



THE CITY OF WINNIPEG

TENDER

TENDER NO. 324-2021

2021 SEWER RENEWALS BY CIPP LINING – CONTRACT 2

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PART B - BIDDING PROCEDURES

B1. CONTRACT TITLE

B1.1 2021 SEWER RENEWALS BY CIPP LINING – CONTRACT 2

B2. SUBMISSION DEADLINE

B2.1 The Submission Deadline is 12:00 noon Winnipeg time, June 3, 2021.

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

B3. SITE INVESTIGATION

B3.1 Further to C3.1, the Bidder may view the Site without making an appointment.

B3.2 The Bidder is advised that video inspections of all sewers (and manholes where available) included in this contract are available from the Contract Administrator. The corresponding inspection condition coding reports are also available.

B4. ENQUIRIES

B4.1 All enquiries shall be directed to the Contract Administrator identified in D5.1.

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 he/she has 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 D5.

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;
- (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 his/her 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 he/she wishes 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 his/her 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;
 - (c) Form G1: Bid Bond and Agreement to Bond.
- B8.2 Further to B8.1, the Bidder should include the written correspondence from the Contract Administrator approving a substitute in accordance with B7.
- B8.3 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.
- B8.4 The Bid shall be submitted electronically through MERX at www.merx.com.
- B8.4.1 Bids will **only** be accepted electronically through MERX.
- B8.5 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 his/her own name, his/her name shall be inserted;
 - (b) if the Bidder is a partnership, the full name of the partnership shall be inserted;
 - (c) if the Bidder is a corporation, the full name of the corporation shall be inserted;
 - (d) if the Bidder is carrying on business under a name other than his/her 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 his/her own name, it shall be signed by the Bidder;
 - (b) if the Bidder is a partnership, it shall be signed by the partner or partners who have authority to sign for the partnership;
 - (c) if the Bidder is a corporation, it shall be signed by its duly authorized officer or officers;
 - (d) if the Bidder is carrying on business under a name other than his/her 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.
- B10.1.1 Notwithstanding C12.2.3(c), prices on Form B: Prices shall not include the Manitoba Retail Sales Tax (MRST, also known as PST), which shall be extra where applicable.
- B10.1.2 Prices stated on Form B: Prices shall not include any costs which may be incurred by the Contractor with respect to any applicable funding agreement obligations as outlined in D29. Any such costs shall be determined in accordance with D29.
- 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 its 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 its 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 its 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 its 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 its 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 its sole discretion:

- (a) disqualify a Bidder that fails to disclose a perceived, potential or actual Conflict of Interest of the Bidder or any of its 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 its 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 its 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 its 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.

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, Materials Management 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);
- (d) upon request of the Contract Administrator, provide the Security Clearances in accordance with PART F - ;
- (e) utilize only CIPP suppliers and installers pre-approved under the City of Winnipeg "Request for Qualifications for the Supply and Installation of Cured-in-Place Pipe (CIPP), Bid Opportunity No. 403-2007"

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, Materials Management Division website at <http://www.winnipeg.ca/matmgt/>).

B13.5 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.

B13.6 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.

B14. BID SECURITY

B14.1 The Bidder shall include in its 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, Materials Management Division website at <https://www.winnipeg.ca/MatMgt/templates/files/eBidsecurity.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 his/her 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 his/her Bid or in other information required to be submitted, that he/she is 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.
- 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 its own forces;
 - (d) only one Bid is received; or
 - (e) in the judgment of the Award Authority, the interests of the City would best be served by not awarding a Contract.
- B19.3 If funding for the Work is provided to the City of Winnipeg by the Government of Manitoba and/or the Government of Canada, Bidders are advised that the terms of D29 shall immediately take effect upon confirmation of such funding, regardless of when funding is confirmed.
- B19.4 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.
- B19.4.1 Following the award of contract, a Bidder will be provided with information related to the evaluation of his/her 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, Materials Management 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 sewer rehabilitation by installation of CIPP liners and related work.

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

- (a) Mobilization to the Site;
- (b) Sewer cleaning and CCTV video inspection;
- (c) Internal sewer preparation;
- (d) Manhole repairs and modifications;
- (e) Flow control (sewer and sewer services);
- (f) Full segment lining by CIPP, and
- (g) Surface restoration, site clean-up and demobilization

D4. DEFINITIONS

D4.1 When used in this Tender:

- (a) "**ACI**" means American Concrete Institute;
- (b) "**ASTM**" means American Society for Testing and Materials;
- (c) "**AWWA**" means American Water Works Association;
- (d) "**CIPP**" means Cured In Place Pipe;
- (e) "**CIPP Supplier and Installer**" means only the Suppliers and Installers that were pre-approved under the City of Winnipeg "Request for Qualifications for Supply and Installation of Cured-in-Place-Pipe (CIPP), Bid Opportunity No. 403-2007" shall be approved for the 2009 sewer lining projects in the City of Winnipeg;
- (f) "**CPR**" means Canadian Pacific Railway;
- (g) "**CSA**" means Canadian Standards Association;
- (h) "**External Point Repair (EPR)**" means a partial segment sewer repair installed by traditional excavation methods at an intermediate point between existing manholes;
- (i) "**Fully Deteriorated (FD)**" means the host pipe is not structurally sound and cannot support soil and live loads or is expected to reach this condition over the design life of the rehabilitated pipe. Liners for fully deteriorated pipes shall be designed to support all overburden loads, including: soil, live, external hydrostatic pressure and internal pressure.
- (j) "**Host Pipe**" means the existing sewer intended for rehabilitation through the installation and curing of a CIPP liner;

- (k) “**IGN**” means Information and Guidance Notes;
- (l) “**ISO**” means International Organization for Standardization;
- (m) “**Partially Deteriorated (PD)**” means the host pipe can support the soil and surcharge loads throughout the design life of the rehabilitated pipe. Liners for partially deteriorated pipes are shall be designed to account for internal and external hydrostatic pressure only; and
- (n) “**Structural Performance Grade (SPG)**” means a grade of 1 to 5 manually assigned to sewer and manhole assets to reflect the likelihood of failure.
- (o) “**Trenchless Point Repair (TPR)**” means a partial segment CIPP liner installed at an intermediate point between existing manholes;

D5. CONTRACT ADMINISTRATOR

D5.1 The Contract Administrator is AECOM, represented by:

Nathan Kehler, P.Eng.
Municipal Engineer

Telephone No. 204 928 7436

Email Address Nathan.kehler@aecom.com

D5.2 At the pre-construction meeting, Mr. Kehler will identify additional personnel representing the Contract Administrator and their respective roles and responsibilities for the Work.

D6. CONTRACTOR'S SUPERVISOR

D6.1 At the pre-construction meeting, the Contractor shall identify his/her designated supervisor and any additional personnel representing the Contractor and their respective roles and responsibilities for the Work.

D7. NOTICES

D7.1 Except as provided for in C22.4, all notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications to the Contractor shall be sent to the address or facsimile number identified by the Contractor in Paragraph 2 of Form A: Bid/Proposal.

D7.2 All notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications to the City, except as expressly otherwise required in D7.3 or elsewhere in the Contract, shall be sent to the attention of the Contract Administrator identified in D5.

D7.3 All notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications required to be submitted or returned to the City Solicitor shall be sent to the following facsimile number:

The City of Winnipeg
Legal Services Department
Attn: Director of Legal Services
Facsimile No.: 204 947-9155

D8. FURNISHING OF DOCUMENTS

D8.1 Upon award of the Contract, the Contractor will be provided with 'issued for construction' Contract Documents electronically, including Drawings in PDF formal only.

SUBMISSIONS

D9. AUTHORITY TO CARRY ON BUSINESS

D9.1 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.

D10. SAFE WORK PLAN

D10.1 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.

D10.2 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, Materials Management Division website at <http://www.winnipeg.ca/matmgt/Safety/default.stm>

D10.3 Notwithstanding B13.4 at any time during the term of the Contract, the City may, at its 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.

D11. INSURANCE

D11.1 The Contractor shall provide and maintain the following insurance coverage:

- (a) commercial general liability insurance, in the amount of at least two million dollars (\$2,000,000.00) inclusive, with The City of Winnipeg added as an additional insured, with a cross-liability clause, such liability policy to also contain contractual liability, unlicensed motor vehicle liability, non-owned automobile liability and products and completed operations, to remain in place at all times during the performance of the Work and throughout the warranty period;
- (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) all risks course of construction insurance in the amount of one hundred percent (100%) of the total Contract Price, written in the name of the Contractor and The City of Winnipeg, at all times during the performance of the Work and until the date of Total Performance.

D11.2 Deductibles shall be borne by the Contractor.

D11.3 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.

D11.4 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.

D12. CONTRACT SECURITY

- D12.1 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.
- D12.1.1 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 D12.1(b).
- D12.1.2 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 its discretion, exercised reasonably, allows.
- D12.1.3 Digital bonds passing the verification process will be treated as original and authentic.
- D12.2 The Contractor shall provide the City Solicitor 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.
- D12.3 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 D12.1(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.

D13. SUBCONTRACTOR LIST

- D13.1 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.

D14. EQUIPMENT LIST

D14.1 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.

D15. DETAILED WORK SCHEDULE

D15.1 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.

D15.2 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;
- all acceptable to the Contract Administrator.

D15.3 Further to D15.2(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) Mobilization(s) to site;
- (b) Sewer cleaning, prep work, and pre-lining inspection;
- (c) Sewer measurements and confirmation of design conditions;
- (d) Installation of CIPP liners;
- (e) Restoration, and
- (f) Planned breaks in the performed work pursuant to D17.7

D15.4 The Contractor shall provide an updated detailed work schedule at least once per month or within two (2) Business Days of a request by the Contract Administrator.

D15.5 Further to D15.2(b), the Gantt chart shall show the time on a weekly basis, required to carry out the Work of each trade, or specification division. The time shall be on the horizontal axis, and the type of trade shall be on the vertical axis.

SCHEDULE OF WORK

D16. COMMENCEMENT

D16.1 The Contractor shall not commence any Work until he/she is in receipt of an award letter from the Award Authority authorizing the commencement of the Work.

D16.2 The Contractor shall not commence any Work on the Site until:

- (a) the Contract Administrator has confirmed receipt and approval of:
 - (i) evidence of authority to carry on business specified in D9;
 - (ii) evidence of the workers compensation coverage specified in C6.15;
 - (iii) the Safe Work Plan specified in D10;
 - (iv) evidence of the insurance specified in D11;
 - (v) the contract security specified in D12;
 - (vi) the Subcontractor list specified in D13;
 - (vii) the equipment list specified in D14; and
 - (viii) the detailed work schedule specified in D15.

- (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.
- (c) The Contractor shall not commence CIPP lining on those assets with identified EPRs or TPRs until the specified sewer repairs shown on Drawings are completed.

D16.3 The City intends to award this Contract by July 8, 2021.

D16.3.1 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.

D17. WORKING DAYS

D17.1 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.

D17.2 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.

D17.3 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.

D17.4 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.

D17.5 Notwithstanding C1.1(tt), if the Contractor chooses to work on a Saturday, Sunday, or statutory or civic holiday and is able to complete at least seven (7) hours of work during the period between 7:00 a.m. Winnipeg time or the time the Contractor's operations normally commence, whichever is earlier, and 7:00 p.m. Winnipeg time the day shall be considered a Working Day.

D17.6 Working Days shall be incurred by the Contractor for every Working Day as defined herein. Working Days shall be incurred starting on the date the Contractor commences Work on Site, or the date of commencement identified on the Contractors submitted schedule (D14), whichever occurs first.

D17.7 Planned Breaks in Construction

- (a) The Contractor will be permitted planned suspensions of on-site construction to facilitate crew breaks and seasonal weather breaks where contract work is not completed. Working Days will not be incurred during these periods.
- (b) All planned breaks in on-site construction activity must be clearly identified in the Contractors detailed construction schedule (D14) and notice must be provided in writing a minimum of two (2) Business Days prior to the planned suspension of work. Failure of the Contractor to provide adequate notice, in the opinion of the Contract Administrator, may result in Working Days being incurred.
- (c) During these periods, the Site must be made secure, roadways completely operational, and all existing facilities and work in progress be protected from weather or other potentially harmful effects.
- (d) Upon recommencement of site activities after long breaks (greater than 1 month), the Contractor shall provide an updated schedule and notification to the Contract Administrator a minimum of five (5) Business Days prior to recommencement of work.

- (e) No changes to the Contract completion dates resulting from suspension of contract time as described herein will be considered

D17.8 No additional costs associated with demobilization and remobilization resulting from suspension of contract time will be considered.

D18. CRITICAL STAGES

D18.1 The Contractor shall achieve critical stages of the Work in accordance with the following requirements:

- (a) Critical Stage 1 - Installation of all CIPP liners excluding asset on Sutherland Ave (S-MA70001102) prior to October 15, 2021

D19. SUBSTANTIAL PERFORMANCE

D19.1 The Contractor shall achieve Substantial Performance within sixty (60) consecutive Working Days of the commencement of the Work as specified in D16 or by November 3, 2021; whichever comes first.

D19.2 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.

D19.3 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.

D20. TOTAL PERFORMANCE

D20.1 The Contractor shall achieve Total Performance within seventy-five (75) consecutive Working Days of the commencement of the Work as specified in D16 or by June 14, 2022; whichever comes first.

D20.2 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.

D20.3 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.

D21. LIQUIDATED DAMAGES

D21.1 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 – five hundred dollars (\$500.00)
- (b) Substantial Performance – two thousand dollars (\$2,000.00);
- (c) Total Performance – five hundred dollars (\$500.00).

D21.2 The amounts specified for liquidated damages in D21.1 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.

D21.3 The City may reduce any payment to the Contractor by the amount of any liquidated damages assessed.

D22. COVID-19 SCHEDULE DELAYS

D22.1 The City acknowledges that the schedule for this Contract may be impacted by the COVID-19 pandemic. Commencement and progress of the Work shall be performed by the Contractor with due consideration to the health and safety of workers and the public, directives from health authorities and various levels of government and in close consultation with the Contract Administrator.

D22.2 If the Contractor is delayed in the performance of the Work by reason of the COVID-19 pandemic, 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.

D22.3 A minimum of seven (7) Calendar Days prior to the commencement of Work, the Contractor shall declare whether COVID-19 will affect the start date. The Contractor shall provide sufficient evidence that the delay is directly related to COVID-19, including but not limited to evidence related to availability of staff, availability of Material or work by others.

D22.4 For any delay related to COVID-19 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 D22.3. Failure to provide this notice will result in no additional time delays being considered by the City.

D22.5 The Work schedule, including the durations identified in D16 to D18 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.

D22.6 Where Work not previously identified is being carried over solely as a result of delays related to COVID-19, 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 COVID-19, a partial consideration of the cost of temporary works will be considered by the Contract Administrator.

D22.7 Any time or cost implications as a result of COVID-19 and in accordance with the above, as confirmed by the Contract Administrator, shall be documented in accordance with C7.

D23. SCHEDULED MAINTENANCE

D23.1 The Contractor shall perform the following scheduled maintenance in the manner and within the time periods required by the Specifications:

(a) Landscaping as specified in CW 3510;

D23.2 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

D24. JOB MEETINGS

D24.1 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.

D24.2 The Contract Administrator reserves the right to cancel any job meeting or call additional job meetings whenever he/she deems it necessary.

D25. PRIME CONTRACTOR – THE WORKPLACE SAFETY AND HEALTH ACT (MANITOBA)

D25.1 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).

D26. THE WORKPLACE SAFETY AND HEALTH ACT (MANITOBA) – QUALIFICATIONS

D26.1 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 its sole discretion and acting reasonably, require updated proof of compliance, as set out in B13.4.

MEASUREMENT AND PAYMENT

D27. PAYMENT

D27.1 Further to C12, the City may at its option pay the Contractor by direct deposit to the Contractor's banking institution.

WARRANTY

D28. WARRANTY

D28.1 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.

D28.2 Notwithstanding C13.2 or D28.1, the Contract Administrator may permit the warranty period for a portion or portions of the Work to begin prior to the date of Total Performance if:

(a) a portion of the Work cannot be completed because of unseasonable weather or other conditions reasonably beyond the control of the Contractor but that portion does not prevent the balance of the Work from being put to its intended use.

D28.2.1 In such case, the date specified by the Contract Administrator for the warranty period to begin shall be substituted for the date specified in C13.2 for the warranty period to begin.

THIRD PARTY AGREEMENTS

D29. FUNDING AND/OR CONTRIBUTION AGREEMENT OBLIGATIONS

D29.1 In the event that funding for the Work of the Contract is provided to the City of Winnipeg by the Government of Manitoba and/or the Government of Canada, the following terms and conditions shall apply, as required by the applicable funding agreements.

D29.2 Further to D29.1, in the event that the obligations in D29 apply, actual costs legitimately incurred by the Contractor as a direct result of these obligations ("Funding Costs") shall be determined by the actual cost to the Contractor and not by the valuation method(s) outlined in C7.4. In all other respects Funding Costs will be processed in accordance with Changes in Work under C7.

D29.3 For the purposes of D29:

- (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.

D29.4 Modified Insurance Requirements

- D29.4.1 If not already required under the insurance requirements identified in D11, the Contractor will be required to provide wrap-up liability insurance in an amount of no less than two million dollars (\$2,000,000) inclusive per occurrence. Such policy will be written in the joint names of the City, Contractor, Consultants and all sub-contractors and sub-consultants and include twelve (12) months completed operations. The Government of Manitoba and its Ministers, officers, employees, and agents shall be added as additional insureds.
- D29.4.2 If not already required under the insurance requirements identified in D11, the Contractor will be required to provide builders’ risk insurance (including boiler and machinery insurance, as applicable) providing all risks coverage at full replacement cost, or such lower level of insurance that the City may identify on a case-by-case basis, such as an installation floater.
- D29.4.3 The Contractor shall obtain and maintain third party liability insurance with minimum coverage of two million dollars (\$2,000,000.00) per occurrence on all licensed vehicles operated at the Site. In the event that this requirement conflicts with another licensed vehicle insurance requirement in this Contract, then the requirement that provides the higher level of insurance shall apply.
- D29.4.4 Further to D11.3, insurers shall provide satisfactory Certificates of Insurance to the Government of Manitoba prior to commencement of Work as written evidence of the insurance required. The Certificates of Insurance must provide for a minimum of thirty (30) days’ prior written notice to the Government of Manitoba in case of insurance cancellation.
- D29.4.5 All policies must be taken out with insurers licensed to carry on business in the Province of Manitoba.

D29.5 Indemnification By Contractor

- D29.5.1 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.

D29.6 Records Retention and Audits

- D29.6.1 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.
- D29.6.2 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 D29.6.1 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.

D29.7 Other Obligations

- D29.7.1 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.
- D29.7.2 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.
- D29.7.3 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.
- D29.7.4 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.
- D29.7.5 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.
- D29.7.6 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 D12)

KNOW ALL MEN BY THESE PRESENTS THAT

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

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

_____ dollars (\$_____.)

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

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

TENDER NO. 324-2021

2021 SEWER RENEWALS BY CIPP LINING – CONTRACT 2

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 D12)

KNOW ALL MEN 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. 324-2021

2021 SEWER RENEWALS BY CIPP LINING – CONTRACT 2

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 D14)

2021 SEWER RENEWALS BY CIPP LINING – CONTRACT 2

<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 D14)

2021 SEWER RENEWALS BY CIPP LINING – CONTRACT 2

<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 its 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, Materials Management 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:

Appendix No.	Title
A	Repair Requirements
B	Design Conditions
C	Traffic Control – General Requirements
D	Design Requirements for CIPP Liners
E	Flow Control Information
F	CP Access Permit Documents
G	Record Drawings
H	Flow Control Risk Levels

Drawing No.	Drawing Name/Title
12871	DRAWING INDEX
12872	DRAWING INDEX
12873	ASSINIBOINE AVE
12874	ASSINIBOINE AVE
12875	BRAZIER STREET
12876	BULLER STREET
12877	COLLEGE AVE
12878	GREY ST (W OF CL)
12879	HIGGINS AVE (CL)
12880	MCKENZIE STREET
12881	MCKENZIE STREET (CL)
12882	NAVY WAY
12883	NAVY WAY
12884	SMITH ST / NAVY WAY
12885	PARKVILLE DRIVE
12886	ST MARY'S RD
12887	SUTHERLAND AVE
12888	SUTHERLAND AVE
12889	WALL ST
12890	WESTWOOD DRIVE
12891	PARKING LOT (W OF WESTWOOD DR)

<u>Drawing No.</u>	<u>Drawing Name/Title</u>
12892	PORTAGE AVE N OF CL
12893	WILLIAM AVE
12894	POINT DOUGLAS AVE
12895	MANHOLE RECONSTRUCTION DETAILS 1
12896	MANHOLE RECONSTRUCTION DETAILS 2

GENERAL REQUIREMENTS

E2. SHOP DRAWINGS

E2.1 Description

- (a) This Specification shall revise, amend, and supplement the requirements of CW 1110 of the City of Winnipeg's Standard Construction Specifications.
- (b) The term "Shop Drawings: means drawings, diagrams, illustrations, schedules, performance charts, brochures, and other data, which are to be provided by the Contractor to illustrate details of a portion of the Work.

E2.2 Submit all Shop Drawings in accordance with CW 1110 except as modified herein.

E2.3 The Contractor shall submit specified Shop Drawings to the Contract Administrator for review. All submissions must be in metric units. Where data is in imperial units, the correct metric equivalent shall also be shown on all submissions for Engineering review.

E2.4 Submit Shop Drawing submissions within five (5) Business Days of a request as indicated in E2 or receipt of Notice of Award in accordance with B19, whichever is earlier.

E2.5 Allow for a five (5) Business Days period for review by the Contract Administrator of each individual submission and re-submission, unless noted otherwise in the Contract Documents.

E2.6 Shop Drawings not meeting the requirements of CW 1100 or the requirements specified herein will be returned to the Contractor without review for resubmission.

E2.7 Shop drawing submissions will be limited to 2 reviews per shop drawing. This shall include a review of the initial submission and a review of the revised submission. Costs associated with subsequent reviews will be charged to the Contractor.

E2.8 Measurement and Payment

- (a) The provision of Shop Drawings will be considered incidental to the Work and will not be measured for payment. No additional payment will be made.

E3. CONFINED SPACE ENTRY

E3.1 Description

- (a) This Specification shall outline minimum requirements for confined space operations through the course of the work.

E3.2 General

E3.2.1 The Contractor shall be aware that Hydrogen Sulphide Gas is present in all underground structures connected to the City's sewer systems and has been known to accumulate in concentrations sufficient to cause serious harm or death to personnel who are not using adequate Personal Protective Equipment.

E3.2.2 The Contractor's attention is drawn to the Province of Manitoba Workplace Safety and Health Act ("the Act"), and the Regulations and Guidelines there-under pertaining to Confined Space Entry Work and in particular the requirements for conducting hazard/risk assessments and providing personal protective equipment (PPE).

E3.2.3 The Contractor is responsible for all safety and confined space support throughout the project.

E3.3 Methods

E3.3.1 Hazard Assessment

- (a) In conjunction with securing the site and obtaining underground clearances, the Contractor shall conduct a hazard assessment for each site requiring work within a sewer or manhole. The assessment shall identify and evaluate the hazards, including but not be limited to review of the following as it pertains to the work to be performed:
 - (i) nature of the defect;
 - (ii) location of the defect in the sewer/manhole;
 - (iii) structural condition and amount of debris in the remaining sewer/manhole;
 - (iv) condition of the manholes up and downstream of the required repair;
 - (v) atmospheric conditions in the manholes up and downstream of the required repair;
 - (vi) condition of adjacent downstream sewers; and,
 - (vii) flow in the sewer.
- (b) The hazard assessment shall be based on the Contractors review of video for the sewer(s) and site inspection of the manholes, sewers and external conditions. Prior to the inspection, the Contractor shall conduct the necessary atmospheric monitoring of the affected manholes and sewers to establish acceptable entry conditions.
- (c) Based on the results of the hazard assessment the Contractor shall determine if they can perform the stabilization repairs in a safe manner. If the Contractor decides to proceed with the internal repairs they shall prepare a Safe Work Plan complete with the necessary controls and procedures required to maintain a safe working environment for the repair. Otherwise they shall notify the Contract Administrator and jointly the Contractor and the Contract Administrator shall review the nature of the work and determine alternative means of completing the work are required.

E3.3.2 Safe Work Plan

- (a) Subsequent to performing a hazard assessment the Contractor shall develop a safe work plan to address the potential hazards associated with each site. In addition to addressing the potential hazards the safe work plan shall address but not be limited to the following:
 - (i) guidelines for confined space entry work established by The Manitoba Workplace Safety and Health Act;
 - (ii) provision for emergency response;
 - (iii) training and duties for entry personnel;
 - (iv) rescue and emergency services;
 - (v) requirement for purging, ingesting, flushing and/or continuous ventilation to eliminate or control atmospheric hazards;
 - (vi) requirement for and provision of supplied air;
 - (vii) communication between members of the repair crew in the pipe and on the ground's surface;
 - (viii) current and forecasted weather conditions;
 - (ix) isolating the workspace by plugging of upstream sewers and monitoring of upstream flow levels;
 - (x) provision of back-up equipment;
 - (xi) method of ingress into the sewer; and,
 - (xii) method of egress out of the sewer – forward and backwards.
- (b) The Contactor shall not enter the sewer or manholes to begin the work until they have completed a hazard assessment and safe work plan for the specific repair and

reviewed the plans with their designated safety officer for acceptance. The safe work plan procedures and practices shall conform to all federal, provincial and municipal codes, regulations and guidelines including Manitoba Workplace Safety and Health Regulations.

E3.3.3 Enter the Manhole and Sewer

- (a) The Contractor shall enter the manhole/sewer and complete the work in accordance with their safe work plan and requirements for the repair contained herein.
- (b) If at any time during the repair the attendant and/or Contractor believes he cannot safely perform the work they shall immediately stop the work and evacuate the sewer and manholes. The Contractor shall re-assess their safe work plan considering the reason for the work stoppage. The work shall only be resumed when the Contractor has deemed it safe to return by completing a re-assessment and safe work plan revision, where necessary.
- (c) If the Contractor deems the work cannot be safely completed by internal stabilization they shall notify the Contract Administrator and jointly the Contractor and the Contract Administrator shall review the nature of the defect and determine alternative means of completing the work are required.

E3.4 Measurement and Payment

E3.4.1 Confined Space Entry

- (a) Performing hazard assessments, preparing a Safe Work Plans, and confined space entry support for the Work and inspections will be considered incidental to the Work and will not be measured for payment. No separate payment will be made.

E4. MOBILIZATION AND DEMOBILIZATION

E4.1 Description

- (a) This Specification shall govern mobilization and demobilization from site.

E4.2 Measurement and Payment

E4.2.1 Mobilization and Demobilization

- (a) Mobilization and demobilization will be measured on a lump sum basis and paid for at the Contract Lump Sum Price for "Mobilization and Demobilization". Payment for Mobilization and demobilization shall include all costs associated with mobilization and demobilization, site set up, and cleanup. Payment will be made on the following schedule:
- (b) 25% payment of the Mobilization and Demobilization lump sum price will be paid once sewer cleaning and preparation crews arrive on site and commence with cleaning and sewer preparation works.
- (c) 50% payment of the Mobilization and Demobilization lump sum price will be paid once lining crews arrive on site and commence CIPP liner installations.
- (d) 100% of the Mobilization and Demobilization lump sum price will be paid subsequent to completion of the liner installation, liner repairs (if necessary), and site cleanup.

E5. TRAFFIC MANAGEMENT

E5.1 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 most recent version of The City of Winnipeg, "Manual of Temporary Traffic Control" in Work Areas on City Streets at all times during construction.

E5.2 Maintain access for approaches, driveways, public lanes and crossing streets for all locations.

- E5.3 Bus traffic must be maintained at all times. Where bus traffic cannot be maintained the Contractor shall advise in writing a minimum of ten (10) business days prior to undertaking the lining work to have buses rerouted.
- E5.4 The Contractor shall maintain access to all businesses during business hours, except where written authorization has been provided by the business.
- E5.5 The Contractor shall maintain access to all schools, community centres, and other public buildings at all times.
- E5.6 Further to Section 3.6 of CW 1130 of the General Requirements, the Contractor shall maintain safe pedestrian crossings at intersections at all times. If possible, only one pedestrian crossing at an intersection is to be blocked by construction at any one time. If more than one pedestrian crossing is blocked by construction at an intersection at the same time the Contractor shall provide flag persons to safely escort pedestrians across the intersection. The Contractor shall leave pedestrian crossing locations safe and free of equipment that may hamper pedestrians when no construction activities are being performed at a particular crossing location.
- E5.7 Further to Clause 3.7 of CW 1130 of the General Requirements, should the Contractor be unable to maintain pedestrian or vehicular access to a residence or business, he/she shall review the planned disruption with the business or residence and the Contract Administrator, and take reasonable measures to minimize the impact. The Contractor shall provide a minimum of 24 hours notification to the affected residence or business and the Contract Administrator, prior to disruption of access.
- E5.8 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.
- E5.9 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.
- E5.10 Regional Street Lane Closures
- E5.10.1 As per the City of Winnipeg "Manual of Temporary Traffic Control", construction activities on Regional Streets may be restricted between 07:00 to 09:00 hours and 15:00 to 18:00 hours Monday to Friday and other hours as outlined herein or identified by the Contract Administrator.
- E5.10.2 The City reserves the right to restrict or cancel Regional Street lane closures at any time due to the occurrence of special events or conflicting third party work.
- E5.11 Residential Streets
- (a) The contractor shall strive to maintain at least one lane of traffic on residential streets. Street shall be signed as "Road Closed - Local Access Only".
- (b) A minimum of one lane of traffic shall be maintained on one-way residential streets at all times.
- (c) Where required, the Contractor shall provide notice of complete street shutdowns complete with dates and duration a minimum of five (5) Business Days prior to the street closures.
- E5.12 Lane Closure Requests
- E5.12.1 Lane closure requests must be submitted for all work occurring on City of Winnipeg roadways, on both regional and non regional streets.
- E5.12.2 The Contractor shall submit all lane closure requests to the Contract Administrator a minimum of five (5) Business Days prior to the planned work. Requests for lane closures shall include all required information for submission required by the City's online request

form. A link to the form can be found here:

<http://www.winnipeg.ca/publicworks/trafficcontrol/laneclosures/LaneClosuresMap.asp>).

E5.13 Notwithstanding the requirements noted herein and CW 1130, the Contractor shall maintain the minimum site specific traffic control requirements outlined in Appendix C – Traffic Control – General Requirements.

E5.14 Measurement and Payment

- (a) Traffic management as outlined herein will be considered incidental to the Work and will not be measured for payment. No separate payment will be made

E6. WORKING IN CLOSE PROXIMITY TO RAIL INFRASTRUCTURE

E6.1 Description

- (a) This Specification shall cover site specific conditions required for installation of CIPP liners in close proximity to rail infrastructure.

E6.2 General

- (a) CIPP lining of assets S-MA00013996 (Point Douglas Ave) requires access manholes which are located on property owned and operated by CP Rail.
- (b) The Contractor shall complete all submissions and necessary actions to pre-arrange site access with CP Rail. Example site access application forms can be found in Appendix F. Note that the forms provided are for information only and may not constitute a complete application.
- (c) The Contract Administrator shall be copied on all correspondence with CP Rail. Copies of approved access permissions and agreements shall be provided to the Contract Administrator a minimum of 24 hrs prior to commencing the work.
- (d) The Contractor shall keep all equipment off the railway right of way except under express agreement with CP Rail.
- (e) Work must be undertaken between 7 am and 3 pm.

E6.3 Submissions

- (a) Contractor must provide information a minimum of 45 business days prior to undertaking the work.
- (b) Contractor to provide a detailed work plan for inclusion with the application. The plan should include:
- (i) Overall Work Plan addressing:
 - ◆ Excavation and manhole modifications;
 - ◆ Flow Bypass, including to and from manholes;
 - ◆ Sewer cleaning methods;
 - ◆ Sewer CIPP lining methods.
 - (ii) All equipment to be used within railway property.
- (c) A detailed day by day schedule

E6.4 Measurement and Payment

- (a) The City will directly pay costs associated with access permits and flagging related to the work. Costs covered by the City will be limited to permit applications and flagging costs related to the Contractors submitted schedule and number of working days identified at the time of the permit submission. Additional flagging costs due to delays within the Contractors control will be charged back to the Contractor.
- (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.

E7. FLOW CONTROL

E7.1 Description

- (a) This Specification shall cover flow control measures required for main line sewer and sewer services required to perform the work.

E7.2 Submittals

- (a) Submit a written flow control plan for all sewers to be lined for review by the Contract Administrator in accordance with E2, a minimum of five (5) Business Days prior to undertaking the work. Flow bypass plans shall meet the requirements outlined herein.

E7.3 Methods

- (a) Provide necessary flow control measures for the main line sewer and sewer services required to perform the work. Diversion of wastewater flow directly or indirectly to the environment, land drainage sewers, or storm relief sewers will not be allowed.
- (b) Maintain existing sewer flows from upstream sewers during construction around the sewers being lined.
- (c) Where bypass pumping combined sewer flows, the Contractor shall provide a minimum pumping capacity of 2.75 times the estimated average day flows as provided herein or estimated by the Contractor.
- (d) Erection of scaffolding overtop of active roadways will not be permitted for the purposes of flow control.
- (e) Provide adequate temporary bypass pumping for live sewer services connected to the sewer being lined from when the service is blocked off until it is reinstated.
- (f) Provide security personnel for locations where by-pass pumping requires normally secure or locked doors and access areas to be left open or unlocked.
- (g) Ensure all flow control components and materials are removed from the sewer system upon completion of the work.
- (h) The Contractor shall put in place measures to prevent the spill of wastewater and styrene laden water from the CIPP installation process to the environment. When working near outfalls, the Contractor shall ensure flow bypass methods prevent upstream levels from exceeding overflow levels. Where plugs and other methods are employed to prevent overflows, the Contractor shall have contingency plans in place for unexpected flow increases and undertake 24 hr monitoring of upstream levels while flow control measures are in place.

E7.3.1 Flow Bypass Plans

- (a) The flow control plan shall include the following:
 - (i) A description and sketch detailing the arrangement of the proposed flow control measures.
 - (ii) A list of the key components required for the flow control measures, including but not limited to the following:
 - (i) Cofferdams
 - (ii) Piping or hoses (where required)
 - (iii) Pumps (where required)
 - (iii) Identify suction and discharge manholes.
 - (iv) A detailed procedure for installation and removal of the flow control measures.
 - (v) Monitoring plan (if required). Note: all plans shall include a 24 hr contact person.
 - (vi) Means and methods for dealing with excessive flows or wet weather events.
 - (vii) Means and methods for bypassing flows from apartment complexes and commercial buildings.
 - (viii) Supply of temporary washroom facilities where required.

- (b) A tabular flow control plans (multiple sewers on a single plan) is acceptable for the following:
 - (i) WWS smaller than 300 mm in diameter.
 - (ii) CS 450 mm in diameter and smaller.
- (c) Flow control plans shall be prepared and stamped by a professional Engineer, registered in the Province of Manitoba and experienced in the design and implementation of temporary flow bypass works under the following conditions:
 - (i) WWS 300 mm in diameter and larger;
 - (ii) CS greater than 450 mm in diameter; and,
 - (iii) as specified herein.
- (d) Additional bypass pumping information and calculations, known herein as supplementary submissions, shall be included in the flow control submission under the following conditions:
 - (i) Sewers up to 600 mm in diameter with flow bypass pumping requirements greater than 50% of their identified maximum capacity identified below, or;
 - (ii) Sewers greater than 600 mm in diameter with flow bypass pumping requirements greater than 150 L/s.
- (e) Notwithstanding E7.3(b), any flow bypass plan requiring supplementary information shall be submitted individually shall be stamped by a professional Engineer, registered in the Province of Manitoba and experienced in the design and implementation of temporary flow bypass works.
- (f) Where supplementary submissions are required, the Contractor shall develop system curves for the flow bypass arrangement demonstrating the ability of the proposed pumping arrangement to meet the identified flow regime for the sewer being bypassed. The submitted calculations shall include the following minimum information:
 - (i) a sketch showing all major components of the flow bypass setup;
 - (ii) suction manhole depths;
 - (iii) a table showing bypass piping diameters, length, materials, fittings, static lift, etc, used to develop a system curve. The table shall be complete with minor loss coefficients;
 - (iv) provision of the system curves plotted with the pump curves, demonstrating the pumping capacity of the proposed system.
- (g) Where the proposed flow control plan includes changes to the operation of the City's collection system, the Contractor shall submit their flow control plans a minimum of twenty (20) Business Days prior to commencement of the work to permit review by the Contract Administrator and the City. Changes to the City's collection system may include but are not limited to raising of outfall weirs, closure of outfall gates, or changes to City pump station operations. The Contractor shall be aware that changes to the operation of the City's collection system may require extensive review by both the Contract Administrator and the City and may result in the Contractor having to implement additional measures to maintain an acceptable operational risk profile for the City's collection system.
 - (i) The flow capacities for all sewer assets in this Contract are included in . Risk designation is assigned for each sewer asset based on the Average Dry Weather Flows in Appendix G
 - (i) Low Risk: Contractor may be required to implement flow control.
 - (ii) Medium Risk: Contractor is required to implement flow control measures in accordance with E7.3.
 - (iii) High Risk: Contractor is required to implement flow control measures in accordance with E7.

E7.3.2 Mainline Sewer Flows

- (a) The Contractor shall ensure wet weather or excessive flow conditions can be pumped or otherwise accommodated through the work area. The Contractor shall schedule

work requiring complete blockage of the sewer when the chances of wet weather events are minimized in accordance with E7.3.5.

- (b) The Contractor shall determine appropriate sewer bypass flows for sewer assets meeting the following criteria:
 - (i) WWS smaller than 300 mm in diameter.
 - (ii) CS 450 mm in diameter and smaller.
- (c) For sewers larger than those listed in E7.3.2(b), the following has been provided in Appendix E for the purposes of designing flow bypass arrangements:
 - (i) Average Dry Weather Flows (ADWF)
 - (ii) Peak Dry Weather Flows (PDWF)
 - (iii) Maximum surcharge levels
- (d) Notwithstanding E7.3.2(b), E7.3.2(c), and E7.3(c), the following assets may exhibit intermittent flows resulting from the operation of upstream pump stations. The following ADWF and peak pump station discharge flows have been provided for the purposes of sizing bypass systems. Submit flow control plans in accordance with E7.2. Flow control plans shall be stamped by a Professional Engineer, registered in the Province of Manitoba and experienced in the design and implementation of temporary flow bypass works

E7.3.3 Sutherland Trunk Sewer - Sutherland Ave (S-MA70001102).

- (a) The Sutherland Trunk Sewer conveys flows from both the Montcalm Pumping Stations. The following peak pump station discharge flows have been provided for information.
 - (i) Montcalm Pumping Station:
 - ◆ Peak Discharge Capacity: 1140 L/s.
 - ◆ Discharges in the Sutherland Trunk Sewer at the upstream end of the Sutherland Trunk Sewer near the Red River.
- (b) The Contractor shall provide one of the following for flow control on the Sutherland Trunk Sewer:
 - (i) Option 1 (Pumping):
 - ◆ The Contractor shall provide a firm pumping capacity of 295 L/s.
 - ◆ The City will limit pumping rates at the Montcalm Pumping Stations to 295 L/s or less.
 - ◆ **No lining or other works resulting in a full blockage of the Sutherland Trunk Sewer (including CIPP liner installation) shall be undertaken when there are above normal flows or when rainfall is forecasted.**
 - (ii) Option 2 (Pumping):
 - ◆ The Contractor shall provide a firm pumping capacity of 595 L/s.
 - ◆ The City will limit pumping rates at the Syndicate and Montcalm Pumping Stations to 595 L/s or less.
 - ◆ **Lining and other works resulting in a blockage of the Sutherland Trunk Sewer will be permitted during elevated flow conditions or rainfall events.**
 - (iii) Option 3 (Gravity Bypass):
 - ◆ A gravity bypass may be implemented, diverting flows to the parallel 900 mm trunk sewer (S-MA70001100) at the upstream manhole (S-MH70000474).
 - ◆ The City will limit pumping rates at the Syndicate and Montcalm Pumping Stations to 610 L/s or less.

◆ **Lining and other works resulting in a blockage of the Sutherland Trunk Sewer will be permitted during elevated flow conditions or rainfall events.**

- (c) The Contractor shall be aware that a flow rate of 610 L/s is approximately the full flow capacity of the 900 mm trunk sewer (S-MA70001100) and flows of this volume are expected overtop the existing weir, located in manhole S-MH70000474. Notwithstanding limitations on pumping capacity to be implemented to facilitate the work as noted herein, the Contractor shall be cognizant that flows may increase rapidly, should additional pumps start within the Montcalm Pumping Station. The Contractor shall take all necessary precautions to protect workers when working within the downstream sewer.
- (d) Firm pumping capacity requires the contractor to have a minimum of one additional pump equal in size to the largest bypass pump proposed for the work on site as redundant capacity for the duration of the flow bypass setup.
- (e) The Contractor shall note that there is no upstream overflow on the Sutherland Trunk Sewer and failure of the bypass system will result in surcharging of the sewer and significant overland flooding.
- (f) The flow control plans for all assets on Sutherland Ave shall be stamped by a Professional Engineer registered in the Province of Manitoba and experienced in the design and implementation of temporary flow bypass works. Notwithstanding E7.2, the flow control plan(s) shall be submitted a minimum of twenty (20) days prior to lining.
- (g) If temporary (short term) exemptions are required to the traffic accommodations listed in E7.3.3(g), a request shall be submitted to the Contract Administrator in accordance with E5 a minimum of five (5) Business Days prior to the planned work.

E7.3.4

Sewer Services

- (a) Intermittent/short term flow blockages (i.e. up to 1 day, intermittently) of live sewer services will be permitted on the proviso that building occupants are informed of the blockage and adequate steps are undertaken to ensure sewer service backups do not occur. The Contractor shall be responsible for any damages occurring from sewer service blockages in instances where inadequate or improper notice has been provided.
- (b) Provide temporary indoor portable toilets for residential homes and for each apartment in small apartment buildings (10 or less apartments) instead of temporary sewer service bypass pumping where feasible and accepted by the building owner and the Contract Administrator.
- (c) Provide temporary indoor or outdoor toilet facilities for smaller commercial properties such as strip malls instead of temporary sewer service bypass pumping where feasible and accepted by the building owner and the Contract Administrator. One toilet facility to be provided for each business in a strip mall.
- (d) Provide necessary supplies for portable toilets and clean as often as required while in use. Remove portable toilets and outdoor toilets promptly once sewer service is reinstated.
- (e) The Contractor may expose sewer services for facilities with a high volume of effluent discharge that have no feasible means of intercepting the flow within the building or at a location outside the building and drain or pump the sewer service from that location until the sewer service is reinstated.
- (f) Excavate for sewer service exposure in accordance with CW 2030. Repair and backfill exposed sewer services in accordance with CW 2130.

E7.3.5

Weather

- (a) Review the Environment Canada weather forecast with the Contract Administrator before each day of liner installation.

- (b) Delay installation of liners and/or secure Works when the anticipated weather conditions are such that anticipated sewer flow will exceed the flow control measures provided.
- (c) The Contractor shall advise immediately of any weather-related delays.
- (d) The Contractor to schedule Work according to the weather; The City is not responsible for costs associated with weather related delays.

E7.4 Measurement and Payment

- (a) Flow control measures necessary for mainline sewers will be measured on a unit basis based on the diameter of the sewer being lined, except where specific locations have identified for measurement on a lump sum basis. The number of units to be paid for will be equal to the number of liner installations where flow control measures are utilized. Utilization of flow control shall constitute the deployment of pumps or hauling of sewage to bypass flows around a sewer being lined. Flow control will not be measured where no flow control measures are utilized.
- (b) Payment for "Flow Control" shall include, but is not limited to the following:
 - (i) Supply of flow control plans, drawings, and submissions;
 - (ii) Investigative work to confirm flows, manhole, and pipe configurations;
 - (iii) Supply, installation, and removal of cofferdams and flow diversions;
 - (iv) Supply, mobilization, monitoring, operation, and demobilization of pumps and hoses;
 - (v) Hydrovac, hauling, and disposal of sewage where required for flow control purposes;
 - (vi) Traffic signage;
 - (vii) Supply, installation, and removal of all traffic ramps and associated materials;
 - (viii) Any and all other plant and materials required to complete the work as specified herein and identified on reviewed flow control plans.
- (c) Only one unit of flow control will be paid for each sewer segment and will include all occurrences of mainline and sewer service flow control requirements for the sewer segment.
- (d) Where no flow control measures are undertaken, no payment will be made for this item of work.
- (e) The supply of temporary washroom facilities and flow control measures for sewer services shall be considered incidental to installation of the liner and will not be measured for payment. No additional payment will be made.

E8. SEWER INSPECTIONS

E8.1 Description:

- (a) This specification describes the requirements for obtaining sewer measurements and CCTV inspections required to facilitate the specified rehabilitation work.
- (b) This specification amends and supplements specification CW 2145.

E8.2 Methods

E8.2.1 Verification of Existing Sewer Dimensions

- (a) Verify sewer dimensions and depths prior to design as follows:
 - (i) Measure the distance from the centre of the start manhole to centre of the finish manhole in accordance with E8.5.8(a).
 - (ii) Manhole invert depths (from the manhole rim) at the upstream, downstream, and any intermediate manhole.
 - (iii) Measure the diameter and cross-section of the sewer at the upstream and downstream manholes and at a minimum distance of 500 millimetres inside the sewer from each manhole.

- (iv) Use calibrated callipers or other suitable measuring device capable of measuring accurately to +/- 1 mm to confirm cross section geometry at the following clock positions:
 - ◆ 12:00 to 6:00
 - ◆ 2:00 to 8:00
 - ◆ 3:00 to 9:00
 - ◆ 4:00 to 10:00
- (v) Obtain additional measurements for large diameter (larger than 600 millimetres) and for non-circular sewers sufficient to define the cross section to meet the design objectives for the rehabilitation system being utilized, including but not limited to:
 - ◆ The length of the inside perimeter (circumference) of the sewer at the upstream and downstream ends.
 - ◆ Perform a pre-design inspection in accordance with E8.2.2(b) where specified in order to confirm the dimensions of the existing host pipe.
- (b) Estimate the remainder of the sewer dimensional requirements based on dimensional checks and the CCTV sewer inspection videos.
- (c) Submit host pipe lengths, depths, and dimensions to the Contract Administrator in conjunction with the design submission and pre-design inspection where required.

E8.2.2

Perform the following sewer inspections in accordance with CW 2145 and as outlined herein:

- (a) Pre-Repair Inspection:
 - (i) Perform prior to undertaking cleaning, repairs, or prep-work.
 - (ii) Except where identified in Appendix A, pre-repair inspections are not a pay item and shall be considered incidental to the cleaning and prep work operations.
 - (iii) Except where identified in Appendix A, submission of the pre-repair inspection is only required where sewer conditions differ from those identified during tendering and additional prep work was undertaken to complete the rehabilitation work.
 - (iv) Where identified in Appendix A, pre-repair inspections shall be completed a minimum of forty (40) Business Days prior to lining and submitted to the Contract Administrator for review prior to undertaking repairs or prep-work on the identified assets.
 - (v) No coding of the submission will be required.
- (b) Pre-Design Inspection (where specified on the drawings and Appendix A):
 - (i) Perform prior to preparing the liner design.
 - (ii) Intent is to confirm the continuous or discontinuous (every 5 metres minimum) measurement of the height and width of large diameter and non-circular sewers along the entire length of the sewer.
 - (iii) The following methods may be employed:
 - ◆ Hand measurements
 - ◆ Laser profiling
 - (iv) CCTV inspections involving hand measurements shall clearly show the dimensional measurements and distance of the measurement from the upstream manhole on the video. Distances based on CCTV cable measurement will be permitted.
 - (v) Any change in sewer cross section shall be sufficiently dimensioned to permit design and post-lining assessment of liner dimensions. Where hand measurements are utilized, any changes in the sewers cross sectional shape shall be documented in accordance with E8.2.1.

- (vi) CCTV inspections involving templating shall clearly show the passage of the template through the sewer. For templated sewers the dimensions of the template shall be measured visibly on the CCTV inspection and dimensions submitted for review with the pre-design inspection.
- (vii) Laser profiling technology must have sufficient accuracy and replicability as per E8.6.3.
- (viii) No coding of the submission will be required.
- (c) Pre-Lining Inspection:
 - (i) Perform after sewer cleaning and preparation.
 - (ii) The Pre-Lining Inspection shall confirm:
 - ◆ Necessary cleaning and pipe preparation work, including internal and external sewer repairs, have been satisfactorily completed.
 - ◆ Condition of the sewer pipe is consistent with the design conditions and the Specifications. The Contractor shall advise the Contract Administrator of any condition that is contrary to the design conditions or assumptions made that may affect either long or short term performance of the liner prior to commencing lining.
 - (iii) Provide the Pre-Lining CCTV inspection a minimum of five (5) Business Days prior to lining for approval to proceed with the liner installation.
 - (iv) No coding of the submission will be required.
- (d) Post-Lining Inspection:
 - (i) Perform immediately following installation of the liner, after completion of sewer service reinstatement, and while flow control measures are in place.
 - (ii) Perform Post-Lining Inspection where Regional Street lane closures are required within 24 hours of completing the installation of the liner.
 - (iii) Intent is to confirm the adequacy of sewer service reinstatements and the fit and finish of the liner.
 - (iv) Post-Lining inspection shall be submitted within fifteen (15) Business Days of completion of the liner installation. Substantial Performance and Total Performance for the project will not be granted prior to submission and acceptance of the Post-Lining inspection CCTV and associated reports.
 - (v) Full coding required.
- (e) Post-Design Inspection (where specified):
 - (i) Perform subsequent to installing the liner.
 - (ii) Intent is to confirm the continuous or discontinuous (every 5 metres minimum) measurement of the height and width of large diameter and non-circular liners along the entire length of the sewer to confirm that the liner is consistent with the expected post-lining diameter or dimensions.
 - (iii) The following methods may be employed:
 - ◆ Hand measurements
 - ◆ Templating
 - ◆ Laser profiling
 - (iv) Perform while flow control measures are in place.
 - (v) CCTV inspections involving hand measurements shall clearly show the dimensional measurements and distance of the measurement from the upstream manhole on the video. Distances based on CCTV cable measurement will be permitted.
 - (vi) CCTV inspections involving templating shall clearly show the passage of the template through the sewer. For templated sewers the dimensions of the template shall be measured visibly on the CCTV inspection and dimensions submitted for review with the post-design inspection.

- (vii) Laser profiling technology must have sufficient accuracy and replicability as per E8.6.3.
- (viii) Post-Design inspection shall be submitted within fifteen (15) Business Days of completion of the liner installation. Substantial Performance and Total Performance for the project will not be granted prior to submission and acceptance of the Post-Design inspection CCTV and associated reports.
- (ix) No coding of the submission will be required.
- (f) Warranty Inspection:
 - (i) Perform before expiration of the warranty period and final acceptance but not prior to 10 months after installation of the liner.
 - (ii) Intention is to confirm the fit and finish of the liner, the need for any remedial work, and acceptance of any repair work performed during the warranty period.
 - (iii) Undertake sewer cleaning in accordance with CW 2140 as required to obtain a satisfactory inspection.
 - (iv) Full coding required.

E8.2.3 Submit all inspection videos to the Contractor Administrator for review in accordance with CW 2145 and as specified herein.

E8.3 Sewer Inspection Reports

- (a) Provide the Contract Administrator with the following sewer inspection reports prepared in accordance with CW 2145.
 - (i) Pre and post-lining inspection and reports before acceptance of the Work for Total Performance.
 - (ii) Warranty inspection report before Final Acceptance of the Work.

E8.4 Sewer Service Reports

- (a) The Contractor is responsible to determine the usage and status of all service connections connected to the sewer to be rehabilitated. Confirm exact location of all sewer services connected to the sewer being lined by dye testing, tracing, or other methods. Any additional investigative and/or remedial work resulting from improper identification of connected services shall be borne by the Contractor.
- (b) Submit a written Sewer Service Report for each liner location to the Contract Administrator a minimum of five (5) Business Days prior to installation of liners. Provide the following information for each sewer service including CB leads and utility manhole drains.
 - (i) Location of connection (chainage from upstream manhole and clock reference).
 - (ii) Diameter of sewer connection lateral.
 - (iii) Material type of sewer connection.
 - (iv) Observed condition of connection.
 - (v) Status of connection (active, inactive or unable to determine).
 - (vi) Property serviced including the address.
- (c) Sewer Service Reports shall be submitted in conjunction with the Pre-Lining CCTV Inspection submission.

E8.5 Amendments and Supplements to CW 2145:

E8.5.1 Replace Section 3.4 with:

- (a) Ensure each operator is fully trained and certified in all aspects of sewer inspections and capable of making accurate observations and recording all conditions that may be encountered in the sewers.
- (b) Inspection shall be performed by certified operators in accordance with the National Association of Sewer Service Companies (NASSCO) having attained and retained their "Pipeline Assessment Certification Program" (PACP) and "Manhole Assessment Certification Program" (MACP) certification.

E8.5.2

Replace Section 3.5 with:

- (a) Perform sewer condition coding in accordance with the requirements of the NASSCO PACP and to Version 7.0.0 of the manual, or greater in accordance with E8.5.1 of this specification, and with the following additional requirements.

Pipe Header Section	Field No.	Field Name	NASSCO Mandatory	REQUIRED (Yes / No)?
General Information	1	Surveyed By (<i>Operator / PACP User Name</i>)	Yes	Yes
	2	Certificate Number	Yes	Yes
	3	Reviewed By	No	No
	4	Reviewer Certificate Number	No	No
	5	Owner	No	Yes
	6	Customer	No	Yes
	7	P/O Number (<i>Contract No.</i>)	No	Yes
	8	Work Order	No	Yes
	9	Media Label	No	Yes
	10	Project	No	Yes
	11	Date	Yes	Yes
	12	Time	No	Yes
	13	Sheet Number	Yes	Yes
	14	Weather	No	Yes
	15	Pre-Cleaning	Yes	Yes
	16	Date Cleaned	No	No
	17	Flow Control	No	No
	18	Purpose of Survey	No	Yes
	19	Direction of Survey	Yes	Yes
	20	Inspection Technology Used	No	Yes
	21	Inspection Status	Yes	Yes
	22	Consequence of Failure	No	No
	23	Pressure Value	No	No
Location	24	Drainage Area	No	Yes
	25	Pipe Segment Reference (<i>Asset ID</i>)	No	Yes
	26	Street (<i>Name and Number</i>)	Yes	Yes
	27	City	Yes	Yes
	28	Location Code	No	Yes
	29	Location Details	No	Yes

Pipe Header Section	Field No.	Field Name	NASSCO Mandatory	REQUIRED (Yes / No)?
Pipe	30	Pipe Use	Yes	Yes
	31	Height (Diameter)	Yes	Yes
	32	Width	Yes	Yes
	33	Shape	Yes	Yes
	34	Material	Yes	Yes
	35	Lining Method	No	No
	36	Coating Method	No	No
	37	Pipe Joint Length	No	Yes
	38	Total Length (Steel Tape Measurement)	No	Yes
	39	Length Surveyed	No	Yes
	40	Year Constructed	No	No
	41	Year Renewed	No	No

Measurements	42	Upstream MH No.	Yes	Yes
	43	Upstream MH Rim to Invert	No	No
	44	Upstream MH Rim to Grade	No	Yes
	45	Upstream MH Grade to Invert	No	No
	46	Upstream MH Northing	No	No
	47	Upstream MH Easting	No	No
	48	Upstream MH Elevation	No	No
	49	Downstream MH No.	Yes	Yes
	50	Downstream MH Rim to Invert	No	Yes
	51	Downstream MH Rim to Grade	No	No
	52	Downstream MH Grade to Invert	No	No
	53	Downstream MH Northing	No	No
	54	Downstream MH Easting	No	No
	55	Downstream MH Elevation	No	No
	56	MH Coordinate System	No	No
	57	MH Vertical Datum	No	No
	58	GPS Accuracy	No	No
59	Additional Information	No	Yes*	

Yes* - when required.

(b) Record place names in accordance with Clause 3.9.4 of the CW 2145.

E8.5.3 Further to CW 2145 Clause 3.7.4, operators failing to provide copies of their NASSCO certification and / or meet the accuracy requirements on two occasions will not be permitted to code on the remainder of the Contract until they can demonstrate to the Contract Administrator that they can code in accordance with the requirements of the NASSCO PACP and MACP version 7.0.0 of the manual or greater.

E8.5.4 Further to Section 3.13, a paper or "hard copy" of the sewer inspection reports is not required and the digital format should be submitted on a CD-R.

(a) The Contractor shall maintain backup copies of all digital video and inspection data submissions for the duration of the Warranty Period as stated in C13.

- (b) The Contractor shall supply inspection data for review by the Contract Administrator on a DVD.
 - (c) The Contractor shall supply separately one (1) set of archival grade digital versatile discs, DVD-R format in accordance with E8.5.7 to the City upon completion of the project.
- E8.5.5 The Contract drawings are based on information contained in the City's GIS database. If the Contractor has trouble interpreting the drawings, or if they believe them to be wrong, the Contract Administrator shall be approached for assistance/clarification.
 - (a) The Contractor shall assist the Contract Administrator in making any required measurements for the correction of errors found on the Drawings.
- E8.5.6 Replace Clause 3.8.1 with:
 - (a) Provide a minimum of 400 lines of resolution around the periphery of the picture for digital MPEG video playback.
- E8.5.7 Replace Clause 3.11.1 with:
 - (a) Capture the inspections in digital format in colour from the live video source on archival grade digital versatile discs, DVD-R format to the following minimum requirements. Adjust requirements as required to achieve 400 lines of resolution specified in Clause E8.5.5 of this Specification.
 - (i) XDVD MPEG-2 or MPEG-4 format (MPEG-4 preferred).
 - (ii) Picture Size: NTSC 720 x 480 @ 29.97 frames per second.
 - (iii) Data/Bit Rate: 6.0 M-bits/sec.
- E8.5.8 Replace Clause 3.16.1 with:
 - (a) Measure the distance between the centre of the start and finish manholes on the ground surface above the sewer to the nearest 0.01 of a metre using a survey grade ISO 16331-1:2012(E) approved outdoor laser distance measurer capable of attaining 150m minimum steel tape distance, or alternative measuring methods approved by the Contract Administrator, before beginning the sewer inspection. The centre of the manhole will be based on the centre of the manhole cover regardless of the manhole configuration. If bends are identified to exist within the sewer segment, the Contractor shall approximate the measurement on the ground surface using incremental distances to the approximate alignment of the sewer between the start and finish manholes, to the approval of the Contract Administrator's Site Inspector.
- E8.5.9 Further to Clause 3.17.7.8:
 - (a) Service connection tap observation distances must occur at the centre of the tap and the side periphery. To determine use and deficiencies of the tap, the camera must continue to travel, camera centred in the perspective view (to capture other observations), to stop perpendicular to the tap and pan so that the camera can view directly into the barrel of the lateral, to enable the inspector to apply modification and descriptor codes to the tap as per NASSCO PACP standards as necessary.
- E8.5.10 Replace Clause 3.17.7.6, with:
 - (a) Record the distance from the centre of the manhole to the cable calibration location at the start of the inspection and adjust the distance reading so that zero is at the centre of the start manhole. This distance is known as the cable calibration distance. The cable calibration location is the intersection point between the camera's widest horizontal viewing angle and the pipe's side periphery (03 or 09 o'clock) when the camera is level and looking forward.
- E8.5.11 The sewer inspected distance shall represent the distance from the center of the start to the center of the end manhole, access or control structure unless incomplete as per Section 3.19.2.

- E8.5.12 Further to Section 3.19.2, incomplete inspections for sewer and manhole inspections shall be communicated to the Contract Administrator, indicating the date and time of the attempt, reasoning, efforts and actions set out by Section 3.19.
- E8.5.13 Further to Section 3.19.2, manholes identified being in a surcharged environment (standing water) or in imminent failure shall be communicated to the Contract Administrator, indicating the issues observed in the inspection.
- E8.5.14 Further to Section 3.22.1, clear water infiltration observations shall be communicated to the Contract Administrator, providing asset number, location, date and time of the observation, description with attached screen captures to help facilitate Section 3.19.
- E8.6 Sewer Inspection Equipment
- E8.6.1 Notwithstanding CW 2145, CCTV equipment meet the following requirements:
- (a) In-Line sewer inspection equipment shall be comprised of a self-propelled track-mounted platform bearing multiple inspection sensors / technologies that can undertake simultaneous remote inspection in sewers of all diameter ranges.
 - (b) In areas where a self-propelled track-mounted platform is not possible to use during the inspections, the inspections shall be performed using a float or skid system. The Contractor shall notify the Contract Administrator prior to the use of a float or skid platform, tethered by use of flusher hosing capable at distances stated in E8.6.2(b).
- E8.6.2 Minimum requirements of the in-line inspection platform include:
- (a) Independently controlled drive tracks that enable the platform to manoeuvre around bends and climb over debris up to 300mm in height.
 - (b) Operable under partially or fully submerged flow conditions, for distances up to 500m upstream or downstream from a single access point.
 - (c) Operable in sewers of various cross-sections and constructed of standard pipe materials including brick, concrete, PVC, HDPE, and steel.
 - (d) Tethered to facilitate extraction of the platform from the sewer, without causing damage to the sewer infrastructure, in the event the equipment fails or otherwise becomes uncontrollable within the sewer.
 - (e) Equipped with sufficient high intensity lighting to illuminate the sewer for visual inspection.
 - (f) Equipment shall be capable of continuously capturing digital video from first generation recordings with no frame loss, regardless of the progression of the inspection.
 - (g) Equipment shall be used to acquire continuous digital video images of the sewer for the entire length being inspected.
- E8.6.3 Three Dimensional (3D) LASER Scanning Inspection
- (a) "Three Dimensional (3D) Laser Scanning" is a technique to determine the surface profile of mainline pipes using a three dimensional (3D) laser on the entire circumference above fluid level of the pipe.
 - (b) Three Dimensional (3D) LASER scanning equipment shall provide an accurate determination of pipe geometry (features and defects) above the fluid level.
 - (c) Minimum equipment requirements are:
 - (i) The laser shall be Class 1; eye-safe for operator safety.
 - (ii) Surface measurements accurate to 5mm at 3 metres in 1200mm pipes and larger.
 - (iii) Precision ovality / deflection detailed range laser measurement scans accurate to $\pm 1\%$.

- (iv) Laser scans shall produce a point cloud with a maximum distance between points of 10 mm in the transverse direction and 40 mm in the longitudinal direction. The rate of scan shall not exceed 9 m / minute.
- (d) The provision of LASER scanning Internal Diameter and Deflection graphs will be used, as needed, to quantify internal pipe wall material loss/gain or deformation (ovality and deflection) at a given location. Pipe cross-sections obtained from high resolution scans will be used to provide quantitative information regarding internal pipe diameter, including ovality. Precision Scans are produced with multi-colour indication depicting deviations from as built conditions as well as localized material gain and/or loss.
- (e) LASER scanning shall be conducted on identified sewer pipe entities and be conducted from access point to access point. LASER equipment shall be moved through the pipeline on a transport vehicle capable of supporting the LASER inspection equipment above the water level.

E8.7 Video Coding

- (a) Perform sewer condition coding in accordance with the requirements of the National Association of Sewer Service Companies (NASSCO) "Pipeline Assessment Certification Program" (PACP) and to version 7.0.3 of the manual or better.
- (b) Perform condition coding using certified operators in accordance with the NASSCO PACP and MACP. Ensure each operator is fully trained in all aspects of sewer inspection and capable of making accurate observations and recording all conditions that may be encountered in the sewers.
- (c) Operators failing to provide copies of their NASSCO certification and / or failing to meet the accuracy requirements on two occasions will not be permitted to code on the remainder of the Contract until they can demonstrate to the Contract Administrator that they can code in accordance with the requirements of the NASSCO PACP and MACP version 7.0.0 of the manual or greater.
- (d) Incorporate a suitable distance-reading device to measure the location of the equipment in the pipe, to an accuracy of $\pm 0.5\%$ of the length of the inspection.

E8.8 Measurement and Payment

E8.8.1 Verification of Sewer Dimensions:

- (a) Verification of existing sewer lengths, depths, and dimensions will be considered incidental to the Work and will not be measured for payment. No separate payment will be made.

E8.8.2 Sewer inspections will be measured and paid for in accordance with CW 2145 except as modified herein:

- (a) The total length of inspection to be paid will be the total length of sewer inspected to the satisfaction of the Contract Administrator.
 - (i) The maximum length to be paid will be the manhole to manhole sewer length provided by the Contractor.
 - (ii) Where partial or incomplete inspections are submitted, the length of sewer inspected will be the length recorded by the Contractor's calibrated inspection equipment or as determined by the Contract Administrator.

E8.8.3 Sewer Service Reports

- (a) Sewer service reports shall be considered incidental to the CIPP installation and will not be measured for payment. No separate payment will be made.
- (b) The Contractor is responsible for rectifying any damages caused or additional inspection work resulting from incomplete or erroneous Sewer Service Reports.

E8.8.4 Sewer Inspection Reports

- (a) Sewer inspection reports measured and paid for in accordance with CW 2145.

E9. DIGITAL PANORAMIC MANHOLE INSPECTIONS

E9.1 Description:

- (a) This Specification describes the requirements for obtaining panoramic manhole inspections.

E9.2 Equipment

- E9.2.1** Notwithstanding CW 2145, inspect manholes using digital panoramic manhole inspection system such as the IBAK PANORAMO SI, or equivalent meeting the following criteria:
- (a) The inspection camera system must be 100% digital. Any analog or NTSC video camera will be deemed unacceptable.
 - (b) Perform manhole condition coding in accordance with the requirements of the NASSCO MACP V7.0.2 or greater.
 - (c) Perform condition coding using operators who are certified in accordance with the National Association of Sewer Service Companies (NASSCO) having attained and retained their "Manhole Assessment Certification Program" (MACP) certification.
 - (d) Operators failing to meet the accuracy requirements on two occasions will not be permitted to code on the remainder of the contract until they can demonstrate to the Contract Administrator that they can code in accordance with the requirements of the NASSCO MACP V7.0.0 manual or greater.
 - (e) The inspection camera system must have two independently or simultaneously controlled digital cameras, one facing in the downward direction and one facing in the upward direction. Each camera must have a minimum of 185 degree field of view.
 - (f) The inspection camera system must provide sufficient illumination of the interior of the manhole to obtain proper exposure without introducing any motion blur. The light shall be positioned to distribute the light evenly onto the structure walls. The lighting must be able to illuminate manholes without the need of any auxiliary lighting having a recommended contrast set to less than 1.5.
 - (g) The inspection system shall produce individual images or frames with no more than 0.001 inches (0.025mm) of movement during image or frame exposure to produce crisp, clear images. Inspections showing evidence of corrupt or erroneous imagery, scratched lenses or protective glass plate or similar due to poor handling and application shall be rejected.
 - (h) The inspection camera must provide a minimum of 3000 line of vertical resolution in the side view and a minimum of 500 lines in the perspective view.
 - (i) Contractor is responsible for reviewing collected data, coding observations, however the City must have the ability to view the digital film file in the way that the contractor can view them, including full control of the virtual pan and tilt.
 - (j) The digital film files will be captured to a "High Quality" setting that must include an unfolded view of the manhole with a minimum of 3000 lines of vertical resolution, providing all front, back and wrapped images that will be, at a minimum height and width of 1040x1040 pixels, to a resolution of 96 dots per inch. Latest 4k technologies will also be reviewed for acceptance.
 - (k) The digital film files must include the capability to produce a three dimensional representation of the manhole structure. This data shall be used to perform geometric measurements. This file shall be exportable to common CAD programs for further analysis.
 - (l) The digital file files must include a distortion-free virtual pan and tilt allowing the review of the manhole structure from any angle from any depth. The virtual pan and tilt must be able to view 360 degrees in any direction. The virtual pan and tilt must consist of views from the top and bottom camera, any virtual pan and tilts that artificially create this view from a single camera will be deemed unacceptable due to distorted images on the direct side view.

- (m) The virtual pan and tilt and unfolded views must be able to be viewable by the City with all the required executable software included for each disc and HDD.
- (n) The Contractor shall provide the database.
- (o) All chambers that exhibit weir wall or spill pipe weir levels as observed within the field or identified, but not limited to control structures or manholes identified within the Construction Drawings, must be recorded as an MGO and its measurement from manhole rim to weir crest recorded within the remarks field.
- (p) Further to Clause 3.11.5 provide file names within the 360Player.exe software, manholes to be in alpha numeric order to ensure efficient reference.
- (q) Manhole condition coding shall be submitted to the Contract Administrator as per E8.5.4.

E9.3 Measurement and Payment

- E9.3.1 Provisional Manhole inspections will be measured and paid for in accordance with CW 2145.

E10. EXCAVATIONS AND PIPELINE ACCESS

E10.1 Description

- (a) This Specification shall cover excavations, shoring, and modifications to and construction of new manholes as required for pipeline access to facilitate the proposed rehabilitation work.

E10.2 Submittals

- (a) A work plan shall be provided for each manhole slated for disassembly and/or reconstruction to facilitate liner installation. Work plans are not required where only the manhole frame and cover are being removed. The work plan shall include the following:
 - (i) Limits of excavation (width, length, depth);
 - (ii) means of shoring the excavation;
 - (iii) services to be disrupted. Means of maintaining or otherwise dealing with service flows;
 - (iv) manhole work to be undertaken; and
 - (v) other information required to describe the work.
- (b) Shop Drawings for excavation shoring (where required) shall be prepared and submitted in accordance with E2 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.

E10.3 Shoring Design

- (a) Shoring shall be provided for excavations in accordance with CW 2030.
- (b) Excavation shoring shall be designed to accommodate the installation of CIPP liners.
- (c) All shoring systems shall comply with Manitoba Workplace Safety and Health requirements.

E10.4 Materials

- (a) All materials shall conform to City of Winnipeg Standard Construction Specifications.

E10.5 Methods

E10.5.1 Protection of Existing Trees

- (a) The Contractor shall take the following precautionary steps to avoid damage from his construction activities to existing boulevard trees within and adjacent to the limits of construction:
 - (i) The Contractor shall not stockpile materials and soil or park vehicles and equipment on boulevards within 2 metres of any tree.
 - (ii) Mature tree trunks shall be strapped with 25 x 150 x 2400 (1" x 6" x 8") wood planks. Smaller trees shall be similarly protected using appropriately sized wood planks.
 - (iii) Excavations shall be carried out in such a manner so as to minimize damage to existing root systems. Roots over 50 mm in diameter that must be cut to facilitate an excavation shall be neatly pruned with a saw prior to excavation and coated with an appropriate wound dressing to prevent infection.
 - (iv) Operation of equipment within the dripline of trees shall be kept to the minimum required to perform the work. 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.
 - (v) Work on site shall be carried out in such a manner so as to minimize damage to existing tree branches. Where damage to tree branches does occur, the Contractor shall neatly prune the damaged branch.
 - (vi) American elm trees are not to be pruned between April 1st and August 1st and Siberian elm trees between April 1st and July 1st of any year under provisions of The Dutch Elm Disease Act.
- (b) E3.2 All damages to existing trees caused by the Contractor's construction activities shall be repaired to the requirements and satisfaction of the City of Winnipeg, Parks and Open Space Division, Urban Forestry Branch.
- (c) No separate measurement or payment will be made for protection of trees. It shall be considered incidental to the Contract Work.

E10.5.2 Manhole Modifications to Facilitate Liner Installation

- (a) If required to complete the work, the Contractor may choose to remove and replace the upper portions of the existing manholes to permit access to the existing sewers.
 - (i) The Contractor may reuse existing pre-cast concrete manhole components when found to be in good condition. The Contractor shall replace all other manhole components and pre-cast concrete manhole components found to be in a deteriorated condition.
 - (ii) Where manhole stacks are to be replaced and sizes are not noted on the drawings, the new manhole stack shall be the largest practical nominal size up to 1200 mm without exceeding the existing manhole base dimensions.
 - (iii) Select existing manholes and chambers may not be modified or excavated as shown on the Drawings.
- (b) All manhole works shall conform to CW2130.

E10.5.3 Excavation

- (a) The Contractor is responsible for locating the existing sewer and all other buried utilities, and shall take all steps to locate the existing sewer prior to excavation and installation of shoring.
- (b) Construction materials and excavation spoils shall not be stockpiled over pipelines.
- (c) Carefully excavate to expose existing pipelines.

- (d) Only smooth edged buckets may be utilized for excavations within 1.5 m of the existing sewer.
- (e) The existing sewer shall be located prior to proceeding with excavations within 1.0 m of the pipe. Final excavation (within 300 mm of the pipe wall) shall be completed using soft dig or hand excavation methods to prevent damage to the pipe.
- (f) Excess excavation materials shall be disposed of off site.
- (g) Any services severed during excavation and shoring installation must be rerouted or otherwise bypassed in accordance with E7.3.3

E10.5.4 Shoring Installation

- (a) Piles (if used) shall be installed with a minimum of 500 mm of clear separation between the pile and the outside of the existing sewer wall.
- (b) Piles (if used) shall be pre-bored to a depth below the invert of the sewer. Pre-bored holes shall be filled with a flowable low strength cementitious material after installation of piles to prevent movement of existing soils around the pipe, permit excavation/installation of shoring, and removal of piles.
- (c) Excavation and shoring installation shall not initiate movement or otherwise destabilize soils sounding brick and concrete sewers greater than 1200 mm in diameter.
- (d) Locate the extents of the existing sewer prior to pre boring and installing shoring using soft dig methods. Please note the wall thicknesses and outside diameter of the existing trunk sewers are unknown.
- (e) Shoring shall be suspended and shall not rest on the top of existing sewers.
- (f) Construction Vibrations
 - (i) The Contractor shall use means and methods that will limit vibrations at locations adjacent to utilities and structures.

E10.5.5 Demolition

- (a) Carefully remove, expose, and demolish existing manholes and sewers as required. The use of pneumatic breakers is prohibited. Tops of sewers may be saw cut or removed using small hand held jack hammers. Final openings in the existing sewers shall be neatly cut square to the existing pipe.

E10.5.6 Trunk Sewer Closures and Manhole Base Reconstruction

- (a) Construct trunk sewer closures and cast in place manhole bases as shown on the drawings after completion of the liner installation.
- (b) Complete cast-in-place concrete and reinforcing steel work as shown on the Drawings and in accordance with E13 and E14.

E10.5.7 Shoring Removal

- (a) Shoring systems shall be completely removed upon completion of the works.
- (b) Care shall be taken to remove the shoring system and backfill the trench in such a way as to not create voids. If the shoring system requires removal after backfill is in place, resulting voids shall be filled with flowable cement slurry.

E10.5.8 Backfill

- (a) Backfill within 1.0 m of existing and proposed pavements shall be completed to CW 2030, Class 1 standards. Granular Class 2 backfill shall extend to the underside of the stabilized fill.
- (b) Backfilling with frozen materials will not be permitted.

E10.6 Measurement and Payment

E10.6.1 Pipeline Access

- (a) Pipeline access, unless otherwise identified in Form B, shall be considered incidental to "Full Segment CIPP Lining" and will not be measured for payment. No additional payment will be made.
- (b) Where identified for payment in Form B, pipeline access shall be paid on a Lump Sum basis for each identified asset at the Contract Unit Price for "Pipeline Access" as listed in the Form B: Prices.
- (c) Payment for "Pipeline Access" shall include all costs associated with providing access to the pipeline to accommodate CIPP lining, including but not limited to: tree trimming and removals, excavations, shoring, demolition, manhole modifications, manhole replacement, new manhole installations, backfill, and all other materials, labour, and equipment required to complete the work as specified. Payment will be made on the following schedule:
 - (i) 50% payment of the Site Access lump sum price for each asset will be paid upon commencement of the liner installation for each site.
 - (ii) 100% payment of the Site Access lump sum price for each asset will be paid upon completion and acceptance of restoration at each site.
- (d) All manhole modifications required to facilitate the identified rehabilitation work shall be considered incidental to the pay items identified herein. Additional payment will not be made for manhole modifications required to complete the identified rehabilitation works where site conditions and work requirements are consistent with the tendered scope of work. Where a material change in condition is present or the rehabilitation work has materially changed, additional costs to complete manhole modifications will be paid under the "Cash Allowance for Provisional Manhole Construction" (E11.6.9).

E11. SEWER AND MANHOLE, PREPARATION, REPAIRS, AND STABILIZATION

E11.1 Description

- (a) Sewer and manhole stabilization shall mean the internal repair of sewers and manholes by man entry techniques. Repairs are varied and may consist of holes in sewers with voids, missing bricks in sewers, obstructions and manhole base or riser repairs. Sewer stabilization repairs shall be carried out in accordance with E11.3, prior to performing sewer lining.
- (b) The scope of work involved in sewer stabilization is as follows:
 - (i) Secure the site and provide temporary traffic control.
 - (ii) Obtain all necessary underground clearances.
 - (iii) Conduct a hazard assessment, including identification and evaluation.
 - (iv) Develop a safe work plan.
 - (v) Implement the necessary procedures and controls to control hazards and maintain a safe working environment.
 - (vi) Enter the manhole/sewer and perform the required repairs.
 - (vii) Clean-up the site.

E11.2 Materials

E11.2.1 Concrete

- (a) Concrete for large internal repairs to concrete and brick sewers and manholes and internal void filling shall be in conformance with Table CW 2160.1, Type B.

- (b) Patching and grouting of repairs to concrete and brick sewers and manholes shall be with a fast hardening high strength concrete repairing compound designed for underwater use
 - (i) Approved products: Duro-Crete by C Chemicals or approved equal in accordance with B7
- (c) Flowable cement-stabilized fill for external void filling from the ground surface shall be in conformance with Table CW 2160.1, Type D.

E11.2.2 Manhole components shall conform to CW2130.

E11.3 Sewer Repairs and Preparation Work

E11.3.1 Existing Sewer Design Conditions

- (a) The assessment of the liner system design conditions and site-specific repairs required to accommodate lining were based on the conditions observed from sewer inspections that were performed as part of the City of Winnipeg's Sewer Inspection Program. Copies of these video inspections are available to the Contractor upon request by providing a portable hard disk drive (HDD) to the Contract Administrator. The Contract Administrator will copy the inspections onto the HDD and make available to the Contractor for review purposes.
- (b) The Contractor shall be aware the video inspections provided were completed immediately after sewer cleaning and the amount of sediment and debris present at the time of this Bid Opportunity may not be the same. The Contractor shall be responsible to determine the actual amount of sediment and debris in the sewers included in this Work.
- (c) The specific repair requirements applicable to each CIPP lining location is shown in Appendix A– Repair Requirements.
- (d) Refer to E12.8 for additional site-specific conditions.

E11.3.2 Sewer Cleaning

- (a) Cleaning of sewers and manholes shall be completed in accordance with CW 2140 and this Specification.
- (b) Further to E11.3.2(a)(a), the following additional cleaning requirements shall apply for the CIPP liner installation, refer to E12.7.2

E11.3.3 Observed sewer defects and cleaning/preparation works evident in the existing sewer inspection videos have been provided in Appendix A

Host Pipe Conditions

E11.3.4 Notwithstanding E11.3.1(a), the following sewer stabilization, repairs, and preparation work can be reasonably assumed to be required and shall be completed prior to undertaking the identified rehabilitation work:

- (a) General Preparation
 - (i) Remove loose debris, solid debris, roots, and grease in accordance with CW 2140.
 - (ii) Remove any remaining organic or biological materials.
 - (iii) Remove any loose or spalling concrete to a depth sufficient to provide a competent host pipe surface.
 - (iv) Remove any loose or damaged bricks and/or mortar.
 - (v) Remove wall encrustations throughout.
 - (vi) Remove encrustations at service connections.
 - (vii) Grout sewer services as required following encrustation removal.
 - (viii) Remove intruding sewer connections in accordance with CW 2140.

- (ix) Reshape host sewer pipe invert to the original dimension and cross section at locations where the invert has completely deteriorated.
- (b) Further to E11.3.4(a), the following site-specific repairs shall be completed prior to liner installation work:
 - (i) Parkville Dr (S-MA50015183)
 - ◆ Grout patch around the lateral at the obvert of the pipe as a void filler to add additional support for the lateral.
 - (ii) Sutherland Ave (S-MA00013973)
 - ◆ Construct a new manhole at the downstream of the sewer asset meeting the requirements of CW2130 and the Drawings.
 - (iii) Higgins Ave (S-MA70033682)
 - ◆ Cut or bend protruding rebars at approximately 10.2m upstream of S-MH20012292. A short length must remain to support existing wood planks.
- (c) Further to E11.3.4(a), the following work shall be completed prior to the installation of CIPP liners:
 - (i) In accessible sewers, prepare and fill all voiding, holes, and discontinuities in the host pipe wall greater than 50 mm in depth or 150 mm diameter to provide a reasonably smooth surface against which to install the liner.
 - (ii) Fill voiding from any missing bricks with a cementitious repair product.
 - (iii) Repair any sources of infiltration to a level required to successfully complete the liner installation.

E11.3.5 The above is the minimum work program required, specific installation requirements for the chosen rehabilitation technology may require additional work beyond what has been specified herein. The Contractor is encouraged to familiarize themselves with the available CCTV data during tendering. Claims for additional costs related to prep work required to complete the installation where conditions are found to be consistent with the tendered condition of the pipeline will not be considered.

E11.4 Construction Methods

E11.4.1 Equipment Set Up

- (a) In accordance with the safe work plan for the repair, the Contractor shall set up the required safety equipment and controls to safely perform the work.
- (b) Specialized equipment to perform the repair work, such as lights, pressure washers, drills and chipping hammers shall in no way adversely affect the operation of the safety equipment required to perform the work.
- (c) Subsequent to completion of the repairs the Contractor shall remove all equipment from the sewers and manholes.

E11.4.2 Internal Sewer Repairs

- (a) The Contractor shall repair the sewer fabric to restore the structural integrity of the sewer and provide a smooth flow surface conforming to the adjacent sewer/manhole cross-section and materials.
- (b) Large concrete repairs shall include a reasonable and limited level of surface preparation, including removal of unsound material and cleaning of the edges of the repair area, and setting of the required formwork and bracing. Concrete placement and finishing shall be done in accordance with CW 2160. All formwork and bracing shall be removed from the sewer/manhole at the completion of the work.
- (c) Concrete patching shall include a reasonable and limited level of surface preparation, including removal of unsound material and cleaning of the edges of the repair area. The Contractor shall apply the patching material in accordance with the manufacturer's printed instructions.

- (d) Small voids in the backfill shall be filled with concrete or other approved material from the inside of the sewer prior to repairing the sewer fabric or by pressure grouting after completion of the repairs. The void shall be completely filled to prevent settlement of the backfill and provide a solid backing for the liner.
- (e) Pressure grouting shall be done in accordance with the manufacturer's printed instructions.
- (f) Large voids shall be filled from the ground surface after completion of the repairs. Holes shall be cored in the pavement or the pavement shall be saw cut and removed to permit vacuum excavation from the underside of the pavement to the void. The void shall then be completely filled with flowable cement-stabilized fill.

E11.4.3 External Point Repairs

- (a) The Contractor shall provide CCTV video of any proposed EPRs for review and acceptance by the Contract Administrator prior to undertaking the work.
- (b) Complete external point repairs in accordance with CW2130.

E11.4.4 Sewer Service Grouting

- (a) Sewer service grouting prior to lining shall be completed using a non-shrink, watertight cement grout, an appropriate polyurethane grout compound, or other approved grouting product, compatible with the existing host pipe. Grouting shall create a watertight and smooth inner surface for the host pipe and sewer service.
- (b) Sewer service grouting post lining shall fill voids between the sewer liner and the host pipe at sewer service openings with an appropriate polyurethane or other grouting system that is compatible with the liner system to form a smooth watertight connection.

E11.4.5 Annulus Grouting for CIPP

- (a) Complete annulus grouting where voids are evident between the liner and the host pipe.
- (b) Annulus grouting post lining shall be completed using an appropriate cementitious or polyurethane grouting system that is compatible with the liner system.
- (c) A cementitious grout shall be used where grouting is required to achieve long term structural performance of the liner and host pipe. In all other applications, a polyurethane grout may be used to fill voids between the liner and host pipe.
- (d) Cementitious grout shall conform to the requirements of CW 2130 and CW 2160.
- (e) The Contractor shall ensure short term buckling pressures of the installed liner are not exceeded during the grouting process.
- (f) A detailed grouting plan shall be submitted for all grouting operations, including the following:
 - (i) Proposed grouting material complete with physical characteristics.
 - (ii) Grouting procedure complete with estimated grouting pressures.
 - (iii) Allowable grouting pressure based on the buckling capacity of the installed liner.

E11.4.6 Manhole Repairs, Modifications, and Installations

- (a) Complete manhole repairs, modifications, and new installations identified in the Specifications or on the Drawings in accordance with the drawings and CW 2130.
- (b) Complete cast-in-place concrete and reinforcing steel work as shown on the Drawings and in accordance with E13 and E14.
- (c) Manhole rungs removed to facilitate installation of CIPP liner must be replaced with new manhole rungs meeting the requirements of CW 2130.

E11.5 Quality Control

E11.5.1 Repair Acceptance

- (a) Upon completion of the designated repair the Contractor shall clean and perform the pre-lining inspection.
- (b) The Contractor shall not be responsible for defects in existing un-repaired sewer lines unless those defects are a direct result of the Contractor's operation.

E11.5.2 Correction of Deficiencies

- (a) The Contractor shall correct deficiencies found in the sewer repair at their own cost including the cost of re-cleaning and re-inspection to confirm that the deficiencies are rectified in accordance with these specifications.

E11.6 Measurement and Payment

E11.6.1 Sewer Cleaning

- (a) Sewer cleaning will be measured and paid in accordance with CW 2140, except as modified herein:
- (b) The total length of cleaning to be paid will be the total length of sewer cleaned to the satisfaction of the Contract Administrator.
 - (i) The maximum length to be paid will be the manhole to manhole sewer length provided by the Contractor.
 - (ii) Where partial or incomplete cleaning is completed, the length of sewer cleaned will be the length recorded by the Contractors calibrated inspection equipment or as determined by the Contract Administrator.

E11.6.2 Internal Sewer Repairs

- (a) Internal sewer repairs will be measured on a unit basis and paid for at the Contract Unit Price for "Internal Sewer Repairs" for the respective repair type. Number of units to be paid for will be the total number of internal sewer repairs made in accordance with this specification, accepted and measured by the Contract Administrator.
 - (i) Concrete patching of sewer walls up to 1.0 metre in length will be measured and paid for on a unit basis and paid for at the Contract Unit Price for "Concrete Patching – Up to 1.0 metre long". Number of units to be paid for will be total number of concrete patch repairs up to 1.0 metre long completed in accordance with this specification, accepted and measured by the Contract Administrator.
 - (ii) Concrete patching of sewer walls greater than 1.0 metre in length will be measured and paid for on a linear metre basis and paid for at the Contract Unit Price for "Concrete Patching – Greater than 1.0 metre long". Distance to be measured and paid will be total length of concrete patch in excess of 1.0 m long completed in accordance with this specification, accepted and measured by the Contract Administrator.
 - (iii) Grouting of cross bores will be measured and paid on a lump sum basis at Contract Unit Price for "Cross Bore Grouting" at the locations identified in Form B.
 - (iv) Annulus grouting will be measured and paid on a lump sum basis at Contract Unit Price for "Annulus Grouting" at the locations identified in Form B.
- (b) Payment for Internal Sewer Repairs shall include all materials, equipment and labour required to complete the work as specified.

E11.6.3 External Point Repairs

- (a) Measurement and payment for EPRs will be measured and paid on a lump sum basis per EPR as identified in Form B. Payment will be for all labour, equipment, and materials required to complete the work and restoration as specified.
 - (i) 80% payment will be made upon completion of the EPR, backfill, and temporary site restoration.

- (ii) 100% payment will be made upon acceptance of EPR after submission and review of the pre-lining CCTV inspection and restoration of the site.

E11.6.4 Manhole Installation

- (a) Installation of a new manhole at Sutherland Ave and Euclid Ave will be measured and paid on a lump sum basis at the Contract Unit Price for "Installation of new Manhole on Sutherland Ave. & Euclid Ave. (Downstream of S-MA00013973)". Payment will be for all labour, equipment, and materials required to complete the work and restoration as specified.
 - (i) 80% payment will be made upon completion of the installation, backfill, and temporary site restoration.
 - (ii) 100% payment will be made upon restoration of the site.

E11.6.5 Annulus Grouting

- (a) Annulus voids due to the Contractor's method of lining, deficiencies in the liner installation, or any other reason related to the Contractor's workmanship or method of operations shall be filled at the Contractor's expense.
- (b) Repair of defective or incomplete annulus grouting shall be at the Contractors own expense.

E11.6.6 Manhole Modifications

- (a) The completion of all manhole and sewer modifications to facilitate pipeline access shall be measured and paid in accordance with E10.6.

E11.6.7 Provisional - Sewer Service Grouting

- (a) Sewer service grouting will be measured on a unit basis and paid for at the Contract Unit Price for "Sewer Service Grouting (900 mm Dia. and greater)". Number of units to be paid for will be the total number of units reinstated in accordance with this specification, accepted and measured by the Contract Administrator.
- (b) If voids at sewer services are due to the Contractor's method of reinstatement, deficiencies in the CIPP installation, or any other reason related to the Contractor's workmanship or method of operations, grouting shall be completed at the Contractor's expense.

E11.6.8 Provisional - Manhole and Catch Basin Repairs

- (a) The completion of all manhole and sewer modifications to facilitate pipeline access shall be measured and paid in accordance with E10.6.
- (b) Where additional manhole works are required beyond what is required to facilitate lining or identified by the Contract Administrator payment shall be made in accordance with E11.6.9. Work shall include additional works required due to manhole deterioration in excess of that identified at the time of tendering or additional repairs identified by the Contract Administrator through the course of the project. Confirm all extra repairs with the Contract Administrator prior to commencement.
- (c) Repair of concrete manhole benching will be measured on a unit basis and paid for at the Contract Unit Price for "Repair of Concrete Benching (up to 0.5 m³)". Payment for concrete manhole benching repair shall include all required materials and labour to complete the repair of the manhole benching identified by the Contract Administrator up to 0.5 m³ of grout. Number of units to be paid for will be the total number of repairs completed in accordance with this specification, accepted and measured by the Contract Administrator.
- (d) Patching of existing manholes shall be measured and paid on a vertical m basis at the Contract unit price for "Patching Existing Manholes". Payment shall include all materials, labour, and equipment required to complete the work as specified.
- (e) Repointing of existing brick manholes shall be measured and paid on a vertical m basis at the Contract unit price for "Re-Pointing Existing Brickwork". Payment shall

include all materials, labour, and equipment required to complete the work as specified.

- (f) Replacement of existing manhole rungs will be paid on a unit basis at the Contract unit price for "Replace Existing Manhole Rungs". Payment shall include all materials, labour, and equipment required to complete the work as specified.
- (g) Supply and installation of manhole frame and covers will be measured and paid on a unit basis at the Contract unit price identified in Form B for the respective item. Payment shall include all materials, labour, and equipment required to complete the work as specified.

E11.6.9 Cash Allowance for Provisional Manhole Construction and Repair

- (a) The Cash Allowance for provisional manhole construction and repair is intended to be used for the out of scope construction and repair of manholes where required to facilitate installation of CIPP liners and where directed by the Contract Administrator. The Cash Allowance will not be used to pay for the construction of manholes identified on the drawings and within Form B or for the repair of manholes where provisional items exist in Form B.
- (b) 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.
- (c) Cost of authorized manhole installations 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 for Provisional Manhole Construction. If the valuation of the authorized Work exceeds the Value of the Cash Allowance for Provisional Manhole Construction, the Contract Value will be adjusted by the shortfall.

E11.6.10 Cash Allowance for Provisional External Point Repairs

- (a) The Cash Allowance for provisional external point repairs is intended to be used for the out of scope repair of sewer assets where required to facilitate installation of CIPP liners, and where directed by the Contract Administrator. The Cash Allowance will not be used to pay for any EPRs identified on the drawings and within Form B, or for provisional EPRs identified within Form B.
- (b) 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.
- (c) Cost of authorized EPRs which are identified prior to lining, reviewed and determined to be necessary in order to complete installation of the CIPP liner 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 for Provisional External Point Repairs. If the valuation of the authorized Work exceeds the Value of the Cash Allowance for Provisional External Point Repairs, the Contract Value will be adjusted by the shortfall.

E12. CURED-IN-PLACE-PIPE (CIPP)

E12.1 Description

- (a) This specification covers the supply and installation of full segment, partial full segment (blind shot), and point repairs using cured-in-place pipe (CIPP).

E12.2 Definitions

- (a) Cured-in-place-pipe (CIPP) means trenchless sewer rehabilitation by installing a resin-felt composite structure which when cured will form a continuous-close fit liner within an existing sewer.

- (b) Approved CIPP Suppliers and Installers means suppliers and installers pre-approved under City of Winnipeg “Request for Qualifications for the Supply and Installation of Cured in Pipe (CIPP)”. A list of pre-approved CIPP suppliers and installers for 2010 is included in the Specifications.
- (c) Full segment CIPP means CIPP extending from manhole to manhole or manhole to node (wye or tee connection to another sewer).
- (d) Partial full segment CIPP means CIPP extending from a manhole to an intermediate point within the sewer and shall generally be longer than ten metres in length.
- (e) Non-Reinforced CIPP liners shall be considered any CIPP liner constructed from a non-reinforced felt.
- (f) Reinforced CIPP liners shall be considered any CIPP liner constructed from either a carbon fibre or glass fibre reinforced felt.

E12.3 Pre-Approved CIPP Suppliers, Installers, and Materials

- (a) The following is a list of sewer lining systems – suppliers, installers and materials that have been pre-approved under the City of Winnipeg “Request for Qualifications for the Supply and Installation of Cured in Pipe (CIPP)” Bid Opportunity No. 253-2006 and Bid Opportunity 403-2007 for City of Winnipeg sewer rehabilitation projects.

Table E2.3.1a): Pre-Approved CIPP Suppliers and Installers

<i>Applicant</i>	<i>Insituform Technologies Limited</i>	<i>Capital Commercial Pipe Services</i>	<i>Nelson River Construction Inc.</i>	<i>Clean Water Works Inc.</i>
Contact	Andrew Foster 780-413-0200	Brian Ratchford 905-522-0522	Brad Morton 204-949-8700	Jeff Pappin 613-745-2444
Supplier	Insituform Technologies Inc.	Capital Commercial Pipe Services	C.I.P.P. Corporation	Clean Water Works Inc.
Installer	Insituform Technologies Limited	Capital Commercial Pipe Services	Nelson River Construction Inc.	Clean Water Works Inc.
Liner Name	Standard ITL CIPP & Standard ITL CIPP AISC	Capital Lining System (CIPP)	C.I.P.P. Corp Liner	CWW CIPP Design

E12.4 Submittals

- E12.4.1 Installation of CIPP liners shall not commence prior to submission and review of the submissions identified herein by the Contract Administrator.
- E12.4.2 Provide CIPP designs for review by the Contract Administrator in accordance with E2 a minimum of ten (10) Business Days prior to starting lining operations. CIPP shop drawings 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 trenchless rehabilitation systems.
 - (a) CIPP thickness computations including all specified design checks identified in E12.5. Identify design assumptions based on a review of the Sewer Maintenance Inspection that differ from the information provided in the Specifications for the existing sewer design conditions.
 - (i) Tabular design summaries are acceptable as a design submission for all small diameter liners (considered less than 450 mm in diameter). Tabular design submissions must meet all requirements outlined herein and include all design inputs and assumptions.

- (ii) Design submissions for all large diameter sewers (considered equal to or greater than 450 mm in diameter) shall include all calculations and be submitted on individual calculation sheets.
 - (b) Name, manufacturer and product of the resin and felt tube proposed for each CIPP.
 - (c) Means of liner installation and curing method (e.g. air/steam, water, air/UV).
 - (d) CIPP material properties used for design.
 - (e) Host pipe measurements identified in E8.2.1, including the following:
 - (i) Sewer length
 - (ii) Host pipe dimensions
 - (iii) Sewer invert depths
 - (f) Liner sizing. Identify under-sizing from the measured circumference and anticipated liner stretch to form a close fit with the host pipe.
 - (g) Other information that may reasonably be required by the Contract Administrator to confirm the CIPP design proposed conforms to the specified requirements and design intent.
- E12.4.3 Provide resin samples within five (5) Business Days of a request by the Contract Administrator. Samples shall be provided as follows:
- (a) Arrange for the manufacturer of the resin to forward a reference sample of each type of resin proposed for use on the works to a test laboratory designated by the Contract Administrator to be used as a comparative reference sample for infrared spectrum testing.
 - (b) When requested by the Contract Administrator, deliver a representative sample from each resin batch to be used on the project before adding the catalyst from the wet-out facility to a test laboratory designated by the Contract Administrator.
 - (c) The Contract Administrator will arrange and pay for an infrared analysis of the samples, if required for the project.
- E12.4.4 Submit a liner impregnation protocol that provides information on the following a minimum of five (5) Business Days prior to wet of out liners:
- (a) Resin impregnation method.
 - (b) Designated location of the wet out facility.
 - (c) Documentation that the resin to be used has not exceeded its shelf life as recommended by the manufacturer of the resin.
 - (d) Volume and weight of resin to be impregnated into each liner and repair section including the proposed excess allowance for polymerization and migration (typically 7%) into cracks and joints of the host pipe.
 - (e) Resin calculations shall be provided for each liner greater than 1200 in diameter or height.
 - (f) Roller gap setting required to provide the final installed CIPP thickness based on the proposed volume of resin.
 - (g) Details of the field wet-out procedure for TPR.
- E12.4.5 Submit a liner installation protocol that provides information on the following a minimum of five (5) Business Days prior to installation of CIPP:
- (a) Proposed main line and sewer service flow control arrangements in accordance with E4. Note, flow control plans may be submitted separate from the liner installation protocol.
 - (b) Installation and curing method complete with proposed equipment.
 - (c) A full curing protocol, including:
 - (i) Curing times (heat up, curing, cool down)

- (ii) Curing temperatures
 - (iii) Inversion and cure pressures (minimum and maximum)
 - (iv) Rate of travel of the UV light train and amount of lamps in operation in the case of UV cures.
- (d) Provide the maximum allowable axial and longitudinal tensile stress for the fabric tube and the arrangement for monitoring pull-in forces during installation if liner insertion is to be by pull-in methods.
- (e) Number and location of heat source monitor gauges.
- (f) Number and location of thermistors to be used for monitoring the temperature of the liner during the curing process.
- (g) Estimated length of time required to reinstate the main line sewer and sewer services.
- (h) Additional information may be required by the Contract Administrator for complex installations. This may include site setup details, over the hole wetout procedures, and other information pertinent to the review and evaluation of the Contractors proposed construction methods.
- (i) Submission Requirements:
- (i) Tabular installation protocols showing multiple installations are acceptable for all small diameter liners (considered less than 450 mm in diameter), provided they meet all other requirements outlined herein.
 - (ii) Installation protocols for all large diameter sewers (considered equal to or greater than 450 mm in diameter) shall be submitted as individual submissions.

E12.4.6

Submit a sampling protocol a minimum of five (5) Business Days prior to installation of the first CIPP liner. The protocol shall include:

- (a) Detailed procedure for preparing plate samples, including a sample plate sample preparation quality control form. The Contractor shall provide a filled out plate sample preparation form for each plate sample provided, signed off by the wet out supervisor and project manager affirming the correct preparation of the samples. The form shall include the dimensions of the sample, direction of the circumferential fibres, and date of preparation, location of preparation.
- (b) Sampling procedures for plate samples, confined pipe samples.
- (c) Description of confined pipe forms to be utilised.
- (d) Procedure, complete with diagram for placement of heat sink (sand bags) for confined pipe samples.
- (e) Sizes for all samples to be obtained.
- (f) Liner repair products and procedures for direct cut samples.

E12.4.7

Submit a styrene management plan in accordance with E12.7.9(d) a minimum of five (5) Business Days prior to installation CIPP liners requiring styrene management. All styrene management plans shall include sufficient details on:

- (i) Regulatory compliance considerations for discharge based on the Contractor's proposed resin selection, curing method, and discharge location for steam condensate or cure water, first flush, etc.
- (ii) The means, methods, and techniques employed to mitigate styrene levels to within acceptable limits for the site specific application, including:
 - ◆ Resin selection to eliminate or mitigate styrene levels;
 - ◆ Cure considerations to mitigate excessive styrene volatilization;
 - ◆ Handling considerations, post cure to mitigate levels discharged to aquatic or other environments that may be deleteriously impacted by excessive styrene levels.

E12.5 Design of CIPP Liners

E12.5.1 Design Objectives

- (a) Maximizing the structural enhancement of the sewer by installing a close-fit CIPP.
- (b) Maximise the internal diameter of the rehabilitated sewer with as little impact on the hydraulic capacity of the sewer as possible.
- (c) Reducing infiltration and exfiltration.
- (d) Preventing root intrusion.
- (e) Providing sufficient chemical resistance to prevent further sewer pipe degradation related to the conveyance of sewage.
- (f) Minimizing sewer service disruption during rehabilitation.
- (g) Minimizing the time required to complete the sewer rehabilitation.
- (h) Minimizing disturbance to pavements and boulevards.
- (i) Minimizing disruption to vehicular and pedestrian traffic.
- (j) Minimizing the impact of construction on commercial, industrial, and institutional facilities.
- (k) Additional design objectives for internal point repair CIPP include.
 - (i) Providing a smooth transition between the internal point repair CIPP and the host pipe to prevent the build-up of solids and minimize wear on the repair due to routine sewer cleaning and other maintenance activities.
 - (ii) Filling any existing voids outside the sewer at the point of repair.
- (l) Select a CIPP product and construction approach for rehabilitation with the intent towards maximizing the achievement of these design objectives.

E12.5.2 General

- (a) Chemical and mechanical properties of the liner based on the waste stream to establish and minimum design life of 50 years.
- (b) Size CIPP in accordance with the design objectives to provide a close-fit to the host pipe with no annulus except for the maximum allowable diametric shrinkage due to curing permitted in ASTM D5813.
- (c) Design features of internal point repair CIPP shall include:
 - (i) Design internal point repair CIPP as a gravity pipe in a fully deteriorated pipe condition and the depth of cover calculated based on the specific location of the repair in the sewer or sewer service.
 - (ii) Tapered end sections to promote a smooth transition from the repair to the host pipe.
 - (iii) A means to facilitate flow through by-pass of existing dry weather flow during the course of the repair.
- (d) Long-term values for flexural modulus of elasticity and flexural strength will be considered to be the projected value at 50 years of a continuous application of the design load based on the specific resin and felt composite as established by ASTM D2990 (or equivalent ISO or otherwise accepted testing method) based on an applied stress level of 25% of the yield strength of the liner and approved for use in the pre-qualification process. A minimum test length of 10,000 hrs is required. The Contractor shall provide supporting long term test data conforming to ASTM D2990 for any resin and felt composites not approved for use in the prequalification process.
- (e) The Contractor shall also provide short term test data on the modulus of elasticity and flexural strength of the in place composite structure conforming to ASTM D790 for any resin and felt composites not approved for use in the prequalification process.

E12.5.3 Minimum Loading Assumptions:

- (a) Unless otherwise specified, the groundwater table shall be assumed to be 2.0 m below the existing ground surface.
- (b) Calculate soil loads based on saturated soil unit weight of 18.85 kN/m^3 (1922 kg/m^3).
- (c) Design calculations shall consider both maximum and minimum soil cover scenarios for each liner. The governing load case shall govern the design.
- (d) The following live loads shall be included in the design:
 - (i) Sewers crossing beneath rail lines: Where identified, applied soil pressures from a Cooper E80 rail load shall be estimated and utilized in the design of the CIPP liner. Rail loads shall include a track allowance dead load of 297 kg/m . Applied rail loads at depth shall be calculated using the Boussinesq solution for distribution of soil stresses from surface point loads. Impact factors for rail loads shall be calculated in accordance with the AREMA Manual for Railway Engineering.
 - (ii) All other sewers: The applied soil pressures from an AASHTO HS 25 design truck unless a higher or lower value is indicated in the contract specifications shall be estimated and utilized in the design of the CIPP liner. Applied soil pressures from AASHTO design truck loads shall be estimated in accordance with AASHTO LRF D Bridge Design Specifications, Seventh Edition (2014).
- (e) Unless otherwise specified, applied soil pressures at depth caused by superimposed surface loads shall be calculated using the Boussinesq solution for distribution of stresses from surface point loads.

E12.5.4 Hydraulic Design Checks

- (a) Perform a design check to confirm that the full flow hydraulic capacity of the CIPP will be equal to or greater than the existing sewer. Use "Manning's" formula with assumed 'n' value of 0.012 for the CIPP and 0.014 for the existing sewer. Report any sewers showing a decrease in post lining flow capacity from existing conditions.

E12.5.5 Circular CIPP Design – Minimum Design Assumptions

- (a) An enhancement factor (K) of 7, assuming a close fit with the host pipe.
- (b) Minimum factor of safety (N) of 2 for restrained buckling analysis.
- (c) Modulus of soil reaction (E's) will be assumed to be 6900 kPa unless otherwise specified.
- (d) The following minimum values for ovality of the existing sewer shall be used unless otherwise specified or as determined from observation of the maintenance inspection:
 - (i) Partially deteriorated design – 3%
 - (ii) Fully deteriorated design – 2%

E12.5.6 Circular CIPP Design - Partially Deteriorated Condition

- (a) Design CIPP for partially deteriorated pipe condition in accordance with Appendix X1 of ASTM F1216 and the following minimum design checks:
 - (i) Determine wall thickness by restrained buckling analysis.
 - (ii) Determine whether wall thickness will be governed by long-term flexural stress.
 - (iii) Determine whether any localized thickening is required for missing segments or holes in the host pipe.
 - (iv) Perform supplemental design checks where the host pipe has invert "flats" to determine whether wall thickness will be governed by one of the following:
 - ◆ Buckling by assuming the flat functions as a pin-ended strut.
 - ◆ Stress, by assuming the flat functions as a pinned member, subjected to axial and transverse loads.
 - ◆ Deflection by assuming that allowable deflection is limited to 3% of the length of the flat.

E12.5.7 Circular Design – Fully Deteriorated Condition

- (a) Design CIPP for fully deteriorated pipe condition in accordance with Appendix X1 of ASTM F1216 and the following minimum design checks:
 - (i) Determine wall thickness by restrained buckling analysis.
 - (ii) Check minimum wall thickness requirements.
- (b) Applied external loads shall be estimated in accordance with Appendix X1 of ASTM F1216.

E12.5.8 Non-Circular Design

- (a) The selection of CIPP minimum thicknesses for non-circular liners shall be completed in accordance with the appropriate design equations provided in . The design equations provide thickness requirements based a range of long-term flexural strength and modulus values for the conditions noted in the design tables.
- (b) The Contractor shall determine the required CIPP liner wall thickness using the following procedure:
 - (i) Select the long-term flexural strength and modulus for the lining product proposed for use.
 - (ii) Determine the depth and load conditions for the liner.
 - (iii) Using reviewed and accepted long-term flexural strength and modulus determine the minimum liner thickness from the respective design equation using applicable design conditions.
 - (iv) The required minimum liner thickness shall be the greater of the thicknesses determined from the design equation for flexural modulus and flexural strength.
 - (v) Select a nominal CIPP liner thickness greater than the minimum determined through the above method.
- (c) Minimum material properties:
 - (i) Material properties shall conform to the material requirements specified herein and fall within the range of material properties noted in Appendix D.
- (d) The Contractor shall confirm the design conditions stipulated with the design equations and advise the Contract Administrator of any conditions more adverse than those identified with the designs. If field conditions are found to be more adverse than those identified with the designs the Contract Administrator (designer) will provide new design curves for the design conditions measured on site. Increases to the liner thickness based on the discovery of more adverse design conditions will be considered a Change in Work as defined by the General Conditions.

E12.5.9 Existing Sewer Design Conditions

- (a) The assessment of the liner system design conditions and site-specific repairs required to accommodate lining were based on the conditions observed from sewer inspections that were performed as part of the City of Winnipeg's Sewer Inspection Program. Refer to E11.3.1 regarding obtaining copies of the existing inspections.
- (b) The specific design conditions applicable to each CIPP lining location are shown in Appendix B.

E12.6 Materials

E12.6.1 Non-Reinforced CIPP Products

- (a) Non-Reinforced CIPP products shall conform to the requirements of ASTM F1216 and D5813.

E12.6.2 Reinforced CIPP Products

- (a) Reinforced CIPP products shall conform to the requirements of ASTM F2019 and D5813. Notwithstanding ASTM F2019, the fabric tube may be reinforced with either

glass or carbon fibres, as required to achieve the desired short and long term material properties and may be installed via inversion methods.

- (b) Reinforced CIPP systems utilizing UV curing methods may be utilized.

E12.7 Construction Methods

E12.7.1 Verification of Existing Sewer Dimensions

- (a) Verify dimensional requirements of each sewer to be rehabilitated prior to design and manufacture of the CIPP tube in accordance with E8.2.1.

E12.7.2 Sewer Cleaning

- (a) Remove loose debris, solid debris, roots, and grease in accordance with CW 2140 in order to adequately prepare the sewer for lining.

E12.7.3 Sewer Preparation and Repairs Prior to Lining

- (a) Perform sewer preparation and repairs as indicated in the specification and drawings.
- (b) Complete the following internal host pipe repairs as indicated in Appendix A in accordance with E11 of this specification.
 - (i) Fill in holes and patch deteriorated sections of the host sewer pipe wall.
 - (ii) Fill voids in the surrounding backfill flush with the inside surface of the sewer pipe.
 - (iii) Reshape host sewer pipe invert to the original dimension and cross section at locations where the invert has completely deteriorated.
 - (iv) Remove intruding sewer services in accordance with CW 2140.
 - (v) Sewer service grouting in accordance with E11.

E12.7.4 Manhole, and Catch Basin Modifications

- (a) Remove and replace manhole frames, covers, rungs and risers required to facilitate the CIPP installation in accordance with E9 and CW 2130.

E12.7.5 Continuous Temperature Monitoring

- (a) Where specified, the Contractor shall install the CIPP liners complete with a fibre optic thermal sensing cable (to be left in place) that is capable of continuously monitor curing temperatures along the entire length of CIPP liner. The cable and recording equipment shall be capable of temperature readings every 450 mm in real time. Curing data logs shall be submitted to the Contract Administrator with the Quality Control records.
- (b) Continuous temperature monitoring shall be utilized on the following installations:
 - (i) Air/steam installations 900 mm and greater in diameter;
 - (ii) water installations 1200 mm and greater in diameter; and/or
 - (iii) as specified in E12.8 and/or on the Drawings.

E12.7.6 Installation of CIPP

- (a) Install liners by inversion methods in accordance with ASTM F1216 or by pull-in methods in accordance with ASTM F1743 or ASTM F2019.
- (b) Full segment and partial full segment CIPP shall be cured by hot water, steam, or UV light sources.
- (c) Carry out workmanship in accordance with ASTM D5813.
- (d) Trim ends of CIPP neatly to fit flush with interior vertical surface and manhole benching and seal to make watertight.
- (e) Fill annular spaces where the CIPP does not make an adequate seal with the host pipe at manholes, termination points and sewer services due to broken or misaligned pipe with a resin-rich mixture compatible with the CIPP.

- (f) Extend limits for internal point repairs a minimum of 300 millimetres in each direction beyond the limits of the defect to be repaired. Extend internal point repairs that terminate at sewer service services a minimum distance of 300 millimetres beyond the limit of the service.
- (g) Ensure termination points of internal point repairs provide a smooth and uniform flow transition to the host pipe for the full circumference of the repair.

E12.7.7 Reinstatement of Sewer Services

- (a) Reinstatement all active and unable to determine sewer services including CB leads and utility drains to 100% of the original cross sectional area.
- (b) Cut out openings for sewer services from inside the lined sewer by manual means or with a television camera and a remote controlled cutting device.
- (c) Remove sharp edges from opening cut outs and provide a smooth rounded lip.
- (d) Sewer Service Grouting
 - (i) Sewer service grouting may be required if visible voiding is present at the service during the review of Post Lining Video Inspection.
 - (ii) Complete sewer service grouting in accordance with E9.
- (e) Ensure that all cut-outs for sewer connections are removed from the sewer and are prevented from being washed into the sewer system downstream of the repair location. Damages resulting from failure to capture CIPP cut-outs will be the direct responsibility of the Contractor.

E12.7.8 Annulus Grouting

- (a) Complete annulus grouting in accordance with E9 where identified by the Contract Administrator during the Post Lining Video inspection.

E12.7.9 Styrene Management

- (a) Under no circumstances shall cure water or condensate containing styrene be discharged into a storm sewer or any other direct connection to surficial drainage courses or facilities.
- (b) The Contractor shall develop and implement a styrene management plan for each site that could reasonably be impacted by planned or inadvertent discharge of styrene into the land drainage system, based on the site specific conditions for the CIPP installation and boundary conditions at that site.
- (c) The Contractor shall submit styrene management plan(s) for each identified site in accordance with E12.4.7.
- (d) The Contractor's styrene management approach shall include one of the following methods of control:
 - (i) Use of styrene free resins;
 - (ii) Use of on-site treatment systems where hot water curing methods are utilized;
 - (iii) 100% condensate capture and off-site disposal to the WWS system;
 - (iv) On-site monitoring to verify no residual styrene is discharged to the environment where UV curing methods are used.
- (e) The Contractor shall be responsible to undertake sufficient monitoring to confirm and demonstrate that discharge levels are consistent with the styrene management plan's stated discharge limit objectives. Provide a report on styrene monitoring results upon completion of liner installation.

E12.7.10 Quality Control Records

- (a) Maintain the following Quality Control records of the work and provide to the Contract Administrator after completion of the work.
 - (i) Summary of the resin impregnation process including:
 - ◆ Volume of resin supplied.

- ◆ Excess quantity of resin added during the wet out to account for polymerization and migration into the host pipe.
 - ◆ Roller gap setting.
 - ◆ Resin catalyst(s) used.
 - ◆ Time and location of the wet out.
 - ◆ Means taken to store and transport the resin impregnated CIPP from the wet out facility to the job site.
- (ii) Means of curing liners.
 - (iii) Continuous log of pressure maintained in the liner during the curing period.
 - (iv) Pulling force used to pull or winch CIPP into place in the host sewer and measured liner elongation.
 - (v) Continuous log of temperature at boiler in and out and at all thermistors placed between the host pipe and the liner at all manholes during the initial cure, cure, and cool down periods.
 - (vi) Where specified, the Contractor shall install the CIPP liners complete with a fibre optic thermal sensing cable (to be left in place) that is capable of continuously monitor curing temperatures along the entire length of CIPP liner. Curing data logs shall be submitted to the Contract Administrator with the Quality Control records.
 - (vii) For UV cures, monitoring shall also include the rate of travel of the UV assembly and the amount of lamps in operation during the curing process.
 - (viii) Continuous temperature monitoring logs.

E12.7.11 CIPP Samples for Quality Assurance Purposes

- (a) The Contractor shall provide the following samples from each CIPP liner:
 - (i) Confined test sample in accordance with E12.7.11(i).
 - (ii) Plate sample in accordance with E12.7.11(j).
- (b) If it can be demonstrated that it is impractical to obtain confined test samples due to CIPP size and/or site specific conditions then results from test plate sample results modified in accordance with Clause E12.7.11(j)(vi) of this specification will be used to confirm flexural strength and flexural modulus.
- (c) Schedule the installation of liners for which confined pipe samples are impractical to obtain after a minimum of three (3) previous CIPP linings on the same project have been completed and confined pipe and test plate samples have been secured to provide collaborative testing. The Contract Administrator will coordinate and pay for CIPP sample testing to confirm the CIPP flexural strength, flexural modulus and thickness in accordance with the requirements of ASTM D5813, D790, and ASTM D3567.
- (d) Where plate sample test results are used for design reconciliation purposes, they will be reduced by the statistical difference between plate and pipe sample testing results on the project as described in E12.7.11(c). Where no statistical correlation can be found due to poor testing results or lack of comparison samples, a 15% reduction will be applied to both flexural strength and modulus results obtained from plate sample testing.
- (e) In larger sewer sizes where it is not possible to provide a full diameter confined test sample and upon the request of the Contract Administrator, the Contractor shall cut a sample directly from the installed CIPP liner in accordance with E12.7.11(k).
- (f) Where confined test samples cannot be obtained or where confined test samples forms do not match the inside dimensions of the host pipe the Contractor shall obtain and provide the Contract Administrator with pre and post lining measurements taken in accordance with Clause E8.2.1 of this specification to confirm in-place liner thickness.

- (g) The Contract Administrator will review CIPP liner thickness results taken from test plates or unconfined samples on a case-by-case basis.
- (h) All samples shall be labeled as follows:
 - (i) City of Winnipeg Tender Number
 - (ii) City of Winnipeg asset number
 - (iii) Date of installation
 - (iv) Street name
- (i) Confined Test Samples
 - (i) Provide necessary forms of the same diameter as the host pipe and secure a minimum 200-millimetre-long full diameter confined test sample from each CIPP and internal point repair. Large diameter CIPP liners utilizing reinforcing may require a longer sample length, confirm with the Contract Administrator.
 - (ii) Locate the test sample from inside an intermediate manhole or at a termination point and invert through the form.
 - (iii) Confined test sample forms shall be covered with sandbags or a similar medium to form a heat sink and replicate the install conditions of the CIPP liner.
 - (iv) Cut the CIPP sample to coincide with multi-piece form if used for CIPP larger than 450 millimetres in diameter to facilitate removal from the manhole.
 - ◆ Identify the sewer where the liner sample is from on the form or sample itself if no form and provide to the Contract Administrator intact in the form.
- (j) Test Plate Samples
 - (i) Produce and provide to the Contract Administrator test plate samples of each CIPP liner installed.
 - (ii) Test plate samples shall be produced from a full thickness portion of the liner (where possible), shall contain the same resin and hardener ratios and volumes used in the CIPP liner wet-out. Ensure the test plate is clamped as close to the final installation thickness of the CIPP liner as possible.
 - (iii) For unreinforced liners the minimum dimension of test plate sample shall be 300mm x 300mm.
 - (iv) For reinforced liners the test plate sample shall be sized to accommodate a 32:1 span to depth (liner thickness) ratio. Circumferential reinforcing fibres shall be orientated in the long dimension of the test plate sample. Minimum dimensions for the test sample shall be as follows. Confirm the required test plate size for reinforced liners with the Contract Administrator prior to installation of the CIPP liner.
 - ◆ Width: 13 times the thickness of the liner
 - ◆ Length: 35 times the thickness of the liner
 - (v) Prepare test plate samples on-site from the actual CIPP and cure in the following manner:
 - ◆ in a clamped mold placed in the downtube or manhole for water-cured liners.
 - ◆ In a clamped mold placed in a container filled with uniformly distributed steam from the installation manhole for steam-cured liners.
 - (vi) Flexural strength and flexural modulus results obtained from test plates will be reduced, if necessary, by the maximum percentage difference of the confined pipe and test plate samples prepared from the same CIPP system for a minimum of three (3) previous CIPP linings of similar size on the same project.
- (k) Direct Samples
 - (i) Where directed, the Contractor shall obtain a sample of the installed CIPP liner from within the host pipe.

- (ii) Direct samples of the CIPP liner shall be a minimum of 300mm x 300mm for unreinforced liners.
- (iii) For reinforced liners the sample shall be sized to accommodate a 32:1 span to depth (liner thickness) ratio. Circumferential reinforcing fibres shall be orientated in the long dimension of the sample. Minimum dimensions for the test sample shall be as follows. Confirm the required sample size for reinforced liners with the Contract Administrator prior to obtaining the sample.
 - ◆ Width: 13 times the thickness of the liner
 - ◆ Length: 35 times the thickness of the liner
- (iv) Cut the test sample from a location where no defects were noted in Appendix A and at the 10:00 o'clock or 2:00 o'clock position in circular sewers. Direct samples from reinforced liners shall be oriented with the long dimension vertically in the straightest portion of the sewer or as directed by the Contract Administrator. Confirm sampling locations with the Contract Administrator prior to work.
- (v) For repairs up to 25 mm in thickness, grout the area where test sample was taken with a resin-rich repair product such as an epoxy based repair system that is compatible with the liner system and specifically designed for the nature, size and thickness of the patch being repaired to form a smooth watertight patch flush with liner.
 - ◆ For repairs over 25 mm in thickness, polymer modified cementitious grout compatible with the liner materials may be used.
- (vi) Ensure repairs at direct sampling locations are captured during subsequent CCTV inspections.

E12.7.12 Infrared Spectroscopy

- (a) The Contract Administrator may arrange for testing to compare the infrared spectrum of the resin field samples supplied from the wet-out to the reference spectrum generated from the resin sample provided by the resin manufacturer to verify installed material acceptability at no cost to the Contractor.

E12.7.13 Post Construction Design Review for Total Performance

- (a) The Contract Administrator will perform a post-construction design review to confirm that the completed CIPP meets the 50 year design life structural requirements prior to issuance of Total Performance. The design review will utilize the measured values for flexural strength, flexural modulus, and CIPP thickness from the confined pipe sample testing, directly obtained samples, or the reduced strength/modulus values obtained from the test plate testing in circumstances where confined pipe samples are not able to be secured.
- (b) CIPP strength values will be further reduced to account for creep based on the creep reduction values recommended in the pre-qualification submissions to assess the suitability of the liner to meet the 50 year design life requirement. The use of full enhancement factors in this analysis will be limited to liners that are confirmed by visual classification to be close-fit liners based on the post-lining sewer inspection.
- (c) The Contract Administrator will advise of any discrepancies between the constructed CIPP and the design requirements.
 - (i) Deficiencies in the physical testing results for CIPP liners will be reviewed by the Contract Administrator. The Contract Administrator will undertake efforts to reconcile the design based on the physical test results for the deficient liner, and accounting for the verified condition of the host pipe prior to lining, the CIPP installation conditions, and the long-term use of the sewer to assess whether the installed CIPP meets the specified design objective.
 - (ii) Defects in CIPP liners will be reviewed on a case by case basis by the Contract Administrator. The Contract Administrator will consult with the Contractor and taking into account the condition of the host pipe prior to lining, the CIPP

installation conditions, and the long term use of the sewer to assess the structural and performance ramifications of the defects

- (d) The Contractor shall:
- (i) Perform necessary remedial measures to confirm that a CIPP deemed as structurally deficient will comply with the 50 year design life requirement such as confirmation of actual ovality, determination of a more representative groundwater elevation locally through monitoring, and supplemental strength testing and thickness measurements.
 - (ii) Repair sections of CIPP removed for supplemental testing by placing a full circumference internal point repair of the same thickness as the full segment liner over and extending 300 millimetres beyond each side of the cut section.
 - (iii) Install a supplemental CIPP of the required thickness to structurally enhance the installed CIPP if supplemental testing fails to confirm the CIPP will meet the 50 year design life requirement.
 - (iv) Review remedial action with the Contract Administrator prior to implementation.
 - (v) Perform further testing, monitoring and calculations and install structural enhancements at own cost.

E12.8 Site Specific Design and Installation Considerations

- (a) Site specific design and installation conditions have been identified for the assets listed below:

E12.8.1 Blind Shots

- (a) The following assets have been identified as terminating directly into the downstream sewer:
- (i) N/A

E12.8.2 Storm Sewers

- (a) The following assets have been identified as storm sewers. The Contractor shall employ styrene management methods in accordance with E12.7.9.
- (i) S-MA50015183 (Parkville Dr)

E12.8.3 S-MA70033682 – Higgins Ave

- (a) An existing abandoned manhole 10.2m upstream of the downstream manhole S-MH20012292.
- (b) Contractor to review existing protruding rebars at the abandoned manhole location.
- (c) An apparent diameter reduction from 750mm to 650mm (assumed) has been identified at approximately 12.8 meters downstream of S-MH70001452.
- (d) Protruding rebars at 10 and 2 o'clock 10.2 meters upstream of S-MH20012292 may be cut or bent to facilitate lining. A short length must remain to support existing wood planks.

E12.8.4 S-MA00012875 – McKenzie St

- (a) An existing 525mm SRS crossbore at approximately 11.5 meters downstream S-MH00011507. Contractor to line through the crossbore.

E12.8.5 S-MA20014174 – Navy Way

- (a) Sewer ends at a wye with a downstream sewer. Liner to be terminated at the interface with the downstream sewer and parge surface (patching) any unlined section of the 750mm as per the Drawings.

E12.8.6 S-MA50015183 – Parkville Dr

- (a) Service connection crossbore at approximately 79 meters downstream of S-MH50012192. Grout patching around the crossbore as void filler prior to lining.

- E12.8.7 S-MA00013973 – Sutherland Ave
- (a) New manhole to be constructed at the downstream end of the sewer as per the Drawings.
- E12.8.8 S-MA70001102– Sutherland Ave
- (a) Montcalm Pump Station is located upstream of the asset. Flow control consideration to be completed in accordance with E6. Tree cutting is anticipated to facilitate access to the upstream manhole S-MH70000474. Tree cutting is to be completed in accordance with E10.5.1.
- E12.8.9 S-MA00013996 – Point Douglas Ave
- (a) Requires access to CP Rail property, see E6.
- E12.9 Measurement and Payment
- E12.9.1 Verification of Existing Sewer and CIPP Dimensions
- (a) Verification of existing sewer and CIPP dimensions shall be considered incidental to the Work and will not be measured for payment. No separate payment will be made.
- E12.9.2 Sewer Cleaning
- (a) Sewer cleaning will be measured and paid for in accordance with CW 2140.
- (b) Only one item of payment will be made for pre-lining cleaning.
- (c) Removal of intruding sewer services and solid debris cutting will be measured and paid for in accordance with CW 2140.
- (d) Grease and roots cutting will be measured on a unit basis and paid for at the Contract Unit Price for “Removal of Excessive Grease, and or Roots per Sewer Segment”. Grease and root removal will be measured per sewer segment where work is undertaken, accepted, and measured by the Contract Administrator. Only one item of payment will be made for grease and root removal per sewer segment.
- (e) Where diameter changes have been identified mid-pipe, sewer cleaning for that asset will be paid at the Contract Rate listed in Form B “Sewer Cleaning” for the largest identified diameter of that asset.
- E12.9.3 Sewer Preparation and Repairs Prior to Lining
- (a) Internal sewer pipe repairs will be measured and paid for in accordance with E11 for the type of work done.
- E12.9.4 CIPP Installation
- (a) Liner installation will be measured on a length basis for each size and paid for at the Contract Unit Price for “Full Segment CIPP”, “Partial Full Segment CIPP” or “Internal Point Repair CIPP”. Length to be paid for will be the total length of CIPP supplied and installed in accordance with this specification, accepted and measured by the Contract Administrator.
- (b) Full segment CIPP measurement will be made horizontally at grade, above the centreline of the pipe from centre to centre of manholes.
- (c) Partial full segment CIPP measurement will be made from the centre of one manhole to the termination point of the CIPP as measured by the post lining video inspection. Partial full segment CIPP installed beyond the limits identified by the Contract Administrator during review of the pre-lining video will not be measured for payment.
- (d) CIPP point repairs will be measured by the post lining video inspection. CIPP point repairs installed beyond the limits identified by the Contract Administrator during review of the pre-lining video shall not be measured for payment.
- (e) 80% of the payment will be made upon satisfactory completion of the CIPP installation work. The remaining 20% of the payment will be made upon confirmation of the CIPP

strength, delivery and acceptance of all required submissions, shop drawings, and reports, and rectification of all identified defects.

- (f) Where CIPP liners are improperly installed due to negligence on the part of the Contractor, payment for the CIPP liner will be withheld until the identified issues have been rectified.

E12.9.5 Reinstatement of Sewer Services

- (a) Reinstatement of sewer services will be measured on a unit basis and paid for at the Contract Unit Price for "Reinstatement of Sewer Services". Number of units to be paid for will be the total number of units reinstated in accordance with this specification, accepted and measured by the Contract Administrator.
- (b) Payment for sewer service reinstatement will occur after confirmation of sewer service reinstatement via review of the Post-Lining CCTV video. Payment will not be made until the Post-Lining inspection videos have been submitted and reviewed.

E12.9.6 Sewer Service and Annulus Grouting

- (a) Sewer service and annulus grouting will be measured and paid for in accordance with E11 for the type of work done.

E12.9.7 Quality Control Records

- (a) Preparation of quality control records shall be considered incidental to the CIPP installation and will not be measured for payment. No separate payment shall be made.

E12.9.8 Test Samples

- (a) All work and materials required for the preparation, recovery, and repair of CIPP test samples shall be considered incidental to the CIPP installation and will not be measured for payment. No separate payment shall be made.

E12.9.9 Continuous Temperature Monitoring

- (a) All work and materials required for the supply, preparation, installation, and operation of continuous temperature monitoring apparatus shall be considered incidental to the CIPP installation and will not be measured for payment. No separate payment shall be made.

E12.9.10 Styrene Management

- (a) All work and materials required for the management of styrene will be considered incidental to the CIPP installation and will not be measured for payment. No separate payment shall be made.

E13. CAST-IN-PLACE CONCRETE

E13.1 Description

- (a) This Specification shall cover the construction of cast-in-place concrete trunk sewer closures.
- (b) All cast-in-place concrete shall be carried out in accordance with CW 2160 and CSA A23.1, except as amended or supplemented herein

E13.2 Submissions

E13.2.1 Construction Method Submission

- (a) No Work shall commence until after the Contract Administrator's review of the Contractor's Construction Method submission.
- (b) The Contractor shall prepare for the Contract Administrator's review a Construction Method submission detailing:

- (i) Construction sequence to be followed including all methods to be employed to ensure no damage occurs to existing structures or adjacent properties within or adjacent to excavation.
- (ii) Proposed method of construction.
- (iii) Specialized equipment to be used.
- (iv) Any design revisions proposed to accommodate the Contractor's proposed construction method.
- (v) Flow control considerations including details on the Contractor's proposed method of flow control.
- (vi) The Contractor shall respond to any concerns that may be raised by the Contract Administrator after review of the Construction Method submission.

E13.3 Materials

(a) Structural Concrete Mix Design

- (i) Provide concrete mixed in accordance with requirements of CW 2160 and CSA-A23.2. Concrete shall conform to requirements of Type A concrete in accordance with Table CW 2160.1.
- (ii) Structural concrete design shall be in accordance with performance specification having the following properties:
 - ◆ Class of Exposure: S-1
 - ◆ Minimum Compressive Strength @ 28 days: 35 MPa

(b) Polyurethane sealant for manhole construction

- (i) Shall be non sag, polyurethane sealant; Sikaflex 2C NSL, or approved equal in accordance with B7. Colour: Precast.

(c) Hydrophilic Waterstop

- (i) One-part polyurethane, extrudable swelling waterstop (bentonite-free). Sikaswell S-2 or approved equal in accordance with B7.

E13.4 Construction Methods

E13.4.1 Forming

- (a) The Contractor shall be responsible for the design and installation of all necessary shoring, bracing and formwork.
- (b) All shoring shall conform to CW 2160, CSA S269.3 and CSA C23.1.

E13.4.2 Cast-in-Place Concrete

- (a) All cast-in-place concrete shall conform to CW 2160, and CSA A23.1.

E13.5 Measurement and Payment

- (a) Supply and placement of cast-in-place concrete shall be considered incidental to "Pipeline Access" and will not be measured for payment. No separate payment will be made.

E14. REINFORCING STEEL

E14.1 Description

- (a) This Specification shall cover all reinforcing steel work, in accordance with Specification CW 2160, except as amended or supplemented herein.

E14.2 Submittals

- (a) The Contractor shall submit reinforcing steel Shop Drawings in accordance with E2 a minimum of ten (10) Business Days prior to the fabrication of any reinforcing steel.

E14.3 Materials

E14.3.1 Reinforcing Steel

- (a) Further to CW 2160 Sentence 2.6 Materials: Reinforcing Steel, all reinforcing steel shall conform to the requirements of CSA G30.18, Grade 400.

E14.3.2 Bar Accessories

- (a) Bar accessories shall be of type approved by the Contract Administrator. They shall be made from a non-corroding material, and they shall not stain, blemish, or spall the concrete surface for the life of the concrete. Bar chairs are to be PVC; galvanized bar chairs are not acceptable.
- (b) Bar accessories shall include bar chairs, spacers, clips, wire ties, wire (18 gauge minimum), or other similar devices that may be approved by the Contract Administrator. Bar accessories are not shown on the Contract Drawings. The supply and installation of bar accessories shall be considered incidental to the supply and placing of reinforcing steel.

E14.4 Construction Methods

E14.4.1 Placing of Reinforcing Steel

- (a) Placement of reinforcing steel shall be completed in accordance with CW 2160, CSA A23.1, and CSA A23.3.
- (b) Lap splices in accordance with CSA A23.3
- (c) Reinforcing steel shall be placed accurately in the positions shown on the Contract Drawings. Carefully adjust the location of reinforcing steel adjacent to openings to frame those openings in accordance with good practice, and maintain the bar spacing intent.
- (d) Splices in reinforcing steel shall be made only where indicated on the Contract Drawings. Prior approval of the Contract Administrator shall be obtained where, in the opinion of the Contractor, other splices must be made. All splices shall have laps of at least 40 bar diameters. Welded splices shall not be used.
- (e) A minimum of twenty-four (24) hours notice shall be given to the Contract Administrator prior to the pouring of any concrete to allow for inspection of reinforcing steel.

E14.4.2 Quality Control

- (a) The Contractor shall provide, without charge, the samples of reinforcing steel required for quality control tests and provide such assistance and use of tools and construction equipment as is required.

E14.5 Measurement and Payment

- (a) Supply and placement of reinforcing steel shall be considered incidental to "Pipeline Access" and will not be measured for payment. No separate payment will be made.

E15. CATCH BASIN LEAD INSPECTIONS

E15.1 Description

- E15.1.1 This specification shall cover the cleaning and inspection of catch basin leads connected to sewers included in this contract to be lined with CIPP for the purpose of determining whether the catch basin lead requires repair work. The Contractor shall clean and inspect catch basin leads as directed by the Contract Administrator.

E15.2 Construction Methods

E15.2.1 Cleaning

- (a) Clean catch basin leads in accordance with CW 2140.

- E15.2.2 Video Inspections and Inspection Reports
- (a) Perform video inspection from catch basin to mainline sewer in accordance with CW 2145. No coding of the submission will be required.
- E15.2.3 Repair Work
- (a) Catch basin lead repairs identified from the inspections will be done (by others) prior to lining work to the corresponding sewer main.
- E15.3 Measurement and Payment
- E15.3.1 Provisional - Cleaning
- (a) Cleaning of catch basin leads shall be measured and paid for in accordance with CW 2140.
- E15.3.2 Provisional - Video Inspections
- (a) Video Inspection of catch basin leads shall be measured and paid for in accordance with CW 2145.

E16. SUSPENSION OF WORK ACTIVITIES WHEN SEWER CONTROL GATES ARE ACTIVATED DURING PERIODS OF HIGH RIVER LEVELS

- E16.1 The Contractor is advised that as the elevation of the Red and Assiniboine Rivers rise from the normal winter or summer levels due to spring runoff or periods of heavy rainfall the City is required to close various control gates located on sewer system outfalls. Similarly, as the elevation of the rivers drop to normal levels, the City is required to open the control gates that have been closed. Control gates begin to be closed when river levels reach elevation 224.51 (James Avenue 9.0). As well, higher river levels can cause the level of flow in sewers to be higher than normal.
- E16.2 In the event the Red and Assiniboine Rivers rise to an elevation where the City has to begin closing control gates, the Contract Administrator will direct that work activities in any sewers affected by the gate closure be suspended and the risk of runoff causing flooding in the sewer evaluated. Work will continue to be suspended as long as there is a risk of the sewer being flooded while the control gate is closed unless the Contractor provides flow control measures approved jointly by the Contract Administrator, City of Winnipeg Collection System and Flood Control Branch and Local Services Branch.
- E16.3 Similarly, as river elevations drop and the City has to open control gates that have been closed, the Contract Administrator will direct that work activities in any sewers affected by the control gate opening be suspended due to the risk of the river flooding the sewer once the gate is opened. Work will continue to be suspended as long as the sewer is being flooded from the river unless the Contractor provides flow control measures approved jointly by the Contract Administrator, City of Winnipeg Collection System and Flood Control Branch and Local Services Branch.
- E16.4 The Contractor will have no claim for extra Work or compensation as a result of suspension of Work due to the City closing and opening control gates during periods of rising and dropping river levels. If in the opinion of the Contract Administrator the suspension will cause the completion of the Work to occur after the specified date for Critical Stages or Substantial Performance and the Contractor's schedule would have reasonably permitted completion of the Work before the required date, the date for Critical Stages or Substantial Performance will be adjusted accordingly.
- E16.5 The flood activation elevations for each site will be available upon request prior to construction.

E17. WATER SUPPLY

- E17.1 Further to Section 3.14 of CW 2140 and Section 3.7 of CW 1120 of the General Requirements water supply for the Work may be taken from City of Winnipeg hydrants.

- E17.2 The Contractor shall make the following arrangements for hydrant turn on and turn off.
- (a) Contact City of Winnipeg Water Services Division (WSD) for hydrant turn on and turn off required between 0800 hours and 1500 hours Monday to Friday. Notice for turn on and turn off shall be provided on the previous business day.
 - (b) Contact Emergency Services Branch (986-2626) with a minimum of 2 hours notice for hydrant turn on and turn off required outside of the above hours.
 - (c) The Contractor shall wait at the hydrant from the requested turn on or turn off time until City staff arrives to turn on or turn off the hydrant.
- E17.3 Hydrants shall be considered to be “in the Contractor’s control” from the time the City has turned the hydrant on until the City has turned the hydrant off.
- E17.4 Between November 1 and April 30 of any year the Contractor shall take all necessary precautions to prevent freezing of hydrants and related appurtenances for hydrants in their control and shall be responsible to pump out hydrants turned off by Emergency Services.
- E17.5 If a hydrant or appurtenance is damaged due to freezing or improper turn on or turn off procedures while in the Contractor’s control, WSD will assess the damage and determine if WSD will repair the damage or if the Contractor will be responsible to repair the damage. Costs for repairs completed by WSD will be deducted from payments owing the Contractor. Repairs completed by the Contractor will be at the Contractor’s expense.
- E17.6 The Contractor shall provide a traffic ramp for hydrant connection hoses that cross roadways. The ramp shall be designed and constructed to not present a hazard to vehicles travelling over it and to ensure that no part of the hose is run over by a motor vehicle. Traffic ramps shall be satisfactory to the Contract Administrator.
- E17.7 Measurement and Payment
- (a) Charges incurred for the permits and water meters shall be paid for by the Contractor when the permit is taken out. The Contractor shall forward the invoice to the Contract Administrator for reimbursement. The billing for water usage sent to the Contractor shall be forwarded to the Contract Administrator for payment. The Bid Opportunity number shall be noted on each permit.
 - (b) All other costs associated with sourcing construction water will be considered incidental to the Work and will not be measured for payment. No additional payment will be made.

E18. RESTORATION

E18.1 Description

- (a) This Specification shall cover the restoration of all work sites.

E18.2 Restoration Works

- (a) Reconstruct concrete pavements in accordance with CW 3230, CW3310, and SD-213A.
- (b) Reconstruct asphalt pavements and overlays in accordance with CW3410 using a Type 1A asphaltic concrete pavement.
- (c) Sidewalks:
 - (i) Reconstruct existing asphalt sidewalks with 75 mm of Type 1A asphaltic concrete pavement conforming to CW3410. The sidewalk shall be constructed with 50 mm (min) of compacted base material and 150 mm (min) of sub-base material.
 - (ii) Reconstruct existing non reinforced concrete sidewalks with a 100 mm non-reinforced concrete conforming to CW3325 and SD-228A. The sidewalk shall be constructed with 100 mm (min) of compacted base material.
 - (iii) Reconstruct of the existing reinforced concrete sidewalks with a 150 mm reinforced concrete conforming to CW3235 and SD-237. The sidewalk shall be constructed with 100 mm (min) of compacted base material. To be used for private approaches.

- (d) Reconstruct concrete barrier curbs in accordance with CW3240 and SD-206A.
- (e) Sod all maintained grassed areas in accordance with CW3510 and in accordance with D23.

E18.3 Measurement and Payment

E18.3.1 Surface restoration will be considered incidental the CIPP installations and manhole work and will not be measured for payment. No separate payment will be made.

E18.3.2 Where restoration is delayed a holdback may be applied to subsequent progress estimates until such a time that restoration has been completed and accepted.

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 his/her 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 its 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.