THE CITY OF WINNIPEG

BID OPPORTUNITY

BID OPPORTUNITY NO. 388-2006

BRIDGE DECK SURFACE SEALING REPAIRS VARIOUS LOCATIONS

TABLE OF CONTENTS

PART B - BIDDING PROCEDURES

B1. PROJECT TITLE

B1.1 BRIDGE DECK SURFACE SEALING REPAIRS VARIOUS LOCATIONS

B2. SUBMISSION DEADLINE

B2.1 The Submission Deadline is 12:00 noon Winnipeg time, June 27, 2006.

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

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

B3. SITE INVESTIGATION

B3.1 Further to GC:3.1, the Bidder may view the Site without making an appointment.

B3.2 The Bidder shall not be entitled to rely on any information or interpretation received at the Site investigation unless that information or interpretation is the Bidder's direct observation, or is provided by the Contract Administrator in writing.

B4. ENQUIRIES

B4.1 All enquiries shall be directed to the Contract Administrator identified in D3.1.

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

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

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

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

B5. ADDENDA

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

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

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

B5.2.2 The Bidder is responsible for ensuring that he has received all addenda and is advised to check the Materials Management Branch internet site for addenda shortly before submitting his Bid.

B5.3 The Bidder shall acknowledge receipt of each addendum in Paragraph 8 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 seven (7) 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 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 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 shall base his Total Bid Price upon the specified item but may also indicate an alternative price based upon the approved alternative. Such alternatives will be evaluated in accordance with B14.

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

B7. BID SUBMISSION

B7.1 The Bid Submission consists of the following components:

(a) Form A: Bid;

(b) Form B: Prices;

B7.2 The Bid Submission shall be submitted enclosed and sealed in an envelope clearly marked with the Bid Opportunity number and the Bidder's name and address.

B7.2.1 Samples or other components of the Bid Submission 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 Submission.

B7.3 Bid Submissions submitted by facsimile transmission (fax) or internet electronic mail (e-mail) will not be accepted.

B7.4 Bid Submissions shall be submitted to:

The City of Winnipeg
Corporate Finance Department
Materials Management Branch
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 own name, his 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 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 10 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 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;

(d) if the Bidder is carrying on business under a name other than his 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 shall be printed below such signatures.

B8.4.2 All signatures shall be original.

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 Submission 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.

B9.2 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.

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;

(b) be responsible and not be suspended, debarred or in default of any obligation to the City;

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

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

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

(f) employ only Subcontractors who:

(i) are responsible and not suspended, debarred or in default of any obligation 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 Branch internet site at http://www.winnipeg.ca/matmgt); and

(ii) have successfully carried out work similar in nature, scope and value to the portion of the Work proposed to be subcontracted to them, and are fully capable of performing the Work required to be done in accordance with the terms of the Contract;

(g) have a written workplace safety and health program in accordance with The Workplace Safety and Health Act (Manitoba);

(h) have such other pertinent data as may be required by the Contract Administrator; and

(i) be a Manufacturers Certified Applicator of the non-skid polymer wearing surface system.

(j) execute the joint five (5) year Agreement to Warranty Form: W1 in accordance with D21.

B10.2 The Bidder shall be prepared to 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.

B10.3 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. OPENING OF BIDS AND RELEASE OF INFORMATION

B11.1 Bid Submissions will be opened publicly, after the Submission Deadline has elapsed, in the office of the Corporate Finance Department, Materials Management Branch, or in such other office as may be designated by the Manager of Materials.

B11.1.1 Bidders or their representatives may attend.

B11.2 After the public opening, the names of the Bidders and their Total Bid Prices as read out (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 Branch internet site at http://www.winnipeg.ca/matmgt.

B11.3 After award of Contract, the name(s) of the successful Bidder(s) and the Contract Amount(s) will be available on the Closed Bid Opportunities (or Public/Posted Opening & Award Results) page at The City of Winnipeg, Corporate Finance, Materials Management Branch internet site at http://www.winnipeg.ca/matmgt.

B11.4 The Bidder is advised that any information contained in any Bid Submission may be released if required by City policy or procedures, by The Freedom of Information and Protection of Privacy Act (Manitoba), by other authorities having jurisdiction, or by law.

B12. IRREVOCABLE BID

B12.1 The Bid(s) submitted by the Bidder shall be irrevocable for the time period specified in Paragraph 9 of Form A: Bid.

B12.2 The acceptance by the City of any Bid shall not release the Bids of the next two lowest evaluated responsive Bidders and these Bidders shall be bound by their Bids on such Work for the time period specified in Paragraph 9 of Form A: Bid.

B13. WITHDRAWAL OF BIDS

B13.1 A Bidder may withdraw his Bid without penalty by giving written notice to the Manager of Materials at any time prior to the Submission Deadline.

B13.1.1 Notwithstanding GC:23.3, the time and date of receipt of any notice withdrawing a Bid shall be the time and date of receipt as determined by the Manager of Materials.

B13.1.2 The City will assume that any one of the contact persons named in Paragraph 3 of Form A: Bid or the Bidder's authorized representatives named in Paragraph 10 of Form A: Bid, and only such person, has authority to give notice of withdrawal.

B13.1.3 If a Bidder gives notice of withdrawal prior to the Submission Deadline, the Manager of Materials shall:

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

(b) open the Bid Submission to identify the contact person named in Paragraph 3 of Form A: Bid and the Bidder's authorized representatives named in Paragraph 10 of Form A: Bid; and

(c) if the notice has been given by any one of the persons specified in B13.1.3(b), declare the Bid withdrawn.

B13.2 A Bidder who withdraws his Bid after the Submission Deadline but before his Bid has been released or has lapsed as provided for in B12.2 shall be liable for such damages as are imposed upon the Bidder by law and subject to such sanctions as the Chief Administrative Officer considers appropriate in the circumstances. The City, in such event, shall be entitled to all rights and remedies available to it at law.

B14. EVALUATION OF BIDS

B14.1 Award of the Contract shall be based on the following bid evaluation criteria:

(a) compliance by the Bidder with the requirements of the Bid Opportunity (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.

B14.2 Further to B14.1(a), the Award Authority may reject a Bid as being non-responsive if the Bid Submission 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 if the interests of the City so require.

B14.3 Further to B14.1(b), the Award Authority shall reject any Bid submitted by a Bidder who does not demonstrate, in his Bid Submission or in other information required to be submitted, that he is responsible and qualified.

B14.4 Further to B14.1(c), the Total Bid Price shall be the sum of the quantities multiplied by the unit prices for each item shown on Form B: Prices.

B14.4.1 If there is any discrepancy between the Total Bid Price written in figures, the Total Bid Price written in words and the sum of the quantities multiplied by the unit prices for each item, the sum of the quantities multiplied by the unit prices for each item shall take precedence.

B15. AWARD OF CONTRACT

B15.1 The City will give notice of the award of the Contract or will give notice that no award will be made.

B15.2 The City will have no obligation to award a Contract to a Bidder, even though one or all of the Bidders are determined to be responsible and qualified, and the Bids are determined to be responsive.

B15.2.1 Without limiting the generality of B15.2, the City will have no obligation to award a Contract where:

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

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

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

(d) only one Bid is received; or

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

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

B15.4 Notwithstanding GC:4, the City will issue a Purchase Order to the successful Bidder in lieu of the execution of a Contract.

B15.5 The Contract, as defined in GC:1.1, in its entirety shall be deemed to be incorporated in and to form a part of the Purchase Order notwithstanding that it is not necessarily attached to or accompany said Purchase Order.

PART C - GENERAL CONDITIONS

C1. GENERAL CONDITIONS

C1.1 The *General Conditions for Construction Contracts* (Revision 2000 11 09) are applicable to the Work of the Contract.

C1.1.1 The *General Conditions for Construction Contracts* are available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Branch internet site at http://www.winnipeg.ca/matmgt.

PART D - SUPPLEMENTAL CONDITIONS

GENERAL

D1. GENERAL CONDITIONS

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

D1.2 The General Conditions are amended by striking out “The City of Winnipeg Act” wherever it appears in the General Conditions and substituting “The City of Winnipeg Charter”.

D1.3 The General Conditions are amended by striking out “Tender Package” wherever it appears in the General Conditions and substituting “Bid Opportunity”.

D1.4 The General Conditions are amended by striking out “Tender Submission” wherever it appears in the General Conditions and substituting “Bid Submission”.

D1.5 The General Conditions are amended by deleting GC:6.16 and GC:6.17. The City of Winnipeg is now within the jurisdiction of the Manitoba Ombudsman pursuant to The Ombudsman Act.

D2. SCOPE OF WORK

D2.1 The Work to be done under the Contract shall consist of all operations relating to the repair of the existing concrete bridge deck, preparation of the bridge deck surface and application of a skid resistant polymer wearing surface on the Pembina Highway Twin Bridge over the La Salle River and the St. Vital Bridge over the Red River.

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

(a) traffic control

(b) concrete deck repairs

(c) concrete deck surface preparation work, and

(d) application of skid resistant polymer wearing surface

D3. CONTRACT ADMINISTRATOR

D3.1 The Contract Administrator is:

B.A. Neirinck, P.Eng
Bridge Planning & Operations Engineer
100 Main Street, Winnipeg, Manitoba, R3C 1A4

Telephone No. (204) 986-7950
Facsimile No. (204) 942-4811

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.

D4. CONTRACTOR'S SUPERVISOR

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

D5. NOTICES

D5.1 Except as provided for in GC:23.2.2, 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.

D5.2 All notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications to the City, except as expressly otherwise required in D5.3, D5.4 or elsewhere in the Contract, shall be sent to the attention of the Contract Administrator at the address or facsimile number identified in D3.1.

D5.3 All notices of appeal to the Chief Administrative Officer shall be sent to the attention of the Chief Financial Officer at the following address or facsimile number:

The City of Winnipeg
Chief Administrative Officer Secretariat
Administration Building, 3rd Floor
510 Main Street
Winnipeg MB R3B 1B9

Facsimile No.: (204) 949-1174

D5.4 All notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications required to be submitted or returned to the City Solicitor shall be sent to the following address or facsimile number:

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

Facsimile No.: (204) 947-9155

SUBMISSIONS

D6. INSURANCE

D6.1 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) all inclusive, with The City of Winnipeg being added as an additional insured, with a cross-liability clause, such liability policy to also contain a contractual liability, an unlicensed motor vehicle liability and a products and completed operations endorsement to remain in place at all times during the performance of the Work and throughout the warranty period;

(b) automobile liability insurance for owned and non-owned automobiles used for or in connection with the Work in the amount of at least two million dollars ($2,000,000.00) at all times during the performance of the Work and until the date of Total Performance;

D6.2 Deductibles shall be borne by the Contractor.

D6.3 The Contractor shall provide the City Solicitor with a certificate of insurance of each policy, in a form satisfactory to the City Solicitor, at least two (2) Business Days prior to the commencement of any Work on the Site but in no event later than seven (7) Calendar Days from notification of the award of Contract.

D6.4 The Contractor shall not cancel, materially alter, or cause each policy to lapse without providing at least fifteen (15) Calendar Days prior written notice to the Contract Administrator.

D7. PERFORMANCE SECURITY

D7.1 If the Contract Price exceeds twenty-five thousand dollars ($25,000.00), 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.

D7.1.1 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.

D7.2 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 Purchase Order and prior to the commencement of any Work on the Site.

D8. SAFE WORK PLAN

D8.1 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 GC:4.1, for the return of the executed Contract.

D8.2 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 internet site at http://www.winnipeg.ca/matmgt.

D9. SUBCONTRACTOR LIST

D9.1 The Contractor shall provide the Contract Administrator with a complete list of the Subcontractors whom the Contractor proposes to engage (Form J: Subcontractor List) at least two (2) Business Days prior to the commencement of any Work on the Site but in no event later than seven (7) Calendar Days from notification of the award of Contract.

SCHEDULE OF WORK

D10. COMMENCEMENT

D10.1 The Contractor shall not commence any Work until he is in receipt of a Purchase Order from the Award Authority authorizing the commencement of the Work.

D10.2 The Contractor shall not commence any Work on the Site until:

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

(i) evidence that the Contractor is 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;

(ii) evidence of the workers compensation coverage specified in GC:6.14;

(iii) evidence of the insurance specified in D6;

(iv) the performance security specified in D7;

(v) the Safe Work Plan specified in D8;

(vi) the Subcontractor list specified in D9

(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.

D10.3 The Contractor shall commence the Work on the Site within seven (7) Working Days of receipt of the Purchase Order.

D11. SUBSTANTIAL PERFORMANCE

D11.1 The Contractor shall achieve Substantial Performance by August 31, 2006.

D11.2 When the Contractor considers the Work to be substantially performed, the Contractor shall arrange, attend and assist in the inspection of the Work with the Contract Administrator for purposes of verifying Substantial Performance. Any defects or deficiencies in the Work noted during that inspection shall be remedied by the Contractor at the earliest possible instance and the Contract Administrator notified so that the Work can be reinspected.

D11.3 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.

D12. TOTAL PERFORMANCE

D12.1 The Contractor shall achieve Total Performance by August 31, 2006.

D12.2 When the Contractor or the Contract Administrator considers the Work to be totally performed, the Contractor shall arrange, attend and assist in the inspection of the Work with the Contract Administrator for purposes of verifying Total Performance. Any defects or deficiencies in the Work noted during that inspection shall be remedied by the Contractor at the earliest possible instance and the Contract Administrator notified so that the Work can be reinspected.

D12.3 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.

D13. LIQUIDATED DAMAGES

D13.1 If the Contractor fails to achieve Substantial Performance in accordance with the Contract by the day fixed herein for Substantial Performance, the Contractor shall pay the City Five Hundred dollars ($500.00) per Calendar Day for each and every Calendar Day following the day fixed herein for Substantial Performance during which such failure continues.

D13.2 The amount specified for liquidated damages in D13.1 is based on a genuine pre-estimate of the City's losses in the event that the Contractor does not achieve Substantial Performance by the day fixed herein for same.

D13.3 The City may reduce any payment to the Contractor by the amount of any liquidated damages assessed.

CONTROL OF WORK

D14. JOB MEETINGS

D14.1 Regular weekly job meetings will be held at the Site. These meetings shall be attended by a minimum of one representative of the Contract Administrator, one representative of the City and one representative of the Contractor. Each representative shall be a responsible person capable of expressing the position of the Contract Administrator, the City and the Contractor respectively on any matter discussed at the meeting including the Work schedule and the need to make any revisions to the Work schedule. The progress of the Work will be reviewed at each of these meetings.

D14.2 The Contract Administrator reserves the right to cancel any job meeting or call additional job meetings whenever he deems it necessary.

D15. TEMPORARY STRUCTURES

D15.1 The location of all Contractors temporary structures shall be subject to the approval of the Contract Administrator. Temporary structures erected by the Contractor shall remain his property and shall be removed from the Site immediately upon completion of the Work or as directed by the Contract Administrator.

D16. COOPERATION WITH OTHERS

D16.1 The Contractor's attention is directed to the fact that other Contractors, the personnel of Utilities and the staff of the City may be working on the structure, approach roadways, adjacent roadways or rights-of-way. The activities of these agencies may coincide with the Contractor's execution of the Work, and it will be the Contractor's responsibility to cooperate to the fullest extent with the other personnel working in the area, and such cooperation is an obligation of the Contractor under the terms of this Contract.

D16.2 Specifically, the Contractor is advised that another Contractor will be undertaking concrete traffic barrier restoration Works and expansion joint repairs to the St. Vital Northbound Bridge. His Work will predominately require a single curb lane closure outside of morning rush hour. It is anticipated that his Works will be undertaken within a continuous five week period sometime between July 3, 2006 and August 31, 2006. The Contractor shall coordinate his activities at this Site with the other Contractor whose Work will take precedence. Consideration shall be given to undertaking the deck sealing Works at this Site either before commencement or after completion of the Works of the other Contract. For further traffic control and schedule requirements at this Site, see E4.2(b)

D17. CONSTRUCTION METHODOLOGY

D17.1 The Contractor shall submit a construction schedule to the Contract Administrator for approval, such that the length of traffic lane closures at each Site are minimized.

D17.2 Simultaneous operations at multiple Sites or in more than one lane at each Site will only be considered upon satisfactory demonstration to the Contract Administrator that the Contractor has sufficient resources to undertake this type of operation in an efficient manner.

D17.3 No deviation from the approved construction schedule shall be permitted unless otherwise agreed to in writing by the Contract Administrator.

D18. EVIRONMENTAL PLANNING

D18.1 The Contractor shall conduct his operations in accordance with all current federal, provincial, or other regulations concerning environmental protection and pollution control. It shall be the Contractor's responsibility to familiarize himself with all applicable regulations and to obtain all necessary approvals and permits for his operations.

D19. CLEAN UP

D19.1 The Contractor shall maintain the Sites of Work in a tidy condition and free from the accumulation of waste and debris.

D20. PRIME CONTRACTOR – THE WORKPLACE SAFETY AND HEALTH ACT (MANITOBA)

D20.1 Further to GC:6.26, 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).

WARRANTY

D21. WARRANTY

D21.1 Notwithstanding GC:13.2, the warranty period shall begin on the date of Total Performance and shall expire five (5) years thereafter unless extended pursuant to GC:13.2.1 or GC:13.2.2, in which case it shall expire when provided for there under.

D21.2 Maintain the Work

(a) Further to GC:13.2 of the General Conditions, the Contractor shall, at his sole cost and expense, maintain the Work against any and all defects of deficiencies or otherwise, which may arise for a Warranty Period of Five (5) years from the date of the Certificate of Total Performance.

(b) Furthermore, the Contractor **shall correct, at his sole cost and expense, all seasonal or other pre-warranty identified deficiencies**, in accordance with the Contract Documents during the Warranty Period.

D21.3 Final Acceptance of the Work

(a) At least two (2) weeks prior to the expiration of the Warranty Period, or upon correction of all outstanding defects and deficiencies, whichever is the later, the Contractor shall request of the Contract Administrator a joint acceptance inspection of the Work. The Contract Administrator will, on being satisfied that all outstanding defects and deficiencies of the Contract have been corrected, issue a Certificate of Acceptance of the Work to be dated not earlier than five (5) years after the date of the Certificate of Total Performance, or the date that the Contractor corrects the final defects and deficiencies, whichever is the later, thereby terminating the Warranty period. The Certificate of Acceptance will, subject to GC:13.9, GC:13.10 and GC:13.11, indicate acceptance of the due performance of the Contract.

D21.4 Extension of Warranty Period

(a) Further to GC:13.9, GC:13.10 and GC:13.11, in the event that all outstanding defects and deficiencies have not been corrected to the satisfaction of the Contract Administrator at least one (1) week prior to the expiration of the Warranty Period, the Contractor shall be required to provide and maintain, at his sole cost and expense, an extension of the Performance Bond for a further one (1) year term with regard to those items of the Works

that have been identified by the Contract Administrator as still being defective and/or deficient. Failure to do so will necessitate the calling of the Performance Bond by the City.

D21.5 Additional Warranty

(a) In addition to the preceding requirements, the Contractor (Applicator) and the Manufacturer shall jointly warranty the **Skid Resistant Polymer Wearing Surface** for a period of **five (5) years.**

(b) Form W1: Agreement to Warranty shall be executed within three (3) Business Days of a request by the Contract Administrator.

(c) The polymer resin Manufacturer and the Contractor shall jointly and severally warranty the wearing surface against all defects in material and workmanship for a period of five (5) years in accordance with the requirements on Form W2: Warranty Agreement

(d) The Warranty Agreement (Form W2: Warranty Agreement) shall be signed by both the Manufacturer and the Contractor, acceptable to the City Solicitor.

(e) The Contractor shall perform all warranty repairs within thirty (30) good-weather application days, as defined in E5.3.8 after notification of defects by the Contract Administrator.

(f) The five (5) year warranty period shall commence on the date of issuance of the Certificate of Total Performance. The warranty shall cover all labour, equipment, materials, and traffic control required to satisfactorily repair or replace the wearing surface at no cost to the City. Warranty repairs shall be completed to the same Specifications as the original Work. Work that is not done in accordance with these Specifications will be rejected.

(g) Until such time as the Warranty Agreement (Form W2) is submitted to the Contract Administrator, the Work of This Contract will be deemed incomplete and issuance of the Certificate of Total Performance and the final progress estimate will not be considered.

FORM H1: PERFORMANCE BOND
(See D7)

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 dated the

_____ day of _____ , 20____ , for:

BID OPPORTUNITY NO. 388-2006

BRIDGE DECK SURFACE SEALING REPAIRS VARIOUS LOCATIONS

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 for two (2) years from the date of the Certificate of Total Performance;

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)

_____
(Name of Principal)

Per: _____ (Seal)

Per: _____

_____
(Name of Surety)

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

FORM H2: IRREVOCABLE STANDBY LETTER OF CREDIT
(PERFORMANCE SECURITY)
(See D7)

_____
(Date)

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

RE: PERFORMANCE SECURITY - BID OPPORTUNITY NO. 388-2006

BRIDGE DECK SURFACE SEALING REPAIRS VARIOUS LOCATIONS

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

_____ ,
(Name of Contractor)

_____
(Address of Contractor)

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

_____

_____ Canadian dollars.

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

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

Partial drawings are permitted.

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

_____
(Address)

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

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

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

_____ .
(Date)

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

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

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

_____
(Name of bank or financial institution)

Per: _____
(Authorized Signing Officer)

Per: _____
(Authorized Signing Officer)

FORM J: SUBCONTRACTOR LIST
(See D9)

BRIDGE DECK SURFACE SEALING REPAIRS VARIOUS LOCATIONS

Name	Address

FORM W1: AGREEMENT TO WARRANTY

(See Error! Reference source not found.**)**

Bridge Deck Surface Sealing Systems
SKID RESISTANT POLYMER WEARING SURFACE

FIVE YEAR WARRANTY TO THE CITY OF WINNIPEG

FOR PROJECT:

Bridge Deck Surface Sealing Repairs Various Locations
Bid Opportunity No. 388-2006

Product

Manufacturer's Name and Address

Contractor's Name and Address

do hereby jointly and severally provide, in accordance with D21 of the Supplemental Conditions, a Five (5) Year Warranty for the herein identified Bridge Deck Surface Sealing System, in accordance with Form W2: Warranty Agreement.

MANUFACTURER

Name of Company Officer	Corporate Position	Signature of Company Officer
Name of Witness	Signature of Witness	Date

APPLICATOR

Name of Company Officer	Corporate Position	Signature of Company Officer
Name of Witness	Signature of Witness	Date

FORM W2: WARRANTY AGREEMENT
(Page 1 of 2)

(See D21.5)

Bridge Deck Surface Sealing Systems
SKID RESISTANT POLYMER WEARING SURFACE

FIVE YEAR WARRANTY TO THE CITY OF WINNIPEG

FOR PROJECT:

Bridge Deck Surface Sealing Repairs Various Locations
Bid Opportunity No. 388-2006

Product

Manufacturer's Name and Address

Contractor's Name and Address

Do hereby jointly provide, in accordance with the Specifications of this Contract, a **Five (5) Year Warranty** for the herein identified Bridge Deck Surface Sealing System, as follows:

The Manufacturer and Contractor jointly and severally warrant the Bridge Deck Sealing System will be free of the following defects and/or deficiencies:

1. all debonding between the Sealing System and the deck slab, between the Sealing System and the deck repair areas, and between the layers of the Sealing System; and
2. cracking; and
3. an inadequate waterproof seal to protect the bridge deck surface below; and
4. a skid resistant wearing surface that is equivalent to or better than the concrete deck surface it covers

except where the defects and/or deficiencies are caused by:

1. active structural cracks or defects in the underlying structure;
2. disintegration of the substrate concrete surface;
3. misuse or mechanical damage caused by individuals, tools, other outside agents; or
4. unusual settlement or expansion of the structure;

(Continued on Page 2)

FORM W2: WARRANTY AGREEMENT (Continued)
(Page 2 of 2)

Bridge Deck Surface Sealing Systems
SKID RESISTANT POLYMER WEARING SURFACE

FIVE YEAR WARRANTY TO THE CITY OF WINNIPEG

FOR PROJECT:

Bridge Deck Surface Sealing Repairs Various Locations
Bid Opportunity No. 388-2006

all for a five (5) year period fro the date of issue of the Certificate of Total Performance. The city of Winnipeg will notify the Contractor within 30 days of becoming aware of the occurrence of the defects and/or deficiencies.

In the event of any such defects and/or deficiencies, the Manufacturer and Contractor hereby jointly and severally agree to promptly replace defective areas of the Bridge Deck Surface Sealing System, at no cost to the City of Winnipeg.

MANUFACTURER

SIGNED, SEALED, AND DELIVERED
in the presence of

Name of Company Officer	Corporate Position	Signature of Company Officer (Corporate Seal)
Name of Witness	Signature of Witness	Date

CONTRACTOR

SIGNED, SEALED, AND DELIVERED
in the presence of

Name of Company Officer	Corporate Position	Signature of Company Officer (Corporate Seal)
Name of Witness	Signature of Witness	Date

PART E - SPECIFICATIONS

GENERAL

E1. APPLICABLE SPECIFICATIONS, STANDARD DETAILS AND DRAWINGS

E1.1 *The City of Winnipeg Standard Construction Specifications* in its entirety, whether or not specifically listed on Form B: Prices, shall apply to the Work.

E1.1.1 *The City of Winnipeg Standard Construction Specifications* is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Branch internet site at http://www.winnipeg.ca/matmgt.

E1.1.2 The version in effect three (3) Business Days before the Submission Deadline shall apply.

E1.1.3 Further to GC:2.4(d), Specifications included in the Bid Opportunity shall govern over *The City of Winnipeg Standard Construction Specifications*.

E1.2 The following Drawings are applicable to the Work:

Drawing No.	Drawing Name/Title
B224-06-01	Pembina Highway Twin Bridge Plan and Sections
B224-06-02	Pembina Highway Twin Bridge Wearing Surface Details
B116-06-04	St. Vital Bridge Plan and Sections
B116-06-05	St. Vital Bridge Wearing Surface Details

E2. VERIFICATION OF WEIGHTS

E2.1 All Material which is paid for on a weight basis shall be weighed on a scale certified by Consumer & Corporate Affairs, Canada.

E2.1.1 All weight tickets shall have the gross weight and the time and date of weighing printed by an approved electro/mechanical printer coupled to the scale.

E2.1.2 The tare weight and net weight may either be hand written or machine printed. All weights, scales and procedures shall be subject to inspection and verification by the Contract Administrator. Such inspection and verification may include, but shall not be limited to:

(a) checking Contractor's scales for Consumer & Corporate Affairs certification seals;

(b) observing weighing procedures;

(c) random checking of either gross or tare weights by having such trucks or truck/trailer(s) combinations as the Contract Administrator shall select weighed at the nearest available certified scale;

(d) checking tare weights shown on delivery tickets against a current tare.

E2.2 The Contractor shall ensure that each truck or truck/trailer(s) combination delivering Material which is paid for on a weight basis carries a tare not more than one (1) month old.

E2.2.1 The tare shall be obtained by weighing the truck or truck/trailer(s) combination on a certified scale and shall show:

(a) upon which scale the truck or truck/trailer(s) combination was weighed;

(b) the mechanically printed tare weight;

(c) the license number(s) of the truck and trailer(s);

(d) the time and date of weighing.

E3. TRUCK WEIGHT LIMITS

E3.1 The City shall not pay for any portion of Material which results in the vehicle exceeding the maximum gross vehicle weight allowed under *The City of Winnipeg Traffic By-Law*, unless such vehicle is operating under special permit.

E4. TRAFFIC CONTROL

E4.1 General

(a) Further to Standard Provisions CW 1130-R1 of the City of Winnipeg, Works and Operations, Standard Construction Specifications, the Contractor shall be responsible for traffic control and maintenance of access within the specified contract limits indicated on the Construction Drawings.

(b) Only one lane may be closed at a time. Only continuous lanes and not portions of lanes will be permitted to be closed. There shall be no disruption of traffic entering or leaving intersecting streets or approaches unless otherwise approved by the Contract Administrator.

(c) The Contractor shall not disrupt pedestrian traffic on the bridges for the duration of the contract.

(d) The use of traffic signs having wheel rim bases will not be permitted. The Contractor shall utilize traffic signs with a 24" x 24" flat plate base with the corners turned or angled downwards 1". The signs shall be ballasted with sand bags to prevent overturning under wind pressures of 100 km/h wind velocities. The Contractor is responsible for monitoring and maintaining all traffic control signage 24 hours per day.

E4.2 Specific

(a) Pembina Highway Twin Bridge

(i) A single lane closure will be allowed. Once Work has commenced on Site, it must continuously progress until completion unless otherwise approved by the Contract Administrator.

(b) St. Vital Bridge

(i) For specific coordination with others see D16.2. In order to limit traffic disruption, Works at this Site shall be undertaken adjacent to and over a weekend, subject to weather conditions. It is anticipated that Work shall commence on a Friday after morning rush hour at 9:00 a.m. with the lanes reopened for traffic on Monday morning by 7:00 a.m.

(ii) Only single lane closures will be allowed. Each traffic lane closure for repairs in the curb and median lanes shall be limited to 3 days each unless otherwise approved by the Contract Administrator.

E4.3 Measurement and Payment

(a) Traffic control Works will not be measured. This item of Work will be paid for at the Contract Lump Sum Price, per location for “Items of Work”, listed here below, performed in accordance with the Specification and accepted by the Contract Administrator.

Items of Work:

Traffic Control

a) Pembina Highway Twin Bridge (LaSalle River)
b) St. Vital Bridge (Red River)

E5. SKID RESISTANT POLYMER WEARING SURFACE

E5.1 Description

(a) This Specification shall cover the supply, deck repair, surface preparation including removal of areas of previously applied skid resistant polymer wearing surfaces, and installation of a thin, flexible, multi-layered, bonded, skid resistant polymer wearing surface onto designated concrete bridge deck surfaces.

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

E5.2 Materials

E5.2.1 General

(a) The Contractor shall be responsible for the supply, safe storage, and handling of all materials set forth in this Specification. All materials shall be new and within the recommended shelf-life, as approved by the Contract Administrator.

E5.2.2 Testing and Approval

(a) Notwithstanding that the Contractor is responsible to provide all routine quality control testing for this Work, 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.

E5.2.3 Handling and Storage of Materials

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

(b) All materials especially the aggregates, shall be protected from all sources of moisture, dust, or other contaminants. All wet or otherwise contaminated materials will be subject to rejection at the discretion of the Contract Administrator.

(c) The epoxy resin shall be stored in a secure, heated enclosure.

E5.2.4 Polymers

E5.2.4.1 Epoxy Resin

(a) The epoxy resins shall be light coloured, one hundred percent (100%) solids, two (2) component flexible, thermosetting, moisture-insensitive material. It shall have high resistance to ultraviolet radiation, as well as excellent toughness, abrasion resistance, high bond strength, and waterproofing properties. The epoxy resin and epoxy mortar shall have the physical properties, as determined by a C.S.A. certified laboratory, shown in Table 1.

(b) The following epoxy resins are approved products subject to receipt of satisfactory test data:

(i) Flexolith

(ii) Trafficguard EP 35

(iii) E-Bond 526

(c) Further to B6, no other epoxy polymer will be considered acceptable to undertake this Work unless approved of by the City of Winnipeg Engineering Division following completion of a satisfactory field trial on an existing bridge deck in the City of Winnipeg.

(d) Separate samples of the constituents from each batch of epoxy resin supplied for this Work shall be provided by the Contractor to the Contract Administrator for testing and approval at least ten (10) Working Days prior to the scheduled commencement of Work.

(e) The epoxy resin and epoxy mortar shall meet the following physical properties or be otherwise accepted by the City of Winnipeg Engineering Division. (See Table 1: Physical Properties of Epoxy).

TABLE 1
PHYSICAL PROPERTIES OF EPOXY

Material	Physical Property	Required Value	Test Method
Epoxy Resin	Bond strength to concrete @ 2 days	8.0 MPa (minimum)	ASTM C882-78
Epoxy Resin	Tensile strength @ 7 days	12.0 MPa (minimum)	ASTM D638-82A Speed 4-6 mm/min Sample type M-1 Use 6 x 10 mm sample
Epoxy Resin	Tensile elongation @ 7 days	30.0% (minimum)	ASTM D638-82A Speed 4-6 mm/min Use 6 x 10 mm sample
*Epoxy Mortar	compressive strength @ 7 days	45.0 MPa (minimum)	ASTM C109-86 50 x 50 mm cube specimens (See E:4.4.4)
Epoxy Resin	modulus of elasticity @ 7 days	700 MPa (maximum)	ASTM C109-86 50 x 50 mm cube specimens (See E4.4.4)
*Epoxy Mortar	Thermal compatibility @ 7 days	10 cycles of - 21°C to +60°C (minimum)	ASTM C884-78 6 mm depth
*Epoxy Mortar	Absorption volume of permeable void @ 7 days	1.25% (maximum)	ASTM C642-82 50 x 50 mm cubes oven dry @ 60°C for 48 hours

* *Epoxy Mortar test specimens shall consist of 1 part by volume of epoxy resin to 2.5 parts by volume of coarse aggregate.*

E5.2.4.2 Methyl Methacrylate (MMA) Degussa Degadeck Bridge Deck Overlay System

(a) The only approved MMA Polymer, subject to the receipt of satisfactory test data is Degussa Degadeck Bridge Deck Overlay System which shall conform to the latest edition of the manufacturer's data sheet. Further to B6, no other MMA polymer will be considered acceptable to undertake this Work unless approved of by the City of Winnipeg Bridge Engineer following completion of a satisfactory field trial on an existing Bridge deck in the City of Winnipeg.

(b) The resins shall be amber, medium viscosity, one-hundred percent (100%) solids, two (2) component, thermoplastic materials. They shall have excellent resistance to ultraviolet radiation, as well as excellent toughness, abrasion resistance, bond strength, and waterproofing properties.

(c) The primer Degadeck Primer, basecoat Degadeck Body Coat, and sealer Degadeck Topcoat, shall have the following physical properties at the age of seven (7) days or as otherwise noted in Table 2 (a) and Table 2 (b).

TABLE 2 (a)
PHYSICAL PROPERTIES OF DEGADECK RESINS

Property	Units	Primer	Basecoat	Sealer	Test Method
Density	g/cm^3	1.05	1.01	0.98	--
Viscosity*	cps	80-150	1100-1300	450-550	ASTM D2393
Hardness	Shore D	83	56	61	ASTM D2240
Water Absorption	%	0.1	0.1	0.1	ASTM D570
Tensile Strength	MPa	29	8	14.8	ASTM D638
Elongation @ Break	%	3	50	35	ASTM D638

* *at time of mixing*

E5.2.4.3 Initiator

(d) The Initiator for the MMA resins shall be fifty percent (50%) Benzoyl Peroxide powder such as AKZO Chemicals, Inc. CADOX BFF-50 or an approved equivalent. Dosage rates shall be in accordance with the MMA overlay Manufacturer's recommendations issued in the Degadeck Mixing Chart.

E5.2.4.4 Promoter

(e) The Promoter, required for use with the MMA resins at application temperatures below 4°C, shall be N, N-Dimethyl-p-toluidine such as R.S.A. Corporation DMPT or an approved equivalent. Dosage rates shall be in accordance with the MMA overlay Manufacturer's recommendations.

E5.2.4.5 Degadeck Basecoat

(f) The basecoat shall have the following physical properties at the age of seven (7) days as noted in Table 2 (b).

(g) The tests listed in Tables 2 (a) and 2 (b) shall be conducted by a C.S.A. approved testing lab, and shall include infra-red spectro-analysis graphs of frequency vs. amplitude for each component. All tests, including the spectro-analysis, shall be done on the same samples of material.

TABLE 2 (b) PHYSICAL PROPERTIES OF DEGADECK BASECOAT			
Property	**Units**	**Required Value**	**Test Method**
Compressive Strength	MPa	12-14	ASTM D695
Tensile Strength	MPa	8.9-9.7	ASTM D638
Elongation @ Break	%	13	ASTM D638
Flexural Strength	MPa	10.3-11.7	ASTM C790
Freeze/Thaw Resistance	MPa	Pass	ASTM C666
Bond Strength to Concrete	MPa	1.7 Minimum	ACI 503R
Coefficient of Thermal Expansion	10E-5/K	7.9	DIN
Vicat Temperature	°C	50	DIN

E5.2.4.6 Methyl Methacrylate Mortar

(h) Surface repair of the deck and curb shall be done with approved one hundred percent (100%) solids MMA mortar as described and supplied by the Manufacturer of the methacrylate polymer overlay. Installation shall be in strict accordance with the manufacturer's instructions

E5.2.5 Aggregate for Epoxy Resin Wearing Surface and Shallow Depth Deck Repair

(a) The aggregate for the wearing surface and shallow depth deck repair shall be 3M Havelock Trap Rock, or approved equal, with the properties shown in Table 3 (a) and having sufficient field experience, to the satisfaction of the Contract Administrator, to show equivalent wear resistance. Only new, clean, dry aggregate meeting the gradation requirements shown in Table 3 (b) shall be used. The use of reclaimed aggregate from previous seeding operations will not be allowed.

(b) These aggregates shall meet the following physical properties:

TABLE 3 (a) AGGREGATE PROPERTIES			
Physical Properties	**Units**	**Required Value**	**Test Method**
Compressive Strength	MPa	200 (minimum)	ASTM D2638-86
Water Absorption	%	0.75 (maximum)	ASTM C128-88
Sulfate Soundness (15 cycles)	%	0.75 (maximum)	ASTM C88-83
LA Abrasion Loss ASTM (on coarse aggregate sample)	%	12 (maximum)	ASTM C131-81
Hardness (Mohs scale)	Mohs	6-7	

(c) The aggregates for the wearing surface and for the shallow depth deck repair shall furthermore meet the following gradation requirements:

TABLE 3 (b) GRADATION OF AGGREGATES	
Coarse	
Opening Size	**Percent Passing**
4.76 mm 3.36 mm 2.38 mm 2.00 mm 1.19 mm	100% 97 - 100% 45 - 55% 20 - 30% 0 - 2%
Fine	
Opening Size	**Percent Passing**
2.38 mm 2.00 mm 1.19 mm 0.841 mm 0.595 mm 0.420 mm	100% 95 - 100% 40 - 60% 20 - 32% 5 - 15% 0 - 2%

E5.2.6 Aggregates for MMA Resin Wearing Surface

(a) Basecoat Filler Aggregate

(i) For use in the basecoat application, materials shall consist of clean, dry (with less than 0.2% moisture), angular grained silica sand and shall be free from dirt, clay, asphalt, and other organic materials. Materials shall conform to the following sieve analysis:

TABLE 4 (a)
GRADATION OF BASECOAT FILLER AGGREGATES
0.045 mm Ground Silica Flour
A minimum of 90% shall pass the 0.045 mm sieve

Basaltic Sand

Sieve, mm	4.750	2.360	1.000	0.600	0.300	0.150
% Passing	99 - 100	92 - 100	16 - 70	45 - 65	10 - 20	0 - 10

(b) Basecoat Broadcast Aggregate

(i) The basecoat broadcast aggregate shall conform to the requirements of Table 3 (b) except that the gradation of the seed aggregate shall meet requirements of Table 4 (b) below.

TABLE 4 (b) BASECOAT BROADCAST AGGREGATE				
Sieve, mm	4.750	3.350	2.000	0.850
% Passing	100	98 - 100	10 -35	0 - 3

E5.3 Construction Methods

E5.3.1 Surface Preparation

(a) The Contractor shall be aware of the presence of Xorex Steel Fibres within the concrete deck of the Pembina Highway Twin Bridge and shall undertake all measures necessary to ensure that the Xorex Steel Fibres Fibres will not interfere with the application and/or performance of the skid resistant polymer wearing surface.

(b) Immediately prior to commencing application of the skid resistant polymer wearing surface, the concrete surface of the applicable deck slab or span, including the repair areas over which the wearing surface is to be applied, shall be thoroughly shot-blasted to remove all surface laitance, dirt, oil, grease, curing compound, existing membranes or protective coatings including previously applied skid resistant polymer wearing surfaces, or other deleterious material. Surface preparation shall expose the fine aggregates and the coarse aggregate. The surface preparation shall produce a minimum surface profile of 3 mm on the substrate deck concrete.

(c) Prior to shot blasting, the Contractor shall, in areas that a skid resistant polymer wearing surface had been previously applied or is still present, remove the membrane by a mechanical means acceptable to the Contract Administrator. The Contractor shall satisfy himself and the Contract Administrator that should the removal of the existing membrane be incomplete, the extent to which it remains will not be detrimental to the performance of the wearing surface being applied in any way.

(d) The prepared surface shall be free of all dirt, moisture, or other contaminants immediately prior to installation of the wearing surface. Reshot-blasting shall be required in the event of rain, delay in applying the wearing surface, or leakage of oil or other contaminants on the prepared surface. The face of the concrete shoulder traffic barriers shall also undergo this surface preparation to a height of 100 mm above the deck surface.

(e) If the concrete shoulder barriers are treated with membranes or protective coverings, the limits of removal on the barrier shall first be sawcut to a 6 mm depth prior to removal by approved mechanical means. Membrane system to remain beyond the 100 mm polymer overlay upturn shall be fully protected during removal and sandblasting operations. All damages to these membranes which occur as a result of the Contractor's operations shall be repaired as directed by the Contract Administrator at the Contractor's expense. No material shall be placed without approval of the surface preparation by the Contract Administrator.

(f) All existing caulking at the joint between the bridge deck and traffic barriers shall be removed prior to sandblasting. All joint reveals shall be thoroughly cleaned to the satisfaction of the Contract Administrator and be fully filled with a compatible mortar prior to the application of the skid resistant polymer wearing surface. This Work is considered incidental to the application of skid resistant polymer wearing surface and no extra payment will be considered.

(g) Only the area inaccessible for shot-blasting, including the 100 mm vertical face of the concrete shoulder barriers, shall be prepared by very heavy sandblasting to remove all laitance and to expose the coarse aggregate in the substrate concrete to a minimum surface profile of 3 mm.

(h) The acceptability of the surface preparation will be determined by a vertical axis pull bond test. This test involves the bonding of a 64 mm diameter sandblasted steel disk to the prepared substrate, using a fast-setting epoxy, and its removal from the substrate by applying a vertical pull.

(i) Substrate preparation will be approved if at least seventy-five percent (75%) of the bonded steel disk surface is covered with substrate concrete exceeding 3 mm in depth. The frequency of this test is at the discretion of the Contract Administrator, but initially one (1) test will be done for approximately each one hundred (100 m^2) square metres.

E5.3.2 Polymer Application Coverage Rates

(a) The polymer coverage rates shown in Table 7 and Table 8 are the maximum deck areas to be covered by one (1 L) litre of undiluted polymer applied to a smooth shot-blasted deck surface. The area covered by one (1 L) litre of polymer shall be decreased accordingly by the Contractor to accommodate all deck surface build-up

required to depths of 6 mm and deck crack sealing. This may be necessary as a result of extra removals that occur during deck surface preparation as a consequence of the deck having areas of scaling, weaker concrete mix, deterioration, surface irregularities, wheel path wear, etc. Extra polymer material may also be required due to coarse texturing or grooving of the deck surface, or porosity of the concrete. No additional payment will be made for extra polymer required for deck surface build-up.

TABLE 7
EPOXY POLYMER COVERAGE REQUIREMENTS
LITRES PER SQUARE METRE (L/M^2)

1st Layer	2nd Layer	3rd Layer
1.33	2.00	0.25

TABLE 8
MMA POLYMER COVERAGE REQUIREMENTS
LITRES PER SQUARE METRE (L/m^2)

Primer Layer	Premixed Basecoat Layer	Sealer layer
0.4	5.0	0.67

E5.3.3 Aggregate Application Quantities

(a) The type and amount of aggregate to be used are shown in Table 9 and Table 10. Note that the coverage rates shown include only the amounts to be retained in the membrane layers and do not include the excess aggregate that will be removed (normally thirty (30%) to fifty (50%) percent of the total aggregate placed, depending on the skill used in placing).

TABLE 9
EPOXY POLYMER AGGREGATE REQUIREMENTS
TYPE/AMOUNT
KILOGRAMS PER SQUARE METRE (kg/m^2)

1st Layer	2nd Layer
Fine 6 kg/m^2	Coarse 7 kg/m^2

TABLE 10
MMA POLYMER SEED AGGREGATE REQUIREMENTS
KILOGRAMS PER SQUARE METRE (kg/m^2)

Primer Layer	Basecoat Layer	Sealer Layer
0.5	5 – 10	N/A

E5.3.4 Deck Application Layout

(a) Prior to the application of each layer, the Contractor shall submit a sketch showing the deck surface divided into segments to be covered by each batch of skid resistant polymer wearing surface. The length of each segment shall take into account the overlay width, including 100 mm face on shoulder traffic barriers, surface roughness, the coverage rate, the amount of epoxy in each batch, and losses in application equipment and containers.

(b) After approval of the layout sketches, masking tape shall be applied to the deck surface to accurately outline the boundaries of all segments. No overlay Work shall commence until all layout by masking tape has been acceptably completed.

E5.3.5 Proportioning and Mixing of Epoxy Resin Components

(a) It is the responsibility of the Contractor to calibrate his batching operation before each day's production run. Such calibration shall be recorded in writing for verification by the Contract Administrator. The approved methods of batching the epoxy resin shall be either by calibrated static mixer or pre-measuring each epoxy component in separate calibrated pails prior to transferring each component into a single pail for mixing. Records of calibration shall contain the method of determining batch volumes of epoxy components. In the case of static mixing heads, epoxy resin components shall be run into two (2) separate measuring containers equipped with accurate volume marks for a given time period. The material shall be drawn from a disconnected feed upstream of the static mixing head and downstream from the pump.

(b) At the end of the test, the two (2) volumes shall be measured and shall agree with the manufacturer's specified mix ratio. This calibration shall be repeated if the temperature of the epoxy resin mix material changes more than five degrees Celsius (5°C).

(c) Addition, and in the case of pre-measuring of the epoxy resin components in separate pails, such pails shall be filled with water from a measuring container equipped with accurate volume marks until the desired batch quantities have been reached. The measuring containers shall then be marked at the top of the water column with a permanent mark.

(d) The epoxy resin components shall be mixed in batches no larger than twenty (20 L) litres. Each component shall be measured to an accuracy of three percent (3%). All containers shall be clean and free of contaminants or hardened epoxy. Containers used for mixing and blending shall not be used for measuring.

(e) The epoxy resin components shall be thoroughly mixed and blended together for a period of time specified in the manufacturer's instructions. After mixing, the epoxy resin components shall be transferred into another clean pail for further mixing. In all cases, in the absence of a manufacturer's time limit for mixing, the minimum time limit for mixing shall not be less than three (3) minutes. Attention shall be given to blend the epoxy resin components adjacent to the mixing container surface. Air or Water bubbles or other contaminants in the completed epoxy resin mix will be cause for rejection of that batch. The Contractor shall make a small mixed epoxy resin mix sample from each batch in fifty (50 ml) millilitre aluminum foil dish or similar container and label it with the deck location of that batch. These labelled samples shall be submitted to the Contract Administrator the following day.

(f) When mixing operations are carried out on or near the bridge deck, the deck and adjacent areas shall be protected from spillage of epoxy resin components, solvents, and other materials. Any such materials that are spilled on any part of the bridge shall be removed by the Contractor at his own expense to the satisfaction of the Contract Administrator.

E5.3.6 Application Timing for Epoxy Resin Mix

(a) Once mixed, the liquid epoxy resin mix is in a temperature and time-sensitive condition. The temperature of the deck, air, epoxy resin mix, and aggregate will have a significant effect on the timing aspects of this Work, including mixing times required, application times, completion of aggregate seeding, rate of strength gain, cure time required prior to beginning successive layers, and cure time required prior to allowing traffic on completed overlay. Similarly, other factors, such as the ratio of the epoxy resin components, the degree of thoroughness of the mixing of epoxy resin

components, the presence of direct sunlight on the deck and/or stored materials, or on mixing equipment may also influence the timing required to perform this Work. In addition, the temperature, wind, and sunlight conditions will vary during the course of the day. It is the Contractor's responsibility to follow the manufacturer's instructions on the use of their materials while minimizing the adverse effects of other variables noted above. Failure of the Contractor to comply with the above requirements will result in suspension of the Work at the discretion of the Contract Administrator.

E5.3.7 Proportioning and Mixing of MMA Resins

(a) Proportioning of primers, basecoats and sealers shall be done by volume. The initiator may be added with a marked volumetric measure. In this case the vessel shall be calibrated and marked with volumetric marks using a weigh scale and the appropriate dosage weight initiator.

(b) Mixing shall be adjusted so that the mixer does not entrap air or induce significant temperature increases. The mixture shall be tested for segregation in the field by density determinations performed on the top and bottom portion of two (2) sample batches prior to adding the initiator. The densities shall not vary by more than eight percent (8%).

E5.3.8 Weather Conditions, Dryness of Concrete Substrate and Polymer Layers

(a) The Work of this Contract shall be done in suitable conditions of temperature, wind, dust, and moisture. If weather factors or moisture conditions of the substrate concrete are detrimental to the acceptable placement of the overlay, the Work shall be suspended until suitable conditions exist. Mixing, placing and curing of polymer shall be done at ambient air and substrate concrete temperatures between 10°C and 27°C. The Contract Administrator's decision on the suitability of weather conditions shall be final.

(b) The concrete substrate, including concrete patching and repairs shall be completely dry before the first layer of polymer is applied. Subsequent layers of polymer shall not be applied until previous layers are completely cured. Presence of moisture will be determined by the modified ASTM D4263, "Standard Test Method for Indicating Moisture in Concrete by Plastic Sheet Method". This test shall be carried out on the concrete substrate as well as on previous placed polymer overlays. The Contractor shall place a minimum of four (4) test windows, per application area, at different time periods. The test windows shall consist of three (3) layers of clear and one (1) layer of black heavy duty six (6)μm poly, 1000mm x 500 mm located in moisture prone areas. The test windows shall be heated at a temperature of 55°C continuously for a time period of six (6) hours for each test and at a time duration, period and frequency of test, as determined by the Engineer. Timing of the test windows shall not start until the temperature of the concrete surface has reached 55°C. This will not relieve the Contractor from his responsibility to ensure that the overlay does not debond. The Contractor shall provide four (4), 500 watt halogen lamps and a portable electric generator (3500 watt) and carry out required testing which will be considered incidental to the Contract and no separate or additional payment will be made.

(c) Application of the first layer is recommended when there is sufficient evidence of declining deck concrete temperatures.

E5.3.9 Application of Epoxy Resin Mix

(a) Only after the Contract Administrator's acceptance of the surface preparation and repairs to the deck surface, and satisfactory submission of a Deck Application Layout plan by the Contractor, shall the epoxy resin mix be applied in accordance with the manufacturer's instructions regarding mixing, blend time, temperature, time between layers, pot life, method of application, condition of substrate and any other requirements. Non-compliance with any of these requirements which may cause

rapid gelling of the epoxy resin mix, failure to gel, poor bond, thermal incompatibility, or other failures, will result in rejection of the application, and require removal and repair of the same by the Contractor at the Contractor's expense.

(b) The waterproofing ability of the skid resistant polymer wearing surface is reduced by pinholes or defects in the layers. The Contractor should note that the results of the out-gassing and in-gassing of the concrete deck can produce an unacceptable number of pinholes, resulting in rejection of the overlay or repair at the Contractor' expense.

(c) Out-gassing is related to the behaviour of water in the pore of the concrete. Changing deck temperatures result in phase changes of water from liquid to gas and create bubbles, blisters, pinholes, or other defects.

(d) The Contractor shall use application procedures that prevent pinholing. **He shall apply the first layer of epoxy resin mix during low sunlight and declining deck temperatures.** Application of this first layer shall not be commenced unless the deck temperature has continuously declined at least five degrees Celsius (5°C) during the preceding thirty (30) minutes. The Contract Administrator's decision as to the suitability of environmental conditions affecting the placement shall be final.

(e) The Contractor shall spread the epoxy resin mix uniformly over the pre-measured area using a squeegee and roller brush or spraying equipment to carefully work the epoxy resin mix into the surface and obtain the required depth. Defects in the spreading operation that are apparent in the final product will require remedial work. Spiked footwear will be permitted for use by personnel involved in the application work, but only prior to gelling of the epoxy resin mix and with constraint that all damage or defects in the surface will be repaired. Spreading and levelling of fresh epoxy resin mix shall be completed while material is in a state of low viscosity, and within seven (7) minutes of batching. Failure to comply with the seven (7) minute limit will result in rejection of the epoxy resin mix batch. Application of material which has begun to gel and increase in viscosity will not be permitted.

(f) Each layer on the skid resistant polymer wearing surface shall be applied continuously between expansion joints. Intermediate transverse cold joints will not be permitted unless approved, in advance, by the Contract Administrator, as specified herein.

(g) All longitudinal lane cold joints in the overlay, including those overlays previously applied by others, shall be overlaid a minimum of 25 mm or as recommended by the manufacturer, from the cold joints of previous layers of overlay. To ensure straightness, masking tape shall be applied along the perimeter of all repair areas as well as along all steel deck joints, drains, curb faces, or other edges of the layers of overlay. The seeded layers of epoxy resin mix shall extend up the concrete curb or parapet faces a minimum distance of 100 mm. Where sawcuts have been employed to cut existing membranes and protective coverings, the boundary taping, and epoxy resin mix application shall be done in such a manner to ensure full sealing of the sawcut flush to the surface of the completed overlay. All masking tape used to define the boundaries of each segment shall be completely removed prior to gelling of the epoxy resin mix.

E5.3.10 Application of MMA Resin Mix

(a) The basecoat mixture shall be prepared by blending the silica flour and basaltic sand components with the resin in a suitable container (e.g. 20 L pail), followed by the addition and subsequent blending of the initiator. The mixture shall be applied over clean, dry, cured primer surfaces at 5 mm thickness using a draw box and pin rakes, or an approved equivalent.

(b) The draw box shall be equipped with an adjustable rear gate allowing for openings of 0 to 5 mm at the bottom of the box. Typical box dimensions are 600 mm wide, 150 mm long and 150 mm deep. The box, which does not contain a bottom, is filled with

base course material and drawn along the prepared deck surface in single, continuous passes. The design thickness of the overlay, including the seeded base course, shall be 8 mm. The applicator shall take care to allow the ridges between passes to self-level before broadcasting aggregate. Small areas may be touched up with a steel trowel.

(c) The deck layout may be subdivided into coverage areas corresponding to a maximum of one-hundred (100 L) litres of MMA mix.

(d) Applicators shall not walk on fresh polymer layer except for the first four (4) minutes after placement. During this period, golf shoes equipped with spikes must be worn.

(e) The topcoat sealer mix shall be applied to the cured and swept basecoat using paint rollers and brushes. Application shall be in a "dip-and -roll" manner from containers holding no more than eight (8) litres at a time. **The Topcoat Sealer shall not be poured directly onto the deck.**

E5.3.11 Anchoring of Wearing Surface Edges

(a) In order to prevent bond failures at the edges of the wearing surface at high impact locations and adjacent to bridge deck lanes not treated with the skid resistant polymer overlay, 12 mm deep by 10 mm wide grooves as shown on the Drawings shall be cut by router or saw immediately behind and parallel to all deck drains and all other transverse edges. These grooves or keys are intended to provide increased anchorage for the overlay and shall be properly filled with polymer and then sealed. To ensure the flush interface between the finished wearing surface and the expansion joints, the deck area for 300 mm adjacent to the deck expansion joints shall be removed by chipping to a depth of 6 mm at the outside edge and increasing the chipping to 12 mm at the expansion joint. To ensure the flush interface between the finished wearing surface and the deck drains, the deck area for 300 mm adjacent to the deck drains shall be removed by chipping to a depth of 6 mm. Both expansion joint and deck drain areas shall then be followed by shot-blast surface preparation to permit the installation of the skid resistant polymer wearing surface. Rough spots exceeding 3 mm in height on or adjacent to, deck joints and drains shall be removed to provide a smooth transition across the deck joints and/or drains. Anchoring of wearing surface edges shall be considered incidental to the application of the skid resistant polymer wearing surface and no extra payment will be considered.

E5.3.12 Seeding of Aggregate

(a) For each layer of the skid resistant polymer wearing surface, the aggregate shall be seeded into the fresh polymer resin mix prior to commencement of gelling or an increase in viscosity in such a manner that no ripples or waves are created in the polymer resin mix. This requires the aggregate to impact the fresh polymer resin mix surface in a near vertical direction. Improper seeding technique will result in the Work being suspended until proper methods are employed. The aggregate shall be placed so that an excess quantity covers an entire surface of the fresh epoxy resin mix, such that no polymer is visible, and such that the surface has a dry appearance. As the aggregate settles into the fluid polymer resin mix, wet spots that may appear on the surface shall be promptly reseeded with additional aggregate while the polymer resin mix is still in a low viscosity condition. At no time shall the Contractor attempt to disturb already placed aggregate in an effort to cover surface wet spots. After commencement of gelling of the polymer resin/aggregate layer being applied, walking on this layer will not be permitted until it has properly and fully cured.

(b) WARNING: All dust and fines from the air or from the aggregate result in reduced waterproofing performance of the finished wearing surface. Care shall be taken to prevent dust from entering each wearing surface layer until it has set. If compressed air is used for seeding, it shall be done in such a manner that fines are separated from the aggregate and are not allowed to contaminate the layer.

(c) In the event that insufficient aggregate has been placed and the wet areas harden to form glassy, resin-rich areas, the Contractor shall remove all of these areas to sound concrete and reapply the wearing surface layer in a proper manner at the Contactor's expense.

(d) Upon curing of each wearing surface layer, and upon approval of the Contract Administrator, all excess aggregate or other contaminants shall be removed from the surface by power sweeping and air blasting prior to applying a subsequent layer of polymer resin mix. Additional cleaning will be required if application of subsequent layers of polymer resin mix are delayed and the overlay surface is contaminated. Note: All excess aggregate removed from each layer shall be disposed of, off and away from the Site. In no case **shall this aggregate be reused. Only new, clean, dry aggregate shall be used in the seeding operation**.

E5.3.13 Smoothness of Finished Wearing Surface

(a) Although larger defects in smoothness of the bridge deck shall be repaired by patching, as directed by the Contract Administrator, all minor irregularities, wheel path wear and defects of up to 6 mm depth in the concrete deck shall be smoothed by the application of the constituent layers of skid resistant polymer wearing surface.

(b) Roughness attributable to the overlay will be tested with a 3 m long straight edge. When placed anywhere, in any direction on the surface, except for on the crown, the gap between the bottom of the straight edge and the surface of the overlay shall not exceed 3 mm. Furthermore, a regular frequency of gaps and ridges producing a washboard finish, even with specified limits, will be rejected. Corrective measures, as approved by the Contract Administrator, will be undertaken by the Contractor at his own expense.

(c) The location and number of measurements taken will be at the discretion of the Contract Administrator.

E5.3.14 Physical Properties of Wearing Surface

(a) The completed skid resistant polymer wearing surface shall be light in colour, reflective, durable, waterproof, skid resistant, and meet or exceed the physical properties shown in Table 10 at twenty-eight (28) days after placing:

TABLE 10
PHYSICAL PROPERTIES OF COMPLETED WEARING SURFACE

Repair Class	Skid Resistance (ASTM E670-87)	Resistivity (ASTM D3633-83) (ohms)	Bond Strength (MPa)
A	75	1,000,000	3.0

E5.3.15 Opening to Traffic

E5.3.15.1 Epoxy Aggregate System

(a) The skid resistant polymer wearing surface shall not be exposed to traffic except with the approval of the Contract Administrator. The Contract Administrator's approval will be based on the maturity of the completed wearing surface. As an aid to measuring the rate of strength gain, 50 mm epoxy-aggregate mortar cubes may be cast by the Contract Administrator from randomly selected batches of mixed epoxy resin mix as it is being placed on the deck. These cubes will be allowed to cure under the same ambient weather conditions as the overlay, and shall have attained a compressive strength of at least 20 MPa.

(b) Normally a set of three (3) cubes will be sampled from the final batch applied. The Contractor shall select the age at which these three (3) cubes are to be tested, and will bear all costs of testing should the cubes not achieve 20 MPa. If the cube

strengths are less than 20 MPa, traffic shall be kept off of the completed wearing surface for an additional forty-eight (48) hours or longer, at the discretion of the Contract Administrator.

E5.3.15.2 MMA Aggregate System

(c) The basecoat shall be cured at least one (1) hour, or until brooming or vacuuming can be performed without tearing or otherwise damaging the surface and no traffic or equipment shall be permitted on the basecoat surface during the curing period. After the curing period, all loose aggregate shall be removed by brooming or vacuuming in preparation for the sealer application. The unsealed basecoat shall not be opened to traffic. If traffic has to be accommodated due to extenuating circumstances, the basecoat shall be thoroughly cleaned of all impurities with sand blast or shotblast equipment and any resulting loss of MMA shall be replaced before the seal coat is applied.

(d) The Contractor shall plan and prosecute the Work so as to provide a minimum of thirty (30) minutes cure on the primer course and one (1) hour cure on the topcoat sealer course prior to opening that section to public or construction traffic. Job scheduling may be accommodated by the opening of cured primer surfaces to traffic while other sections of the deck are prepared.

(e) As an aid to measuring the rate of strength gain of the MMA basecoat, 12.7 mm diameter by 25.4 mm long compression plugs will be cast by the Contract Administrator from randomly selected batches as they are being placed on the deck. These cubes will be allowed to cure in the same ambient weather conditions as the overlay and shall have attained a minimum compressive strength of 12 MPa prior to traffic being allowed on the completed overlay. In addition, the final seal coat shall be cured for at least one (1) hour before the completed overlay may be opened up to public traffic.

E5.3.16 Clean Up

(a) Upon completion of the Work, the entire deck surface shall be re-cleaned with a power sweeper and air-blasted to remove all loose aggregates and sandblasting sand. The Site shall be cleaned of all surplus materials or spillage involved in the Work. Debris from clean up shall be hauled from the Site and properly disposed of, incidental to this Work.

E5.4 Quality Control

E5.4.1 Inspection

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

(b) The Contractor shall notify the Contract Administrator at least twenty-four (24) hours in advance of inspections and approvals to proceed to subsequent **phases of the work are desired**.

E5.4.2 Qualifications of Contractor

(a) The skid resistant polymer wearing surface shall be installed by a Manufacturer's Certified Applicator. The applicator shall provide satisfactory evidence of their previous experience in installing skid resistant polymer wearing surfaces.

E5.4.3 Materials

(a) All materials supplied under this specification shall be subject to testing and approval by the Contract Administrator in accordance with E5.2.2.

(b) The Contractor shall provide the Contract Administrator with quality control documentation from the Manufacturer for all resin products to be used in the Work at least two (2) business days prior to any on-Site Work.

E5.4.4 Compressive Strength

(a) The Contractor shall prepare a preliminary test batch of the basecoat mixture for the purpose of verifying the compressive strength properties of the proposed products. The preliminary test batch shall be prepared at least seven (7) business days prior to commencement of any on Site Work. The minimum compressive strength values and identified in Table 11 shall be achieved before approval from the Contract Administrator is granted to proceed with on Site Work

(b) Notwithstanding the Contractor's responsibility to provide routine quality control testing, the Contract Administrator will, at his discretion, perform compressive strength testing as a measure of quality control of batching procedures. These tests will be used for acceptance or rejection of the Work and determination of payment range as specified in Table 12.

(c) Samples of the epoxy resin mix material will be randomly selected and used to cast 50 mm cube specimens for compressive strength testing in accordance with test method ASTM C-109. The test specimens will be cast with a ratio of 2.5 parts by volume of coarse aggregate to 1 part by volume of mixed epoxy. The cube specimens will be cured for seven (7) days in dry lab conditions prior to testing. The compression test will be done using a steady loading rate of 0.5 MPa ± 0.05 MPa per second. The strength will be defined as the maximum load measured or the load resulting in a 2.5 mm deflection of the cube being loaded in the event this occurs prior to reaching the maximum load. This ASTM C-109 test method will also be used for approval testing of potential overlay materials.

(d) Samples of the MMA resin mix will be randomly selected and used to cast 12.7 mm diameter by 25.4 mm long compression plug specimens for compressive strength testing in accordance with test method ASTM D695. Compression plug specimens will be obtained directly from a batch of the MMA mix immediately after mixing is complete. No coarse aggregate shall be added to the compression plug specimens. The compression plug specimens shall be cured for seven (7) days in accordance with the Manufacturer's instructions prior to testing. The compression test will be done using a steady strain rate of 1.3 ±0.3 mm/min. The compressive strength will be defined as the maximum compressive load carried by the specimen during the test divided by the original minimum cross sectional area of the specimen.

(e) The approved products identified in Table 11 shall have a minimum seven (7) day compressive strength as shown therein.

TABLE 11
MINIMUM COMPRESSIVE STRENGTH OF APPROVED PRODUCTS

Product	7 Day Compressive Strength (MPa)
Flexolith / Trafficguard / E-Bond	40 (min.)
Degadeck MMA	12.0 (min.)

(f) In the event that a seven (7) day compressive strength test specimen fails to reach the specified minimum compressive strength, the City of Winnipeg Engineering Division, at their discretion, accept the wearing surface at a reduced rate of payment as shown in Table 12. For a test specimen taken on any layer of the wearing surface,

the reduced rate of payment will be applied by the Contract Administrator to the unit bid price for the entire thickness of overlay that has been placed in the area represented by a low test result. Each test specimen will be taken to represent up to a maximum of fifty square metres (100 m^2) of wearing surface installed during the same placement operation.

Table 12
Reduced Payment Schedule
(for Reduced Compressive Strength)

Flexolith Trafficguard E-Bond (MPa)	Degadeck (MMA)	Percentage of Unit Price
40.0 and over	12.0 and over	100%
38.0 to 40.0	11.4 to 12.0	90%
36.0 to 38.0	10.8 to 11.4	80%
34.0 to 36.0	10.2 to 10.8	70%
32.0 to 34.0	9.6 to 10.2	60%
30.0 to 32.0	9.0 to 9.6	50%
Below 30.0	Below 9.0	0% (Rejected)

E5.4.5 Corrective Action

(a) Failure to comply strictly with the polymer manufacturer's instructions regarding storage, mixing, application methods, weather conditions, timing, or other instructions will result in rejection, removal, and replacement of the Work by the Contractor at the Contractor's expense. Similarly, any delay in spreading the polymer on the deck or in seeding the aggregates, failure to consider wind, rain, temperature conditions, or other improper workmanship resulting in a non-uniform distribution of aggregates or segregation of aggregates in the overlay or unsatisfactory roughness will result in rejections of the Work.

E5.5 Measurement and Payment

E5.5.1 Skid Resistant Polymer Wearing Surface

(a) Supply and installation on the skid resistant polymer wearing surface for the bridge deck and bridge sidewalk will be measured on an area basis and paid for at the Contract Unit Price per square metre for "Items of Work" listed herebelow. The area to be paid for will be the total number of square metres of skid resistant polymer overlay installed in accordance with the specification, accepted and measured by the Contract Administrator.

Items of Work:

Skid Resistant Polymer Wearing Surface

a) Bridge Deck

b) Bridge Sidewalk

E6. CONCRETE DECK REPAIRS

E6.1 Description

(a) This Specification shall cover all concrete repairs to the bridge decks as required prior to the installation of the skid resistant polymer overlay.

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

E6.2 Materials

E6.2.1 General

(a) The Contractor shall be responsible for the supply, safe storage and handling of all materials set forth in this Specification. All materials shall be new and within the recommended shelf-life, as approved by the Contract Administrator.

E6.2.2 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 accepted by the Contract Administrator at least five (5) 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 material shall be rejected by the Contract Administrator and replaced by the Contractor at his own expense.

E6.2.3 Concrete Repair Material

(a) Concrete repair material shall be compatible with the polymer overlay and shall be of a rapid cure type to limit the overall length of the time of the lane closures.

(b) Either ready mix concrete or proprietary repair mortars may be used having the following minimum properties:

(i) Compressive Strength @ 28 days = 35 Mpa
(ii) Compressive Strength @ 1 day = 20 Mpa
(iii) Water / Cement Ratio = 0.4
(iv) Air Content = 5 to 8%

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

(d) Any proposed proprietary repair mortar shall be subject to the approval of the Contract Administrator.

E6.3 Equipment

E6.3.1 All equipment shall be a type approved by the Contract Administrator and shall be kept in good working order.

E6.4 Construction Methods

E6.4.1 Concrete Removal and Surface Preparation

(a) After removal of the defective skid resistant polymer wearing surface areas, or new application areas as applicable, the Contract Administrator will mark out areas requiring concrete repairs.

(b) Concrete is to be removed a minimum of 50mm or to the depth of deterioration, whichever is greater. Concrete shall be removed a minimum of 20mm behind reinforcing steel bars if more than half the bar diameter is exposed. The resulting surface is to be rough with a minimum amplitude of 6mm a maximum frequency of 15mm.

(c) Limits of the repair area to be sawcut 20 mm to provide a well-defined interface and bonding surface with the existing sound concrete.

(d) After removal of concrete but before placement, the concrete surface shall be mechanically abraded to provide additional mechanical bond. Epoxy coated reinforcing steel shall be touched up with approved epoxy paint.

E6.4.2 Mixing and Placing Concrete

(a) The Contract Administrator must be notified at least twenty-four (24) hours prior to placing concrete so that an adequate inspection may be made of the prepared concrete substrate surface and related works. Placement without required prior notification will not be allowed.

(b) Equipment for mixing or conveying the concrete shall be thoroughly flushed with clean water prior to commencement of the repair operation. All equipment and processes are subject acceptance by the Contract Administrator.

E6.4.3 Curing

(a) All patches shall be wet cured unless otherwise approved by the Contract Administrator.

E6.5 Quality Control

E6.5.1 All workmanship and materials furnished and supplied under this Specification are subject to close and systematic inspection and testing by the Contract Administrator, including all operations from the selection and production of materials through to final acceptance of the specified Work. The Contractor shall be wholly responsible for the control of all operations incidental hereto notwithstanding any inspection or acceptance 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.

E6.6 Measurement and Payment

(a) The concrete repairs will be measured on an area basis and paid for at the Contract Unit Price per square metre for “Concrete Deck Repairs”. The area to be paid for will be the total number of square metres of concrete installed in accordance with the specification, accepted and measured by the Contract Administrator.