



THE CITY OF WINNIPEG

TENDER

TENDER NO. 447-2024

**NEWPCC PIPING INSTALLATION, SOIL REMEDIATION, AND SITE COMPOUND
DEVELOPMENT**

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PART B - BIDDING PROCEDURES

B1. CONTRACT TITLE

B1.1 NEWPCC Piping Installation, Soil Remediation, and Site Compound Development

B2. SUBMISSION DEADLINE

B2.1 The Submission Deadline is 12:00 noon Winnipeg time, August 27, 2024.

B2.2 The Contract Administrator or the Manager of Purchasing may extend the Submission Deadline by issuing an addendum at any time prior to the time and date specified in B2.1.

B3. SITE INVESTIGATION

B3.1 Further to C3.1, the Contract Administrator or an authorized representative will be available at the Site at 10:00 am on August 14, 2024 to provide Bidders access to Parcel B of the Site. Access will be provided at the entrance road off Ferrier Street, approximately 600 m south of Murray Avenue.

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

B3.3 The Bidder is responsible for inspecting the Site, the nature of the Work to be done and all conditions that might affect their Bid or their performance of the Work, and shall assume all risk for conditions existing or arising in the course of the Work which have been or could have been determined through such inspection.

B4. ENQUIRIES

B4.1 All enquiries shall be directed to the Contract Administrator identified in D6.1.

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

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

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

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

B4.6 Any enquiries concerning submitting through MERX should be addressed to:
MERX Customer Support
Phone: 1-800-964-6379
Email: merx@merx.com

B5. CONFIDENTIALITY

B5.1 Information provided to a Bidder by the City or acquired by a Bidder by way of further enquiries or through investigation is confidential. Such information shall not be used or disclosed in any

way without the prior written authorization of the Contract Administrator. The use and disclosure of the confidential information shall not apply to information which:

- (a) was known to the Bidder before receipt hereof; or
- (b) becomes publicly known other than through the Bidder; or
- (c) is disclosed pursuant to the requirements of a governmental authority or judicial order.

B5.2 The Bidder shall not make any statement of fact or opinion regarding any aspect of the Tender to the media or any member of the public without the prior written authorization of the Contract Administrator.

B6. ADDENDA

B6.1 The Contract Administrator may, at any time prior to the Submission Deadline, issue addenda correcting errors, discrepancies or omissions in the Tender, or clarifying the meaning or intent of any provision therein.

B6.2 The Contract Administrator will issue each addendum at least two (2) Business Days prior to the Submission Deadline, or provide at least two (2) Business Days by extending the Submission Deadline.

B6.3 Addenda will be available on the MERX website at www.merx.com.

B6.4 The Bidder is responsible for ensuring that they have received all addenda and is advised to check the MERX website for addenda regularly and shortly before the Submission Deadline, as may be amended by addendum.

B6.5 The Bidder shall acknowledge receipt of each addendum in Paragraph 10 of Form A: Bid/Proposal. Failure to acknowledge receipt of an addendum may render a Bid non-responsive.

B6.6 Notwithstanding B4, enquiries related to an Addendum may be directed to the Contract Administrator indicated in D6.1.

B7. SUBSTITUTES

B7.1 The Work is based on the Plant, Materials and methods specified in the Tender.

B7.2 Substitutions shall not be allowed unless application has been made to and prior approval has been granted by the Contract Administrator in writing.

B7.3 Requests for approval of a substitute will not be considered unless received in writing by the Contract Administrator at least five (5) Business Days prior to the Submission Deadline.

B7.4 The Bidder shall ensure that any and all requests for approval of a substitute:

- (a) provide sufficient information and details to enable the Contract Administrator to determine the acceptability of the Plant, Material or method as either an approved equal or alternative;
- (b) identify any and all changes required in the applicable Work, and all changes to any other Work, which would become necessary to accommodate the substitute;
- (c) identify any anticipated cost or time savings that may be associated with the substitute;
- (d) certify that, in the case of a request for approval as an approved equal, the substitute will fully perform the functions called for by the general design, be of equal or superior substance to that specified, is suited to the same use and capable of performing the same function as that specified and can be incorporated into the Work, strictly in accordance with the proposed work schedule and the dates specified in the Supplemental Conditions for Substantial Performance and Total Performance; and

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

B7.5 The Contract Administrator, after assessing the request for approval of a substitute, may in their sole discretion grant approval for the use of a substitute as an “approved equal” or as an “approved alternative”, or may refuse to grant approval of the substitute.

B7.6 The Contract Administrator will provide a response in writing, at least two (2) Business Days prior to the Submission Deadline, to the Bidder who requested approval of the substitute.

B7.6.1 The Contract Administrator will issue an Addendum, disclosing the approved materials, equipment, methods and products to all potential Bidders. The Bidder requesting and obtaining the approval of a substitute shall be responsible for disseminating information regarding the approval to any person or persons they wish to inform.

B7.7 If the Contract Administrator approves a substitute as an “approved equal”, any Bidder may use the approved equal in place of the specified item.

B7.8 If the Contract Administrator approves a substitute as an “approved alternative”, any Bidder bidding that approved alternative may base their Total Bid Price upon the specified item but may also indicate an alternative price based upon the approved alternative. Such alternatives will be evaluated in accordance with B18.

B7.9 No later claim by the Contractor for an addition to the Total Bid Price because of any other changes in the Work necessitated by the use of an approved equal or an approved alternative will be considered.

B8. BID COMPONENTS

B8.1 The Bid shall consist of the following components:

- (a) Form A: Bid/Proposal;
- (b) Form B: Prices; and
- (c) Form G1: Bid Bond and Agreement to Bond.

B8.2 All components of the Bid shall be fully completed or provided, and submitted by the Bidder no later than the Submission Deadline, with all required entries made clearly and completely.

B8.3 The Bid shall be submitted electronically through MERX at www.merx.com.

B8.3.1 Bids will **only** be accepted electronically through MERX.

B8.4 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).

B9. BID

B9.1 The Bidder shall complete Form A: Bid/Proposal, making all required entries.

B9.2 Paragraph 2 of Form A: Bid/Proposal shall be completed in accordance with the following requirements:

- (a) if the Bidder is a sole proprietor carrying on business in their own name, their name shall be inserted;
- (b) if the Bidder is a partnership, the full name of the partnership shall be inserted;
- (c) if the Bidder is a corporation, the full name of the corporation shall be inserted;

- (d) if the Bidder is carrying on business under a name other than their own, the business name and the name of every partner or corporation who is the owner of such business name shall be inserted.
- B9.2.1 If a Bid is submitted jointly by two or more persons, each and all such persons shall identify themselves in accordance with B9.2.
- B9.3 In Paragraph 3 of Form A: Bid/Proposal, the Bidder shall identify a contact person who is authorized to represent the Bidder for purposes of the Bid.
- B9.4 Paragraph 13 of Form A: Bid/Proposal shall be signed in accordance with the following requirements:
 - (a) if the Bidder is a sole proprietor carrying on business in their own name, it shall be signed by the Bidder;
 - (b) if the Bidder is a partnership, it shall be signed by the partner or partners who have authority to sign for the partnership;
 - (c) if the Bidder is a corporation, it shall be signed by their duly authorized officer or officers;
 - (d) if the Bidder is carrying on business under a name other than their own, it shall be signed by the registered owner of the business name, or by the registered owner's authorized officials if the owner is a partnership or a corporation.
- B9.4.1 The name and official capacity of all individuals signing Form A: Bid/Proposal should be entered below such signatures.
- B9.5 If a Bid is submitted jointly by two or more persons, the word "Bidder" shall mean each and all such persons, and the undertakings, covenants and obligations of such joint Bidders in the Bid and the Contract, when awarded, shall be both joint and several.

B10. PRICES

- B10.1 The Bidder shall state a price in Canadian funds for each item of the Work identified on Form B: Prices.
 - (a) "Section C - Trailer Compound Sewer and Water Services" subtotal shall be the amount deducted from the amount (Total price) if the Trailer Compound Sewer and Water Services is removed from the Contract scope of Work in accordance with Drawings YC2-C111, YC2-C112, YC2-C113, YC2-C114, YC2-C122, and YC2-C501.
 - (b) "Section D - Trailer Pad Site Development and Section F Cash Allowances" subtotals shall be the amount deducted from the amount (Total price) if the Trailer Pad Site Development is removed from the Contract scope of Work in accordance with Drawings YC2-C122, and YC2-E101.
 - (c) "Section F - Cash Allowances" subtotal shall be the amount deducted from the amount (Total price) if the Cash Allowances are removed from the Contract Scope of Work.
- B10.1.1 Prices on Form B: Prices shall be inclusive of the Manitoba Retail Sales Tax (MRST also known as PST).
- B10.2 The quantities listed on Form B: Prices are to be considered approximate only. The City will use said quantities for the purpose of comparing Bids.
- B10.3 The quantities for which payment will be made to the Contractor are to be determined by the Work actually performed and completed by the Contractor, to be measured as specified in the applicable Specifications.
- B10.4 Payments to Non-Resident Contractors are subject to Non-Resident Withholding Tax pursuant to the Income Tax Act (Canada).
- B10.5 The Bidder shall enter the Total Bid Price from Form B: Prices into the Total Bid Price field in MERX.

B10.5.1 Bidders are advised that the calculation indicated in B18.4 will prevail over the Total Bid Price entered in MERX.

B11. DISCLOSURE

B11.1 Various Persons provided information or services with respect to this Work. In the City's opinion, this relationship or association does not create a conflict of interest because of this full disclosure. Where applicable, additional material available as a result of contact with these Persons is listed below.

B11.2 The Persons are:

- (a) N/A

B12. CONFLICT OF INTEREST AND GOOD FAITH

B12.1 Further to C3.2, Bidders, by responding to this Tender, declare that no Conflict of Interest currently exists, or is reasonably expected to exist in the future.

B12.2 Conflict of Interest means any situation or circumstance where a Bidder or employee of the Bidder proposed for the Work has:

- (a) other commitments;
- (b) relationships;
- (c) financial interests; or
- (d) involvement in ongoing litigation;

that could or would be seen to:

- (i) exercise an improper influence over the objective, unbiased and impartial exercise of the independent judgment of the City with respect to the evaluation of Bids or award of the Contract; or
- (ii) compromise, impair or be incompatible with the effective performance of a Bidder's obligations under the Contract;
- (e) has contractual or other obligations to the City that could or would be seen to have been compromised or impaired as a result of their participation in the Tender process or the Work; or
- (f) has knowledge of confidential information (other than confidential information disclosed by the City in the normal course of the Tender process) of strategic and/or material relevance to the Tender process or to the Work that is not available to other bidders and that could or would be seen to give that Bidder an unfair competitive advantage.

B12.3 In connection with their Bid, each entity identified in B12.2 shall:

- (a) avoid any perceived, potential or actual Conflict of Interest in relation to the procurement process and the Work;
- (b) upon discovering any perceived, potential or actual Conflict of Interest at any time during the Tender process, promptly disclose a detailed description of the Conflict of Interest to the City in a written statement to the Contract Administrator; and
- (c) provide the City with the proposed means to avoid or mitigate, to the greatest extent practicable, any perceived, potential or actual Conflict of Interest and shall submit any additional information to the City that the City considers necessary to properly assess the perceived, potential or actual Conflict of Interest.

B12.4 Without limiting B12.3, the City may, in their sole discretion, waive any and all perceived, potential or actual Conflicts of Interest. The City's waiver may be based upon such terms and conditions as the City, in their sole discretion, requires to satisfy itself that the Conflict of Interest has been appropriately avoided or mitigated, including requiring the Bidder to put into place such policies, procedures, measures and other safeguards as may be required by and be

acceptable to the City, in their sole discretion, to avoid or mitigate the impact of such Conflict of Interest.

- B12.5 Without limiting B12.3, and in addition to all contractual or other rights or rights at law or in equity or legislation that may be available to the City, the City may, in their sole discretion:
- (a) disqualify a Bidder that fails to disclose a perceived, potential or actual Conflict of Interest of the Bidder or any of their employees proposed for the Work;
 - (b) require the removal or replacement of any employees proposed for the Work that has a perceived, actual or potential Conflict of Interest that the City, in their sole discretion, determines cannot be avoided or mitigated;
 - (c) disqualify a Bidder or employees proposed for the Work that fails to comply with any requirements prescribed by the City pursuant to B12.4 to avoid or mitigate a Conflict of Interest; and
 - (d) disqualify a Bidder if the Bidder, or one of their employees proposed for the Work, has a perceived, potential or actual Conflict of Interest that, in the City's sole discretion, cannot be avoided or mitigated, or otherwise resolved.
- B12.6 The final determination of whether a perceived, potential or actual Conflict of Interest exists shall be made by the City, in their sole discretion.

B13. QUALIFICATION

- B13.1 The Bidder shall:
- (a) undertake to be in good standing under The Corporations Act (Manitoba), or properly registered under The Business Names Registration Act (Manitoba), or otherwise properly registered, licensed or permitted by law to carry on business in Manitoba; and
 - (b) be financially capable of carrying out the terms of the Contract; and
 - (c) have all the necessary experience, capital, organization, and equipment to perform the Work in strict accordance with the terms and provisions of the Contract; and
 - (d) submit a completed Social Procurement Plan.
- B13.2 The Bidder and any proposed Subcontractor (for the portion of the Work proposed to be subcontracted to them) shall:
- (a) be responsible and not be suspended, debarred or in default of any obligations to the City. A list of suspended or debarred individuals and companies is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Purchasing Division website <https://www.winnipeg.ca/matmgt/Templates/files/debar.pdf>
- B13.3 The Bidder and/or any proposed Subcontractor (for the portion of the Work proposed to be subcontracted to them) shall:
- (a) have successfully carried out work similar in nature, scope and value to the Work; and
 - (b) be fully capable of performing the Work required to be in strict accordance with the terms and provisions of the Contract; and
 - (c) have a written workplace safety and health program if required pursuant to The Workplace Safety and Health Act (Manitoba); and
 - (d) have completed the Accessible Customer Service online training required by the Accessibility for Manitobans Act (AMA) (see B13.5 and D8).
- B13.4 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:
- (a) Written confirmation of a safety and health certification meeting SAFE Work Manitoba's SAFE Work Certified Standard (e.g., COR™ and SECOR™) in the form of:

- (i) a copy of their valid Manitoba COR certificate and Letter of Good Standing (or Manitoba equivalency) as issued under the Certificate of Recognition (COR) Program administered by the Construction Safety Association of Manitoba or by the Manitoba Heavy Construction Association's WORKSAFELY™ COR™ Program; or
 - (ii) a copy of their valid Manitoba SECOR™ certificate and Letter of Good Standing (or Manitoba equivalency) as issued under the Small Employer Certificate of Recognition Program (SECOR™) administered by the Construction Safety Association of Manitoba or by the Manitoba Heavy Construction Association's WORKSAFELY™ COR™ Program; or
- (b) a report or letter to that effect from an independent reviewer acceptable to the City. (A list of acceptable reviewers and the review template are available on the Information Connection page at The City of Winnipeg, Corporate Finance, Purchasing Division website at <http://www.winnipeg.ca/matmgt/>.)

B13.5 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 [Accessibility Training](#) for anyone that may have any interaction with the public on behalf of the City of Winnipeg.

B13.6 The Bidder shall submit, within three (3) Business Days of a request by the Contract Administrator, proof satisfactory to the Contract Administrator of the qualifications of the Bidder and of any proposed Subcontractor.

B13.7 The Bidder shall provide, on the request of the Contract Administrator, full access to any of the Bidder's equipment and facilities to confirm, to the Contract Administrator's satisfaction, that the Bidder's equipment and facilities are adequate to perform the Work.

B13.8 Further to B13.1(d), the Bidder shall within five (5) Business Days of a request by the Contract Administrator, provide a completed Social Procurement Plan.

B14. BID SECURITY

B14.1 The Bidder shall include in their Bid Submission bid security in the form of a digital bid bond, in the amount of at least ten percent (10%) of the Total Bid Price, and agreement to bond of a company registered to conduct the business of a surety in Manitoba, in Form G1: Bid Bond and Agreement to Bond, available on The City of Winnipeg, Corporate Finance, Purchasing Division website at <https://www.winnipeg.ca/MatMgt/templates/files/Bidsecurity.pdf>.

B14.2 Bid security shall be submitted in a digital format meeting the following criteria:

- (a) The version submitted by the Bidder must have valid digital signatures and seals.
- (b) The version submitted by the Bidder must be verifiable by the City with respect to the totality and wholeness of the bond form, including: the content; all digital signatures and digital seals; with the surety company, or an approved verification service provider of the surety company.
- (c) The version submitted must be viewable, printable and storable in standard electronic file formats compatible with the City, and in a single file. Allowable formats include pdf.
- (d) The verification may be conducted by the City immediately or at any time during the life of the bond and at the discretion of the City with no requirement for passwords or fees.
- (e) The results of the verification must provide a clear, immediate and printable indication of pass or fail regarding B14.2(b).

B14.3 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).

B14.4 Bonds passing the verification process will be treated as original and authentic.

- B14.4.1 If the Bidder submits alternative bids, the bid security shall be in the amount of the specified percentage of the highest Total Bid Price submitted.
- B14.5 The bid security of the successful Bidder and the next two lowest evaluated responsive and responsible Bidders will be released by the City when a Contract for the Work has been duly formed with the successful Bidder and the contract securities are furnished as provided herein. The bid securities of all other Bidders will be released when a Contract is awarded.
- B14.6 The bid securities of all Bidders will be released by the City as soon as practicable following notification by the Contract Administrator to the Bidders that no award of Contract will be made pursuant to the Tender.

B15. OPENING OF BIDS AND RELEASE OF INFORMATION

- B15.1 Bids will not be opened publicly.
- B15.2 Following the Submission Deadline, the names of the Bidders and their Total Bid Prices (unevaluated and pending review and verification of conformance with requirements) will be available on the MERX website at www.merx.com.
- B15.3 After award of Contract, the name(s) of the successful Bidder(s) and their Contract amount(s) will be available on the MERX website at www.merx.com.
- B15.4 The Bidder is advised that any information contained in any Bid may be released if required by The Freedom of Information and Protection of Privacy Act (Manitoba), by other authorities having jurisdiction, or by law or by City policy or procedures (which may include access by members of City Council).
- B15.4.1 To the extent permitted, the City shall treat as confidential information, those aspects of a Bid Submission identified by the Bidder as such in accordance with and by reference to Part 2, Section 17 or Section 18 or Section 26 of The Freedom of Information and Protection of Privacy Act (Manitoba), as amended.

B16. IRREVOCABLE BID

- B16.1 The Bid(s) submitted by the Bidder shall be irrevocable for the time period specified in Paragraph 11 of Form A: Bid/Proposal.
- B16.2 The acceptance by the City of any Bid shall not release the Bids of the next two lowest evaluated responsive Bidders and these Bidders shall be bound by their Bids on such Work until a Contract for the Work has been duly formed and the contract securities have been furnished as herein provided, but any Bid shall be deemed to have lapsed unless accepted within the time period specified in Paragraph 11 of Form A: Bid/Proposal.

B17. WITHDRAWAL OF BIDS

- B17.1 A Bidder may withdraw their Bid without penalty at any time prior to the Submission Deadline.

B18. EVALUATION OF BIDS

- B18.1 Award of the Contract shall be based on the following bid evaluation criteria:
- (a) compliance by the Bidder with the requirements of the Tender, or acceptable deviation there from (pass/fail);
 - (b) qualifications of the Bidder and the Subcontractors, if any, pursuant to B13 (pass/fail);
 - (c) Total Bid Price;
 - (d) economic analysis of any approved alternative pursuant to B7.

- B18.2 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.
- B18.3 Further to B18.1(b), the Award Authority shall reject any Bid submitted by a Bidder who does not demonstrate, in their Bid or in other information required to be submitted, that they are qualified.
- B18.4 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 adjusted, if necessary, as follows:
- (a) if the lowest evaluated responsive Bid submitted by a responsible and qualified Bidder is within the funds available for the Work, no adjustment will be made to the Total Bid Price; or
 - (b) if the lowest evaluated responsive Bid submitted by a responsible and qualified Bidder exceeds the funds available for the Work, as shown in D3.3,
 - (i) the Award Authority may accept the Bid; or
 - (ii) the Award Authority may reject the Bid as being non-responsive; or
 - (iii) the Total Bid Price of all responsive Bids submitted by responsible and qualified Bidders may be adjusted by progressively deducting prices in the order listed in B10.1 until a Total Bid Price within the budgetary provision is achieved, i.e., Total Bid Price = Total Bid Price – (Section C) – (Section D) – (Section F).
- B18.4.1 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.
- B18.4.2 Bidders are advised that the calculation indicated in B18.4 will prevail over the Total Bid Price entered in MERX.

B19. AWARD OF CONTRACT

- B19.1 The City will give notice of the award of the Contract or will give notice that no award will be made.
- B19.2 The City will have no obligation to award a Contract to a Bidder, even though one or all of the Bidders are determined to be qualified, and the Bids are determined to be responsive.
- B19.2.1 Without limiting the generality of B19.2, the City will have no obligation to award a Contract where:
- (a) the prices exceed the available City funds for the Work;
 - (b) the prices are materially in excess of the prices received for similar work in the past;
 - (c) the prices are materially in excess of the City's cost to perform the Work, or a significant portion thereof, with their own forces;
 - (d) only one Bid is received; or
 - (e) in the judgment of the Award Authority, the interests of the City would best be served by not awarding a Contract.
- B19.3 Where an award of Contract is made by the City, the award shall be made to the qualified Bidder submitting the lowest evaluated responsive Bid, in accordance with B18.
- B19.3.1 Following the award of contract, a Bidder will be provided with information related to the evaluation of their Bid upon written request to the Contract Administrator.

PART C - GENERAL CONDITIONS

C0. GENERAL CONDITIONS

- C0.1 The *General Conditions for Construction* (Revision 2020 01 31) are applicable to the Work of the Contract.
- C0.1.1 The *General Conditions for Construction* are available on the Information Connection page at The City of Winnipeg, Corporate Finance, Purchasing Division website at http://www.winnipeg.ca/matmgt/gen_cond.stm
- C0.2 A reference in the Tender to a section, clause or subclause with the prefix “C” designates a section, clause or subclause in the *General Conditions for Construction*.

PART D - SUPPLEMENTAL CONDITIONS

GENERAL

D1. GENERAL CONDITIONS

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

D2. FORM OF CONTRACT DOCUMENTS

D2.1 Notwithstanding C4.1(c) and C4.4, the Contract Documents will be provided to the Contractor electronically and there will be no requirement for execution and return to the City by the Contractor. Accordingly, the provisions under C4.4(a) and C4.4(b) are no longer applicable.

D3. SCOPE OF WORK

D3.1 The Work to be done under the Contract shall consist of construction of site preparation work for the City's site office compound for future NEWPCC upgrade contracts, the extension of water main on Ferrier Street, the installation of railway under crossings for a 250 mm water main, two 2.44 m utilidors and a 500 mm casing pipe for a future biogas main, and the removal, disposal, and replacement of impacted soils within Parcel B at the North End Sewage Treatment Plant.

D3.2 The major components of the Work are as follows:

- (a) Earthworks and base works to construct a gravel pad for the site trailer compound and access road;
- (b) Ditch excavation;
- (c) Installation of chain link fencing and gates;
- (d) Site electrical work in the site trailer compound;
- (e) Installation of approximately 280 m of 250 mm water main on Ferrier Street and 50 m of water main on Parcel A by trenchless installation methods;
- (f) Installation of approximately 490 m of 50 mm water service by trenchless installation methods and service riser for future site trailer;
- (g) Installation of approximately 340 m of 75 mm sewage forcemain by trenchless installation methods;
- (h) Installation of approximately 35 m of 150 mm wastewater service riser for future site trailer;
- (i) Construction of a sewage lift station;
- (j) Excavation, hauling and disposal of impacted soils and backfilling and compacting excavation zone with suitable site borrow material;
- (k) Trenchless construction of CPKC railway undercrossings for:
 - (i) Approximately 40 m of 250 mm water main in a 500 mm steel casing;
 - (ii) Approximately 40 m of 500 mm steel casing for a future biogas main; and
 - (iii) Two, approximately 40 m long 2440 mm precast concrete pipes for future use as utilidors.

D3.3 The funds available for this Contract are \$8,000,000.00.

D4. SITE INVESTIGATION DUE DILIGENCE AND RISK

D4.1 Notwithstanding C3.1, the Contractor acknowledges that the site investigation reports and other site information included in this Tender have been provided to it and may be relied upon by the Contractor to the extent that the Contractor uses Good Industry Practice in interpreting such

report(s) and site information and carries out the Work in accordance with Good Industry Practice based upon such report(s) and the information contained in them and such other site information. In the event that a site condition related to:

- (a) the location of any utility which can be determined from the records or other information available at the offices of any public authority or person, including a municipal corporation and any board or commission thereof, having jurisdiction or control over the utility;
- (b) the Site conditions, including but not limited to subsurface hazardous materials or other concealed physical conditions;
- (c) the location, nature, quality or quantity of the materials to be removed or to be employed in the performance of the Work;
- (d) the nature, quality or quantity of the Plant needed to perform the Work;
- (e) all matters concerning access to the Site, power supplies, location of existing services, utilities or materials necessary for the completion of the Work; and
- (f) all other matters which could in any way affect the performance of the Work;

that could not have been “properly inferable”, “readily apparent” and readily discoverable” using Good Industry Practice by the Contractor, results in additional Work which is a direct result of this newly discovered site condition, such additional Work will be considered by the City under Changes in Work.

D5. DEFINITIONS

D5.1 When used in this Tender:

- (a) “**NEWPCC**” is the acronym for North End Water Pollution Control Centre.
- (b) “**Parcel A**” refers to the land occupied by the current NEWPCC plant, bounded by Main Street to the east, The future extension of Chief Peguis Trail to the north, CPKC Railway Winnipeg Beach rail line to the west and the former CP Rail Bergen right of way to the south.
- (c) “**Parcel B**” refers to the land slated for expansion of the NEWPCC site, bounded by CPKC Railway Winnipeg Beach rail line to the east, the future extension of Chief Peguis Trail to the north, Ferrier Street to the west, and the former CP Bergen right of way to the south.
- (d) “**Parcel C**” refers to the land slated for expansion of the NEWPCC site, bounded by CPKC Railway Winnipeg Beach rail line to the east, Murray Avenue to the north, Ferrier Street to the west, and the future extension of Chief Peguis Trail to the south. In the interim, this land will partially be used for Contractor laydown and staging in near term expansion of NEWPCC treatment upgrade projects.
- (e) “**Supply Chain Disruption**” means an inability by the Contractor to obtain goods or services from third parties necessary to perform the Work of the Contract within the schedule specified therein, despite the Contractor making all reasonable commercial efforts to procure same. Contractors are advised that increased costs do not, in and of themselves, amount to a Supply Chain Disruption.

D6. CONTRACT ADMINISTRATOR

D6.1 The Contract Administrator is AECOM Canada Ltd., represented by:

Arthur Anderson
Project Manager

Telephone No. 204-801-7579

Email Address arthur.anderson@aecom.com

D6.2 At the pre-construction meeting, AECOM Canada Ltd. will identify additional personnel representing the Contract Administrator and their respective roles and responsibilities for the Work.

D7. CONTRACTOR'S SUPERVISOR

D7.1 At the pre-construction meeting, the Contractor shall identify their designated supervisor and any additional personnel representing the Contractor and their respective roles and responsibilities for the Work.

D8. ACCESSIBLE CUSTOMER SERVICE REQUIREMENTS

D8.1 The Accessibility for Manitobans Act (AMA) imposes obligations on The City of Winnipeg to provide accessible customer service to all persons in accordance with the Customer Service Standard Regulation ("CSSR") to ensure inclusive access and participation for all people who live, work or visit Winnipeg regardless of their abilities.

D8.1.1 The Contractor agrees to comply with the accessible customer service obligations under the CSSR and further agrees that when providing the Goods or Services or otherwise acting on the City of Winnipeg's behalf, shall comply with all obligations under the AMA applicable to public sector bodies.

D8.1.2 The accessible customer service obligations include, but are not limited to:

- (a) providing barrier-free access to goods and services;
- (b) providing reasonable accommodations;
- (c) reasonably accommodating assistive devices, support persons, and support animals;
- (d) providing accessibility features e.g., ramps, wide aisles, accessible washrooms, power doors and elevators;
- (e) inform the public when accessibility features are not available;
- (f) providing a mechanism or process for receiving and responding to public feedback on the accessibility of all goods and services; and
- (g) providing adequate training of staff and documentation of same.

D9. UNFAIR LABOUR PRACTICES

D9.1 Further to C3.2, the Contractor declares that in bidding for the Work and in entering into this Contract, the Contractor and any proposed Subcontractor(s) conduct their respective business in accordance with established international codes embodied in United Nations Universal Declaration of Human Rights (UDHR) <https://www.un.org/en/about-us/universal-declaration-of-human-rights> International Labour Organization (ILO) [https://www.ilo.org/global/lang--en/index.htm](https://www.ilo.org/global/lang-en/index.htm) conventions as ratified by Canada.

D9.2 The City of Winnipeg is committed and requires its Contractors and their Subcontractors, to be committed to upholding and promoting international human and labour rights, including fundamental principles and rights at work covered by ILO eight (8) fundamental conventions and the United Nations Universal Declaration of Human Rights which includes child and forced labour.

D9.3 Upon request from the Contract Administrator, the Contractor shall provide disclosure of the sources (by company and country) of the raw materials used in the Work and a description of the manufacturing environment or processes (labour unions, minimum wages, safety, etc.).

D9.4 Failure to provide the evidence required under D9.3, may be determined to be an event of default in accordance with C18.

D9.5 In the event that the City, in its sole discretion, determines the Contractor to have violated the requirements of this section, it will be considered a fundamental breach of the Contract and the Contractor shall pay to the City a sum specified by the Contract Administrator in writing ("Unfair Labour Practice Penalty"). Such a violation shall also be considered an Event of Default, and shall entitle the City to pursue all other remedies it is entitled to in connection with same pursuant to the Contract.

- D9.5.1 The Unfair Labour Practice Penalty shall be such a sum as determined appropriate by the City, having due regard to the gravity of the Contractor's violation of the above requirements, any cost of obtaining replacement goods/ services or rectification of the breach, and the impact upon the City's reputation in the eyes of the public as a result of same.
- D9.5.2 The Contractor shall pay the Unfair Labour Practice Penalty to the City within thirty (30) Calendar Days of receiving a demand for same in accordance with D9.5. The City may also hold back the amount of the Unfair Labour Practice Penalty from payment for any amount it owes the Contractor.
- D9.5.3 The obligations and rights conveyed by this clause survive the expiry or termination of this Contract, and may be exercised by the City following the performance of the Work, should the City determine, that a violation by the Contractor of the above clauses has occurred following same. In no instance shall the Unfair Labour Practice Penalty exceed the total of twice the Contract value.

D10. FURNISHING OF DOCUMENTS

- D10.1 Upon award of the Contract, the Contractor will be provided with 'issued for construction' Contract Documents electronically, including Drawings in PDF format only.

SUBMISSIONS

D11. SOCIAL PROCUREMENT

D11.1 Social Procurement Plan

- D11.1.1 The City of Winnipeg Council has directed that social procurement requirements are to be considered and evaluated on this project. This includes specific commitments to engage skilled labour including targets for employment of Indigenous peoples and other under-represented groups within the Manitoba market.
- D11.1.2 As a requirement for this project, the Contractor shall commit to a target percentage, greater than zero, to engage with skilled labour of Indigenous peoples and other under-represented groups within the Manitoba market.
- D11.1.3 The Contractor shall provide the Contract Administrator with a Social Procurement Plan in Appendix J within five (5) Business Days of a request by the Contract Administrator as per B13.8.

D11.2 Social Procurement Reporting

- D11.2.1 As a requirement for this project, the Contractor shall commit to reporting on Skilled, Semi-Skilled, and General Labour of Indigenous Peoples and other Under-Represented Groups within the Manitoba Market.
- D11.2.2 The Contractor shall keep detailed records of the total number of full-time and part-time employees that identify as Indigenous peoples and other under-represented groups within the Manitoba market using the Employee Voluntary Self Identification Survey in Appendix H. The Contractor shall report the total number of employee hours that are delivered by Indigenous peoples and other under-represented groups within the Manitoba market using the Skilled Labour Employee Hours Report in Appendix I.
- D11.2.3 The Contractor shall provide the Contract Administrator the Skilled Labour Employee Hours Report midway through the Contract period and upon completion of the Contract period.
- D11.2.4 This commitment is inclusive of subcontractor employment hours and the Contractor shall report on their subcontractor's employment hours.

- D11.3 See Definitions in Appendix G.

D12. AUTHORITY TO CARRY ON BUSINESS

D12.1 The Contractor shall be in good standing under The Corporations Act (Manitoba), or properly registered under The Business Names Registration Act (Manitoba), or otherwise properly registered, licensed or permitted by law to carry on business in Manitoba, or if the Contractor does not carry on business in Manitoba, in the jurisdiction where the Contractor does carry on business, throughout the term of the Contract, and shall provide the Contract Administrator with evidence thereof upon request.

D13. SAFE WORK PLAN

D13.1 The Contractor shall provide the Contract Administrator with a Safe Work Plan at least five (5) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 for the return of the executed Contract Documents, if applicable.

D13.2 The Safe Work Plan should be prepared and submitted in the format shown in the City's template which is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Purchasing Division website at <http://www.winnipeg.ca/matmgt/Safety/default.stm>

D13.3 Notwithstanding B13.4 at any time during the term of the Contract, the City may, at their sole discretion and acting reasonably, require an updated COR Certificate or Annual Letter of good Standing. A Contractor, who fails to provide a satisfactory COR Certificate or Annual Letter of good Standing, will not be permitted to continue to perform any Work.

D14. INSURANCE

D14.1 The Contractor shall provide and maintain the following insurance coverage:

- (a) Wrap up liability insurance written in the name of the Contractor and The City of Winnipeg including all subcontractors involved in the project in the amount of at least ten million dollars (\$10,000,000.00) inclusive, such policy to provide coverage for bodily injury, personal injury, property damage and products and completed operations endorsement. Wrap Up liability to include cross-liability clause, contractual liability, unlicensed motor vehicle liability, non-owned automobile liability, sudden and accidental pollution liability and 12 months completed operations endorsement. Policy to include confirmation that there is no XCU exclusion. The insurance maintained by the contractor shall be primary and non-contributory to any other insurance. Wrap Up liability to include the following additional insureds, Manitoba and its ministers, officers, employees and agents, Canadian Pacific Railway Company.
- (b) if applicable, Automobile Liability Insurance covering all motor vehicles, owned and operated and used or to be used by the Contractor directly or indirectly in the performance of the Work. The Limit of Liability shall not be less than \$2,000,000 inclusive for loss or damage including personal injuries and death resulting from any one accident or occurrence.
- (c) Contractors Pollution Liability (CPL) insurance in the amount of no less than one million dollars (\$1,000,000) per occurrence and two million dollars (\$2,000,000) aggregate covering third party injury and property damage claims including clean-up costs and transported cargo as a result of pollution conditions arising from the Contractor's operations and completed operations. Such policy shall name the City as an additional insured and remain in place for a minimum of twelve (12) months following Total Performance.
- (d) an all risks installation floater carrying adequate limits to cover the cost of any materials and supplies forming part of the final installation.
- (e) all risks course of construction insurance policy including testing and commissioning, for the full replacement cost of the sewage lift station, to be written in the name of the Contractor and The City of Winnipeg. Such policy to remain in place until the date of substantial performance and the completion of all testing and commissioning.

- D14.2 Deductibles shall be borne by the Contractor.
- D14.3 All policies shall be taken out with insurers licensed to carry on business in the Province of Manitoba.
- D14.4 The Contractor shall provide the City Solicitor with a certificate(s) of insurance, in a form satisfactory to the City Solicitor, at least two (2) Business Days prior to the commencement of any Work but in no event later than the date specified in C4.1 for the return of the executed Contract Documents, as applicable.
- D14.5 The Contractor shall not cancel, materially alter, or cause each policy to lapse without providing at least thirty (30) Calendar Days prior written notice to the Contract Administrator.

D15. CONTRACT SECURITY

- D15.1 The Contractor shall provide and maintain the performance bond and the labour and material payment bond until the expiration of the warranty period in the form of:
- (a) a performance bond of a company registered to conduct the business of a surety in Manitoba, in the form attached to these Supplemental Conditions (Form H1: Performance Bond), in the amount of fifty percent (50%) of the Contract Price; and
 - (b) a labour and material payment bond of a company registered to conduct the business of a surety in Manitoba, in the form attached to these Supplemental Conditions (Form H2: Labour and Material Payment Bond), in an amount equal to fifty percent (50%) of the Contract Price.
- D15.1.1 Where the contract security is a performance bond, it may be submitted in hard copy or digital format. If submitted in digital format the contract security must meet the following criteria:
- (a) the version submitted by the Contractor must have valid digital signatures and seals.
 - (b) the version submitted by the Contractor must be verifiable by the City with respect to the totality and wholeness of the bond form, including: the content; all digital signatures and digital seals; with the surety company, or an approved verification service provider of the surety company.
 - (c) the version submitted must be viewable, printable and storable in standard electronic file formats compatible with the City, and in a single file. Allowable formats include pdf.
 - (d) the verification may be conducted by the City immediately or at any time during the life of the bond and at the discretion of the City with no requirement for passwords or fees.
 - (e) the results of the verification must provide a clear, immediate and printable indication of pass or fail regarding D15.1(b).
- D15.1.2 Digital bonds failing the verification process will not be considered to be valid and may be determined to be an event of default in accordance with C18.1. If a digital bond fails the verification process, the Contractor may provide a replacement bond (in hard copy or digital format) within seven (7) Calendar Days of the City's request or within such greater period of time as the City in their discretion, exercised reasonably, allows.
- D15.1.3 Digital bonds passing the verification process will be treated as original and authentic.
- D15.2 The Contractor shall provide the Contract Administrator identified in D6 with the required performance and labour and material payment bonds within seven (7) Calendar Days of notification of the award of the Contract by way of an award letter and prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 for the return of the executed Contract Documents, if applicable.
- D15.3 The Contractor shall, as soon as practicable after entering into a contract with a Subcontractor:
- (a) give the Subcontractor written notice of the existence of the labour and material payment bond in D15.1(b); and

- (b) post a notice of the bond and/or a copy of that bond in a conspicuous location at the Site of the Work.

D16. SUBCONTRACTOR LIST

- D16.1 The Contractor shall provide the Contract Administrator with a complete list of the Subcontractors whom the Contractor proposes to engage (Form J: Subcontractor List) at least two (2) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 for the return of the executed Contract Documents, if applicable.

D17. EQUIPMENT LIST

- D17.1 The Contractor shall provide the Contract Administrator with a complete list of the equipment which the Contractor proposes to utilize (Form K: Equipment List) at least two (2) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 for the return of the executed Contract Documents, if applicable.

D18. DETAILED WORK SCHEDULE

- D18.1 The Contractor shall provide the Contract Administrator with a detailed work schedule at least two (2) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 for the return of the executed Contract Documents if applicable. The detailed work schedule shall consist of the following:
 - (a) a critical path method (C.P.M.) schedule for the Work;
 - (b) a Gantt chart for the Work based on the C.P.M. schedule; and
 - (c) a daily manpower schedule for the Work;all acceptable to the Contract Administrator.
- D18.3 Further to D18.2(a), the C.P.M. schedule shall clearly identify the start and completion dates of all of the following activities/tasks making up the Work as well as showing those activities/tasks on the critical path.
 - (a) Commencement date, Substantial Performance and Total Performance dates, milestone dates for critical stages of the Work and major components of the Work as identified in D3.2.

SCHEDULE OF WORK

D19. COMMENCEMENT

- D19.1 The Contractor shall not commence any Work until they are in receipt of an award letter from the Award Authority authorizing the commencement of the Work.
- D19.2 The Contractor shall not commence any Work on the Site until:
 - (a) the Contract Administrator has confirmed receipt and approval of:
 - (i) evidence of the workers compensation coverage specified in C6.15;
 - (ii) the Social Procurement Plan specified in D11;
 - (iii) evidence of authority to carry on business specified in D12;
 - (iv) the Safe Work Plan specified in D13;
 - (v) evidence of the insurance specified in D14;
 - (vi) the contract security specified in D15;
 - (vii) the Subcontractor list specified in D16;
 - (viii) the equipment list specified in D17;
 - (ix) the detailed work schedule specified in D18;

- (x) the direct deposit application form specified in D31.
 - (b) the Contractor has attended a pre-construction meeting with the Contract Administrator, or the Contract Administrator has waived the requirement for a pre-construction meeting.
- D19.3 The City intends to award this Contract by September 27, 2024.
- D19.3.1 If the actual date of award is later than the intended date, the dates specified for Commencement, Critical Stages, Substantial Performance, and Total Performance will be adjusted by the difference between the aforementioned intended and actual dates.

D20. WORK BY OTHERS

- D20.1 Further to C6.25, the Contractor's attention is directed to the fact that other Contractors, the personnel of Utilities and the staff of the City may be working within the project limit, approach roadway, adjacent roadways or right-of-way. The activities of these agencies may coincide with the Contractors execution of Work and it will be the Contractor's responsibility to cooperate to the fullest extent with other personnel working in the area, and such cooperation is an obligation of the Contractor under the terms of Contract.
- D20.2 Work by others on or near the Site will include but not necessarily be limited to:
- (a) Tender 446-2024: NEWPCC Supply and Installation of Prefabricated Modular Office Complex,
 - (b) Tender 659-2018 B: Design Build of North End Sewage Treatment Plant (NEWPCC) Upgrade: Headworks Facilities,
 - (c) Tender 385-2023: NEWPCC DCS Migration - General Construction Package,
 - (d) Tender 36-2023: North End Sewage Treatment Plant (NEWPCC) Digester Tank 9-14 Spiral Heat Exchanger Replacements UV Upgrades,
 - (e) Manitoba Hydro – Installation of power and gas supply to the site office compound.
 - (f) BellMTS – Installation of communication fibre to the site office compound.
- D20.3 Further to D20.1 the Contractor shall cooperate and coordinate all activities with all parties performing required Work by Others identified in D20.1 and accommodate the necessary area on Site required for the Work by Others to complete the Work.

D21. WORKING DAYS

- D21.1 Further to C1.1(tt), the Contract Administrator's determination of whether or not atmospheric and Site conditions are such that a Working Day is deemed to have elapsed may be based at one time on one type of work while at another time a Working Day may be based on another type of work. When more than one type of major work is involved, the quantity of equipment that must be able to work in order to meet the requirements of a Working Day may vary considerably from that specified in the General Conditions.
- D21.2 In the event that incidental work is behind schedule which, in the opinion of the Contract Administrator, should have been or could have been carried out by the Contractor in conjunction with or immediately following work of a major type, the City hereby reserves the right to charge Working Days on the incidental work until such time as it is up to schedule.
- D21.3 When the major type of work involves restoration of the site to the condition it was prior to rainfall, Working Days shall not be charged.
- D21.4 The Contract Administrator will furnish the Contractor with a daily record for each major type of work showing various information concerning the equipment, the time it worked, could have worked and Working Days charged. This report is to be signed each day by an authorized representative of the Contractor.

D22. CRITICAL STAGES

- D22.1 The Contractor shall achieve critical stages of the Work in accordance with the following requirements:
- (a) Critical Stage 1 includes the completion of all of the following work and shall occur no later than April 30, 2025:
 - (i) All clearing and grubbing on Parcel C;
 - (ii) All stripping and stockpiling of topsoil on Parcel C and within the expected zone of impacted material remediation on Parcel B, including any area the Contractor plan to use for material handling.
 - (b) Critical Stage 2 includes the completion of all of the following work and shall occur no later than July 18, 2025:
 - (i) All site grading and base works required for the site compound;
 - (ii) Installation and commissioning of the lift station, mechanical, and controls;
 - (iii) All below grade utilities that will provide service to the future prefabricated modular office complex including, but not limited to, Ferrier Street 250 mm watermain extension, installation of 50 mm water service, installation of 75 mm forcemain and connection to interceptor manhole, and all electrical works; and
 - (iv) Fencing and gate installation around the trailer compound.

D23. SUBSTANTIAL PERFORMANCE

- D23.1 The Contractor shall achieve Substantial Performance by August 29, 2025.
- D23.2 When the Contractor considers the Work to be substantially performed, the Contractor shall arrange, attend and assist in the inspection of the Work with the Contract Administrator for purposes of verifying Substantial Performance. Any defects or deficiencies in the Work noted during that inspection shall be remedied by the Contractor at the earliest possible instance and the Contract Administrator notified so that the Work can be reinspected.
- D23.3 The date on which the Work has been certified by the Contract Administrator as being substantially performed to the requirements of the Contract through the issue of a certificate of Substantial Performance is the date on which Substantial Performance has been achieved.

D24. TOTAL PERFORMANCE

- D24.1 The Contractor shall achieve Total Performance by September 12, 2025.
- D24.2 When the Contractor or the Contract Administrator considers the Work to be totally performed, the Contractor shall arrange, attend and assist in the inspection of the Work with the Contract Administrator for purposes of verifying Total Performance. Any defects or deficiencies in the Work noted during that inspection shall be remedied by the Contractor at the earliest possible instance and the Contract Administrator notified so that the Work can be reinspected.
- D24.3 The date on which the Work has been certified by the Contract Administrator as being totally performed to the requirements of the Contract through the issue of a certificate of Total Performance is the date on which Total Performance has been achieved.

D25. LIQUIDATED DAMAGES

- D25.1 If the Contractor fails to achieve Critical Stages, 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 Working Day for each and every Working Day following the days fixed herein for same during which such failure continues:
- (a) Critical Stage 1 – two thousand dollars (\$2,000);
 - (b) Critical Stage 2 – eight thousand dollars (\$8,000);

- (c) Substantial Performance – two thousand dollars (\$2,000);
- (d) Total Performance – one thousand five hundred dollars (\$1,500).

D25.2 The amounts specified for liquidated damages in D25.1 are based on a genuine pre-estimate of the City's losses in the event that the Contractor does not achieve critical stages, Substantial Performance or Total Performance by the days fixed herein for same.

D25.3 The City may reduce any payment to the Contractor by the amount of any liquidated damages assessed.

D26. SUPPLY CHAIN DISRUPTION SCHEDULE DELAYS

D26.1 The City acknowledges that the schedule for this Contract may be impacted by Supply Chain Disruption. Commencement and progress of the Work shall be performed by the Contractor with due consideration to the delivery requirements and schedule identified in the Contract, in close consultation with the Contract Administrator.

D26.2 If the Contractor is delayed in the performance of the Work by reason of Supply Chain Disruption, the Work schedule may be adjusted by a period of time equal to the time lost due to such delay and costs related to such delay will be determined as identified herein.

D26.3 A minimum of seven (7) Calendar Days prior to the commencement of Work, the Contractor shall declare whether a Supply Chain Disruption will affect the start date. The Contractor shall provide sufficient evidence that the delay is directly related to a Supply Chain Disruption, including but not limited to evidence related to availability ordering of Material or Goods, production and/or manufacturing schedules or availability of staff as appropriate.

D26.4 For any delay related to supply chain disruption and identified after Work has commenced, the Contractor shall within seven (7) Calendar Days of becoming aware of the anticipated delay declare the additional delay and shall provide sufficient evidence as indicated in D26.3. Failure to provide this notice will result in no additional time delays being considered by the City.

D26.5 The Work schedule, including the durations identified in D22 to D24 where applicable, will be adjusted to reflect delays accepted by the Contract Administrator. No additional payment will be made for adjustment of schedules except where seasonal work, not previously identified in the Contract, is carried over to the following construction season.

D26.6 Where Work not previously identified is being carried over solely as a result of delays related to Supply Chain Disruption, as confirmed by the Contract Administrator, the cost of temporary works to maintain the Work in a safe manner until Work recommences, will be considered by the Contract Administrator. Where the Work is carried over only partially due to Supply Chain Disruption, a partial consideration of the cost of temporary works will be considered by the Contract Administrator.

D26.7 Any time or cost implications as a result of Supply Chain Disruption and in accordance with the above, as confirmed by the Contract Administrator, shall be documented in accordance with C7.

D27. SCHEDULED MAINTENANCE

D27.1 The Contractor shall perform the following scheduled maintenance in the manner and within the time periods required by the Specifications:

- (a) Land scape maintenance as specified in CW 3510 and 3520.

D27.2 Determination of Substantial Performance and Total Performance shall be exclusive of scheduled maintenance identified herein. All scheduled maintenance shall be completed prior to the expiration of the warranty period. Where the scheduled maintenance cannot be completed during the warranty period, the warranty period shall be extended for such period of time as it takes the Contractor to complete the scheduled maintenance.

CONTROL OF WORK

D28. JOB MEETINGS

- D28.1 Regular weekly job meetings will be held at the Site. These meetings shall be attended by a minimum of one representative of the Contract Administrator, one representative of the City and one representative of the Contractor. Each representative shall be a responsible person capable of expressing the position of the Contract Administrator, the City and the Contractor respectively on any matter discussed at the meeting including the Work schedule and the need to make any revisions to the Work schedule. The progress of the Work will be reviewed at each of these meetings.
- D28.2 The Contract Administrator reserves the right to cancel any job meeting or call additional job meetings whenever they deem it necessary.

D29. PRIME CONTRACTOR – THE WORKPLACE SAFETY AND HEALTH ACT (MANITOBA)

- D29.1 Further to C6.26, the Contractor shall be the Prime Contractor and shall serve as, and have the duties of the Prime Contractor in accordance with The Workplace Safety and Health Act (Manitoba).

D30. THE WORKPLACE SAFETY AND HEALTH ACT (MANITOBA) – QUALIFICATIONS

- D30.1 Further to B13.4, the Contractor/Subcontractor must, throughout the term of the Contract, have a Workplace Safety and Health Program meeting the requirements of The Workplace Safety and Health Act (Manitoba). At any time during the term of the Contract, the City may, at their sole discretion and acting reasonably, require updated proof of compliance, as set out in B13.4.

MEASUREMENT AND PAYMENT

D31. PAYMENT

- D31.1 Further to C12, the City shall make payments to the Contractor by direct deposit to the Contractor's banking institution, and by no other means. Payments will not be made until the Contractor has made satisfactory direct deposit arrangements with the City. Direct deposit application forms are at https://winnipeg.ca/finance/files/Direct_Deposit_Form.pdf.
- D31.2 Further to E36, no payment will be made for Cash Allowances other than as set out in E36.4.

WARRANTY

D32. WARRANTY

- D32.1 Notwithstanding C13.2, the warranty period shall begin on the date of Total Performance and shall expire one (1) year thereafter unless extended pursuant to C13.2.1 or C13.2.2, in which case it shall expire when provided for thereunder.

DISPUTE RESOLUTION

D33. DISPUTE RESOLUTION

- D33.1 If the Contractor disagrees with any opinion, determination, or decision of the Contract Administrator, the Contractor shall act in accordance with the Contract Administrator's opinion, determination, or decision unless and until same is modified by the process followed by the parties pursuant to D33.
- D33.2 The entire text of C21.4 is deleted, and amended to read: "Intentionally Deleted"

- D33.1 The entire text of C21.5 is deleted, and amended to read:
- (a) If Legal Services has determined that the Disputed Matter may proceed in the Appeal Process, the Contractor must, within ten (10) Business Days of the date of the Legal Services Response Letter, submit their written Appeal Form, in the manner and format set out on the City's Purchasing Website, to the Chief Administrative Officer, and to the Contract Administrator. The Contractor may not raise any other disputes other than the Disputed Matter in their Appeal Form.
- D33.2 Further to C21, prior to the Contract Administrator's issuance of a Final Determination, the following informal dispute resolution process shall be followed where the Contractor disagrees with any opinion, determination, or decision of the Contract Administrator ("Dispute"):
- (a) In the event of a Dispute, attempts shall be made by the Contract Administrator and the Contractor's equivalent representative to resolve Disputes within the normal course of project dealings between the Contract Administrator and the Contractor's equivalent representative.
 - (b) Disputes which in the reasonable opinion of the Contract Administrator or the Contractor's equivalent representative cannot be resolved within the normal course of project dealings as described above shall be referred to a without prejudice escalating negotiation process consisting of, at a minimum, the position levels as shown below and the equivalent Contractor representative levels:
 - (i) The Contract Administrator;
 - (ii) Supervisory level between the Contract Administrator and applicable Department Head;
 - (iii) Department Head.
- D33.3 Names and positions of Contractor representatives equivalent to the above City position levels shall be determined by the Contractor and communicated to the City at the pre-commencement or kick off meeting.
- D33.4 As these negotiations are not an adjudicative hearing, neither party may have legal counsel present during the negotiations.
- D33.5 Both the City and the Contractor agree to make all reasonable efforts to conduct the above escalating negotiation process within twenty (20) Business Days, unless both parties agree, in writing, to extend that period of time.
- D33.6 If the Dispute is not resolved to the City and Contractor's mutual satisfaction after discussions have occurred at the final escalated level as described above, or the time period set out in D33.5, as extended if applicable, has elapsed, the Contract Administrator will issue a Final Determination as defined in C1.1(v), at which point the parties will be governed by the Dispute Resolution process set out in C21.

INDEMNITY

D34. INDEMNITY

- D34.1 Indemnity shall be as stated in C17.
- D34.2 Notwithstanding C17.1, the Contractor shall save harmless and indemnify the City in the amount of twice the Contract Price or five million dollars (\$5,000,000), whichever is greater, against all costs, damages or expenses arising from actions, claims, demands and proceedings, by whomsoever brought, made or taken as a result of negligent acts or negligent omissions of the Contractor, their Subcontractors, employees or agents in the performance or purported performance of the Work, and more particularly from:
- (a) accidental injury to or death of any person whether retained by or in the employ of the contractor or not, arising directly or indirectly by reason of the performance of the Work, or by reason of any trespass on or damage to property;

- (b) damage to any property owned in whole or in part by the City, or which the City by duty or custom is obliged, directly or indirectly, in any way or to any degree, to construct, repair or maintain;
- (c) damage to, or trespass or encroachment upon, property owned by persons other than the City;
- (d) any claim for lien or trust claim served upon the City pursuant to The Builders' Liens Act;
- (e) failure to pay a Workers Compensation assessment, or Federal or Provincial taxes;
- (f) unauthorized use of any design, device, material or process covered by letters patent, copyright, trademark or trade name in connection with the Work;
- (g) inaccuracies in any information provided to the City by the Contractor.

D34.3 Further to C17, The City shall save harmless and indemnify the Contractor in the amount of twice the Contract Price or five million dollars (\$5,000,000), whichever is greater, against all costs, damages or expenses arising from actions, claims, demands and proceedings, by whomsoever brought, made or taken as a result of negligent acts or negligent omissions of the City, their employees or agents in the performance of its obligation under the Contract.

THIRD PARTY AGREEMENTS

D35. FUNDING AND/OR CONTRIBUTION AGREEMENT OBLIGATIONS

D35.1 Funding for the Work of the Contract is being provided to the City of Winnipeg by the Government of Manitoba and/or the Government of Canada and accordingly, as required by the applicable funding agreements, the following terms and conditions shall apply.

D35.2 For the purposes of D35:

- (a) "**Government of Canada**" includes the authorized officials, auditors, and representatives of the Government of Canada; and
- (b) "**Government of Manitoba**" includes the authorized officials, auditors, and representatives of the Government of Manitoba.

D35.3 Indemnification By Contractor

D35.3.1 In addition to the indemnity obligations outlined in C17 of the General Conditions for Construction, the Contractor agrees to indemnify and save harmless the Government of Canada and the Government of Manitoba and each of their respective Ministers, officers, servants, employees, and agents from and against all claims and demands, losses, costs, damages, actions, suit or other proceedings brought or pursued in any manner in respect of any matter caused by the Contractor or arising from this Contract or the Work, or from the goods or services provided or required to be provided by the Contractor, except those resulting from the negligence of any of the Government of Canada's or the Government of Manitoba's Ministers, officers, servants, employees, or agents, as the case may be.

D35.3.2 The Contractor agrees that in no event will Canada or Manitoba, their respective officers, servants, employees or agents be held liable for any damages in contract, tort (including negligence) or otherwise, for:

- (a) any injury to any person, including, but not limited to, death, economic loss or infringement of rights;
- (b) any damage to or loss or destruction of property of any person; or
- (c) any obligation of any person, including, but not limited to, any obligation arising from a loan, capital lease or other long term obligation;

in relation to this Contract or the Work.

D35.4 Records Retention and Audits

- D35.4.1 The Contractor shall maintain and preserve accurate and complete records in respect of this Contract and the Work, including all accounting records, financial documents, copies of contracts with other parties and other records relating to this Contract and the Work during the term of the Contract and for at least six (6) years after Total Performance. Those records bearing original signatures or professional seals or stamps must be preserved in paper form; other records may be retained in electronic form.
- D35.4.2 In addition to the record keeping and inspection obligations outlined in C6 of the General Conditions for Construction, the Contractor shall keep available for inspection and audit at all reasonable times while this Contract is in effect and until at least six (6) years after Total Performance, all records, documents, and contracts referred to in D35.4.1 for inspection, copying and audit by the City of Winnipeg, the Government of Manitoba and/or the Government of Canada and their respective representatives and auditors, and to produce them on demand; to provide reasonable facilities for such inspections, copying and audits, to provide copies of and extracts from such records, documents, or contracts upon request by the City of Winnipeg, the Government of Manitoba, and/or the Government of Canada and their respective representatives and auditors, and to promptly provide such other information and explanations as may be reasonably requested by the City of Winnipeg, the Government of Manitoba, and/or the Government of Canada from time-to-time.
- D35.5 Other Obligations
- D35.5.1 The Contractor consents to the City providing a copy of the Contract Documents to the Government of Manitoba and/or the Government of Canada upon request from either entity.
- D35.5.2 If the Lobbyists Registration Act (Manitoba) applies to the Contractor, the Contractor represents and warrants that it has filed a return and is registered and in full compliance with the obligations of that Act, and covenants that it will continue to comply for the duration of this Contract.
- D35.5.3 The Contractor shall comply with all applicable legislation and standards, whether federal, provincial, or municipal, including (without limitation) labour, environmental, and human rights laws, in the course of providing the Work.
- D35.5.4 The Contractor shall properly account for the Work provided under this Contract and payment received in this respect, prepared in accordance with generally accepted accounting principles in effect in Canada, including those principles and standards approved or recommended from time-to-time by the Chartered Professional Accountants of Canada or the Public Sector Accounting Board, as applicable, applied on a consistent basis.
- D35.5.5 The Contractor represents and warrants that no current or former public servant or public office holder, to whom the Value and Ethics Code for the Public Sector, the Policy on Conflict of Interest and Post Employment, or the Conflict of Interest Act applies, shall derive direct benefit from this Contract, including any employment, payments, or gifts, unless the provision or receipt of such benefits is in compliance with such codes and the legislation.
- D35.5.6 The Contractor represents and warrants that no member of the House of Commons or of the Senate of Canada or of the Legislative Assembly of Manitoba is a shareholder, director or officer of the Contractor or of a Subcontractor, and that no such member is entitled to any benefits arising from this Contract or from a contract with the Contractor or a Subcontractor concerning the Work.

FORM H1: PERFORMANCE BOND
(See D15)

KNOW EVERYONE BY THESE PRESENTS THAT

_____ ,
(hereinafter called the "Principal"), and

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

_____ dollars (\$_____.)

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

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

TENDER NO. 447-2024

NEWPCC Piping Installation, Soil Remediation, and Site Compound Development

which is by reference made part hereof and is hereinafter referred to as the "Contract".

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

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

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

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

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

_____ day of _____, 20____.

SIGNED AND SEALED
in the presence of:

(Witness as to Principal if no seal)

(Name of Principal)

Per: _____ (Seal)

Per: _____

(Name of Surety)

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

FORM H2: LABOUR AND MATERIAL PAYMENT BOND
(See D15)

KNOW EVERYONE BY THESE PRESENTS THAT

his/its heirs, executors, administrators, successors or assigns (hereinafter called the "Principal"), and

his/its heirs, executors, administrators, successors or assigns (hereinafter called the "Surety"), are held and firmly bound unto **THE CITY OF WINNIPEG** (hereinafter called the "Obligee"), for the use and benefit of claimants as herein below defined, in the amount of

_____ dollars (\$_____)

of lawful money of Canada, for the payment whereof we, the Principal and the Surety jointly and severally bind ourselves firmly by these presents.

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

TENDER NO. 447-2024

NEWPCC PIPING INSTALLATION, SOIL REMEDIATION, AND SITE COMPOUND DEVELOPMENT

which is by reference made part hereof and is hereinafter referred to as the "Contract".

NOW THEREFORE the condition of the above obligation is such that if the Principal shall promptly make payment to all claimants as hereinafter defined, for all labour, service and material used or reasonably required for use in the performance of the Contract, then this obligation shall be void, otherwise it shall remain in full force and effect subject, however, to the following conditions:

- (a) A claimant is defined as one having a direct contract with the Principal for labour, service and material, or any of them, used or reasonably required for use in the performance of the contract, labour, service and material being construed to include that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental of equipment (but excluding rent of equipment where the rent pursuant to an agreement is to be applied towards the purchase price thereof) directly applicable to the Contract;
- (b) The above-named Principal and Surety hereby jointly and severally agree with the Obligee that every claimant as herein defined, who has not been paid in full before the expiration of a period of ninety (90) days after the date on which the last of such claimant's work, labour or service was done or performed, or materials were furnished by such claimant, may sue on this bond, prosecute the suit to final judgment for such sum or sums as may be justly due claimant, and have execution thereon;
- (c) No suit or action shall be commenced hereunder by any claimant
 - (i) unless claimant shall have given written notice to the Principal and the Surety above-named, within one hundred and twenty (120) days after such claimant did or performed the last of the work, labour or service, or furnished the last of the materials for which said claim is made, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were furnished, or for whom the work, labour or service was done or performed. Such notice shall be served by mailing the same by registered mail to the Principal, and Surety, at any place where an office is regularly maintained for the transaction of business, or served in any manner in which legal process may be served in the Province of Manitoba;

- (ii) after the expiration of one (1) year following the date on which Principal ceased work on said Contract; including work performed under the guarantees provided in the Contract;
 - (iii) other than in a court of competent jurisdiction in the Province of Manitoba.
- (d) The amount of this bond shall be reduced by and to the extent of any payment or payments made in good faith hereunder, inclusive of the payment by Surety of mechanics liens which may be filed of record against said improvement, whether or not claim for the amount of such lien be presented under and against this bond.
- (e) The Surety shall not be liable for a greater sum than the specified penalty of this bond.

The Principal and Surety hereby agree that The Guarantors' Liability Act (Manitoba) shall apply to this Bond.

IN TESTIMONY WHEREOF, the Principal has hereunto set its hand affixed its seal, and the Surety has caused these presents to be sealed and with its corporate seal duly attested by the authorized signature of its signing authority this

_____ day of _____, 20_____ .

SIGNED AND SEALED
in the presence of:

(Witness as to Principal if no seal)

(Name of Principal)

Per: _____ (Seal)

Per: _____

(Name of Surety)

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

FORM K: EQUIPMENT
(See D17)

NEWPCC PIPING INSTALLATION, SOIL REMEDIATION, AND SITE COMPOUND DEVELOPMENT

<p>1. Category/type:</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p>
<p>2. Category/type:</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p>
<p>3. Category/type:</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p>

FORM K: EQUIPMENT
(See D17)

NEWPCC PIPING INSTALLATION, SOIL REMEDIATION, AND SITE COMPOUND DEVELOPMENT

<p>4. Category/type:</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p>
<p>5. Category/type:</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p>
<p>6. Category/type:</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p> <p>Make/Model/Year: _____ Serial No.: _____</p> <p>Registered owner: _____</p>

PART E - SPECIFICATIONS

GENERAL

E1. APPLICABLE SPECIFICATIONS AND DRAWINGS

- E1.1 These Specifications shall apply to the Work.
- E1.2 *The City of Winnipeg Standard Construction Specifications* in their entirety, whether or not specifically listed on Form B: Prices, shall apply to the Work.
- E1.2.1 *The City of Winnipeg Standard Construction Specifications* is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Purchasing Division website at <http://www.winnipeg.ca/matmgt/Spec/Default.stm>.
- E1.2.2 The version in effect three (3) Business Days before the Submission Deadline shall apply.
- E1.2.3 Further to C2.4(d), Specifications included in the Tender shall govern over *The City of Winnipeg Standard Construction Specifications*.
- E1.3 Bidders are reminded that requests for approval of substitutes as an approved equal or an approved alternative shall be made in accordance with B7. In every instance where a brand name or design specification is used, the City will also consider approved equals and/or approved alternatives in accordance with B7.
- E1.4 The following are applicable to the Work:

SPEC. NO.	TITLE	NO. OF PAGES
00 01 00	Table of Contents	1
	DIVISION 1	
01 33 00	Submittal Procedures	6
01 35 43	Environmental Procedures	7
01 60 00	Material and Equipment	3
01 65 00	Facility Start-up/Commissioning	6
01 73 00	Operation and Maintenance Manual	3
01 78 00	Closeout Submittals	2
	DIVISION 2	
02 61 00.01	Soil Remediation	5
	DIVISION 9	
09 91 00	Painting	3
	DIVISION 26	
26 05 00	Common Work Results - Electrical	15
26 05 20	Wire and Box Connectors (0-1000 V)	4
26 05 21	Wires and Cables (0-1000 V)	20
26 05 28	Grounding - Secondary	13
26 05 29	Hangers and Supports for Electrical Systems	8
26 05 31	Splitters, Junction, Pull Boxes and Cabinets	5
26 05 32	Outlet Boxes, Conduit Boxes and Fittings	6
26 05 34	Conduits, Conduit Fastenings and Conduit Fittings	18
26 05 44	Installation of Cables in Trenches and In Ducts	7
26 05 95	Heat Tracing	18
26 08 05	Acceptance Testing	19
26 12 16	Dry Type Transformers up to 600 V Primary	8
26 24 17	Panelboards – Breaker Type	4

SPEC. NO.	TITLE	NO. OF PAGES
26 27 26	Wiring Devices	4
26 28 16.02	Moulded Case Circuit Breakers	2
26 28 23	Disconnect Switches Fused and Non-Fused up to 600 V Primary	3
26 50 00	Lighting	4
	DIVISION 31	
31 61 13	Pile Foundations, General Requirements	2
31 63 23	Bored Concrete Piles	3
	DIVISION 32	
32 31 33	Cantilevered Access Gates	5
	DIVISION 40	
40 61 96	Process Control Descriptions	4
40 72 00	Level Measurement	2
	DIVISION 43	
43 21 39	Lift Station	7
43 21 39A	Equipment Data Sheet	1

DRAWING NO.	DRAWING NAME/TITLE
YC2-G001	COVER PAGE
YC2-G002	DRAWING INDEX & SHEET LOCATION PLAN
YC2-C101	CPKC WPG BEACH UNDERCROSSING - WATERMAIN
YC2-C102	CPKC WPG BEACH UNDERCROSSING - BIOGAS
YC2-C103	CPKC WPG BEACH UNDERCROSSING - UTILIDOR
YC2-C105	FERRIER STREET WATERMAIN EXTENSION - STA 0+100 TO 0+260
YC2-C106	FERRIER STREET WATERMAIN EXTENSION - STA 0+260 TO 0+410
YC2-C107	WATERMAIN EXTENSION - HPO REACTORS TO CPR
YC2-C111	PREFABRICATED MODULAR OFFICE COMPLEX SERVICING - TEMPORARY WATER SERVICE - STA 0+090 TO 0+260
YC2-C112	PREFABRICATED MODULAR OFFICE COMPLEX SERVICING - TEMPORARY WATER SERVICE & FORCEMAIN - STA 0+260 TO 0+420
YC2-C113	PREFABRICATED MODULAR OFFICE COMPLEX SERVICING - TEMPORARY WATER SERVICE & FORCEMAIN - STA 0+420 TO 0+56
YC2-C114	PREFABRICATED MODULAR OFFICE COMPLEX SERVICING - TEMPORARY FORCEMAIN - STA 0+000 TO 0+150
YC2-C121	PARCEL C - OVERALL SITE PLAN AND GRADING
YC2-C122	PREFABRICATED MODULAR OFFICE COMPLEX - SERVICING AND GRADING PLAN
YC2-E001	LEGEND
YC2-E101	PREFABRICATED MODULAR OFFICE COMPLEX - SITE PLAN
YC2-E501	ELECTRICAL DETAILS
YC2-E502	ELECTRICAL DETAILS
YC2-E601	SINGLE LINE DIAGRAM
YC2-E602	PANEL SCHEDULE - PNL-Y7020, CDP-Y7010
YC2-C301	BORROW AREA CROSS SECTIONS
YC2-C501	LIFT STATION - PLAN AND SECTIONS
YC2-C502	FORCEMAIN CONNECTION TO EXISTING INTERCEPTOR MANHOLE
YC2-C503	FENCING DETAILS 1
YC2-C504	FENCING DETAILS 2

E2. SOILS INVESTIGATION REPORT

- E2.1 Further to C3.1, soils investigations were undertaken for CPKC Railway utility under crossings, Phase 2 & 3 ESA on Parcel B, Phase 2 ESA on Parcel C, and general soils conditions on Parcel C. Geotechnical Data is found in Appendices A1, A2, A3 and D1, D2, D3, and D4.
- E2.2 Appendices A1, A2, and A3 note conditions and design assumptions of the CPKC Railway utility crossings as well as track and subsurface monitoring requirements.
- E2.3 Appendices D1 through D4 note conditions and requirements for soils remediation on Parcel B.

GENERAL REQUIREMENTS

E3. OFFICE FACILITIES FOR THE CONTRACT ADMINISTRATOR

- E3.1 The Contractor shall supply office facilities meeting the following requirements:
- (a) The field office shall be for the exclusive use of the Contract Administrator.
 - (b) The building shall be conveniently located near the site of the Work.
 - (c) The building shall have a minimum floor area of 25 square metres, a height of 2.4 m with a window/two windows for cross ventilation and a door entrance with a suitable lock.
 - (d) The building shall be suitable for all weather use. It shall be equipped with an electric heater and air conditioner so that the room temperature can be maintained between either 16-18°C or 24-25°C.
 - (e) The building shall be adequately lighted with fluorescent or LED fixtures and have a minimum of six wall outlets.
 - (f) The building shall be furnished with one desk, one drafting table, table 3 m X 1.2 m, one stool, one four drawer legal size filing cabinet, and a minimum of 10 chairs.
 - (g) A portable toilet shall be located near the field office building. The toilet shall have a locking door and be for the exclusive use of the Contract Administrator and other personnel from the City.
 - (h) The field office building and the portable toilet shall be cleaned on a weekly basis immediately prior to each site meeting. The Contract Administrator may request additional cleaning when they deem it necessary.
- E3.2 The Contractor shall be responsible for all installation and removal costs, all operating costs, and the general maintenance of the office facilities.
- E3.3 The office facilities will be provided from the date of the commencement of the Work to the date of Substantial Performance of the Contract.

E4. HAZARDOUS MATERIALS

- E4.1 If asbestos or other hazardous materials are encountered during the Work of the Contract, the Contractor shall stop all work and notify the Contract Administrator immediately. Removal of hazardous materials shall be dealt with by the City and the Contractor shall await further instruction by the Contract Administrator.

E5. HERITAGE RESOURCES PROTECTION

- E5.1 The Contractor shall make all staff and all staff of Subcontractors aware of the requirements of the Heritage Resources Protection Plan noted in Appendix K.
- E5.2 In the event that a heritage resource is discovered resulting in a stop work order, compensation for delays shall be as per C7. The Contractor shall reasonably re-deploy resources to limit cost and schedule impacts until the stop work order is resolved.

E6. PROVISIONAL ITEMS

- E6.1 The Provisional Items listed in the Schedule of Prices are a part of the Contract.
- E6.2 The Contractor shall not perform Work included in the Provisional Items without prior authorization from the Contract Administrator. All Work included in the Provisional Items will be carried out within the construction areas shown on the drawings.
- E6.3 Notwithstanding C.7, the City reserves the right to diminish all or any portion of the items of Work listed in the Provisional Items and no claim shall be made for damages on grounds of loss of anticipated profit or for any other reason.

E7. PROTECTION OF EXISTING TREES

- E7.1 The Contractor shall take the following precautionary steps to prevent damage from construction activities to existing boulevard trees within or adjacent to public right of ways:
- (a) The Contractor shall not stockpile materials and soil or park vehicles and equipment on boulevards within 2 m of trees.
 - (b) Trees identified to be at risk by the Contract Administrator are to be strapped with 25 x 100 x 2400 mm wood planks, or suitably protected as approved by the Contract Administrator.
 - (c) Excavation shall be performed in a manner that minimizes damage to the existing root systems. Where possible, excavation shall be carried out such that the edge of the excavation shall be a minimum of 1.5 times the diameter (measured in inches), with the outcome read in feet, from the closest edge of the trunk. Where roots must be cut to facilitate excavation, they shall be pruned neatly at the face of excavation.
 - (d) Operation of equipment within the dripline of the trees shall be kept to the minimum required to perform the work required. Equipment shall not be parked, repaired, refuelled; construction materials shall not be stored, and earth materials shall not be stockpiled within the driplines of trees. The dripline of a tree shall be considered to be the ground surface directly beneath the tips of its outermost branches. The Contractor shall ensure that the operations do not cause flooding or sediment deposition on areas where trees are located.
 - (e) Work on-site shall be carried out in such a manner so as to minimize damage to existing tree branches. Where damage to branches does occur, they shall be neatly pruned.
- E7.2 All damage to existing trees caused by the Contractor's activities shall be repaired to the requirements and satisfaction of the Contract Administrator and the City Forester or their designate.
- E7.3 No separate measurement or payment will be made for the protection of trees.
- E7.4 Except as required in E7.1(c) and E7.1(e), Elm trees shall not be pruned at any time between April 1 and July 31.

E8. TRAFFIC CONTROL

- E8.1 In accordance with the Manual of Temporary Traffic Control on City Streets (MTTC), the Contract Administrator shall make arrangements with the Traffic Services Branch of the City of Winnipeg to place, maintain, and remove all regulatory signs and traffic control devices authorized and/or required by the Traffic Management Branch in the following situations:
- (a) Parking restrictions,
 - (b) Stopping restrictions,
 - (c) Turn restrictions,
 - (d) Diamond lane removal,
 - (e) Full or directional closures on a Regional Street,
 - (f) Traffic routed across a median,

- (g) Full or directional closure of a non-regional street where there is a requirement for regulatory signs (turn restrictions, bus stop relocations, etc.) to implement the closure.
 - (h) Approved Designated Construction Zones with a temporary posted speed limit reduction. Traffic Services will be responsible for placing all of the advance signs and 'Construction Ends' (TC-4) signs. The Contractor is still responsible for all other temporary traffic control including but not limited to barricades, barrels and tall cones.
- E8.2 Further to E8.1(c), the Contractor shall make arrangement with the Traffic Services Branch of the City of Winnipeg to supply regulatory signs as required.
- E8.3 Upon request from the Contract Administrator, the Contractor shall provide records demonstrating that the Site has been maintained.
- E8.4 Further to E8.1(c) and E8.1(d) the Contractor shall make arrangements with the Traffic Services Branch of the City of Winnipeg to reinstall the permanent regulatory signs after the Contract Work is complete. At this time the Contractor shall make arrangements to drop off the stockpiled materials to Traffic Services at 495 Archibald Street.
- E8.5 Any changes to the approved traffic management plan must be submitted to the Contract Administrator a minimum of (five) 5 Working Days prior to the required change for approval.
- E8.6 If the Contract Administrator determines that the Contractor is not performing Traffic Control in accordance with this specification, Traffic Services Branch may be engaged to perform the Traffic Control. In this event the Contractor shall bear the costs associated charged to the project by the Traffic Services Branch of the City of Winnipeg in connection with the required Works undertaken by the Contractor.
- E9. TRAFFIC MANAGEMENT ON CITY STREETS**
- E9.1 Further to Section 3.7 of CW 1130 of the General Requirements the Contractor shall be responsible to redirect and maintain traffic with appropriate signing in accordance with The City of Winnipeg, "Manual of Temporary Traffic Control in Work Areas on City Streets" at all times during construction.
- E9.2 Maintain access for approaches, driveways, public lanes and crossing streets for all locations.
- E9.3 The Contractor shall maintain access to all businesses during business hours, except where written authorization has been provided by the business.
- E9.4 The Contractor shall not park company or private vehicles inside the barricaded work zone in a manner that will block sightlines for vehicles and pedestrians approaching and crossing intersections.
- E9.5 The Contractor is responsible for maintaining safe vehicular and pedestrian traffic through their work site as identified herein. The Contractor shall rectify any unsafe conditions immediately upon notification. This could include but is not limited to, providing flag persons, clearing debris and snow from sites, moving equipment, and erecting additional signage.
- E9.6 Regional Street Lane Closures
- E9.6.1 Not applicable.
- E9.7 Local Streets
- (a) Erect Road Closure signage in accordance with The City of Winnipeg, "Manual of Temporary Traffic Control in Work Areas on City Streets".
 - (b) The Contractor shall maintain at two way traffic on Ferrier Street. Closure of a single lane will be permitted with required signage and flag persons around work areas.
- E9.8 Measurement and Payment

- (a) Traffic management as outlined here will be considered incidental to the Work. No separate payment will be made.

E10. WATER OBTAINED FROM THE CITY

- E10.1 Further to 3.7 of CW 1120, the Contractor shall pay for all costs, including sewer charges, associated with obtaining water from the City in accordance with the Waterworks and Sewer By-laws.

E11. EXPOSING EXISTING UTILITIES

- E11.1 Where indicated on the drawings or as directed by the Contract Administrator, expose existing utilities by vacuum excavation methods. Backfill test excavations to the same standard as specified for utility installation. Where these test excavations occur within pavement limits, plate excavations to allow for reopening of lanes to traffic prior to completing permanent pavement restoration. No separate measurement or payment shall be made for test excavations, backfilling, or plating excavations prior to permanent restoration.

E12. WATER MAIN TESTING

- E12.1 Further to CW 2125 Clause 3.4.3, samples must be submitted to the laboratory no later than 20 hours following sampling.
- E12.2 Water main shown on drawings YC2-C101 and YC2-C107 will have no permanent connection to a pressurized distribution source at the time specified for the Critical Stage in D22.1(b). The Contractor will be required to provide water for filling and flushing of this line and shall complete the hydrostatic pressure test with acceptable results prior to the future watermain being available for connection.

The future water main is being installed under Tender 659-2018 B: Design Build of North End Sewage Treatment Plant (NEWPCC) Upgrade: Headworks Facilities and is scheduled to be commissioned in July, 2025. Following the commissioning of the water main in Tender 659-2018B, the Contractor shall return to site, connect to the water main installed under Tender 659-2018B, and complete final flushing and disinfection of the water main in accordance with CW 2125.

No additional measurement and payment will be made for re-mobilization. Include all costs in the price bid for the water mains.

E13. OIL AND GAS RESISTANT GASKETS

- E13.1 Further to CW 2110, where indicated on the construction drawings or as directed by the Contract Administrator, the Contractor shall install water mains with oil and gas resistant gaskets. Within the required limits, all pipe, valves, hydrant assemblies, fittings, couplings, and appurtenances shall be installed with oil and gas resistant gaskets.
- E13.2 Gaskets shall be oil and gas resistant Nitrile conforming to ASTM F477 and shall be supplied by the pipe manufacturer.
- E13.3 Water mains installed with oil and gas resistant gaskets will be measured and paid for as specified in CW 2110 Clause 4.1 at the unit price bid for "Water Main Renewal, with nitrile gaskets" for each size of pipe and class of backfill. In addition to the cost of all work specified in CW 2110 Clause 4.1, the price bid per lineal metre will include the cost for all gaskets required for pipe, fittings, valves, pipe, valves, hydrant assemblies, fittings, couplings, and appurtenances.

E14. SURFACE RESTORATIONS

- E14.1 Further to 3.3 of CW 1130, when Total Performance is not achieved in the year the Contract is commenced, the Contractor shall temporarily repair any Work commenced and not completed

to the satisfaction of the Contract Administrator. The Contractor shall maintain the temporary repairs in a safe condition as determined by the Contract Administrator until permanent repairs are completed. The Contractor shall bear all costs associated with temporary repairs and their maintenance.

E15. BOULEVARD AND DITCH RESTORATION ON FERRIER STREET

E15.1 Description

E15.1.1 Further to CW 3520 and CW 3540, this specification shall define the requirements for boulevard and ditch restoration on Ferrier Street.

E15.2 Materials

E15.2.1 Salt Tolerant Grass Seed

(a) Shall be in accordance with E34.2(c)(ii).

E15.3 Construction Methods

E15.3.1 With the exception of the limits specified below, all disturbed areas in the Ferrier Street ditches and boulevards shall be restored with topsoil and Salt Tolerant Grass Seed. Seed shall be applied by hydro-seeding as specified in CW 3520 and shall include mulch and tackifier.

E15.4 Measurement and Payment

E15.4.1 No measurement for payment will be made for boulevard and ditch restoration on Ferrier Street. Include all costs in the cost of water main installation.

E16. CASING PIPES

E16.1 General

- (a) This specification supplements the requirements for casing pipe installation specified in CW 2110.
- (b) Scope of work includes installation of steel casing pipe beneath Canadian Pacific Kansas City (CPKC) Railway right of way for 250 PVC water main and future digester gas pipe.

E16.2 Materials

- (a) Further to Section 3.5 of CW 2110 Casing pipes for pipe crossings under railways shall be Standard Black Steel ASTM A53 Grade B ERW, wall thickness as noted on the drawings, minimum yield strength 241MPa nominal diameter as indicated on the construction drawings.

E16.3 Schedule

- (a) No utility under crossing activities shall occur between the dates of January 1 and March 31 in any calendar year.

E16.4 Execution

- (a) Install casing pipe by jacking methods. The casing pipe must be advanced to maintain a 1.0 metre soil plug within the head of the casing at all times until the casing reaches the receiving pit.
- (b) Casing pipes shall be installed with a bore diameter equal to that of the casing pipe's outside diameter.
- (c) Verify grade and elevation of the casing during installation using laser leveling equipment.
- (d) Remove all soil and debris from the casing pipe upon completion of jacking installation.
- (e) Support water main pipe on casing spacers as indicated on the drawings.
- (f) Sealing Casing Pipes:

- (i) Ends of the casing shall be sealed against the water main pipe by wrapping the casing and water main with two wraps of geotextile drainage fabric meeting the requirements of CW 3120 and be products listed as Approved Products for Surface Works. The geotextile fabric shall be banded with three rows of minimum 10 mm wide stainless-steel band spaced 150 mm apart along each of the pipe and the casing. The fabric shall be placed loosely at each end of the casing such that it is not in tension when backfilled. Pipe and casing shall be carefully bedded and backfilled with sand to 200 mm above the casing.
- (ii) For the empty casing pipe installed for future digester gas, wrap each end of the casing pipe with two thicknesses of geotextile drainage fabric meeting the requirements of CW 3120 and be products listed as Approved Products for Surface Works. The geotextile fabric shall be banded with three rows of minimum 10 mm wide stainless-steel bands spaced 150 mm apart at each of the casing.

E16.5 Measurement and Payment

- (a) The installation of casing pipes shall be measured on a length basis, measured horizontally at grade above the casing. Payment shall be at the unit price bid for casing pipe installations for each diameter and thickness.
- (b) Payment for carrier pipe installed in casing pipe shall be as per CW2110.

E17. WARNING SIGNS

E17.1 Description

- (a) This specification covers the supply and installation of permanent warning signs required to identify the presence of new pipelines at railway crossings.

E17.2 Materials

- (a) Galvanized Steel Posts:
 - (i) 38 mm nominal diameter schedule 40 steel pipe conforming to the latest revision of CAN-Z245.1.
 - (ii) O.D. = 48.3 mm
 - (iii) Wall thickness = 3.7 mm

E17.3 Warning Sign

- (a) Aluminum sheet size as indicated on the drawings.
- (b) Black lettering on white Type VIII retroreflective sheeting (ASTM D4956).

E17.4 Construction Methods

- (a) Install warning signs as indicated on the Construction Drawings.

E17.5 Measurement and Payment

- (a) Supply and installation of warning signs shall be measured on a unit basis and paid for at the Contract Unit Price for "Warning Signs". The number of units to be paid for will be the total number of warning signs supplied and installed in accordance with these specifications.

E18. HYDRANT ACCESS PADS

E18.1 Description

- (a) This Specification covers the construction of approaches to provide access across existing ditches to new hydrants.

E18.2 Construction Methods

- (a) Construct embankment from suitable common excavated material to the dimensions shown on the drawings in accordance with CW 3170.

- (b) Place and compact crushed limestone base course to the dimensions shown on the drawings in accordance with CW 3110.
- (c) Hydro-seed earth slopes with salt tolerant grass seed as specified in E34.2(c)(ii).
- (d) Supply and install CSP culverts in accordance with CW 3610 where indicated.
- (e) Supply and install culvert end markers in accordance with CW 3610.

E18.3 Method of Measurement and Basis for Payment

- (a) Construction of hydrant approaches will be measured for payment on a unit basis and paid for at the Contract Unit Price for "Construction of Hydrant Access Pads". The price bid shall include the cost for all embankment work, base work, supply and installation of the culvert and end markers, and hydro seeding. Number of units to be paid for will be the total number of hydrant access pads acceptably constructed in accordance with this specification, accepted and measured by the Contract Administrator.

E19. EXISTING CULVERTS

- E19.1 Further to CW 1120 and CW 1130, prior to construction, the Contractor with the Contract Administrator shall conduct and inspection of and document the conditions of existing culverts within the project limits.
- E19.2 Any culvert damaged by the Contractor's negligence will be repaired by the Contractor and no cost to the project.
- E19.3 If the Contractor believes a culvert conflicts with the work, he shall notify the Contract Administrator prior to construction and the Contract Administrator shall document the extent of culvert to be removed and replaced.
- E19.4 Repairs or removal and replacement of existing culverts that conflict with the work will be measured and paid for as specified in CW 3610.

E20. SITE ACCESS

- E20.1 Parcel A Access
 - E20.1.1 The Contractor shall access site areas on Parcel A from Main Street via Highland Avenue and Gibbs Street to the north NEWPCC internal road.
 - E20.1.2 There may be times when the above noted access is encumbered by work of other Contractors. If these conditions occur, upon approval of the Contract Administrator, the Contractor may access site areas on Parcel A via Main Street through the central NEWPCC roadway as directed by the Contract Administrator. During these permitted times, the Contractor's traffic shall not interfere with operational traffic or the needs of other contractors on the site.
 - E20.1.3 The posted speed limit through the NEWPCC Parcel A Site is 20 km/hr.
- E20.2 Parcel B Access
 - E20.2.1 All construction traffic accessing Parcel B shall use the following route:
 - (a) Ferrier Road via Templeton Avenue to Leila Avenue.
 - E20.2.2 The Contractor shall make arrangements for the opening of the gate to Parcel B or obtaining keys from the Contract Administrator and shall be responsible for closing and locking the gate at the end of each workday.
 - E20.2.3 The Contractor shall maintain access to the radio tower road at all times.
 - E20.2.4 At the Contractor's option, an opening in the fence on the north side of Parcel B will be permitted if the Contractor chooses to haul borrow material directly from the borrow pit. Any opening in the fence must be secured at the end of the workday to the satisfaction of

the Contract Administrator. The Contractor will be responsible for reinstatement of the fence at the completion of construction and for restoring all surfaces, swales and berms.

E20.3 Parcel C Access

E20.3.1 All construction traffic accessing Parcel B shall use the following route:

- (a) Ferrier Road via Templeton Avenue to Leila Avenue.

E21. EXCAVATION, SHORING, AND BACKFILL

E21.1 Description

- (a) This Specification covers the requirements for excavations and backfilling of trenches, pipelines, and structures.

E21.2 Submittals

- (a) Shop Drawings for all excavation shoring (where required) shall be prepared and submitted in accordance with Section 01 33 00 a minimum of five (5) Business Days prior to undertaking the excavation and shoring installation. Where required by Workplace Safety and Health Regulation, shoring Shop Drawings shall be sealed by a Professional Engineer, registered in the Province of Manitoba, experienced in the design of excavation shoring systems.

E21.3 Approvals

- (a) Approvals for rail under crossings have been secured. Refer to Appendices B1, B2, and B3.

E21.4 Shoring Design

- (a) Shoring, except as otherwise noted, shall be provided for excavations in accordance with CW 2030.
- (b) Shoring adjacent to CPKC Railway tracks and outside of the Zone of Potential Track Loading, shall be designed by a Professional Engineer registered in the Province of Manitoba. Any modification to designs may be subject to approval by CPKC Railway. Contractor shall be responsible for cost and application to CPKC Railway for any design changes proposed. Changes to contract dates as a result of any requested design changes will not be permitted.
- (c) Excavation shoring shall be designed to accommodate the installation of all manholes and fittings.
- (d) Where long term shoring for excavations is required provide stamped Shop Drawings.
- (e) All shoring systems shall comply with Manitoba Workplace Safety and Health requirements.

E21.5 Excavation Adjacent to Manitoba Hydro Overhead Power Poles

- (a) Maintain clearance from Manitoba Hydro power poles as indicated on the drawings and as may be dictated by Manitoba Hydro. Minimum clearances vs excavation depth as per Manitoba Hydro standard CD30-55. Refer to Appendix C.
- (b) Obtain approval from Manitoba Hydro for all excavations within 15m of Manitoba Hydro poles. Comply with all Manitoba Hydro requirements for excavation, shoring and support. All costs to be born by the Contractor.

E21.6 Excavation

- (a) Materials shall not be stockpiled over pipelines.
- (b) Excess excavation material from excavations shall be disposed of off-site or if suitable for embankment construction, hauled, placed and compacted in accordance with CW 3110 in project embankment areas.

- (c) Carefully excavate to expose existing pipelines and structures. Excavation within 1.0 m of the pipe shall be done using soft dig or hand excavation methods to prevent damage to the pipe.
- (d) The Contractor shall undertake all efforts to prevent freezing of soils underlying existing pipelines, bedding and backfilling will not be permitted overtop of frozen soils. Excavations left open when nighttime atmospheric temperatures are expected to drop below 0°C shall be hoarded and heated as required to keep soils and pipelines from freezing.
- (e) Provide heating and hoarding around the lower portion of the excavation and pipe during freezing conditions.

E21.7 Backfill

- (a) Backfill within 1 m of existing and proposed pavements shall be completed to CW 2030, Class 2 or Class 3 standards.
- (b) All other areas shall be backfilled with a Class 4 backfill unless otherwise noted on the Drawings.
- (c) The Contractor shall undertake all efforts to prevent excavated material intended for backfilling from freezing. Backfilling with frozen materials will not be permitted.

E21.8 Measurement and Payment

- (a) Excavation, shoring, and backfilling for excavations will be considered incidental to the utility being installed. No separate payment will be made.
- (b) Where suitable excess trenching excavation is used in project embankment areas refer to E31.5 for measurement and payment for hauling, placing, and compacting.

E22. CANADIAN PACIFIC KANSAS CITY RAILWAY PROTECTION WORKS

E22.1 Description

- (a) This Specification shall cover site specific conditions required for installation of utilities beneath Canadian Pacific Kansas City (CPKC) Railway tracks and right of way. The utilities include:
 - (i) 250 mm PVC Water Main in a 500 mm Casing Pipe.
 - (ii) 500 mm Casing Pipe for a future Digester Gas pipe.
 - (iii) Two 2400 mm Precast Concrete Pipes for future development as a utilidor.

The future digester gas piping and future utilities within the utilidors are not in the scope of this project.

E22.2 General

- (a) Applications for utility crossing agreements have been secured and copies of the agreements are included in Appendices B1, B2, and B3.
- (b) Geotechnical reviews and detailed monitoring plans are included in Appendices A1, A2, and A3.
- (c) The Contract Administrator shall be copied on all Contractor correspondence with CPKC Railway.
- (d) All charges for flagging shall be borne by the Contractor and paid directly to CPKC Railway. Appendix F - CPKC Flagging Application Form indicates flagging rates assessed by the railway company. It is the Contractor's responsibility to estimate the total cost for flagging requirements based upon their intended work methodologies and contingencies. Rates stated in Appendix F are for 2024. No additional compensation will be considered should there be escalation of flagging rates in 2025 for work that carries over to the following season.

- E22.2.1 Under no circumstances will the Contractor be allowed to cross the CPKC Railway directly from Parcel A to Parcel B or from Parcel B to Parcel A.

E22.3 Safety

- (a) The Contractor shall adhere to the latest edition of CPKC's "Minimum Safety Requirements for Contractors Working on CPKC Property in Canada", included in Appendix E. CPKC Railway have the right to stop all work that does not comply with their safety requirements or that they deem is unsafe.
- (b) The Contractor shall at all times conduct his operations in a responsible manner to avoid damage to trackage or property on railway right-of-way. It shall be his responsibility that all workers and persons employed by him or his agents, or under his control shall use due care that no person or property is injured, and that no rights are infringed in the execution of the work.
- (c) No work that will impede railway traffic shall be undertaken without proper flagging protection. Should a flag person be provided for any portion of the Work, the Contractor will adhere to the instructions given by the flag person or foreman in charge.
- (d) The Contractor's forces shall co-operate fully with the CPKC flag persons in the regulation of construction machinery and manpower on the CPKC right-of-way. No work or entry onto the railway right-of-way at any time shall be undertaken without proper flagging protection.
- (e) Care must be taken to ensure that no obstructions or hazards are created on CPKC Railway tracks that will interfere with the safe passage of trains. The Contractor shall not erect or allow to be erected any structure nor place any machinery or equipment within the right of way, without prior approval of CPKC.
- (f) The Contractor is responsible for the proper care and storage of work equipment at night, and at other times when equipment is not in use. All reasonable precaution must be taken to protect the equipment against unauthorized use, damage or tampering. Equipment stored on the right-of-way must be clear of the operation tracks.
- (g) The Contractor shall erect markers, barricades or fences as required and post signs to warn all persons working on this project not to trespass on railway company property. No crossing or entry into the CPKC Railway right of way by any vehicles or equipment will be permitted. Enter into the CPKC Railway right of way only under the supervision of CPKC Rail railway flag persons for work necessary: utility clearances, track settlement monitoring operations.

E22.4 Coordination

- (a) The Contractor shall be responsible for coordinating his work with the Railway Company.
- (b) The Contractor shall be responsible for any charges levied by the Railway Company for track removal, replacement, or realignment and the Railway Company inspection or supervision of the work if the Company deems such is required.
- (c) Provide CPKC Railway Roadmaster a minimum of thirty (30) Business Days notice of requiring flagging.
- (d) The flagging foreman must be forewarned of any equipment changes or extensions of the Work limits or changes in Work shift time in order that, amongst other things, a determination can be made if additional flagging protection is required. It will be the responsibility of the Contractor to advise the flagging foreman each day of the next workday's activities, shift times and durations, including any of the aforementioned changes.

E22.5 Shoring and Track Settlement Monitoring Program

- (a) The Contractor shall install track monitoring surface and sub-surface monitoring points as shown on the drawings a minimum of 5 days prior to construction commencement.
- (b) Required track monitoring program is detailed in Appendices A1, A2, and A3.
- (c) The Contractor shall permit AECOM access to the Site to collect elevations required for the monitoring program prior to, during the course of and following the completion of each undercrossing.
- (d) The Contractor shall take immediate actions if reported shoring or track movements are reported as Alert or Action thresholds indicated.

E22.6 Submissions

- (a) A minimum of ten (10) Business Days prior to undertaking the work provide a detailed work plan for each crossing. The plan should include:
 - (i) Overall Work Plan addressing:
 - ◆ Excavation and shoring procedures;
 - ◆ Installation method statement
 - ◆ Backfill and shoring removal;
 - ◆ Restoration
 - (ii) All equipment to be used to construct each under crossing.
- (b) A detailed day by day schedule.

E22.7 Measurement and Payment

- (a) Flagging costs associated with completing the Work shall be paid by the Contractor directly to CPKC Railway. Flagging cost will be considered incidental to the Work and will not be measured for payment. No separate payment will be made.
- (b) All other costs associated with working in close proximity to rail infrastructure as outlined herein will be considered incidental to the Work and will not be measured for payment. No separate payment will be made.

E23. SEWAGE FORCEMAIN

E23.1 Description

- (a) Work shall include the supply and installation of a 75 mm HDPE forcemain from the proposed lift station to connection point into the Northwest Interceptor Sewer manhole west of Ferrier Street.

E23.2 Reference Standard Specifications

- (a) CW 2030 Excavation Bedding and Backfill
- (b) CW 2125 Flushing, Hydrostatic Leakage Testing and Disinfection Of Water mains and Water Services
- (c) CW 2130 Gravity Sewers

E23.3 Standards

- (a) American Society of Testing and Materials (ASTM):
 - (i) A53/A53M: Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - (ii) D638: Standard Test Method for Tensile Properties of Plastics.
 - (iii) F-714: Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter.
 - (iv) D 3350 Specification for Polyethylene Plastics Pipe and Fittings Materials.
 - (v) F 1055 Standard Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene Pipe and Tubing.
 - (vi) D 3035 Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter.
 - (vii) F 2620 Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings.
- (b) American Water Works Association (AWWA):
 - (i) C906: Polyethylene (PE) Pressure Pipe and Fittings, 4 in. (100 mm) Through 63 in. (1,600 mm), for Water Distribution and Transmission.
- (c) Plastic Pipe Institute:
 - (i) TR-3 Policies and Procedures for Developing Hydrostatic Design Basis (HDB), Hydrostatic Design Stresses (HDS), Pressure Design Basis (PDB), Strength Design

Basis (SDB), and Minimum Required Strength (MRS) Ratings for Thermoplastic Piping Materials or Pipe.

- (ii) TR-4 PPI Listing of Hydrostatic Design Basis (HDB), Hydrostatic Design Stress (HDS), Strength Design Basis (SDB), Pressure Design Basis (PDB) and Minimum Required Strength (MRS) Ratings For Thermoplastic Piping Materials or Pipe.

(d) CSA:

- (i) CSA B137.1, PE Pipe, Tubing, and Fittings for Cold-Water Pressure Services

E23.4 Definitions

- (a) Appurtenances: Additional piping items as required to provide a complete piping system suitable to convey water as specified and intended. These items may or may not be specified but are necessary to complete the piping system.

E23.5 Products

E23.5.1 HDPE Piping

(a) General:

- (i) Pipe to be made from polyethylene resin compound with a minimum cell classification of PE 445574C for PE 4710 materials in accordance with ASTM D3350. Resin is to have a minimum hydrostatic design basis (HDB) of 1600 psi and qualify for a 0.63 design factor to establish a maximum recommended hydrostatic design stress (HDS) of 1000 psi at 73°F (23°C) for water. Materials shall be listed in Plastic Pipe Institute (PPI) TR-4 2009, TABLE I.A.13 - PE 4710.
- (ii) To be iron pipe sized, certified for potable water use, made in accordance with AWWA C901, and CSA B137.1
- (iii) Manufacture pipe to ASTM F714 or D3035.
- (iv) Markings: continuously or at 1.5 m intervals indent print the following: pipe Manufacturer, nominal pipe size, dimension ratio, PE. grade per ASTM D3350, followed by the Hydrostatic Design basis in 100's of psi, AWWA and CSA certification or complete with certification trademark logo, Manufacturing reference standard ASTM D 3035, and date of manufacture.
- (v) Maximum pipe ovality for polyethylene pipe prior to joining shall not exceed 4%.
- (vi) Shall contain no recycled material except that generated in the Manufacturer's own plant from the resin of the same specification and same raw material supplier.

(b) HDPE Forcemain:

- (i) Use DR 17 for all piping unless otherwise stated. Pipe shall be rated for use at a pressure class of 0.86 MPa (125 psi).
- (ii) Utilize coiled pipe and minimize number of pipe joints.

(c) Acceptable Products:

- (i) Sclairpipe by Infra Pipe Solutions Ltd.
- (ii) DriscoPlex by Performance Pipe
- (iii) WL Plastics
- (iv) or Approved Equal in accordance with B7.

(d) Polyethylene Pipe Joints:

- (i) Joints to be thermal butt fusion welded, except where connecting to flanged fittings.
- (ii) Flanged connections with epoxy coated ductile iron backing rings. Bolts and nuts to be 316 stainless steel.
- (iii) Connections to pipe of other materials:
 - ◆ Bolts sleeve connections as per CW2110 complete with stainless steel inserts.

E23.5.2 Polyethylene Fittings

- (a) Manufactured in accordance with the same specifications as HDPE pipe and shall be the same series and resin as the pipe with which the appurtenance is used.
- (b) Fittings shall be of the dimension ration (DR) as the pipe. The average wall thickness shall be 25% greater than that of the pipe. Where butt-fused, ends shall have the same wall thickness as the pipe.
- (c) Electrofusion fittings as per ASTM F1055.

E23.5.3 Tracer Wire

- (a) As per E24.6.3.

E23.5.4 Forcemain Gate Valves

- (a) Forcemain gates valves shall be resilient seat gate valves conforming to AWWA C509 and CoW-WM-05 with flanged ends. Approved products as per City of Winnipeg Approved Product List.
- (b) Top of valve box to be marked "S".

E23.6 Submittals

- (a) Make submittals in accordance with Section 01 33 00.

E23.6.1 Shop drawings for HDPE pipe, fittings and appertenances.

E23.6.2 Pipe Manufacture Quality Control Reports

- (a) Submit quality control reports, for testing required in accordance with AWWA C901 Section 5.4, no later than five (5) Business Days upon manufacture of pipe.

E23.6.3 Affidavit of Compliance

- (a) An affidavit of compliance signed by an officer of the pipe manufacturing company shall be provided stating that the pipe and fittings comply with this Specification, in accordance with Section 6.3 of AWWA C901.

E23.6.4 Written verification from the Manufacturer that the Contractor's personnel performing pipe fusing are qualified and that the jointing equipment has been inspected and is suitable for the pipe supplied.

E23.6.5 Pipe Manufacturer's written bulletins on required procedures, heat and pressures for butt fusion of HDPE pipe.

E23.6.6 Installation requirements for electrofusion fittings.

E23.6.7 Field welding reports containing data on:

- (a) Location of welds
- (b) Ambient temperature
- (c) Fusion temperature
- (d) Interface pressure
- (e) Heating time
- (f) Cooling time

E23.6.8 Data on all electrofusion welds performed.

E23.7 Quality Control

E23.7.1 Inspection:

- (a) The Contractor shall afford the Contract Administrator every facility to access and inspect all plant to be provided, work to be performed, materials to be supplied and equipment or machinery to be installed in accordance with Specifications.

E23.7.2 Testing of Pipe and Materials:

- (a) The Contractor shall provide access to the Contract Administrator or his appointed representative to conduct plant inspections, in accordance with Section 5.8 of AWWA C901. The Contractor shall provide a minimum of 7 calendar days notice of commencement of pipe manufacture, for the purposes of scheduling plant inspections.
- (b) The Contract Administrator reserves the right to conduct third party quality control testing.

E23.8 Construction Methods

E23.8.1 General:

- (a) Pipes, fittings, valves, and appurtenances shall be cleaned of accumulated debris before installation.
- (b) Carefully inspect all materials for defects. Remove defective materials from site.

E23.8.2 Fusing:

- (a) HDPE pipe sections are to be thermal butt fused with flanged connections used at fitting locations unless otherwise specified by the Contract Administrator.
- (b) Provide trained personnel and fusion machine suitable for the type of pipe being fused. Provide certification from the pipe manufacturer showing that the joining equipment is suitable for type of pipe used, and the Operator is qualified to operate same.
- (c) Submit records of fusing operations including:
 - (i) Location of welds; Ambient temperature; Fusion temperature; Interface pressure; Heating time; Cooling time.

E23.8.3 Installation:

- (a) Excavation shall be in accordance with Specification CW2030, "Excavation, Bedding and Backfill".
- (b) Install tracer wire as per E24.7(l).
- (c) Install pipe by trenchless methods.
- (d) Pipe installation in accordance with CW 2110.
 - (i) Supply and install Denso paste and tape to coat all backing rings on flanged connections.

E23.9 Field Testing

E23.9.1 Flush new mains in accordance with City of Winnipeg Standard Construction Specifications CW 2145 prior to testing.

E23.9.2 Hydrostatic Leakage Testing:

- (a) After the system has been installed and backfilled to the satisfaction of the Contract Administrator, pressure test the system.
- (b) Provide labour, equipment and materials required to perform hydrostatic leakage tests hereinafter described. Ensure system will pass test prior to requesting Contract Administrator to witness test.
- (c) Notify Contract Administrator at least two (2) working days in advance of all proposed tests. Perform tests in presence of Contract Administrator.
- (d) Where any section of system is provided with concrete thrust blocks, do not conduct tests until at least five (5) days after placing concrete or two (2) days if high early strength concrete is used.
- (e) The test shall consist of an initial expansion phase and a test phase.

E23.9.3 Test Procedure:

- (a) Open mainline valves.

- (b) Provide temporary valves of caps for testing. Remove upon acceptance of test results.
- (c) Expel air from main by slowly filling main with potable water and complete flushing by running water to waste. Provide all water required for filling and flushing.
- (d) Flushing shall achieve velocities of 3.0 m/s.
- (e) Initial Expansion Phase:
 - (i) Pressurize the pipeline to an initial pressure of 1,000 kPa, based on the elevation of highest point in main and corrected to elevation of gauge, for a period of two (2) hours. To accommodate the initial expansion of the pipe under test, sufficient make-up water shall be added to the system at hourly intervals for four (4) hours to return to the initial test pressure.
 - (ii) Do not exceed the test pressure within 72 hours prior to completing the pressure testing.
 - (iii) In the event that the initial test pressure cannot be obtained, discontinue testing and repair leaks.
- (f) Test Phase:
 - (i) At the end of the four hour expansion phase, reduce the pipeline pressure by 70 kPa and monitor the pressure for 1 hour. No additional makeup water shall be added during the test phase.
 - (ii) Acceptable pressure drop during the one hour test phase is 5% of test pressure.
 - (iii) Following completion of the test phase bleed off water equivalent to from a location remote from the gauge location to demonstrate the pressure drop in the system.
- (g) Irrespective of pressure drop, repair any known leaks.
- (h) Depressurize and allow the piping system to “relax” for at least eight hours if the test is not completed within eight hours or must be repeated for any reason.
- (i) Locate and repair defects if leakage is greater than amount specified. Report leaks to Contract Administrator prior to excavating to allow Contract Administrator to be on Site if so desired. Provide written summary of all repair works completed.
- (j) Record tests whether acceptable or not on and sign and submit leakage test form to the Contract Administrator.
- (k) Repeat test in the presence of the Contract Administrator until pressure drop is within specified allowance.
- (l) Remove all temporary access points after satisfactorily completion of test and seal holes with brass plugs or as otherwise directed by the Contract Administrator.

E23.9.4 Connections to Existing Systems:

- (a) Make connections to existing systems following acceptance of all pressure testing.
- (b) Coordinate all shutdowns with Contract Administrator and City and submit schedule for shutdowns 14 calendar days prior to Work.
- (c) Re-confirm schedule for shutdowns 24 hours prior to Work.
- (d) Expose all connections points prior to construction to confirm elevation and location.

E23.10 Measurement and Payment

E23.10.1 With the exception of the items listed below, Measurement and Payment will be in accordance with CW 2110 as indicated for the items listed in Form B.

- (a) Tracer wire is incidental to pipe installation.
- (b) The supply and installation of sewage forcemains will be measured on a length basis and paid for at the Contract Unit Price per meter for Sewage Forcemain.

E24. WATER SERVICE

E24.1 Description

- (a) This specification supplements CW 2110, defining the requirements for PEX Water Service Pipe.

E24.2 Submittals

- (a) **Product Data:** Submit manufacturer's product submittal forms, catalog cuts, brochures, specifications and installation instructions. Submit data in sufficient detail to indicate compliance with the contract documents.

E24.3 Reference Standard Specifications

- (a) CW 1120 - Existing Services, Utilities and Structures
- (b) CW 2030 - Excavation, Bedding and Backfill
- (c) CW 2110 – Water mains

E24.4 Referenced Approved Products

- (a) AP-013 - Minneapolis Style Curb Box for 20 and 25 Millimetre Minneapolis Style Curb Stops

E24.5 Standards

- (a) Work and materials to be in accordance with the following standards:
 - (i) NSF National Sanitation Foundation:
 - NSF Standard 14 - Plastic Piping System Components and Related Materials.
 - NSF Standard 61 - Drinking Water System Components - Health Effects.
 - (ii) PPI Plastic Pipe Institute.
 - (iii) American Water Works Association:
 - ANSI/AWWA C904 - Cross-Linked Polyethylene (PEX) Pressure Pipe, ½ In. (12 mm) Through 3 In. (76 mm), for Water Service.
 - AWWA C800 – Underground Service Line Valves and Fittings.
 - (iv) ASTM:
 - ASTM F 876 - Standard Specification for Cross-Linked Polyethylene (PEX) Tubing.
 - ASTM F 877 - Cross-linked Polyethylene (PEX) Plastic Hot and Cold Water Distribution Systems 3.
 - ASTM F2080 – Standard Specification for Cold-Expansion Fittings with Metal Compression-Sleeves for Crosslinked Polyethylene (PEX) Pipe.
 - (v) Canadian Standards Association (CSA International):
 - B137.5 Cross-linked Polyethylene (PEX) Tubing Systems for Pressure Applications.

E24.6 Products

E24.6.1 Cross-linked Polyethylene (PEX) Pressure Pipe for Water Service:

- (a) PEXa water service tubing, SDR9 copper tube sizes (CTS), certified to CSA B 137.5 "Cross-Linked Polyethylene (PEX) Tubing for Pressure Applications", NSF Standard 14 and 61, ASTM F 876, and ANSI/AWWA C904.
- (b) Pressure Class 1105 kPa @ 23°C (160 psi @ 73.4°F).
- (c) Thermoplastic Tubing Material Designation Code: 3306 in accordance with ASTM F 876.
- (d) Minimum degree of crosslinking - 80% in accordance with ASTM D 2765, Method B.
- (e) Markings (at intervals of 1.5 m or less):
 - (i) manufacturer's name or trademark;

- (ii) manufacturing date and machine number;
 - (iii) nominal size and SDR;
 - (iv) pressure class and temperature rating;
 - (v) material designation;
 - (vi) Certifications of: ASTM F 876, CSA B 137.5, NSF, and AWWA;
 - (vii) meterage marking.
- (f) Pipe to be supplied in coils of sufficient length to permit installation without couplings.
- (g) Approved product:
- (i) Municipex – as manufactured by Rehau,
 - (ii) Blue904 – as manufactured by Ipex,
 - (iii) Approved Equal in accordance with B7.
- (h) Pipe shall be installed within twelve (12) months of the date of manufacture.
- (i) Insulation as per E25.

E24.6.2 Fittings

- (a) Fittings must meet all material and design requirements of City of Winnipeg Standards AT-4.1.2.31 and AT-4.1.2.40 and be from one of the approved manufacturers, except as noted herein.
- (b) Fittings shall be compression style and installed with stainless steel support insert in accordance with ASTM F2080 approved for use by the manufacturer.
- (c) Fittings shall incorporate an anode/thaw wire connection point.
- (d) Fittings shall be manufactured and installed to provide electrical continuity between the wire connectors and the corporation, curb stop and/or valve.

E24.6.3 Tracer Wire

- (a) Type RWU 90, 12 gauge, 7 or more strand copper wire, 60°C or higher. 600V or approved equivalent; continuous strand.

E24.7 Construction Methods

- (a) Complete excavation and backfill in accordance with CW 2030.
- (b) Install pipe by trenchless methods (HDD).
- (c) Pipe bedding to be Class B sand bedding in open trench locations.
- (d) Installation to CW 2110 except as noted herein.
- (e) Couplings for PEX to PEX piping will be to be minimized. Use continuous lengths of piping where feasible.
- (f) Connections:
 - (i) Tap pipe at 10 – 20 degrees above horizontal.
 - (ii) Cut pipe squarely with an approved tool.
 - (iii) Connect to compression fittings with stainless steel inserts.
 - (iv) Ensure correct pipe alignment at fittings.
 - (v) Install pipe with minimum 1.2 m gooseneck at connection to main.
- (g) Carefully bed pipe at fittings to ensure no stress and pipe remains true at connection.
- (h) Snake pipe in trench to Manufacturer's recommended offsets for installation temperature.
- (i) Do not bend back pipe from coil beyond straight.
- (j) Do not kink pipe or use kinked pipe.
- (k) Do not exceed Manufacturer's recommended minimum bending radius.
- (l) Tracer Wire Installation
 - (i) Attach tracer wire to anode/thaw wire lug on corporation stop.

- (ii) Fasten tracer wire to PEX tubing every 1.5 m with general purpose cable tie.
 - (iii) Attach tracer wire to curb stop anode/thaw wire lug, and curb box anode wire.
 - (iv) Splicing of tracing wire is not allowed.
 - (v) Demonstrate tracer wire continuity from corporation stop to curb box.
 - (vi) Tracer wire is to terminate at curb stop box with 0.5 m coiled around the top 100mm of the curb stop box at one end and with 0.5 m coiled around the top 100mm of the service riser (per-insulated pipe).
- (m) Install anode on curb stop boxes and corporation stops.
- (n) Terminate pipe with pre-insulated vertical riser pipe extending 0.3 m above grade.
- (o) Install curb stop at termination to facilitate flushing, disinfection and pressure testing of the water service.

E24.8 Measurement and Payment

- (a) The supply and installation of PEX water Service piping will be measured on a length basis and paid for at the Contract Unit Price per meter for Water Service Pipe.
- (b) Tracer wire is incidental to pipe installation.
- (c) Installation of pre-insulated PEX piping riser will be measured on a vertical meter basis and paid for at the Contract Unit Price per meter for Pre-Insulated Water Service Riser.
- (d) Curb Stops will be measured and paid for as specified in CW 2110.

E25. FACTORY PRE-INSULATED PIPING

E25.1 General

- (a) Further to CW 2110, where indicated on the drawings, the Contractor shall supply and install pre-insulated piping.

E25.2 Materials

- (a) Pipe: as specified in the applicable pipe sections: E23 and E24.
- (b) Thermal insulation: to be factory applied, rigid, closed cell polyurethane insulation to a thickness of 50 mm, Shaw Pipe Protection "Insul 8" systems of Urecon Ltd. "U.I.P." system meeting the following requirements:
 - (i) Core density, ASTM D1622 35-48 kg/m³
 - (ii) Compressive strength, ASTM D1621 275 kPa
 - (iii) Thermal conductivity, ASTM C518 0.020 W/cm °C to 0.025 W/cm °C
 - (iv) Service temperature -45°C to 85°C
 - (v) Closed cell content, ASTM D6226 90% minimum
 - (vi) Water absorption, ASTM D2842 4.0% maximum by volume
 - (vii) Dimensional stability, ASTM D2126, procedure B & E
- (c) Protective jacketing to be either of the following:
 - (i) A 1.14 mm thickness of continuously extruded polyethylene over a rubber mastic under adhesive as manufactured by Shaw Pipe Protection, "Insul 8" system.
 - (ii) A 1.27 mm thickness in two (2) layers spirally wrapped high density polyethylene tape, hot applied, counter wound, overlapped 15% of tape width on each seam, Urecon Ltd. "U.I.P." system.
- (d) Heat shrink sleeves: adhesive coated cross-linked polyethylene sleeve to provide a moisture proof seal at joints in 150 mm widths.
- (e) Mastic: Flintguard No. 110-14 asphalt mastic vapour barrier.
- (f) All pre-insulated pipe shall have two heat tracing conduits 180 degrees apart.

E25.3 Construction Methods

E25.3.1 Preparation of pipe and insulation

- (a) Clean all surfaces adequately prior to applying adhesives, polyurethane, mastic, shrink sleeves or tape. Remove and replace any materials where proper bond is not attained.
- (b) Transport, store, and handle insulated components with care to prevent damage to insulation and/or protective jacket.
- (c) Repair damaged insulation with field applied urethane. Repair damaged protective jacket with heat shrink sleeves or heat shrink tape.
- (d) Do jointing as required. Cut back insulation on pipe to provide snug fit.
- (e) Coat all exposed surfaces of pipe insulation with mastic.

E25.3.2 Installation

- (a) Install pre-insulated water main pipe by trenchless methods as specified in CW 2110 Clause 3.4.
- (b) After making pipe joint, install heat shrink sleeve across joint.
- (c) Where spiral wound protective jacketing is used, install piping in cored hole in the direction of winding.
- (d) Ensure insulation and protective jacket is not damaged during installation in a cored hole.

E25.4 Measurement and Payment

- (a) Refer to applicable pipe specifications.

E26. FORCEMAIN CONNECTION TO NORTHWEST INTERCEPTOR MANHOLE

E26.1 Description

This specification defines the requirements for connection the new forcemain to the existing manhole on the Northwest interceptor.

E26.2 Products

- (a) Refer to E23.5.1 for HDPE piping.
- (b) Stainless steel pipe supports:
 - (i) All pipe supports shall be 316 stainless steel as per CW 2130 Clause 2.8.
 - (ii) Provide pipe supports as per SD-010D.

E26.3 Execution

E26.3.1 Scheduling

- (a) The Contractor is advised that depth of flow within the Northwest Interceptor may vary widely. Prior to commencement of any work, meet with the Contract Administrator, City Project Manager and NEWPCC operations staff. The Contractor shall schedule and work within the manhole during times when flow in the Northwest Interceptor is lightest and will not interfere with the Contractor's operations.
- (b) Notify the Contract Administrator, City Project Manager and NEWPCC operations staff a minimum of 5 days prior to commencement of work. Confirm schedule and note all planned activities for the following day 24-hours in advance, through to completion of works within the manhole.
- (c) Suspend and reschedule work when sewer flows are high enough to interfere with the work or pose safety conditions that cannot be mitigated. No additional compensation or time will be granted when work is suspended due to high flow conditions.

E26.3.2 Installation

- (a) Core neatly through the manhole wall for pipe penetration. Undertake measures to ensure the core does not fall into the pipe below and demonstrate the core has been recovered.
- (b) Install vertical HDPE pipe as tight to the manhole wall as possible. Fasten with stainless steel pipe supports at minimum 1.8 m spacing with lowest support within 300 mm of the pipe end and highest support within 150 mm of wall penetration. Route piping to not interfere with manhole ladder rungs.
- (c) Grout wall penetration to the requirements of CW 2130.

E26.4 Measurement and Payment

- (a) Connection of the new forcemain to the northwest Interceptor manhole will be paid on a lump sum basis for all work and materials required within the manhole, excavation and backfill along side the manhole, coring the penetration hole and grouting the new pipe into the manhole.

E27. TUNNELING SHAFTS

E27.1 Description

- E27.1.1 This Section includes excavation and initial support of shafts, including launch shafts and receiving shafts.

E27.2 General

E27.2.1 Performance Requirements

- (a) Select methods of shaft excavation and initial ground support that are compatible with requirements for placement of permanent structures, control of water, safety of personnel, and protection of adjacent property.
- (b) Initial ground support systems shall maintain the safety of personnel, prevent damage to adjacent property, and maintain the inherent strength and stability of ground surrounding the excavation. Initial ground support systems shall prevent ground loading on the new Work until after design strength has been reached.
- (c) Specific methods of initial ground support and groundwater control required in this Section or shown on the Drawings are to be considered minimum requirements. Contractor is solely responsible for any additional construction measures necessary to achieve the requirements of this Section, and is solely responsible for any damages resulting from failure to meet the requirements of this Section.
- (d) Establish the size and configuration of shaft excavation to accommodate means and methods of construction, subject to minimum requirements and to any limitations shown on the Drawings and Specifications.
- (e) Construction of shafts in addition to those shown on the Drawings, or in locations other than those shown on the Drawings, at the request of and for the convenience of Contractor, is subject to review and acceptance by the Contract Administrator.
- (f) Should the Contractor be allowed to relocate a shaft from the position shown on the Drawings, any increase in the cost of relocating utilities above the estimated cost at the location shown on the Drawings, as determined by the Contract Administrator, shall be borne by the Contractor.

E27.2.2 Initial Ground Support System Design by Contractor

- (a) Contractor shall be solely responsible for design of initial ground support systems, and for any revision of designs shown.
- (b) Shop drawings for shoring systems shall bear the seal of a Registered Professional Engineer in the Province of Manitoba.
- (c) Initial ground support systems should be designed to the recommended ground loads and surcharge loads provided in the Geotechnical Baseline Report. Contractor shall verify that ground loads and surcharge loads for design are adequate for the expected ground conditions, and are appropriate for the type of support system proposed.

Contractor shall add construction loads appropriate to the means and methods of construction.

- (d) Design of the initial ground support system shall consider:
 - (i) Ground conditions described in the Geotechnical Baseline Report.
 - (ii) Methods for control of water.
 - (iii) Maintenance of soil stability at the bottom of the excavation.
 - (iv) Deformation of the support system under load.
 - (v) The proximity of existing underground and above-ground structures, including buried water lines and the potential effect of their rupture on the support system.
 - (vi) Effects of vibration on adjacent structures, from driving and pulling sheeting and piling.
 - (vii) All loading conditions, including loading due to delay in adding support members, removal of support members, and dynamic loading.
 - (viii) Tunnel break-in and break-out procedures.
 - (ix) Placement of permanent lining and structures.
 - (x) Site and environmental conditions.
- (e) Additional requirements for initial ground support systems for shaft excavations are shown on the Drawings.

E27.2.3

Utility Relocation

- (a) Due to the wide variety of shaft configurations, number of shafts and construction methods, any required utility relocations as a result of the Contractor's selection of shaft methodology, shall be designed and paid for by the Contractor. This includes all utilities shown on the drawings, including but not limited to;
 - (i) Natural Gas;
 - (ii) Telephone;
 - (iii) Other communication utilities;
 - (iv) Combined Sewers;
 - (v) Water Mains;
- (b) On completion of construction, utilities shall be relocated to their initial position if requested by the utility company. Relocated sewers and water mains shall be restored to their initial position, unless otherwise permitted by the City. In no case, shall temporary vertically relocated sewers be permitted to remain (i.e. temporary siphons).

E27.2.4

Accommodation of Tunnelling Work

- (a) The shafts used for launching and receiving shall be made fully adequate for the tunnelling and trenchless work. Contractor shall be responsible for providing each launching shaft and each receiving shaft with all of the provisions necessary to perform the tunnelling and trenchless operations. Furnish all labor, equipment, material, and additional design, as necessary, to meet the minimum requirements as contained herein.
- (b) Contractor shall provide, as required, each launch shaft with thrust blocks, entrance seals, base slabs, pumping and drainage systems, ventilation systems, electrical systems, and lighting systems. Contractor's Engineer shall design the thrust blocks, entrance seals, and base slabs including any necessary modifications to the shoring. Contractor's Engineer shall also be responsible for developing a Fluid Control Plan to be implemented by Contractor at each of the launching shaft sites in accordance with the requirements as contained herein.
- (c) Contractor shall provide, as required, each receiving shaft with exit seals, working floors, and, as necessary, a pumping and drainage system to maintain dry working conditions. Contractor's Engineer shall design the exit seals including any necessary modifications to the shoring.

- (d) Prevent the inflow of ground and/or groundwater into the shafts during the tunnelling and trenchless operations including but not limited to break-in and break-out of the shaft during the launching and receiving processes. The ground shall be improved, as necessary, to prevent any inflow of ground and/or groundwater in excess of specified tolerances as contained herein.
- (e) Prevent the machine from sinking or otherwise veering off of the alignment during the launching and/or receiving process. The ground shall be improved, as necessary, to prevent the machine from deviating along line and grade during the launching and receiving process in excess of the specified tolerances as contained herein.
- (f) Contractor shall be responsible for ensuring that each of the shafts, including any modifications, used with the tunnelling and trenchless operations is fully adequate for installation of the structures as shown on the Drawings. Contractor shall modify these shafts as necessary to accommodate the construction of these structures. Furthermore, Contractor's Engineer shall provide any additional design necessary for completing this work.
- (g) Contractor shall be responsible for interpretation of ground conditions in the geotechnical reports.
- (h) Contractor shall store, process, transport, and dispose of any muck and/or excavated material in accordance with environmental regulations.

E27.2.5 Experience Requirements

- (a) Contractor's Engineer shall be licensed by the Province of Manitoba with at-least five (5) years of experience designing tunnelling and trenchless shafts.

E27.3 Submissions

E27.3.1 Shaft Plan

- (a) The Contractor shall submit a construction shaft plan to the Contract Administrator a minimum of ten (10) Business Days prior to commencement of shaft construction works. If changes are made to the installation plan during construction, the Contractor shall submit these changes to the Contract Administrator for review in advance of implementation of the changes. The construction shaft plan shall include the following:
 - (i) Shop Drawings, in accordance with Section 01 33 00, showing the shaft construction. Shop Drawings shall be signed by a Professional Engineer Licenced to practice engineering in the Province of Manitoba and experienced in the design of shoring systems. Shop Drawings shall include the following minimum information:
 - ◆ Dimensioned layout of support system including location of members (such as caissons, beams, columns, piles, walers, struts, sheeting and other supports);
 - ◆ Member sizes and thickness, and bending tolerances of structural steel;
 - ◆ Quality of materials to be used (by reference to recognized standards such as ASTM), including but not limited to timber structural members, sheeting, and blocking; steel structural members, sheeting, plates, and bars; concrete; and grout;
 - ◆ Connection details;
 - ◆ Maximum allowable spacing between bracing points on compression members to maintain stability and alignment;
 - ◆ Requirements or limits on pre-loading braces;
 - ◆ Sequence of erection and removal;
 - ◆ Design loading conditions;
 - ◆ Codes and reference standards used as a basis for design;
 - ◆ Location, dimensions, and means of ensuring stability at openings;

- ◆ For initial support members installed in advance of excavation, describe methods of installation, of quality control, and of correcting support system defects exposed by subsequent excavation;
 - ◆ Existing utilities with separation distances;
 - ◆ Means of accommodating tunnelling and connection pipe installation;
 - ◆ Means of accommodating construction of the final chambers and appurtenances;
 - ◆ Where shafts are to form part of the final chamber, include sufficient details to demonstrate that the shafts meet the reinforcing requirements and design intent identified on the drawings and herein;
 - ◆ Where shafts are to act as forming for the final chamber, include sufficient details to demonstrate the ability to accommodate final chamber construction;
 - ◆ Any other details required to demonstrate the proposed shafts meet the requirements of the tunnelling work and associated piping and chamber construction works.
- (ii) Shaft Excavation Plan, including the following information:
- ◆ Limits of shaft work sites.
 - ◆ Location and dimensions of shaft excavations.
 - ◆ Methods of excavation.
 - ◆ Means of maintaining soil stability at the bottom of the shaft.
 - ◆ Provisions for ventilating the excavation to prevent accumulations of hazardous gas.
 - ◆ Measures employed at tunnel entry and exit points to stabilize the ground and to control groundwater.
 - ◆ Site and shaft security arrangements.
- (iii) Designers' qualifications;
- (iv) Sketch or sketches of the site clearing showing shafts, tunnelling and other equipment necessary to complete the Work;
- (v) Dimensions for all swales and ditches to be used to control surface water;
- (vi) Monitoring and maintenance plan including Contractor's designated contact person responsible for dewatering and drainage, inspection intervals and means for supervising and monitoring pumping activity;
- (vii) Pump sizes, power source, and noise attenuation features; and
- (viii) Any other related information reasonably requested by the Contract Administrator.
- (b) Submit samples, certifications, and test results of imported shaft bottom preparation materials, geotextiles, and backfill materials.
- (c) Coordinate the submittal requirements of this Section with submittals required under other Sections for control of water, and for backfill grouting.

E27.3.2 Fluid Control Plan

- (a) Fluid Control Plan to ensure that the equipment operator maintains full control over fluid volumes and fluid pressures during tunnelling and trenchless operations including slurries and/or lubricants. Contractor shall determine the construction activities at each launch shaft site location and describe these in detail. Contractor's Engineer shall evaluate these activities and develop a plan including recommendations to ensure that fluid control is not impeded to any degree by any construction activity occurring at the site including but not limited to backfilling operations, leakage in the shoring, dewatering activities, and induced flow of groundwater. Consideration shall be given to the ground and groundwater conditions in the GDR.

E27.3.3 Shaft Layout and Details

- (a) For each tunnelling and trenchless shaft, provide complete details, drawings, and schematics, as applicable. Show layout of shaft, including equipment, drawn to scale. Demonstrate that proposed layout of shafts is adequate for sequence of construction, equipment operations, and means and methods of pipe installation including any required acceptance testing. Describe in detail provisions for the working slab, invert treatment, and pump and drainage systems. Include details of lighting, ventilation, hydraulic, and electrical systems.

E27.4 Materials

E27.4.1 General

- (a) Materials shall be selected by the Contractor to meet the performance requirements of the shoring system.
- (b) Incorporation of used prefabricated elements into initial support systems is permitted, provided the strength and stability of used elements is verified prior to incorporation, and allowances made for lost strengths, if any, due to existing damage or deterioration.
- (c) Any portions of the shoring system that are to act as the final structure shall meet all of the requirements identified on the Drawings.

E27.5 Construction

E27.5.1 General

- (a) Do not begin work on any of the tunnelling and trenchless shafts until all relevant submittals have been reviewed and accepted by the Contract Administrator.
- (b) Furnish all necessary labor, material, equipment, power, water, and utilities to complete the work. Additionally:
 - (i) Select the means and methods for performing the work.
 - (ii) Select, design, and install the thrust blocks. The thrust blocks shall be sufficiently reinforced, isolated, and otherwise anchored, to include any necessary ground improvement measures, to prevent movement from occurring within the launching shaft and/or misalignment of the jacking frame.
 - (iii) Select, design, and install the entrance seals, including any necessary modifications to the shoring, for the launching shafts.
 - (iv) Select, design, and install the base slabs, including any necessary modifications to the shoring, for the launching shafts.
 - (v) Select, design, and install the exit seals, including any necessary modifications to the shoring, for the receiving shafts.
- (c) Damaged and/or deficient materials shall be repaired and/or replaced as directed by Contract Administrator.
- (d) Protect from damage all of the existing improvements at the site including but not limited to structures, utilities, and culverts.
- (e) Perform work in accordance with the reviewed submittals.
- (f) The Contractor's surveyor shall be responsible for verifying any control points identified in the Contract Documents. Contractor's surveyor shall check any baseline and/or benchmarks shown prior to starting and report any errors or discrepancies to Contract Administrator.
- (g) Notify the Contract Administrator immediately upon detecting any larger than predicted deformation, distress, or damage to the excavation support system.
- (h) Notify the Contract Administrator immediately of any structural element that is not in accordance with the reviewed design submittals.
- (i) Do not resume construction activities until corrective measures have been fully implemented.

E27.5.2 Groundwater Dewatering

- (a) The contractor shall undertake groundwater dewatering if required to prevent basal instabilities in the shaft.

E27.5.3 Surface and Groundwater

- (a) Inflow of Ground and Groundwater: If the groundwater is mixed with any slurry and/or lubricant, it shall be prevented from entering the shaft in accordance with Fluid Control Plan.
- (b) Control water within excavations to prevent flowing conditions.
- (c) Prevent piping and loss of fines from the surrounding soils.
- (d) Contractor to utilize appropriate measures such as advance ground treatment and/or adequate wall toe-in depths to prevent the possibility of base heave or soil piping.
- (e) Take appropriate measures to prevent flooding of the shaft during periods of rainfall or overland flood.
- (f) Prevent ice formation on shaft walls by groundwater cut-off, frequent scaling, heating of ventilation air, or other measures as necessary to eliminate the hazard of falling ice.
- (g) The Contractor is responsible for the control, diversion, storage and pumping of all water including without limitation rain, snow melt, groundwater, leaking infrastructure and water in pipes throughout all stages of the Work.
- (h) Do not pump or drain any water containing excessive suspended materials or harmful substances into waterways, sewers or other drainage systems. Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with the governing authority's limitations and requirements.
- (i) The Contractor shall be responsible for all damages within or outside the Site directly resultant from the Contractor's actions, omissions or neglect which may be caused by or which may result from water backing up, flowing through, overflowing or excessive surcharge of drainage systems.
- (j) The Contractor shall organize and bear all costs related to the effective dewatering of the excavations and all other pumping and drainage necessary for the proper execution of the Work, including keeping the pipes, structures, shafts, excavations and trenches free of undesirable accumulations of groundwater, seepage, surface water, melt water or rainwater.
- (k) All dewatering equipment and discharge hoses shall be protected from freezing and shall remain fully operational in freezing weather.
- (l) Dispose of all water drained or pumped as above by discharging it into sewers, drainage ditches or natural water courses as reviewed by the Contract Administrator, and in compliance with all local, Municipal, Provincial and Federal environmental regulations, ordinances, bylaws, etc., and provide documentation indicating that authority has been granted to discharge effluent water into any drainage ditch, brook, creek or river. The Contractor shall develop and implement at their own cost any filtration, settlement or other acceptable treatment methods required prior to disposal.
- (m) Keep all drainage channels, gutters, swales, ditches, sewers, culverts and disposal areas free of silt, sand, debris and gravel and remove such deposits as required.

E27.5.4 Initial Ground Support Systems - General

- (a) Construct initial ground support systems to general line, grade, dimensions, and tolerances that allow permanent structures and pipes to be placed as shown on the Drawings and in accordance with specified tolerances.
- (b) As the excavation progresses, perform periodic verification of shaft vertical alignment.
- (c) Develop and maintain firm and uniform bearing of the support system against the ground by advancing the support system in advance of excavation, or by timely placement of internal supporting members, or by expanding the support system tightly against the ground, or by timely backfill grouting between a non-expanding support system and the ground.

- (d) As the excavation progresses, perform periodic inspections for indications of loosening or instable ground; loss of ground through the support system; cracking and subsidence of ground near the excavation; or excessive deformation, overstress, or weakening of the initial support system.
- (e) Maintain the initial ground support system in fully functional condition for the duration of its use. Promptly reset, repair, or replace support system elements that settle, become misaligned, were improperly installed, or become damaged.
- (f) Utilize excavation methods which prevent basal heave or soil piping methods leading to instability of the shaft base.

E27.5.5 Initial Ground Support Systems in Soil

- (a) Adopt adequate embedment depths to prevent basal heave or soil piping leading to instability of the shaft base, and adopt tremie concreting methods for construction of the shaft base where appropriate.
- (b) Where precast or cast in place systems are used, utilize bentonite or other supporting mud to assist shaft sinking and minimize the movement of the ground surrounding the shaft.
- (c) Coordinate the installation of initial support systems with excavation to prevent heaving or raveling of exposed soils.

E27.5.6 Backfill Grouting of Precast Concrete or Cast-In-Place Concrete Caisson Linings

- (a) On completion of shaft sinking, grout behind the lining to displace annular bentonite, minimize ground movement into the annular space, and migration of fluids through the annular space.
- (b) Inject grout in continuous progression of grout holes along the perimeter of the shaft, commencing from the bottom of the shaft and working upwards.
- (c) Pump grout until material discharging from next hole in sequence is similar in consistency to that at the point of injection. Exercise care to completely fill voids around any obstruction to the natural flow of grout.
- (d) Grouting pressure shall be established by the Contractor, but shall not exceed safe limits established by the Contractor in advance. Control grouting pressure to avoid distorting the shoring.
- (e) Equip the grout plant with reliable pressure gauges at the point of injection and at the pump, to provide accurate pressure readings on a continuous basis.
- (f) After completing the grouting of a hole, hold the grout by means of the stop valve until the grout has set to the extent that it will be retained in the hole.

E27.5.7 Removal of Initial Ground Support Systems

- (a) Wall support shall be left in place as shown on the Drawings, unless otherwise accepted by the Contract Administrator. Bracing members shall be removed in a sequence that prevents and movement of the wall support.
- (b) Sheet piling shall be removed, where permitted, as the excavation is backfilled, and in a manner to maintain stability and strength of soils, and to avoid disturbing adjacent utilities and structures. Voids left on removal of sheet piling shall be backfilled to prevent subsidence.
- (c) Support systems that extend below the bottom of the excavation, such as sheet piling, shall not be removed.
- (d) Support systems that cannot be removed without causing damage to existing structures, utilities, or the Work, in the sole opinion of Contractor, shall be left in place at no additional cost to the project.
- (e) Shoring systems shall be removed to a minimum depth of 1.5 metres below ground surface.
- (f) Contractor to provide as-built of locations of shoring remaining in place.

- (g) Repair any settlement or damage to the Work or adjacent property resulting from removal of initial ground support systems.

E27.5.8 Soil Excavation

- (a) Adopt a shaft support system that maintains continuous ground support during excavation.
- (b) Excavate in a manner to minimize loss of soil into the excavation, to minimize soil movement outside the excavation, to maintain stability of the excavation, and to preserve the existing strength of soils surrounding the excavation.
- (c) Methods of ground stabilization and groundwater control employed at shaft entry and exit points, such as ground freezing or jet grouting, shall be compatible with methods of tunnel excavation.

E27.5.9 Shaft Bottom Stabilization

- (a) Design and install a concrete base connecting to the wall support system, to prevent ground heave, loss of fines and water ingress.
- (b) Use of foundation stabilization material shall conform to CW2030.
- (c) Where ground and hydrostatic conditions require, utilize tremie concreting techniques for placement of shaft bases.
- (d) Stabilize the foundations of structures not in the shaft as necessary to prevent damage from the proposed shaft installation.
- (e) Where the existing material in the bottom of the excavation is unsuitable for supporting the structure, over-excavate and replace with suitable granular material compacted to 95% SPMDD or cementitious material as shown on the Drawings. Any open graded material shall be wrapped in a non-woven geotextile fabric to prevent the transfer of fines.
- (f) Use of foundation stabilization material made necessary by Contractor's failure to maintain bottom stability due to inappropriate means of ground support or groundwater control shall be the responsibility of the Contractor.

E27.5.10 Backfill of Shafts

- (a) Remove all form materials and trash from the excavation before placing any backfill. Remove loose, sloughing, or caving soil from bottoms and sidewalls of excavation.
- (b) Backfill around cast-in-place concrete only after concrete has attained 2/3 of the specified 28-day compressive strength. Review backfilling requirements of permanent construction with respect to attained concrete strength prior to backfilling.
- (c) Backfill all shafts to CW 2030 Class 4 standards. Where sealed shaft construction is utilized, provide means of draining backfill such as a dewatering pump well. Weep holes in the LDS sewer will be permitted. Provide sediment traps and patch weep holes on completion of work.
- (d) Changes to shaft backfill at request of the Contractor, such as use of cement stabilized fill, shall be borne by the Contractor, unless requested by the Contract Administrator.
- (e) Raise backfill uniformly to prevent unbalanced lateral loading that could push the shaft structure out of vertical alignment.
- (f) Limit lift heights to prevent hydrostatic loading that would overstress the shaft structure.

E27.5.11 Shaft Security

- (a) Provide shaft security protection to a minimum height of 1 metre above grade.
- (b) Secure shaft excavations deeper than 3 metres during all periods when shaft site is unoccupied by Contractor or security personnel, including routine absences such as lunch breaks, overnight, and weekends.

- (c) Security measures shall be designed to deter vandalism, and to prevent unauthorized or accidental entry of persons, animals, or objects into the shaft. Minimum security measures shall consist of items (i) or (ii) below. Item (iii) is required at all locations:
 - (i) temporary shaft cover consisting of a rigid steel frame covered with steel mesh, expanded metal, or equal, with sufficient structural capacity to support persons standing on the cover;
 - (ii) temporary shaft cover consisting of steel or nylon netting, with sufficient structural capacity to support persons standing on the netting; fully secured to the extended shaft lining; and,
 - (iii) chain link security fence conforming to these Specifications, installed on the shaft work site perimeter; closed and locked whenever the site is unattended by Contractor's personnel.
- (d) Excavations which are exposed to public vehicular traffic, including run-off-the-road traffic, shall be barricaded along the exposed side with portable concrete "Jersey barriers" designed and positioned to deflect errant vehicles.

E27.5.12 Line and Grade

- (a) Line and Grade during the Launching and Receiving Operations: line shall be maintained within ± 100 mm and grade shall be maintained within ± 50 mm at any point.

E27.6 Measurement and Payment

E27.6.1 Construction of Tunnelling Shafts

- (a) Construction of tunnelling shafts will not be measured for payment. Shafts will be considered incidental to the price of "Utilidor Construction".
- (b) Cost of utility relocations to accommodate the Contractors selected shaft geometry or construction methodology shall be borne by the Contractor.
- (c) Construction of tunneling shafts will be progressed as a percentage of tunnel construction, based on reasonable construction costs.

E28. CONTACT GROUTING FOR TUNNELLING INSTALLATION

E28.1 Description

- (a) This specification describes the minimum requirements for providing the contact grouting to be used with primary support tunnelling.

E28.2 Submissions

- (a) Submit the following in accordance with Section 01 33 00.
 - (i) Grouting equipment to include layout of equipment during grouting operations.
 - (ii) Calibration certificates for gauges, flow meters, and regulators.
 - (iii) Applied pressure and estimated volume of grout per pipe or casing segment.
 - (iv) Procedure to fill the annular space to help limit settlement and reduce long term embedment loads on the pipe. Provide procedure, schematic, equipment, layout, injection pressures, and design calculations.
 - (v) Provide estimated injection volumes and pressures, supported by calculations, for the anticipated soil conditions as well as control measures to prevent damage to the pipe or casing.
 - (vi) MSDS for grout mix additives.
 - (vii) Grout mix.
 - (viii) Daily production records submitted no later than the beginning of the following workday.

E28.3 Materials

- (a) Cement: Cement shall be HS Portland cement conforming to ASTM C 150 and CSA A3000-08.

E28.4 Construction

- (a) Design
 - (i) Grout mix shall be designed by the Contractor's Engineer.
 - (ii) Calculate grout pressures and determine effects of fluid pressure on pipe using a minimum factor of safety of 2.0.
 - (iii) Stiffness, strength, injection pressure, and volume of the contact grout mix shall be compatible with the ground and groundwater conditions as described in the GDR as well as the pipe that is being grouted.
- (b) Quality Control
 - (i) Contractor shall maintain logs of all grouting operations, including pressures, grout volumes, QA/QC testing. The Contractor shall submit all grouting logs and testing results within ten (10) Business Days of completion of the grouting works or upon receipt of testing results from the testing lab.
 - (ii) Provide access to during contact grouting operations to record the pressure gauge, volumetric gauge, and position of the shut-off valve.
- (c) Packaging, Handling, Shipping, Storage and Site Transport
 - (i) Packaging, handling, shipping, storage, and site transport of materials shall be done in accordance with the manufacturer's instructions.
- (d) Execution
 - (i) Inject grout at all of the ports in the new pipe string to completely fill the annular space between the pipe or casing and the ground.
 - (ii) Perform contact grouting in accordance with reviewed submittals.
 - (iii) Use calibrated flow meters, gauges, and regulators.

E28.5 Measurement and Payment

- (a) Supply and installation of contact grouting will be considered incidental and will not be measured for payment. No additional payment will be made.

E29. TUNNELLING AND PIPE JACKING FOR UTILIDOR CONSTRUCTION

E29.1 Description

- (a) This specification describes the requirements for installation of pipe by pipe jacking using a tunnel boring machine (TBM) for the installation of two 2.44 m precast concrete utilidors beneath CPKC Railway Winnipeg Beach Spur Line.

E29.2 General

- (a) Furnish all labor, equipment, materials and incidentals necessary to install the precast pipe in accordance with the requirements of this specification. Be responsible for the special requirements, as defined herein.
- (b) Provide a Tunnel Boring Machine (TBM) that meets the requirements of this specification.
- (c) Construct the tunnelling shafts in accordance with E27.
- (d) Furnish and install product pipe to include conducting the required acceptance testing in accordance with this specification and product pipe specification.
 - (i) Reinforced Concrete Pipe as per E30

E29.3 Definitions

- (a) Refer to ASCE 36 and D4.

E29.4 References

- (a) Province of Manitoba, Occupational Health and Safety Act, revised Oct 1, 2013.
- (b) American Society for Civil Engineering (ASCE), 36-01. Standard Construction Guidelines for Tunnelling.

E29.5 Schedule

- E29.5.1 No tunneling activities shall occur between the dates of January 1 and March 31 in any calendar year.
- E29.5.2 Commencement of tunnelling on the second utilidor must lag behind completion of the first utilidor, including grouting of any annular void space, by a minimum of 5 calendar days.

E29.6 Submittals

- E29.6.1 Submit the following in accordance with Section 01 33 00 a minimum of ten (10) Business Days prior to commencement of tunnelling work:
 - (a) Construction Method and Sequence of Operations:
 - (i) Provide a description of the proposed method of construction and the sequence of operations to be performed during construction. A general description and schedule of the tunneling procedure, including but not limited to, construction of the shafts, set-up of tunneling equipment, muck disposal, methods of protection and maintenance of project site, and ground and groundwater control methods.
 - (b) Site Layout:
 - (i) Typical layout of launching and receiving shaft work sites showing equipment locations, materials storage, muck storage, site offices and facilities, worksite access and egress.
 - (ii) Source of potable water to be used at each location.
 - (c) TBM Equipment:
 - (i) Provide manufacturer information, including preprinted machine specifications, installed options, operating instructions, and manuals.
 - (ii) Additionally for a used TBM, prior to starting this project, provide a certification in writing that the TBM has been certified fit for use based on the anticipated project conditions.
 - (iii) Detailed shop drawings of the TBM, including configuration of cutter wheel along with details of the tools and hard facing.
 - (iv) TBM grade and alignment control system details to include type of guidance system and/or enhanced guidance systems with complete details on equipment capabilities and limitation.
 - (v) Electrical system, lighting system, and on-site power generation. Also provide details of power supplied by utility provider.
 - (vi) Details of overcut to include size of overcut, which is not to exceed 25 mm or the pipe manufacturer overcut recommendation. The submitted overcut shall be reviewed and accepted by the Contract Administrator prior to implementation.
 - (d) Launch Procedures:
 - (i) Complete launch procedure. Describe any modifications to the designed shoring for launching the TBM and when these modifications are to be in place. Describe any the ground stabilization adjacent to the shoring and when the stabilization methods are to be in place.
 - (ii) Complete receiving procedure for the TBM. Describe any modifications to the designed shoring for receiving the TBM and when these modifications are to be in place. Describe any ground stabilization adjacent to the shoring and when the stabilization methods are to be in place.
 - (e) For Slurry-MTBM, submit details of slurry system and soil separation methods including slurry formulations by soil type, and calculations of the system capacity to handle flows at all proposed distances and changes of elevations to and from the face of the MTBM and to and from the slurry separation plant.

- (i) Submit Material Safety Data Sheet (MSDS) for slurry additives.
 - (ii) Use of NSF/ANSI Standard 60 Certified materials only, or approved equal in accordance with B7.
 - (iii) Calculations and operating information to be controlled with the intent of preventing inadvertent returns and balancing face pressure.
 - (iv) Sample slurry log sheet including time, date, sample, shaft location, pipe number, slurry additives, quantity added, soil type, viscosity, specific gravity, water added, and operating pressure.
 - (v) Account for ground characteristics to include equipment wear, high permeability and slurry loss, and fine grain content with difficult separation.
 - (vi) Indicate limits of target control of sediment content within the slurry.
- (f) For EPB-MTBM or rotary TBM, submit details of complete muck transport system from tunnel face to muck storage locations. Provide detailed procedures for determining conditioning agents by soil type to be used to assist in maintaining earth pressure balancing and relief for the anticipated soil conditions and test measurements to ensure acceptable performance of conditioning agents. Details of proposed conditioning agent formulations by soil type, and calculations of the system capacity to handle flows at all proposed distances and changes of elevations to and from the TBM.
- (i) Submit Material Safety Data Sheet (MSDS) for conditioning agents.
 - (ii) Use NSF/ANSI Standard 60 Certified materials only, or approved equal in accordance with B7.
 - (iii) Sample conditioning agent log sheet including time, date, sampler, shaft location, pipe number, conditioning agents, quantity added, soil type, viscosity, specific gravity, water added, and operating pressure.
- (g) Description of automatic lubrication mix equipment and procedures for lubricating the pipe during the jacking operations to include the estimated volume for the anticipated site conditions. Account for ground characteristic to include any swelling clay and highly permeable ground.
- (i) Submit Material Safety Data Sheet (MSDS) for lubricant additives.
 - (ii) Use NSF/ANSI Standard 60 Certified materials only, or approved equal in accordance with B7.
 - (iii) Details that demonstrate that the lubrication delivery system shall have sufficient pressure and volume to perform as intended. Calculations shall demonstrate adequate volume and pressure of the lubricant to completely fill the annular space with considerations for overcoming ground water pressures and any fluid loss in permeable soil.
 - (iv) Sample lubrication log sheet including time, date, sample, shaft location, pipe number, slurry additives type, quantity added, soil type, viscosity, specific gravity, water added, and system operating pressures and volumes.
- (h) Jacking system details, method of operation, thrust capacity, and sleeve details, plus method of control to prevent exceeding the maximum allowable jacking force, as defined herein, on the jacking pipes.
- (i) Theoretical jacking force calculations and pipe material calculations shall be prepared and submitted in accordance with Specifications E30 and Section 01 33 00. If the jacking force calculations are based upon the use of a lubricant, then the lubricant shall be used in accordance with the submitted calculations.
 - (ii) Contractor shall furnish product pipe submittals in accordance with appropriate pipe specifications.
 - (iii) Thrust block details at each launching shaft location.
- (i) Proposed contingency plan for potential issues regarding tunneling operations shall be provided for the following scenarios:
- (i) The TBM encounters an unmovable obstruction manmade and/or natural.

- (ii) The jacking pressures start to increase rapidly and reasonable concern exists for completing the pipe jacking installation process to the receiving shaft. Include discussion on pipe damage, lubrication aspects, and, in the extreme case, the use of rescue pits.
- (iii) Pipe suffers severe damage or exceeds 90 percent of its maximum allowable jacking force and the structural pipe monitoring system is required. Describe process for implementing structural pipe monitoring systems on each subsequent drive. Provide the schedule for the monitoring system to be on-site, installed, tested, and in proper working order.
- (j) Survey plans including, but not limited to, the following:
 - (i) Settlement surveying and monitoring plan.
 - (ii) Initial survey.
 - (iii) Final survey.
 - (iv) Verification of line and grade for TBM operations.
 - (v) As-built survey for each installed length of the sewer pipe within 24 hours of the completion of each drive or reach.

E29.6.2 Submit tunnelling operations log(s) in accordance with Section 01 33 00:

- (a) Provide a sample of logging reports and daily reports prior to beginning tunnelling.
- (b) Transcribe to paper and submit to Contract Administrator at the end of each shift a jacking operations log completed by the TBM operator complete with the date and names of TBM operator and project superintendent. Both TBM operator and Project superintendent shall initial and date. The jacking operations log shall include the following:
 - (i) Provide starting and finish times for each crew shift.
 - (ii) Observations of settlement or heaving.
 - (iii) Sampling interval shall produce at least three measurements per pipe and shall not exceed a 15 minute time duration to include:
 - ◆ Time of measurement.
 - ◆ Position of the TBM in relation to design line and grade. Include the distance of the MTBM from the launching shaft.
 - ◆ Number of each pipe installed and length of pipe.
 - ◆ Maximum jacking forces exerted on the pipe from the main jacking system.
 - ◆ Position of steering jacks.
 - ◆ Inclination of TBM and torque of cutter wheel.
 - ◆ Hydraulic pressures.
 - ◆ Volume of pipe lubricant used, viscosity, pumping pressure, and name of the operator of the lubrication plant. Provide lubrication details.
 - ◆ Provide output from the automatic lubrication plant in approved format.
 - ◆ For Slurry-TBM, face pressure and volumetric flow rate of slurry.
- (c) Automated data recording system for tunnelling:
 - (i) Submit a sample of all information available for recording, variations in sampling frequency, and the formats in which these data can be recorded and presented.
 - (ii) The Contract Administrator will then select the information, sampling frequency, and format of the data based on these samples.
 - (iii) The sampling interval selected by the Contract Administrator will produce at least three measurements per pipe, and it will not exceed 1 minute time durations.
 - (iv) At a minimum the automated data recording system shall record the time; date; distance; and hydraulic pressures for the main jacking system; torque at the cutter wheel; pressure at the face; extension of each of the steering cylinders;

machine orientation to include pitch, roll, and yaw; deviations from alignment line and grade; and the rate of pipe advancement.

- (v) This information shall be submitted on a daily basis using an electronic thumb drive or other approved device.
- (d) For Slurry-MTBM, results from sediment content tests to monitor plant efficiency.
- (e) Manual Jacking Records: Provide complete written Jacking Records to the Contract Administrator. These records shall include for each pipe, at a minimum: date, time, name of operator, tunnel drive identification, installed pipe number and corresponding tunnel length, start and end time of each jacked pipe, time required to set subsequent pipe, spoil volumes (muck carts per pipe joint), soil conditions including occurrences of unstable soils and estimated groundwater inflow rates if any, jacking forces, steering jack positions, line and grade offsets, any movement of the guidance system, TBM roll, and jacking forces, volume and location of lubricant pumped, problems encountered with the TBM or other components or equipment, and durations and reasons for delays. Recorded observations should be made at intervals of not less than 2 metres of advance, whenever conditions change, and as directed by the Contract Administrator. At least seven (7) days prior to the launch of the TBM, submit samples of the jacking logs or records to be used.

E29.6.3 Contractor's Qualifications:

- (a) TBM Operator Experience: Experience requirements include the construction and completion of a minimum of seven pipeline projects installed by tunnelling methods, each with a drive length of at least 60 percent of the proposed maximum drive length for installed pipe 1800 mm or larger. The reference projects shall have been completed in the previous 5 years prior to the bid date. The MTBM operator shall also have:
 - (i) Operated an TBM similar to the one proposed.
 - (ii) Utilized the same type of pipe material as that used for the jacking pipe on this project.
 - (iii) Successfully completed a project in similar ground conditions to those contained in the GDR.
 - (iv) Operator for drives using a structural pipe monitoring system, if required, shall demonstrate experience with the system, else documentation of manufacturer recommended training will be required at no additional cost to City.

E29.7 Tunnelling Design

E29.7.1 Design Requirements

- (a) Every design submitted as part of this specification shall be signed, sealed, and dated by the Contractor's Engineer registered in the Province of Manitoba.
- (b) Use recognized standards to the extent possible.
- (c) Provide comments, assumptions, symbols, units, sketches, and input parameters as necessary to convey the design intent.

E29.7.2 Jacking Thrust

- (a) Determine size of thrust wall at each launching shaft location. Demonstrate that ground has sufficient reaction without excess deformation using not less than 300% of the maximum anticipated jacking loads. Fully describe any mitigation measures to be implemented, as necessary, such as isolation of thrust wall.

E29.7.3 Existing Project Conditions

- (a) The Contractor is responsible for interpreting ground, groundwater, and gas conditions.
- (b) Comply with applicable codes, standards, and regulations.

- (c) Assess existing conditions, including property rights of adjacent properties whether private or public, for the possible effects of proposed temporary works and construction methods.
- (d) Reports: GDR: Appendix A3.

E29.8 Quality Control

- E29.8.1 Defective materials: Any material found to be defective shall be immediately marked "DEFECTIVE – NOT FOR USE". This marking shall be clear from any point of view and shall be permanent. The defective material shall then be transported off-site and properly disposed in a time period not to exceed 24 hours.
- E29.8.2 Provide access to Contract Administrator at all times during construction operations to perform inspections and to observe quality.
- E29.8.3 The Contract Administrator shall be allowed access to manually record the operating parameters during the tunnelling operations such as pitch, roll, yaw, guidance system information, valve positions, thrust force, cutter wheel torque, rate of advance, and installed length of pipe. Access to this information shall be provided either by admitting the Contract Administrator into the control cabin to record the data or else by setting up a remote electronic display monitor that contains the same information as that displayed on the operator control console in real time. This remote monitor shall be located in a suitable shelter in the vicinity of the launching shaft.
- E29.8.4 Provide the Contract Administrator with access to manually record the pressure gauge, volumetric gauge, and position of the shut-off valve for the lubrication system during the tunnelling operations.
- E29.8.5 Survey the tunnel not less than once daily.

E29.9 Equipment

- E29.9.1 TBM: Provide a TBM with the following features:
 - (a) General: The tunnelling system selected shall be specifically designed for excavating, transporting, and separating the materials encountered along the sewer alignment. This equipment shall be capable of satisfactorily installing the jacking pipe as contained herein.
 - (b) Requirements for the MTBM include:
 - (i) The MTBM shall maintain the tunnel face under wet, dry, and adverse soil conditions. The MTBM shall provide face support of the excavated face at all times including temporary shutdowns during operations. Carefully controlled face pressure for supporting the excavation face as well as to prevent inflows of ground and/or groundwater. The system shall maintain control during both excavation and shutdown periods.
 - (ii) Articulated steering. The TBM shall be able to maintain the alignment within the specified tolerances for the anticipated ground at tunnel level as contained in the GDR.
 - (iii) Seal mechanism between the TBM and the leading pipe.
 - (iv) Water damage protection for electric and hydraulic motors and operating controls.
 - (v) Bi-directional drive on the cutter wheel to control roll. Other measures such as adjustable fins and/or other means shall be used, as necessary.
 - (vi) Back loading cutting tools replacement.
 - (vii) Synchronized control of the excavated material volume with the advance rate of the machine to limit ground loss and/or heave during operation.
 - (viii) The overcut of the shield shall not exceed the value submitted with overcut details.
 - (ix) Tunnel face access to the cutterhead to permit man access for obstruction removal and tool maintenance.

- E29.9.2 Pipe Launching Equipment: Provide a pipe jacking system with the following features:
- (a) Main hydraulic cylinders mounted in a jacking frame located in the launching shaft used to push the TBM and pipe through the ground. Jacking frame shall be sufficiently anchored/braced to prevent any misalignment.
 - (b) Jacking system that successively pushes the TBM along with a string of connected pipes towards a receiving shaft.
 - (c) Sufficient jacking capacity to push the TBM and the pipe string between the shaft locations as identified on the Drawings.
 - (d) Hydraulic cylinder extension rates shall be synchronized with the excavation rate of the TBM and be compatible with the ground conditions.
 - (e) Uniform distribution of jacking forces on the end of the pipe by use of thrust ring and packers.
 - (f) Monitored hydraulic pressure and cylinder extension. The system shall have automatic shut off to prevent overstressing of the pipe being jacked.
- E29.9.3 Active Direction Control: Guidance systems that do not perform adequately shall be immediately replaced.
- (a) Provide an active direction control system that is fully compatible with the TBM; this system shall have the following features:
 - (i) Controls line and grade by a guidance system.
 - (ii) Equipped with a high intensity laser (maximum legal limit). The laser shall be securely mounted and protected from disturbance by personnel working within the launching shaft. When laser capacity is exceeded enhanced guidance systems shall be incorporated.
 - (iii) Capable of maintaining line and grade to the tolerances specified.
 - (iv) Provides active steering information that is monitored and transmitted to the operating console in real time. At a minimum, this information shall include location of the laser beam on the target and location of the cutter-head.
 - (v) Provides positioning and operation information to the operator on the control console.
 - (vi) Provides a reference laser, or other submitted device, that indicates visually in the launching shaft that the directional control laser has not been accidentally moved.
 - (vii) Provide ventilation to maintain temperature control within tunnel to minimize laser projection disturbance onto the target.
 - (b) Enhanced Guidance System:
 - (i) Furnish and operate an acceptable enhanced guidance system whenever the drive length exceeds the manufacturer rated capability of the laser guidance equipment or whenever the guidance system becomes unstable and cannot be seen clearly on the steering target, whichever condition is the more restrictive.
 - (ii) Any enhanced guidance system used shall be on-site, installed, tested, and in working order prior to implementation as verified in writing by authorized representative for systems manufacturer.
 - (iii) For enhanced guidance systems, provide complete manufacturer recommended system. Perform manual surveys in accordance with written recommendations of supplier not to exceed intervals of 30 m.
- E29.9.4 Slurry separation equipment for use with Slurry-MTBM: Provide a slurry separation system that is capable of the following:
- (a) Provide adequate separation of the muck from the slurry to maintain microtunnel operation with no suspension of activities due to issues with separation of fine contents such that the slurry has sediment content below the limits set by the submitted Work Plan and can be returned to the cutting face for reuse. Test sediment content daily. Use a mechanical separation plant, including scalping screens, shaker

screens, de-sanding and de-silting cones, and centrifuge as deemed necessary. Contain the muck at the site prior to disposal as submitted in the Work Plan.

- (b) Use the type of separation process suited to the size of the tunnel being constructed, the soil type being excavated, and the workspace available at each launching shaft location for operating the plant.
- (c) Carefully monitor the composition of the slurry to maintain the slurry weight, gel strength, and viscosity limits defined by the submitted Work Plan.

E29.9.5 Muck transport equipment for use with EPB-MTBM or rotary TBM: Provide a muck transport system that is capable of the following:

- (a) Transporting the muck throughout the tunnel length from the TBM up the shaft to the muck storage site.
- (b) The muck transport equipment shall accommodate the guidance system and not interfere with its operation.

E29.9.6 Safety Equipment: Provide all appropriate safety equipment as necessary and as required by all applicable Laws and Regulations.

E29.9.7 Structural Pipe Monitoring System: Any structural pipe monitoring system used shall be on-site, installed, tested, and in working order prior to implementation as verified in writing by authorized representative for systems manufacturer.

E29.10 Construction

E29.10.1 General

- (a) Limit ground movements to those specified in E22.
- (b) The Contractor is responsible for any additional requirements to include impacts to cost and schedule for operating in "hazardous gas" conditions to include monitoring, ventilating, operating in an explosion proof environment, if encountered.
- (c) Use equipment that is in proper working order without excessive equipment wear and/or malfunction history as defined herein.
- (d) Confine the tunnelling operations to the limits as shown on the Contract Drawings. Minimize impacts to surroundings.
- (e) Employ measures to reduce noise and vibrations to comply with applicable regulations and noise By-Laws.
- (f) Restore the site conditions in accordance with the Contract Documents.

E29.10.2 Preconstruction Meeting

- (a) The Contractor shall prepare and provide a presentation for the Pre-Construction meeting or for a mutually agreed upon separate meeting to review and discuss the following items with the Contract Administrator at a minimum of fifteen (15) Business Days prior to commencement of the tunnelling work. Provide handouts to go along with Contractor presentation.
 - (i) Scope of work to be performed.
 - (ii) Construction methods and constraints overview.
 - (iii) TBM operating parameters, equipment capabilities, condition assessment of equipment, and required support equipment.
 - (iv) Ground Conditions assumed including ground, groundwater, and hazardous gas conditions.
 - (v) Special measures for long drives.
 - (vi) Surveying equipment, methods, and techniques.
 - (vii) Guidance system, steering, mixed ground conditions, recovery to line and grade, field verification, and tolerances.
 - (viii) Settlement, mitigation measures, mixed ground conditions, and the potential for damage to structures and facilities.

- (ix) Pipe damage, packer cushions, lubrication, steering, and jacking forces.
- (x) Instrumentation program to include installation, monitoring, and reporting.
- (xi) Impacts to structures, buildings, and properties.
- (xii) Launch shaft sites as well as machine launching process to include layout of site, parking, and security measures.
- (xiii) Receiving shaft sites as well as machine receiving process.
- (xiv) Rescue pits, machine failures, and man-made and natural obstructions.
- (xv) Pipe materials, manufacturer, shipping, storage, handling, and installation.
- (xvi) Job site safety procedures.
- (xvii) Quality Control procedures and Quality Assurance measures.
- (xviii) Acceptance testing.
- (xix) Reporting requirements.
- (xx) Submittals drive schedule, and production.
- (xxi) Other issues as may be raised by either party.

E29.10.3 Launching and Receiving

- (a) Shafts: Construct the launching and receiving shafts for tunnelling in accordance with E27 and as specified on the Drawings.
- (b) Process: If the inflow of ground and/or groundwater exceeds the specified limit during the launching or receiving process or if the machine deviates from the alignment more than the specified limit for horizontal alignment and/or for vertical elevation during the launching and/or receiving process, do not begin a new drive until ground improvement, as defined herein, has been implemented at the break-out and break-in locations at each of the launching and receiving shafts for each of the subsequent drives.

E29.10.4 Work Area Preparation and Maintenance

- (a) In addition to the requirements specified in E22 the Contractor shall be responsible for the following:
 - (i) Means and methods: Select the means and methods in accordance with this specification.
 - (ii) Safety: Provide and maintain safety to include but not limited to construction personnel, the public, and adjacent property, whether public or private.
 - (iii) Clean working conditions: Remove muck, debris, equipment, and other material that is not required for operations. Pipe shall not be stored on any city streets unless given written permission by the Contract Administrator. Streets shall be kept clean at all times. Complaints shall be addressed to maintain appropriate community relations especially with respect to noise, dust, debris, parking, mowing, snow removal, and lighting to the fullest extent reasonable.
 - (iv) Organization: The construction equipment shall be organized to enable efficient operation at all times.
 - (v) Provide suitable oil and gas containment basins made of plastic lining and sandbags to ensure no loss of oil to drains, water courses, or ground contamination.
 - (vi) All equipment shall be maintained and kept in proper working order. All oil, hydraulic, or fuel leaks shall be repaired immediately. Any leak shall be cleaned up immediately and disposed of properly.
 - (vii) All lubricant and slurry spills shall be immediately contained, cleaned up, and disposed of properly.

E29.10.5 Installation

- (a) Prior to commencing any drive, The Contractor shall demonstrate that:
 - (i) The jacking loads can be safely maintained on the pipe using actual drive data.

- (ii) The guidance system(s) is functioning properly and meets the requirements, as specified herein, for the longer drive length.
 - (iii) The automatic lubrication system has performed successfully.
 - (iv) Any contingency measures that were implemented by the Contractor are working effectively.
- (b) Do not damage the product pipes during the installation process.
- (c) Establishing the Alignment: Contractor shall be responsible for adherence to the following requirements and conditions:
 - (i) Qualified surveyor for the Contractor shall perform all of the surveying and check baseline and benchmarks prior to any tunneling work and report any errors or discrepancies to the Contract Administrator.
 - (ii) Use the baseline and benchmarks shown on the Drawings to furnish and maintain reference control lines and grades for the sewer pipe construction. Use these lines and grades to establish the exact location of the pipeline excavation and structures.
 - (iii) Establishing and maintaining the accuracy of control work to included alignment and grade of the sewer pipe.
 - (iv) Establishing control points sufficiently far from the tunnel operation so as not to be affected by ground movement.
 - (v) Check the primary control for the tunnelling system against an above ground undisturbed reference at least once each week or not greater than 75 m intervals of pipeline being constructed.
 - (vi) Perform survey traverse as per reviewed submittals when implementing enhanced guidance systems.
- (d) Maintaining the Alignment: Contractor shall adhere to the following requirements and conditions:
 - (i) Pipe installation shall not vary by more than the allowable alignment deviations as specified herein.
 - (ii) Record the exact position of the TBM at 2.5m intervals or a minimum of once per pipe segment, whichever is more often, to ensure the alignment is within the specified tolerances. The tunnel guidance system may be used; however, select times to measure and record this information after the air temperatures have stabilized throughout the pipe to ensure accurate readings.
 - (iii) Immediately correct any misalignment. When the excavation is off of line or grade, return to the design line and/or grade over the remaining portion of the drive and at a rate of not more than that specified.
 - (iv) If alignment deviations are exceeded, Contractor shall pay all costs for correction (redesign, reconstruction, and re-inspection). If redesign is required, Contractor shall obtain the services of a Professional Engineer licensed in the Province of Manitoba for the redesign. The installed pipe must be capable of meeting the design flow. Plans showing the changes shall be submitted to the Contract Administrator for review.
 - (v) Perform a verification survey with a transit or total station of each of the installed pipe lengths from launching shaft to receiving shaft within 24 hours after the completion of the removal of the TBM. Document measured conformance to design line and grade of the pipe together with locations and deviation (distance and direction) of any out-of-tolerance locations.
- (e) Launch and Retrieval: The Contractor shall implement appropriate procedures and notify the Contract Administrator immediately upon implementation of any contingency plan.
- (f) Tunnelling Operations: Contractor shall read all of the reports listed in the Project Conditions before commencing tunnelling operations. A copy of each report contained in the Project Conditions shall be maintained in a secured location near the launch shaft. Contractor shall adhere to the following requirements and conditions:

- (i) Conduct tunnelling operations in accordance with applicable safety rules and regulations, and use methods that include due regard for safety of workers and protection for adjacent structures, utilities, and the public.
 - (ii) Monitor for hazardous gas conditions; if encountered, take appropriate steps to ventilate the work area.
 - (iii) Keep tunnel excavation within the rights-of-way indicated on the Drawings, within the lines and grades designated on the Drawings, and within the specified tolerances.
 - (iv) Equipment powered by combustible fuels shall be located at suitable distances from the shafts as per written instructions from the dedicated site safety representative. These instructions shall be made immediately available to the Contract Administrator upon request.
 - (v) Synchronize the rate of advance of the TBM with the rate of spoil removed to limit ground loss or heave.
 - (vi) Operate the tunnelling system within the operating parameters established in the specifications and accepted submittals.
 - (vii) Make the excavation of a minimum sufficient size to permit pipe installation by jacking in accordance with project conditions with allowance for injection of the lubricant.
 - (viii) Maintain an envelope of lubricant around the exterior of the pipe during jacking and excavation operation to minimize potential surface settlements as the ground squeezes into the annular space and to reduce the exterior friction acting against the pipe with the possibility of the pipe seizing in place.
 - (ix) Fluid jetting to advance the pipe is prohibited.
 - (x) If the pipe “freezes” and the TBM and/or pipeline are unable to be moved, a rescue pit may be allowed with the location subject to review and acceptance by the Contract Administrator. Rescue pit construction shall be performed as specified herein.
 - (xi) In the event a section of pipe is damaged during the jacking operation or joint failure occurs, as evidenced by visible groundwater inflow or other observations, use one of the following procedures to correct the damage at no additional cost:
 - ◆ Slightly damaged pipe that passes the specified leak acceptance testing and maintains pipe barrel and joint structural integrity may, if access is possible, be repaired in place with a method approved by the pipe supplier and if the proposed technique is accepted by the Contract Administrator. These actions shall be performed at the expense of the Contractor.
 - ◆ Severely damaged pipe, or pipe where joint failure is evident, shall be removed from the excavation by surface excavation, by jacking the damaged pipe through the excavation and removing it at the receiving shaft, or by sinking a rescue shaft and removing and replacing damaged pipe. Do not begin a new drive until structural pipe monitoring system is implemented on all remaining drives. These actions shall be performed at the expense of the Contractor.
 - (xii) Perform contact grouting of the annular space as required to fill annular space, reduce embedment loads, and control settlement.
- (g) Obstructions and Rescue Pits during Tunnelling:
- (i) Remove, clear, or otherwise make it possible for the tunnelling equipment and pipe to progress past or through objects in accordance with the submitted contingency plan.
 - (ii) The object blocking the forward motion of the TBM shall meet the definition of an obstruction and the following requirements shall be met:
 - ◆ Notify Contract Administrator immediately upon encountering an object that prevents the forward progress of the TBM.

- ◆ Proceed with removal of the object by means of obstruction removal procedures in accordance with the submitted contingency plan.
 - ◆ The Contract Administrator shall be provided access to document the obstruction. No excavation within 5 feet of the tunnelling equipment cutter wheel is to take place without the Contract Administrator being present.
 - ◆ The Contractor shall have on hand at all times and readily available: equipment, tools, materials, and labor appropriate for the effective and efficient work related to obstruction removal.
- (iii) The proposal of alternative methods for removing, clearing, or otherwise making it possible for the tunnelling equipment to progress past objects that do not allow for the visual observation and measurement of the nature of the object shall not be considered for additional payment.
- (h) Rescue pit:
- (i) If a rescue pit is requested, obtain written authorization from the Contract Administrator before beginning construction of this pit. Contractor's request shall include all necessary permits and approvals, minimize public inconvenience, and minimize impacting existing facilities. Additional ground monitoring instrumentation shall be required.
- E29.10.6 Noise Monitoring and Abatement
- (a) Comply with City of Winnipeg Neighbourhood Liveability By-law.
- E29.10.7 Disposal of Muck and Excess Material
- (a) Remove muck and excavated material from the project site and dispose of spoil as noted below.
 - (b) Locate and acquire a site for the legal disposal of muck and excess excavated material and dispose of same in accordance with all applicable laws and regulations.
- E29.10.8 Site Cleanup
- (a) Restore the site in accordance with the Contract Documents.
- E29.10.9 Settlement/Heave
- (a) Settlement/Heave: Ground deformations from tunnelling shall be in accordance with the requirements contained in E22.
- E29.10.10 Allowable Alignment Deviations and Return to Line and/or Grade
- (a) Horizontal (Line): Do not exceed more than 100 mm from that depicted on the Drawings at any point along the alignment.
 - (b) Elevation (Grade): Do not exceed more than 50 mm from that depicted on the Drawings at any point along the alignment.
 - (c) When the excavation is off of line or grade, return to the design line and/or grade over the remaining portion of the drive and at a rate of not more than 25 mm per 8 m.
- E29.10.11 Surveys
- (a) The qualified surveyor for the Contractor shall conduct all of the surveys required for the Work. The Contract Administrator will provide location coordinates shown on the Drawings within five (5) days' notice of request for these coordinates. Attend a survey coordination meeting and adhere to the schedule established at that meeting.
- E29.11 Measurement and Payment
- E29.11.1 Tunneling and Pipe Jacking
- (a) Construction of the pipe jacked installation of the sewer shall be measured on a linear metre basis and paid at the contract unit price of "Utilidor Construction" for the tunnel installed using this method. The price shall include all work described herein including, but not limited to Tunnelling, pipe, shafts, contact grouting, bedding, backfilling, surface reinstatement, and all appurtenances and miscellaneous materials.

- (i) Measurement for length of tunnel will be made horizontally at grade above the centreline of pipe through shafts from existing connection points to centre of manholes.
- (ii) Repair of damage to underground and surface structures due to surface subsidence and soil heaving caused by Tunnelling methods will be at own expense.
- (iii) Relocation of utilities to accommodate shaft construction or tunneling methodology shall be borne by the Contractor.
- (iv) Bedding and backfill will be incidental to "Utilidor Construction".
- (v) Surface restorations will be incidental to "Utilidor Construction".

E29.11.2 Tunnelling Shafts

- (a) Refer to Tunnelling Shafts in E27.

E30. REINFORCED CONCRETE PIPE FOR TRENCHLESS INSTALLATIONS

E30.1 Description

- (a) This Specification shall cover the minimum requirements for Reinforced Concrete Pipe (RCP) to be installed using trenchless methods, for the construction of utilidors.

E30.2 General

- (a) Prior to selecting RCP for installation, the Contractor shall take into account the properties of RCP, the means and methods that will be used to install the pipe, the specified leakage criteria as contained herein, and the ground and groundwater conditions in the GDR.
- (b) The Contractor is responsible for selecting an acceptable pipe material to be installed without damage to either the pipe or the pipe joints using equipment selected by the Contractor for use in the ground and groundwater conditions.
- (c) Designs for RCP shall be produced, signed and sealed by a Professional Engineer licenced to practice in the Province of Manitoba. The Contractor is responsible for the work produced by this engineer.
- (d) Contractor's Engineer shall evaluate the pipe design against all temporary load conditions due to handling, shipping, storage, transport, and trenchless installation. Design and furnish this pipe with additional strength, reinforcement, and wall thickness as necessary to withstand all temporary load conditions due to handling, shipping, storage, transport, and installation. The pipe shall be handled, shipped, stored, transported, and installed without damage.
- (e) Contractor's Engineer shall evaluate the joint design/configuration against all temporary load conditions due to handling, shipping, storage, transport, and trenchless installation as well as ensuring that the joints meet the specified leakage criteria after installation. Design and furnish joints in this pipe that meet the specified leakage criteria and that safely withstand all temporary loading conditions due to handling, shipping, storage, transport, and installation. The pipe shall be handled, shipped, stored, transported, and installed without damage to the joints, and upon installation, the specified leakage criteria shall be met. Furnish joint cushions that meet or exceed pipe manufacturer recommendations.

E30.3 Submittals

- E30.3.1 Submit RCP designs in accordance with Section 01 33 00 a minimum of ten (10) Business Days prior to manufacturing or shipping of the RCP, whichever should come first and no later than twenty (20) Business Days prior to commencement of tunnelling works. RCP designs shall include the following information and shall be sealed and signed by a Professional Engineer, registered in the Province of Manitoba and experienced in the design of RCP for tunnelling applications. RCP design submissions shall include the following:

- (a) Pipe thickness and reinforcing design computations including all specified design checks identified in E30.4. Designs to be provided for all pipe and specials required to complete the installation. Identify geotechnical design assumptions used;
- (b) Name and manufacturer of the RCP;
- (c) Material properties used for design. Include relevant historical and demonstration testing data to confirm material properties used in design;
- (d) Certification by Contractor's Engineer that the pipe is sufficient for installation, as indicated on the Drawings using trenchless installation methods as selected by Contractor for the ground and groundwater conditions;
- (e) Other information that may reasonably be required by the Contract Administrator to confirm the RCP design proposed conforms to the specified requirements and design intent.

E30.3.2 Submit the following Shop Drawings in accordance with Section 01 33 00 a minimum of ten (10) Business Days prior to commencement of pipe manufacturing or shipping, whichever should come first and no later than twenty (20) Business Days prior to commencement of tunnelling works: Shop Drawings shall contain the following minimum information:

- (a) Shop Drawings showing pipe construction details to include length, wall thickness, reinforcement, manufacturing tolerances, pipe joint design and configuration, allowable angular deflection, compression rings, specials, location of grout ports, and other pipe appurtenances. Show method for closure of ports.
- (b) Qualifications of the pipe manufacturer.
- (c) The pipe manufacturer shall certify that the ground and groundwater conditions as well as the installation methods, as selected by Contractor, have been reviewed prior to manufacturing the pipe.
- (d) Manufacturer literature stating the handling, shipping, storage, transport, and installation recommendations for the pipe.

E30.3.3 Submit Quality Control Records in accordance with ASTM C1417 and Section 01 33 00 within ten (10) Business Days of manufacturing or completion of testing. In addition to the requirements of ASTM C1417, submit the following:

- (a) Mill tests for reinforcing steel and steel joint components;
- (b) External joint bands conforming to ASTM A36;
- (c) Cement conforming to ASTM C150;
- (d) Aggregates conforming to ASTM A1064/1064M, and A615 as applicable;
- (e) Pipe conforming to ASTM C1417;
- (f) Pipe joints conforming to ASTM C443;
- (g) Submit pipe manufacturer's recordkeeping for maintaining quality control of the pipes during the fabrication and curing processes in accordance with Section 01 33 00, including but not limited to:
 - (i) Tracking methods;
 - (ii) Serial numbers;
 - (iii) Inspections;
 - (iv) Physical test results.
- (h) Submit pipe manufacturer's control measures and manufacturing tolerances for:
 - (i) Straightness of pipe;
 - (ii) Squareness of pipe ends;
 - (iii) Smoothness of outside surface;
 - (iv) Inside and Outside diameter of pipe;
 - (v) Circumferential Uniformity;
 - (vi) Roundness.

E30.3.4 Submit results from proof of design test(s) results in accordance with Section 01 33 00.

E30.3.5 Submit an affidavit of compliance in accordance with Section 01 33 00.

- (a) An affidavit of compliance signed by an officer of the pipe manufacturing company shall be provided stating that the pipe and fittings comply with this Specification and ASTM C1417.

E30.3.6 Submit a hydrostatic leakage testing plan in accordance with Section 01 33 00.

E30.4 Design of Reinforced Concrete Pipe

E30.4.1 RCP shall be designed using direct design methods in accordance with the latest edition of ASCE 27 meeting the following requirements. Pipe installed in open installations (if required) shall be designed in accordance with ASCE 15 assuming a minimum Type 2 SIDDD as shown on the Drawings:

- (a) Pipe shall be designed for the following minimum failure modes under both long term and temporary loads including handling, shipping, storage, transport, and installation of the sewer pipe in accordance with established practices, national standards, and the requirements as contained herein.
- (b) Pipe designs shall consider the following failure modes:
 - (i) Flexural strength
 - (ii) Crack control
 - (iii) Diagonal tension
 - (iv) Radial tension
- (c) Additional reinforcement, strength of pipe, wall thickness, and provisions for joints shall be designed by Contractor and furnished as necessary to ensure the adequacy of the pipe for all temporary load conditions.

E30.4.2 Jacking forces:

- (a) Assess and design the pipe for imparted axial forces due to the tunnelling operations in accordance with ASCE 27.
- (b) Imparted axial forces shall be evaluated based on the anticipated installation methods and the potential for eccentric loading. At a minimum, the following conditions shall be assessed:
 - (i) Full concentric contact;
 - (ii) Eccentric loading with full contact on bearing pad; and,
 - (iii) Additional checks if partial contact is anticipated.

E30.4.3 The pipe shall be additionally designed by the Contractor to safely withstand all anticipated temporary loads due to handling, shipping, storage, transport, and installation of the sewer pipe in accordance with ASCE 27 and the requirements contained herein. Also account for contact grouting of the pipe after trenchless operations have been completed.

E30.4.4 If this pipe material cannot be manufactured with sufficient strength and/or wall thickness to withstand all of the handling, shipping, storage, transport, and trenchless installation loads, then this product shall not be considered suitable for installation on this project by trenchless methods. Furthermore, if the joints lack sufficient strength to withstand all of the handling, shipping, storage, transport, and trenchless installation loads or if the joints lack sufficient water tightness to meet the specified leakage criteria after installation, then this product shall not be considered suitable for installation on this project by trenchless methods.

E30.5 Materials

E30.5.1 Reinforced Concrete Pipe

- (a) Reinforced Concrete Pipe shall be manufactured in accordance with ASTM C1417, ASCE 27, CW 2130 and the minimum requirements as contained herein. The more restrictive of these criteria shall apply.

- (b) Concrete Requirements:
 - (i) A minimum 28 day concrete compressive strength: 41.4 MPa.
 - (ii) Pozzolan shall conform to ASTM C618.
 - (iii) Type HS cement shall be used.
- (c) Reinforcement Requirements:
 - (i) Reinforcement for pipe intended for trenchless installations must take into account the potential for the pipe to rotate during installation. The design of stirrups and circumferential reinforcement must not result in a preferential installation orientation for the pipe unless appropriate controls are put in place, precluding rotation of the pipe during installation.
- (d) Joint Requirements:
 - (i) Pipe joints shall conform to ASTM C443.
 - (ii) If required for development of sufficient concrete area for jacking forces, a steel bell shall be used. The external steel bell shall not protrude past the outside of the pipe barrel.
 - (iii) For normal jacking pipe, a steel reinforcement band shall be used as per CW 2030.
- (e) Joint Bands:
 - (i) External joint bands shall conform to ASTM A36.
 - (ii) External joint bands shall meet the following dimensions:
 - ◆ Minimum width: 220 mm.
 - ◆ Minimum bell depth: 113 mm.
 - (iii) Steel bells shall be protected from corrosion with a minimum of 16 mils of epoxy, as per AWWA C210.
 - (iv) Steel bells may be fabricated from 316 Stainless Steel.
 - (v) Fusion bonded epoxy may be used as an alternative to a liquid epoxy for steel bells. Fusion bonded epoxy must conform to AWWA C213. The final minimum coating thickness shall be 16 mils.
 - (vi) Steel bells exposed to abrasive soils shall be additionally coated with sacrificial abrasion resistant overlay of a minimum of 0.75 mm (30 mil) polymer epoxy concrete or approved equal in accordance with B7.
- (f) Lubrication ports, at a minimum, shall be located every 10 m. Stagger ports at 12:00, 3:00, and 9:00 o'clock positions.
- (g) Dimensions:
 - (i) The pipes and joints shall be in accordance with the permissible variations contained in Appendix A of the ASCE 27, ASTM C361, and ASTM C1417 except as required below. The more restrictive of these criteria shall apply.
 - (ii) Pipe shall be supplied in nominal lengths. At least 90% of the total footage, excluding special order lengths, shall be furnished in nominal length sections.
 - (iii) The minimum wall thickness, measured at the bottom of the spigot gasket groove where the wall cross-section has been reduced, shall be determined from the maximum jacking loads.

E30.5.2 Quality Control

- (a) The pipe manufacturer shall be a company that specializes in the production of reinforced concrete jacking pipes with at least ten (10) continuous years manufacturing reinforced concrete jacking pipe.
- (b) Contractor's Engineer shall be a licensed Professional Engineer with registration in the Province of Manitoba having at least five (5) years of demonstrable experience in the design of reinforced concrete jacking pipe to include the various pipe joint assemblies used with jacking pipe.

- (c) Do not manufacture any pipe until all relevant submittals have been reviewed and accepted by the Contract Administrator. Mark all pipe at the place of manufacture in accordance with Appendix A of the ASCE 27 and ASTM C1417. Place serial numbers on the pipe for unique identification.
- (d) Inspect pipe as it is delivered from manufacturer. Immediately reject any pipe that has not been properly marked, shipped, or handled in accordance with the reviewed submittals or that does not meet the requirements as contained herein.
- (e) Allow Contract Administrator access to inspect the shipping, handling, storage, transport, and installation of each pipe.
- (f) Testing:
 - (i) Pipes shall be tested in accordance with ASTM C1417. The compressive strength of the concrete shall be tested in accordance with ASTM C39. Evaluate the properties of the pipe using ASTM C1417. Provide the results of this testing.
 - (ii) Pipe joints shall be tested in accordance with ASTM C443. Provide the results of this testing.
 - (iii) In addition to testing required by ASTM C1417, a proof of design tests shall be undertaken for each class of pipe produced for the project. The proof of design tests shall consist of testing a minimum of five (5) pipes per class of pipe to ultimate failure in a three edge bearing test machine in accordance with ASTM C497. The tests shall be performed in the presence of the Contract Administrator. The pipe supplier shall provide a minimum of ten (10) Business Days advance notice to the Contract Administrator prior to undertaking the proof of design testing. The pipe supplier shall endeavour to maximize the number of proof of design tests to be undertaken on one occasion in order to limit the number of visits to the plant by the Contract Administrator.
- (g) Plant Inspections:
 - (i) The Contractor shall afford the Contract Administrator every facility to access and inspect all plant to be provided, work to be performed, materials to be supplied and equipment or machinery to be installed.
 - (ii) Provide notice a minimum of ten (10) Business Days prior to manufacturing of pipe.

E30.6 Construction

E30.6.1 Packaging, Handling, Shipping, Storage and Site Transport

- (a) Packaging, handling, shipping, storage, and site transport shall be done in accordance with the manufacturer's instructions and reviewed submittals. Do not ship until the pipe is marked in accordance with the requirements as contained herein. The pipes must be stored in accordance with reviewed submittals.
- (b) Care shall be exercised in handling, storing, transporting and placing pipe to prevent damage. No interior hooks or slings shall be used in lifting pipe. All handling operations shall be done with an exterior sling or other device acceptable to the Contract Administrator.
- (c) All rubber gaskets shall be stored in as cool a place as practicable, preferably at 20°C or less, and in no case shall the rubber gaskets be exposed to the direct rays of the sun for more than 72 hours.

E30.6.2 Installation

- (a) The installation of pipe and fittings shall be the responsibility of Contractor in accordance with the minimum requirements as established in the project plans, specifications, pipe manufacturer's recommendations, and reviewed submittals. Do not damage pipe or pipe joints.
- (b) Installation of pipe using open cut methods shall conform to the CW2130 and ASTM C1479 Type 2 installation except as modified herein:

- (i) Pipe which may be installed by open cut methods is limited to pipes protruding from the jacking or receiving shafts.
- (ii) The pipe shall be laid and fitted together so that when complete, the pipe will have a smooth and uniform invert. The trench shall be free of water while the pipe is being installed. The excavation of the trench shall be fully completed a sufficient distance in advance so as not to interfere with the laying of the pipe.
- (iii) Once the pipe is placed, the bedding layer shall be compacted (except the middle third). Subsequent layers shall then be placed and compacted to meet the installation requirements.
- (iv) Selection, placement and compaction of bedding materials shall conform to ASTM C1479, and the Construction Drawings. The Contractor shall ensure that disturbance of the pipe or damage to the pipe coating does not occur during sand bedding and backfilling operations.

E30.6.3 Pipe Handling

- (a) Use methods in accordance with reviewed submittals and requirements as contained herein.

E30.6.4 Pipe Jointing

- (a) Inspect pipe end, gasket, and sealing surfaces for damages.
- (b) Clean ends of pipe and joint components.
- (c) Apply joint lubricant to the bell interior surface and the rubber seals. Use only lubricants approved by the pipe manufacturer.
- (d) Use suitable equipment and end protection to push the pipes together.
- (e) Do not exceed forces as recommended by the manufacturer for joining or pushing the pipe.

E30.6.5 CCTV Inspection

- (a) CCTV Inspection is not required.

E30.7 Measurement and Payment

E30.7.1 Reinforced Concrete Pipe for Trenchless Installations

- (a) 2440 mm Reinforced Concrete Pipe Utilidor:
 - (i) Supply and installation of 2440 mm RCP and all other labour and materials required to complete the work as specified herein will be considered incidental to "Utilidor Construction" and will not be measured for payment.

E31. EARTHWORKS

E31.1 Description

- (a) This specification shall supplement CW 3110.
- (b) Work includes stripping of topsoil, topsoil stockpiling, subgrade compaction and proof rolling, ditch excavation, embankment construction, hauling, placing and compacting suitable excess trench material, and borrow excavation from designated borrow areas.

E31.2 Definitions

- (a) Classes of excavation are defined as:
 - (i) Borrow Excavation: material obtained from designated borrow area and required for construction of embankments or for other portions of work. Free haul distance for borrow excavation will include all fill and embankment areas in Parcel B. Overhaul will include material excavated from the borrow area on Parcel B and placed in Parcel C.
 - (ii) Common Excavation: – material excavated and re-used upon the site in embankments or designated waste areas.

- (iii) Ditch Excavation – material excavated to construct new ditches where the excavation site is not directly adjacent to earthwork embankment works.
- (iv) Excavation – Disposal at Licensed Waste Disposal Grounds.
- (v) Topsoil Excavation – Stripping and stockpiling: – topsoil excavation and disposal in designated areas on site.

E31.3 Products

- (a) Suitable site embankment material as per CW 3110.

E31.4 Execution

- (a) Strip topsoil from roadway, site pad, designated borrow area, and ditches in accordance with CW 3170. Stockpile in area designated and in temporary stockpile for reuse in topsoiling road, embankment, and ditch side slopes. Stockpiled topsoil in designated areas shall be trimmed and finish graded to a height note exceeding 1.5 m with side slopes from 6: 1 to 8:1.
- (b) Provide all dewatering necessary for excavation of borrow pit.
- (c) Excavate borrow pit for the full width of the designated area to a consistent depth to obtain the required volume needed for site fills and embankments.
- (d) Subgrade preparation and placement of embankment materials as per CW 3110 and 3170.
- (e) Place and grade suitable site topsoil on ditches, road and embankment slopes to a uniform thickness of 100 mm in preparation for hydroseeding.

E31.5 Measurement and Payment

- (a) Stripping and Stockpiling Topsoil:
 - (i) Stripping and stockpiling topsoil will be measured on a volume basis and paid for at the contract unit price per cubic metre for Stripping and Stockpiling Topsoil. The volume to be paid for shall be the total number of cubic metres that are excavated in accordance with this Specification acceptable to the Contract Administrator, as computed from measurements made by the Contract Administrator. No payment will be made for material removed outside the limits of excavation.
- (b) Placement of Suitable Site Topsoil:
 - (i) Placement of suitable site topsoil will be measured on a volume basis, as computed from area measurements made by the Contract Administrator multiplied by the specified thickness of topsoil placement. Payment shall be made at the Contract Unit Price per cubic metre for Placement of Suitable Site Topsoil.
 - (ii) The volume to be paid for shall be the total number of cubic metres that are placed and graded in accordance with this Specification acceptable to the Contract Administrator.
- (c) Excavation:
 - (i) With the exception of Excavation - Disposal at Licensed Waste Disposal Grounds, excavation will be measured on a volume basis. The volume to be paid for shall be the total number of cubic metres of each class of excavation that are excavated in accordance with this Specification acceptable to the Contract Administrator, as computed from measurements made by the Contract Administrator. No payment will be made for material removed outside the limits of excavation.
 - (ii) The volume of excavation shall be as measured in its original position, and as determined by the method of Average End Areas.
 - (iii) Excavation - Disposal at Licensed Waste Disposal Grounds will be measured and paid for on a weight basis. The total weight to be paid for will be determined from the summation of weigh scale tickets at the disposal site. The Contractor shall submit tickets daily and ticket shall indicate as a minimum, date of weighing, truck number, gross weight, tare weight and net weight.
 - (iv) Payment classes for excavation are:
 - (i) Common Excavation,

- (ii) Borrow Excavation - Free Haul,
 - (iii) Borrow Excavation - Overhaul,
 - (iv) Ditch Excavation,
 - (v) Excavation - Disposal at Licensed Waste Disposal Grounds.
- (d) Embankment:
- (i) Embankment fill material will be measured and paid for as specified in CW 3170 for "Suitable Site Material", or "Clay Borrow Material".
 - (ii) Suitable fill material from Ditch Excavation or excess trench material will be classed as "Clay Borrow Material" when used in embankment construction.
 - (iii) Embankment material will also include materials placed and compacted to CW3170 requirement to backfill excavations made for removal of impacted soils.

E32. CHAIN LINK FENCE

E32.1 Description

- (a) This specification shall supplement CW 3550.
- (b) This specification shall include all operations related to supply and installation of new chain link fence and chain link fencing gates and parking fences. For electrical work on parking fences refer to Division 26.
- (c) The Work to be done by the Contractor under this Section 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 the Work as hereinafter specified.

E32.2 Materials

- (a) Fencing:
 - (i) Chain link fence and chain link fence gates to be supplied in accordance with CW 3550 and the drawings (drawings take precedence over CW 3550).
 - (ii) Further to CW 3550, bottom rails shall not be used.
 - (iii) Further to CW 3550, braces shall be used for corner and terminal posts as specified on the drawings.
 - (iv) Tracks and rollers for chain link fence gates shall be suited to the weight of the gate.
 - (v) Gates shall have end catches where the two gate sections meet, barbed wire with supports to the same height as adjacent fence and upper support rollers at terminal fence posts.
 - (vi) Pressure treated lumber as noted on the drawings.
- (b) Contractor to provide shop drawings for approval prior to manufacture. Gate weights shall be provided on shop drawing submittals.

E32.3 Execution

- (a) Post Installations:
 - (i) All posts shall be installed 3.05 m on centre by direct drive method and spacing may be adjusted for up to five fence sections.
 - (ii) Posts shall be plumbed and set to give correct alignment. Bending of posts to give correct alignment is not acceptable.
- (b) Chain Link Fence:
 - (i) Install new chain link fence and chain link fence gates to the limits shown on the drawings in accordance with CW 3550 and details shown on the drawings.

E32.4 Measurement And Payment

- (a) Chain Link Fence:

- (i) Chain Link Fencing will be measured for payment on a length basis and paid for at the Contract Unit Price per metre for "Chain Link Fence, XX m Height" which price shall be payment in full for supplying all materials and for completing all operations herein described and all other items incidental to the Work included in this Specification, accepted and measured by the Contract Administrator.
- (ii) Chain Link Fencing Gates will be measured for payment on a unit basis for each type and span of gate and paid for at the Contract Unit Price per metre for "Chain Link Fencing Gates" which price shall be payment in full for supplying all materials and for completing all operations herein described and all other items incidental to the Work included in this Specification, accepted and measured by the Contract Administrator.
- (iii) Cast-in-place concrete pile foundations for gates shall be considered incidental to the gates.

E33. INSTALLATION OF STRAW WATTLES

E33.1 Description

- (a) Straw wattles are required to be installed as erosion control measures to mitigate any deleterious materials from entering existing ditch systems.

E33.2 Materials

- (a) The straw wattles shall be Stenlog or other biodegradable straw wattles.

E33.3 Construction Methods

- (a) As directed by the Contract Administrator, install 300 millimetre Stenlog or other straw wattle sediment control material in accordance with the manufacturer's specifications in seeded areas to mitigate any deleterious materials from entering the ditch system adjacent to the site.
- (b) Install straw wattles so that no gaps exist between the soil and the bottom of the wattle, and the ends of adjacent wattles are overlapped 150 millimetres minimum to prevent water and sediment passing. Achieve a tight seal between the wattle segments.
- (c) Dogleg terminal ends of straw wattle up the slope to prevent channelling of sedimentation.
- (d) Use 600 millimetres wooden stakes to fasten straw wattle to the soil. Place stakes on each side of the straw wattle, lying across the natural fibre twine, spaced 1200 millimetres on center.
- (e) Leave 30 to 50 millimetres of wood stake exposed above the wattle.
- (f) Avoid damage to wattles. Damaged areas of wattles should be cut and tied off, then treated as terminal ends.
- (g) At the direction of the Contract Administrator, the straw wattles shall be removed after seeding has established and before the end of the warranty period.

E33.4 Measurement and Payment

- (a) Installation of straw wattles will be considered incidental to the Contract and no separate measurement for payment will be made.

E34. HYDRO SEEDING

E34.1 Description

- (a) General:
 - (i) Further to CW 3520 and CW 3540, this specification covers supply and placement of topsoil and seed.
- (b) Reference Standard Construction Specifications:
 - (i) CW 3520 Seeding

(ii) CW3540 Topsoil and Finish Grading for Establishment of Turf Areas

E34.2 Materials

- (a) Topsoil:
 - (i) Topsoil that is stripped and stockpiled in accordance with CW 3110 shall be utilized for areas to be seeded. Topsoil shall be imported only if the volume of stockpiled topsoil is insufficient to cover all areas to be seeded.
- (b) Fertilizer:
 - (i) A complete synthetic starter fertilizer with an N-P-K analysis of 8-32-16 shall be placed at a rate recommended by the manufacturer.
- (c) Grass Seed:
 - (i) Two seed mixtures, defined below, shall be spread on this site.
 - (ii) Mix 1 shall be 40% Fulfs Alkaligrass, 30% Walsh Western Wheatgrass, 20% Aberdeen Creeping Red Fescue, 10% Perennial Rye.
 - (iii) Mix 2 shall be 25% Tall Fescue, 25% Slender Wheatgrass, 20% Tall Wheatgrass, 10% Alfalfa, 10% Dahurian Wild Rye, 10% Sweet Clover.
- (d) Hydro Mulch:
 - (i) Hydro mulch shall be a cellulose fibre product.

E34.3 Construction Methods

- (a) Do not perform work during inclement weather conditions or under adverse field conditions such as frozen ground or ground covered with snow, ice, or standing water.
- (b) The synthetic fertilizer shall be placed via a drop spreader on the areas at a rate defined by the manufacturer and incorporated into the upper 50 mm of the topsoil.
- (c) Two seed mixtures, defined above, shall be spread on this site. Mix 1 shall be seeded on the roadside to the base through the median and along the roadside to the base of the ditches. Mix 2 shall be seeded on the backslope of the ditches, the north side of the north ditch and the south side of the south ditch.
- (d) Water all areas prior to application of the hydro mulch. Seed bed should be moist to maintain seed germination and grass growth.
- (e) Further to CW 3520, the established turf area shall be mowed at regular intervals to a height of 50-60 mm. To ensure seedling vigour and limit damage to the leaf tissue, only sharp mower blades shall be used.

E34.4 Measurement and Payment

- (a) Hydro Seeding will be measured and paid for in accordance with City of Winnipeg Standard Construction Specification CW 3520 for Hydro Seeding.

E35. MAN GATE HARDWARE

E35.1 Description

- (a) Man Gate shall be supplied with fully functioning actuated egress panic bar with electric strike for external exposure, commercial grade, snow-resistant weatherized exit device.
- (b) Power gate activation device on the east side of the Man Gate as follows:
 - (i) Contractor to provide Model HOOD-CS-4.5x8 pedestal head or approved equal. Nominal 115 mm wide x 200 mm high x 76 mm deep polyester powder coated steel pedestal head secured to gate post.
 - (ii) Contractor to provide gate activation device: Model CM-550SK as manufactured by Camden Door Controls or approved equal.
- (c) Contractor supplied and installed Egress Panic bar and actuator to be SARGEANT ASSA ABLOY panic bar or approved equal:
 - (i) HC-PE8800 series in 32D finish.

- (ii) Electric Strike: Weather resistant, fail safe open when power supply off.
- (iii) 24 volt control system power supply cabinet to be mounted into supplementary NEMA 3R enclosure. Secure supplementary NEMA 3R enclosure adjacent to person gate.

E36. CASH ALLOWANCE FOR ADDITIONAL WORK

- E36.1 Additional Work may be necessitated due to unforeseen circumstances that may arise during the course of the project due to:
- (a) Additions to the scope of Work by the Contract Administrator, beyond that defined herein.
- E36.2 A cash allowance has been included on Form B: Prices.
- E36.3 The City reserves the right to delete any or all of the Cash Allowance from the Contract if the Work intended to be covered by the Cash Allowance is not required, or if the Works intended are found to be more extensive than the provisional Cash Allowance.
- E36.4 Cost of additional work shall be evaluated by the methods outlined in C7.4, and a Change Order prepared by the Contract Administrator. Cost of the Change Order will be paid on the Progress Estimate and deducted from the Cash Allowance. If the valuation of the authorized work exceeds the Value of the Cash Allowance, the Contract Value will be adjusted by the shortfall.
- E36.5 Additional services and/or Work will not be initiated for:
- (a) Reasons of lack of performance or errors in execution.
 - (b) Scheduling changes initiated by the City, where at least 24 hours' notice is given prior to the Contractors schedule time to be on Site.
- E36.6 Should it be determined that additional material or services are required, the Contract Administrator shall approve the Work, prior to commencement of the additional Work.
- E36.7 Material Mark-Up Factors in accordance with C7:
- (a) The base cost is to be the wholesale cost of the material, regardless of the Contractor or Subcontractor supplying the material.
 - (b) In general, the party (Contractor or Subcontractor) supplying the material is the party that purchases the material from a supplier who does not perform any work on Site, unless otherwise determined by the Contract Administrator.
 - (c) Where the Contractor is supplying the material, the mark-up on the material is limited to fifteen percent (15%).
 - (d) Where the Contractor's immediate Subcontractor is supplying the material the total mark-up on the material including all Subcontractors and the Contractor is limited to twenty-five percent (25%):
 - (i) The Subcontractor's mark-up on the material is limited to fifteen percent (15%);
 - (ii) The Contractor's mark-up on the material is limited to ten percent (10%).
 - (e) A Third-Level Subcontractor is a Subcontractor of a Subcontractor of the Contractor.
 - (i) No Third-Level Subcontractors on this project are approved for additional mark-up.
- E36.8 In the event that a Third-Level Subcontractor is utilized, that is not approved for additional mark-up, the Contractor is responsible for coordinating the split of the maximum approved mark-up between the Contractor and Subcontractors.

PART F - SECURITY CLEARANCE

F1. SECURITY CLEARANCE

- F1.1 Each individual proposed to perform the following portions of the Work:

- (a) any Work on private property;
 - (b) any Work within City facilities other than:
 - (i) an underground structure such as a manhole;
 - (ii) in areas and at times normally open to the public;
 - (c) communicating with residents and homeowners in person or by telephone;
- F1.1.1 Each Individual shall be required to obtain a Police Information Check from the police service having jurisdiction at their place of residence. Or
- (a) Sterling BackCheck – for existing account holders, log into your account to send individual invitations to employees requiring security clearance. For those that do not have an account, click on the following link to open an account:
<https://forms.sterlingbackcheck.com/partners/platform2-en.php?&partner=winnipegcity>; or
 - (b) Commissionaires (Manitoba Division), forms to be completed can be found on the website at: <https://www.commissionaires.ca/en/manitoba/home>; or
 - (c) FASTCHECK Criminal Record & Fingerprint Specialists, forms to be completed can be found on the website at: <https://myfastcheck.com>
- F1.2 Prior to the award of Contact, and during the term of the Contract if additional or replacement individuals are proposed to perform Work, the Contractor shall supply the Contract Administrator with a Police Information Check obtained not earlier than one (1) year prior to the Submission Deadline, or a certified true copy thereof, for each individual proposed to perform such Work.
- F1.3 Any individual for whom a Police Information Check is not provided, or for whom a Police Information Check indicates any convictions or pending charges related to property offences or crimes against another person will not be permitted to perform any Work specified in F1.1.
- F1.4 Any Police Information Check obtained thereby will be deemed valid for the duration of the Contract subject to a repeated records search as hereinafter specified.
- F1.5 Notwithstanding the foregoing, at any time during the term of the Contract, the City may, at their sole discretion and acting reasonably, require an updated Police Information Check. Any individual who fails to provide a satisfactory Police Information Check as a result of a repeated Police Information Check will not be permitted to continue to perform any Work specified in F1.1.