THE CITY OF WINNIPEG

TENDER

TENDER NO. 351-2023

2023 SEWER RENEWALS BY CIPP LINING (LARGE DIAMETER) – CONTRACT 4

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PART B - BIDDING PROCEDURES

B1. CONTRACT TITLE

B1.1 2023 SEWER RENEWALS BY CIPP LINING (LARGE DIAMETER) – CONTRACT 4

B2. SUBMISSION DEADLINE

B2.1 The Submission Deadline is 12:00 noon Winnipeg time, November 10, 2023.

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 part of the project site is located on Portage Avenue and significant traffic control is required to complete the work. It is recommended that the bidder review the site constraints and specified traffic management requirements.

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

B4. ENQUIRIES

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

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

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

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

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

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

B5. CONFIDENTIALITY

B5.1 Information provided to a Bidder by the City or acquired by a Bidder by way of further enquiries or through investigation is confidential. Such information shall not be used or disclosed in any way without the prior written authorization of the Contract Administrator. The use and disclosure of the confidential information shall not apply to information which:

(a) was known to the Bidder before receipt hereof; or

(b) becomes publicly known other than through the Bidder; or

(c) is disclosed pursuant to the requirements of a governmental authority or judicial order.

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

B6. ADDENDA

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

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

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

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

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

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

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 their sole discretion grant approval for the use of a substitute as an “approved equal” or as an “approved alternative”, or may refuse to grant approval of the substitute.

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

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

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

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

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

B8. BID COMPONENTS

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

(a) Form A: Bid/Proposal;

(b) Form B: Prices;

(c) Form G1: Bid Bond and Agreement to Bond.

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

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

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

B8.4 Bidders are advised that inclusion of terms and conditions inconsistent with the Tender document, including the General Conditions, will be evaluated in accordance with B18.1(a).

B9. BID

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

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

(a) if the Bidder is a sole proprietor carrying on business in their own name, their name shall be inserted;

(b) if the Bidder is a partnership, the full name of the partnership shall be inserted;

(c) if the Bidder is a corporation, the full name of the corporation shall be inserted;

(d) if the Bidder is carrying on business under a name other than their own, the business name and the name of every partner or corporation who is the owner of such business name shall be inserted.

B9.2.1 If a Bid is submitted jointly by two or more persons, each and all such persons shall identify themselves in accordance with B9.2.

B9.3 In Paragraph 3 of Form A: Bid/Proposal, the Bidder shall identify a contact person who is authorized to represent the Bidder for purposes of the Bid.

B9.4 Paragraph 13 of Form A: Bid/Proposal shall be signed in accordance with the following requirements:

(a) if the Bidder is a sole proprietor carrying on business in their own name, it shall be signed by the Bidder;

(b) if the Bidder is a partnership, it shall be signed by the partner or partners who have authority to sign for the partnership;

(c) if the Bidder is a corporation, it shall be signed by their duly authorized officer or officers;

(d) if the Bidder is carrying on business under a name other than their own, it shall be signed by the registered owner of the business name, or by the registered owner's authorized officials if the owner is a partnership or a corporation.

B9.4.1 The name and official capacity of all individuals signing Form A: Bid/Proposal should be entered below such signatures.

B9.5 If a Bid is submitted jointly by two or more persons, the word "Bidder" shall mean each and all such persons, and the undertakings, covenants and obligations of such joint Bidders in the Bid and the Contract, when awarded, shall be both joint and several.

B10. PRICES

B10.1 The Bidder shall state a price in Canadian funds for each item of the Work identified on Form B: Prices.

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 D36. Any such costs shall be determined in accordance with D36.

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) Insituform Technologies Limited
    (i) Discussion on constructability.

(b) EmPipe Infrastructure Group
    (i) Discussion on constructability.

B12. CONFLICT OF INTEREST AND GOOD FAITH

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

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

(a) other commitments;

(b) relationships;

(c) financial interests; or

(d) involvement in ongoing litigation;

that could or would be seen to:

(i) exercise an improper influence over the objective, unbiased and impartial exercise of the independent judgment of the City with respect to the evaluation of Bids or award of the Contract; or

(ii) compromise, impair or be incompatible with the effective performance of a Bidder's obligations under the Contract;

(e) has contractual or other obligations to the City that could or would be seen to have been compromised or impaired as a result of their participation in the Tender process or the Work; or

(f) has knowledge of confidential information (other than confidential information disclosed by the City in the normal course of the Tender process) of strategic and/or material relevance to the Tender process or to the Work that is not available to other bidders and that could or would be seen to give that Bidder an unfair competitive advantage.

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

(a) avoid any perceived, potential or actual Conflict of Interest in relation to the procurement process and the Work;

(b) upon discovering any perceived, potential or actual Conflict of Interest at any time during the Tender process, promptly disclose a detailed description of the Conflict of Interest to the City in a written statement to the Contract Administrator; and

(c) provide the City with the proposed means to avoid or mitigate, to the greatest extent practicable, any perceived, potential or actual Conflict of Interest and shall submit any additional information to the City that the City considers necessary to properly assess the perceived, potential or actual Conflict of Interest.

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

B12.5 Without limiting B12.3, and in addition to all contractual or other rights or rights at law or in equity or legislation that may be available to the City, the City may, in their sole discretion:

(a) disqualify a Bidder that fails to disclose a perceived, potential or actual Conflict of Interest of the Bidder or any of their employees proposed for the Work;

(b) require the removal or replacement of any employees proposed for the Work that has a perceived, actual or potential Conflict of Interest that the City, in their sole discretion, determines cannot be avoided or mitigated;

(c) disqualify a Bidder or employees proposed for the Work that fails to comply with any requirements prescribed by the City pursuant to B12.4 to avoid or mitigate a Conflict of Interest; and

(d) disqualify a Bidder if the Bidder, or one of their employees proposed for the Work, has a perceived, potential or actual Conflict of Interest that, in the City's sole discretion, cannot be avoided or mitigated, or otherwise resolved.

B12.6 The final determination of whether a perceived, potential or actual Conflict of Interest exists shall be made by the City, in their sole discretion.

B13. QUALIFICATION

B13.1 The Bidder shall:

(a) undertake to be in good standing under The Corporations Act (Manitoba), or properly registered under The Business Names Registration Act (Manitoba), or otherwise properly registered, licensed or permitted by law to carry on business in Manitoba; and

(b) be financially capable of carrying out the terms of the Contract; and

(c) have all the necessary experience, capital, organization, and equipment to perform the Work in strict accordance with the terms and provisions of the Contract.

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 at 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) have completed the Accessible Customer Service online training required by the Accessibility for Manitobans Act (AMA) (see B13.6 and D8)

(e) upon request of the Contract Administrator, provide the Security Clearances in accordance with PART F - Security Clearance; and,

(f) 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, the Bidder or any Sub-Contractor completing the manhole rehabilitation work must be able to demonstrate the following specific qualifications in accordance with B13.7:

(a) a minimum of five (5) examples of successful manhole rehabilitation projects using spray applied polymeric liner systems;

(b) a minimum of three (3) successful applications using the identified approved lining system; and,

(c) be certified by the product manufacturer.

B13.5 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/.

B13.6 Further to B13.3(d), the Bidder acknowledges they and all Subcontractors have obtained training required by the Accessibility for Manitobans Act (AMA) available at http://www.accessibilitymb.ca/training.html for anyone that may have any interaction with the public on behalf of the City of Winnipeg.

B13.7 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. The Bidder shall utilize Form L: Contractor Experience or provide similar project sheets containing all information identified in Form L: Contractor Experience.

B13.8 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 their Bid Submission bid security in the form of a digital bid bond, in the amount of at least ten percent (10%) of the Total Bid Price, and agreement to bond of a company registered to conduct the business of a surety in Manitoba, in Form G1: Bid Bond and Agreement to Bond, available on The City of Winnipeg, Corporate Finance, 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(a).

B14.3 Bonds failing the verification process will not be considered to be valid and the bid shall be determined to be non-responsive in accordance with B18.1(a).

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

B14.4.1 If the Bidder submits alternative bids, the bid security shall be in the amount of the specified percentage of the highest Total Bid Price submitted.

B14.5 The bid security of the successful Bidder and the next two lowest evaluated responsive and responsible Bidders will be released by the City when a Contract for the Work has been duly formed with the successful Bidder and the contract securities are furnished as provided herein. The bid securities of all other Bidders will be released when a Contract is awarded.

B14.6 The bid securities of all Bidders will be released by the City as soon as practicable following notification by the Contract Administrator to the Bidders that no award of Contract will be made pursuant to the Tender.

B15. OPENING OF BIDS AND RELEASE OF INFORMATION

B15.1 Bids will not be opened publicly.

B15.2 Following the Submission Deadline, the names of the Bidders and their Total Bid Prices (unevaluated and pending review and verification of conformance with requirements) will be available on the MERX website at www.merx.com.

B15.3 After award of Contract, the name(s) of the successful Bidder(s) and their Contract amount(s) will be available on the MERX website at www.merx.com.

B15.4 The Bidder is advised that any information contained in any Bid may be released if required by The Freedom of Information and Protection of Privacy Act (Manitoba), by other authorities having jurisdiction, or by law or by City policy or procedures (which may include access by members of City Council).

B15.4.1 To the extent permitted, the City shall treat as confidential information, those aspects of a Bid Submission identified by the Bidder as such in accordance with and by reference to Part 2, Section 17 or Section 18 or Section 26 of The Freedom of Information and Protection of Privacy Act (Manitoba), as amended.

B16. IRREVOCABLE BID

B16.1 The Bid(s) submitted by the Bidder shall be irrevocable for the time period specified in Paragraph 11 of Form A: Bid/Proposal.

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

B17. WITHDRAWAL OF BIDS

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

B18. EVALUATION OF BIDS

B18.1 Award of the Contract shall be based on the following bid evaluation criteria:

(a) compliance by the Bidder with the requirements of the Tender, or acceptable deviation there from (pass/fail);

(b) qualifications of the Bidder and the Subcontractors, if any, pursuant to B13 (pass/fail);

(c) Total Bid Price;

(d) economic analysis of any approved alternative pursuant to B7.

B18.2 Further to B18.1(a), the Award Authority may reject a Bid as being non-responsive if the Bid is incomplete, obscure or conditional, or contains additions, deletions, alterations or other irregularities. The Award Authority may reject all or any part of any Bid, or waive technical requirements or minor informalities or irregularities, if the interests of the City so require.

B18.3 Further to B18.1(b), the Award Authority shall reject any Bid submitted by a Bidder who does not demonstrate, in their Bid or in other information required to be submitted, that they are qualified.

B18.4 Further to B18.1(c), the Total Bid Price shall be the sum of the quantities multiplied by the unit prices for each item shown on Form B: Prices.

B18.4.1 Bidders are advised that the calculation indicated in B18.4 will prevail over the Total Bid Price entered in MERX.

B18.4.2 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.

B19. AWARD OF CONTRACT

B19.1 The City will give notice of the award of the Contract or will give notice that no award will be made.

B19.2 The City will have no obligation to award a Contract to a Bidder, even though one or all of the Bidders are determined to be qualified, and the Bids are determined to be responsive.

B19.2.1 Without limiting the generality of B19.2, the City will have no obligation to award a Contract where:

(a) the prices exceed the available City funds for the Work;

(b) the prices are materially in excess of the prices received for similar work in the past;

(c) the prices are materially in excess of the City's cost to perform the Work, or a significant portion thereof, with their own forces;

(d) only one Bid is received; or

(e) in the judgment of the Award Authority, the interests of the City would best be served by not awarding a Contract.

B19.3 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 D36 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 their Bid upon written request to the Contract Administrator.

PART C - GENERAL CONDITIONS

C0. GENERAL CONDITIONS

C0.1 The *General Conditions for Construction* (Revision 2020-01-31) are applicable to the Work of the Contract.

C0.1.1 The *General Conditions for Construction* are available on the Information Connection page at The City of Winnipeg, Corporate Finance, 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 the rehabilitation of existing sewers by the installation of CIPP liners, rehabilitation of manholes, and related work.

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

(a) Mobilize to site;

(b) CCTV video inspection;

(c) Internal sewer and manhole cleaning and preparation for lining;

(d) Pipeline access works;

(e) Flow Control (sewers and sewer services);

(f) Traffic Control;

(g) Full segment lining by CIPP;

(h) Manhole rehabilitation; and

(i) Surface restoration, site clean-up, and demobilization.

D4. SITE INVESTIGATION DUE DILIGENCE AND RISK

D4.1 Notwithstanding C3.1, the Contractor acknowledges that the site investigation reports and other site information included in this Tender have been provided to it and may be relied upon by the Contractor to the extent that the Contractor uses Good Industry Practice in interpreting such report(s) and site information and carries out the Work in accordance with Good Industry Practice based upon such report(s) and the information contained in them and such other site information. In the event that a site condition related to:

(a) the location of any utility which can be determined from the records or other information available at the offices of any public authority or person, including a municipal corporation and any board or commission thereof, having jurisdiction or control over the utility;

(b) the Site conditions, including but not limited to subsurface hazardous materials or other concealed physical conditions;

(c) the location, nature, quality or quantity of the materials to be removed or to be employed in the performance of the Work;

(d) the nature, quality or quantity of the Plant needed to perform the Work;

(e) all matters concerning access to the Site, power supplies, location of existing services, utilities or materials necessary for the completion of the Work; and

(f) all other matters which could in any way affect the performance of the Work;

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

D5. DEFINITIONS

D5.1 When used in this Tender:

(a) **“Acceptance Testing”** means testing completed on the installed product or prepared samples to confirm conformance with the project objectives and design requirements;

(b) **“ACI”** means American Concrete Institute;

(c) **“AMPP”** means Association for Materials Protection and Performance;

(d) **“ASTM”** means American Society for Testing and Materials;

(e) **“AWWA”** means American Water Works Association;;

(f) **“Bonded Liner”** means A SIPL requiring bond with the host structure for its long-term performance;;

(g) **“CIPP”** means Cured-In-Place Pipe;;

(h) **“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”.;

(i) **“Combined Sewer (CS)”** means a sewer conveying both wastewater and surface runoff within or from a combined sewer district;

(j) **“CSA”** means Canadian Standards Association;

(k) **“Demonstration Testing”** means demonstrations and testing completed prior to commencement of the Work intended to demonstrate the Contractor’s proposed methods will achieve the project objectives and design requirements for the installation;

(l) **“External Point Repair (EPR)”** means a partial segment sewer repair installed by traditional excavation methods at an intermediate point between existing manholes;.

(m) **“Fully Deteriorated (FD)”** means the host pipe is not structurally sound and cannot support soil and/or 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 external loads, including: soil, live, external hydrostatic pressure, and internal pressure;.

(n) **“Host Pipe”** means the existing sewer intended for rehabilitation by installation and curing of a CIPP liner;

(o) **“ICRI”** means International Concrete Repair Institute;

(p) **“IGN”** means Information and Guidance Notes;

(q) **“ISO”** means International Organization for Standardization;

(r) **“Land Drainage Sewer (LDS)”** means a sewer conveying primarily land drainage (surface runoff) flows;

(s) **“NACE”** means National Association of Corrosion Engineers;

(t) **“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 shall be designed to account for internal and externally hydrostatic pressure only;

(u) **“Phase 1 Traffic Control”** means traffic control undertaken between Burnell St and Dominion St on Portage Ave to facilitate the identified work.

(v) **“Phase 2 Traffic Control”** means traffic control undertaken between Dominion St and Wall St on Portage Ave to facilitate the identified work.

(w) **“Spray in Place Liner (SIPL)”** means a lining system which is applied by spraying it to directly the host structure;

(x) **"Structural Performance Grade"** means a grade of 1 to 5 assigned to sewer and manhole assets to reflect the likelihood of failure;

(y) "**Supply Chain Disruption"** means an inability by the Contractor to obtain goods or services from third parties necessary to perform the Work of the Contract within the schedule specified therein, despite the Contractor making all reasonable commercial efforts to procure same. Contractors are advised that increased costs do not, in and of themselves, amount to a Supply Chain Disruption;

(z) **"Trenchless Point Repair (TPR)"** means a partial segment CIPP liner installed at an intermediate point between existing manhole;

(aa) **"Type Testing"** means product testing completed by the manufacturer, typically not as part of the Work, to confirm the product characteristics and suitability for use on the project;

(bb) **"Unbonded Liner"** means A SIPL relying on its inherent structural capacity and not bond with the host structure for its long-term performance; and

(cc) **"Wastewater Sewer (WWS)"** means a sewer primarily conveying wastewater flows (no significant surface runoff) in a separated sewer district.

D6. CONTRACT ADMINISTRATOR

D6.1 The Contract Administrator is Morrison Hershfield Ltd., represented by:

Nathan Kehler, P. Eng.
Municipal Engineer

Telephone No. 204 226-1008
Email Address nkehler@morrisonhershfield.com

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

D7. CONTRACTOR'S SUPERVISOR

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

D8. ACCESSIBLE CUSTOMER SERVICE REQUIREMENTS

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

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

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

(a) providing barrier-free access to goods and services;

(b) providing reasonable accommodations;

(c) reasonably accommodating assistive devices, support persons, and support animals;

(d) providing accessibility features e.g. ramps, wide aisles, accessible washrooms, power doors and elevators;

(e) inform the public when accessibility features are not available;

(f) providing a mechanism or process for receiving and responding to public feedback on the accessibility of all goods and services; and

(g) providing adequate training of staff and documentation of same.

D9. UNFAIR LABOUR PRACTICES

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

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

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

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

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

D9.5.1 The Unfair Labour Practice Penalty shall be such a sum as determined appropriate by the City, having due regard to the gravity of the Contractor's violation of the above requirements, any cost of obtaining replacement goods/ services or rectification of the breach, and the impact upon the City's reputation in the eyes of the public as a result of same.

D9.5.2 The Contractor shall pay the Unfair Labour Practice Penalty to the City within thirty (30) Calendar Days of receiving a demand for same in accordance with D9.5. The City may also hold back the amount of the Unfair Labour Practice Penalty from payment for any amount it owes the Contractor.

D9.5.3 The obligations and rights conveyed by this clause survive the expiry or termination of this Contract, and may be exercised by the City following the performance of the Work, should the City determine, that a violation by the Contractor of the above clauses has occurred following same. In no instance shall the Unfair Labour Practice Penalty exceed the total of twice the Contract value.

D10. FURNISHING OF DOCUMENTS

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

SUBMISSIONS

D11. AUTHORITY TO CARRY ON BUSINESS

D11.1 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.

D12. SAFE WORK PLAN

D12.1 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.

D12.2 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

D12.3 Notwithstanding B13.4 at any time during the term of the Contract, the City may, at their sole discretion and acting reasonably, require an updated COR Certificate or Annual Letter of good Standing. A Contractor, who fails to provide a satisfactory COR Certificate or Annual Letter of good Standing, will not be permitted to continue to perform any Work.

D13. INSURANCE

D13.1 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, broad form property damage cover 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) an all risks Installation Floater carrying adequate limits to cover all machinery, equipment, supplies and/or materials intended to enter into and form part of any installation.

D13.2 Deductibles shall be borne by the Contractor.

D13.3 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.

D13.4 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.

D14. CONTRACT SECURITY

D14.1 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.

D14.1.1 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 D14.1(b).

D14.1.2 Digital bonds failing the verification process will not be considered to be valid and may be determined to be an event of default in accordance with C18.1. If a digital bond fails the verification process, the Contractor may provide a replacement bond (in hard copy or digital format) within seven (7) Calendar Days of the City's request or within such greater period of time as the City in their discretion, exercised reasonably, allows.

D14.1.3 Digital bonds passing the verification process will be treated as original and authentic.

D14.2 The Contractor shall provide the Contract Administrator identified in D6 with the required performance and labour and material payment bonds within seven (7) Calendar Days of notification of the award of the Contract by way of an award letter and prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 for the return of the executed Contract Documents, if applicable.

D14.3 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 D14.1(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.

D15. SUBCONTRACTOR LIST

D15.1 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 the General Conditions for the return of the executed Contract Documents, if applicable.

D16. EQUIPMENT LIST

D16.1 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.

D17. DETAILED WORK SCHEDULE

D17.1 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.

D17.2 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

all acceptable to the Contract Administrator

D17.3 Further to D17.2(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 inspections;

(c) Sewer measurements and confirmation of design conditions;

(d) EPR's;

(e) Phase 1 Traffic Control on Portage Ave;

(f) Phase 2 Traffic Control on Portage Ave;

(g) Installation of CIPP liners;

(h) Manhole rehabilitation;

(i) Restoration, and

(j) Planned breaks in construction in accordance with D21.7

D17.4 Further to D17.2(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.

D18. REQUIREMENTS FOR SITE ACCESSIBILITY PLAN

D18.1 The Contractor shall provide the Contract Administrator with an Accessibility 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.

D18.2 The Accessibility Plan shall demonstrate how the Contractor will accommodate the safe passage of pedestrians and cyclists in accordance with the Manual of Temporary Traffic Control, the Contract Drawings, Staging Plans, and Streets By-Law No. 1481/77 at all times for the duration of the Construction. Unless noted in the Contract, the Accessibility Plan must include a written plan for the following:

(a) How the Contractor will maintain at least one crossing in each direction for each intersection (one north/south crosswalk and one east/west crosswalk).

(b) How the Contractor will maintain access to bus stops within the site.

(c) How the Contractor will maintain access to pedestrian corridors and half signals.

(d) How the Contractor will maintain cycling facilities.

(e) How the Contractor will maintain access to residents and businesses unless otherwise noted in the Contract.

(f) Any required detour signage at adjacent crossings to facilitate sidewalk or active transportation pathway closures.

D18.3 The Accessibility Plan may also include figures, sketches, or drawings to demonstrate the proposed plan.

D18.4 The Accessibility Plan shall include written details on how the Contractor intends to review, maintain, and document all items related to the Accessibility Plan on-site during Construction, including, but not limited to:

(a) Signage

(b) Temporary Ramping

(c) Transit Stops

(d) Detour Signage

D18.5 At minimum, the Contractor shall review the site conditions on a daily basis to ensure that all features related to the Accessibility Plan are in place. The site review is intended to correct deficiencies as a result of unforeseen events such as wind, traffic, or the general public. Deficiencies that are direct result of the Contractors actions must be corrected immediately.

D18.6 Any changes to the Accessibility Plan must be approved by the Contract Administrator.

D18.7 Upon request from the Contract Administrator, the Contractor shall provide records demonstrating that the site has been maintained.

D18.8 Deficiencies as a direct result of actions by the Contractor that are not immediately corrected and/or failure to produce records that demonstrate that the site was maintained in compliance with the Accessibility Plan may result in a pay adjustment via the monthly Progress Payment. The rate of pay adjustment will be as per the following schedule:

(a) First Offence – A warning will be issued and documented in the weekly or bi-weekly site meeting.

(b) Second Offence – A field instruction to immediately correct the site will be issued by the Contract Administrator.

D18.9 Third and subsequent Offences – A pay reduction will be issued in the amount of $250.00 per instance and per day.

SCHEDULE OF WORK

D19. COMMENCEMENT

D19.1 The Contractor shall not commence any Work until they are in receipt of an award letter from the Award Authority authorizing the commencement of the Work.

D19.2 The Contractor shall not commence any Work on the Site until:

(a) the Contract Administrator has confirmed receipt and approval of:

(i) evidence of authority to carry on business specified in D11;

(ii) evidence of the workers compensation coverage specified in C6.15;

(iii) the Safe Work Plan specified in D12;

(iv) evidence of the insurance specified in D13;

(v) the contract security specified in D14;

(vi) the Subcontractor list specified in D15;

(vii) the Equipment list specified in D16;

(viii) the Detailed work schedule specified in D17;

(ix) the Requirements for Site Accessibility Plan specified in D18; and

(x) the direct deposit application form specified in D31

(b) the Contractor has attended a pre-construction meeting with the Contract Administrator, or the Contract Administrator has waived the requirement for a pre-construction meeting.

D19.3 The Contractor shall not commence CIPP lining on those assets with identified EPR's or TPR's until the specified sewer repairs are complete.

D20. WORK BY OTHERS

D20.1 Further to C6.25, the Contractor's attention is directed to the fact that other Contractors, the personnel of Utilities and the staff of the City may be working within the project limit, approach roadway, adjacent roadways or right-of-way. The activities of these agencies may coincide with the Contractors execution of Work and it will be the Contractor's responsibility to cooperate to the fullest extent with other personnel working in the area, and such cooperation is an obligation of the Contractor under the terms of Contract.

D20.2 Work by others on or near the Site will include but not necessarily be limited to:

(a) N/A

D20.2.1 Further to D20.1 the Contractor shall cooperate and coordinate all activities with all parties performing required Work by Others identified in D20.1 and accommodate the necessary area on Site required for the Work by Others to complete the Work.

D21. WORKING DAYS

D21.1 Further to C1.1(tt), the Contract Administrator's determination of whether or not atmospheric and Site conditions are such that a Working Day is deemed to have elapsed may be based at one time on one type of work while at another time a Working Day may be based on another type of work. When more than one type of major work is involved, the quantity of equipment that must be able to work in order to meet the requirements of a Working Day may vary considerably from that specified in the General Conditions.

D21.2 In the event that incidental work is behind schedule which, in the opinion of the Contract Administrator, should have been or could have been carried out by the Contractor in conjunction with or immediately following work of a major type, the City hereby reserves the right to charge Working Days on the incidental work until such time as it is up to schedule.

D21.3 When the major type of work involves restoration of the site to the condition it was prior to rainfall, Working Days shall not be charged.

D21.4 The Contract Administrator will furnish the Contractor with a daily record for each major type of work showing various information concerning the equipment, the time it worked, could have worked and Working Days charged. This report is to be signed each day by an authorized representative of the Contractor.

D21.5 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.

D21.6 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 (D17), whichever occurs first.

D21.7 Planned Breaks in Construction

(a) The Contractor will be permitted planned suspensions of on-site construction to facilitate the nature of the work and seasonal weather breaks where contract work is not or cannot be 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 (D17) 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) Planned breaks in construction should be minimised to the greatest degree possible to promote the efficient and expedient completion of the Work. Individual days or repeated short duration breaks (less than five (5) Working Days) where work could otherwise be completed will not be accepted as planned breaks in construction. Outside of planned breaks in construction, consecutive Working Days will be applied.

(d) 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.

(e) 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.

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

D22. CRITICAL STAGES

D22.1 The Contractor shall achieve critical stages of the Work in accordance with the following requirements:

(a) Critical Stage 1

(i) Sewer rehabilitation work on Portage Avenue within the Phase 1 Traffic Control limits shall be completed within twenty (20) Working Days from the installation of the Lane Closure. No planned breaks in construction will be allowed once work on the Critical Stage begins. Work shall include CIPP lining and manhole rehabilitation, including all post-lining works (sewer service reinstatement, pavement restoration, and post-lining CCTV inspections).

(ii) Rehabilitation of the following sewer assets are included within this Critical Stage: S-MA20011143, S-MA20017639, S-MA20015190, S-MA20015187, S-MA20015185, S-MA20015246,

(iii) Rehabilitation of the following manhole assets are included within this Critical Stage S-MH20010155, S-MH20013516, S-MH20013692, S-MH20013741, and S-MH20013746.

(iv) Sewer preparation work and pre-lining sewer inspections for these assets shall be completed prior to the identified Critical Stage window. Manhole rehabilitation preparation works must be completed within the identified Critical Stage window.

(b) Critical Stage 2

(i) Sewer rehabilitation work on Portage Avenue within the Phase 2 Traffic Control limits shall be completed within twenty (20) Working Days from the installation of the Lane Closure; No planned breaks in construction will be allowed once the critical stage begins. Work shall include CIPP lining and manhole rehabilitation, including all post-lining works (sewer service reinstatement, pavement restoration, and post-lining CCTV inspections).

(ii) Rehabilitation of the following sewer assets are included within this Critical Stage: S-MA20011111, S-MA20011118, S-MA20011101, S-MA20011114, S-MA20011106, S-MA20011107, S-MA20011126

(iii) Rehabilitation of the following manhole assets are included within this Critical Stage: S-MH20010123, S-MH20010124, S-MH20010122, S-MH20010121, S-MH20010120, and S-MH20010133.

(iv) Sewer preparation work and pre-lining sewer inspections for these assets may be completed outside of the identified critical stage window. Manhole rehabilitation preparation works must be completed within the identified critical stage window.

(c) Critical Stage 3

(i) Any pavement repairs requiring road closures which affect on-street parking shall be completed within 7 **Calendar Days** from:

(i) Completion of backfill, where pavement repairs are to be done immediately following sewer work, or

(ii) Installation of traffic control for removal of temporary pavement repairs.

D23. SUBSTANTIAL PERFORMANCE

D23.1 The Contractor shall achieve Substantial Performance within sixty-five (65) consecutive Working Days of the commencement of the Work as specified in D19, or by July 26, 2024, whichever comes first.

D23.2 When the Contractor considers the Work to be substantially performed, the Contractor shall arrange, attend and assist in the inspection of the Work with the Contract Administrator for purposes of verifying Substantial Performance. Any defects or deficiencies in the Work noted during that inspection shall be remedied by the Contractor at the earliest possible instance and the Contract Administrator notified so that the Work can be reinspected.

D23.3 The date on which the Work has been certified by the Contract Administrator as being substantially performed to the requirements of the Contract through the issue of a certificate of Substantial Performance is the date on which Substantial Performance has been achieved.

D24. TOTAL PERFORMANCE

D24.1 The Contractor shall achieve Total Performance within seventy-five (75) consecutive Working Days of the commencement of the Work as specified in D19, or by August 30, 2024, whichever comes first.

D24.2 When the Contractor or the Contract Administrator considers the Work to be totally performed, the Contractor shall arrange, attend and assist in the inspection of the Work with the Contract Administrator for purposes of verifying Total Performance. Any defects or deficiencies in the Work noted during that inspection shall be remedied by the Contractor at the earliest possible instance and the Contract Administrator notified so that the Work can be reinspected.

D24.3 The date on which the Work has been certified by the Contract Administrator as being totally performed to the requirements of the Contract through the issue of a certificate of Total Performance is the date on which Total Performance has been achieved.

D25. LIQUIDATED DAMAGES

D25.1 If the Contractor fails to achieve Critical Stages, Substantial Performance or Total Performance in accordance with the Contract by the days fixed herein for same, the Contractor shall pay the City the following amounts per Working Day (or Calendar Day) for each and every Working Day (or Calendar Day) following the days fixed herein for same during which such failure continues:

(a) Critical Stage1 – Five hundred dollars ($500.00) per Working Day;

(b) Critical Stage 2 – Five hundred dollars ($500.00) per Working Day;

(c) Critical Stage 3 – Five hundred dollars ($500.00) per **Calendar Day**;

(d) Substantial Performance – Two thousand dollars ($2,000.00) per Working Day;

(e) Total Performance – One thousand dollars ($1,000.00) per Working Day.

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

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

D26. SUPPLY CHAIN DISRUPTION SCHEDULE DELAYS

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

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

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

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

D26.5 The Work schedule, including the durations identified in D21 to D24 where applicable, will be adjusted to reflect delays accepted by the Contract Administrator. No additional payment will be made for adjustment of schedules except where seasonal work, not previously identified in the Contract, is carried over to the following construction season.

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

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

D27. SCHEDULED MAINTENANCE

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

(a) Maintenance of sod restoration as specified in CW 3510.

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

CONTROL OF WORK

D28. JOB MEETINGS

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

D28.2 The Contract Administrator reserves the right to cancel any job meeting or call additional job meetings whenever they deem it necessary.

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

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

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

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

MEASUREMENT AND PAYMENT

D31. PAYMENT

D31.1 Further to C12, the City shall make payments to the Contractor by direct deposit to the Contractor's banking institution, and by no other means. Payments will not be made until the Contractor has made satisfactory direct deposit arrangements with the City. Direct deposit application forms are at https://winnipeg.ca/finance/files/Direct_Deposit_Form.pdf.

D31.2 Further to E3, no payment will be made for Cash Allowances other than as set out in E3.4.

D32. FUEL PRICE ADJUSTMENT

D32.1 The Contract is subject to a fuel price adjustment which will be calculated monthly based on eligible Work completed utilizing the following mathematical formulas;

(a) where the price of fuel has increased - ((CFI/BFI)-1.15) x Q x FF; and

(b) where the price of fuel has decreased - ((CFI/BFI)-0.85) x Q x FF; where

(i) BFI = base fuel index

(ii) CFI = current fuel index

(iii) FF = fuel factor

(iv) Q = monetary value of Work applied in the calculation.

D32.1.1 Eligible Work will be determined in accordance with D32.5.

D32.1.2 The base fuel index (BFI) will be the retail price of fuel identified on the Submission Deadline based on latest published "Monthly average retail prices for gasoline and fuel by geography" for Winnipeg, published by Statistics Canada, Table 18-10-0001-01. The BFI is a blended rate based on 15% regular unleaded gasoline at self-service filling stations and 85% diesel fuel at self-service filling stations.

D32.1.3 The current fuel index (CFI) based on the above blended rate will be determined for each monthly progress estimate and applied on the following progress estimate as a change order once rates are published by Statistics Canada.

D32.1.4 A Fuel Factor (FF) rate of the monetary value of all eligible Work completed that month based on the Contract unit prices will be used to calculate the assumed apportioned cost of fuel.

D32.2 Fuel cost adjustments may result in additional payment to the Contractor or credit to the City within the Contract by way of a monthly change order.

D32.3 The fuel escalation or de-escalation adjustment will not be applied if the CFI is within ±15% of the BFI.

D32.4 Fuel escalation adjustments will not be considered beyond the Substantial Performance/Critical Stages except where those dates/Working Days are adjusted by change order. Fuel de-escalation adjustments will apply for Work that extends beyond the dates/Working Days specified for Substantial Performance/Critical Stages.

D32.5 The Fuel Factor (FF) rates will be set as follows:

(a) The Fuel Factor rate will be set at 1.2% of the monitory value for all Work identified on Form B: Prices related to Water & Waste Work.

WARRANTY

D33. WARRANTY

D33.1 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.

D33.2 Notwithstanding C13.2 or D33.1, 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.

D33.2.1 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.

DISPUTE RESOLUTION

D34. DISPUTE RESOLUTION

D34.1 If the Contractor disagrees with any opinion, determination, or decision of the Contract Administrator, the Contractor shall act in accordance with the Contract Administrator's opinion, determination, or decision unless and until same is modified by the process followed by the parties pursuant to D34.

D34.2 The entire text of C21.4 is deleted, and amended to read: "Intentionally Deleted"

D34.3 The entire text of C21.5 is deleted, and amended to read:

(a) If Legal Services has determined that the Disputed Matter may proceed in the Appeal Process, the Contractor must, within ten (10) Business Days of the date of the Legal Services Response Letter, submit their written Appeal Form, in the manner and format set out on the City's Materials Management Website, to the Chief Administrative Officer, and to the Contract Administrator. The Contractor may not raise any other disputes other than the Disputed Matter in their Appeal Form.

D34.4 Further to C21, prior to the Contract Administrator's issuance of a Final Determination, the following informal dispute resolution process shall be followed where the Contractor disagrees with any opinion, determination, or decision of the Contract Administrator ("Dispute"):

(a) In the event of a Dispute, attempts shall be made by the Contract Administrator and the Contractor's equivalent representative to resolve Disputes within the normal course of project dealings between the Contract Administrator and the Contractor's equivalent representative.

(b) Disputes which in the reasonable opinion of the Contract Administrator or the Contractor's equivalent representative cannot be resolved within the normal course of project dealings as described above shall be referred to a without prejudice escalating negotiation process consisting of, at a minimum, the position levels as shown below and the equivalent Contractor representative levels:

(i) The Contract Administrator;

(ii) Supervisory level between the Contract Administrator and applicable Department Head;

(iii) Department Head.

D34.4.1 Names and positions of Contractor representatives equivalent to the above City position levels shall be determined by the Contractor and communicated to the City at the pre-commencement or kick off meeting.

D34.4.2 As these negotiations are not an adjudicative hearing, neither party may have legal counsel present during the negotiations.

D34.4.3 Both the City and the Contractor agree to make all reasonable efforts to conduct the above escalating negotiation process within twenty (20) Business Days, unless both parties agree, in writing, to extend that period of time.

D34.4.4 If the Dispute is not resolved to the City and Contractor's mutual satisfaction after discussions have occurred at the final escalated level as described above, or the time period set out in D34.4.3, as extended if applicable, has elapsed, the Contract Administrator will issue a Final Determination as defined in C1.1(v), at which point the parties will be governed by the Dispute Resolution process set out in C21.

INDEMNITY

D35. INDEMNITY

D35.1 Indemnity shall be as stated in C17.

D35.2 Notwithstanding C17.1, the Contractor shall save harmless and indemnify the City in the amount of twice the Contract Price or five million dollars ($5,000,000), whichever is greater, against all costs, damages or expenses arising from actions, claims, demands and proceedings, by whomsoever brought, made or taken as a result of negligent acts or negligent omissions of the Contractor, their Subcontractors, employees or agents in the performance or purported performance of the Work, and more particularly from:

(a) accidental injury to or death of any person whether retained by or in the employ of the contractor or not, arising directly or indirectly by reason of the performance of the Work, or by reason of any trespass on or damage to property;

(b) damage to any property owned in whole or in part by the City, or which the City by duty or custom is obliged, directly or indirectly, in any way or to any degree, to construct, repair or maintain;

(c) damage to, or trespass or encroachment upon, property owned by persons other than the City;

(d) any claim for lien or trust claim served upon the City pursuant to The Builders' Liens Act;

(e) failure to pay a Workers Compensation assessment, or Federal or Provincial taxes;

(f) unauthorized use of any design, device, material or process covered by letters patent, copyright, trademark or trade name in connection with the Work;

(g) inaccuracies in any information provided to the City by the Contractor.

D35.3 Further to C17, The City shall save harmless and indemnify the Contractor in the amount of twice the Contract Price or five million dollars ($5,000,000), whichever is greater, against all costs, damages or expenses arising from actions, claims, demands and proceedings, by whomsoever brought, made or taken as a result of negligent acts or negligent omissions of the City, their employees or agents in the performance of its obligation under the Contract.

THIRD PARTY AGREEMENTS

D36. FUNDING AND/OR CONTRIBUTION AGREEMENT OBLIGATIONS

D36.1 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.

D36.2 Further to D36.1, in the event that the obligations in D36 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.

D36.3 For the purposes of D36:

(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.

D36.4 Modified Insurance Requirements

D36.4.1 If not already required under the insurance requirements identified in D13, 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 their Ministers, officers, employees, and agents shall be added as additional insureds.

D36.4.2 If not already required under the insurance requirements identified in D13, 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.

D36.4.3 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.

D36.4.4 Further to D13.3, 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.

D36.4.5 All policies must be taken out with insurers licensed to carry on business in the Province of Manitoba.

D36.5 Indemnification By Contractor

D36.5.1 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.

D36.5.2 The Contractor agrees that in no event will Canada or Manitoba, their respective officers, servants, employees or agents be held liable for any damages in contract, tort (including negligence) or otherwise, for:

(a) any injury to any person, including, but not limited to, death, economic loss or infringement of rights;

(b) any damage to or loss or destruction of property of any person; or

(c) any obligation of any person, including, but not limited to, any obligation arising from a loan, capital lease or other long term obligation;

in relation to this Contract or the Work.

D36.6 Records Retention and Audits

D36.6.1 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.

D36.6.2 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 D36.6.1 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.

D36.7 Other Obligations

D36.7.1 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.

D36.7.2 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.

D36.7.3 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.

D36.7.4 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.

D36.7.5 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.

D36.7.6 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 D14)

KNOW EVERYONE BY THESE PRESENTS THAT

_____
(hereinafter called the "Principal"), and

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

_____

_____ dollars ($_____.____)

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

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

TENDER NO. 351-2023

2023 SEWER RENEWALS BY CIPP LINING (LARGE DIAMETER) – CONTRACT 4

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 D14)

KNOW EVERYONE BY THESE PRESENTS THAT

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

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

_____

_____ dollars ($_____.____)

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

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

TENDER NO. 351-2023

2023 SEWER RENEWALS BY CIPP LINING (LARGE DIAMETER) – CONTRACT 4

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

(ii) 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;

(iii) 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;

(iv) 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 J: SUBCONTRACTOR LIST
(See D15)

2023 SEWER RENEWALS BY CIPP LINING (LARGE DIAMETER) – CONTRACT 4

Name	Address

FORM K: EQUIPMENT
(See D16)

2023 SEWER RENEWALS BY CIPP LINING (LARGE DIAMETER) – CONTRACT 4

1. Category/type:

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

2. Category/type:

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

3. Category/type:

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

FORM K: EQUIPMENT
(See D16)

2023 SEWER RENEWALS BY CIPP LINING (LARGE DIAMETER) – CONTRACT 4

4. Category/type:

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

5. Category/type:

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

6. Category/type:

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

Make/Model/Year: _____ Serial No.: _____

Registered owner: _____

FORM L: CONTRACTOR EXPERIENCE
(See B13)

2023 SEWER RENEWALS BY CIPP LINING (LARGE DIAMETER) – CONTRACT 4

Attach additional resumes and documents as required. Indicate whether Projects/Project Personnel are for the Bidder, Subcontractor, or Key Personnel.

Project References:

Project Client/Contact: _____
(Name)

_____
(Address)

_____
(phone) (email)

Year	Description of Project	Value

Project References:

Project Client/Contact: _____
(Name)

_____
(Address)

_____
(phone) (email)

Year	Description of Project	Value

PART E - SPECIFICATIONS

GENERAL

E1. APPLICABLE SPECIFICATIONS AND DRAWINGS

E1.1 These Specifications shall apply to the Work.

E1.2 *The City of Winnipeg Standard Construction Specifications* in their entirety, whether or not specifically listed on Form B: Prices, shall apply to the Work.

E1.2.1 *The City of Winnipeg Standard Construction Specifications* is available on the Information Connection page at The City of Winnipeg, Corporate Finance, 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.	Appendix Title
A	Host Pipe Conditions and Inspections
B	Design Conditions
C	Traffic Control – General Requirements
D	Combined Sewer Overflow Review

Drawing No.	Drawing Name/Title
13336	COVER SHEET
13337	INDEX PAGE - DRAWING INDEX, CONSTRUCTION NOTES, LEGEND, HATCH PATTERNS & ABBREVIATIONS
13338	PORTAGE AVENUE - 1ST MH E OF WALL STREET TO MH AT GOULDING STREET
13339	PORTAGE AVENUE - MH AT GOULDING STREET TO MH AT MINTO STREET
13340	PORTAGE AVENUE - MH AT MINTO STREET TO MH AT DOMINION STREET (E PL)
13341	PORTAGE AVENUE - MH AT GARFIELD STREET SOUTH TO TIE-IN AT AUBREY STREET
13342	PORTAGE AVENUE - MH AT BANNING STREET (E OF PL) TO TIE-IN AT LIPTON STREET
13343	PORTAGE AVENUE - MH AT BURNELL STREET TO MH AT BANNING STREET (E OF CL)
13344	ST MATTHEWS AVENUE - MH AT STRATHCONA STREET (CL) TO MH AT ASHBURN STREET (CL)
13345	ST MATTHEWS AVENUE - MH AT VALOUR ROAD TO MH AT TEFLER STREET NORTH
13346	ST MATTHEWS AVENUE - MH AT TEFLER STREET NORTH TO TIE-IN AT CLIFTON STREET
13347	ST MATTHEWS AVENUE - MH AT GOULDING STREET TO MH AT WALL STREET (W OF CL)
13348	ST MATTHEWS AVENUE - MH AT SHERBURN STREET (S OF CL) TO MH AT INGERSOLL STREET (S OF CL)
13349	WELLINGTON AVENUE - MH AT LIPTON STREET (W PL) TO MH AT LIPTON STREET (CL)
13350	MANHOLE DETAILS - 1
13351	MANHOLE DETAILS - 2
13352	MANHOLE DETAILS - 3
13384	MANHOLE REHABILITATION - 1
13385	MANHOLE REHABILITATION - 2

GENERAL REQUIREMENTS

E2. MOBILIZATION AND DEMOBILIZATION PAYMENT

E2.1 Description

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

E2.2 Measurement and Payment

E2.2.1 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.

E3. CASH ALLOWANCE FOR ADDITIONAL WORK

E3.1 Additional Work may be necessitated due to unforeseen circumstances that may arise during the course of the project due to:

(a) Additions to the scope of Work by the Contract Administrator, beyond that defined herein.

E3.2 A cash allowance has been included on Form B: Prices.

E3.3 The City reserves the right to delete any or all of the Cash Allowance from the Contract if the Work intended to be covered by the Cash Allowance is not required, or if the Works intended are found to be more extensive than the provisional Cash Allowance.

E3.4 Cost of additional work shall be evaluated by the methods outlined in C7.4, and a Change Order prepared by the Contract Administrator. Cost of the Change Order will be paid on the Progress Estimate and deducted from the Cash Allowance. If the valuation of the authorized work exceeds the Value of the Cash Allowance, the Contract Value will be adjusted by the shortfall.

E3.5 Additional services and/or Work will not be initiated for:

(a) Reasons of lack of performance or errors in execution.

(b) Scheduling changes initiated by the City, where at least 24 hours’ notice is given prior to the Contractors schedule time to be on Site.

E3.6 Should it be determined that additional material or services are required, the Contract Administrator shall approve the Work, prior to commencement of the additional Work.

E3.7 Material Mark-Up Factors in accordance with C7:

(a) The base cost is to be the wholesale cost of the material, regardless of the Contractor or Subcontractor supplying the material.

(b) In general, the party (Contractor or Subcontractor) supplying the material is the party that purchases the material from a supplier who does not perform any work on Site, unless otherwise determined by the Contract Administrator.

(c) Where the Contractor is supplying the material, the mark-up on the material is limited to fifteen percent (15%).

(d) Where the Contractor's immediate Subcontractor is supplying the material the total mark-up on the material including all Subcontractors and the Contractor is limited to twenty-five percent (25%)

(i) The Subcontractor's mark-up on the material is limited to fifteen percent (15%);

(ii) The Contractor's mark-up on the material is limited to ten percent (10%).

(e) A Third-Level Subcontractor is a Subcontractor of a Subcontractor of the Contractor.

(i) No Third-Level Subcontractors on this project are approved for additional mark-up.

(ii) In the event that a Third-Level Subcontractor is utilized, that is not approved for additional mark-up, the Contractor is responsible for coordinating the split of the maximum approved mark-up between the Contractor and Subcontractors.

E4. TRAFFIC CONTROL

E4.1 Further to clauses 3.6, 3.7 and 3.8 of CW 1130:

(a) Where directed by the Contract Administrator, the Contractor shall construct and maintain temporary asphalt ramps to alleviate vertical pavement obstructions such as manholes and planing drop-offs to the satisfaction of the Contract Administrator.

(b) In accordance with the Manual of Temporary Traffic Control on City Streets (MTTC), the Contractor ("Construction Agency" in the manual) shall be responsible for supplying, placing, maintaining and removing the appropriate temporary traffic control devices as specified by the MTTC, the Contract Drawings, Staging Plans, and Traffic Management Plans or by the Traffic Management Branch of the City of Winnipeg Public Works Department. The Contractor shall bear all costs associated with the supply, placement and maintenance of temporary traffic control devices by their own forces or subcontractor.

(c) In addition, the Contractor shall be responsible for removing, placing, and maintaining all regulatory signing including but not limited to:

(i) Parking restrictions,

(ii) Stopping restrictions,

(iii) Turn restrictions,

(iv) Diamond lane removal,

(v) Full or directional closures on a Regional Street,

(vi) Traffic routed across a median,

(vii) Full or directional closure of a non-regional street where there is a requirement for regulatory signs (turn restrictions, bus stop relocations, etc.) to implement the closure.

(viii) Approved Designated Construction Zones with a temporary posted speed limit reduction. Traffic Services will be responsible for placing all of the advance signs and 'Construction Ends' (TC-4) signs. The Contractor is still responsible for all other temporary traffic control including but not limited to barricades, barrels and tall cones.

E4.2 Submissions

E4.2.1 Any changes to the approved traffic management plan must be submitted to the Contract Administrator a minimum of (five) 5 Working Days prior to the required change for approval.

E4.2.2 Traffic Management Plans

(a) The Contractor shall submit a detailed traffic management plan for works at sites identified below. The traffic management plan shall be submitted a minimum of fifteen (15) Business Days prior to commencement of work on each site to allow sufficient

time for review by the Contract Administrator and Traffic Management department. Traffic control plans shall include, but not necessarily be limited to, the following:

(i) Details of lane closures on regional and non-regional streets; detours; access accommodations for local businesses; and access accommodations for pedestrians throughout any and all stages of construction;

(ii) Traffic control coordination with flow bypass works, including traffic ramp locations;

(iii) construction and flow bypass staging/schedule.

(b) Traffic management plans shall be submitted for the following locations:

(i) Phase 1 Traffic Control on Portage Ave (S-MA20011143, S-MA20017639, S-MA20015190, S-MA20015187, S-MA20015185, S-MA20015246, S-MH20010155, S-MH20013516, S-MH20013692, S-MH20013741, and S-MH20013746)

- WB Lane Closures on Portage Av from Burnell St to Dominion St

(ii) Phase 2 Traffic Control on Portage Ave (S-MA20011111, S-MA20011118, S-MA20011101, S-MA20011114, S-MA20011106, S-MA20011107, S-MA20011126, S-MH20010123, S-MH20010124, S-MH20010122, S-MH20010121, S-MH20010120, and S-MH20010133)

- WB Lane Closures on Portage Av from Dominion St to Wall St

E4.2.3 Lane Closure Requests

(a) The Contractor shall submit all lane closure requests to the Contract Administrator a minimum of five (5) Business Days prior to the planned work.

(b) Requests for full or directional closures, median crossovers, speed limit reductions, or designated construction zones shall be submitted to the Contract Administrator a minimum of fifteen (15) Business days prior to the planned work.

(c) Requests for regional lane closures shall include all required information for submission required by the City's online request form. It is recommended that the Contractor fill out the online form, print to pdf, and submit the pdf to the Contract Administrator. The Contractor is solely responsible for the correctness of lane closure requests and responsible for any costs and/or delays resulting from the submission of inaccurate lane closures requests.

(d) A link to the form can be found here:

https://laneclosures.winnipeg.ca/

E4.2.4 All submitted traffic control plans are subject to review and acceptance by City of Winnipeg Traffic Management and Traffic Services divisions.

E4.3 General Requirements

E4.3.1 Intersecting private approach access shall be maintained at all times unless excavation operations require temporary closure.

(a) 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.

E4.3.2 The Contractor shall maintain access to all businesses during business hours, except where written authorization has been provided by the business.

E4.3.3 The Contractor shall maintain access to all schools, community centres, and other public buildings at all times.

E4.3.4 Bus traffic must be maintained at all times or as accepted by the Contract Administrator and Winnipeg Transit. Winnipeg Transit shall have the authority to determine the level of

accommodation at bus stops in work zones. Bus stops may be closed, relocated, or maintained in a work zone at Winnipeg Transit's discretion.

E4.3.5 Ambulance/emergency vehicle access must be maintained at all times.

E4.3.6 Designated, permanent, and/or temporary bicycle routes shall be safely maintained throughout the work, or temporary traffic control put in place to reroute bicycle traffic around the work area. Temporary traffic control chosen for the closure or modification of an active transportation route shall match the level of safety provided by the route that is being closed or modified.

E4.3.7 Pedestrian access must be maintained on the one side at all times. One pedestrian crossing in the east-west direction and one pedestrian crossing in the north-south direction must be maintained at each intersection at all times. If this cannot be maintained, 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. Refer also to D8.

E4.3.8 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.

E4.3.9 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.

E4.3.10 During the project, temporary snow fence shall be installed adjacent to existing and temporary sidewalks as necessary to prevent access to the construction area and to provide separation from the excavation area. The Contractor shall be responsible for maintaining the snow fence in a proper working condition. No measurement for payment shall be made for this work.

E4.3.11 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.

E4.3.12 Flag persons may be necessary to maintain the flow of traffic during certain work operations.

E4.3.13 Notwithstanding the requirements noted herein and CW 1130, the Contractor shall maintain the minimum site-specific traffic control requirements outlined in Appendix C and as indicated on the Drawings.

E4.4 Regional Streets

E4.4.1 The following traffic control requirements shall apply to work on Regional Streets under this contract.

E4.4.2 Regional Streets in this Contract are:

(a) Portage Avenue

(b) Wall Street

E4.4.3 Portage Avenue

(a) Phase 1: Maintain a minimum of two (2) lanes of westbound traffic at all times. It is anticipated that the second and third lanes from the curb will be closed to facilitate the Work. Lane closure shall remain in place until all Work is completed, including manhole rehabilitation and permanent pavement restoration.

(b) Phase 2: Maintain a minimum of two (2) lanes of westbound traffic at all times. It is anticipated that the third and fourth lanes from the curb will be closed to facilitate the work. Lane closure shall remain in place until all Work is completed, including manhole rehabilitation and permanent pavement restoration.

E4.4.4 Wall Street at St Matthews Ave

(a) Maintain a minimum of one (1) lane of northbound traffic on Wall St at all times.

(b) Maintain a minimum of one (1) lane in each direction on St Matthews Av at all times.

E4.4.5 Refer to Appendix C for additional details.

E4.4.6 Refer to D22 and D25 for details on Contract Critical Stages and Liquidated Damages associated with Regional Street Lane Closures.

E4.4.7 The Contractor will have access to the open lane(s) of traffic provided flag persons are used in accordance with the most current edition of The City of Winnipeg Manual for Temporary Traffic Control on City Streets to maintain traffic safety.

E4.4.8 Further to E4.1, should the Contract Administrator require that Work on a Regional Street be carried out at night, on Sundays, on public holidays or that Work be restricted or suspended during peak traffic hours, the Contractor shall comply without any additional compensation being considered to meet these requirements.

E4.4.9 The City reserves the right to restrict, reject, or cancel Regional Street lane closures at any time due to the occurrence of special events or conflicting third party work.

E4.5 Residential Streets

E4.5.1 Traffic Control on Non-Regional Streets during construction shall be as follows:

(a) Maintain one lane of traffic with street signed as “Road Closed – No Exit”;

(b) Intersecting streets and private approaches will be maintained at all times; and

(c) Bus traffic will be maintained at all times.

(d) A minimum of one lane of traffic shall be maintained on one-way and dead end residential streets at all times.

(e) 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.

E4.6 Regulatory Signage

(a) Further to E4.1(c), the Contractor shall make arrangement with the Traffic Services Branch of the City of Winnipeg to supply regulatory signs as required.

(b) The Contractor shall remove and stockpile any regulatory signage not required during construction such as but not limited to parking restrictions, turn restrictions and loading restrictions.

(c) Further to E4.1(c)(iii) and E4.1(c)(iv) the Contractor shall make arrangements with the Traffic Services Branch of the City of Winnipeg to reinstall the permanent regulatory signs after the Contract Work is complete. At this time the Contractor shall make arrangements to drop off the stockpiled materials to Traffic Services at 495 Archibald Street.

E4.7 Maintenance of Traffic Control

(a) Upon request from the Contract Administrator, the Contractor shall provide records demonstrating that the Site has been maintained.

(b) If the Contract Administrator determines that the Contractor is not performing Traffic Control in accordance with this specification, Traffic Services Branch may be engaged to perform the Traffic Control. In this event the Contractor shall bear the costs associated charged to the project by the Traffic Services Branch of the City of Winnipeg in connection with the required Works undertaken by the Contractor.

E4.8 Measurement and Payment

(a) Unless indicated otherwise on Form B, 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.

(b) Where identified for payment in Form B, Traffic Control installation and maintenance will be measured and paid on a Lump Sum basis at the Contract Lump Sum price for each individual site. Payment shall include all rental costs, prep work, setup, maintenance, removal and any other efforts required to maintain the closure for the duration of the Work. No additional payments will be made for additional expenses incurred in the installation, maintenance, modification, or removal of the closure, including additional costs incurred due to delays in completing the sewer rehabilitation work resulting from the Contractor's means and methods.

(c) Payment for Traffic Control will be made in full upon completion of the work and removal of the lane closure to the satisfaction of the Contract Administrator and City of Winnipeg Traffic Management Dept.

E5. SHOP DRAWINGS

E5.1 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.

E5.2 Submit all Shop Drawings in accordance with CW 1110 except as modified herein.

E5.3 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 Shop Drawings.

E5.4 Submit Shop Drawing submissions within five (5) Business Days of a request as indicated in E5 or receipt of Notice of Award in accordance with B19, whichever is earlier.

E5.5 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.

E5.6 Shop Drawings not meeting the requirements of CW 1100 or the requirements specified herein will be returned to the Contractor without review for resubmission.

E5.7 Shop drawing submissions will be limited to two (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.

E5.8 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.

E6. CONFINED SPACE ENTRY

E6.1 Description

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

E6.2 General

(a) 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 (PPE).

(b) 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 PPE.

(c) The Contractor is responsible for all safety and confined space support throughout the project.

E6.3 Methods

E6.3.1 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.

E6.3.2 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.

E6.3.3 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.

E6.4 Measurement and Payment

E6.4.1 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.

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 sewers to be lined for review by the Contract Administrator in accordance with E5, a minimum of five (5) Business Days prior to undertaking the work. Flow bypass plans shall meet the requirements outlined herein.

E7.3 Flow Control Plans

E7.3.1 Flow control plans shall include the following:

(a) A description and sketch detailing the arrangement of the proposed flow control measures.

(b) 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) Traffic Ramps (where required)

(iv) Pumps (where required)

(c) Identify suction and discharge manholes.

(d) A detailed procedure for installation and removal of the flow control measures.

(e) Monitoring plan (if required). Note: all plans shall include a 24 hr contact person.

(f) Means and methods for dealing with excessive flows or wet weather events.

(g) Means and methods for bypassing flows from apartment complexes and commercial buildings.

(h) Supply of temporary washroom facilities where required.

E7.3.2 A tabular flow control plan with multiple sewer locations is acceptable for assets 450 mm in diameter and smaller. All other submissions shall be prepared on an individual sewer/liner installation basis.

E7.3.3 Where identified, supplementary flow control submissions shall be submitted in conjunction with the flow control plan. The supplementary submissions shall include system curves for the flow bypass arrangement demonstrating the ability of the proposed arrangement to meet the identified flow requirements. The submission shall include the following minimum information:

(a) a sketch showing all major components of the flow bypass setup;

(b) suction manhole depths;

(c) 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; and

(d) provision of the system curves plotted with the pump curves, demonstrating the pumping capacity of the proposed system, and inclusive of the pump name plate data complete with nominal capacity, total dynamic head, and power.

E7.3.4 Supplementary submissions, in accordance with E7.3.3, shall be included in the flow control submission for the following sites:

(a) N/A

E7.3.5 Flow control plans for the following locations 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:

(a) N/A

E7.3.6 Advanced Flow Control Plans

(a) 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.

(b) The following locations require the submission of advanced flow control plans:

(i) N/A

E7.3.7 The Contractor shall be aware that flow control plans which deviate significantly from tendered flow control requirements and/or require a review of changes to the operation of the City's collection system can require significant review efforts by the Contract Administrator and City. Costs associated with these reviews may be charged back to the Contractor if the submitted plans are deemed to be a significant deviation from the tendered conditions. The Contractor Administrator will advise the Contractor prior to undertaking reviews for which costs will be charged back to the Contractor.

E7.4 Mainline Sewer Flows

E7.4.1 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 E7.6.

E7.4.2 The Contractor shall determine appropriate sewer bypass flows for sewer assets meeting the following criteria.

(a) WWS smaller than 300 mm in diameter.

(b) CS 450 mm in diameter and smaller.

E7.4.3 For sewers larger than those listed in E7.4.2, the following flows have been provided the purposes of designing flow bypass arrangements:

(a) Portage Av (S-MA20011111)
  (i) Average Dry Weather: 1.14 L/s

(b) Portage Av (S-MA20011118)
  (i) Average Dry Weather: 1.83 L/s

(c) Portage Av (S-MA20011114)
  (i) Average Dry Weather: 1.83 L/s

(d) Portage Av (S-MA200011101)
  (i) Average Dry Weather: 2.23 L/s

(e) Portage Av (S-MA20011106)
  (i) Average Dry Weather: 3.08 L/s

(f) Portage Av (S-MA20011107)
  (i) Average Dry Weather: 4.25 L/s

(g) Portage Av (S-MA20011126)
  (i) Average Dry Weather: 5.06 L/s

(h) Portage Av (S-MA20011143)
  (i) Average Dry Weather: 5.53 L/s

(i) Portage Av (S-MA20017639)
  (i) Average Dry Weather: 6.79 L/s

(j) Portage Av (S-MA20015190)
  (i) Average Dry Weather: 3.77 L/s

(k) Portage Av (S-MA20015187)
  (i) Average Dry Weather: 3.77 L/s

(l) Portage Av (S-MA20015185)
  (i) Average Dry Weather: 2.51 L/s

(m) Portage Av (S-MA20015246)
  (i) Average Dry Weather: 1.76 L/s

(n) St Matthews Av (S-MA20009784)
  (i) Average Dry Weather: 1.69 L/s

(o) St Matthews Av (S-MA70113962)
  (i) Average Dry Weather: 1.98 L/s

(p) St Matthews Av (S-MA20009103)
  (i) Average Dry Weather: 2.93 L/s

(q) St Matthews Av (S-MA20009129)
  (i) Average Dry Weather: 3.57 L/s

(r) St Matthews Av (S-MA20009132)
  (i) Average Dry Weather: 3.91 L/s

(s) St Matthews Av (S-MA20009421)
  (i) Average Dry Weather: 3.21 L/s

(t) St Matthews Av (S-MA20009430)
  (i) Average Dry Weather: 0.59 L/s

(u) St Matthews Av (S-MA20017074)
  (i) Average Dry Weather: 1.58 L/s

(v) Wellington Av (S-MA20017810)
  (i) Average Dry Weather: 1.92 L/s

E7.4.4 The estimated flows provided herein have been estimated based on the City's sewer collection system hydraulic model. The Contractor shall be responsible to confirm these flows prior to submission of the flow bypass plan and report any discrepancies to the Contractor Administrator.

E7.4.5 Notwithstanding E7.4.2 and E7.4.3 the following assets may exhibit intermittent flows resulting from the operation of upstream pump stations. The following information has been provided for the purposes of sizing bypass systems:

(a) N/A

E7.4.6 The following additional site-specific information is provided for the Contractors use and shall be reviewed and incorporated into the Contractor's flow control plans:

(a) A review of combined sewer overflow locations and elevations have been included in Appendix D. The contractor shall take note of limited freeboard upstream of select sewers and incorporate appropriate control measures into their flow control plans.

E7.5 Sewer Services

E7.5.1 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.

E7.5.2 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 approved by the building owner and the Contract Administrator.

E7.5.3 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 approved by the building owner and the Contract Administrator. One toilet facility to be provided for each business in a strip mall.

E7.5.4 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.

E7.5.5 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 agreed upon by the Contract Administrator and drain or pump the sewer service from that location until the sewer service is reinstated.

E7.5.6 Excavate for sewer service exposure in accordance with CW 2030. Repair and backfill exposed sewer services in accordance with CW 2130.

E7.6 Manholes

E7.6.1 Flow control may be required to isolate manholes to complete the specified manhole rehabilitation works. Flow control methods may include flow through inflatable plugs, flumes, or other means of conveying flows through the work zone.

E7.6.2 Any flow control methods employed must meet the flow capacity and any other performance requirements identified herein.

E7.7 Methods

E7.7.1 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.

E7.7.2 Maintain existing sewer flows from upstream sewers during construction around the sewers being lined.

E7.7.3 Where rehabilitation work will result in the complete blockage of a combined sewer for any period of time (e.g. CIPP liner installation) the Contractor shall provide a minimum bypass pumping capacity of 2.75 times the estimated average day flows as provided herein or measured by the Contractor.

E7.7.4 Erection of scaffolding overtop of active roadways will not be permitted for the purposes of flow control.

E7.7.5 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.

E7.7.6 Provide security personnel for locations where by-pass pumping requires normally secure or locked doors and access areas to be left open or unlocked.

E7.7.7 Ensure all flow control components and materials are removed from the sewer system upon completion of the work.

E7.7.8 The Contractor shall put in place measures to prevent the spill of wastewater and styrene laden water from CIPP installation operations to the environment. When working in LDS, near outfalls (all sewers), 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.

E7.7.9 The Contractor shall demonstrate that the installed flow bypass system operates as intended and is capable of conveying the incoming flows prior to lining.

E7.7.10 Storage in the upstream system will be limited to the obvert of the pipe immediately upstream of any manhole being used for pumping. Upstream storage as a means of buffering incoming flows is not an acceptable method of flow control.

E7.8 Weather

E7.8.1 Review the Environment Canada weather forecast with the Contract Administrator before each day of liner installation.

E7.8.2 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.

E7.8.3 The Contractor shall advise immediately of any weather-related delays.

E7.8.4 The Contractor shall schedule the Work according to the weather; the City is not responsible for costs associated with weather related delays.

E7.9 Measurement and Payment

E7.9.1 Mainline Sewer Rehabilitation

(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 site locations have been identified for measurement on a lump sum basis. The number of units to be paid 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 for payment 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) Supply, installation, and removal of traffic ramps and associated materials required for flow control works;

(vii) Any and all other plant, materials, and labour 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 flow control is measured and paid on a lump sum basis:

(i) 25% payment for the Contract Lump Sum price for each respective site will be paid when flow control measures have been mobilized to that site and are in operation.

(ii) 100% of the Contract Lump Sum price for each respective site will be paid subsequent to the completion of the liner installation and demobilization of flow control measures from that site.

(e) Where no flow control measures are undertaken, no payment will be made for this item of work.

(f) 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.

(g) No additional payments will be made for additional Flow Control costs, including equipment, material, rentals, or labour, due to delays in the Work caused by the Contractor's own means and methods.

E7.9.2 Manhole Rehabilitation

(a) Flow control for manhole rehabilitation will be considered incidental to the Work and will not be measured for payment. No separate 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 center of the start manhole to center of the finish manhole using a steel tape, laser distance finder, or similar suitable measuring process. Length measurements must be accurate as they will be utilized for evaluating liner designs, and for payment, where applicable.

- The Contract Administrator will review submitted lengths from the pre-design and/or pre-lining inspections in conjunction with the submitted inspections to determine payment lengths for all applicable length-based pay items as defined herein. These lengths will be reviewed with the Contractor for the first Progress Estimate and used for the remainder of the project except where noted.

(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) For manhole rehabilitation, confirm all manhole dimensions as per E13.

(d) 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, E9, and as outlined herein:

(a) Pre-Repair Inspection (where specified and as deemed necessary):

(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 and submitted to the Contract Administrator a minimum of forty (40) Business Days prior to lining, 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):

(i) Perform where identified in Appendix A prior to preparing the liner design.

(ii) Sewer must be completely cleaned to facilitate inspection.

(iii) 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.

(iv) The following methods may be employed (the Contractor shall confirm an acceptable pre-design inspection method for the rehabilitation technology being employed):

- Hand measurements
- Laser profiling
- Templating (Rigid liner installation only)

(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) 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.

(vii) 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.

(viii) Laser profiling technology must have sufficient accuracy and replicability as per E8.7 and must capture the entire circumference of the pipe.

(ix) 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.

(v) The sewer service report shall be submitted with the pre-lining inspection.

(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. 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 where specified in Appendix A 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
- 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) Laser profiling technology must have sufficient accuracy and replicability as per E8.7 and must capture the entire circumference of the pipe.

(vii) Post-Design inspection shall be submitted within fifteen (15) Business Days of completion of the liner installation. Total Performance for the project will not be granted prior to submission and acceptance of the Post-Design inspection CCTV and associated reports.

(viii) 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) Sewer shall be completely cleaned to facilitate the inspection.

(iii) 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.

(iv) Undertake sewer cleaning in accordance with CW 2140 as required to obtain a satisfactory inspection.

(v) 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 with the pre-lining inspection. Pre-lining inspections will not be reviewed without submission of the sewer service report. 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.

E8.5 Amendments and Supplements to CW 2145 for Sewer Inspections:

E8.5.1 Further to Section 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.

E8.5.2 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.

E8.5.3 Replace Clause 3.11.1 with: Capture the inspections in digital format in colour from the live video source on HDD to the following minimum requirements.

(a) For sewer diameters less than 1800mm in height the minimum camera lens and recording requirements will be:

(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.

(b) For sewer diameters 1800mm in height and larger, the minimum camera lens and recording requirements will be:

(i) XDVD MPEG-2 or MPEG-4 format (MPEG-4 preferred).

(ii) Picture Size: 024x768 (or greater) @ 29.97 (minimum) frames per second.

(iii) Data/Bit Rate: 6.0 M-bits/sec.

(c) The use of Side Wall Scanning technologies resolution shall be at a level of resolution as per E8.6.3 to ensure pipe wall loss clarity is provided within the imagery. Viewing software shall be provided at no cost to the City or the Contract Administrator to ensure the user has full autonomy when viewing the sewer pipe. Pre-recorded video shall also be submitted for Side Wall Scanning technologies in addition to specialty autonomous viewing software and data. No water droplets, debris marks or similar shall exist on the lens that would cause image blur or inhibit the clear and uninterrupted view of the pipe during the inspection. Side Wall Scanning technology platforms shall be used having sufficient illumination within given diameters as per the camera manufacturer's recommendations.

E8.5.4 Further to Clause 3.8 and E8.6.3 video imagery must not contain black or other coloured or other erroneous columns or bands where formatting of lesser resolution camera lens recordings have been resized to meet the Picture Size requirements of this specification. Video will be reviewed by the Contract Administrator with the potential for rejection if these bands or columns are observed.

E8.6 Sewer Inspection Equipment

E8.6.1 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.

E8.6.2 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 E8.6.3.

E8.6.3 In-Line CCTV Inspection Platform Minimum Requirements

(a) Independently controlled drive tracks that enable the platform to manoeuvre around bends and climb over debris up to 300 mm in height.

(b) Operable under partially or fully submerged flow conditions, for distances up to 600 m upstream or downstream from a single access point.

(c) Operable in sewers of various cross-section, and constructed of standard pipe materials including brick, clay, concrete, PVC, HDPE, and steel.

(d) Tethered to facilitate the conveyance and 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 at the widest horizontal viewing angle and the pipe's side periphery.

(i) Lighting for the camera shall be waterproof and suitable to allow a clear picture of the entire periphery of the pipe. The camera shall be operative and provide a clear picture in 100 percent humidity conditions.

(ii) An unclear picture due to excessive lighting (image flare), the lack of lighting or the presence of fog, steam, or excessive humidity will be considered unsatisfactory. The Contractor is responsible for identifying and implementing corrective actions to obtain suitable video quality, such as using fans or ventilation systems to dissipate the fog or by the heating of incoming air to mitigate fog.

(iii) Light heads shall be changed upon the request of the Contract Administrator.

(f) A blurred picture due to fats, oil or grease or a failure in one or all of the primary colour additives, Red, Green, Blue (RGB) visuals will be considered unsatisfactory. The Contractor is responsible for identifying and implementing corrective actions to obtain suitable video quality, such as cleaning the sewer mainline, having the camera lens cleaned prior to reinspection of the mainline.

(g) The Contractor is responsible for presenting issues regarding questionable video quality immediately to the attention of the Contract Administrator.

E8.7 Three-Dimensional (3D) Laser Scanning Inspection

E8.7.1 "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.

E8.7.2 Three-Dimensional (3D) LASER scanning equipment shall provide an accurate determination of pipe geometry (features and defects) above the fluid level.

(a) Field 38 – 43 data shall be collected using a hand-held GPS device to achieve Nearest (N) or sub-meter (M) accuracies dependent upon available satellite coverage.

E8.7.3 Minimum equipment requirements are:

(a) The laser shall be Class 1; eye-safe for operator safety.

(b) Surface measurements accurate to 5mm at 3 metres in 1200mm pipes and larger.

(c) Precision ovality / deflection detailed range laser measurement scans accurate to ±1%.

(d) 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.

E8.7.4 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.

E8.7.5 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.

E8.8 Catch Basin Lead Inspections and Cleaning

E8.8.1 This specification shall cover the cleaning and inspection of catch basin leads connected to sewers included in this contract for the purpose of determining whether the catch basin lead requires repair work.

E8.8.2 The Contractor shall clean and inspect catch basin leads where indicated for repair on the drawings, and/or as directed by the Contract Administrator.

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

(b) Perform CCTV inspection from catch basin to mainline sewer in accordance with CW 2145. No coding of the submission will be required.

E8.8.3 Catch basin lead repairs in accordance with E11.4.

E8.9 Measurement and Payment

E8.9.1 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.

E8.9.2 Sewer and catch basin lead 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 Contractors calibrated inspection equipment or as determined by the Contract Administrator.

(b) Pre-lining, post-lining, and warranty inspections will not be paid for where re-inspections are required due to the need for additional work and further verification of the installed liner.

E8.9.3 Sewer Service Reports

(a) The provision of sewer service reports will be considered incidental to the Work 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.

E8.9.4 Sewer Inspection Reports

(a) The provision of sewer inspection reports will be considered incidental to the Work and will not be measured for payment. No separate payment will be made.

E9. DIGITAL PANORAMIC MANHOLE INSPECTIONS

E9.1 Description:

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

E9.2 General

E9.2.1 Digital panoramic manhole inspections will be utilized for manhole rehabilitation with inspections following the format and intent outlined in E8.

E9.3 Digital Panoramic Manhole Inspection

E9.3.1 Notwithstanding CW 2145, inspect manholes using digital panoramic manhole inspection system such as the IBAK PANORAMO SI, RST Helix or equivalent shall meet the following criteria:

(a) The inspection camera system must be 100% digital, having submitted software that will provide and allow the autonomous viewing of the chamber to facilitate the Condition Assessment process. Any analog or NTSC video camera will be deemed unacceptable.

(b) Perform manhole condition coding in accordance with the requirements of the NASSCO MACP V7.00 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 at no additional cost to the Contract Administrator or the City of Winnipeg.

(n) The Contractor shall provide the database.

(o) The inspection system must descend to the lowest point within the manhole chamber to a depth that will facilitate accurate perpendicular measurements using the software's measuring tools to occur.

(p) Any inspection exhibiting an incomplete descent having a distance greater than one (1) metre above the invert or water level resulting to data interpolation, will be rejected unless appurtenances or obstructions are present within the chamber and accepted by the Contract Administrator.

(q) 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.

(r) Manhole condition coding shall be submitted to the Contract Administrator as per E8.

E9.4 Amendments and Supplements to CW 2145 for Digital Panoramic Manhole Inspections:

E9.4.1 Inspection of manholes will use side scanning imagery and point cloud collection equipment only to NASSCO MACP Level 2 inspections for the purposes of assessing thoroughness of cleaning, observing and recording structural and service defects and construction features of existing manhole and control structure assets and to verify new and rehabilitated sewer construction prior to acceptance.

E9.4.2 Replace Clause 3.6 with:

(a) Perform NASSCO MACP V7.0.0 or greater manhole condition Level 2 inspection and coding in general accordance with E15 of this specification and with the following additional requirements.

(b) The following fields shall be used when completing the "Header" details in the manhole inspection header form. By default, Field 5 the "Owner" is City of Winnipeg and Field 6, the "Customer" will be the Contract Administrator identified in D6.

E9.4.3 Further to Section 3.6, Field 34-37 of the Measurements section shall be measured in whole numbers and expressed in millimetres.

E9.4.4 Further to Clause 3.17.8:

(a) A skilled and NASSCO MACP certified technician or supervisor who shall be located at the control panel in the mobile data collection studio shall control the operation of the digital panoramic inspection equipment. Perform manhole inspections in accordance with the following:

(i) From the top to the bottom of the manhole.

(ii) From the manhole frame to the center line elevation of the existing sewer.

(iii) Ensure the frame of the manhole is clearly visible at the start of the inspection.

(iv) Provide a chalk or dry-erase-board placed adjacent to the manhole cover, within the inspection imagery, noting the Date, Contract #, Manhole Asset ID # and physical measurement of manhole rim to invert dimension.

(v) Provide a second chalk or dry-erase-board placed adjacent to the manhole cover, within the inspection imagery, using an arrow to indicate where North is located.

(vi) Spray paint a mark (with a colour consistent for the duration of the project and a different color to the North point) indicating the 6 o'clock position that is in reference to the first outgoing pipe (taken from north in a clockwise direction, as

per NASSCO MACP requirements) visible on the surface and within the manhole frame. Plastic templates placed on the surface may also be used to represent the North point and the 6 o'clock position.

(vii) Block ambient light during the inspection to minimize problems related to lens flare and poor contrast. Latest technologies now incorporate sun shields; where possible, ensure image capture surrounding the above ground environments for site familiarisation / orientation is completed.

(viii) Inspect the manhole to the lowest depth that will facilitate accurate perpendicular measurements using the software's measuring tools. Depth distances shall be provided in millimetres as per E15.5.

(ix) Complete all steel tape or calibrated footage counter measurements pertinent to mandatory MACP Level 2 measurements that are located at or around the cover and frame area. In accordance with NASSCO MACP standards, the Contractor shall measure the rim to invert using a steel tape or calibrated footage counter from the surface to validate the measurement available from the panoramic scan.

(x) No confined space entry shall be completed without Contract Administrators approval.

E9.4.5 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.

E9.5 Measurement and Payment

E9.5.1 Digital panoramic manhole inspections will be measured and paid for in accordance with CW 2145 except as modified herein:

(a) Pre-lining, post-lining, and warranty inspections will not be paid for where re-inspections are required due to the need for additional work and further verification of the installed liner.

E9.5.2 Manhole Inspection Reports

(a) The provision of manhole inspection reports will be considered incidental to the Work and will not be measured for payment. No separate payment will be made.

E10. EXCAVATIONS AND PIPELINE ACCESS

E10.1 Description

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

(b) Refer to E13 for manhole rehabilitation and associated preparation works.

E10.2 Submittals

(a) A work plan shall be provided for each excavation and/or manhole slated for installation, 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 E5 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 completion of the Work.

(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.

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.

(iii) 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.

(iv) 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.

(v) 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) 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.

E10.5.2 Manhole Modifications to Facilitate Liner Installation

(a) If required to complete the work, the Contractor may choose to remove and replace manholes or portions of manholes (e.g. 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 and as follows:

- Manholes identified for rehabilitation on Portage Ave are located in close proximity to existing third party utilities and excavation and disassembly for CIPP liner installation is not feasible. CIPP liners within these areas must be installed through the existing manholes, which will then be rehabilitated as specified herein and shown on the Drawings.
- Select manholes are located on larger cast in place concrete chambers. Cast in place concrete chambers may not be modified or roof structures removed where noted and/or where removable roof slabs are not present. If present, removable roof slabs may be removed to facilitate lining.

(iv) Where manholes are removed down to the sewer, they shall be reconstructed as per 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 E7.5.

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) 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

(a) Construct trunk sewer closures 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 E14 and E15.

E10.5.7 New Manholes

(a) Construct new cast-in-place or pre-cast 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 E14 and E15.

(c) Manholes shall be constructed as shown on the Drawings and in accordance with CW2130.

E10.5.8 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.

E10.5.9 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, will 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 will 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 sewer rehabilitation, including but not limited to: excavations, shoring, demolition, manhole modifications including replacement of manhole risers up to 2.0 m below grade (if required), manhole replacement, new manhole installations, trunk sewer closures, 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 Pipeline Access Modifications lump sum price for each site or asset will be paid upon commencement of the liner installation for each site.

(ii) 100% payment of the Pipeline Access Modifications lump sum price for each site or asset will be paid upon completion and acceptance of backfill and manhole restoration at each site.

(d) All manhole modifications required to facilitate the identified rehabilitation work will 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 and Additional External Point Repairs”. Refer to E3 and E11.7.13.

E10.6.2 Provisional – Replacement of Existing 750 mm Concrete Manhole Risers

(a) Replacement of existing 750 mm concrete manhole risers will be measured on a unit basis and paid for at the Contract vertical meter price for “Remove and Replace Existing 750 mm Concrete Manhole Riser Sections”. The quantity to be paid will be the total vertical meters of 750 mm manhole riser replacement completed in accordance with this specification, accepted and measured by the Contract Administrator. Only replacements completed in excess of a depth of 2.0 m will be considered for payment and only where manholes are already being disassembled for CIPP liner installation.

(b) Payment for “Remove and Replace Existing 750 mm Concrete Manhole Riser Sections” shall include all materials, equipment and labour required to complete the work as specified.

E10.6.3 Protection of Existing Trees

(a) The protection of existing trees will be considered incidental to the Work and will not be measured for payment. No additional payment will be made.

E11. SEWER AND MANHOLE 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 this specification and Appendix A prior to performing sewer lining.

(b) This section addresses sewer and manhole cleaning and repairs required to facilitate installation of CIPP liners. Refer to E13 for all works related to manhole rehabilitation.

(c) 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 that 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) Observed sewer defects and cleaning/preparation works evident in the existing sewer inspection videos have been provided in Appendix A.

(d) Refer to E11.3.3(b) 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.

E11.3.3 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 E11.3.3(a), the following site-specific repairs shall be completed prior to liner installation work:

(i) N/A

(c) Further to E11.3.3(a), and unless noted otherwise on the Drawings, the following work shall be completed prior to the installation of CIPP liners:

(i) In accessible sewers (equal to or greater than 900 mm), prepare and fill all voiding, holes, and discontinuities in the host pipe wall greater than 50 mm in depth or 150 mm in 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.

E11.3.4 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 form 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 to confirm the extents and location of the repair.

(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 Post-Liner Installation Annulus Grouting for Tight Fit Liners

(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 Catch Basin Lead Repair

(a) Repair and restore all catch basin leads where indicated on the Drawings, and/or as requested by the Contract Administrator.

(b) Clean all catch basin leads prior to inspection in accordance with CW 2140 and E8.8.

(c) Inspect all catch basin leads scheduled for repair in accordance with CW 2145 and E8.8. Catch basin leads shall be inspected prior to excavating to confirm the extents of repairs required. Provide a copy of the inspections and proposed repair extents to the Contract Administrator for review prior to construction.

(d) Restore catch basin leads and reconnect to the sewer main in accordance with CW 2130.

E11.4.7 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) Manhole rungs removed to facilitate liner installation activities liner must be replaced with new manhole rungs meeting the requirements of CW 2130. New manhole rungs are only required to be installed where the existing manhole diameter is 1200 mm or greater. Short sections of smaller diameter risers at pavement level, where the main diameter of the MH barrel is 1200 or larger shall have new manhole rungs installed where required. Review with the Contract Administrator on site prior to completing the work.

(c) Complete cast-in-place concrete and reinforcing steel work as shown on the Drawings and in accordance with E14 and E15.

E11.5 Inspections

(a) Complete panoramic manhole inspections in accordance with E9 wherever manholes are modified or repaired through the course of the work.

E11.6 Quality Control

E11.6.1 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.

E11.6.2 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.

E11.7 Measurement and Payment

E11.7.1 Sewer and Catch Basin Lead Cleaning

(a) Sewer cleaning, including catch basins will be measured and paid in accordance with CW2140, 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.

(c) Only one item of payment will be made for pre-lining cleaning.

(d) 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.

E11.7.2 Sewer Preparation Work

(a) Removal of intruding sewer services and solid debris cutting will be measured and paid for in accordance with CW2140.

(b) Grease and roots cutting will be measured on a unit basis and paid for at the Contract Unit Price for “Removal of Grease and 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.

E11.7.3 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 Concrete Patching” for the respective repair type. The number of units to be paid 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 in sewers less than 900 mm in diameter up to 0.5 m from the manhole interface will be measured and paid for on a unit basis and paid for at the Contract Unit Price for “Internal Sewer Concrete Patching at Manhole Interface for Sewers Less than 900 mm in Dia – Up to 0.5 m Long”.

(ii) Concrete patching of sewer walls in sewers 900 mm in diameter and greater up to 1.0 meter in length will be measured and paid for on a unit basis and paid for at the Contract Unit Price for “Internal Sewer Concrete Patching for Sewers Equal to and Greater than 900 mm in Dia – Up to 1.0 meter long”.

(iii) Concrete patching of sewer walls in sewers 900 mm in diameter and greater in lengths greater than 1.0 meter in length will be measured and paid for on a linear meter basis and paid for at the Contract Unit Price for “Internal Sewer Concrete Patching for Sewers Equal to and Greater than 900 mm in Dia – Greater than 1.0 meter long”.

(iv) Cross bore grouting will be measured and paid on a lump sum basis at the Contract Unit Price for “Internal Sewer Concrete Patching for Sewers Equal to and Greater than 900 mm in Dia – Cross Bore 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.

E11.7.4 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.

(c) Where specified, annulus grouting will be measured and paid on a lump sum basis at the Contract Unit Price for "Annulus Grouting" at the locations identified in Form B.

E11.7.5 Manhole Modifications

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

E11.7.6 New Manhole Installation

(a) Where identified on the Drawings, the installation of new manholes will be measured and paid on a lump sum basis at the Contract Unit Price for "New Manhole on Existing Sewer" at the locations identified in Form B.

E11.7.7 Catch Basin Lead Repair

(a) Cleaning and inspection of catch basin leads scheduled for repair will be paid in accordance with E8.9.2 and E11.7.1.

(b) Restoration of catch basin leads scheduled for repair will be measured and paid on a linear meter basis at the Contract Unit Price for "Catch Basin Lead Repair" at the respective diameters and locations identified on Form B. Maximum length to be paid will be the total length of new catch basin lead installed as verified by field measurement or CCTV inspection. Payment shall include all materials, equipment, and effort required to complete the work, including excavation, backfill, and surface restoration.

E11.7.8 External Point Repairs

(a) Construction of EPRs will be measured and paid in accordance with CW 2130, except as modified herein.

(b) Maximum length of repair to be paid will be the total length of repair verified by the pre-lining CCTV inspection and accepted by the Contract Administrator.

(c) Payment will be at the Contract Unit Rate(s) for each scheduled repair as identified on Form B. Payment shall include all labour, equipment, and materials required to complete the work, including excavation, pipe repair, backfill, and surface restoration.

(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 the EPR after submission and review of the pre-lining CCTV inspection, and full restoration of the site.

E11.7.9 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 (Sewer Diameter 900 mm and Greater)". Number of units to be paid for will be the total number of sewer services grouted 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 liner installation, or any other reason related to the Contractor's workmanship or method of operations, grouting shall be completed at the Contractor's expense.

E11.7.10 Provisional – Replacement of Manhole Rungs

(a) Replacement of existing manhole rungs will be measured and paid for in accordance with CW2130. Payment for replacement of existing manhole rungs shall include removal of existing rungs where required.

(b) Number of units to be paid for will be the total number of rungs instated in accordance with this specification, accepted and measured by the Contract Administrator.

E11.7.11 Provisional – Manhole Components

(a) The supply of replacement of existing manhole components will be measured and paid for on a unit basis for the component supplied at the applicable unit price in Form B. Payment for replacement manhole components shall include supply to site only, except where noted in Form B.

(b) Number of units to be paid for will be the total number of components supplied and/or installed in accordance with this specification, accepted and measured by the Contract Administrator.

E11.7.12 Provisional – Manhole and Catch Basin Repairs

(a) The completion of all manhole and sewer modifications to facilitate pipeline access will 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 will be made in accordance with E3 and E11.7.13. 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 will be measured and paid on a vertical meter 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 will be measured and paid on a vertical meter 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.

E11.7.13 Cash Allowance for Provisional Manhole Construction and Additional External Point Repairs

(a) Cash allowances will be evaluated for payment in accordance with E3.

(b) The Cash Allowance for provisional manhole construction and additional external point repairs is intended to be used for the out-of-scope construction and repair of manholes and sewers not previously identified on Form B and as directed by the Contract Administrator.

(c) Post-Lining EPRs required to repair defects in the installed sewer liner caused by negligent or deficient installation procedures will not be considered for payment.

E12. CURED-IN-PLACE PIPE

E12.1 Description

(a) This specification covers the supply and installation of full segment, partial full segment (blind shot), and point repairs (TPR) 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 will generally be longer than ten metres in length.

(e) Non-Reinforced CIPP liners will be considered any CIPP liner constructed from non-reinforced felt.

(f) Reinforced CIPP liners will be considered any CIPP liner constructed from either a carbon fibre or glass fibre reinforced felt.

(g) Minimum material requirements for CIPP shall conform to ASTM D5813 "Standard Specification for Cured-In-Place Thermosetting Resin Sewer Pipe" and the supplemental requirements are noted herein.

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.

Pre-Approved CIPP Suppliers and Installers

Applicant	***Insituform Technologies Limited***	***Capital Commercial Pipe Services***	***Nelson River Construction Inc.***	***Clean Water Works Inc.***
Contact	Andrew Foster 780-413-0200	Brian Ratchford 905-522-0522	Mike Huard 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 E5 and a minimum of ten (10) Business Days prior to starting lining operations. CIPP shop drawings shall including the following information and shall be sealed and signed by a Professional Engineer licensed to practice 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 and manufacturer 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, provide a representative sample from each batch of resin to be used on the project before adding the catalyst at the wet-out facility.

(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 out of 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) Roller gap setting required to provide the final installed CIPP thickness based on the proposed volume of resin.

(f) Details of the wet-out procedure for internal point repair CIPP.

(g) Details of the field wet-out procedure for TPR's.

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 E7. 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 (maximum and minimum)

(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 wet-out 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 to be 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 utilized.

(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 a minimum of five (5) Business Days prior to installation CIPP liners requiring styrene management. All styrene management plans shall include sufficient details on:

(a) 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.

(b) The means, methods, and techniques employed to mitigate styrene levels to within acceptable limits for the site-specific application, including:

(i) Resin selection to eliminate or mitigate styrene levels;

(ii) Cure considerations to mitigate excessive styrene volatilization;

(iii) 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 hours 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. Where long-term flexural strength creep retention testing data is not available, long-term flexural modulus creep retention values shall be utilized for design for both properties.

(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) 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 LRFD Bridge Design Specifications, Seventh Edition (2014) assuming a flexible pavement condition.

(d) 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 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(a) regarding obtaining copies of the existing inspections.

(b) The site-specific design conditions and repair requirements applicable to each CIPP lining location are shown in Appendix A and 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 ATSM 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 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 E11 and 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 - Host Pipe Conditions and Inspections 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 E11 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) Reinstate all active and indeterminate 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 E11.

(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 E11 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 land drainage 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) in accordance with E12.4.7 for each identified site a minimum of five (5) Business Days prior to lining.

(i) Styrene Management Plans are required for the following locations:

- N/A

(d) Irrespective of the need for a styrene management plan, the contractor shall not discharge styrene laden waters to a water course, land drainage sewer, or other surface drainage feature.

(e) The Contractor's Styrene Management Plans shall include at least one of the following methods of control:

(i) Use of styrene fee 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;

(f) 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 the 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. 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.

(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 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.

(b) The Contractor shall provide the following samples from each CIPP liner:

(i) Confined test sample in accordance with E12.7.11(j);

(ii) Plate sample in accordance with E12.7.11(k).

(c) 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(e) of this specification will be used to confirm flexural strength and flexural modulus.

(d) 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.

(e) Where plate sample test results are used for confirmation of CIPP physical strengths and/or 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(d). 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.

(f) In larger sewer sizes where it is not possible to provide a full diameter confined test sample, and where requested by the Contract Administrator, the Contractor shall cut a sample directly from the installed CIPP liner in accordance with E12.7.11(l).

(g) 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 Clauses E12.7.1 and E8.2.1 of this specification to confirm in-place liner thickness.

(h) The Contract Administrator will review CIPP liner thickness results taken from test plates or unconfined samples on a case-by-case basis. Liner thickness results of test plate samples will not be considered where confined test samples have also been taken.

(i) All samples shall be clearly and legibly labelled as follows:

(i) City of Winnipeg tender number

(ii) City of Winnipeg asset number

(iii) Date of installation

(iv) Street name

(j) Confined Test Samples

(i) Provide necessary forms of the same diameter as the host pipe and secure a minimum 300 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 that approximates the install conditions of the CIPP liner in the host sewer.

(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.

(k) 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 the CIPP installation.

- Width: 13 times the thickness of the liner
- Length: 35.2 times the thickness of the liner

(v) Prepare test plate samples on-site from the actual CIPP and cure in the following manner:

- For the full duration and comparable temperature as the liner being installed, and
- In a clamped mold placed in the downtube or manhole for water-cured liners, or
- In a clamped mold placed in a container filled with uniformly distributed steam from the installation manhole for steam-cured liners.

(l) Direct Samples

(i) Where directed by the Contract Administrator, 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: 35.2 times the thickness of the liner

(iv) Cut the test sample from a location where no defects were noted in Appendix A – Host Pipe Conditions and Inspections 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) Where direct samples are taken and repaired, the Contractor shall submit CCTV inspection video clearly showing the sample location repair.

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 and Reconciliation for Total Performance

(a) The Contract Administrator will review quality assurance testing results and inspection videos to confirm that the completed CIPP meets the 50-year design life structural requirements prior to issuance of Total Performance. 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 indicating low material properties or thicknesses will be flagged for design reconciliation by the Contractor.

(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 to assess the structural and performance ramifications of the defects, taking into account the condition of the host pipe prior to lining, the CIPP installation conditions, and the long-term use of the sewer.

(b) When any of the sample test results (flexural modulus, flexural strength or thickness) or defects in the installed liner are not in accordance with the design submissions, then the liner shall be deemed apparently deficient until the sample test results are reconciled, if possible, as described herein. If, after reconciliation, the liner is still found to be deficient, the Contractor shall provide a plan for remedial action that is acceptable to the Contract Administrator.

(c) Where a CIPP liner has been deemed deficient, the Contractor shall:

(i) Complete a design reconciliation in accordance with E12.7.13(d) for each installed liner where sample test results indicate material properties or installed liner thicknesses lower than the required minimums in the accepted design submissions.

(ii) Perform a review of the liner design conditions to confirm that the assumed design conditions are reflective of the actual installed conditions, such as confirmation of actual host pipe ovality, determination of a more representative groundwater elevation locally through monitoring, and/or supplemental strength testing and thickness measurements of the installed liner.

(iii) 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 mm beyond each side of the cut section.

(iv) 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.

(v) Review all proposed remedial actions with the Contract Administrator prior to implementation.

(vi) The Contractor shall perform further testing, monitoring, reconciliation calculations and structural remediation at their own cost.

(d) Design Reconciliation

(i) The designs for each liner found to be apparently deficient shall be revisited using the reported material properties from the quality assurance testing.

(ii) Design reconciliation calculations shall be completed in accordance with the design requirements found herein, originally submitted designs, and the observed site conditions. Any deviations from previously accepted design conditions required to reconcile the design calculations shall be clearly identified and come complete with justification and backup for the deviation from the original design.

(iii) Short-term CIPP strength values shall be reduced to account for creep based on the creep retention values recommended in the pre-qualification submissions to assess the suitability of the liner to meet the 50-year design life requirement. Refer to E12.5.2(d).

(iv) In all cases, testing results from pipe samples shall govern over the results from plate samples for a given liner. The results from plate sample testing shall be reduced as per E12.7.11(e) for reconciliation purposes.

(v) 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.

(vi) Design reconciliation calculations shall be submitted in accordance with E5 and sealed by a Professional Engineer licensed in the Province of Manitoba and experienced in the design of CIPP liners.

E12.8 Site Specific Design and Installation Considerations

E12.8.1 Site specific design and installation conditions have been identified for the assets listed below:

(a) Blind Shots - The following assets have been identified as terminating directly into the downstream sewer:

(i) Portage Av – S-MA20017639

(ii) Portage Av – S-MA20015190

(iii) St Matthews Av – S-MA2009132

(iv) Wellington Av – S-MA20017810

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 E11.

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 Lining”, “Partial Full Segment CIPP Lining” or “Internal Point Repair CIPP Lining”. Length to be paid 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 centerline of the pipe from center to center of manholes. The maximum length to be paid will be the manhole-to-manhole sewer length provided by the Contractor.

(c) Partial full segment CIPP measurement will be made from the center 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 shall 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) Payment for CIPP lining will be made on the following schedule:

(i) 80% of the payment will be made upon satisfactory completion of the CIPP installation work for each liner.

(ii) The remaining 20% of the payment will be made upon confirmation of the CIPP strength and 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 will be considered incidental to the CIPP installation and will not be measured for payment. No separate payment will be made.

E12.9.8 Test Samples

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

E13. MANHOLE REHABILITATION

E13.1 Description

(a) This specification covers the rehabilitation of manholes via the use of spray applied polymeric lining systems complete with all associated preparation work, including structural repairs.

E13.2 Definitions

(a) A polymeric Spray in Place Lining (SIPL) system means the trenchless application of a polymeric lining system within an existing manhole for the purposes of structurally rehabilitating and protecting the structure from future deterioration.

E13.3 Submittals

E13.3.1 Installation of SIPL shall not commence prior to submission and review of the submissions identified herein by the Contract Administrator.

E13.3.2 Submit a SIPL installation protocol that provides information on the following a minimum of ten (10) Business Days prior to installation of SIPL:

(a) Proposed main line sewer flow control arrangements in accordance with E7. Note, flow control plans may be submitted separate from the liner installation protocol.

(b) Name and manufacturer of the SIPL system and resins.

(c) SIPL product information and material properties meeting the requirements herein.

(d) SIPL manufacturer installation recommendations.

(e) Host pipe measurements identified in E8.2.1 including the following:

(i) Manhole depth;

(ii) Manhole dimensions;

(f) Host pipe measurements shall clearly indicate the depth of any significant change in cross sectional size or shape of the manhole.

(g) Installation protocols:

(i) Manhole preparation requirements, tools, and procedures.

(ii) Environmental requirements for application of the polymeric materials

(iii) Number of coats and applicable recoat times

(h) Other information that may reasonably be required by the Contract Administrator to confirm the SIPL design proposed conforms to the specified requirements and design intent.

(i) Additional information may be required by the Contract Administrator for complex installations. This may include site setup details, contingency plans, and other information pertinent to the review and evaluation of the Contractors proposed construction methods.

(j) Submission Requirements:

(i) A singular SIPL installation protocol covering multiple installations is acceptable on the basis that all site specific installation conditions are included and clearly identified within the submission.

E13.3.3 Submit a testing and sampling protocol a minimum of five (5) Business Days prior to installation of the first SIPL liner. The protocol shall include:

(a) Detailed procedure for preparing all specified samples.

(b) Detailed procedures for all specified testing.

(c) Qualifications and certifications for all personnel completing Acceptance Testing.

(d) Liner repair products and procedures for core and cut sample locations.

E13.4 SIPL System Requirements

E13.4.1 The SIPL system shall be designed and certified by the manufacturer for use in sewer applications.

E13.4.2 The SIPL shall meet the following chemical resistant testing requirements:

(a) ASTM F1216, Appendix X2.

(b) California Standard Specifications for Public Works Construction (The Greenbook) requirements for CIPP liners.

E13.4.3 The SIPL systems shall meet the following physical requirements:

(a) Minimum short-term flexural modulus (ASTM D790): 2,000 MPa

(b) Minimum short-term flexural strength (ASTM D790): 74 MPa

(c) Minimum short-term tensile strength (ASTM D638): 40 MPa

(d) Minimum short-term compressive strength (ASTM D695): 40 MPa

(e) Minimum long-term creep retention (ASTM D2990): 35%

(f) Minimum elongation (ASTM D412-C): 3.5%

E13.4.4 Approved Polymeric SIPL Products:

(a) Nukote PP300 by Nukote Coating Systems or approved equal in accordance with B7.

E13.4.5 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 SIPL system 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 hours is required. Where long-term flexural strength creep retention testing data is not available, long-term flexural modulus creep retention values shall be utilized for design for both properties.

E13.4.6 While cementitious repairs may be required to restore the existing manhole structures prior to lining, repair systems utilizing cementitious SIPL products will not be accepted as an alternative to the specified polymeric SIPL system.

E13.5 Design of Polymeric SIPL Systems

E13.5.1 Design Objectives:

(a) Maximizing the structural enhancement of the existing manhole by installing a SIPL.

(b) Maximize the internal diameter of the rehabilitated manhole.

(c) Maximize flexibility of the liner system near the roadway to prevent cracking.

(d) Reducing infiltration.

(e) Preventing root intrusion.

(f) Providing sufficient chemical resistance to prevent further manhole degradation related to the conveyance of sewage.

(g) Minimizing sewer flow disruption during rehabilitation.

(h) Minimizing the time required to complete the sewer rehabilitation.

(i) Minimizing disturbance to pavements and boulevards.

(j) Minimizing disruption to vehicular and pedestrian traffic.

(k) Minimizing the impact of construction on commercial, industrial, and institutional facilities.

E13.5.2 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) The following live loads shall be included in the design:

(i) Manholes near rail lines: Where identified, applied soil pressures from a Cooper E80 rail load shall be estimated and utilized in the design of the SIPL 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 manholes: 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 SIPL liner. Applied soil pressures from AASHTO design truck loads shall be estimated in accordance with AASHTO LRFD Bridge Design Specifications, Seventh Edition (2014) assuming a flexible pavement condition.

(d) 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.

E13.5.3 Existing Manhole 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(a) regarding obtaining copies of the existing inspections.

E13.5.4 SIPL Design Approach

(a) SIPL have been designed as follows:

(i) Close fit liners, independent liners within the existing manhole structure.

(ii) Designs have been completed without accounting for bond with the host structure. Based on the condition of the manholes, liners utilizing bond as the primary structural mode will not be accepted.

(iii) A partially deteriorated design condition has been utilized for all locations. The existing manholes, with identified repairs, are anticipated to support all external soil and live loading through the design life of the rehabilitated structures. Thus, the liners are designed to support externally applied hydrostatic (groundwater) stress only.

(b) The following design conditions and liner thicknesses are applicable to all manholes identified for rehabilitation on this project:

Manhole Section	Internal Manhole Dimensions	Host Pipe Condition / Liner Structural Mode	Required Liner Thickness
0 to 5 m below grade	750 mm (Circular)	Partially Deteriorated Unbonded/Structural	12.0 mm
Beyond 5 m below grade (up to 7.7 m below grade)	750 mm (Circular)	Partially Deteriorated Unbonded/Structural	16.5 mm
Last 1.5 m above the top of the sewer	Up to 1625 x 910 mm (Oval)	Partially Deteriorated Unbonded/Structural	74.0 mm (Taper the liner thickness from 74 mm at the base to match the barrel thickness at the top of the taper)

Last 1.5 m above the top of the sewer	Up to 1265 x 910 mm (Oval)	Partially Deteriorated Unbonded/Structural	65.0 mm (Taper the liner thickness from 65 mm at the base to match the barrel thickness at the top of the taper)

E13.6 Materials

E13.6.1 Reinforcing steel and concrete shall meet the requirements of E14 and E15.

E13.6.2 Patching shall be completed using fast setting, high performance cementitious patching material compatible with the host structure. The use of polymer modified or similar products is recommended.

E13.6.3 Cementitious Buildout Layers

(a) Where permitted, a cementitious buildout layer may be utilized for the purposes of repairing the host structure and/or providing a uniform substrate for application of the polymeric SIPL.

(b) The cementitious buildout layer shall be constructed using a high-performance cementitious product compatible with the polymeric SIPL and capable of achieving sufficient bond with the host structure. The product shall achieve a minimum bond with the existing host structure of 1035 kPa (150 psi), or that which is required for the polymeric SIPL system, whichever is greater.

E13.6.4 Chemical Grout

(a) Means a chemical sealant solution containing principle chemical sealant constituent, initiator and catalysts specifically recommended for the purpose of reducing or eliminating groundwater inflow to seal larger volume leaks in concrete cracks and fissures. The chemical grout is a two-part system (grout and accelerator), that, when it makes contact with water, is designed to set-off and cut-off gushing water. Once cured, the chemical grout shall become closed cell foam that is resistant to most organic solvents, mild acids, alkali, petroleum and micro-organisms.

(b) Chemical grouts shall be carefully selected by a grout specialist depending on the issue to be addressed, ground condition and other constraints. Acrylic gels, polyurethane foams and other chemical grouts shall be used to fill voids and to provide soil stability behind the wall of maintenance hole chamber. Where voids have occurred behind below grade structures, the expansive polyurethane hydrophobic foams may be used to fill the void.

E13.7 Equipment

E13.7.1 All SIPL application equipment must be certified by the SIPL manufacturer for the intended application.

E13.8 Construction Methods

E13.8.1 Verification of Existing Manhole Conditions

(a) Verify dimensional requirements of each manhole to be rehabilitated prior to mobilization to confirm the liner thicknesses identified in E13.5. The Contractor shall confirm the following:

(i) Manhole internal diameter. Note any changes in diameter c/w new diameter and depth of the transition.

(ii) Maximum depth of the liner to be installed.

(b) The Contractor shall complete a pre-construction inspection of the manholes to confirm that the conditions are consistent with the tender conditions and suitable for the identified rehabilitation works. The Contractor shall report any conditions materially different from the tender conditions for review by the Contract Administrator.

If necessary, the Contract Administrator may request a pre-repair inspection be completed to assess any changes to the identified rehabilitation work.

E13.8.2 Flow Control

(a) The Contractor shall provide flow control and temporary bypass in accordance with E7 and consistent with the requirements for the humidity/dryness needed for application of the rehabilitation.

(b) Where required, rehabilitation of the benching and invert areas shall be completed with temporary bypass in operation.

E13.8.3 Manhole Cleaning

(a) Thorough cleaning of the manhole surface is critical for a successful installation. All debris, grease, slime, scale and foreign material shall be removed from the interior surface of the manhole. In the case where a cementitious coating has been applied to a brick maintenance hole, the Contractor shall remove the cementitious coating to the best of their ability without causing damage to the brick or mortar surfaces. The means and execution of cleaning is the Contractor's responsibility.

(b) In all cases, all deteriorated materials shall be removed from the manhole walls and the walls repaired prior to lining. While preparation methods are the responsibility of the contractor, high pressure washing with a minimum pressure of 35 MPa (5000 psi) is typically adequate to remove deteriorated materials.

(c) The Contractor shall dispose of debris from cleaning and preparation at an approved location. No debris from cleaning and preparation operations and shall remain in, or be allowed to enter, the sewer system.

E13.8.4 Manhole Component Replacements

(a) Where indicated, manhole components shall be replaced in accordance with CW2130.

E13.8.5 Structural Manhole Repairs

(a) Where indicated, structural concrete repairs shall be completed to restore the original structural capacity of the manhole prior to rehabilitation. Structural concrete repairs shall be completed in accordance with the Drawings.

E13.8.6 Surface Preparation and Profile for Bonded Liners

(a) Bonding is a function of both the applied product and the surface to which it is applied. The interior manhole surface requires a high degree of cleaning and preparation to achieve a durable bond of sufficient strength. Preparation includes producing a suitable maintenance hole surface profile to achieve the durable bond. Acid wash is not an accepted method of cleaning and preparation.

(b) Prepare the surface of the manhole according to NACE No. 6/SSPC-SP 13 and to ICRI Technical Guideline No. 03732. Note, NACE is now a part of AMPP. For reference in ICRI Guideline No. 03732 bonded manhole rehabilitation products shall be considered as a polymer overlay.

(c) It is the Contractor's responsibility to employ a preparation method that will achieve the required CSP number. While several preparation methods are capable of achieving a CSP 5, it is recommended that high or ultra-high-pressure (34 – 69 MPa) water jetting will be used as described in the ICRI guideline.

(d) In the event that the condition of the existing maintenance hole concrete is not capable of being prepared to CSP 5, the Contractor shall advise the Contract Administrator of this finding and halt any further work. This may be evident by continual erosion or removal of the concrete during the preparation process so that a CSP 5 cannot be obtained or cannot be obtained without removing more than 20 mm locally or 6 mm generally of concrete material. In advising the Contract Administrator of this finding, the Contractor shall identify whether this is a localized problem in the maintenance hole or is a general problem with the maintenance hole concrete

structure. The conditions will be reviewed with the Contract Administrator prior to proceeding with additional repairs, including but not limited to structural manhole repairs.

E13.8.7 Moisture Control

(a) Successful SIPL installations typically requires a dry surface meeting the manufacturers recommendations. Immediately prior to the application of SIPL that are intended to bond to the concrete, the concrete shall be dry to the point of no visible signs of dampness or moisture. The Contractor is responsible for the method by which this dryness is achieved. The Contractor shall use fans, heat drying, dehumidifier and other means required to remove moisture.

(b) Where required by the manufacturer or where bonded liners are to be installed, the moisture content of concrete substrates shall be tested using a moisture meter or qualitatively using the method described in ASTM D 4263, which involves taping down a 450 mm by 450 mm piece of 75 to 150 micron thick film for a period of 24 hours. Linings shall not be applied if any moisture is entrapped inside the film, or if the moisture content of the concrete substrate exceeds 4% or as specified by the product manufacturer. The above moisture test shall be completed by the Contractor at their cost and provided to the Contract Administrator prior to commencing lining. Application of rehabilitation material(s) that are intended to bond to the maintenance hole shall not be accepted where the maintenance hole dryness requirement is not met.

E13.8.8 Patching

(a) Patch repair using corrosion resistant and fast setting repair mortar shall be undertaken for areas with deep voids. And deviation from the original or prepared surface greater than 20 mm shall be patched. Patching deviations less than 20 mm may be required to maintain a minimum of 20 mm of concrete cover over the existing reinforcing steel.

(b) If existing reinforcement steel is exposed, it shall be cleaned and repaired as required. Reinforcements shall be fully embedded in concrete while patching. A minimum cover of 20 mm over the reinforcement shall be maintained.

(c) Any exposed steel reinforcement shall be cleaned and then coated immediately with a corrosion resistant zinc rich primer to avoid flash rusting. Concrete steel reinforcement that has lost up to 10% of its diameter due to corrosion shall be augmented by new reinforcement of similar size.

E13.8.9 Resurfacing

(a) If the SIPL requires large-scale repair of irregular concrete surfaces, concrete patch repair may be completed in advance and proper curing of concrete shall occur before SIPL material is applied.

(b) High strength, fast setting and corrosion resistant repair concrete/mortar shall be used. The finished surface profile shall be such that the surface provides an optimum bonding surface with the SIPL lining.

(c) Benching shall be repaired in accordance with CW2130 and CW2160. All benching repairs shall be completed together with main line lining where applicable, and when the temporary bypass is in operation. Where the invert and bench surfaces require repair, they shall be smooth and sloped in the direction of the flow.

E13.8.10 Infiltration Repair

(a) Any manhole with active infiltration shall be grout sealed by injection of grout from the inside prior to installation of any rehabilitation materials. The Contractor shall identify all active infiltration and stop this infiltration with a suitable grout sealing material. There shall be no active infiltration present during the application and curing of any rehabilitation material applied to the interior surfaces.

(b) Active minor leaks should be stopped using a rapid setting hydraulic cement product specifically for such purpose. For stopping major leaks, a chemical grout sealant injected forced into the joints and crack may be used. The sealant shall be acrylamide or urethane base gel type. It should be tinted to allow detection of grout in drill holes or at leakage locations. Where tree roots are present, the grout shall have root inhibitor agent. Any holes shall be patched upon completion of the sealing operation.

(c) The grout installation method and the grout type used to stop all active infiltration during application and curing of the rehabilitation materials are the Contractor's responsibility. The material used for repair shall comply with material section of this specification.

E13.8.11 Crack and Joint Repair

(a) All cracks or fractures greater than 12.5 mm shall be sealed using an acceptable backer and filler material prior to spraying the SIPL. Any backer or filler used to seal cracks in the substrate including the use of the liner material will form part of the substrate and therefore will be held to the same standard as entire substrate. After surface preparation, there shall be no cracks or fractures in the concrete substrate greater than 12.5 mm. Cleaning and surface preparation requirements shall be the responsibility of the Contractor.

(b) Active cracks that do not affect the structural integrity shall be treated as joints and repaired as per below. Non-active cracks, with opening greater than 1 mm, should be repaired using crack sealing method, where the path along the crack are opened up forming a wedge shape slot 20 mm wide x 20 mm deep and filled with repair mortar. Smaller non-active cracks may be filled with chemical grout.

(c) Repair joints with hydrophilic grout sealant to prevent active infiltration. Materials used to seal any joints in the lining need to be compatible with other repair materials for the adjacent concrete surfaces and have a comparable life. The Contractor shall be responsible for developing the joint repair method as required to suit actual site conditions and joint materials. It shall be submitted to the Contract Administrator for approval prior to commencing the work.

E13.8.12 Masonry Repair

(a) Any loose and protruding brick shall be removed using hammer and chisel. Voids caused by the removal of brick shall be reconstructed using sound clean bricks and corrosion resistant, high strength and fast setting mortar. Care must be taken to ensure the integrity of the structure during this process. Lost mortar joints shall be repointed using suitable mortar material and the surface shall be struck flush with the brick surface prior to lining application. Any infiltration shall be stopped first prior to undertaking the repair using the method specified herein.

E13.8.13 Installation of Polymeric SIPL

(a) The details of the installation methods and procedures are the responsibility of the Contractor, subject to the following provisions:

(i) Installation methods and procedures shall be in accordance with the rehabilitation system manufacturer recommendations.

(ii) Installation methods and procedures shall not produce a conflict with requirements of the Drawings or those stipulated herein.

(iii) The SIPL application procedures shall conform to the recommendations of the protective coating/lining manufacturer, including material handling, mixing, environmental controls during application, safety, and spray equipment.

(iv) The SIPL spray equipment shall be specifically designed to accurately ratio and apply the specified protective coating/lining materials and shall be regularly maintained and in proper working order.

(v) The SIPL must be spray applied by a certified applicator of the protective coating/lining manufacturer.

(vi) Flow and odour control shall be in operation during the SIPL application process including the duration when the maintenance hole is open and can result in sewer gases and odour emission.

(vii) The SIPL shall be applied in recommended thickness lifts and after ensuring timing between each lift meets the manufacturer requirements. If necessary, subsequent additional lifts/coats of the SIPL should occur as soon as per manufacturer recommendations, no later than the recoat window for the specified products. Additional surface preparation procedures will be required if this recoat window is exceeded.

(viii) If the SIPL is a multi-component system, a multi-component spray application equipment approved by the SIPL supplier shall be used to apply each coat of the protective coating/lining.

E13.8.14 Liner Edge Finish

(a) The finished edge of a maintenance hole liner along the benching shall prevent ground water leakage. In order to improve the liner performance in preventing infiltration at the finished edge of the liner, prior to applying the liner a groove shall be cut into the maintenance hole bench. The groove shall be cut into the benching approximately 200 mm away from the edge of the liner. The grove shall be a minimum of 6 mm wide and 12 mm deep along the full length of the maintenance hole bench. During the liner application this groove shall be completely filled with the rehabilitation product ensuring the liner material does not bridge over the cut groove.

(b) If configuration of the maintenance hole makes it impossible to configure the above groove, the Contractor shall propose an alternative groove configuration which achieves the same results.

E13.8.15 Interface with CIPP Liner

(a) The following applies when a Cured-In-Place Pipe (CIPP) sewer liner extends continuously through a manhole.

(b) This scenario will result in the trough being lined with CIPP with the upper portion of the CIPP cut out for access. In this case the manhole rehabilitation shall be applied after the portion of the CIPP above the trough has cured, been cut away and removed. The manhole rehabilitation shall be applied in a manner to form a complete seal (interface) between the CIPP liner and the manhole rehabilitation product. There shall be no areas within the interface that allow for the infiltration of groundwater or exfiltration of sewage.

E13.8.16 Sewer Services

(a) Flow from sewer services located within the manhole shall be controlled in accordance with E7.

(b) Reinstate all active and indeterminate sewer services including CB leads and utility drains to 100% of the original cross-sectional area.

E13.8.17 Fit and Finish

(a) The final rehabilitation shall provide a smooth and uniform fit, finish fit and cover to all surfaces of the maintenance hole consistent with the objectives for rehabilitation. There shall be no ledges, shoulders or other protrusions where debris may attach or collect except as may be required for zones of permitted wall thickness changes as per the design requirements. There shall be no gaps, cracking, peeling, pinholes, leaking or any other imperfections between the interface of the maintenance hole rehabilitation material and the CIPP sewer liner.

(b) All areas of coverage shall be fully bonded to the maintenance hole surface beneath without any locations that indicate looseness or lifting.

E13.8.18 Rungs and Ladders

(a) All existing rungs and ladders shall be removed prior to the application of the linings. All bolts are to be cut flush with the maintenance hole wall. A punch or grinder is to be

used to remove any sharp edges from remaining portion of the steel bolts to ensure the steel does not protrude beyond the surrounding concrete.

(b) The Contractor shall install rungs in accordance with CW2130 at the same location and on the same wall that the existing rungs and ladders were located on, unless specified otherwise herein or on the Drawings.

(c) Rungs and ladders shall be installed after the maintenance hole rehabilitation lining has been installed. Rungs and ladders may be installed prior to rehabilitation provided that all rungs and ladder surfaces are covered and protected from being covered or splattered by the rehabilitation materials.

(d) At each location where the rungs, platforms, and ladders are required to be attached to the newly lined wall, the hole for the stainless steel anchor bolts shall be drilled through the liner by a carbide drill bit. The hole size to be just sufficient to permit the bolt to pass through the liner with a very tight fit. Bolts must be generously coated with a suitable flexible sealant immediately prior to installation.

E13.9 Quality Control and Assurance

E13.9.1 Type Testing

(a) Evidence of material type testing shall be provided with the as defined in herein (see E13.4), including but not limited to:

(i) Short-term material properties as specified herein.

(ii) Long-term creep retention testing as specified herein.

(iii) Ability to achieve bond where required by the design.

(iv) Chemical resistance as specified herein.

E13.9.2 Demonstration Testing

(a) The Contractor shall provide acceptance testing results from a minimum of three (3) projects within the last five (5) years demonstrating their ability to successfully install and achieve the minimum material properties identified herein and/or utilized in the SIPL design.

(b) Where bond is required for structural performance, the Contractor shall:

(i) Complete a trial application utilizing the submitted preparation and installation procedures to demonstrate the achievement of bond and other related performance requirements. The trial work shall be completed in Winnipeg, above ground, and at a mutually agreeable location. A suitable substrate example shall be utilized, e.g. salvaged manhole components. A 1000x1000 area shall be prepared and sprayed for testing as well as a plate sample for material property testing. The trial area will be subject to the following testing. All testing must pass the specified performance objectives:

- Substrate testing after preparation (ASTM C1583)
- Bond testing (ASTM D7234)
- Thickness testing (ASTM D6132)
- Holiday testing (ASTM D4787)
- Material property testing via prepared samples

(ii) In lieu of the above and if available, the Contractor may provide acceptance testing and documentation for three (3) past projects within the last five (5) years showing successful achievement of the above listed performance requirements under similar conditions.

E13.9.3 Acceptance Testing

(a) The Contractor shall complete the following acceptance testing:

(i) Visual inspection for defects – Every manhole

- All surfaces shall be visually inspected before and after repair for cracks, spalls, rust stains, dampness, discolouration, honeycombing, etc.

- Where bond is required, the prepared surface profile shall be checked against the applicable requirements.
- The surface shall meet the manufacturer's and specified criteria for installation of the SIPL

(ii) Substrate Testing (ASTM C1583) – Every manhole (only required where bond is required)

- Three (3) per manhole.
- The test locations shall generally be at the top, middle, and bottom of the manhole at locations of the Contract Administrators choosing.
- Any failures will result in the need for additional prep work and retesting.
- The substrate shall exhibit tensile strength properties consistent with the design bond strength for the polymeric SIPL.

(iii) Buildout Layer Bond Testing (ASTM C1583)

- Three (3) per manhole for the first three (3) installations. If no failures occur the frequency may be reduced to three (3) per every third manhole. If failures occur the frequency will be reduced back to every manhole.
- The bond locations shall generally be at the top, middle, and bottom of the manhole at locations of the Contract Administrators choosing.
- If a failure occurs, three (3) additional tests will be completed in the general area.
- The buildout layer shall exhibit bond strengths consistent with the design bond strength for the polymeric SIPL.

(iv) Delamination survey – Every manhole

- The applied lining including patch repair or resurfacing material used in surface preparation shall be inspected for delamination (drumminess) using a light hammer.
- Any areas found to be drummy shall be assessed further. More tests may be required to determine the extent of defects and will be reviewed with the Contractor and Contract Administrator.
- For bonded liners, all areas found to be disbanded shall be removed and repaired. If the Contractor disagrees, complete bonding testing at this location will be completed at the Contractors cost.

(v) Hardness Testing (ASTM D2240) – Every Manhole (1 per manhole)

(vi) Thickness Testing (ASTM D6132) – Every Manhole (1 test for every 2 m of depth, minimum of 10 per manhole) and at any location identified by the Contract Administrator.

- ASTM D6132 using ultrasonic or magnetic gauge, or other pre-accepted method by the Contract Administrator. Destructive method should be avoided.

(vii) Holiday Testing (ASTM D4787) – Every manhole

- The Contractor shall undertake spark testing using appropriate high voltage holiday detection equipment to detect the presence of pinholes, cracks, or other discontinuities in all areas.

(viii) Bond Testing (ASTM D7234) – Where bond is required for the design

- Three (3) per manhole for the first three (3) installations. If no failures occur the frequency may be reduced to three (3) per every third manhole. If failures occur the frequency will be reduced back to every manhole.
- Testing shall be completed using a 50 mm dolly.
- The bond locations shall generally be at the top, middle, and bottom of the manhole at locations of the Contract Administrators choosing.

- If a failure occurs, three (3) additional tests will be completed in the general area.
- The polymeric SIPL shall exhibit bond strengths consistent with the design bond strength for the polymeric SIPL.
- Cut sample repairs shall be repaired in a manner consistent with the manufacturers recommendations using a resin rich repair product. Preferably with the same product that was used for rehabilitation.

(b) All testing completed by the Contractor shall be completed by trained and certified personnel for the testing being performed.

(c) The following testing will be arranged for by the Contract Administrator utilizing samples prepared by the Contractor. Samples shall be prepared as per E13.9.5.

(i) Compressive Strength Testing (ASTM D695) – Every manhole

(ii) Flexural Modulus and Strength Testing (ASTM D790) – Every manhole

(iii) Tensile Strength Testing (ASTM D638) – Every manhole

E13.9.4 Quality Control Records

(a) Maintain the following Quality Control records of the work (as applicable to the installation) for all testing identified in E13.9.3(a) and provide to the Contract Administrator after completion of the work.

(b) Quality Control records will be reviewed and kept on file for use in the event issues arise during the post-construction review process and warranty period. Contractor shall bring to the attention of the Contract Administrator any deviations from the specifications or manufacturer's recommendations.

E13.9.5 Polymeric SIPL Samples for Quality Assurance Purposes

(a) The Contractor shall provide three (3) plate samples from each manhole. Samples shall be provided to the Contract Administrator on site with a clear chain of custody.

(b) The Contract Administrator will coordinate and pay for sample testing to confirm the flexural strength, flexural modulus, tensile strength, and compressive strength and thickness as specified herein.

(c) All samples shall be clearly and legibly labelled as follows:

(i) City of Winnipeg tender number

(ii) City of Winnipeg asset number

(iii) Date of installation

(iv) Street name

(d) Test Plate Samples

(i) Produce and provide to the Contract Administrator test plate samples of each manhole.

(ii) Test plate samples shall be produced to the same thickness that is applied to the manhole (thickest identified section). The sample shall be sprayed at the same time as the manhole with the same materials.

(iii) The minimum dimension of test plate samples shall be:

- Two (2): 12.5 mm x 300 mm x 300 mm.
- One (1): 25 mm x 300 mm x 300 mm.

(e) Direct Samples

(i) Where directed by the Contract Administrator, the Contractor shall obtain a sample of the installed SIPL liner from within the manhole. Direct cut samples will only be utilized where test plates are not prepared or to verify in place material properties if there are concerns with testing results from the test plates

(ii) Direct samples shall be a minimum of 300 mm x 300 mm.

(iii) Cut the test sample from an advantageous location in the manhole where no significant defects were noted prior to rehabilitation. Confirm sampling locations with the Contract Administrator prior to work.

(iv) Cut sample repairs shall be repaired in a manner consistent with the manufacturers recommendations using a resin rich repair product. Preferably with the same product that was used for rehabilitation.

E13.10 Post Construction Design Review and Reconciliation for Total Performance

E13.10.1 The Contract Administrator will review quality assurance testing results and inspections to confirm that the completed SIPL meets the 50-year design life structural requirements prior to issuance of Total Performance. The Contract Administrator will advise of any discrepancies between the constructed SIPL and the design requirements.

(a) Deficiencies in the physical testing results for SIPL liners indicating low material properties or thicknesses will be flagged for design reconciliation by the Contractor.

(b) Defects in SIPL liners will be reviewed on a case-by-case basis by the Contract Administrator. The Contract Administrator will consult with the Contractor to assess the structural and performance ramifications of the defects, taking into account the condition of the host pipe prior to lining, the SIPL installation conditions, and the long-term use of the sewer.

E13.10.2 When any of the sample test results (bond strength, flexural modulus, flexural strength or thickness) are not in accordance with the design submissions, then the liner shall be deemed apparently deficient until the sample test results are reconciled, if possible, as described herein. If, after reconciliation, the liner is still found to be deficient, the Contractor shall provide a plan for remedial action that is acceptable to the Contract Administrator.

E13.10.3 Where a SIPL liner has been deemed deficient, the Contractor shall:

(a) Complete a design reconciliation in accordance with E13.10.4 for each installed liner with testing results showing material properties or installed liner thicknesses below those indicated in the accepted design submissions.

(b) Perform necessary remedial measures to confirm that a SIPL deemed as structurally deficient will comply with the 50-year design life requirement such as determination of a more representative groundwater elevation locally through monitoring and supplemental strength testing and thickness measurements.

(c) Install additional SIPL to structurally enhance the installed SIPL if supplemental testing fails to confirm the SIPL will meet the 50-year design life requirement.

(d) Review all proposed remedial actions with the Contract Administrator prior to implementation.

(e) Perform further testing, monitoring and calculations and install structural enhancements at their own cost.

E13.10.4 Design Reconciliation

(a) The designs for each liner found to be apparently deficient shall be revisited using the reported material properties from the quality assurance testing.

(b) Design reconciliation calculations shall be completed in accordance with the design requirements found herein, originally submitted designs, and the observed site conditions. Any deviations from the accepted design submissions required to reconcile the design calculations shall be clearly identified and come complete with justification and backup for the deviation from the original design.

(c) Short-term SIPL strength values shall be reduced to account for creep based on the creep retention values recommended in the pre-qualification submissions to assess the suitability of the liner to meet the 50-year design life requirement.

(d) Design reconciliation calculations shall be submitted in accordance with E5 and sealed by a Professional Engineer licensed in the Province of Manitoba and experienced in the design of SIPL liners.

E13.11 Measurement and Payment

E13.11.1 Verification of Manhole Conditions and Measurements

(a) Verification of existing manhole conditions and dimensions will be considered incidental to the Work and will not be measured for payment. No separate payment will be made.

E13.11.2 Manhole Cleaning, Sealing, and Surface Preparation Works

(a) All manhole cleaning, sealing, and surface preparation works will be considered incidental to the Work and will not be measured for payment. No separate payment will be made.

E13.11.3 Structural Manhole Repairs

(a) Structural repairs will be measured on a vertical meter basis for each manhole chimney diameter and paid for at the Contract Unit Price for “Structural Concrete Repairs – Manhole Riser”. Length to be paid will be the total length of repairs completed in accordance with this specification, accepted, and measured by the Contract Administrator.

(b) Payment for “Structural Concrete Repairs – Manhole Riser” shall include all materials, labour, and equipment required to complete the work as specified herein.

E13.11.4 Manhole Riser and Component Replacements

(a) Manhole chimney replacement work will be measured and paid for on a unit basis for the component replaced at the applicable unit price in Form B. Lengths and number of units to be paid will be the total length of riser replacement or count of components replaced in accordance with this specification, accepted, and measured by the Contract Administrator.

(b) Payment for manhole riser and component replacement shall include all materials, labour, excavation, shoring, and equipment required to complete the work as specified herein.

E13.11.5 Polymeric SIPL

(a) The installation of polymeric SIPL will be measured on a lump sum basis for each manhole and paid for at the Contract Unit Price for “Install Polymeric SIPL c/w Preparation Work”.

(b) Payment for “Install Polymeric SIPL c/w Preparation Work” shall include all materials, labour, excavation, shoring, flow control, and equipment required to complete the work as specified herein.

(c) Payment for “Install Polymeric SIPL c/w Preparation Work” will be made on the following schedule:

(i) 80% of the payment will be made upon satisfactory installation of the SIPL.

(ii) The remaining 20% of the payment will be made upon confirmation of the SIPL strength and delivery and acceptance of all required submissions, shop drawings, and reports and rectification of all identified defects.

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

E13.11.6 Reinstatement of Sewer Services

(a) Reinstatement of sewer services will be considered incidental to Work and will not be measured for payment. No separate payment will be made.

E13.11.7 Quality Control Records

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

E13.11.8 Test Samples

(a) All work and materials required for the preparation, recovery, and repair of SIPL test samples will be considered incidental to "Spray Applied Manhole Liner c/w Preparation Work" and will not be measured for payment. No separate payment will be made.

E14. CAST-IN-PLACE CONCRETE

E14.1 Description

(a) This Specification shall cover the construction of cast-in-place concrete trunk sewer closures and manhole reconstructions.

(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.

E14.2 Submissions

E14.2.1 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.

E14.3 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.

E14.4 Construction Methods

E14.4.1 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.

E14.4.2 Cast-in-Place Concrete

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

E14.5 Measurement and Payment

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

E15. REINFORCING STEEL

E15.1 Description

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

E15.2 Submittals

(a) The Contractor shall submit reinforcing steel Shop Drawings in accordance with E5 a minimum of ten (10) Business Days prior to the fabrication of any reinforcing steel.

E15.3 Materials

E15.3.1 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.

E15.3.2 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.

E15.4 Construction Methods

E15.4.1 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.

E15.4.2 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.

E15.5 Measurement and Payment

(a) Supply and placement of reinforcing steel will be considered incidental to the Work and will not be measured for payment. No separate payment will be made.

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 Substantial Performance and the Contractor's schedule would have reasonably permitted completion of the Work before the required date, the date for 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 Buisness 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. RESTORATIONS

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 D24.

E18.3 Schedule

E18.3.1 Refer to D22 for Critical Stages related to restoration works.

E18.3.2 Refer to D25 for Liquidated Damages related to restoration works.

E18.4 Measurement and Payment

(a) Surface restoration will be considered incidental the Work and will not be measured for payment. No separate payment will be made.

(b) 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 their place of residence. Or

(a) Sterling BackCheck – for existing account holders, log into your account to send individual invitations to employees requiring security clearance. For those that do not have an account, click on the following link to open an account: https://forms.sterlingbackcheck.com/partners/platform2-en.php?&partner=winnipegcity; or

(b) Commissionaires (Manitoba Division), forms to be completed can be found on the website at: https://www.commissionaires.ca/en/manitoba/home; or .

(c) FASTCHECK Criminal Record & Fingerprint Specialists, forms to be completed can be found on the website at: https://myfastcheck.com

F1.2 Prior to the award of Contact, and during the term of the Contract if additional or replacement individuals are proposed to perform Work, the Contractor shall supply the Contract Administrator with a Police Information Check obtained not earlier than one (1) year prior to the Submission Deadline, or a certified true copy thereof, for each individual proposed to perform such Work.

F1.3 Any individual for whom a Police Information Check is not provided, or for whom a Police Information Check indicates any convictions or pending charges related to property offences or crimes against another person will not be permitted to perform any Work specified in F1.1.

F1.4 Any Police Information Check obtained thereby will be deemed valid for the duration of the Contract subject to a repeated records search as hereinafter specified.

F1.5 Notwithstanding the foregoing, at any time during the term of the Contract, the City may, at their sole discretion and acting reasonably, require an updated Police Information Check. Any individual who fails to provide a satisfactory Police Information Check as a result of a repeated Police Information Check will not be permitted to continue to perform any Work specified in F1.1.