir and thoroughly mix the E-44T adhesive with a wide wooden paint paddle or air driven paint mixer. **Make sure any sediment on the bottom of the 5-gallon container is completely stirred into a consistent solution.** ***(See Figure 14.)***

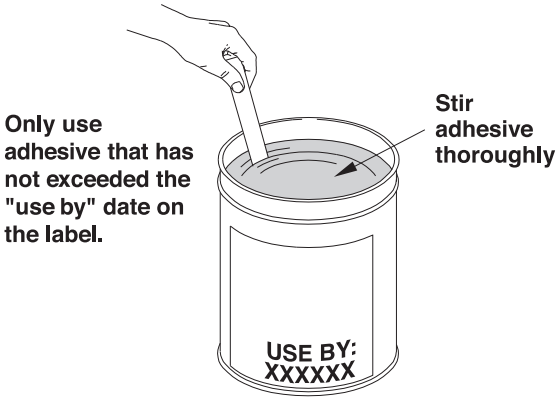


Figure 14.

6. Apply the adhesive.

a. **If using P-50 adhesive on asphalt 4-10 days old,** see Step 5 on Page 9.

b. **If using P-50 or E-44T for an intersection or and transverse making - including legends and symbols -** evenly apply one coat of adhesive to the road surface using a solvent-resistant roller with a minimum 3/8-inch (2.0 cm) nap. The coating on the pavement must extend at least 1 inch (2.5 cm) beyond the premarked area. **(See Figure 15.)**

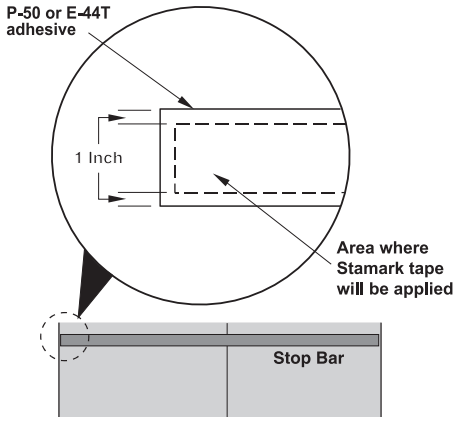


Figure 15.

Overlay Application of Transverse Markings *(continued)*

7. Allow the adhesive to set.

It is very important that the surface preparation adhesive is set to prevent the tape from sliding after application. If the surface preparation adhesive is not allowed to set, it will not bond properly to the adhesive on the tape and adhesion failure will likely occur. Surface preparation adhesive is set (see Figure 16) when it feels tacky but will not lift or string when touched with fingertips protected with gloves. The time needed for the E-44T to set is approximately 5 minutes under optimal conditions of 70°F (21°C) and medium to low humidity. Set time will change depending on climate conditions. Typical time for P-50 to set is 2 to 3 minutes under optimal conditions of 70ºF (21ºC) and medium to low humidity levels. ***(See Figure 16.)***

Note: If E-44T dries to a tack free state, apply a second coat.

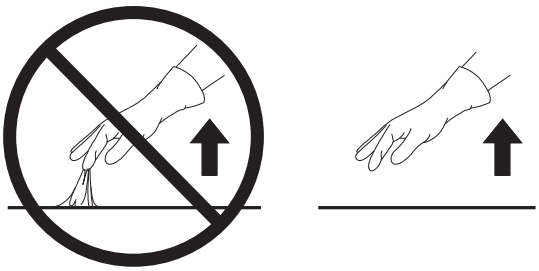


Figure 16.

8. Remark the road (if needed).

9. Determine next step, based on tape series being used.

a. If tape is Series A (with adhesive), ***go to Step 11.***
b. If tape is Series L (with adhesive and a liner), then ***go to Step 11.***
c. If tape is Series N (no adhesive and no liner), ***go to Step 10.***

10. Apply a second coat of adhesive to the road surface and a single coat to the back side of the tape. (N Series [tape with no adhesive or liner] only).

Allow adhesive to "set". It is very important that the adhesive is set to prevent the tape from sliding after application. The adhesive is set when it will not lift or string but does feel tacky when touched with fingertips protected with gloves. The time needed for the E-44T to set is approximately 5 minutes under optimal conditions of 70°F (21°C) and medium to low humidity. Set time will change depending on climate conditions. ***(See Figure 16.)***

Important Note: a. E-44T forms a skin as it dries so a firm pressing to the E-44T surface is needed to determine if it is set. No blisters or strings of adhesive should come away with the finger as it is removed.

b. Always check in different areas and especially depressions in the road surface where more E-44T may be present and slower to dry.

11. Apply the tape by hand.

Apply the tape by hand. When splicing is required, do not overlap the material. Use butt splices. ***(See Figure 17.)***

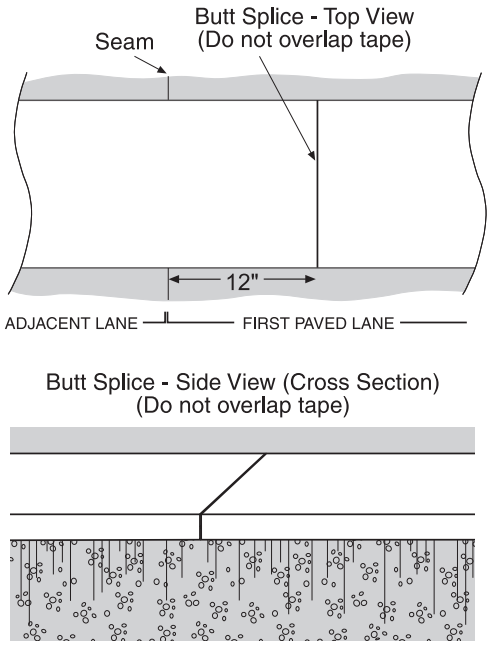


Figure 17.

Note: If there is a crack in the road that causes the tape to bridge, lay the tape over the crack, tamp the tape, and then cut the tape one inch from each side of the crack. ***(See Figure 18.)***

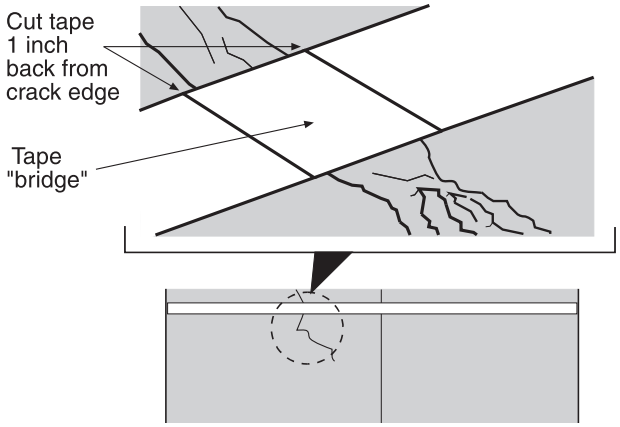


Figure 18.

Overlay Application of Transverse Markings *(continued)*

Use this same technique on concrete when the transverse marking is applied over a joint: Cut the tape 1 inch back from each side of the joint.

For material with liner (L Series): Refer to IF 5.8 for liner removal techniques

Position the marking and peel back the liner. Press the exposed tape down. Slowly remove the rest of the liner as the tape is carefully guided into place. Refer to IF 5.8 for liner removal.

12. Tamp the tape.

Tamp the tape thoroughly with the RTC-2 tamper cart with a minimum **200-lb. (90-kg)** load. ***(See Figure 19.)***

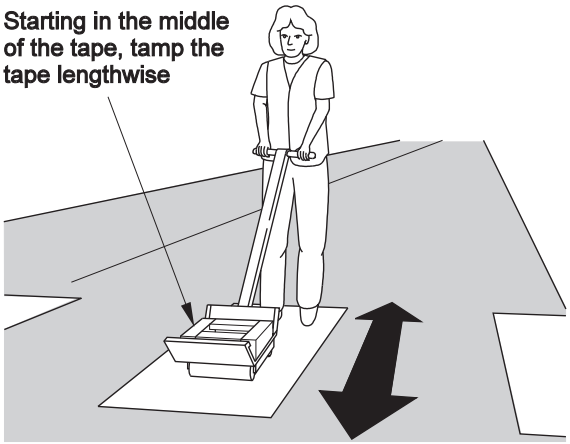


Figure 19.

- Start in the center of the marking.
- Do not twist or turn the tamper cart on the tape.
- Make six passes (three passes back and forth) over each part of the tape.
- Make sure all edges are firmly adhered.
  Note: Do not use a vehicle tire to tamp transverse markings!

13. Open the road to traffic.

Additional Information

STORAGE

3M™ Stamark™ Tapes, Stamark™ Surface Preparation Adhesive P-50 and Stamark™ Contact Cement E-44T must be stored in a cool, dry area indoors. A storage temperature of 40-100ºF (4-38ºC) is recommended. Use all tape products within one year of receipt. Unopened containers of P-50 must be used within two years of receipt. Check lable for expiration date of receipt.

REMOVAL

Stamark tapes are designed for permanent, non-removal applications. Contact your 3M representative for guidance concerning removal of Stamark tapes.

HEALTH AND SAFETY

Read all health hazard, precautionary and first-aid statements found in the Material Safety Data Sheet (MSDS) and/or product label of chemicals prior to handling or use. Also refer to the MSDS for information about the volatile organic compound (VOC) content of chemical products. Consult local regulations and authorities for possible restrictions on product VOC content and/or VOC emission.
Personal protective equipment may be appropriate for safely installing these products in a work zone environment. For example, eye, ear, and respiratory protection may be appropriate during grooving, surface preparation, or for the removal of existing pavement markings. Always follow safe work zone practices.

CAUTION

- Gloves should be worn when using any Stamark tapes to prevent injury to hands.
- Do not use a flame or torch to remove Stamark tapes. Burning may violate local, state or federal air quality regulations. Also, exposing the tape to very high temperatures with the use of a flame or torch could generate emissions that may be harmful to skin, eyes and respiratory system.

Appendix A. Pavement Surface Types

The pavement surface type and age determine which application procedures for 3M™ Stamark™ Pavement Marking Tapes should be used. For pavement types not covered, contact your 3M representative.

ASPHALTIC CEMENT CONCRETE (ACC)

Standard Mix Asphalt
A standard mix contains both fine (sand) and large (1/4-inch [6-mm]) aggregate with an asphalt cement binder. Stamark tapes can be inlaid or overlaid on this surface.

Open Grade Friction Course
An open grade friction course mix consists of only large aggregate, up to 3/4 inches (19 mm), with an asphalt cement binder. Stamark tapes can be inlaid or overlaid on this surface. Refer to the inlay application section of this folder for further explanation, beginning on page 4.

Chip Seal
A chip seal is achieved by spraying a hot asphalt emulsion onto an existing surface and then covering it with a 1/4-inch (6.4-mm) aggregate. Excess aggregate is removed after several days of exposure to traffic. Stamark tapes can be overlaid on this surface after the loose aggregate is removed and the surface has cured.

Slurry Seal
A slurry seal is a hot asphalt emulsion that is sprayed onto an existing surface, as a top coat dressing only. No aggregate is added. Stamark tape can be overlaid on this surface after the road has been open to traffic for three days.

Recycled Asphalt
This road surface consists of an existing asphalt that is removed through milling or grinding, reprocessed and then reapplied. Stamark tape can be inlaid or overlaid on this surface.

Rubberized Asphalt
Rubberized asphalt mixes contain additives designed to increase durability. The mix can be either a “standard mix” or an “open grade friction course” mix. Stamark tape can be applied as noted under the appropriate headings in this information folder.

PORTLAND CEMENT CONCRETE (PCC)

New Concrete
During construction, the new surface is often brushed or grooved (tined). Concrete that has been open to traffic less than 90 days must have the curing compound removed before applying Stamark tapes or surface preparation adhesive. Sandblasting is the method commonly used to remove curing compound from new concrete. Other methods, such as shot-blasting or hydro-blasting, can also be used. In the case of hydro-blasting, the pavement must be allowed to dry before the surface preparation adhesive and tape are applied.

Old Concrete
Old concrete is a PCC surface that has been open to traffic for more than one year and is showing signs of wear. Often this surface is smooth with large amounts of exposed, polished aggregate. Stamark tape can be overlaid using a surface preparation adhesive. The old concrete surface may require texturing prior to surface preparation adhesive and tape application. Contact a technical service representative at 1-800-553-1380 for additional information.

Appendix B. Surface Preparation Adhesives

Two surface preparation adhesives are commonly available for application of Stamark pavement marking tapes: Stamark E-44T contact cement and Stamark surface preparation adhesive P-50.

A. E-44T Contact Cement
E-44T contact cement is used with the roller applied 3-Coat Method to apply all N-Series (no adhesive) intersection markings including stop bars, crosswalks, symbols, channelizing lines and gore markings. It is applied using a long-handled, thick (3/4 -inch [2-cm]) nap paint roller with a solvent-resistant core. Refer to the section, "Overlay Application of Transverse Markings," for complete surface preparation and adhesive application procedure, beginning on page 11.
Note: E-44T is recommended for ES tapes in high shear exposures. Refer to Appendix C for more detail.

Stamark Tapes Non-Adhesive Coated (N Series only)
A three-coat system is used: One uniform coat of E-44T contact cement is roller applied first to the road surface and allowed to set. A second coat is then applied to the road surface and a single coat is applied to the nonreflective (bottom) side of the tape and allowed to set. Traffic must be kept off the coated surface prior to tape installation.

Note: E-44T Contact Cement can be applied to all road surfaces except for new, 0 to 10 day old asphalt. When applying to new concrete (PCC) opened to traffic for less than 3 months, the curing compound must be removed by sandblasting light grinding, hydroblasting, or shotblasting.

B. Surface Preparation Adhesive P-50
P-50 sprayable adhesive is applied using the PS-14 spray applicator or an airless or a compressed air sprayer as found on a highway striping paint truck.

For a compressed air sprayer, adjust as needed to achieve target application rate as listed in chart #3. It is designed to be used as a surface preparation adhesive for long-line applications.

It is also applied using a long-handled, thick (3/8 inch [0.95cm]) nap paint roller with a solvent-resistant core.

C. Coverage for E-44T and P-50 Adhesives
See Chart 3 below to determine how much adhesive you need to cover a specific area.

Chart 3

Adhesive Type	One Coat	Three Coats
E-44T Contact Cement Roller Application	75 sq. ft./gallon (1.8 sq. m/liter) (3/4 inch Nap) metric	25 sq. ft./gallon (0.6 sq. m/liter)
P-50 Surface Preparation Adhesive Spray Application	One coat sprayed at a 6-inch (15-cm) width for a 4-inch (10-cm) line covers approximately 450 lineal ft./gallon (35 lineal meters/liter) or 225 sq. ft./gallon (5.3 sq. m/liter)	N/A
P-50 Roll Application	75 sq. ft/gallon (1.8 sq. m/liter) (3/8 inch Nap) metric	N/A

Appendix C. Road Type Surface Preparation Adhesive Application Recommendations

Road lanes are typically exposed to different levels of traffic shear exposure. Road lanes that are exposed to a high frequency of high shear turning; especially by trucks and other large vehicles require use of E-44T Contact Cement for application of Stamark pavement marking tapes. The following table summarizes the product and surface preparation adhesive application recommendations by shear condition:

Important Note: Refer to Overlay Application of Transverse Markings sections starting on page 11.

Contact 3M Technical Service at 1-800-553-1380 for questions on E-44T applications.

Shear Level	Product and Adhesive Recommendation
Very High Shear	Stamark Tape “N” Series Use 3 Coats of E-44T
High Shear	Stamark Tape "A" and "L" Series Use One Coat of E-44T
Moderate Shear	Stamark Tape "A" and "L" Series Use P50
Low Shear	Stamark Tape "A" and "L" Series

Within the Climate Guide Recommendations

Literature Reference

For additional information on 3M™ Stamark™ Pavement Marking Tapes, application recommendations, or 3M application equipment, refer to the following publications:

Product Bulletin 310	3M™ Stamark™ Pavement Marking Tape Series 310
Product Bulletin 380AW	3M™ Stamark™ High Performance All Weather Tape Series 380AW
Product Bulletin 380I ES	3M™ Stamark™ High Performance Tape Series 380IES
Product Bulletin 380I-5ES	3M™ Stamark™ High Performance Tape Series 380I-5ES
Product Bulletin 380WR ES	3M™ Stamark™ High Performance Wet Reflective Tape Series 380WR ES
Product Bulletin 380WR-5ES	3M™ Stamark™ High Performance Wet Reflective Contrast Masking Tape Series 380WR-5ES
Product Bulletin 270 ES	3M™ Stamark™ Pavement Marking Tape 270ES
Product Bulletin 390	3M™ Stamark™ High Performance Tape Series 390
Product Bulletin 390-5	3M™ Stamark™ High Performance Contrast Marking Tape
Information Folder 5.2	Highway Tape Applicator (HTA)
Information Folder 5.8	Application of 3M™ Stamark™ Precut Symbols and Legends
Information Folder 5.13	3M™ Stamark™ Contact Cement E-44T
Information Folder 5.17	3M™ Stamark™ Surface Preparation Adhesive P-50
Information Folder 5.18	Guidelines for Pavement Marking Applications in Grooved Pavement Surfaces
3M Climate Guide	Climate Guide for 3M™ Stamark™ Pavement Marking Tapes
3M Road Surface Guide	Road Surface Guide for 3M™ Stamark™ Pavement Marking Tapes.

FOR INFORMATION OR ASSISTANCE
CALL:
1-800-553-1380

IN CANADA CALL:
1-800-265-1840

Internet:
www.3M.com/tss

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All statements, technical information and recommendations contained herein are based on tests we believe to be reliable, but the accuracy or completeness thereof is not guaranteed, and the following is made in lieu of all warranties, or conditions express or implied. Seller's and manufacturer's only obligation shall be to replace such quantity of the product proved to be defective. Neither seller nor manufacturer shall be liable for any injury, loss or damage, direct, special or consequential, arising out of the use of or the inability to use the product. Before using, user shall determine the suitability of the product for his/her intended use, and user assumes all risk and liability whatsoever in connection therewith. Statements or recommendations not contained herein shall have no force or effect unless in an agreement signed by officers of seller and manufacturer.

3M

Traffic Safety Systems Division
3M Center, Building 235-3A-09
St. Paul, MN 55144-1000
1-800-553-1380
www.3M.com/tss

3M Canada Company
P.O. Box 5757
London, Ontario N6A 4T1
1-800-3MHELPS

3M México, S.A. de C.V.
Av. Santa Fe No. 55
Col. Santa Fe, Del. Alvaro Obregón
México, D.F. 01210

Bolger 11060544
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Stamark™ Pavement Marking Tape and Liquid Pavement Markings

Application Guidelines for Pavement Markings in Grooved Pavement Surfaces

Information Folder 5.18 Grooving Applications **May, 2011**

Replaces IF 5.18 Dated August, 2009

Description

Grooving the pavement surface of a road or highway provides an alternative method for installation of 3M™ Stamark™ Pavement Marking Tape and 3M™ Liquid Pavement Markings (LPM, All Weather Paint and All Weather Thermoplastic). The benefits of grooving include enhanced protection of the pavement marking and retroreflective beads from snowplow damage in northern climates. Grooving extends the service life of the pavement markings.

This information folder lists the recommended procedures and application guidelines for completing a grooving application for products mentioned above.

The following sections can be found in this information folder:

I. Groove Specifications
II. Equipment Alternatives and Surface Texture Recommendations
III. Application Guidelines
IV. Measuring Groove Depths
V. Surface Wetting Test

Follow the detailed application instructions for "Overlay Applications" in 3M Information Folder 5.7 Pavement Surface Preparation and Application Techniques for Stamark tapes when applying pavement marking tapes in a groove.

All weather and climate conditions for the specific pavement marking product (liquid or tape) must be met before application into the groove.

For situations not specifically covered in this information folder, or questions regarding application of 3M products in a groove, it is the responsibility of the installer to contact the appropriate 3M Sales Representative or 3M pavement marking Technical Service Representative at 1-800-553-1380 for guidance.

I. Groove Specifications

Figure 1 shows a typical section of a pavement marking in a groove with the required groove width and depth indicated for both liquid and tape pavement markings.
(1000 mil = 1 inch)

Note: See Tables A and B for specific pavement marking type recommendations.

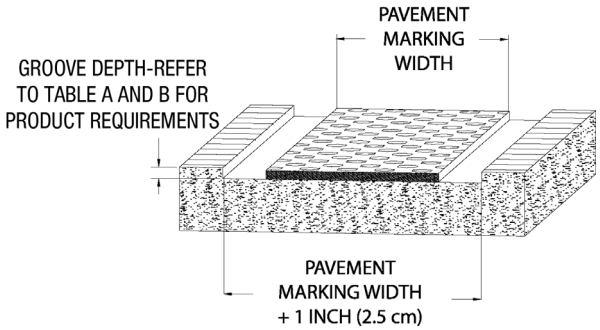


Figure 1 – Groove and Pavement Marking – Typical Section

Groove Depth
As shown on Figure 1, the groove depth should be cut according to the values recommended shown in Tables A and B below.

Table A UNIFORM GROOVE DEPTH

Pavement Marking Material	Required Groove Depth	
	Minimum	Maximum
3M™ Stamark™ Pavement Marking Tapes (Series 380 IES, 390, 270 ES, 310	100 mils (2.54 mm)	200 mils (5.08 mm)
3M™ Stamark™ Pavement Marking Tapes Series 380AW	110 mils (2.79 mm)	200 mils (5.08 mm)

Table B UNIFORM GROOVE DEPTH

Pavement Marking Material	Required Groove Depth
3M™ Stamark™ Liquid Pavement Markings Series 1000 w/AASHTO M247 beads	40mils (1.02 mm) Minimum
3M™ All Weather Paint with All Weather Elements	60 mils min. (1.52 mm) 80 mils (2.03 mm) for max retained reflectivity
3M™ Stamark™ Liquid Pavement Markings Series 1000 w/large beads AND Series 1400 Polyurea or Epoxy binder with All Weather Elements	60 mils min. (1.52 mm) 80 mils (2.03 mm) for max retained reflectivity
3M™ All Weather Thermoplastic or MMA with All Weather Elements	Minimum 30 mils in addition to binder thickness (0.76 mm + binder thickness) For maximum retained reflectivity - 40 mils in addition to the binder thickness specification. (1.02 mm + binder thickness)

Note: More aggressive traffic or climate environments may require deeper grooves.

Groove Width – Longitudinal Markings
As shown in Figure 1, the typical groove width shall be one inch (2.5 cm) plus the width of the pavement marking. A groove two inches (5 cm) wider than the pavement marking width is sometimes preferred to allow for ease of straight tape application within the groove. The extra width also allows for improved tamping of the edges of the tape. Narrower grooves may provide additional protection to the pavement marking, but extra care must be taken to cut straight grooves that will allow for a straight alignment of the pavement marking installed in the groove.

Groove Position
The recommended position of the groove edge is a minimum of 2 inches (5 cm) from the edge of concrete joints or asphalt seams along edge or centerlines.

Groove Cutting Speed
The speed of groove cutting equipment will vary with the width of the groove, the size of the application, the pavement surface (new or old asphalt or concrete) and the equipment and blades used for cutting. The speed must be set in accordance with other factors to ensure the required groove depth specifications are met.

Groove Cleaning
Cooling the cutting head with water may be necessary for some applications and equipment. In general, long continuous groove cuts for edge lines may require water to keep blades cool. Groove cutting for skip dash or other intermittent markings allows the blades to cool between cutting operations, so cooling water may not be necessary. If cooling water is necessary, flush the groove immediately with a high pressure power washer to remove any build-up of cement dust/water slurry. If this is not done, the slurry may harden in the groove.

Note: This process must also be used when dry grooving during a rainfall period.

Allow the groove to dry a minimum of 24 hours after groove cleaning, removal of excess water, and prior to pavement marking application if water is used in the grooving process. The groove must be clean and dry for proper application of the pavement marking.

Clean the groove completely prior to pavement marking application using an air compressor with at least 185 CFM air flow and 120 PSI air pressure. A street sweeper or pick-up broom may also be effective, but will require a pass with the air compressor to completely clean the bottom of the groove. **Note:** An open groove may be left open over night if it has been blown out or flushed out at the time of grooving. It is recommended to blow out the groove again before application of a pavement marking.

Grooved and Recessed Intersection Markings

Intersection markings such as crosswalks and stop bars can be grooved into the pavement and recessed by making multiple side-by-side passes with grooving equipment typically used for long line pavement markings. Multiple passes are made to allow for placement of the wider intersection markings in a groove.

Cutting grooves with multiple passes can result in a ridge between each pass due to the stops on each side of the cutting head resting on different levels of pavement surfaces. The first pass with the grooving equipment is completed with the stops resting on an even surface (Figure 2).

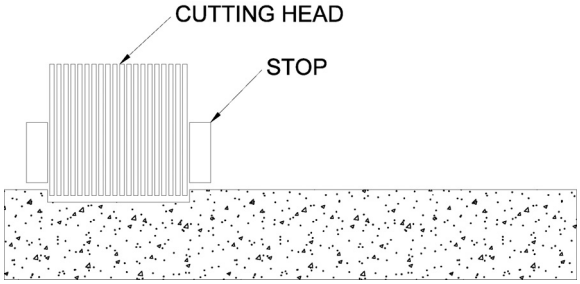


Figure 2 - Initial Pass, Intersection Groove Cut

After the first pass, one stop will sit on the old pavement surface and the other stop will sit in the newly cut groove (Figure 3). This produces ridges which are unacceptable.

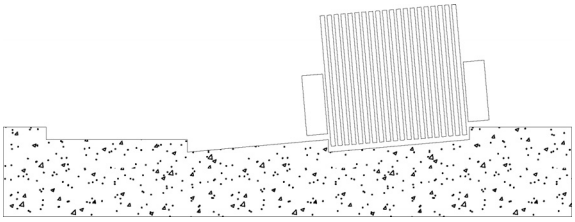


Figure 3 - Additional Passes with Ridge along Cutter Head Edge

Adjust the stops after the first pass to prevent this problem or grind off the ridges between the passes prior to placing the pavement marking in the recessed groove.

You can also use a metal plate the depth of the groove and move over for each cut across the groove face.

Legends and symbols can be grooved and recessed by grooving a large square or rectangular shaped area that will fit the pavement marking. Refer to IF 5.8 for more information.

Use wider cutting heads and more blades gang stacked on the saw auger to reduce the number of ridges formed by multiple passes with the cutting head.

Curb and median obstacles may not allow for cutting the groove using large truck-mounted equipment across the full width of the intersection marking. Use smaller equipment in areas near obstacles to achieve a groove at the recommended depth.

II. Equipment Alternatives and Surface Texture Recommendations

Several different cutting head configurations are available from different equipment manufacturers that specialize in saw cutting and grooving equipment. Different grooves will result from the use of different cutting heads and grooving equipment.

Groove equipment with a free-floating, independent head is recommended. This type of configuration allows the cutting head to follow irregularities in the pavement surface and provides a more consistent groove depth.

Important Note: The use of gang stacked cutting blades is required for asphalt pavement surfaces. The use of gang stacked cutting blades is strongly recommended for concrete pavement surfaces; especially for older surfaces or surfaces that show visible signs of deterioration.

Special note: Diamond cutting blades produce an optimal groove surface.

Saw Blade Cutting Heads

One alternative for grooving equipment consists of a single large diameter (12 -18 inch saw blades) cutting head, with gang-stacked, 1/8-inch (0.30 cm) to 1/4-inch (0.63 cm) wide carbide or diamond tipped cutting blades (Figure 4). Spacers are placed between the blades to provide a gap for the wider cutting head tips and to decrease the number of blades required for the cutting head.

Figure 4 – Saw Blade Cutting Head

Wider spacing of the blades may result in a heavily "ribbed" or "ridged" pattern that is not recommended for pavement marking applications (Figure 5). The ribbed pattern or corduroy effect must not be irregular or large enough to prevent tape conformance into the lower areas of the pattern. If the tape bridges these lower areas and does not make contact with the pavement surface, poor adhesion will occur due to moisture penetration.

Use of gang-stacked diamond tipped cutting blades creates a corduroy or ribbed pattern as shown in Figure 5.

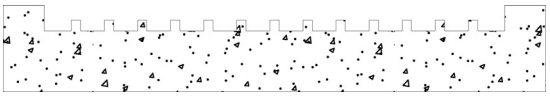


Figure 5 – Cross Section Coarse Tooth Pattern Widely Spaced or Worn Blades

Replace blades and/or change spacing to correct this appearance.

Thinner spacers may be used between the blades to prevent an irregular raised pattern in the groove. This will result in a groove with a smoother surface (Figure 6, 7 and 8). The height of the ridges should be no greater than 15 mil. above the base of the groove.

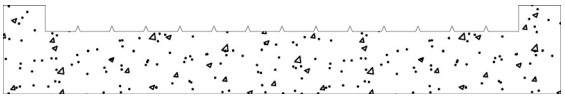


Figure 6 – Cross Section Smooth Groove Thin Spacers and New Blades.

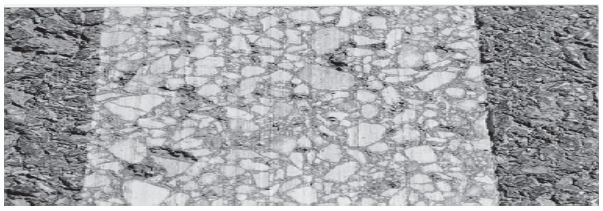


Figure 7 – ACC Light Corduroy or ribbed pattern made with properly spaced, gang stacked cutting blades.

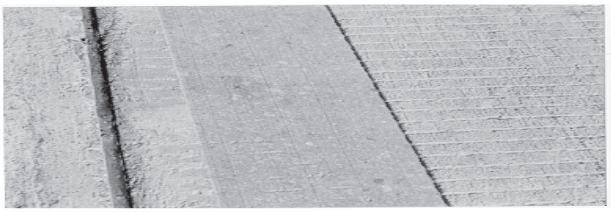


Figure 8 – PCC Light Corduroy or ribbed pattern made with properly spaced, gang stacked cutting blades.

Grinder Cutting Heads

Another alternative for grooving ONLY newer PCC pavement surfaces in good repair is the use of a grinder-type cutting head (Figure 9).

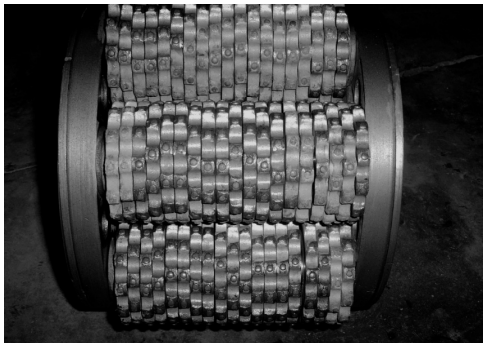


Figure 9 – Grinder Cutting Head

Use of the grinder head shown in Figure 9 results in a groove with an irregular surface texture shown in Figure 10 and 11. This surface texture is often the superior surface for application of liquid pavement markings.

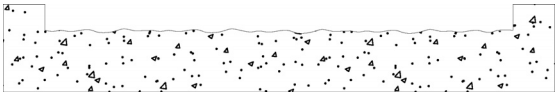


Figure 10- Cross Section Textured Groove Cut with Grinder Head

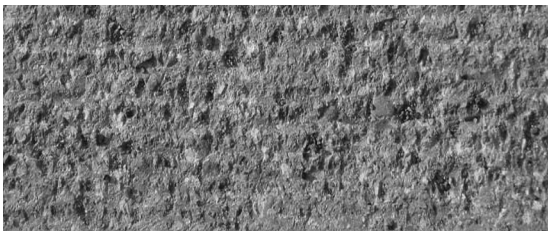


Figure 11 – Textured Groove Surface

Achieving a Textured Surface with Saw Blades

A textured groove surface is a groove bottom surface that has an irregular pattern and does not show the typical ribbed or corduroy pattern common to new grooves cut with saw blades.

Besides using a grinder cutting head as shown in Figure 9, a textured groove surface can also be achieved with the saw blade configuration shown in Figure 4 using the following procedure. The textured surface is achieved by using a slow moving shot blaster, grinder, or sand blaster to knock down the ridges and create the textured surface after cutting the initial groove with the saw blade cutting head. Hydroblasting can also be used, but the groove must be allowed to dry (24-hour minimum) prior to application of the pavement markings.

New concrete surfaces may contain more fine cement dust after cutting. This dust and any cement residue must be removed and blown clean from the groove prior to application of the pavement marking.

Asphalt Cement Concrete (ACC) Surfaces

As with concrete, grooving asphalt surfaces provides some of the same benefits for pavement markings such as reducing the profile to help prevent snow plow damage and providing a "new" exposed surface for adhesion.

Important Note: The use of gang stacked cutting blades is required for asphalt pavement surfaces.

Special Note: Diamond cutting blades produce an optimum groove surface

Existing asphalt surfaces should possess the strength necessary to support the cutting of a groove. Inspect the surface for obvious signs of distress before cutting a groove. Refer to the 3M Road Surface Guide for guidance. Always inspect the groove at start-up for signs of weakness in the channel or at the groove wall. Light scratching in the channel or at the groove wall, light scratching with a pointed object can help to determine the integrity of the cut.

Groove cutting some older asphalt surfaces may result in weak aggregate/asphalt bonds near the surface. The structural integrity of the groove bottom should be checked after grooving and prior to application of pavement markings.

In general, new asphalt shall not be grooved within a minimum 10 days of the placement of the final course of pavement. The asphalt surface must be open to traffic during this period. Asphalt may be too soft within 10 days of placement to support grooving operations, especially during periods of hot weather.

Some asphalt mixes may require as long as 30 days to achieve enough strength to support grooving operations. Perform a field test at a small localized area on new asphalt mixes to verify that proper surface strength has been achieved.

Inlay techniques (rolling tape into fresh hot asphalt) for Stamark tape should be utilized for new asphalt surfaces whenever possible. See 3M Information Folder 5.7 for additional information on inlay techniques.

III. Application Guidelines

The following are specific application guidelines for Stamark tapes in a groove. Review the detailed application instructions in 3M Information Folder 5.7, Pavement Surface Preparation and Application Techniques for 3M™ Stamark™ Tapes, as well as climate and weather recommendations for proper installation and application.

Clean the Groove

Clean the groove completely prior to pavement marking application using an air compressor with at least 185 CFM air flow and 120 PSI air pressure. There should be no more than 50 feet of 3/4-inch ID hose from the compressor to the air nozzle and the air nozzle should be no less than1/2-inch ID. The compressor should also be equipped with a moisture and oil trap. When cleaning the groove it is recommended that the air nozzle be more than two feet from the ground. A street sweeper or pick-up broom may also be effective, but will require a pass with air compressor to completely clean the bottom of the groove.

Apply the Tape

Apply Stamark tape in the groove following the detailed instructions for "Overlay Applications" in 3M Information Folder 5.7, Pavement Surface Preparation and Application Techniques for 3M™ Stamark™ Tapes.

Tamp the Tape

Tamp the tape thoroughly with a minimum of six (6) passes minimum (three passes back and forth) over the surface of the new tape in the groove. Use a RTC-2 Tamper Cart (contact Century Tool at 763-428-2168) with a 200-pound (90 kg) load.

Tape application in a groove will require tamping with a tamper cart roller cut to fit in the groove. Tamping the edges of the tape is very important. A vehicle tire may tamp the center of the tape but not the tape edges near the edge of the groove. Use a modified tamper cart roller if necessary. (See Figure 11) Modified rollers can be purchased from Century Tool, 763-428-2168. A typical modified roller will have a 4-inch width and a 1/4-inch depth. **Important Note:** Use of a vehicle tire to tamp a long line application of pavement marking tape in a groove is acceptable for waffle pattern tapes (380IES, 270ES, 310, 390, and 380AW). Refer to IF 5.7 for further information.

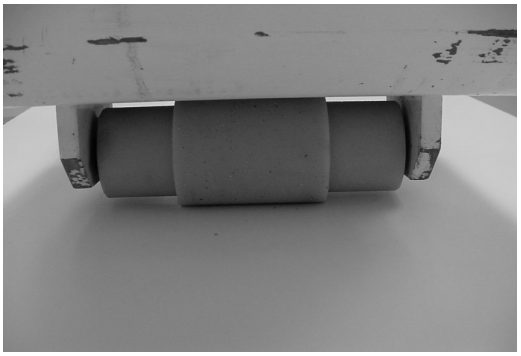


Figure 11 – Tamper cart roller cut for groove tamping

3M Liquid Pavement Markings

Applying Liquid Pavement Markings products properly in a groove provides increased durability and improved long-term retroreflective performance. This method is especially effective to extend the service life of the pavement marking in northern climates where snow removal equipment is used.

Refer to Information Folder 5.20 (Liquid Pavement Markings), 5.22 (All Weather Paint), and 5.24 (All Weather Thermoplastic) for proper surface preparation and application requirements.

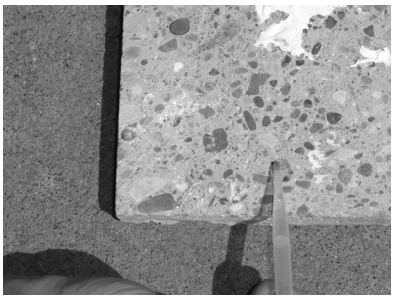
The liquid pavement marking must be placed fully within the groove for successful application and to achieve the full benefit of the groove. A wider groove (up to two inches greater than the marketing width) may be needed to allow for the proper placement of the liquid pavement marking into the groove.

IV. Measuring Uniform Groove Depths

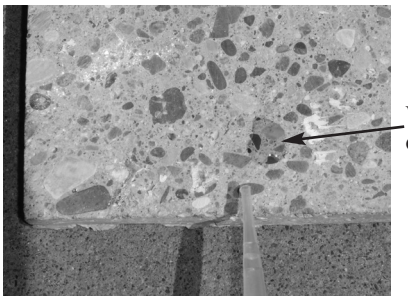
A micrometer or depth gage can be used to verify the uniform depth of new grooves. Another method is the use of depth plate (see Appendix A). Grooves should be checked frequently as a new alignment is cut to make adjustments early in the process. As an example, on a new groove cutting application, check the groove depths at 10-foot intervals for the first 50 feet. Each measurement should be within the tolerance shown in Table A. Calculate an average of the five depths measured – the average should equal the appropriate depth shown in Table A. If the average does not equal the values in the table, make adjustments to the cutting equipment and check the next 50 feet using a similar method. Continue to adjust the equipment until the depth shown in Table A is the average calculated groove depth.

V. Surface Wetting Test

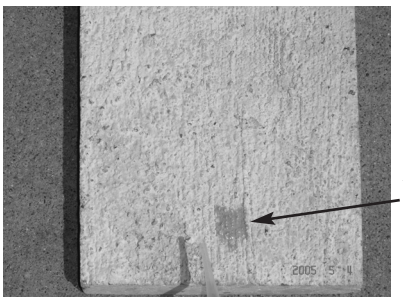
Measure wetability of the grooved surface. Use an eye dropper to apply drop of water to the surface. The water drop should wet out in the groove surface. If not, the groove needs to be cleaned out, ground, or shot blasted.



Place a drop of clean drinking or distilled water on the pavement surface.



If the drop of water does not spread (but instead forms a bead on surface), the surface may be contaminated, need additional surface preparation or need to be recleaned with high pressure air.



If the water drop spreads (wets), the surface is ready to accept application of pavement marking.

Appendix A

Depth plate 100 mil or the agency's specifications

Drop plate into groove

Check to see if plate fits into groove

Put straight edge across groove over the top of depth plate

Slide plate back and forth to see if groove is at the right depth

Health and Safety Information

Read all health hazard, precautionary, and first aid statements found in the Material Safety Data Sheet (MSDS), and/or product label of chemicals prior to handling or use. Also refer to the MSDS for information about the volatile organic compound (VOC) content of chemical products. Consult local regulations and authorities for possible restrictions on product VOC content and/or VOC emissions. Electronically, visit us at www.3M.com/us and select MSDS search.

Literature References

PB 270 ES	3M™ Stamark™ Pavement Marking Tape Series 270 ES
PB 380I ES	3M™ Stamark™ High Performance Tape Series 380I ES
PB 1000	3M™ Stamark™ Liquid Pavement Marking Series 1000
PB 1400	All Weather Liquid Pavement Marking Series 1400
PB 380AW	3M™ Stamark™ High Performance All Weather Tape Series 380AW
PB 310	3M™ Stamark™ Pavement Marking Tape Series 310
PB 390	3M™ Stamark™ High Performance Pavement Marking Tape Series 390
IF 5.7	Pavement Surface Preparation and Application Techniques for 3M™ Stamark™ Tapes
IF 5.8	Instructions for Precut Symbols and Legends
IF 5.20	Application Guidelines for Liquid Pavement Markings
IF 5.22	3M™ All Weather Paint Application Guidelines
IF 5.24	3M All Weather Thermoplastic application guidelines
PB AWT	All Weather Thermoplastic
PB AW Dry	All Weather Dry Elements
PB AWE	All Weather Elements

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CALL:
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Internet:
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3M

Traffic Safety Systems Division
3M Center, Building 235-3A-09
St. Paul, MN 55144-1000
1-800-553-1380
www.3M.com/tss

3M Canada Company
P.O. Box 5757
London, Ontario N6A 4T1
1-800-3MHELPS

3M México, S.A. de C.V.
Av. Santa Fe No. 55
Col. Santa Fe, Del. Alvaro Obregón
México, D.F. 01210

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