

615-2022 ADDENDUM 1

ST. VITAL TWIN BRIDGE OVER THE RED RIVER REHABILITATION AND RELATED WORKS

URGENT

PLEASE FORWARD THIS DOCUMENT TO WHOEVER IS IN POSSESSION OF THE BID/PROPOSAL

ISSUED: December 15, 2022
BY: Bill Ebenspanger
TELEPHONE NO. 204-977-8370

THIS ADDENDUM SHALL BE INCORPORATED INTO THE BID/PROPOSAL AND SHALL FORM A PART OF THE CONTRACT DOCUMENTS

Template Version: Add 2021-03-05

Please note the following and attached changes, corrections, additions, deletions, information and/or instructions in connection with the Bid/Proposal, and be governed accordingly. Failure to acknowledge receipt of this Addendum in Paragraph 10 of Form A: Bid/Proposal may render your Bid/Proposal non-responsive.

PART B – BIDDING PROCEDURES

- Revise: B2.1 to read: The Submission Deadline is 12:00 noon Winnipeg time, January 19, 2023.
- Add: B3.4 Further to C3.1, the Contract Administrator or an authorized representative will be available at the Site at 10:00 am on December 21, 2022 to provide Bidders access into the Site abutments, beginning with the north abutment. Bidders are advised to supply their own safety and lighting equipment.
- Revise: B8.4 to read: Bidders are advised that inclusion of terms and conditions inconsistent with the Tender document, including the General Conditions, will be evaluated in accordance with B18.1(a).
- Revise: B13.4 to read: Further to B13.3(c), the Bidder shall, within five (5) Business Days of a request by the Contract Administrator, provide proof satisfactory to the Contract Administrator that the Bidder/Subcontractor has a workplace safety and health program meeting the requirements of The Workplace Safety and Health Act (Manitoba), by providing:
- Revise: B13.5 to read: Further to B13.3(d), the Bidder acknowledges they and all Subcontractors have obtained training required by the Accessibility for Manitobans Act (AMA) available at <http://www.accessibilitymb.ca/training.html> for anyone that may have any interaction with the public on behalf of the City of Winnipeg.
- Revise: B14.2(e) to read: The results of the verification must provide a clear, immediate and printable indication of pass or fail regarding B14.2(a).
- Revise: B14.3 to read: Bonds failing the verification process will not be considered to be valid and the bid shall be determined to be non-responsive in accordance with B18.1(a).
- Revise: B18.2 to read: Further to B18.1(a), the Award Authority may reject a Bid as being non-responsive if the Bid is incomplete, obscure or conditional, or contains additions, deletions, alterations or other irregularities. The Award Authority may reject all or any part of any Bid, or waive technical requirements or minor informalities or irregularities, if the interests of the City so require.
- Revise: B18.3 to read: Further to B18.1(b), the Award Authority shall reject any Bid submitted by a Bidder who does not demonstrate, in his/her Bid or in other information required to be submitted, that he/she is qualified.

- Revise: B18.4 to read: Further to B18.1(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.
- Revise: B18.4.1 to read: Further to B18.1(a), in the event that a unit price is not provided on Form B: Prices, the City may determine the unit price by dividing the Amount (extended price) by the approximate quantity, for the purposes of evaluation and payment.

PART D – SUPPLEMENTAL CONDITIONS

- Add: D3.6(a)(xxvi) Riverbank excavation and riprap installation.
- Delete: D28. Critical Stages
- Revise: D31.1 to read: If the Contractor fails to achieve Substantial Performance or Total Performance in accordance with the Contract by the days fixed herein for same, the Contractor shall pay the City the following amounts per Calendar Day for each and every Calendar Day following the days fixed herein for same during which such failure continues:
- Delete: D31.1(a)
- Revise: D31.2 to read: The amounts specified for liquidated damages in D31.1 are based on a genuine pre-estimate of the City's losses in the event that the Contractor does not achieve Substantial Performance or Total Performance by the days fixed herein for same.
- Add: D44.5 The Transport Canada Approval under the Canadian Navigable Waters Act for this Work is contained in Appendix 'G'. The Contractor shall comply will all Terms and Conditions of the Transport Canada Approval.

PART E – SPECIFICATIONS

- Revise: E4.2 to read: Further to C3.1, the hydraulic report is provided to aid the Contractor's evaluation of the existing hydraulic conditions. The Hydraulic Report is contained in Appendix 'B'.
- Add: E4.3 Further to C3.1, the substructure condition assessment report is provided to aid the Contractor's evaluation of the existing substructure conditions. The Substructure Condition Survey Report is contained in Appendix 'F'.
- Revise: E6.2.1(b) to read: Trees within or adjacent to a construction area that are not approved for removal by the Contract Administrator must be protected during construction by means of a barrier surrounding the TPZ as outlined in E6.2.4. Activities that are likely to injure or destroy the tree are not permitted within the TPZ.
- Delete: E6.2.1(c)
- Delete: E6.2.1(d)
- Revise: E6.2.1(e) to read: Tree pruning or root pruning of City of Winnipeg owned trees may only be done by a Contractor approved by the project's Qualified Tree Consultant (refer to E6.2.7) or Urban Forestry Branch.
- Revise: E6.2.6(b) to read: Root Pruning will be required to be done under the direction of, and along with, written sign-off by the Project's Qualified Tree Consultant (Refer to E6.2.7). The objective is to avoid severance of anchor roots, which provide upright support for trees and minimize damage to the tree
- Add: E19.3.1(a)(ix) Partial removal of abutment columns, abutment front wall bays, masking walls and exterior footings as illustrated on drawings;

- Add: E19.7.2 (h) Column removals may be accomplished after deck is removed from carriageway prior to pouring new deck. Column removals must be performed on one bearing column at a time, starting from top moving towards the base.
- Revise: E22.7.6(a) to read: Prior to using compressed air for abrasive blast cleaning, blowing down surfaces, and metallizing or painting application, the Contractor shall verify that the compressed air is free of moisture and oil contamination according to the requirements of ASTM D 4285.
- Delete: E22.7.6(b)
- Replace: E22.7.13 to read: Daily Metallizing Operator - Equipment Qualification - Bend Tests
- (a) Unless directed otherwise by the Contract Administrator, each day that metallizing will be applied, the Contractor shall perform bend testing prior to beginning production work.
 - (b) For each metallizing applicator, five (5) carbon steel coupons 50 mm x 200 mm x 1.3 mm thick shall be blast cleaned using the same equipment and abrasive used for the production work. Each applicator shall apply the metallizing to five (5) coupons in accordance with the requirements of this Specification to a dry film thickness of 8.0 to 12.0 mils (200 to 300 µm).
 - (c) 180 degree bend testing shall be performed on all five (5) coupons using a 13 mm mandrel in accordance with the requirements and acceptance criteria of SSPC-CS 23/AWS C2.23M/NACE 12. Minor cracks that cannot be lifted from the substrate with knife blade are acceptable. If lifting occurs on any coupon, the surface preparation and/or metallizing process shall be modified until acceptable results are achieved before proceeding with production work.
- Revise: E23.4.3(a)(ii) to read: The Contractor shall submit at a minimum, the test data to prove that the minimum compressive strength, flexural strength for Fibre Reinforced Concrete (FRC) only, air content, and slump of the concrete to be supplied meets or exceeds the performance criteria. In addition, test data shall be submitted to support requirements for post-cracking residual strength index (Ri) and fibre dispersion in accordance with the Canadian Highway Bridge Design Code (CHBDC) CAN/CSA-S6-19, Section 16, Fibre Reinforced Structures, Clause 16.6.
- Revise: E23.5.26(a) to read: Ethafoam joint filler shall be non-staining, polyethylene, closed-cell product for expansion and contraction and/or isolation joint application and shall be the type accepted by the Contract Administrator in accordance with B7.
- Add: E23.9.1(c) Heating concrete and housing and heating deposited concrete will be considered incidental to the Work. No separate measurement or payment shall be made for the work associated with this Specification.
- Delete: E23.9.2
- Replace: E27.9(a) to read: Riverbank excavation will be measured on a volume basis and paid for at the Contract Unit Price per cubic meter for "Riverbank Excavation", performed in accordance with this Specification, measured and accepted by the Contract Administrator, which price shall be paid in full for supplying all materials/equipment and for performing all operations herein described and all other items incidental to the Work.
- Replace: E28.4.1 to read: Rock
- (a) Rock for riprap shall consist of hard, dense, durable rock. The rock shall be quarried rock or fieldstone, dense and durable, and resistant to the action of frost and water and suitable in all other respect for the purpose intended. Stone rip-rap shall be free of sod, roots, organic material and debris prior to placement. Individual pieces of stone shall be free of defects such as seams or cracks prior to placement. Where stipulated, rock is to be of the same type as that existing in place meeting the following properties:
 - (i) minimum bulk specific gravity of 2.6 (ASTM C127);

- (ii) maximum Los Angeles abrasion loss of thirty–two percent (32%) (ASTM C535);
- (iii) maximum Magnesium Sulphate Soundness Loss of thirteen percent (13%) (ASTM C88);
- (iv) maximum absorption of two and a half percent (2.5%) (ASTM C127);
- (v) gradation requirements, as follows:

The riprap shall be well graded having a full range and even distribution of sizes and shall conform to the following gradation:

Gradation Requirements for Rip-rap

Diameter (mm)	Percent Passing by dry Weight	
	Class 350	Class 450
450		100%
350	100%	
300		40% - 70%
200	15% - 50%	
100		25% - 50%
5	0% - 15%	0% - 5%

- (b) Individual particles shall be shaped such that no dimension is greater than four (4) times the smallest dimension. Flat, elongated, or platy particle shapes will not be accepted.
- (c) The diameter shall be taken as the average of the shortest and longest dimension measured on an individual piece of riprap.
- (d) Contractors supplying riprap shall be responsible for demonstrating that the material is of adequate quality, gradation, and volume to meet the material specifications contained herein.
- (e) All materials set forth in this Specification shall be subject to inspection and testing by the Contract Administrator or by the testing laboratory designated by the Contract Administrator.
- (f) The Contract Administrator will visit proposed quarry Sites for inspection of the proposed riprap material and quarry faces a minimum of fourteen (14) days prior to supply and placement of riprap.
- (g) No supply and placement of riprap will be permitted prior to the Contract Administrator approving the source.
- (h) The testing frequency necessary to confirm the material quality will be specified at the discretion of the Contract Administrator.

Replace: E28.6 to read:

Construction Methods

- (a) The bed for riprap shall be shaped and trimmed to the lines as shown on the Drawings or as staked in the field by the Contract Administrator, prior to placing of any riprap. No riprap shall be placed until the bed has been inspected and approved by the Contract Administrator.
- (b) Place a layer of geotextile fabric under the riprap. Anchor the geotextile fabric as per the Manufacturer's recommendations.
- (c) Place the rock riprap carefully on the geotextile fabric so that it does not tear. Place the rock in such a manner that the larger stones are uniformly distributed and smaller rocks serve to fill the spaces between the larger rocks. Sufficient hand work shall be done to procure a neat and uniform surface with the thickness as shown on the Drawings.

- Revise: E29.4(a)(ii) to read: details of standby jacking, and supporting equipment (including provisions for allowing normal expansion / contraction movements of the bridge superstructure and the potential for movements resultant from release of potential locked in stresses);
- Add: E32.6.4(c) to read: Provide electrical continuity in columns by wiring new and existing reinforcement at quarter locations or spacing recommended by Manufacturer. The distributed galvanic anodes will be connected to existing reinforcement in columns. Proposed electrical connection details for columns shall be approved by the anode manufacturer and shall be detailed on the shop drawing submittal.
- Add: E33.6.6(g) The discrete galvanic anodes will be connected to the existing, exposed reinforcement. Provide electrical continuity with new dowels embedded into existing concrete as per Manufacturer's guidelines to provide a 50-year design life. Proposed electrical connection details shall be approved by the anode manufacturer and shall be detailed on the shop drawing submittal. Anodes do not need to be connected to corrosion resistant reinforcement (e.g. stainless steel reinforcement).
- Revise: E62.6.3 to read: E62.6.3 Excavation
- (a) Tree Pit and Tree Trenches to be dug with back-hoe.
 - (b) Excavate tree pits and trenches in accordance to layout and dimensions shown on the Drawings.
 - (c) Protect bottom of excavations against freezing.
 - (d) Remove water which enters excavations prior to planting. Ensure source of water is not ground water and notify Contract Administrator if standing water persists past removal.
 - (e) Tree pit and trench depth shall be such that the top of the root ball is even with the existing grade, and the root flare to be at or slightly above the finished grade. Determine how deep the root flare is in the root ball before excavation or before the tree is placed in the planting hole. If necessary, at installation, raise the top of the root ball until the root flare is at the proper planting depth through the addition of a topsoil atop the scarified layer.
 - (f) Upon excavation of the planting bed, the excavation shall be backfilled with a topsoil mixture to a depth to permit adequate installation and stabilization of the plant material. Topsoil shall be placed in accordance with City of Winnipeg Standard Construction Specification CW 3540 to a 300mm depth.
- Replace: E62.6.4 to read: Installation
- (a) All nursery stock shall be set plumb in the centre of pits and at levels as shown on the planting details after settlement has taken place.
 - (b) Nursery stock shall be faced to give the best appearance or relationship to adjacent structure and to the approval of the City of Winnipeg representative.
 - (c) Each tree must be planted such that the trunk flare is visible at the top of the root ball. Trees where the trunk flare is not visible shall be considered a deficiency and payment for the planting will not be received until the deficiency is addressed. Do not cover the top of the root ball with soil.
 - (d) Planting shall be done during periods of suitable weather conditions and in accordance with locally accepted practice.
 - (e) No tree pit is to be left open at the end of the Contractor's Work Day. Planting program is to be planned to ensure that all approved trees delivered to the Site at designated planting locations are installed and thoroughly watered the same day as delivery.
 - (f) With balled and burlapped root balls and root balls in wire baskets, burlap shall be loosened and cut away from the top 1/3 without disturbing root ball. Wire shall be cut away and removed from the top 1/3 of the root ball. Burlap or rope shall not be

pulled from under root ball. All twine and non-biodegradable wrapping shall be removed.

- (g) Backfill with topsoil and gently tamp soil around the root ball. Thoroughly water the root ball and planting pit.
- (h) Each tree is to have an earth saucer at its base having a diameter as large as the excavation with a berm no greater than 10cm in height and width formed at the perimeter of the saucer to retain water.
- (i) Install tree trunk protection around the base of each tree trunk. Armoured protection only to be installed on trees between Kingston Row and the Red River.
- (j) Install wood chips or other approved mulch. Mulch shall be a clean bark or wood chip free of leaves, branches and other extraneous matter:
 - (i) Mulch shall consist of chips not less than fifteen (15) mm nor larger than seventy-five (75) mm in size and not more than twenty (20) mm thick.
 - (ii) Mulch shall be to the depth of no more than fifty (50mm) or two (2") inches to one hundred (75mm) or three (3") inches and must not be placed within eight (10cm) or three (4") inches of the trunks of trees.
- (k) Apply water to area around planting hole immediately after planting.
- (l) Install stakes and straps (do not use wire in garden hose) as necessary, or as directed by Contract Administrator or designate.
- (m) Stakes, straps, and watering saucer to be removed at end of warranty.

Add: E62.6.8(c) to read: Tree protection to be removed at end of warranty.

Revise: E62.8.1(a) to read: The Contractor shall, at his/her expense, warrant the Work against any and all defects or deficiencies resulting from insect infestation, disease and mechanical damage due to improper handling, installation or maintenance, for a period of one (1) year from the date of the Total Performance. Nursery stock damaged by vandalism or reasons beyond the control of the Contractor shall be replaced by the client

Revise: E62.8.3 to read: One (1) year maintenance and Enviro Mulch is considered incidental to the supply and installation of all plant material.

Delete: E63

Add: E66.2.1(d) to read: Only Urban Forestry Branch pre-qualified contractors may perform tree removals. Refer to the approved list available at:
http://legacy.winnipeg.ca/publicworks/parksOpenSpace/UrbanForestry/Homeowner_Tree_Maintenance_Guidelines.stm. Submission of a contractor agreement form may be required at the discretion of the Urban Forest Branch.

Revise: E68.6(a) to read: Planting Beds, inclusive of mulch, shall be measured on a square meter basis. The area to be paid for shall be the total number of square meters that are installed in accordance with this Specification and the Drawings, and as acceptable to the Contract Administrator.

Delete: E69.8.3

Add: E69.9 to read: Measurement and Payment

(a) Conduit Hangers

- (iii) Supplying and Installing Bridge Hangers will not be measured. This Item of Work shall be paid for at the Contract Lump Sum Price for "Supply and Install Bridge Hangers" which price shall be paid in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work included in this Specification and accepted by the Contract Administrator.

- (iv) The supply and installation of abutment hanger steel will be measured and paid for under Specification E25, Miscellaneous Metal.
- (b) Conduits
 - (i) Supplying and Installing Conduits shall be measured on a length basis and paid for at the Contract Unit Price per metre for "Supply and Install Conduits", which price shall be paid in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work included in this Specification, accepted and measured by the Contract Administrator.
- (c) All excavation, backfill and concrete encasement will be considered incidental to the Work above.

Add:

E70. PROTECTION OF RIVERBANK INSTRUMENTATION

- E70.1 The Contractor is advised that geotechnical instrumentation is present at the locations shown on the Drawings. During the course of the Work, the Contract Administrator may have additional instrumentation installed to monitor riverbank performance.
- E70.2 The Contractor shall take necessary precautions to prevent damage to the existing or any newly installed geotechnical instrumentation as a result of their Work.
- E70.3 The Contractor shall facilitate any work by others necessary to modify existing instrumentation, to maintain operation of the instrumentation or to install new instrumentation.
- E70.4 The Contractor shall repair or replace instrumentation damaged as a result of their Work at no cost to the City, including fees for supervision of instrumentation installation by the Contract Administrator.
- E70.5 The Contractor is advised that monitoring of geotechnical instrumentation will be undertaken by the Contract Administrator during construction. Every effort will be made to schedule monitoring to avoid interruptions of the Contractor's work activities; however it may be necessary to temporarily suspend operation of equipment to reduce ground vibrations during monitoring.
- E70.6 Measurement and Payment
 - (a) Protection of riverbank instrumentation shall be considered incidental to Mobilization and Demobilization and no additional measurement payments will be made for work described in this specification.

E71. CONCRETE CRACK INJECTION

- E71.1 Description
 - (a) This Specification shall cover all operations relating to the epoxy injection of concrete cracks located on the pier shaft surfaces as shown on the Drawings and as directed by the Contract Administrator.
 - (b) The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tolls, supplies, and all things necessary for and incidental to the satisfactory performance, and completion of all Works as herein specified.
- E71.2 References
 - E71.2.1 All related Specifications and reference Standards are in accordance with the most current issue or latest revision:
 - (a) Specification E36, Self Consolidating Concrete Repairs
- E71.3 Scope of Work

- (a) The Work under this Specification shall include surface preparation and epoxy injection of concrete cracks located on the bridge pier shaft surfaces, as shown on the Drawings and as identified by the Contract Administrator.

E71.4 Submittals

- (a) Four copies of the crack repair work plan shall be submitted to the Contract Administrator at least 3 weeks prior to the commencement of the work.
- (b) The crack repair work plan shall bear the seal and signature of an Engineer and include at least the following information.
- (c) A description of the method of repair, including the following minimum information:
 - (i) Basis of selection.
 - (ii) Proposed effective pressure.
 - (iii) Surface finishing.
 - (iv) Location and size of injection ports.
 - (v) Surface treatment of the concrete prior to surface sealing.
 - (vi) Method of storing and handling grouts, cleaning solvents, and waste materials.
- (d) A list of the materials to be used for crack preparation and repair, including the following minimum information:
 - (i) Material specifications.
 - (ii) Product data sheets with test data.
 - (iii) Material safety data sheets.
 - (iv) Pot life of the components to be used based on a sample size of 200 ml at 5°C and 20°C.
- (e) A certificate from the material supplier shall be submitted stating the material is suitable for the intended use in this Contract.
- (f) A list of the equipment and accessories to be used including the following minimum information:
 - (i) The operating pressure of each component.
 - (ii) The type of injection port and means of closure.

E71.5 Materials

E71.5.1 Epoxy Resin

- (a) Material used for crack injection shall be epoxy resins for passive cracks.
- (b) Epoxy grout shall prevent the penetration of water and shall have sufficient flowability to fill the crack at least 80% of the depth of the crack using the proposed equipment and method of repair at the ambient and substrate temperatures existing at the time of grouting.
- (c) Epoxy resin shall be moisture insensitive and 100% solids.

E71.5.2 Equipment

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

E71.5.3 Gauges

- (a) In addition to the calibrated gauges required for use with the pumps and with the injection hose, additional gauges shall be available on site to replace those that malfunction.
- (b) Certificates of calibration, from an organization accredited by the Standards Council of Canada shall be supplied for each gauge certifying that the gauges are capable of measuring the pressure within a tolerance of ± 5 kPa.

E71.5.4 Pumps

- (a) Equipment used for pressure injection shall be suitable for the intended use and compatible with the grout.

- (b) Pumps shall be positive displacement type and shall be capable of delivering a minimum of two litres of grout per minute.
- (c) Pumps shall be capable of developing a maximum regulated operating pressure at least equal to twice the effective pressure.
- (d) Pumps shall be equipped with a calibrated gauge and shall be capable of accurately maintaining an effective operating pressure of 50 kPa or less.
- (e) Plural component pumps shall be used when multicomponent solution grouts are used.
- (f) Hand cartridge pumps shall not be used unless the volume of crack repair is less than one litre of resin for 100 m² of gross repair area.

E71.5.5 Static In-Line Mixers

- (a) Static in-line mixers shall produce a homogeneous grout and shall be sized to accommodate the minimum and maximum anticipated flow rates.
- (b) Static mixers shall have the manufacturer's plate attached showing the following mixer information:
 - (i) Size.
 - (ii) Type.
 - (iii) Maximum operating pressure.

E71.5.6 Agitating Mixer

- (a) Agitating mixers shall have a power driven paddle mixing head and produce a homogeneous component. The speed of the mixers shall be variable to a maximum of 500 rpm.

E71.5.7 Injection Hoses

- (a) Injection hoses shall have a rated working pressure equal to or greater than the maximum pump operating pressure and shall be equipped with a calibrated gauge at the injection port end.

E71.5.8 Injection Ports

- (a) Injection ports shall be removable or non-metallic insert type units. The pressure capacity of the injection ports shall be at least equal to the maximum operating pressure of the pump. All injection ports shall be equipped with a shut-off valve or other mechanical means of closure under pressure.
- (b) Surface mounted injection ports shall not be used.

E71.5.9 Air Compressor

- (a) Compressed air shall be free from oil and water when tested according to ASTM D 4285.

E71.5.10 Drills

- (a) Drilling of the injection holes shall be performed using a rotary percussion or rotary diamond type drill.
- (b) Percussion drilling equipment shall not be used for drilling holes greater than 26 mm diameter and holes within 150 mm of any edge of concrete.
- (c) Only holes 26 mm or less in diameter shall be drilled within 50 mm of any free edge of concrete.

E71.5.11 Concrete Router

- (a) Hand-held grinding wheel or a multi-bladed cut-off saw equipped with abrasive or diamond blades.
- (b) Multi-bladed floor saw cutting equipment equipped with diamond blades.

E71.6 Construction Methods

E71.6.1 General

- (a) Installation of all accessories and material shall be according to the manufacturer's recommendations and as specified in the submitted work plan.
- (b) Work shall only proceed when the temperature of the concrete is 5 °C or greater.
- (c) Prior to commencement of the work, the cracks requiring repair, as identified by the Contract Administrator, shall be numbered, physically marked as to their extent, and measured in the presence of the Contract Administrator.

- (d) This information shall be recorded and a copy submitted to the Contract Administrator.

E71.6.2 Crack Injection

(a) Drilling for Injection Ports

- (i) Injection holes shall be drilled, on each side of the crack, at a 45° angle to the surface of the concrete. The holes shall be located such that they intersect the crack section at approximately the midpoint and they shall extend through the crack section. The holes shall be sized to accommodate the injection ports. The spacing of the holes shall not exceed the depth of the crack or 200 mm, and the holes shall be alternated from one side of the crack to the other.
- (ii) Prior to installation of the injection ports each hole shall be individually cleaned of all deleterious material by an air-water blast to completely remove all drill cuttings from the hole.
- (iii) Injection ports shall be inserted into the holes and sealed. The inserted end of the injection port shall not extend beyond the point at which the drilled hole intersects the crack.

(b) Cleaning and Flushing

- (i) After the injection ports have been inserted, cracks shall be flushed with an air-water mixture or an alternating water and air flush to remove all deleterious material prior to the injection of grout. The flushing material shall be injected through the injection port and continued until it exudes from the adjacent injection port and the crack is thoroughly cleaned. This flushing shall proceed from one end of the crack to the other.
- (ii) A final flush shall be made with air only to remove all of the free water.

(c) Surface Preparation and Sealing

- (i) Surface opening of the cracks shall be sealed prior to injection.
- (ii) The surface of the concrete shall be mechanically cleaned for a distance of 25 mm each side of the crack sections to prepare a clean substrate for bonding of the surface sealing compound. The surface preparation and sealing shall be as recommended by the manufacturer of the surface sealing material.
- (iii) The surface sealing material shall completely confine the injection grout to the crack section with only the injection ports providing access. The surface sealing material shall withstand the maximum injection pressure without developing leakage along the crack section.
- (iv) Surface sealing of passive cracks shall not commence until at least one hour after the final air flush.

E71.6.3 Injection of Epoxy

- (a) Injection of epoxy shall proceed from the injection port at the lowest elevation of the crack and continue upwards along the crack on an injection port to injection port basis without interruption to the other end of the crack. The injection nozzle shall not be moved to the adjacent injection port until epoxy is showing at the next higher adjacent injection port or refusal criteria is developed.
- (b) While under pressure, each injection port shall be sealed immediately after completion of injection at that injection port.
- (c) When a maximum operating pressure greater than 3 MPa is required to inject the epoxy, the injection operation shall cease until the Contractor determines why this operating pressure is required.

E71.6.4 Monitoring

- (a) The volume of grout used within each five metres of crack length shall be recorded. The pump gauge pressure shall be recorded every 10 minutes. The volume of grout and pump pressure shall be related to the crack location.
- (b) The records shall indicate crack location and number, injection port spacing and confirmation of grout showing or refusal. A copy of the recorded information shall be submitted to the Contract Administrator at the end of each Day.

E71.6.5 Effective Pressure

- (a) When calculating the effective pressure, the head losses shall be determined prior to commencement of injection.
- (b) Head losses shall be determined in the presence of the Contract Administrator by performing a pressure flow test, through the equipment, for each equipment configuration used.

E71.6.6 Ratio Test

- (a) Plural component injection equipment proportioning shall be verified in the presence of the Contract Administrator by measuring the volume output of material in the pressure lines at least once for each two hours of operation.
- (b) When deviation from the manufacturer's specified proportioning ratio exceeds 5%, immediate adjustment or replacement of the equipment is required.

E71.6.7 Pot Life Determination

- (a) Prior to commencing the grouting operation, a sample shall be taken from the material containers on site and manually proportioned to the specified component ratio in the presence of the Contract Administrator. The total sample size shall be 200 ml, and the same size container shall be used for each sample taken.
- (b) The temperature of the material at the time of mixing and the pot life of the mixed material shall be recorded.
- (c) The proportions of materials and pot life shall conform to those specified in the original submissions.
- (d) An additional sample shall be taken from the end of the injection hose and a further pot life determination performed.
- (e) During grouting material samples shall be taken on a frequency of at least one per hour of operation and the pot life recorded.
- (f) Deviation from the proportions and pot life specified shall result in immediate discontinuance of use of the material.
- (g) All records shall be submitted to the Contract Administrator at the end of each working day.

E71.6.8 Surface Finishing

- (a) Surface finishing shall not proceed until the curing period, as specified by the material supplier, has elapsed. Surface finishing shall consist of removal of the injection ports and the surface sealant flush with the original concrete surface. Core holes and holes left after the removal of injection ports shall be filled with a cement-based non-shrink grout after the surface sealant has been removed.
- (b) Where the crack is not completely filled to the injection surface, the crack shall be filled with a compatible material acceptable to the Contract Administrator. The material shall be applied according to the manufacturer's recommendations.

E71.7 Quality Control and Assurance

E71.7.1 Quality Control

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

E71.7.2 Quality Assurance

- (a) All materials will be subject to physical inspection by the Contract Administrator and will be subject to rejection during the course of the Work and for the length of time as specified in the General Conditions, if, in the opinion of the Contract Administrator, the materials involved do not meet the requirements of the Drawings and this Specification.
- (b) All materials shall be subject to testing by the Contract Administrator and will be approved only if the requirements of the Drawings, Standards and this Specification are met. The Contractor shall supply the specimens for testing in accordance with the requests of the Contract Administrator.
- (c) The Contractor shall furnish facilities for the inspection of material and workmanship in the mill, shop and field, and the Contract Administrator shall be allowed free access to the necessary parts of the Works. The

Contractor shall supply samples to the Contract Administrator or his inspector for testing purposes as required. There will be no charge to the City for samples taken.

E71.8 Measurement and Payment

- (a) Concrete crack injection will be measured on a length basis and paid for at the Contract Unit Price per lineal metre for "Concrete Crack Injection", which price shall be paid in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work. Included in this Specification, accepted and measured by the Contract Administrator.

DRAWINGS

- Replace: 615-2022_Drawing_B116-24-6-R0 with 615-2022_Addendum_1_Drawing_B116-24-6-R1
- Replace: 615-2022_Drawing_B116-24-7-R0 with 615-2022_Addendum_1_Drawing_B116-24-7-R1
- Replace: 615-2022_Drawing_B116-24-12-R0 with 615-2022_Addendum_1_Drawing_B116-24-12-R1
- Replace: 615-2022_Drawing_B116-24-13-R0 with 615-2022_Addendum_1_Drawing_B116-24-13-R1
- Replace: 615-2022_Drawing_B116-24-15-R0 with 615-2022_Addendum_1_Drawing_B116-24-15-R1
- Replace: 615-2022_Drawing_B116-24-16-R0 with 615-2022_Addendum_1_Drawing_B116-24-16-R1
- Replace: 615-2022_Drawing_B116-24-17-R0 with 615-2022_Addendum_1_Drawing_B116-24-17-R1
- Replace: 615-2022_Drawing_B116-24-18-R0 with 615-2022_Addendum_1_Drawing_B116-24-18-R1
- Replace: 615-2022_Drawing_B116-24-19-R0 with 615-2022_Addendum_1_Drawing_B116-24-19-R1
- Replace: 615-2022_Drawing_B116-24-20-R0 with 615-2022_Addendum_1_Drawing_B116-24-20-R1
- Replace: 615-2022_Drawing_B116-24-24-R0 with 615-2022_Addendum_1_Drawing_B116-24-24-R1
- Replace: 615-2022_Drawing_B116-24-25-R0 with 615-2022_Addendum_1_Drawing_B116-24-25-R1
- Replace: 615-2022_Drawing_B116-24-27-R0 with 615-2022_Addendum_1_Drawing_B116-24-27-R1
- Replace: 615-2022_Drawing_B116-24-28-R0 with 615-2022_Addendum_1_Drawing_B116-24-28-R1
- Replace: 615-2022_Drawing_B116-24-29-R0 with 615-2022_Addendum_1_Drawing_B116-24-29-R1
- Replace: 615-2022_Drawing_B116-24-30-R0 with 615-2022_Addendum_1_Drawing_B116-24-30-R1
- Replace: 615-2022_Drawing_B116-24-31-R0 with 615-2022_Addendum_1_Drawing_B116-24-31-R1
- Replace: 615-2022_Drawing_B116-24-32-R0 with 615-2022_Addendum_1_Drawing_B116-24-32-R1
- Replace: 615-2022_Drawing_B116-24-34-R0 with 615-2022_Addendum_1_Drawing_B116-24-34-R1
- Replace: 615-2022_Drawing_B116-24-38-R0 with 615-2022_Addendum_1_Drawing_B116-24-38-R1
- Replace: 615-2022_Drawing_B116-24-56-R0 with 615-2022_Addendum_1_Drawing_B116-24-56-R1
- Replace: 615-2022_Drawing_B116-24-67-R0 with 615-2022_Addendum_1_Drawing_B116-24-67-R1
- Replace: 615-2022_Drawing_B116-24-75-R0 with 615-2022_Addendum_1_Drawing_B116-24-75-R1
- Replace: 615-2022_Drawing_B116-24-103-R0 with 615-2022_Addendum_1_Drawing_B116-24-103-R1
- Replace: 615-2022_Drawing_B116-24-104-R0 with 615-2022_Addendum_1_Drawing_B116-24-104-R1
- Replace: 615-2022_Drawing_OHSS-24-2-R0 with 615-2022_Addendum_1_Drawing_OHSS-24-2-R1

Replace: 615-2022_Drawing_OHSS-24-4-R0 with 615-2022_Addendum_1_Drawing_OHSS-24-4-R1

Replace: 615-2022_Drawing_OHSS-24-5-R0 with 615-2022_Addendum_1_Drawing_OHSS-24-5-R1

Replace: 615-2022_Drawing_U216-24-3-R0 with 615-2022_Addendum_1_Drawing_U216-24-3-R1

Replace: 615-2022_Drawing_U216-24-4-R0 with 615-2022_Addendum_1_Drawing_U216-24-4-R1

Replace: 615-2022_Drawing_U216-24-7-R0 with 615-2022_Addendum_1_Drawing_U216-24-7-R1

Replace: 615-2022_Drawing_U216-24-8-R0 with 615-2022_Addendum_1_Drawing_U216-24-8-R1

Replace: 615-2022_Drawing_U217-24-3-R0 with 615-2022_Addendum_1_Drawing_U217-24-3-R1

Replace: 615-2022_Drawing_U217-24-4-R0 with 615-2022_Addendum_1_Drawing_U217-24-4-R1

Replace: 615-2022_Drawing_U217-24-6-R0 with 615-2022_Addendum_1_Drawing_U217-24-6-R1

APPENDICES

Replace: 615-2022_Appendix E – Division 26 – Electrical Requirements with 615-2022_Addendum_1_Appendix E –
Division 26 – Electrical Requirements

Add: 615-2022_Addendum_1_Appendix F - Substructure Condition Survey Report

Add: 615-2022_Addendum_1_Appendix G - Transport Canada Approval