

**PART E**  
**SPECIFICATIONS**

## 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.
- E1.2 *The City of Winnipeg Standard Construction Specifications* is available in Adobe Acrobat (.pdf) format on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division internet site at <http://www.winnipeg.ca/matmgt>.
- E1.3 Further to GC:2.4(d), Specifications included in the Bid Opportunity shall govern over *The City of Winnipeg Standard Construction Specifications*.
- E1.4 The following Drawings are applicable to the Work:

<u>Drawing No.</u>	<u>Drawing</u>
B112-04-01	Disraeli Overpass Structural Steel Deck Repairs – General Elevation & Schedule
B112-04-02	Disraeli Overpass Structural Steel Deck Repairs – Details and Sections
B112-04-03	Disraeli Overpass Structural Steel Deck Repairs – Miscellaneous Metal

#### E2. TRAFFIC AND PEDESTRIAN CONTROL

##### E2.1 General

The Work covered under this item shall include all items relating to traffic and pedestrian control at the site.

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

##### E2.2 Construction Methods

Traffic control shall be carried out in accordance with the latest edition of the "Manual of Temporary Traffic Control in Work Areas on City Streets," issued by the City of Winnipeg and as specified herein.

The Contractor will be allowed single curb lane closures on the Disraeli Freeway outside of normal weekday rush hours to access the repair areas. No lane closures will be permitted between 6:30 to 9:00 a.m. in the southbound direction. nor between 3:00 to 6:00 p.m. in the northbound direction.

The Contractor shall restrict pedestrian access to sidewalks affected by the deck repair operations. Temporary sidewalk closures shall be signed at each end of the bridge as well as at the pedestrian overpass to the south.

##### E2.3 Measurement and Payment

Traffic and pedestrian control will be considered incidental to the Works of this Specification and no additional measurement or payment will be made.

### **E3. STRUCTURAL STEEL REPAIRS**

#### **E3.1 Description**

This Specification shall cover the preparation and coating of the exist structural steel and the supply, fabrication, and installation of new structural steel as specified herein.

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

#### **E3.2 Materials**

##### **E3.2.1 General**

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

The Contractor shall be responsible for the safe removal and disposal of the existing severely corroded steel and for the supply, safe storage and handling of all materials as set forth in this Specification. All materials shall be handled in a careful and workman like manner, to the satisfaction of the Contract Administrator.

##### **E3.2.2 Structural Steel**

All general structural steel shall conform to the requirements of CSA Standard CAN/CSA-G40.21-M-92, Grade 300 W.

##### **E3.2.3 High Strength Bolts, Nuts and Washers**

High strength bolts shall conform to the requirements of ASTM Specification A325, Type 1. Nuts shall conform to the requirements of ASTM Specification A563, Grade DH. Washers shall conform to the requirements of ASTM Specification F436, Type 1. All hardware shall be hot dip galvanized.

##### **E3.2.4 Hot Dip Galvanizing**

All new structural steel supplied under this Specification shall be hot-dip galvanized in accordance with CSA standard G154-M1981 to a retention of 600gm/m<sup>2</sup> after fabrication.

##### **E3.2.5 Galvanizing Touch-Up**

Field applied galvanizing shall be done with self-fluxing, low temperature, zinc-based alloy rods in accordance with ASTM A780-80 for "Repair of Damaged Hot Dip Galvanizing Coatings". An approved product is Galvalloy as manufactured by Metalloy Products Company, P.O. Box No. 3093, Terminal Annex, Los Angeles, California. Locally Galvalloy is available from Welder Supplies Limited, 25 McPhillips Street, Winnipeg, Manitoba.

##### **E3.2.6 Cold Galvanizing Compound**

Cold galvanizing compound for coating existing structural steel shall be Zinga as distributed by Continental Mine & Industrial Supply , or approved equal.

##### **E3.2.7 Zinc Metallizing Material**

The coating material for existing structural steel shall consist of 85/15 zinc/aluminum alloy wire, 3 mm in diameter, as supplied by UTP Welding Materials of Canada Ltd., or equal as approved by the Contract Administrator.

All coating material shall be delivered in the original unopened spools with the manufacturer's labels intact. Any material damaged or otherwise deteriorated shall not be used. If requested by the Contract Administrator, the Contractor shall provide a listing of the spools to be used including their weight and mill test report.

All Materials shall be stored under cover in a secured place approved by the Contract Administrator, and shall be kept within storage temperature limitations recommended by the manufacturer.

E3.2.8 Abrasive for Blast Cleaning

The blast cleaning abrasive shall be free of corrosion-producing contaminants. Silica or other sand will not be permitted. Slag abrasives shall contain no more than 0.1% oil by weight. The blast-cleaning abrasives and grit size employed shall be capable of achieving a surface anchor-tooth profile having a peak-to-valley height of 2 to 4 mils.

E3.2.9 Incidental and Miscellaneous Materials

All incidental and miscellaneous materials required for undertaking the surface preparation and metallizing works shall be strictly in accordance with the manufacturer's guidelines and these Specifications, as approved by the Contract Administrator.

E3.3 Equipment

E3.1 General

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

E3.2 Surface Preparation Equipment

All equipment shall be of a type approved by the Contract Administrator and capable of preparing the steel surfaces in accordance with these Specifications.

E3.3 Zinc Metallizing Application Equipment

The zinc metallizing application equipment shall be designed such that the coating will be applied uniformly to all surfaces in the locations required, as shown on the Drawings or approved by the Contract Administrator. This equipment shall be kept in good working order at all times.

Electric arc equipment is the zinc metallizing preference for this work.

E3.4 Construction Methods

E3.4.1 Scope of Work

The scope of Work shall include the following items:

- (i) Installation and removal of access to all repair areas shown on the Drawings.
- (ii) Surface preparation and coating of the existing structural steel.
- (iii) Fabrication on installation of new structural steel splices.

#### E3.4.2 Methods and Scheduling

At least ten days prior to the commencement of any scheduled on-site work, The Contractor shall submit to the Contract Administrator for review and approval, a proposed schedule, including methods and sequence of operations. The Contractor shall consult with C.P.R. for repairs over their right-of-way in accordance with Clause D17.

#### E3.4.3 Details of Existing Structure

The applicable details and structure dimensions of the existing structure are shown on the Drawings for the information of the Contractor in establishing the methods and limits of removal and determining the cost of the work from his examination of the site.

The information shown has been obtained from existing drawings, measurements, and observations at the site. The accuracy of this information is not guaranteed and the Contractor must verify all information before commencing work.

#### E3.4.4 Access and Scaffolding

The Contractor shall submit access methods for men and equipment to the repair areas at least five days prior to the commencement of on-site construction.

All scaffolding, platforms, and swing-stages shall be designed, constructed, erected and operated in accordance with Workplace Safety and Health Act, applicable Regulations and as approved by the Contract Administrator.

The Contractor is advised that some of the repairs may only be accessed through private property. Access through private property shall be in accordance with Clause D16.

Access and scaffolding in the C.P.R. right-of-way shall be in accordance with Clause D17 and as specified herein.

All access routes shall be restored to the pre-construction condition or better incidental to the Works of this Specification.

#### E3.4.5 Surface Preparation and Coating of Existing Structural Steel

##### (a) General

All surfaces of the existing deck channels shall be prepared and coated to 600mm beyond the new structural steel repairs. In addition, where structural steel plates are located on the underside of the deck, these plates shall also be prepared and coated to the adjacent deck channels on either side. Existing coatings, beyond the identified repairs areas, that are damaged by the Contractor's operations, shall be repaired at the Contractor's expense to the satisfaction of the Contract Administrator.

The Contractor shall comply with all applicable environmental, health, and safety regulations related to the surface preparation and coating of the existing structural steel. As a minimum, the Contractor shall collect all spent blasting abrasives, cleaned off paint residue, and new coating material overspray from the work area. All such materials shall be disposed of off and away from the site by the Contractor in accordance with the appropriate regulations to the satisfaction of the Contract Administrator.

##### (b) Surface Preparation Trials

Prior to actual commencement of the Work, representative trial areas shall be cleaned in accordance with SSPC Specifications.

The degree of cleaning and surface profile achieved, once accepted by the Contract Administrator, will become the standard for all subsequent surface preparations. Furthermore, the Contractor shall prepare and maintain blasted reference panels for

the purpose of calibrating magnetic dry film thickness gauges as specified in SSPC Specification PA2.

All Structural Steel shall be cleaned to SSPC Specification SP:10, "Near White Metal Blast Cleaning."

(c) Surface Cleaning

Before any blast cleaning operations or coating applications commence, the following surface cleaning operations shall be undertaken on all structural steel designated to receive a coating system:

- i) All organic materials such as bird droppings, nests, and other non-structural obstructions or pollutants attached to the steel are to be removed by hand cleaning operations.
- ii) All oil and grease shall be removed manually with solvent cleaning as per SSPC Specification SP1
- iii) The entire area shall be washed clean of road salt using high pressure water washing.

(d) Blast Cleaning Operation

The Contractor shall prepare the structural steel immediately prior to by blast cleaning in accordance with SSPC Specification SP:10, "Near White Metal Blast Cleaning." The prepared surfaces shall have a surface anchor-tooth profile having a peak-to-valley height of 2 to 4 mils.

The Contractor shall ensure that the amount of blasting medium used for blast cleaning is kept to the absolute minimum by conscientious efforts of his workforce and by the efficient use of equipment.

No rust scale shall remain in the designated areas.

The blasting shall be performed so as not to damage or contaminate any previously coated areas.

Freshly prepared steel shall be coated as quickly as practical thereafter. However, if the freshly prepared steel begins to rust prior to application of the coating, the steel must be reblasted to meet the specified SSPC Specification.

In areas where freshly prepared steel may be exposed to direct contact with aqueous solutions, the steel must be protected from highway runoff and immediately coated.

Where the coated surface in a localized area has been damaged or rejected, remove loose or nonadherent coating by hand cleaning or other approved techniques. Surface preparation shall then be performed on this area and for approximately 20 mm beyond the damaged area in all direction, or to such a distance that ensures a soundly adhered coating.

(e) Blast Clean-up Operations

Following all blast cleaning operations and prior to the Contract Administrator's inspection, all surfaces involved shall be blown off with compressed air or cleaned by vacuum for the purpose of removing any and all traces of blast products from the surface, and for the removal of abrasion from all pocket and corners. Following surface preparation cleanup operations, the Contractor shall immediately notify the Contract Administrator so that testing and inspection can be undertaken prior to the application of any coating material.

(f) Surface Testing and Inspection

The Contractor shall provide the Contract Administrator with a minimum of four (4) hours notice prior to coating to allow for testing and inspection of prepared surfaces.

Immediately following blast cleaning and cleanup operations, the Contractor shall notify the Contract Administrator in order that a chemical analysis of the blasted steel and a surface profile inspection can be carried out. No coating shall be applied to any prepared surface until it is approved by the Contract Administrator.

The Contract Administrator may analyze the blasted steel surface for chloride ion content.

Coating shall not be applied to any surface that either exceeds an average of 30 milligrams per square metre chloride ion content, based on three readings taken from three separate areas of 150mm x 150mm each, or that any one reading exceeds 50 milligram per square metre chloride ion content. Any area found to exceed these upper limits shall be high pressure wash-cleaned to flush off the chloride ions and reblasted by the Contractor at his own cost incidental to the surface preparation operations. These areas will then be retested by the Contract Administrator.

(g) Application of Zinc Metallizing Coating

Zinc metallizing shall be applied by either of the following processes: flame spray or electric arc spray. The steel shall not be heated to a temperature exceeding 350°C. The coating shall be applied at a minimum thickness of 12 mils. The coating thickness specified shall be the thickness over the peaks of the blast profile. To ensure this thickness is measured, thickness measurements and gauge calibration methods shall be described in SSPC Specification PA2. Additional layers of zinc metallizing coating material shall be applied until the minimum specified thickness is attained.

E3.4.6 Fabrication and Installation of New Structural Steel

(a) General

Except as otherwise specified herein, steelwork shall be fabricated in accordance with the latest A.W.S. Specification D1.1 and subsequent revisions.

No fabrication shall commence until permission to do so has been received from the Contract Administration.

The repair of any members damaged during fabrication shall be approved by the Contract Administrator.

(b) Submissions

At least five (5) working days prior to the scheduled commencement of any fabrication, the operator's qualifications, the shop drawings, and mill certificates shall be submitted to the Contract Administrator for his approval.

(c) Shop Drawings

No shop drawings are required for this project.

(d) Preparation of Material

Prior to being used in fabrication, all structural steel shall be straight and free from kinks or bends. If straightening is necessary, it shall be done by methods that will not injure the metal. The steel shall not be heated unless permission is given by the Contract Administrator. Sharp kinks and bends will be cause for rejection of the steel.

Steel may be cut to size by sawing, shearing, flame-cutting or machining. All steel after cutting shall be marked by a method agreed to by the Contract Administrator so that it's specification may be immediately identified.

Sheared edges of plates more than 16mm in thickness shall be planed to a depth of 6mm.

Special attention shall be given to the cutting of cover plates or flange plates. Occasional gouges not in excess of 6mm deep will be accepted in areas of low stress at the discretion of the Contract Administrator. The repair or removal of such gouges shall be to the Contract Administrator's instructions.

Edges of flame cut edges shall be ground to a radius of 2mm. Re-entrant cuts shall be filleted to a radius of not less than 19mm.

(e) Bolt Holes

All bolt holes for high strength bolts shall be drilled and shall be of a nominal diameter not more than 2mm in excess of the nominal bolt diameter.

Drilling shall be done with twist drills. Burrs on the outside surface shall be removed.

Poor matching of holes will be cause for rejection.

Bolt holes for new material shall be pre-drilled prior to hot dip galvanizing.

(f) Hot Dip Galvanizing

The hot-dip galvanizing plant shall be a regular member of the American Galvanizers Association Inc. and certified to CSA G164.

Adequate venting and drainage holes shall be provided in enclosed sections for hot dip galvanizing. The galvanizing facility shall be consulted regarding the size and location of these holes. Holes shall be provided by drilling not burning.

The galvanizing coating on the outside surfaces of all steel items shall be smooth and free of blisters, lumpiness and runs.

Minor defects and contaminants in the galvanizing coating such as heavy dross protrusions, flux inclusions, and ash inclusions shall be grounds for rejection of the galvanizing coating system.

The Contractor shall verify the thickness of the galvanized coatings as directed by the Contract Administrator.

The steel items shall be stored on timber blocking after hot dip galvanizing.

(g) Field Applied Touch-up Galvanizing

Any areas of damaged galvanizing as well as field drilled bolt holes shall be touched up using the cold applied galvanizing compound as Specified. It shall be applied in accordance with the Manufacturer's specifications.

(h) Field Assembly

The new structural steel channels shall be snug tight to the underside of the steel plate or steel deck grating. Galvanized steel shims shall be installed where necessary as shown on the Drawings. The new channels shall be used as a template to drill bolt holes in the existing steel channels.

All field connections shall be bolted with high strength bolts. Bolting with high strength bolts shall be carried out in accordance with "AASHTO Standard

Specifications for Highway Bridges-1996 Division II, Clause 11.5-Assembly - turn of nut method”.

(i) Straightening of Bent Material

The straightening of plates and angles or other shapes shall be done by methods that will not produce fracture or other injury. The metal shall not be heated unless permitted by the Contract Administrator, in which case the heating shall not be a higher temperature than that producing a “dark cherry red” colour. After heating, the metal shall be cooled as slowly as possible.

Following the straightening of a bend or buckle, the surface of the metal shall be carefully inspected for evidence of fractures and if necessary, replaced or repaired to the satisfaction of the Contract Administrator.

(j) Misfits

The correction of minor misfits involving harmless amounts of reaming, cutting and chipping as determined by the Contract Administrator will be considered a legitimate part of erection. However, any error in shop fabrication, which prevents the proper assembling and fitting up of parts by the moderate use of drift pins or by a moderate amount of reaming and slight chipping or cutting, shall be the responsibility of the Contractor.

E3.5 Quality Control

E3.5.1 Inspection

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. 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.

E3.5.2 Access

The Contractor shall allow the Contract Administrator free access to all parts of the work at all times. The Contractor shall supply samples to the Contract Administrator or his inspector for testing purposes as required. There will be no charge to the City for samples taken.

E3.5.3 Material Storage and Care

Structural steel, either plain or fabricated, shall be stored on above the ground platforms, skids or other supports. It shall be kept free from dirt and other foreign matter, and shall be protected, as far as practical, from corrosion. Long members shall be supported on skids placed near enough together to prevent injury from deflection.

Prior to fabrication, all steel shall be marked for identification by heat number and specification by a marking system approved by the Contract Administrator.

### E3.6 Measurement and Payment

Structural steel repairs will be measured on a unit basis and paid for at the Contract Unit Price for the "Items of Work" listed here below. The item to be paid for will be the total number of each type of repairs that are completed in accordance with this Specification, accepted and measured by the Contract Administrator.

**Items of Work:**

Regular Deck Channel Splice

Sidewalk Support Channel Splice