

473-2016 ADDENDUM 1

WAVERLEY STREET UNDERPASS AT CN MILE 3.89 RIVERS SUB: CONTRACT 2 – UNDERPASS STRUCTURE, RAILWAYS, ROADWORKS, LAND DRAINAGE SEWER, PUMPING STATION AND LANDSCAPING WORKS

ISSUED: January 27, 2017
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URGENT

**PLEASE FORWARD THIS DOCUMENT TO
WHOEVER IS IN POSSESSION OF THE BID
OPPORTUNITY**

**THIS ADDENDUM SHALL BE INCORPORATED
INTO THE BID OPPORTUNITY AND SHALL
FORM A PART OF THE CONTRACT
DOCUMENTS**

Template Version: A20160708

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

PART A – BID SUBMISSION

Replace: 473-2016_Bid Submission with 473-2016_Addendum_1 - Bid Submission. The following is a summary of changes incorporated in the replacement Bid Submission:

Form B(R1): Add Line Item O.15 v)

Revise Line Item O.18, O.4, O.8, i), ii), iii), iv), v), P.4, P.5, P.12 ii), iii), and P.13

Delete Line Item P.12 iv)

Form G1(R1): Revise Calendar Days from sixty (60) to ninety (90) on Page 2 of 2

Page numbering on some forms may be changed as a result.

PART D – SUPPLEMENTAL CONDITIONS

Revise: D5.2 to read: At least two (2) Business Days prior to the commencement of any Work on the site, the Contractor shall provide the Contract Administrator with a phone number where the supervisor identified in **D5.1** or an alternate can be contacted twenty-four (24) hours a day to respond to an emergency.

Add: D46 **WORKING AROUND MANITOBA HYDRO NATURAL GAS INFRASTRUCTURE**

D46.1 Further to CW 1120, be advised that the Work will be completed in the vicinity of Manitoba Hydro high pressure natural gas mains, distribution pressure natural gas mains, natural gas mains and natural gas services. The approximate locations of the natural gas mains, along with other existing utilities, are provided in Drawings C2-CU-002 to C2-CU-011.

D46.2 The following general requirements for work around natural gas mains or services shall be adhered to, unless modified in following sections where the most stringent requirements shall apply or as directed otherwise by the Contract Administrator:

- (a) all requirements of Manitoba Hydro's Safe Excavation and Safety Watch guidelines shall apply. All natural gas mains and services must be properly located and marked by Manitoba Hydro personnel. This can be arranged by visiting ClickBeforeYouDigMB.com or call 1-800-940-3447. Construction operations are not to commence unless these conditions are adhered to;

- (b) all excavations within 1.0 m of any natural gas main or service must be completed by hand or hydro-excavated;
- (c) a minimum vertical separation of 300 mm from natural gas mains and 100 mm from natural gas services lines must be maintained between any Manitoba Hydro facility and any new installations;
- (d) a minimum 600 mm of cover shall be maintained in all areas where equipment will be crossing, traveling, or compacting over natural gas mains. Vibratory compaction cannot be used over or within 1.0 m of a main;
- (e) a minimum 450 mm of cover shall be maintained in all areas where equipment will be crossing, traveling, or compacting over the gas service lines. Vibratory compaction cannot be used over or within 1.0 m of a service;
- (f) if equipment must cross, travel, or compact over the natural gas main or service with less than the minimum depth of cover, earth bridging, or steel plates shall be placed over the main and extend a minimum of 1.0 m on either side at each crossing location;
- (g) all construction operations within the vicinity of natural gas mains or services are to take place in a manner so as not to damage or cause detriment to the integrity of the natural gas pipeline; and,
- (h) any damages to the coating must be reported to and repaired at no cost by Manitoba Hydro prior to backfilling.

D46.3 High pressure natural gas mains

- (a) Approximate locations of the existing high pressure natural gas mains are as follows:
 - (i) 406.4 mm main along Wilkes Avenue and Hurst Way;
 - (ii) 355.6 mm main at Lindsay Street and Taylor Avenue; and,
 - (iii) 168.3 mm main crossing Hurst Avenue at the first approach east of Waverley Street.
- (b) A Manitoba Hydro High Pressure Safety Watch is required for all construction activities within 3.0 m of the high pressure natural gas mains.
- (c) Contact "Click before you dig" a minimum of two (2) weeks prior to any Work commencing within 3.0 m of the high pressure natural gas main to arrange for the main to properly located and marked by Manitoba Hydro personnel at ClickBeforeYouDigMB.com or Call 1-800-940-3447. Upon receiving clearances, the excavator will be provided with the phone number of the appropriate District in order to coordinate a Manitoba Hydro High Pressure Safety Watch.
- (d) Prior to construction at these locations, the Contractor shall expose the main by hand or hydro-excavation in order to confirm elevation of the pipe. The Contractor shall provide a minimum of five (5) Calendar Days' notice to the Contract Administrator of conducting utility exposures, such that the Contract Administrator can measure depths of the exposed utility.
- (e) A minimum 900 mm of cover shall be maintained in all areas where equipment will be crossing, traveling, or compacting over the high pressure natural gas mains. Vibratory compaction cannot be used over or within 3.0 m of a high pressure natural gas main.
- (f) If equipment must cross, travel, or compact over the gas main with less than the minimum depth of cover, earth bridging or steel plates shall be placed over the main and extend a minimum of 1.0 m on either side at each crossing location.
- (g) When working with less than minimum cover, a minimum 300 mm of granular material shall be bladed into place with tracked equipment offset from the pipeline. Then static compaction equipment would be allowed and built up in layers until minimum cover is achieved.
- (h) A smooth edged bucket shall be used for any excavations within 3.0 m of a high pressure natural gas main.

- (i) Subbase material shall be bladed into place as opposed to being end dumped over the high pressure natural gas mains in areas with less than the minimum cover.
- (j) Caution must be used to ensure the integrity of the pipeline coating. Any damages to the coating must be reported to and repaired at no cost by Manitoba Hydro prior to backfilling.

D46.4 Distribution pressure natural gas mains

- (a) Approximate locations of the existing distribution pressure natural gas mains are as follows:
 - (i) 219.1 mm main along Hurst Way and Waverley Street south of Hurst Way; and,
 - (ii) 219.1 mm main along Grant Avenue.
- (b) Contact "Click before you dig" a minimum of two (2) weeks prior to any Work commencing within 1.0 m of the distribution pressure natural gas main to arrange for the main to properly located and marked by Manitoba Hydro personnel at ClickBeforeYouDigMB.com or Call 1-800-940-3447. Upon receiving clearances, the excavator will be provided with the phone number of the appropriate District in order to coordinate a Manitoba Hydro High Pressure Safety Watch.
- (c) Prior to construction at these locations, the Contractor shall expose the main by hand or hydro-excavation in order to confirm elevation of the pipe. The Contractor shall provide a minimum of five (5) Calendar Days' notice to the Contract Administrator of conducting utility exposures, such that the Contract Administrator can measure depths of the exposed utility.
- (d) A minimum 900 mm of cover shall be maintained in all areas where equipment will be crossing, traveling or compacting over the distribution pressure natural gas mains. Vibratory compaction cannot be used over or within 1.0 m of a distribution pressure natural gas main.
- (e) If equipment must cross, travel, or compact over the distribution pressure natural gas main with less than the minimum depth of cover, earth bridging or steel plates shall be placed over the main and extend a minimum of 1.0 meter on either side at each crossing location.
- (f) When working with less than minimum cover, a minimum 300 mm of granular material shall be bladed into place with tracked equipment offset from the pipeline. Then static compaction equipment would be allowed and built up in layers until minimum cover is achieved.
- (g) A smooth edged bucket shall be used for any excavations within 1.0 m of a large diameter distribution pressure main.
- (h) Subbase material shall be bladed into place as opposed to being end dumped over the distribution pressure natural gas main in areas with less than the minimum cover.
- (i) Caution must be used to ensure the integrity of the pipeline coating. Any damages to the coating must be reported to and repaired at no cost by Manitoba Hydro prior to backfilling.

D46.5 Natural gas service relocations

- (a) The Work may impact natural gas services. Services that are to be exposed in the subgrade must be rock wrapped and lowered during construction or replaced prior to construction. Manitoba Hydro will not be able to complete rock wrapping or lowering of any services unless the lowering is minimal (i.e., < 100-150 mm or < 4-6").
- (b) The Contractor shall advise the Contract Administrator where service relocations are required and allow for three (3) weeks for Manitoba Hydro to mobilize for completion of the work.

D46.6 Insufficient Cover

- (a) Absolutely no work, including concrete cutting or pavement breaking may occur over the natural gas mains or services until depth of cover is determined and a safety watch is on site.

D46.7 Sidewalk Renewals

- (a) Excavations shall be limited to removal of the existing concrete sidewalk. All further excavations within 1.0 m of any natural gas main or service must be completed by hand or hydro-excavated.

D46.8 Asphalt Overlays and Road Reconstruction

- (a) When excavations for concrete works are required within 1.0 m of any natural gas main or service, the main must be exposed by hand or soft dig methods to verify the main elevation at intervals as deemed necessary by the Contract Administrator.

PART E – SPECIFICATIONS

- Add: E11.2 The Contractor shall provide a designated Traffic Coordinator for the duration of the Work. The Traffic Coordinator shall:
- (a) be the sole contact for the Contract Administrator for all traffic control and traffic management planning. The Traffic Coordinator will also be the contact for the City of Winnipeg Traffic Management, Traffic Services, and Traffic Signals in relation to all traffic control for the Work, and third parties such as those listed under D29.4;
 - (b) at each site meeting, provide the Contract Administrator with a minimum two-week outlook on planned routine traffic control operations. The information shall be supplemented as necessary with supporting schematic drawings indicating the location and type of traffic control to be implemented;
 - (c) at each site meeting, work with the Contract Administrator, City of Winnipeg staff, and third parties listed in D29.4 to refine agreed upon traffic control measures for the minimum two-week outlook;
 - (d) communicate agreed upon traffic control measures to the Contractor's forces. This includes co-ordinating all flagging operations and barricade/signage supply and setup;
 - (e) on a daily basis at a minimum, install, move, check, and maintain Contractor signs and barricades as required to ensure they are in the proper location;
 - (f) ensure compliance of the Contractor's forces with the agreed upon traffic control measures; and,
 - (g) maintain/relocate infrastructure signs as per D10.
- Add: E57.2.1(b)(i) CN Guidelines for Design and Monitoring of the Shoring Walls are included in Appendix J.
- Revise: E57.5.5(d) to read: Instrumentation locations will be determined by the Contractor to minimize potential interference with construction activities **and in accordance with the requirements of CN Guidelines for Design and Monitoring of the Shoring Walls.**
- Add: E57.5.5(j) Monitoring plan shall be prepared in accordance with the requirements of CN Guidelines for Design and Monitoring of the Shoring Walls.
- Revise: E58.3.4(a)(i) to read: permanent casing 1219 mm diameter x 19 mm thick ~~permanent casing~~ as indicated on the Drawings, conforming to the requirements of ASTM A252 Grade 3. For pier caissons, steel casings shall be hot dip galvanized for the top 6.5 m of pile length;
- Revise: E59.5.3 to read: Splicing of Piles and Installing Pile Tips

- (a) Full-length piles shall be used where practicable. In exceptional circumstances, splicing of piles may be permitted. The method of splicing shall be as shown on the Drawings, in accordance with the welding procedures, Shop Drawings and the following:
- (i) the butting ends of the driven pile and its extension or the pile and the pile tip shall be cut square to give reasonable bearing between the matting surfaces;
 - (ii) all butting surfaces shall be one hundred percent (100%) butt welded;
 - (iii) the butting surface of the extension piece shall be bevel cut at 45° to facilitate a full-penetration butt weld. Temporary clamping plates may be used as required;
 - (iv) before welding over previously-deposited metal, the slag shall be cleaned off. This requirement shall apply to successive layers, to successive beads, and to the cratered area when welding is resumed after any interruption;
 - (v) all butt welds shall have the root of the initial weld gouged, chipped, or otherwise removed to sound metal before welding is started from the second side;
 - (vi) the piles shall not have more than one splice per pile unless otherwise approved by the Contract Administrator;
 - (vii) (vii) splices shall be located such that no more than fifty percent (50%) of the piles are spliced at the same elevation;
 - (viii) proposed locations of the field splices shall be at least 5 m below the underside of the abutment foundation. Alternate splice locations shall be submitted for acceptance by the Contract Administrator.**
 - (ix) material to be welded shall be preheated in accordance with CSA W59;
 - (x) when the air temperature is below 0 °C, all materials to be welded shall be preheated to 100 °C for a distance of 80 mm beyond the weld and shall be sheltered from the wind; and,
 - (xi) when the air temperature is below -18°C, welding will not be permitted unless suitable hoarding approved by the Contract Administrator is in place.

Revise: E61.2.2(b) to read: The Supplier shall submit directly, in confidence, to the City of Winnipeg, the concrete mix designs for each of the concrete types specified herein. **The City of Winnipeg will, in confidence, forward the concrete mix designs to CN.** The purpose of this confidential submission will be for record keeping purposes and may be used as information related to supplementary testing and investigation of suspected defective concrete. The City of Winnipeg will advise the Supplier if the information needs to be released to third parties. The concrete mix design shall contain a description of the constituents and proportions, and at the minimum the following:

Revise: Table 61-1 to read:

Type of Concrete	Location	Nominal Compressive Strength [MPa]	Class of Exposure	Air Content Category	Max Aggregate Size	Special Requirements	Post Residual Cracking Index
Type 1	Foundations	35 @ 28 Days	S-1	1	20 mm	No slag and/or fly ash	-
Type 2	Caissons	35 @ 28 Days	S-1, C1	1	20 mm	No slag and/or fly ash	-
Type 3	Abutments	35 @ 28 Days	S-1	1	20 mm	No slag and/or fly ash	-
Type 4	Pier Caps, Deck, Trainman's Walkway	35 @ 28 Days	C-1	1	20 mm	No slag and/or fly ash	-

TABLE 61 – 1: REQUIREMENTS FOR HARDENED CONCRETE							
Type 5	Traffic Barriers including Footing and Caps, Slope Paving	35 @ 28 Days	C-1	1	20 mm	Corrosion Inhibitor and Synthetic Fibres	0.15
Type 5	Structural Concrete for Pumping Station	35 @ 28 Days	S-1, C-11	1	20 mm		-
Type 6	Masonry Fill	20 @ 28 Days	N	-	10mm	Max Slump 150mm	-

- Revise: E61.3.7(b) to read: Should the Contractor choose to include a silica fume admixture in the concrete mix design, ~~where permitted~~, the substitution of silica fume shall not exceed eight percent (8%) by mass of cement.
- Revise: E61.3.7(c) to read: Should the Contractor choose to include fly ash in the concrete mix design, ~~where permitted~~, the fly ash shall be Class C1 or F and the substitution shall not exceed thirty percent (30%) by mass of cement.
- Revise: E62.1.1(a) to read: This Specification shall cover all operations relating to the supply, fabrication, delivery, and placement of black steel reinforcing, hot-dipped galvanized steel reinforcing and stainless steel reinforcing, ~~ChromX 9000 (by MMFX)~~ and associated bar accessories, as specified herein and as shown on the Drawings.

Revise: Table 62-1 to read:

Table 62 – 1: SCOPE OF WORK	
Item	Type of Steel Reinforcing
Abutments	Black Steel Reinforcement
Caissons	Hot-dipped Galvanized Steel Reinforcement
Pier Caps	Hot-dipped Galvanized Steel Reinforcement
Deck and Trainman's Walkways	Hot-dipped Galvanized Steel Reinforcement
Traffic Barriers	Stainless Steel Reinforcement
Shoulder Traffic Barrier Footings and Cap Slabs	Stainless Steel Reinforcement
Median Traffic Barrier Footing	Stainless Steel Reinforcement
Slope Protection Pavement	Hot-dipped Galvanized Steel Reinforcement
Pumping Station Caissons	Black Steel Reinforcement
Pumping Station Substructure and Curbs	Black Steel Reinforcement

- Delete: E62.2.1(a)
- Delete: E62.4.4
- Delete: E62.4.6
- Revise: E62.5.1(b) to read: Plain **and** Galvanized Reinforcing Steel ~~and ChromX 9000~~
- (xii) Plain **and** Galvanized ~~and ChromX 9000~~ steel reinforcement shall be bent to the proper shape in a plant that has suitable devices for bending as recommended in the Reinforcing Steel Institute of Canada (RSIC) Manual at Standard Practice.
 - (xiii) Heating shall not be used as an aid in bending.
- Revise: E62.5.1(f)(ii) to read: Placing Plain **and** Galvanized ~~and ChromX 9000~~ Steel Reinforcing Steel
- Revise: E62.5.1(g) to read: Tying ~~Reinforcement~~ Reinforcing Steel
- (i) Plain **and** Galvanized ~~and ChromX 9000~~ Steel Reinforcement Reinforcing Steel

- For lapping plain **and** galvanized ~~and ChromX-9000~~ steel bars at the joints and intersection, an ample supply of annealed wire at least 1.5 mm in diameter shall be provided. Proper cutting pliers shall be used and the bending and tying of the wires done as neatly as possible.
 - Twisted ends of the tie wire shall be bent away from forms and surfaces so that they do not project into the concrete cover over the reinforcement.
- (ii) Stainless Steel Reinforcement
- For lapping stainless steel reinforcement at joints and intersections, an ample supply of stainless steel wire shall be provided. The wire shall not be contaminated with iron or non-stainless steel. Proper stainless steel cutting pliers shall be used and the bending and tying of the wires done as neatly as possible.
 - Twisted ends of the wire shall be bent away from forms and surfaces so that they do not project into the concrete cover over the reinforcement. All tools used shall be stainless steel and shall not be contaminated with iron or non-stainless steel.

Revise: E62.5.1(h)(ii) to read: Plain **and** Galvanized ~~and ChromX-9000 Steel~~ Reinforcing Steel

- For lapped splices, the bars shall be placed in contact and wired together in such a manner as to maintain a clearance of not less than the required minimum clear distance to other bars, and the required minimum distance to the surface of the concrete.
- In general, suitable lap lengths shall be supplied as detailed on the Drawings. If this information is not detailed on the Drawings, a minimum of 35 bar diameters lap length shall be provided.

Revise: E62.7.1(c)(i) to read: Supplying Reinforcing Steel

- Plain Steel Reinforcing
- Galvanized Steel Reinforcing
- Stainless Steel Reinforcing
- ~~ChromX-9000 Steel Reinforcing~~

Revise: E63.6.2 to read: 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) CN will arrange for an additional inspection by an independent inspection firm under separate contract. This will be in addition to the Fabricator's Quality Control and the Contract Administrator's Quality Assurance Programs referred to herein.**
- (c) The Fabricator shall notify CN and their inspection firm of the scheduled date for beginning of bearings' fabrication.**
- (d) The Contractor shall furnish facilities for the inspection of material and workmanship in the mill, shop and field, and the Contractor Administrator **and CN** shall be allowed free access to the necessary parts of the Works.

Revise: E64.1.1(c) to read

The Contractor shall notify the Contract Administrator **and CN** of any subcontractors (Fabricators) that have been subcontracted by the Contractor to fabricate, load and transport the structural steel components. The Contractor shall remain responsible for the work of such subcontractors. All requirements, such as right to access, shall apply to such subcontractors.

- Revise: E64.7.6 to read: The Contractor shall furnish facilities for the inspection of material and workmanship in the mill, shop and field, and the Contract Administrator **and CN** shall be allowed free access to the necessary parts of the Works.
- Add: E64.7.7 CN will arrange for an additional inspection by an independent inspection firm under separate contract. This will be in addition to the Quality Control and Quality Assurance Programs referred to herein.
- Add: E64.7.8 The Fabricator shall notify CN and their inspection firm of the scheduled date for beginning of girders' fabrication.
- Add: E69.2.6 Alternate equivalent systems may be submitted for acceptance to the Contract Administrator in accordance with B8.
- Add: E77.1.2(d) Unsuitable site material: As per Specification CW 3170, Clause 9.2(b), Common Excavation – Unsuitable Site Material shall consist of any excavation (including ditch excavation) which yields unsuitable Site material, as determined by the Contract Administrator.
- Add: E77.1.2(e) Ballast: Material (crushed rock) placed under, between and adjacent to track ties.
- Add: E77.1.2(f) Sub-ballast: Granular material (crushed or screened pit run gravel) below ballast and above subgrade.
- Add: E77.1.2(g) Subgrade: Embankment material immediately below sub-ballast.
- Revise: E77.3.2(a)(iii) to read: Take particular note of the following:
- where necessary, the Contract Administrator may design cuts and fills especially for stability, which will affect dimensions indicated on the Drawings;
 - remove unsuitable materials encountered in cut sections to depth and extent directed;
 - replace with approved material and compact;
 - when slides occur in cuts after they are properly formed, remove the material, modify the slopes and adopt other precautions as directed;
 - the materials shall be classified as "Common Excavation - **Unsuitable Site Material**" and Contractor will be paid for its removal at the Contract Unit Price for "Common Excavation - **Unsuitable Site Material**";
 - complete all excavation as far in advance of fill construction as practical; and,
 - maintain all work in a well-drained condition, free of debris and other obstructions.
- Revise: E77.3.2(b)(i) to read: Remove and dispose of unsuitable material as directed.
- ~~Refill depressions and holes from this work.~~ This work shall be paid for at the Contract Unit Price for "~~Common-Excavation~~ **to Waste**".
- Revise: E77.3.2(d) to read: Material Removal, **Salvage** and Stockpiling.
- (i) Use suitable equipment to ensure cross contamination of nearby materials is kept to a minimum.
 - (ii) Maintain all work in a well-drained condition, free of debris and other obstructions.
 - (iii) Stockpile material at a location identified by the Contract Administrator.
 - (iv) **This work shall be paid for at the Contract Unit Price for "Salvage Ballast" and "Salvage Sub-Ballast"**
- Add: E77.3.2(e) Execution

- (i) Excavation shall be completed to the elevations required to construct the Works or to such other elevations as may be directed by the Contract Administrator in the field. Excavation sequence shall be done in a “top down” direction.
- (ii) After each material excavation is completed, the Contractor shall notify the Contract Administrator.
- (iii) The Contractor shall excavate only material that is necessary for the expeditious construction of the embankment or as set out by the Contract Administrator in the field.
- (iv) Grade the surface after final material excavation to the sub-grade elevation.

Revise: E77.3.3(h)(iv) to read: Remove material not thoroughly compacted at no cost to the City. ~~The City of Winnipeg Specifications.~~

Revise: E77.4.1(a) to read: The Unit Prices, submitted in the Bid, shall include the entire cost of supplying all labour, material, equipment and tools for stripping, excavation, **salvage, stockpiling** and grading of all classes of material; all as required to construct final rail bed and embankment as shown on the Drawings and specified in this Specification.

Revise: E80.6.2 to read: Payment will be made at the Contract Unit Price for **“FeederMain Protection”** as listed in the Form B Prices.

Add: E112 **TEMPORARY SHORING, EXCAVATION, DEWATERING AND MONITORING FOR MIDTOWN FEEDER MAIN CASING UPGRADE**

E112.1 Description

E112.1.1 The supply, fabrication, erection, and removal of all temporary shoring, and such temporary protective measures as may be required to construct the Works.

E112.1.2 The Work covered under this item shall include all operations relating to excavation, installation, and removal of shoring systems required to install the casing around the existing 900 Midtown Feeder Main including dewatering procedures for the duration of the construction period as specified herein.

E112.1.3 The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, safe working plans, overhead, labour, materials, equipment, tools, supplies and all things necessary for and incidental to the satisfactory performance and completion of the Work as hereinafter specified.

E112.1.4 Definitions

- (a) “Open Excavation” means a temporary unsupported excavation with side slopes cut at safe inclination.
- (b) “Supported Excavation” means a temporary excavation supported by an acceptable shoring system.
- (c) Geotechnical Report and the geotechnical design criteria may be viewed at the Contract Administrator’s Office upon request.

E112.2 References

E112.2.1 References and Codes

- (a) All applicable sections of the latest National Building Code of Canada, the Manitoba Building Code and the American Railway Engineering and Maintenance-of-Way Association (AREMA) shall apply to the manufacture, installation, excavation and items and activities incidental to Work included in this Specification.
- (b) All applicable guidelines of the latest CN Design Criteria for the Shoring Walls.
- (c) E80 – Midtown Feeder Main and Watermain Casing Pipe

E112.3 Submittals

- (a) Prepare and submit Shop Drawings for all excavation, shoring, work pads, access ramps and staging.
- (b) Prepare and submit an Excavation and Shoring Safe Working Plan to the Contract Administrator a minimum of two (2) weeks prior to commencing Work on Site. This shall include an Excavation Staging Plan.
- (c) Prepare and submit a monitoring plan including notification and action plan to monitor CN mainline and detour track displacement, shoring and excavation displacement during excavation and until the shoring has been removed to the Contract Administrator a minimum of two (2) weeks prior to commencing Work on Site.

E112.4 Materials

E112.4.1 General

- (a) Be responsible for the supply, safe storage, and handling of all materials set forth in this Specification.

Structural Steel

- (a) All structural steel shapes shall be minimum CSA G40.21 Grade 350W and HSS sections shall be minimum CSA G40.21 Grade 350W.
- (b) Steel "H" Piles shall be structural steel members manufactured in accordance with CAN/CSA-G40.20M/G40.21M, Grade 350W.
- (c) Splice plates shall conform to the requirements of CAN/CSA G40.21M, Grade 350W.

E112.4.2 Welding

- (a) The Contractor is responsible for supplying all welding materials. All welding materials shall conform to the requirements of Welded Steel Construction (Metal Arc Welding).
- (b) All welding shall conform to the latest CSA Standard W59, electric arc method.
- (c) Timber Lagging
 - (i) All timber lagging shall be S-P-F, beams and stringers, grade No. 2 or better in accordance with AREMA Chapter 7 and as specified in the CN design criteria for the shoring walls.

E112.5 Construction Methods

E112.5.1 Condition and Protection of Railway Tracks

- (a) The railway tracks have a limited capacity to withstand excavations necessary for the proposed construction. Ensure that Work activities do not jeopardize the stability or impact the performance of the tracks.
- (b) The Contractor will monitor CN tracks displacement as well as the displacement of shoring system and displacement of soil behind the shoring wall during excavation works as per the approved monitoring plan, and may require modifications to the construction sequence or introduce additional requirements to maintain acceptable track performance. Track performance will be determined by the Contractor based on the references and building codes stated in E112.2.1 and to the satisfaction of the Contract Administrator.

E112.5.2 General Staging and Construction Requirements

- (a) Construct the Shoring Structure in accordance with the requirements identified on the Drawings.
- (b) Construction dewatering per CW 2030-R7.

- (c) Prepare and submit an Excavation and Shoring Safe Working Plan to the Contract Administrator for review a minimum of two (2) weeks prior to the commencement of this work.
- (d) Prior to commencing excavation operations, install sediment control fencing or other such erosion control structures to prevent sediment-laden runoff from leaving the job Site and entering the City land drainage system. The sediment control fencing shall remain in place until all construction activities are complete.
- (e) Complete excavations in accordance with the approved Excavation Plan and to the elevations and dimensions shown on the Excavation Plan or to adjusted elevations as directed by the Contract Administrator in order to install the Midtown Feeder Main casing upgrade.
- (f) Dewater excavations so that the casing upgrade to the Midtown Feeder Main is completed in the dry. Keep the bottom of excavations free from excessive moisture or free-flowing water.
- (g) Handle, store and dispose of excavated materials in accordance with Clause 3.4 of CW 1130.

E112.5.3 Excavation Plan

- (a) Prepare the plan to confirm constructability and assess potential interference with other construction activities.
- (b) Coordinate the progress of the excavation with the groundwater depressurization Work and with the results of the monitoring program.
- (c) Protect cut slopes against surface water and rainfall and keep covered at all times by a protective layer of approved super duty tarp or geosynthetic product.
- (d) Protect excavation area from freezing.

E112.5.4 Installation of Piles

- (a) Location and Alignment of Piles
 - (i) The piles shall be located at the positions shown on the Drawings or as directed by the Contract Administrator. Piles shall be driven vertically unless shown otherwise on the Drawings, and shall not deviate more than two percent (2%) out-of-plumb. Battered piles shall be driven to the battered specified on the Drawings, and shall not deviate more than two percent (2%) from the batter specified. Piles shall not be more than 75 mm off centre measured at cut-off elevation.
 - (ii) Piles shall not be jacked or pulled into their final positions.
- (b) Driving of Piles
 - (i) Piles shall be driven to the depths and in accordance with the pile driving criteria indicated in the Geotechnical Report, on the Drawings or as directed by the Contract Administrator.
 - (ii) All pile driving points shall be welded by the Contractor prior to commencement of pile driving operations, incidental to the works of this Specification.
 - (iii) The piles shall be driven to the approximate tip elevations as shown on the Drawings except when required by the Contract Administrator.
 - (iv) The method of driving shall be such as not to impair the strength of the pile and shall meet the approval of the Contract Administrator. The Contractor will be required to remove any surface and/or shallow depth obstruction(s) to obtain the required penetration of the pile.
 - (v) Piles covering a large area or in groups, shall be driven working out from the centre of the area or group to ensure that the piles at the boundaries are in their correct final positions.

- (vi) For pile installation monitoring purposes, the Contractor shall paint markings on each pile at 0.25 m intervals, with a label at each 1.0 m interval, starting from the toe of the pile.
- (vii) Pile driver leads shall be used to support the piles while they are being driven and shall be braced to the supporting crane so as to hold the piles securely and accurately in the required position during driving. Leads shall be of sufficient length to be supported firmly on the ground. The use of hanging or swinging leads will not be allowed unless they can be held in a fixed position during the driving operations. Battered piles shall be driven with incline leads.
- (viii) The heads of the steel piles shall be squared and protected by a cap of a design approved by the Contract Administrator. The cap shall be designed to hold the axis of the pile in line with the axis of the hammer. The top of the cap shall have a timber shock block.
- (ix) If, during the piling operations, upheaval of pile occurs, the Contractor will be required to redrive the lifted piles down to their original elevations. The Contractor will also be required to excavate material that has boiled up during pile driving operations. The elevation of all piles previously driven or redriven shall be observed to detect uplift. If uplift of 5 mm or more occurs in any pile, that pile shall be redriven to its original elevation and thereafter to the required final driving resistance.
- (x) Driving of all piles shall be continuous without intermission until the pile has been driven to final elevation.
- (xi) Where boulders or other obstructions make it difficult to drive certain piles in the location shown and to the proper bearing strata or depth, the Contractor shall install the piles as directed by the Contract Administrator.
- (xii) Preboring will be carried out in accordance with the drawings.
- (xiii) If, in the judgement of the Contract Administrator, the Contractor is unable to complete properly any pile or piles driven to replace the original pile in the Contract, they shall be abandoned. Piles abandoned, because of obstructions encountered before reaching the accepted bearing strata, shall be removed.
- (xiv) The Contractor shall ensure the safety of all personnel during pile driving operations.
- (xv) The Contractor is responsible for the means, methods, and necessary precautions to manage vibration generated during pile driving. This may include modifying the driving sequence or introducing additional requirements to maintain acceptable vibration levels. The Contractor is responsible for all nuisance, noise, damage, and legal claims resulting from noise/vibration generated through piling or other construction activities.
 - ◆ Further to E112.5.4(b)(xv), note that the Contract Administrator will be monitoring ground vibration due to CN train passage on the shoofly tracks in the vicinity of the StorageVille facility (830 Waverley Street). This will involve spot measurements at StorageVille before construction commences while the trains are travelling along the mainline, and spot measurements when the trains are travelling along the shoofly. This is to establish existing (baseline) vibration levels which are beyond the Contractor's control. The Contract Administrator will not be monitoring ground vibration due to construction activities such as pile driving. The Contract Administrator will install ground vibration measurement instrumentation in the vicinity of StorageVille. Instrument locations will be determined by Contract Administrator and communicated to the Contractor to minimize potential interference with construction activities.

- ◆ Further to the above clause, the Contractor is advised that it may be necessary to limit equipment movement in the vicinity of the instrumentation. The Contract Administrator will make every effort to coordinate the monitoring with the construction operations so as to minimize disruption to the Work

(c) Splicing of Piles and Installing Pile Tips

- (i) Full-length piles shall be used where practicable. In exceptional circumstances, splicing of piles may be permitted. The method of splicing shall be as shown on the Drawings, in accordance with the welding procedures, shop drawings and the following:
 - ◆ the butting ends of the driven pile and its extension or the pile and the pile tip shall be cut square to give reasonable bearing between the matting surfaces;
 - ◆ all butting surfaces shall be one hundred percent (100%) butt welded.
 - ◆ The butting surface of the extension piece shall be bevel cut at 45° to facilitate a full-penetration butt weld. Temporary clamping plates may be used as required;
 - ◆ before welding over previously-deposited metal, the slag shall be cleaned off. This requirement shall apply to successive layers, to successive beads, and to the cratered area when welding is resumed after any interruption;
 - ◆ all butt welds shall have the root of the initial weld gouged, chipped, or otherwise removed to sound metal before welding is started from the second side;
 - ◆ the piles shall not have more than one splice per pile unless otherwise approved by the Contract Administrator;
 - ◆ splices shall be located such that no more than fifty percent (50%) of the piles are spliced at the same elevation;
 - ◆ material to be welded shall be preheated in accordance with CSA W59;
 - ◆ when the air temperature is below 0 °C, all materials to be welded shall be preheated to 100 °C for a distance of 80 mm beyond the weld and shall be sheltered from the wind; and,
 - ◆ when the air temperature is below -18°C, welding will not be permitted unless suitable hoarding approved by the Contract Administrator is in place.

(d) Defective Piles

- (i) The pile driving procedures shall not subject the piles to excessive and undue abuse producing deformation of the steel. Manipulation of piles to force them into proper position will not be permitted.
- (ii) Piles damaged by improper driving, or driven out of proper location, or driven below the cut-off elevation, shall be corrected by one of the following methods accepted by the Contract Administrator:
 - ◆ the piles shall be withdrawn and replaced by new, if necessary, longer piles, or
 - ◆ replacement piles shall be driven adjacent to defective or low piles, or
 - ◆ the piles shall be spliced or built up, as otherwise provided herein, or a sufficient portion of the footing extended to properly embed the piles. All piles, pushed up by the driving of adjacent piles or by any other cause, shall be driven down again; and,

- ◆ in the case of required penetration and bearing capacity are not obtained, the Contractor shall provide a hammer of greater energy, as applicable, or when accepted by the Contract Administrator, resort to pre-drilling.

(e) Cut-Off of Piles

- (i) After piles have been driven to the required penetration (and, if required, redriven), the Contractor shall mark the required cut-off elevation on each pile as specified on the Drawings or as directed by the Contract Administrator. The top of all piles shall be neatly cut off (true and level) at the cut-off elevation.
- (ii) Unless determined otherwise by the Contract Administrator, cut offs shall become the property of the Contractor and shall be removed from the Site.

E112.5.5 Performance Monitoring

- (a) Monitoring plan including notification and action plan to monitor CN track displacement during the excavation shall be accompanied by a design statement sealed by a professional engineer registered in the Province of Manitoba. This will include determination of the threshold values, selections of adequate devices and sufficient coverage in terms of frequency of readings. Displacement of track, slope for open excavations, shoring and the soil behind the shoring will be monitored using an adequate geotechnical instrumentation and surveys or equivalent. Monitoring plan will only be considered acceptable if approved in writing by the Contract Administrator.
 - (i) Instrumentation locations will be determined by the Contractor to minimize potential interference with construction activities.
 - (ii) The Contractor is advised that it may be necessary to limit equipment movement in the vicinity of the monitoring work. The Contractor shall make every effort to coordinate the monitoring with the construction operations so as to minimize disruption of the Work.
 - (iii) Take all necessary precautions to prevent damage to geotechnical instrumentation. Repair or replace to the satisfaction of the Contract Administrator instrumentation that becomes damaged or unreliable as a result of construction operations.
 - (iv) It may become necessary during the Work to install additional geotechnical instrumentation. Notify the Contract Administrator of the installation of this instrumentation.
 - (v) The Contractor shall review excavation progress and may revise construction sequencing and timing and / or introduce staging and waiting periods as required based on performance monitoring results.
 - (vi) Ensure that all personnel understand and observe the requirements of E112.5.5 (a) (ii) and (iii). Prior to commencement of on-site work, the Contractor's superintendent, foremen and heavy equipment operators shall attend an orientation meeting that will outline restrictions for working on and around the tracks and excavations. The Contract Administrator reserves the right to have personnel removed from the Site for failure to comply with these restrictions.
- (vii) Protection of the Works
 - ◆ Contractor shall be responsible for protection of the Works during the duration of the Contract. This shall include but may not be limited to maintaining dewatering systems on completed works, providing fencing and security.

E112.6 Quality Control

E112.6.1 Inspection

- (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. 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.
- (b) The Contractor shall provide a detailed survey of all of the pile locations and provide that to the Contract Administrator prior to cutting off any piles.
- (c) The Contractor shall replace any piles, or add additional pile(s), for piles that do not meet the specified refusal criteria or do not meet the following tolerances: +/- two percent (2%) out of alignment for battered piles, +/- two percent (2%) out of plumb for vertical piles, and 75 mm off centre of the specified locations. Any modifications required to the piles, due to piles out of tolerance or due to required additional piles to compensate for out of tolerance piles, shall be carried out as specified by the Contract Administrator at the Contractor's own costs.

E112.6.2 Access

- (a) The Contractor Administrator shall be allowed free access for the inspection and control testing of the piles at the Site of Work to determine whether the steel piles are being supplied in accordance with this Specification.

E112.7 Measurement and Payment

E112.7.1 Temporary Shoring, Excavation, Dewatering and Monitoring for Midtown Feeder Main Casing Upgrade.

- (a) The temporary shoring, excavation, dewatering and other associated works will not be measured. This Item of Work will be paid for in the Contract Lump Sum Price for "FeederMain Protection", which price will be payment for performing all operation herein described and accepted by the Contract Administrator and all other items incidental to the Work.
- (b) Railway protection, development of the excavation plan and performance monitoring will not be measured. This Item of Work will be paid for in the Contract Lump Sum Price for "FeederMain Protection", which price will be payment for performing all operation herein described and accepted by the Contract Administrator and all other items incidental to the Work.

DRAWINGS

Replace: 473-2016_Drawing_C2-CS-001-R0 with 473-2016_Addendum_1-Drawing_C2-CS-001-R1
473-2016_Drawing_C2-CS-003-R0 with 473-2016_Addendum_1-Drawing_C2-CS-003-R1
473-2016_Drawing_C2-CS-004-R0 with 473-2016_Addendum_1-Drawing_C2-CS-004-R1
473-2016_Drawing_C2-CS-005-R0 with 473-2016_Addendum_1-Drawing_C2-CS-005-R1
473-2016_Drawing_C2-CS-006-R0 with 473-2016_Addendum_1-Drawing_C2-CS-006-R1
473-2016_Drawing_C2-CS-014-R0 with 473-2016_Addendum_1-Drawing_C2-CS-014-R1
473-2016_Drawing_C2-CS-020-R0 with 473-2016_Addendum_1-Drawing_C2-CS-020-R1
473-2016_Drawing_C2-CS-036-R0 with 473-2016_Addendum_1-Drawing_C2-CS-036-R1
473-2016_Drawing_C2-CS-037-R0 with 473-2016_Addendum_1-Drawing_C2-CS-037-R1
473-2016_Drawing_C2-CS-038-R0 with 473-2016_Addendum_1-Drawing_C2-CS-038-R1
473-2016_Drawing_C2-CS-039-R0 with 473-2016_Addendum_1-Drawing_C2-CS-039-R1

473-2016_Drawing_C2-CS-040-R0 with 473-2016_Addendum_1-Drawing_C2-CS-040-R1
473-2016_Drawing_C2-CS-041-R0 with 473-2016_Addendum_1-Drawing_C2-CS-041-R1
473-2016_Drawing_C2-CS-044-R0 with 473-2016_Addendum_1-Drawing_C2-CS-044-R1
473-2016_Drawing_C2-CS-046-R0 with 473-2016_Addendum_1-Drawing_C2-CS-046-R1
473-2016_Drawing_C2-CS-065-R0 with 473-2016_Addendum_1-Drawing_C2-CS-065-R1
473-2016_Drawing_C2-CS-067-R0 with 473-2016_Addendum_1-Drawing_C2-CS-067-R1
473-2016_Drawing_C2-CS-079-R0 with 473-2016_Addendum_1-Drawing_C2-CS-079-R1
473-2016_Drawing_C2-CT-001-R0 with 473-2016_Addendum_1-Drawing_C2-CT-001-R1
473-2016_Drawing_C2-CT-003-R0 with 473-2016_Addendum_1-Drawing_C2-CT-003-R1
473-2016_Drawing_C2-CT-006-R0 with 473-2016_Addendum_1-Drawing_C2-CT-006-R1
473-2016_Drawing_C2-CT-011-R0 with 473-2016_Addendum_1-Drawing_C2-CT-011-R1
473-2016_Drawing_C2-CT-035-R0 with 473-2016_Addendum_1-Drawing_C2-CT-035-R1
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473-2016_Drawing_C2-CT-045-R0 with 473-2016_Addendum_1-Drawing_C2-CT-045-R1
473-2016_Drawing_C2-CT-066-R0 with 473-2016_Addendum_1-Drawing_C2-CT-066-R1
473-2016_Drawing_C2-CT-075-R0 with 473-2016_Addendum_1-Drawing_C2-CT-075-R1
473-2016_Drawing_C2-CU-030-R0 with 473-2016_Addendum_1-Drawing_C2-CU-030-R1
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473-2016_Drawing_C2-CU-032-R0 with 473-2016_Addendum_1-Drawing_C2-CU-032-R1
473-2016_Drawing_C2-GE-027-R0 with 473-2016_Addendum_1-Drawing_C2-GE-027-R1
473-2016_Drawing_C2-GE-031-R0 with 473-2016_Addendum_1-Drawing_C2-GE-031-R1
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473-2016_Drawing_C2-GE-035-R0 with 473-2016_Addendum_1-Drawing_C2-GE-035-R1
473-2016_Drawing_C2-GE-036-R0 with 473-2016_Addendum_1-Drawing_C2-GE-036-R1
473-2016_Drawing_C2-GE-038-R0 with 473-2016_Addendum_1-Drawing_C2-GE-038-R1
473-2016_Drawing_C2-GE-039-R0 with 473-2016_Addendum_1-Drawing_C2-GE-039-R1
473-2016_Drawing_C2-GE-040-R0 with 473-2016_Addendum_1-Drawing_C2-GE-040-R1
473-2016_Drawing_C2-GE-041-R0 with 473-2016_Addendum_1-Drawing_C2-GE-041-R1
473-2016_Drawing_C2-GE-042-R0 with 473-2016_Addendum_1-Drawing_C2-GE-042-R1
473-2016_Drawing_C2-GE-044-R0 with 473-2016_Addendum_1-Drawing_C2-GE-044-R1
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473-2016_Drawing_C2-GE-051-R0 with 473-2016_Addendum_1-Drawing_C2-GE-051-R1

473-2016_Drawing_C2-GE-052-R0 with 473-2016_Addendum_1-Drawing_C2-GE-052-R1

APPENDICES

Add: Appendix J CN Guidelines for Design and Monitoring of the Shoring Walls