



THE CITY OF WINNIPEG

TENDER

TENDER NO. 197-2020

2020 SEWER RENEWALS BY CIPP LINING – CONTRACT 6

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PART B - BIDDING PROCEDURES

B1. CONTRACT TITLE

B1.1 2020 SEWER RENEWALS BY CIPP LINING – CONTRACT 6

B2. SUBMISSION DEADLINE

- B2.1 The Submission Deadline is 12:00 noon Winnipeg time, May 14, 2020.
- 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 shall not be entitled to rely on any information or interpretation received at the Site investigation unless that information or interpretation is the Bidder's direct observation, or is provided by the Contract Administrator in writing.

B4. ENQUIRIES

- B4.1 All enquiries shall be directed to the Contract Administrator identified in D4.1.
- B4.2 If the Bidder finds errors, discrepancies or omissions in the Tender, or is unsure of the meaning or intent of any provision therein, the Bidder shall notify the Contract Administrator of the error, discrepancy or omission, or request a clarification as to the meaning or intent of the provision at least five (5) Business Days prior to the Submission Deadline.
- B4.3 Responses to enquiries which, in the sole judgment of the Contract Administrator, require a correction to or a clarification of the Tender will be provided by the Contract Administrator to all Bidders by issuing an addendum.
- B4.4 Responses to enquiries which, in the sole judgment of the Contract Administrator, do not require a correction to or a clarification of the Tender will be provided by the Contract Administrator only to the Bidder who made the enquiry.
- B4.5 The Bidder shall not be entitled to rely on any response or interpretation received pursuant to B4 unless that response or interpretation is provided by the Contract Administrator in writing.
- B4.6 Any enquiries concerning submitting through MERX should be addressed to:
MERX Customer Support
Phone: 1-800-964-6379
Email: merx@merx.com

B5. CONFIDENTIALITY

- B5.1 Information provided to a Bidder by the City or acquired by a Bidder by way of further enquiries or through investigation is confidential. Such information shall not be used or disclosed in any way without the prior written authorization of the Contract Administrator. The use and disclosure of the confidential information shall not apply to information which:
- (a) was known to the Bidder before receipt hereof; or
 - (b) becomes publicly known other than through the Bidder; or
 - (c) is disclosed pursuant to the requirements of a governmental authority or judicial order.

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

B6. ADDENDA

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

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

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

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

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

B6.6 Notwithstanding B4, enquiries related to an Addendum may be directed to the Contract Administrator indicated in D3.1(a).

B7. SUBSTITUTES

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

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

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

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

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

- B7.5 The Contract Administrator, after assessing the request for approval of a substitute, may in his/her sole discretion grant approval for the use of a substitute as an “approved equal” or as an “approved alternative”, or may refuse to grant approval of the substitute.
- B7.6 The Contract Administrator will provide a response in writing, at least two (2) Business Days prior to the Submission Deadline, to the Bidder who requested approval of the substitute.
- B7.6.1 The Contract Administrator will issue an Addendum, disclosing the approved materials, equipment, methods and products to all potential Bidders. The Bidder requesting and obtaining the approval of a substitute shall be responsible for disseminating information regarding the approval to any person or persons he/she wishes to inform.
- B7.7 If the Contract Administrator approves a substitute as an “approved equal”, any Bidder may use the approved equal in place of the specified item.
- B7.8 If the Contract Administrator approves a substitute as an “approved alternative”, any Bidder bidding that approved alternative may base his/her Total Bid Price upon the specified item but may also indicate an alternative price based upon the approved alternative. Such alternatives will be evaluated in accordance with B18.
- B7.9 No later claim by the Contractor for an addition to the Total Bid Price because of any other changes in the Work necessitated by the use of an approved equal or an approved alternative will be considered.

B8. BID COMPONENTS

- B8.1 The Bid shall consist of the following components:
- (a) Form A: Bid/Proposal;
 - (b) Form B: Prices;
 - (c) Form G1: Bid Bond and Agreement to Bond.
- B8.2 Further to B8.1, the Bidder should include the written correspondence from the Contract Administrator approving a substitute in accordance with B7.
- B8.3 All components of the Bid shall be fully completed or provided, and submitted by the Bidder no later than the Submission Deadline, with all required entries made clearly and completely.
- B8.4 The Bid shall be submitted electronically through MERX at www.merx.com.
- B8.4.1 Bids will **only** be accepted electronically through MERX.
- B8.5 Bidders are advised that inclusion of terms and conditions inconsistent with the Tender document, including the General Conditions, will be evaluated in accordance with B18.1(a).

B9. BID

- B9.1 The Bidder shall complete Form A: Bid/Proposal, making all required entries.
- B9.2 Paragraph 2 of Form A: Bid/Proposal shall be completed in accordance with the following requirements:
- (a) if the Bidder is a sole proprietor carrying on business in his/her own name, his/her name shall be inserted;
 - (b) if the Bidder is a partnership, the full name of the partnership shall be inserted;
 - (c) if the Bidder is a corporation, the full name of the corporation shall be inserted;
 - (d) if the Bidder is carrying on business under a name other than his/her own, the business name and the name of every partner or corporation who is the owner of such business name shall be inserted.

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

B10. PRICES

- B10.1 The Bidder shall state a price in Canadian funds for each item of the Work identified on Form B: Prices.
- B10.1.1 Notwithstanding C12.2.3(c), prices on Form B: Prices shall not include the Manitoba Retail Sales Tax (MRST, also known as PST), which shall be extra where applicable.
- B10.1.2 Prices stated on Form B: Prices shall not include any costs which may be incurred by the Contractor with respect to any applicable funding agreement obligations as outlined in D23. Any such costs shall be determined in accordance with D23.
- B10.2 The quantities listed on Form B: Prices are to be considered approximate only. The City will use said quantities for the purpose of comparing Bids.
- B10.3 The quantities for which payment will be made to the Contractor are to be determined by the Work actually performed and completed by the Contractor, to be measured as specified in the applicable Specifications.
- B10.4 Payments to Non-Resident Contractors are subject to Non-Resident Withholding Tax pursuant to the Income Tax Act (Canada).
- B10.5 The Bidder shall enter the Total Bid Price from Form B: Prices into the Total Bid Price field in MERX.
- B10.5.1 Bidders are advised that the calculation indicated in B18.4 will prevail over the Total Bid Price entered in MERX.

B11. DISCLOSURE

- B11.1 Various Persons provided information or services with respect to this Work. In the City's opinion, this relationship or association does not create a conflict of interest because of this full disclosure. Where applicable, additional material available as a result of contact with these Persons is listed below.
- B11.2 The Persons are:

- (a) N/A

B12. CONFLICT OF INTEREST AND GOOD FAITH

- B12.1 Further to C3.2, Bidders, by responding to this Tender, declare that no Conflict of Interest currently exists, or is reasonably expected to exist in the future.
- B12.2 Conflict of Interest means any situation or circumstance where a Bidder or employee of the Bidder proposed for the Work has:
- (a) other commitments;
 - (b) relationships;
 - (c) financial interests; or
 - (d) involvement in ongoing litigation;
- that could or would be seen to:
- (i) exercise an improper influence over the objective, unbiased and impartial exercise of the independent judgment of the City with respect to the evaluation of Bids or award of the Contract; or
 - (ii) compromise, impair or be incompatible with the effective performance of a Bidder's obligations under the Contract;
- (e) has contractual or other obligations to the City that could or would be seen to have been compromised or impaired as a result of its participation in the Tender process or the Work; or
 - (f) has knowledge of confidential information (other than confidential information disclosed by the City in the normal course of the Tender process) of strategic and/or material relevance to the Tender process or to the Work that is not available to other bidders and that could or would be seen to give that Bidder an unfair competitive advantage.
- B12.3 In connection with its Bid, each entity identified in B12.2 shall:
- (a) avoid any perceived, potential or actual Conflict of Interest in relation to the procurement process and the Work;
 - (b) upon discovering any perceived, potential or actual Conflict of Interest at any time during the Tender process, promptly disclose a detailed description of the Conflict of Interest to the City in a written statement to the Contract Administrator; and
 - (c) provide the City with the proposed means to avoid or mitigate, to the greatest extent practicable, any perceived, potential or actual Conflict of Interest and shall submit any additional information to the City that the City considers necessary to properly assess the perceived, potential or actual Conflict of Interest.
- B12.4 Without limiting B12.3, the City may, in its sole discretion, waive any and all perceived, potential or actual Conflicts of Interest. The City's waiver may be based upon such terms and conditions as the City, in its sole discretion, requires to satisfy itself that the Conflict of Interest has been appropriately avoided or mitigated, including requiring the Bidder to put into place such policies, procedures, measures and other safeguards as may be required by and be acceptable to the City, in its sole discretion, to avoid or mitigate the impact of such Conflict of Interest.
- B12.5 Without limiting B12.3, and in addition to all contractual or other rights or rights at law or in equity or legislation that may be available to the City, the City may, in its sole discretion:
- (a) disqualify a Bidder that fails to disclose a perceived, potential or actual Conflict of Interest of the Bidder or any of its employees proposed for the Work;
 - (b) require the removal or replacement of any employees proposed for the Work that has a perceived, actual or potential Conflict of Interest that the City, in its sole discretion, determines cannot be avoided or mitigated;

- (c) disqualify a Bidder or employees proposed for the Work that fails to comply with any requirements prescribed by the City pursuant to B12.4 to avoid or mitigate a Conflict of Interest; and
- (d) disqualify a Bidder if the Bidder, or one of its employees proposed for the Work, has a perceived, potential or actual Conflict of Interest that, in the City's sole discretion, cannot be avoided or mitigated, or otherwise resolved.

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

B13. QUALIFICATION

B13.1 The Bidder shall:

- (a) undertake to be in good standing under The Corporations Act (Manitoba), or properly registered under The Business Names Registration Act (Manitoba), or otherwise properly registered, licensed or permitted by law to carry on business in Manitoba; and
- (b) be financially capable of carrying out the terms of the Contract; and
- (c) have all the necessary experience, capital, organization, and equipment to perform the Work in strict accordance with the terms and provisions of the Contract.

B13.2 The Bidder and any proposed Subcontractor (for the portion of the Work proposed to be subcontracted to them) shall:

- (a) be responsible and not be suspended, debarred or in default of any obligations to the City. A list of suspended or debarred individuals and companies is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website 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) upon request of the Contract Administrator, provide the Security Clearances in accordance with PART F - Security Clearance;

B13.4 Further to B13.3(c), the Bidder shall, within five (5) Business Days of a request by the Contract Administrator, provide proof satisfactory to the Contract Administrator that the Bidder/Subcontractor has a workplace safety and health program meeting the requirements of The Workplace Safety and Health Act (Manitoba), by providing:

- (a) Written confirmation of a safety and health certification meeting SAFE Work Manitoba's SAFE Work Certified Standard (e.g., COR™ and SECOR™) in the form of:
 - (i) a copy of their valid Manitoba COR certificate and Letter of Good Standing (or Manitoba equivalency) as issued under the Certificate of Recognition (COR) Program administered by the Construction Safety Association of Manitoba or by the Manitoba Heavy Construction Association's WORKSAFELY™ COR™ Program; or
 - (ii) a copy of their valid Manitoba SECOR™ certificate and Letter of Good Standing (or Manitoba equivalency) as issued under the Small Employer Certificate of Recognition Program (SECOR™) administered by the Construction Safety Association of Manitoba or by the Manitoba Heavy Construction Association's WORKSAFELY™ COR™ Program; or
- (b) a report or letter to that effect from an independent reviewer acceptable to the City. (A list of acceptable reviewers and the review template are available on the Information

Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at <http://www.winnipeg.ca/matmgt/>.

- B13.5 The Bidder shall submit, within three (3) Business Days of a request by the Contract Administrator, proof satisfactory to the Contract Administrator of the qualifications of the Bidder and of any proposed Subcontractor.
- B13.6 The Bidder shall provide, on the request of the Contract Administrator, full access to any of the Bidder's equipment and facilities to confirm, to the Contract Administrator's satisfaction, that the Bidder's equipment and facilities are adequate to perform the Work.

B14. BID SECURITY

- B14.1 The Bidder shall include in its Bid Submission bid security in the form of a digital bid bond, in the amount of at least ten percent (10%) of the Total Bid Price, and agreement to bond of a company registered to conduct the business of a surety in Manitoba, in Form G1: Bid Bond and Agreement to Bond, available on The City of Winnipeg, Corporate Finance, Materials Management Division website at <https://www.winnipeg.ca/MatMgt/templates/files/eBidsecurity.pdf>.
- B14.2 Bid security shall be submitted in a digital format meeting the following criteria:
- (a) The version submitted by the Bidder must have valid digital signatures and seals;
 - (b) The version submitted by the Bidder must be verifiable by the City with respect to the totality and wholeness of the bond form, including: the content; all digital signatures and digital seals; with the surety company, or an approved verification service provider of the surety company.
 - (c) The version submitted must be viewable, printable and storable in standard electronic file formats compatible with the City, and in a single file. Allowable formats include pdf.
 - (d) The verification may be conducted by the City immediately or at any time during the life of the bond and at the discretion of the City with no requirement for passwords or fees.
 - (e) The results of the verification must provide a clear, immediate and printable indication of pass or fail regarding B14.2(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 his/her Bid without penalty at any time prior to the Submission Deadline.

B18. EVALUATION OF BIDS

- B18.1 Award of the Contract shall be based on the following bid evaluation criteria:
- (a) compliance by the Bidder with the requirements of the Tender, or acceptable deviation there from (pass/fail);
 - (b) qualifications of the Bidder and the Subcontractors, if any, pursuant to B13 (pass/fail);
 - (c) Total Bid Price;
 - (d) economic analysis of any approved alternative pursuant to B7.
- B18.2 Further to B18.1(a), the Award Authority may reject a Bid as being non-responsive if the Bid is incomplete, obscure or conditional, or contains additions, deletions, alterations or other irregularities. The Award Authority may reject all or any part of any Bid, or waive technical requirements or minor informalities or irregularities, if the interests of the City so require.
- B18.3 Further to B18.1(b), the Award Authority shall reject any Bid submitted by a Bidder who does not demonstrate, in his/her Bid or in other information required to be submitted, that he/she is qualified.
- B18.4 Further to B18.1(c), the Total Bid Price shall be the sum of the quantities multiplied by the unit prices for each item shown on Form B: Prices.
- B18.4.1 Bidders are advised that the calculation indicated in B18.4 will prevail over the Total Bid Price entered in MERX.

B19. AWARD OF CONTRACT

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

- B19.2 The City will have no obligation to award a Contract to a Bidder, even though one or all of the Bidders are determined to be qualified, and the Bids are determined to be responsive.
- B19.2.1 Without limiting the generality of B19.2, the City will have no obligation to award a Contract where:
- (a) the prices exceed the available City funds for the Work;
 - (b) the prices are materially in excess of the prices received for similar work in the past;
 - (c) the prices are materially in excess of the City's cost to perform the Work, or a significant portion thereof, with its own forces;
 - (d) only one Bid is received; or
 - (e) in the judgment of the Award Authority, the interests of the City would best be served by not awarding a Contract.
- B19.3 If funding for the Work is provided to the City of Winnipeg by the Government of Manitoba and/or the Government of Canada, Bidders are advised that the terms of D23 shall immediately take effect upon confirmation of such funding, regardless of when funding is confirmed.
- B19.4 Where an award of Contract is made by the City, the award shall be made to the qualified Bidder submitting the lowest evaluated responsive Bid, in accordance with B18.
- B19.4.1 Following the award of contract, a Bidder will be provided with information related to the evaluation of his/her Bid upon written request to the Contract Administrator.

PART C - GENERAL CONDITIONS

C0. GENERAL CONDITIONS

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

PART D - SUPPLEMENTAL CONDITIONS

GENERAL

D1. GENERAL CONDITIONS

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

D2. SCOPE OF WORK

D2.1 The Work to be done under the Contract shall consist of Sewer Rehabilitation by Cured-in-Place (CIPP) Methods.

D2.2 The major components of the Work are as follows:

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

D2.3 The following shall apply to the Work:

- (a) Universal Design Policy
<http://clkapps.winnipeg.ca/DMIS/DocExt/ViewDoc.asp?DocumentTypeld=2&DocId=3604>

D3. DEFINITIONS

D3.1 When used in this Tender:

- (a) "**ASTM**" means American Society for Testing and Materials;
- (b) "**CIPP Supplier and Installer**" means only the Suppliers and Installers that were pre-approved under the City of Winnipeg "Request for Qualifications for Supply and Installation of Cured-in-Place-Pipe (CIPP), Bid Opportunity No. 403-2007" shall be approved for the 2009 sewer lining projects in the City of Winnipeg.

D4. CONTRACT ADMINISTRATOR

D4.1 The Contract Administrator is:

Stacy Cournoyer, P.Eng.
Senior Project Engineer

Telephone No. 204-986-2142
Email Address scournoyer@winnipeg.ca

D4.2 At the pre-construction meeting, the Contract Administrator will identify additional personnel representing the Contract Administrator and their respective roles and responsibilities for the Work.

D5. CONTRACTOR'S SUPERVISOR

D5.1 At the pre-construction meeting, the Contractor shall identify his/her designated supervisor and any additional personnel representing the Contractor and their respective roles and responsibilities for the Work.

D6. NOTICES

- D6.1 Except as provided for in C22.4, all notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications to the Contractor shall be sent to the address or facsimile number identified by the Contractor in Paragraph 2 of Form A: Bid/Proposal.
- D6.2 All notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications to the City, except as expressly otherwise required in D6.3 or elsewhere in the Contract, shall be sent to the attention of the Contract Administrator identified in D3.1(a).
- D6.3 All notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications required to be submitted or returned to the City Solicitor shall be sent to the following facsimile number:
- The City of Winnipeg
Legal Services Department
Attn: Director of Legal Services
Facsimile No.: 204 947-9155

D7. FURNISHING OF DOCUMENTS

- D7.1 Upon award of the Contract, the Contractor will be provided with five (5) complete sets of the Tender. If the Contractor requires additional sets of the Tender, they will be supplied to him/her at cost.

SUBMISSIONS

D8. AUTHORITY TO CARRY ON BUSINESS

- D8.1 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.

D9. SAFE WORK PLAN

- D9.1 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.
- D9.2 The Safe Work Plan should be prepared and submitted in the format shown in the City's template which is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at <http://www.winnipeg.ca/matmgt/Safety/default.stm>

D10. INSURANCE

- D10.1 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.

D10.2 Deductibles shall be borne by the Contractor.

D10.3 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.

D10.4 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.

D11. CONTRACT SECURITY

D11.1 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.

D11.2 The Contractor shall provide the City Solicitor with the required performance and labour and material payment bonds within seven (7) Calendar Days of notification of the award of the Contract by way of an award letter and prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 for the return of the executed Contract Documents, if applicable.

D11.3 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 D11.1(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.

D12. SUBCONTRACTOR LIST

D12.1 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.

SCHEDULE OF WORK

D13. COMMENCEMENT

D13.1 The Contractor shall not commence any Work until he/she is in receipt of an award letter from the Award Authority authorizing the commencement of the Work.

- D13.2 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 D8;
 - (ii) evidence of the workers compensation coverage specified in C6.15;
 - (iii) the Safe Work Plan specified in D9;
 - (iv) evidence of the insurance specified in D10;
 - (v) the contract security specified in D11; and
 - (vi) the Subcontractor list specified in D12.
 - (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.

D14. SUBSTANTIAL PERFORMANCE

- D14.1 The Contractor shall achieve Substantial Performance by October 30, 2020.
- D14.2 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.
- D14.3 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.

D15. TOTAL PERFORMANCE

- D15.1 The Contractor shall achieve Total Performance by November 27, 2020.
- D15.2 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.
- D15.3 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.

D16. LIQUIDATED DAMAGES

- D16.1 If the Contractor fails to achieve, Substantial Performance or Total Performance in accordance with the Contract by the days fixed herein for same, the Contractor shall pay the City the following amounts per Working Day for each and every Working Day following the days fixed herein for same during which such failure continues:
- (a) Substantial Performance – One thousand five hundred dollars (\$1500.00);
 - (b) Total Performance - Seven hundred fifty dollars (\$750.00).
- D16.2 The amounts specified for liquidated damages in D16.1 are based on a genuine pre-estimate of the City's losses in the event that the Contractor does not achieve, Substantial Performance or Total Performance by the days fixed herein for same.
- D16.3 The City may reduce any payment to the Contractor by the amount of any liquidated damages assessed.

D17. COVID-19 SCHEDULE DELAYS

- D17.1 The City acknowledges that the schedule for this Contract may be impacted by the COVID-19 pandemic. Commencement and progress of the Work shall be performed by the Contractor with due consideration to the health and safety of workers and the public and directives from health authorities and various levels of government, and in close consultation with the Contract Administrator.
- D17.2 If the Contractor is delayed in the performance of the Work by reason of the COVID-19 pandemic, the Work schedule may be adjusted by a period of time equal to the time lost due to such delay and costs related to such delay will be determined as identified herein.
- D17.3 A minimum of seven (7) Calendar Days prior to the commencement of Work, the Contractor shall declare whether COVID-19 will affect the start date. If the Contractor declares that COVID-19 will affect the start date, the Contractor shall provide sufficient evidence that the delay is directly related to COVID-19, including but not limited to evidence related to availability of staff, availability of Material or work by others.
- D17.4 For any delay related to COVID-19 and identified after Work has commenced, the Contractor shall within seven (7) Calendar Days of becoming aware of the anticipated delay declare the additional delay and shall provide sufficient evidence as indicated in D17.3.
- D17.5 The Work schedule, including the durations identified in D14 to D15 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.
- D17.6 Where Work not previously identified is being carried over solely as a result of delays related to COVID-19, as confirmed by the Contract Administrator, the cost of temporary works to maintain the Work in a safe manner until Work recommences, will be considered by the Contract Administrator. Where the Work is carried over only partially due to COVID-19, a partial consideration of the cost of temporary works will be considered by the Contract Administrator.
- D17.7 Any time or cost implications as a result of COVID-19 and in accordance with the above, as confirmed by the Contract Administrator, shall be documented in accordance with C7.

CONTROL OF WORK

D18. JOB MEETINGS

- D18.1 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.
- D18.2 The Contract Administrator reserves the right to cancel any job meeting or call additional job meetings whenever he/she deems it necessary.

D19. PRIME CONTRACTOR – THE WORKPLACE SAFETY AND HEALTH ACT (MANITOBA)

- D19.1 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).

D20. THE WORKPLACE SAFETY AND HEALTH ACT (MANITOBA) – QUALIFICATIONS

D20.1 Further to B13.4, the Contractor/Subcontractor must, throughout the term of the Contract, have a Workplace Safety and Health Program meeting the requirements of The Workplace Safety and Health Act (Manitoba). At any time during the term of the Contract, the City may, at its sole discretion and acting reasonably, require updated proof of compliance, as set out in B13.4.

MEASUREMENT AND PAYMENT

D21. PAYMENT

D21.1 Further to C12, the City may at its option pay the Contractor by direct deposit to the Contractor's banking institution.

WARRANTY

D22. WARRANTY

D22.1 Notwithstanding C13.2, 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.

D22.1.1 In such case, the date specified by the Contract Administrator for the warranty period to begin shall be substituted for the date specified in C13.2 for the warranty period to begin.

THIRD PARTY AGREEMENTS

D23. FUNDING AND/OR CONTRIBUTION AGREEMENT OBLIGATIONS

D23.1 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.

D23.2 Further to D23.1, in the event that the obligations in D23 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.

D23.3 For the purposes of D23:

- (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.

D23.4 Modified Insurance Requirements

D23.4.1 If not already required under the insurance requirements identified in D10, the Contractor will be required to provide wrap-up liability insurance in an amount of no less than two million dollars (\$2,000,000) inclusive per occurrence. Such policy will be written in the joint names of the City, Contractor, Consultants and all sub-contractors and sub-consultants and include twelve (12) months completed operations. The Government of Manitoba and its Ministers, officers, employees, and agents shall be added as additional insureds.

D23.4.2 If not already required under the insurance requirements identified in D10, 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.

- D23.4.3 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.
- D23.4.4 Further to D10.3, 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.
- D23.4.5 All policies must be taken out with insurers licensed to carry on business in the Province of Manitoba.
- D23.5 Indemnification By Contractor
- D23.5.1 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.
- D23.6 Records Retention and Audits
- D23.6.1 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.
- D23.6.2 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 D23.6.1 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.
- D23.7 Other Obligations
- D23.7.1 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.
- D23.7.2 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.

D23.7.3 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.

D23.7.4 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.

FORM H1: PERFORMANCE BOND
(See D11)

KNOW ALL MEN BY THESE PRESENTS THAT

_____ (hereinafter called the "Principal"), and

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

_____ dollars (\$_____)

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

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

TENDER NO. 197-2020

2020 SEWER RENEWALS BY CIPP LINING – CONTRACT 6

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 D11)

KNOW ALL MEN BY THESE PRESENTS THAT

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

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

_____ dollars (\$_____)

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

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

TENDER NO. 197-2020

2020 SEWER RENEWALS BY CIPP LINING – CONTRACT 6

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)

PART E - SPECIFICATIONS

GENERAL

E1. APPLICABLE SPECIFICATIONS AND DRAWINGS

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

<u>Drawing No.</u>	<u>Drawing Name/Title</u>
	Cover Sheet
12442	COVER PAGE
12443	DRAWING INDEX 1, DESIGN NOTES, LEGEND, & ABBREVIATIONS
12444	DRAWING INDEX 2, DESIGN NOTES, LEGEND, & ABBREVIATIONS
12445	ASHLAND AVENUE -MH AT HAY STREET TO 1ST MH E OF HAY STREET
12446	BALDRY BAY - MH AT CORNELL DRIVE (W LEG) TO NODE AT CORNELL DRIVE
12447	BALFOUR AVENUE - 1ST MH E OF FISHER STREET TO MH AT FISHER STREET
12448	BARTLET AVENUE - 1ST MH W OF HAY STREET TO MH AT HAY STREET
12449	BEAVERBROOK STREET - 1ST MH S OF GROSENVOR AVENUE TO 3RD MH S OF GROSENVOR AVENUE
12450	BEAVERBROOK STREET - MH AT JOHN BREBEUF PLACE TO 1ST MH N OF JOHN BREBEUF PLACE
12451	BERESFORD AVENUE - MH AT LILAC STREET TO 1ST MH E OF LILAC STREET
12452	BERWICK PLACE (N-LEG) - 1ST MH N OF BERWICK PLACE (W -LEG) TO 1ST MH N OF BERWICK PLACE (E -LEG)
12453	BOREBANK STREET - 1ST MH S OF CORYDON AVENUE TO 2ND MH S OF CORYDON AVENUE
12454	BROCK STREET - 1ST MH N OF GRANT AVENUE TO 2ND MH N OF GRANT AVENUE
12455	CARPATHIA ROAD - 2ND MH S OF WILLOW AVENUE TO MH AT WILLOW AVENUE
12456	CHRUCHILL DRIVE - 2ND MH W OF OSBORNE STREET TO 3RD MH W OF OSBORNE STREET
12457	CLARE AVENUE - MH AT CASEY STREET TO MH AT FISHER STREET
12458	COMMUNITY ROW - 1ST MH N OF RANNOCK AVENUE TO 2ND MH N OF RANNOCK AVENUE
12459	COMMUNITY ROW - 2ND MH S OF RANNOCK AVENUE TO 1ST MH S OF RANNOCK AVENUE
12460	CORDOVA STREET - 2ND MH S OF GROSENVOR AVENUE TO 1ST MH S OF GROSENVOR AVENUE
12461	DOWKER AVENUE - MH AT CROWSON BAY (W-LEG) TO MH AT CROWSON BAY

	(E-LEG)
12462	DUCHARME AVENUE - MH AT HOUDE DRIVE (E-LEG) TO MH AT VILLENEUVE BOULEVARD
12463	FISHER STREET - MH AT BALTIMORE ROAD (S- E) TO MH AT ASHLAND AVENUE
12464	GIRTON BOULEVARD - 1ST MH S OF WELLINGTON CRESCENT TO MH AT NANTON BOULEVARD
12465	HANDSART BOULEVARD - 1ST MH S OF NANTON BOULEVARD TO MH AT NANTON BOULEVARD
12466	HECTOR BAY WEST - MH AT HECTOR BAY (W-LEG) TO MH AT HECTOR BAY (E-LEG)
12467	LANARK STREET - 1ST MH N OF GROSVENOR AVENUE TO 2ND MH N OF GROSVENOR AVENUE
12468	LANARK STREET - 2ND MH S OF KINGSWAY TO 3RD MH S OF KINGSWAY
12469	LANARK STREET - MH AT WELLINGTON CRESCENT SOUTH TO 1ST MH S OF WELLINGTON CRESCENT SOUTH
12470	LILAC STREET - 1ST MH S OF BERESFORD AVENUE TO MH AT BERESFORD AVENUE
12471	LINDSAY STREET - 2ND MH S OF CORYDON AVENUE TO 3RD MH S OF CORYDON AVENUE
12472	MCNAUGHTON AVENUE - 1ST MH W OF DALY STREET SOUTH TO MH AT DALY STREET SOUTH
12473	MICHIGAN AVENUE - MH AT LOUISIANA PLACE TO MH AT RICE ROAD
12474	MONTROSE STREET - 2ND MH S PF CROYDON AVENUE TO 3RD MH S OF CORYDON AVENUE
12475	NASSAU STREET SOUTH - MH AT WALKER AVENUE TO MH AT KYLEMORE AVENUE
12476	NASSAU STREET SOUTH - MH AT ARNOLD AVENUE (W- E) TO MH AT HETHRINGTON AVE
12477	NORTH DRIVE - 2ND MH E OF LYON STREET TO 1ST MH E OF LYON STREET
12478	OAKWOOD AVENUE - 1ST MH E OF HAY STREET TO MH AT HAY STREET
12479	OAKWOOD AVENUE - MH AT CASEY STREET TO MH AT FISHER STREET (W-LEG)
12480	PARK BOULEVARD NORTH - 1ST MH N OF CULBERTSON AVENUE TO MH AT CULBERTSON AVENUE
12481	QUEENSTON STREET - 1ST MH N OF GRANT AVENUE TO 2ND MH N OF GRANT AVENUE
12482	RATHGAR AVENUE - MH AT NASSAU STREET SOUTH TO 1ST MH E OF NASSAU STREET SOUTH
12483	RILEY CRESCENT (N-LEG) - 1ST MH W OF WICKLOW STREET TO MH AT WICKLOW STREET
12484	RIVERSIDE DRIVE - 2ND MH N OF MERRIAM BOULEVARD TO 1ST MH S OF JUBILEE AVENUE
12485	ROBINDALE ROAD - 1ST MH S OF BETSWORTH AVENUE TO MH AT BETSWORTH AVENUE
12486	ROSDALE AVENUE - 1ST MH E OF LILAC STREET TO 3RD MH E OF LILAC STREET
12487	RYERSON AVENUE - 1ST MH S OF RICE ROAD TO MH AT RICE ROAD
12488	SHAFTSBURY BOULEVARD - 3RD MH N OF GRANT AVENUE TO 4TH MH N OF GRANT AVENUE
12489	SOUTH DRIVE - MH AT WILDWOOD J (E-LEG) TO MH AT WILDWOOD J (W-LEG)
12490	SOUTH DRIVE - MH AT KEBIR PLACE TO MH AT DOVE BAY
12491	SOUTHBOINE DRIVE - MH AR ORCHARD PARK TO MH W OF ORCHARD PARK
12492	THATCHER DRIVE - 1ST M S OF UNVERSITY CRESECENT TO MH AT UNIVERSITY CRESCENT
12493	WALKER AVENUE - 1ST MH E OF ARGUE STREET TO 2ND MH E OF ARGUE STREET
12494	WALKER AVENUE - 2ND MH W OF NASSAU ST SOUTH TO MH W OF NASSAU ST SOUTH
12495	WALKER AVENUE - 1ST MH E OF NASSAU ST SOUTH TO MH AT NASSAU ST

	SOUTH
12496	WEATHERDON AVENUE - 1ST MH E OF WILTON STREET TO MH AT GUELPH ST
12497	WEATHERDON AVENUE - 1ST MH W OF HARROW STREET TO MH AT HARROW STREET
12498	WEDGEWOOD DRIVE - 1ST MH W OF THATCHER DRIVE TO MH AT THATCHER DRIVE
12499	WELLINGTON CRESCENT - MH AT ELM STREET TO MH W OF OAK STREET
12500	WELLINGTON CRESCENT - MH AT RENFREW STREET TO MH AT LANARK STREET
12501	WILLOW AVENUE - MH AT FRANK STREET TO MH AT KENASTON BOULEVARD

E2. SHOP DRAWINGS

E2.1 Description

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

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

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

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

E2.5 Shop Drawings not meeting the requirements of CW 1100 or the requirements specified herein will be returned to the Contractor without review for submission.

E2.6 Allow for a five (5) Business Days period for review by the Contract Administrator of each individual submission and re-submission, unless noted otherwise in the Contract Documents.

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

E2.8 Measurement and Payment

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

E3. CONFINED SPACE ENTRY

E3.1 The Contractor shall be aware that Hydrogen Sulphide Gas is present in all underground structures connected to the City's sewer systems and has been known to accumulate in concentrations sufficient to cause serious harm or death to personnel who are not using adequate Personal Protective Equipment.

E3.2 The Contractor's attention is drawn to the Province of Manitoba Workplace Safety and Health Act ("the Act"), and the Regulations and Guidelines there-under pertaining to Confined Space Entry Work and in particular the requirements for conducting hazard/risk assessments and providing personal protective equipment (PPE).

E4. TRAFFIC MANAGEMENT

- E4.1 Further to Section 3.7 of CW 1130 of the General Requirements the Contractor shall be responsible to redirect and maintain traffic with appropriate signing in accordance with The City of Winnipeg, "Manual of Temporary Traffic Control in Work Areas on City Streets at all times during construction.
- E4.2 Maintain access for approaches, driveways, public lanes and crossing streets for all locations.
- E4.3 Bus traffic must be maintained at all times or as approved by the Contract Administrator.
- E4.4 Further to Section 3.6 of CW 1130 of the General Requirements, the Contractor shall maintain safe pedestrian crossings at intersections at all times. If possible, only one pedestrian crossing at an intersection is to be blocked by construction at any one time. If more than one pedestrian crossing is blocked by construction at an intersection at the same time the Contractor shall provide flag persons to safely escort pedestrians across the intersection. The Contractor shall leave pedestrian crossing locations safe and free of equipment that may hamper pedestrians when no construction activities are being performed at a particular crossing location.
- E4.5 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.
- E4.6 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.
- E4.7 Construction activities on Regional Streets shall be restricted to the closed lanes between 07:00 to 09:00 hours and 15:30 to 17:30 hours Monday to Friday and other hours as directed by the Contract Administrator.
- E4.8 Notwithstanding the requirements noted herein and CW 1130 the Contractor shall maintain the following:
- (a) Regional Streets
 - (i) Shaftsbury Boulevard – Maintain traffic in both north and southbound directions.
 - (ii) University Crescent (Thatcher Drive liner) – Maintain at least one lane of traffic in both north and southbound directions.
 - (iii) Kenaston Boulevard (Willow Avenue liner) – Maintain at least one lane of northbound traffic.
 - (iv) Wellington Crescent (Lanark Street liner) – Maintain traffic in both west and eastbound directions.
 - (b) All non-Regional Streets
 - In accordance with the Manual of Temporary Traffic Control located at:
www.winnipeg.ca/publicworks/InformationAndResources/TrafficControl/manual_of_temp_traffic_control.asp
- E4.8.1 The Contractor shall provide notice of complete street shutdowns (if required) complete with dates and duration a minimum of five (5) working days prior to street closures.
- E4.9 Notwithstanding the requirements noted herein, traffic plans requiring lane closures for Regional Streets need to be approved by the Traffic Management Branch. Plans need to be submitted for review minimum of (5) working days prior to start of the work.
- E4.10 Preparation work for CIPP liner installation on Regional streets shall be done on a weekend or on a weekday between 09:00 hours and 15:30 hours or after 17:30 hours and completed by 07:00 hours the following day including traffic barricade removal.

- E4.11 Installation of the full segment CIPP liners on Shaftsbury Boulevard and Kenaston Boulevard shall be scheduled to be done on a weekend, i.e. Between 17:30 hours Friday and 07:00 hours Monday, or as night work after 22:00 hours on a weekday and completed by 7:00 hours the following day.
- E4.12 Installation of adjacent full segment CIPP liners shall be scheduled to be done consecutively without removing and replacing traffic barricades until after the last segment is completed.

E5. FLOW CONTROL

E5.1 Description

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

E5.2 Submittals

- (a) Submit a written flow control plan for sewers to be lined for review by the Contract Administrator in accordance with E2, a minimum of five (5) Business Days prior to undertaking the work. The flow control plan shall include the following:
- (i) A description and sketch detailing the arrangement of the proposed flow control measures.
 - (ii) A list of the key components required for the flow control measures, including but not limited to the following:
 - (i) Cofferdams
 - (ii) Piping or hoses (as required)
 - (iii) Pumps (as required)
 - (iii) A detailed procedure for installation and removal of the flow control measures.
 - (iv) Monitoring plan (if required). Plan shall include a 24 hour contact person.
 - (v) Means and methods for dealing with excessive flows or wet weather events.
 - (vi) Means and methods for bypassing flows from apartment complexes and commercial buildings.
 - (vii) Supply of temporary washroom facilities where required.
- (b) Flow control plans are not required where no flow bypass work is to be undertaken.
- (c) A tabular flow control plan is acceptable for assets 450 mm in diameter and smaller.
- (d) Where indicated, flow control plans shall be prepared and stamped by a professional Engineer, registered in the Province of Manitoba and experienced in the design and implementation of temporary flow bypass works.

E5.3 Methods

- (a) Provide necessary flow control measures for the main line sewer and sewer services required to perform the work. Diversion of wastewater flow directly or indirectly to the environment, land drainage sewers, or storm relief sewers will not be allowed.
- (b) Maintain existing sewer flows from upstream sewers during construction around the sewers being lined.
- (c) Where bypass pumping combined sewer flows, the Contractor shall provide a minimum pumping capacity of 2.75 times the estimated average day flows as provided herein or estimated by the Contractor.
- (d) Erection of scaffolding overtop of active roadways will not be permitted for the purposes of flow control.
- (e) Provide adequate temporary bypass pumping for live sewer services connected to the sewer being lined from when the service is blocked off until it is reinstated.
- (f) Provide security personnel for locations where by-pass pumping requires normally secure or locked doors and access areas to be left open or unlocked.

- (g) Ensure all flow control components and materials are removed from the sewer system upon completion of the work.
- (h) The Contractor shall put in place measures to prevent the spill of wastewater and styrene laden water from the CIPP installation process to the environment. When working near outfalls, the Contractor shall ensure flow bypass methods prevent upstream levels from exceeding overflow levels. Where plugs and other methods are employed to prevent overflows, the Contractor shall have contingency plans in place for unexpected flow increases and undertake 24 hr monitoring of upstream levels while flow control measures are in place.

E5.3.1 Mainline Sewer Flows

- (a) The Contractor shall ensure wet weather or excessive flow conditions can be pumped or otherwise accommodated through the work area. The Contractor shall schedule work requiring complete blockage of the sewer when the chances of wet weather events are minimized in accordance with E5.3.3.
- (b) The Contractor shall determine appropriate sewer bypass flows for all sewer assets 450 mm and smaller. Submit flow control plans in accordance with E5.2. Flow control plans are not required to be stamped by a Professional Engineer.
- (c) For sewers greater than 450 mm in diameter, the following Average Dry Weather Flows (ADWF) have been provided for the purposes of sizing bypass systems. Submit flow control plans in accordance with E5.2. Flow control plans shall be stamped by a Professional Engineer, registered in the Province of Manitoba and experienced in the design and implementation of temporary flow bypass works:
 - (i) Not Applicable
- (d) Notwithstanding E5.3.1 (b) and (c) the following assets may exhibit intermittent flows resulting from the operation of upstream pump stations. The following ADWF and peak pump station discharge flows have been provided for the purposes of sizing bypass systems. Submit flow control plans in accordance with E5.2. Flow control plans shall be stamped by a Professional Engineer, registered in the Province of Manitoba and experienced in the design and implementation of temporary flow bypass works:
 - (i) Not Applicable

E5.3.2 Sewer Services

- (a) Intermittent/short term flow blockages (i.e. up to 1 day, intermittently) of live sewer services will be permitted on the provision that building occupants are informed of the blockage and adequate steps are undertaken to ensure sewer service backups do not occur. The Contractor shall be responsible for any damages occurring from sewer service blockages in instances where inadequate or improper notice has been provided.
- (b) Provide temporary indoor portable toilets for residential homes and for each apartment in small apartment buildings (10 or less apartments) instead of temporary sewer service bypass pumping where feasible and approved by the building owner and the Contract Administrator.
- (c) Provide temporary indoor or outdoor toilet facilities for smaller commercial properties such as strip malls instead of temporary sewer service bypass pumping where feasible and approved by the building owner and the Contract Administrator. One toilet facility to be provided for each business in a strip mall.
- (d) Provide necessary supplies for portable toilets and clean as often as required while in use. Remove portable toilets and outdoor toilets promptly once sewer service is reinstated.
- (e) 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.

- (f) Excavate for sewer service exposure in accordance with CW 2030. Repair and backfill exposed sewer services in accordance with CW 2130.

E5.3.3 Weather

- (a) Review the Environment Canada weather forecast with the Contract Administrator before each day of liner installation.
- (b) Delay installation of liners and/or secure Works when the anticipated weather conditions are such that anticipated sewer flow will exceed the flow control measures provided.
- (c) The Contractor shall advise immediately of any weather-related delays.
- (d) The Contractor to schedule Work according to the weather; the City is not responsible for delays due to weather.

E5.4 Measurement and Payment

- (a) Flow control measures necessary for mainline sewers will be measured on a unit basis and paid for at the Contract Unit Price for "Flow Control (By Sewer Segment)". Number of units to be paid for will be the total number of units supplied in accordance with this specification, accepted and measured by the Contract Administrator.
- (b) Payment for "Flow Control" shall include, but is not limited to the following:
 - (i) Supply of flow control plans, drawings, and submissions;
 - (ii) Investigative work to confirm flows, manhole, and pipe configurations;
 - (iii) Supply, installation, and removal of cofferdams and flow diversions;
 - (iv) Supply, mobilization, monitoring, operation, and demobilization of pumps and hoses;
 - (v) Hydrovac, hauling, and disposal of sewage where required for flow control purposes;
 - (vi) Traffic signage;
 - (vii) Supply, installation, and removal of all traffic ramps and associated materials;
 - (viii) Any and all other plant and materials required to complete the work as specified herein and identified on reviewed flow control plans.
- (c) Only one unit of flow control will be paid for each sewer segment and will include all occurrences of mainline and sewer service flow control requirements for the sewer segment.
- (d) Where no flow control measures are undertaken, no payment will be made for this item of work.
- (e) The supply of temporary washroom facilities and flow control measures for sewer services shall be considered incidental to installation of the liner and will not be measured for payment. No additional payment will be made.

E6. SEWER INSPECTIONS

E6.1 Description:

- (a) This Specification shall cover sewer CCTV inspections required to facilitate the specified rehabilitation work.

E6.2 Methods

E6.2.1 Perform the following sewer inspections in accordance with CW 2145 in the presence of the Contract Administrator.

- (a) Pre-Design Inspection (where specified):
 - (i) Perform prior to preparing the liner design.
 - (ii) Intent is to confirm the continuous or discontinuous (every 5 metres minimum) measurement of the height and width of large diameter and non-circular sewers along the entire length of the sewer.

- (iii) The following methods may be employed:
 - ◆ Hand measurements
 - ◆ Laser profiling
 - (iv) CCTV inspections involving hand measurements shall clearly show the dimensional measurements and distance of the measurement from the upstream manhole on the video. Distances based on CCTV cable measurement will be permitted.
 - (v) Any change in sewer cross-section shall be sufficiently dimensioned to permit
 - (vi) Laser profiling technology must have sufficient accuracy and replicability as per E6.6.2
 - (vii) No coding of the submission will be required.
- (b) 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 CCTB 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.
- (c) 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 on Regional Streets 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) Full coding required.
- (d) Post-Design Inspection (where specified):
- (i) Perform subsequent to installing the liner.
 - (ii) Intent is to confirm the continuous or discontinuous (every 5 metres minimum) measurement of the height and width of large diameter and non-circular liners along the entire length of the sewer to confirm that the liner is consistent with the expected post-lining diameter or dimension.
 - (iii) The following methods may be employed:
 - ◆ Hand measurements
 - ◆ Templating
 - ◆ Laser profiling
 - (iv) Perform while flow control measures are in place.
 - (v) CCTV inspections involving hand measurements shall clearly show the dimensional measurements and distance of the measurement from the upstream manhole on the video. Distances based on CCTV cable measurement will be permitted.
 - (vi) CCTV inspections involving templating shall clearly show the passage of the template through the sewer. For templated sewers the dimensions of the template shall be measured visibly on the CCTV inspection and dimensions submitted for review with the pre-design inspection.

- (vii) Laser profiling technology must have sufficient accuracy and replicability as per E6.6.2.
 - (viii) No coding of the submission will be required.
 - (e) Warranty Inspection:
 - (i) Perform before expiration of the warranty period and acceptance but not prior to 10 months after installation of the liner.
 - (ii) Intention is to confirm the fit and finish of the liner, the need for any remedial work, and acceptance of any repair work performed during the warranty period.
 - (iii) Undertake sewer cleaning in accordance with CW 2140 as required to obtain a satisfactory inspection.
 - (iv) Full coding required.
- E6.2.2 Submit all inspection videos to the Contractor Administrator for review in accordance with CW 2145 and as specified herein.
- E6.3 Sewer Inspection Reports
 - (a) Provide the Contract Administrator with the following sewer inspection reports prepared in accordance with CW 2145.
 - (i) Pre-sewer repair inspection before undertaking any repairs.
 - (ii) Pre and post-lining inspection and reports before Total Performance of Work.
 - (iii) Warranty inspection report before Final Acceptance of Work.
- E6.4 Sewer Service Reports
 - (a) The Contractor is responsible to determine the usage and status of all service connections connected to the sewer to be rehabilitated. Confirm exact location of all sewer services connected to the sewer being lined by dye testing, tracing, or other methods. Any additional investigative and/or remedial work resulting from improper identification of connected services shall be borne by the Contractor.
 - (b) Submit a written Sewer Service Report for each liner location to the Contract Administrator a minimum of five (5) Business Days prior to installation of liners. Provide the following information for each sewer service including CB leads and utility manhole drains.
 - (i) Location of connection (chainage from upstream manhole and clock reference).
 - (ii) Diameter of sewer connection lateral.
 - (iii) Material type of sewer connection.
 - (iv) Observed condition of connection.
 - (v) Status of connection (active, inactive or unable to determine).
 - (vi) Property serviced including the address.
 - (c) Sewer Service Reports shall be submitted in conjunction with the Pre-Lining CCTV Inspection submission.
- E6.5 Amendments and Supplements to CW 2145:
 - E6.5.1 Replace Section 3.4 with:
 - (a) Ensure each operator is fully trained in all aspects of sewer inspection and capable of making accurate observations and recording all conditions that may be encountered in the sewers.
 - (b) Perform condition coding using certified operators in accordance with the National Association of Sewer Service Companies (NASSCO) having attained and retained their "Pipeline Assessment Certification Program" (PACP) and "Manhole Assessment Certification Program" (MACP).
 - E6.5.2 Replace Section 3.5 with:

- (a) Perform sewer condition coding in accordance with the requirements of the NASSCO PACP and to Version 7.0.0 of the manual, or greater in accordance with E6.5.1 of this specification.
 - (b) Record place names in accordance with Clause 3.9.4 of the CW 2145.
- E6.5.3 Further to CW 2145 Clause 3.7.4, operators failing to provide copies of their NASSCO certification and / or meet the accuracy requirements on two occasions will not be permitted to code on the remainder of the Contract until they can demonstrate to the Contract Administrator that they can code in accordance with the requirements of the NASSCO PACP and MACP version 7.0.0 of the manual or greater.
- E6.5.4 Further to Section 3.13, a paper or “hard copy” of the sewer inspection reports is not required and the digital format should be submitted on a CD-R.
 - (a) The Contractor shall maintain backup copies of all digital video and inspection data submissions for the duration of the Warranty Period as stated in C13.
 - (b) The Contractor shall supply inspection data for review by the Contract Administrator on a DVD.
- E6.5.5 Replace Clause 3.8.1 with:
 - (a) Provide a minimum of 400 lines of resolution around the periphery of the picture for digital MPEG video playback.
- E6.5.6 Replace Clause 3.11.1 with:
 - (a) Capture the inspections in digital format in colour from the live video source on archival grade digital versatile discs, DVD-R format to the following minimum requirements. Adjust requirements as required to achieve 400 lines of resolution specified in Clause E8.1.6 of this Specification.
 - (i) XDVD MPEG-2 or MPEG-4 format (MPEG-4 preferred).
 - (ii) Picture Size: NTSC 720 x 480 @ 29.97 frames per second.
 - (iii) Data/Bit Rate: 6.0 M-bits/sec.
 - (b) Replace Clause 3.17.7.6, with:
 - (i) Record the distance from the centre of the manhole to the cable calibration location at the start of the inspection and adjust the distance reading so that zero is at the centre of the start manhole. This distance is known as the cable calibration distance. The cable calibration location is the intersection point between the camera’s widest horizontal viewing angle and the pipe’s side periphery (03 or 09 o’clock) when the camera is level and looking forward.
- E6.6 Sewer Inspection Equipment
- E6.6.1 Notwithstanding CW 2145, CCTV equipment meet the following requirements:
 - (a) Minimum requirements of the in-line inspection platform include:
 - (i) Independently controlled drive tracks that enable the platform to manoeuvre around bends and climb over debris up to 300mm in height.
 - (ii) Operable under partially or fully submerged flow conditions, for distances up to 500m upstream or downstream from a single access point.
 - (iii) Operable in sewers of various cross-sections and constructed of standard pipe materials including brick, concrete, PVC, HDPE, and steel.
 - (iv) Tethered to facilitate extraction of the platform from the sewer, without causing damage to the sewer infrastructure, in the event the equipment fails or otherwise becomes uncontrollable within the sewer.
 - (v) Equipped with sufficient high intensity lighting to illuminate the sewer for visual inspection.
 - (vi) Equipment shall be capable of continuously capturing digital video from first generation recordings with no frame loss, regardless of the progression of the inspection.

- (vii) Equipment shall be used to acquire continuous digital video images of the sewer for the entire length being inspected.

E6.6.2 Laser profiling equipment shall meet the following minimum requirements:

- (a) Three Dimensional (3D) LASER Scanning Inspection
 - (i) "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.
 - (ii) Three Dimensional (3D) LASER scanning equipment shall provide an accurate determination of pipe geometry (features and defects) above the fluid level.
 - (iii) Minimum equipment requirements are:
 - ◆ The laser shall be Class 1; eye-safe for operator safety.
 - ◆ Surface measurements accurate to 5mm at 3 metres in 1200mm pipes and larger.
 - ◆ Precision ovality / deflection detailed range laser measurement scans accurate to $\pm 1\%$.
 - ◆ 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.
 - (iv) The rate of scan shall not exceed 9 m / minute.

E6.7 Video Coding

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

E6.8 Measurement and Payment

E6.8.1 Sewer inspections will be measured and paid for in accordance with CW 2145 except as modified herein:

- (a) The total length of inspection to be paid shall be the total length of sewer inspected to the satisfaction of the Contract Administrator. The length to be paid shall be the length of sewer inspected by the Contractor as recorded by the Contractor's calibrated inspection equipment or as determined by the Contract Administrator.

E6.8.2 Sewer Service Reports

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

E6.8.3 Sewer Inspection Reports

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

E7. DIGITAL PANORAMIC MANHOLE INSPECTIONS

E7.1 Description

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

E7.2 Equipment

E7.2.1 Notwithstanding CW 2145, inspect manholes using digital panoramic manhole inspection system such as IBAK PANORAMO SI, or equivalent meeting the following criteria:

- (a) The inspection camera system must be 100% digital. Any analog or NTSC video camera will be deemed unacceptable.
- (b) 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.
- (c) 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.
- (d) 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 scratched lenses or protective due to poor handling and application shall be rejected.
- (e) 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.
- (f) 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.
- (g) The digital film files must include an unfolded view of the manhole with a minimum of 3000 lines of vertical resolution.
- (h) 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.
- (i) 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.
- (j) The virtual pan and tilt and unfolded views must be able to be viewable by the City with all the required software included.
- (k) 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 measured from manhole rim to weir crest where possible and detailed within the Inspection Comments field.
- (l) CW 2145 Sections 3.17.8.5, 3.17.8.6, and 3.17.8.7 are not applicable when utilizing digital panoramic methods.
- (m) Further to CW 2145 Clause 3.11.5, provide file names within the 360Player.exe software, manholes to be in alpha numeric order to ensure efficient reference.

E7.3 Measurement and Payment

E7.3.1 Manhole inspections will be measure and paid for in accordance with CW 2145.

E8. SEWER AND MANHOLE STABILIZATION

E8.1 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 at the locations noted in Appendix A –Site Specific Design Conditions and Repair Requirements prior to performing sewer lining.
- (b) The scope of work involved in sewer stabilization is as follows:
 - (i) Secure the site and provide temporary traffic control.
 - (ii) Obtain all necessary underground clearances.
 - (iii) Conduct a hazard assessment, including identification and evaluation.
 - (iv) Develop a safe work plan.
 - (v) Implement the necessary procedures and controls to control hazards and maintain a safe working environment.
 - (vi) Enter the manhole/sewer and perform the required repairs.
 - (vii) Clean-up the site.

E8.2 Materials

E8.2.1 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 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.

E8.3 Construction Methods

E8.3.1 Hazard Assessment

- (a) In conjunction with securing the site and obtaining underground clearances, the Contractor shall conduct a hazard assessment for each site requiring a stabilization repair. 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;
 - (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 in accordance

with E8.3.2 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 defect and determine if an external point repair shall be performed in accordance with CW 2130.

E8.3.2 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;
 - (xii) method of egress out of the sewer – forward and backwards.
- (b) The Contractor 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 Labour "Guidelines for Confined Space Entry".

E8.3.3 Equipment Set Up

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

E8.3.4 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 if an external point repair shall be performed in accordance with CW 2130.

E8.3.5 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.

E8.3.6 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 CIPP 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.

E8.3.7 Annulus Grouting

- (a) Complete annulus grouting where directed by the Contract Administrator.
- (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.

E8.3.8 Manhole Repairs, Modifications, and Installations

- (a) Complete manhole repairs, modifications, and new installations identified in the Specifications or on the Drawings in accordance with CW 2130.
- (b) Manhole rungs removed to facilitate installation of CIPP liner must be replaced with new manhole rungs meeting the requirements of CW 2130.

E8.4 Quality Control

E8.4.1 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.

E8.4.2 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.

E8.5 Measurement and Payment

E8.5.1 Hazard Assessment and Safe Work Plan

- (a) Performing a hazard assessment and preparing a Safe Work Plan will not be measured for payment and shall be considered incidental to the Work. No separate payment shall be made.

E8.5.2 Internal Sewer Repairs

- (a) Large concrete repairs requiring formwork will be measured on a unit basis and paid for at the Contract Unit Price for "Large Concrete Repairs". Number of units to be paid for will be the total number of large concrete repairs made in accordance with this specification, accepted and measured by the Contract Administrator.
- (b) Concrete patching of sewer walls and invert up to 1.0 metre in length will be measured and paid for on a unit basis and paid for at the Contract Unit Price for "Concrete Patching – Up to 1.0 metre long". Number of units to be to be paid for will be total number of concrete patch repairs up to 1.0 metre long completed in accordance with this specification, accepted and measured by the Contract Administrator.
- (c) Concrete patching of sewer walls and inverts in excess of 1.0 metre in length will be measured and paid for on a length basis for "Concrete Patching – In Excess of 1.0 metre long". Length to be paid for will be total linear metres of concrete patch repairs in addition to the initial 1.0 metre length, completed in accordance with this specification, accepted and measured by the Contract Administrator.
- (d) Filling small voids internally will be measured and paid for on a unit basis and paid for at the Contract Unit Price for "Filling Small Voids Internally". Number of units to be to be paid for will be total number of small voids filled internally in accordance with this specification, accepted and measured by the Contract Administrator.
- (e) Filling large voids externally with flowable cement-stabilized fill will be measured and paid for on a volume basis and paid for at the Contract Unit Price for "Filling Large Voids Externally – With Cement-Stabilized Fill". Volume to be to be paid for will be total number of cubic metres of void filled externally in accordance with this specification, accepted and measured by the Contract Administrator.

E8.5.3 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 – Prior To Lining" and "Sewer Service Grouting – After Lining". Number of units to be paid for will be the total number of units reinstated in accordance with this specification, accepted and measured by the Contract Administrator.

- (b) If the voids are due to the condition of the existing sewer service and host pipe, sewer service grouting shall be measured and paid for under sewer service grouting – after lining. If the voids are due to the Contractor's method of reinstatement, deficiencies in the CIPP installation, or any other reason related to the Contractor's workmanship or method of operations, they shall be filled at the Contractor's expense.
- (c) Repair of defective or incomplete sewer service grouting shall be at the Contractors own expense.

E8.5.4 Annulus Grouting

- (a) Annulus grouting will be measured on a unit basis and paid for at the Contract Unit Price for "Annulus Grouting". Payment for annulus grouting shall include all required materials and labour to grout the resulting post lining annulus on the sewer segments and distances listed in Form B. Number of units to be paid for will be the total number of units grouted in accordance with this specification, accepted and measured by the Contract Administrator. No payment will be made if annulus grouting was not undertaken.
- (b) If the voids are due to the condition of the existing host pipe, annulus grouting shall be measured and paid for as stated herein. If the voids are due to the Contractor's method of lining, deficiencies in the CIPP installation, or any other reason related to the Contractor's workmanship or method of operations, they shall be filled at the Contractor's expense.
- (c) Repair of defective or incomplete annulus grouting shall be at the Contractors own expense.

E8.5.5 Provisional - Manhole Repairs

- (a) Manhole repairs will be measured and paid for in accordance with CW 2130 except as modified herein.
- (b) Manhole frames, covers, rungs and risers removed and replaced to facilitate the CIPP installation shall be considered incidental to the CIPP installation and will not be measured for payment. Where existing manhole components are damaged and cannot be reused they shall be replaced and measured and paid for in accordance with CW 2130 and as noted herein. Confirm 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) Excavation and removal of existing pavements shall be considered incidental to the Work and will not be measured for payment. No additional payment will be made.

E8.5.6 Provisional – New Manhole Installations

- (a) New manhole installations shall be paid in accordance with CW 2130. Notwithstanding CW 2130, payment for new manhole installations shall include excavation and removal of existing manholes where required.

E9. CURED-IN-PLACE-PIPE (CIPP)

E9.1 Description

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

E9.2 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 (weye or tee connection to another sewer).
- (d) Partial full segment CIPP means CIPP extending from a manhole to an intermediate point within the sewer and shall generally be longer than ten metres in length.
- (e) Minimum material requirements for CIPP shall conform to ASTM D5813 “Standard Specification for Cured-In-Place Thermosetting Resin Sewer Pipe” and the supplemental requirements noted herein.
- (f) Reinforced CIPP liners shall be considered any CIPP liner constructed from either a carbon fibre or glass fibre reinforced felt.

E9.3 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.

1 Table E8.3.1a): Pre-Approved CIPP Suppliers and Installers

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

E9.4 Submittals

- E9.4.1 Installation of CIPP liners shall not commence prior to submission and review of the submissions identified herein by the Contract Administrator
- E9.4.2 Provide the required submittals for review by the Contract Administrator in accordance with E2 and a minimum of ten (10) Business Days prior to starting lining operations.
 - (a) CIPP designs and shop drawings: 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.
 - (i) CIPP thickness computations including all specified design checks identified in E9.5. 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.

- ◆ Tabular design summaries are acceptable as a design submission for all small diameter liners (considered less than 600 mm in diameter), provided they meet all other requirements outlined herein.
 - ◆ Notwithstanding, design submissions for all large diameter sewers (considered equal to or greater than 600 mm in diameter) shall include all calculations and be submitted on individual calculation sheets.
 - (ii) Name and manufacturer of the resin and felt tube proposed for each CIPP.
 - (iii) Means of liner installation and curing method (e.g. air/steam, water, air/UV)
 - (iv) 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.
- (b) Provide resin samples as follows:
- (i) 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.
 - (ii) When requested by the Contract Administrator, deliver a representative sample from each resin batch to be used on the project before adding the catalyst from the wet-out facility to a test laboratory designated by the Contract Administrator.
 - (iii) The Contract Administrator will arrange and pay for an infrared analysis of the samples, if required for the project.
- (c) Submit a liner impregnation protocol that provides information on the following:
- (i) Resin impregnation method.
 - (ii) Designated location of the wet out facility.
 - (iii) Documentation that the resin to be used has not exceeded its shelf life as recommended by the manufacturer of the resin.
 - (iv) 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.
 - (v) Roller gap setting required to provide the final installed CIPP thickness based on the proposed volume of resin.
 - (vi) Details of the wet-out procedure for internal point repair CIPP.
- (d) Submit a liner installation protocol that provides information on the following:
- (i) Proposed main line and sewer service flow control arrangements in accordance with E5.
 - (ii) Installation and curing method complete with proposed equipment.
 - (iii) A full curing protocol; time, temperature and pressures (minimum and maximum) in the case of hot water or steam cures and time, rate of travel of the UV light train, pressures (minimum and maximum), and amount of lamps in operation in the case of UV cures.
 - (iv) 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.
 - (v) Number and location of heat source monitor gauges.
 - (vi) Number and location of thermistors to be used for monitoring the temperature of the liner during the curing process.
 - (vii) Estimated length of time required to reinstate the main line sewer and sewer services.
 - (viii) Additional information may be required by the Contract Administrator for complex installations. This may include site setup details, over-the-hole wetout

procedures, and other information pertinent to the review and evaluation of the Contractor's proposed construction methods.

(ix) Submission Requirements:

- ◆ Tabular installation protocols showing multiple installations are acceptable for all small diameter liners (considered less than 525 mm in diameter)

E9.5 Design of CIPP Liners

E9.5.1 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.

E9.5.2 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 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.

- (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.

E9.5.3 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).
- (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.

E9.5.4 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.

E9.5.5 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%

E9.5.6 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.

E9.5.7 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.

E9.5.8 Non-Circular CIPP Design – General

- (a) All non-circular CIPP designs shall be undertaken in accordance with Section 5 of Volume II – Sewer Renovation, WRC Sewerage Rehabilitation Manual, 4th Edition as a Type II non-circular liner using the following equations and as modified herein:

- (i) Check for long term permissible flexural stress: $H_1 = (340 * S_L * (t/L)^2) / N$

Where:

- H_1 Permissible external pressure applied to critical section (m of water)
- S_L Maximum long-term flexural stress (MPa)
- t Wall thickness (mm)
- L Length of critical section (mm)
- N Safety Factor

- (ii) Check for long term permissible deflection: $H_2 = R * 236 * E_L * (t/L)^3$

Where:

- H_2 Permissible external pressure applied to critical section (m of water)
- R Shape Factor
- E_L Maximum long-term flexural modulus (MPa)
- t Wall thickness (mm)
- L Length of critical section (mm)

- (b) Design checks shall be undertaken with applied loads on the following critical sections where h = the internal height of the liner and w = the internal width of the liner.

- (i) Egg shaped sewers:

- ◆ Length = $2h/3$
- ◆ Orientation = Vertical
- ◆ Centroid location = $h/3$ from invert

- (c) A minimum safety factor (N) of 2 shall be applied to long term flexural stress design checks for CIPP liners.
- (d) A shape factor (R) of 0.5 shall be used for all long term deflection checks on CIPP liners.
- (e) A lateral earth pressure coefficient (K) of 0.33 shall be used to calculate pressures applied to vertical critical sections.
- (f) Assume the liner to be flexible with no bond to the host pipe.

E9.5.9 Non-Circular CIPP Design - Partially Deteriorated Condition

- (a) Liners designated as partially deteriorated shall be designed to accommodate hydrostatic groundwater conditions only. External groundwater pressure acting on the CIPP liner shall be that acting on the invert of the host pipe. External soil (dead) and live loads need not be considered.

- (b) The following minimum design checks shall be undertaken:
 - (i) Short term flexural stress and deformation checks (only required if secondary grouting is contemplated).
 - (ii) Long term flexural stress and deformation checks due to external hydrostatic pressure.

E9.5.10 CIPP Non-Circular Design - Fully Deteriorated Condition

- (a) Liners designated as fully deteriorated shall be designed to accommodate full overburden (dead and live loads) and hydrostatic pressures.
- (b) The following minimum design checks shall be undertaken:
 - (i) Short term flexural stress and deformation checks (only required if secondary grouting is contemplated).
 - (ii) Long term flexural stress and deformation checks due to external hydrostatic pressure;
 - (iii) Long term flexural stress and deformation checks due to external dead and live loading as noted below.
- (c) Applied external soil loads shall be estimated using the total vertical and horizontal soil stresses applied at the centroid of the CIPP liners critical section. Soil pressures shall be estimated using the depth of soil at the centroid of the critical section and the saturated unit weight of the backfill soils.

E9.5.11 Existing Sewer Design Conditions

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

E9.6 Materials

E9.6.1 Non-Reinforced CIPP Products

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

E9.6.2 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.

E9.7 Construction Methods

E9.7.1 Verification of Existing Sewer Dimensions

- (a) Verify dimensional requirements of each sewer to be rehabilitated prior to manufacture of the CIPP tube as follows.

- (i) Length of sewer from manhole to manhole for full segment and partial full segment CIPP.
 - (ii) 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.
- (b) Use calibrated callipers or other suitable measuring device capable of measuring accurately to +/- 1 millimetre to confirm cross section geometry at the following clock positions:
- (i) 12:00 to 6:00
 - (ii) 2:00 to 8:00
 - (iii) 3:00 to 9:00
 - (iv) 4:00 to 10:00
- (c) Estimate the remainder of the sewer dimensional requirements based on dimensional checks and the Sewer Maintenance Inspections.
- (d) 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 objective of manufacturing and installing a close-fit liner without annulus, including but not limited to:
- (i) The length of the inside perimeter (circumference) of the sewer at the upstream and downstream ends.
 - (ii) Perform a pre-design inspection in accordance E5.4(a) where specified in order to confirm the dimensions of the existing host pipe.
- (e) Submit host pipe dimensions to the Contract Administrator in conjunction with the CIPP design submission and/or the pre-design inspection.

E9.7.2 Sewer Cleaning

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

E9.7.3 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 Site Specific Design Conditions and Repair Requirements in accordance with E7 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 E7.

E9.7.4 Sewer Repairs

- (a) Perform external sewer repairs to facilitate the CIPP installation in accordance with CW 2130.

E9.7.5 Manhole and Catch Basin Modifications

- (a) Remove and replace manhole frames, covers, rungs and risers required to facilitate the CIPP installation in accordance with E7 and CW 2130.

E9.7.6 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.

E9.7.7 Site Specific Installation Requirements:

- (i) N/A

E9.7.8 Reinstatement of Sewer Services

- (a) Reinststate all active and unable to determine sewer services including CB leads and utility drains to 100% of the original cross sectional area.
- (b) Cut out openings for sewer services from inside the lined sewer by manual means or with a television camera and a remote controlled cutting device.
- (c) Remove sharp edges from opening cut outs and provide a smooth rounded lip.
- (d) Sewer Service Grouting
 - (i) Locations for sewer service grouting shall be identified by the Contract Administrator during review of Post Lining Video Inspection.
 - (ii) Complete sewer service grouting in accordance with E7.
- (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.

E9.7.9 Annulus Grouting

- (a) Complete annulus grouting in accordance with E7 where identified by the Contract Administrator during the Post Lining Video inspection.

E9.7.10 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.

E9.7.11 CIPP Samples for Quality Assurance Purposes

- (a) The Contractor shall provide the following samples from each CIPP liner:
 - (i) Confined test sample in accordance with E9.7.11(h)
 - (ii) Plate sample in accordance with E9.7.11(i).
- (b) If it can be demonstrated that it is impractical to obtain confined test samples due to CIPP size and/or site specific conditions then results from test plate sample results modified in accordance with Clause E9.7.11(i)(vi) of this specification will be used to confirm flexural strength and flexural modulus.
- (c) Schedule the installation of liners for which confined pipe samples are impractical to obtain after a minimum of three (3) previous CIPP linings on the same project have been completed and confined pipe and test plate samples have been secured to provide collaborative testing. The Contract Administrator will coordinate and pay for CIPP sample testing to confirm the CIPP flexural strength, flexural modulus and thickness in accordance with the requirements of ASTM D5813, D790, and ASTM D3567.
- (d) In larger sewer sizes where it is not possible to provide a full diameter confined test sample and upon the request of the Contract Administrator, the Contractor shall cut a sample directly from the installed CIPP liner in accordance with E9.7.11(j).
- (e) Where confined test samples cannot be obtained or where confined test samples forms do not match the inside dimensions of the host pipe the Contractor shall obtain and provide the Contract Administrator with pre and post lining measurements taken in accordance with Clause E9.7.1 of this specification to confirm in-place liner thickness.
- (f) The Contract Administrator will review CIPP liner thickness results taken from test plates or unconfined samples on a case-by-case basis.
- (g) All samples shall be labelled as follows:
 - (i) City of Winnipeg Tender number
 - (ii) City of Winnipeg asset number
 - (iii) Date of installation
 - (iv) Street name
- (h) Confined Test Samples
 - (i) Provide necessary forms of the same diameter as the host pipe and secure a minimum 200 millimetre long full diameter confined test sample from each CIPP and internal point repair. Large diameter CIPP liners utilizing reinforcing may require a longer sample length, confirm with the Contract Administrator.
 - (ii) Locate the test sample from inside an intermediate manhole or at a termination point and invert through the form.
 - (iii) Confined test sample forms shall be covered with sand bags or a similar medium to form a heat sink and replicate the install conditions of the CIPP liner.
 - (iv) Cut the CIPP sample to coincide with multi-piece form if used for CIPP larger than 450 millimetres in diameter to facilitate removal from the manhole.

- ◆ Identify the sewer where the liner sample is from on the form or sample itself if no form and provide to the Contract Administrator intact in the form.
- (i) 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 200mm x 200mm.
 - (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:
 - ◆ in a clamped mold placed in the downtube or manhole for water-cured liners.
 - ◆ In a clamped mold placed in a container filled with uniformly distributed steam from the installation manhole for steam-cured liners.
 - (vi) Flexural strength and flexural modulus results obtained from test plates will be reduced, if necessary, by the maximum percentage difference of the confined pipe and test plate samples prepared from the same CIPP system for a minimum of three (3) previous CIPP linings on the same project.
- (j) Direct Samples
- (i) Where directed, the Contractor shall obtain a sample of the installed CIPP liner from within the host pipe.
 - (ii) Direct samples of the CIPP liner shall be a minimum of 300mm x 300mm for unreinforced liners and as follows for reinforced 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 –Site Specific Design Conditions and Repair Requirements and at the 10:00 o'clock or 2:00 o'clock position in circular sewers. Direct samples from reinforced liners shall be oriented with the long dimension vertically in the straightest portion of the sewer or as directed by the Contract Administrator. Confirm sampling locations with the Contract Administrator prior to work.
 - (v) For repairs up to 25 mm in thickness, grout the area where test sample was taken with a resin-rich repair product such as an epoxy based repair system that is compatible with the liner system and specifically designed for the nature, size and thickness of the patch being repaired to form a smooth watertight patch flush with liner.

- ◆ For repairs over 25 mm in thickness, polymer modified cementitious grout compatible with the liner materials may be used.
- (vi) Ensure repairs at direct sampling locations are captured during subsequent CCTV inspections.

E9.7.12 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.

E9.7.13 Post Construction Design Review for Total Performance

- (a) The Contract Administrator will perform a post-construction design review to confirm that the completed CIPP meets the 50 year design life structural requirements prior to issuance of Total Performance. The design review will utilize the measured values for flexural strength, flexural modulus, and CIPP thickness from the confined pipe sample testing or the reduced strength/modulus values obtained from the test plate testing in circumstances where confined pipe samples are not able to be secured.
- (b) CIPP strength values will be further reduced to account for creep based on the creep reduction values recommended in the pre-qualification submissions to assess the suitability of the liner to meet the 50 year design life requirement. The use of full enhancement factors in this analysis will be limited to liners that are confirmed by visual classification to be close-fit liners based on the post-lining sewer inspection.
- (c) The Contract Administrator will advise of any discrepancies between the constructed CIPP and the design requirements.
- (d) Defects in CIPP liners will be reviewed on a case by case basis by the Contract Administrator. The Contract Administrator will consult with the Contractor and taking into account the condition of the host pipe prior to lining, the CIPP installation conditions, and the long term use of the sewer to assess the structural and performance ramifications of the defects.
- (e) The Contractor shall:
 - (i) Perform necessary remedial measures to confirm that a CIPP deemed as structurally deficient will comply with the 50 year design life requirement such as confirmation of actual ovality, determination of a more representative groundwater elevation locally through monitoring, and supplemental strength testing and thickness measurements.
 - (ii) Repair sections of CIPP removed for supplemental testing by placing a full circumference internal point repair of the same thickness as the full segment liner over and extending 300 millimetres beyond each side of the cut section.
 - (iii) Install a supplemental CIPP of the required thickness to structurally enhance the installed CIPP if supplemental testing fails to confirm the CIPP will meet the 50 year design life requirement.
 - (iv) Review remedial action with the Contract Administrator prior to implementation.
 - (v) Perform further testing, monitoring and calculations and install structural enhancements at own cost.

E9.8 Measurement and Payment

E9.8.1 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.
- (b) 50% of the Mobilization and Demobilization unit price will be paid once lining crews arrive on site to commence lining installation.

- (c) The remaining 50% of the Mobilization and Demobilization unit price will be paid subsequent to the completion of the CIPP installation and site cleanup.

E9.8.2 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.

E9.8.3 Sewer Cleaning

- (a) Sewer cleaning will be measured and paid for in accordance with CW 2140.
- (b) Only one item of payment will be made for pre-lining cleaning.
- (c) Removal of intruding sewer services and solid debris cutting will be measured and paid for in accordance with CW 2140.
- (d) Grease and roots cutting will be measured on a unit basis and paid for at the Contract Unit Price for "Removal of Excessive Grease, and or Roots per Sewer Segment". Grease and root removal will be measured per sewer segment where work is undertaken, accepted, and measured by the Contract Administrator. Only one item of payment will be made for grease and root removal per sewer segment.

E9.8.4 Sewer Preparation and Repairs Prior to Lining

- (a) Internal sewer pipe repairs will be measured and paid for in accordance E7 for the type of work done.

E9.8.5 CIPP Installation

- (a) Liner installation will be measured on a length basis for each size and paid for at the Contract Unit Price for "Full Segment CIPP", "Partial Full Segment CIPP" or "Internal Point Repair CIPP". Length to be paid for will be the total length of CIPP supplied and installed in accordance with this specification, accepted and measured by the Contract Administrator.
- (b) Full segment CIPP measurement will be made horizontally at grade, above the centreline of the pipe from centre to centre of manholes.
- (c) Partial full segment CIPP measurement will be made from the centre of one manhole to the termination point of the CIPP as measured by the post lining video inspection. Partial full segment CIPP installed beyond the limits identified by the Contract Administrator during review of the pre-lining video 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) Eighty (80) percent of the payment will be made upon satisfactory completion of the CIPP installation work. The remaining twenty (20) percent of the payment will be made upon confirmation of the CIPP strength and delivery and acceptance of all required submissions, shop drawings, and reports.
- (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.

E9.8.6 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.

E9.8.7 Sewer Service and Annulus Grouting

- (a) Sewer service and annulus grouting will be measured and paid for in accordance with E7 for the type of work done.

E9.8.8 Quality Control Records

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

E9.8.9 Test Samples

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

E10. CATCH BASIN LEAD INSPECTIONS

E10.1 Description

- E10.1.1 This specification shall cover the cleaning and inspection of catch basin leads connected to sewers included in this contract to be lined with CIPP for the purpose of determining whether the catch basin lead requires repair work. The Contractor shall clean and inspect catch basin leads as directed by the Contract Administrator.

E10.2 Construction Methods

E10.2.1 Cleaning

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

E10.2.2 Video Inspections and Inspection Reports

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

E10.2.3 Repair Work

- (a) Catch basin lead repairs identified from the inspections will be done (by others) prior to lining work to the corresponding sewer main.

E10.3 Measurement and Payment

E10.3.1 Provisional - Cleaning

- (a) Cleaning of catch basin leads shall be measured and paid for in accordance with CW 2140.

E10.3.2 Provisional - Video Inspections

- (a) Video Inspection of catch basin leads shall be measured and paid for in accordance with CW 2145.

E11. SUSPENSION OF WORK ACTIVITIES WHEN SEWER CONTROL GATES ARE ACTIVATED DURING PERIODS OF HIGH RIVER LEVELS

- E11.1 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.

- E11.2 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.

E11.3 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.

E11.4 The Contractor will have no claim for extra Work or compensation as a result of suspension of Work due to the City closing and opening control gates during periods of rising and dropping river levels. If in the opinion of the Contract Administrator the suspension will cause the completion of the Work to occur after the specified date for Critical Stages or Substantial Performance and the Contractor's schedule would have reasonably permitted completion of the Work before the required date, the date for Critical Stages or Substantial Performance will be adjusted accordingly.

E11.5 The flood activation elevations for each site will be available upon request prior to construction.

E12. WATER SUPPLY

E12.1 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.

E12.2 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.

E12.3 The Contractor shall make the following arrangements for hydrant turn on and turn off.

- (a) Contact City of Winnipeg Water Services Division (WSD) for hydrant turn on and turn off required between 0800 hours and 1500 hours Monday to Friday. Notice for turn on and turn off shall be provided on the previous business day.
- (b) Contact Emergency Services Branch (986-2626) with a minimum of 2 hours notice for hydrant turn on and turn off required outside of the above hours.
- (c) The Contractor shall wait at the hydrant from the requested turn on or turn off time until City staff arrives to turn on or turn off the hydrant.

E12.4 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.

E12.5 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.

E12.6 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.

E12.7 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.

E13. RESTORATION

E13.1 Description

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

E13.2 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.

E13.3 Measurement and Payment

- (a) Surface restoration shall be considered incidental the CIPP installation and will not be measured for payment. No separate payment will be made.

PART F - SECURITY CLEARANCE

F1. SECURITY CLEARANCE

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

APPENDIX A – SITE SPECIFIC DESIGN CONDITIONS AND REPAIR REQUIREMENTS

Ashland Av (CL) (Asset No. MA60012536)	MH at Hay St (Asset No. MH60010718) to 1st MH E of Hay St (Asset No. MH60007275)
Size/Shape	375mm
Material	Vitrified Clay
Total Length	85.7m
Sewer Depth to Invert – maximum	4.67m
Design Condition	
Fully Deteriorated 10%	
Site Specific Repairs	
Location	Required Action
Distance From MH60010718	
59.1	Solid debris removal, encrustation at joint from 3:00 to 4:00
67.4	Solid debris removal, roots at service from 7:00 to 8:00
68.6	Solid debris removal, roots at service from 7:00 to 9:00
71.3	Solid debris removal, roots at joint at 8:00
79.0	Solid debris removal, roots at joint from 7:00 to 10:00
80.8	Solid debris removal, roots at joint from 4:00 to 8:00

Baldry Bay (N Leg) (Asset No. MA70132832)	MH at Carnell Dr (WPL) (Asset No. MH60017272) to Node at Carnell (CL) (Asset No. MHTE438-0005)
Size/Shape	250mm
Material	Concrete
Total Length	12.3m
Sewer Depth to Invert – maximum	6.89m
Design Condition	
Fully Deteriorated 3%	
Site Specific Repairs	
Location	Required Action
Distance From MH60017272	
8.9	Solid debris removal, encrustation at joint at 4:00

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Balfour By (SPL) (Asset No. MA60008871)	1st MH W of Babel St (Asset No. MH60007285) to MH at Fisher St (Asset No. MH60007279)
Size/Shape	300mm
Material	Vitrified Clay
Total Length	80.2m
Sewer Depth to Invert – maximum	4.69m
Design Condition	
Partially Deteriorated 5%	
Site Specific Repairs	
Location	Required Action
Distance From MH60007285	
8.0-10.8	External Point Repair
23.3	Solid debris removal, roots at service from 7:00 to 10:00
27.3	Solid debris removal, roots on pipe wall at 4:00
71.6	Remove intruding service at 10:00

Bartlet Av (Asset No. MA70005973)	1st MH W of Hay St (Asset No. MH60007242) to MH at Hay St (Asset No. MH70002593)
Size/Shape	300mm
Material	Vitrified Clay
Total Length	71.2m
Sewer Depth to Invert – maximum	4.07m
Design Condition	
Fully Deteriorated 10%	
Site Specific Repairs	
Location	Required Action
Distance From MH60007242	
36.7-38.3	External Point Repair

Beaverbrook St (Asset No. MA60007818)	2nd MH S of Grosvenor Av (Asset No. MH60006366) to 3rd MH S of Grosvenor Av (Asset No. MH60006350)
Size/Shape	375mm

Material	Vitrified Clay
Total Length	96.3m
Sewer Depth to Invert – maximum	4.11m
Design Condition	
Partially Deteriorated 5%	Excessive Roots entire length
Site Specific Repairs	
Location	Required Action
Distance From MH60006366	
No preparatory work required.	

Beaverbrook St (Asset No. MA60023453)	1st MH S of Grosvenor Av (Asset No. MH60006409) to 2nd MH S of Grosvenor Av (Asset No. MH60006366)
Size/Shape	375mm
Material	Vitrified Clay
Total Length	96.3m
Sewer Depth to Invert – maximum	4.11m
Design Condition	
Fully Deteriorated 10%	
Site Specific Repairs	
Location	Required Action
Distance From MH60006409	
34.2	Solid debris removal, roots at joint at 10:00
34.8	Solid debris removal, roots at joint from 3:00 to 9:00
45.8	Solid debris removal, roots at joint at 8:00
46.2	Solid debris removal, roots at service at 10:00
46.7	Solid debris removal, roots at joint at 4:00
47.4	Solid debris removal, roots at joint at 8:00
49.5-52.8	External Point Repair
59.8	Remove intruding service at 10:00
82.7-84.4	External Point Repair
94.8-96.3	External Point Repair

Beaverbrook St (Asset No. MA60006026)	MH at John Brebeuf PI (Asset No. MH60004686) to 1st MH N of John Brebeuf PI (Asset No. MH60004673)
Size/Shape	450mm
Material	Vitrified Clay
Total Length	97.0m
Sewer Depth to Invert – maximum	5.50m
Design Condition	
Fully Deteriorated 10%	
Site Specific Repairs	
Location	Required Action
Distance From MH60004686	
40.9	Solid debris removal, encrustation at joint at 4:00
42.4	Solid debris removal, encrustation at joint at 8:00
44.8	Solid debris removal, roots at joint at 8:00
47.4	Solid debris removal, roots at joint at 8:00
51.1	Solid debris removal, roots at joint from 8:00 to 9:00
51.8	Solid debris removal, roots at joint at 4:00
52.6	Solid debris removal, roots at joint at 8:00
53.2-59.5	External Point Repair
58.1	Solid debris removal, roots at joint at 8:00
59.0	Solid debris removal, roots at joint from 4:00 to 8:00
75.8	Remove intruding service at 2:00
76.3	Remove intruding service at 3:00

Beresford Av (Asset No. MA60012009)	MH at Lilac St (Asset No. MH60010218) to 1st MH E of Lilac St (Asset No. MH60010263)
Size/Shape	375mm
Material	Vitrified Clay
Total Length	87.1m
Sewer Depth to Invert – maximum	4.22m
Design Condition	
Fully Deteriorated 10%	

Site Specific Repairs	
Location	Required Action
Distance From MH60010218	
12.0	Solid debris removal, encrustation at joint at 8:00
12.2	Remove intruding service at 2:00
12.5	Solid debris removal, encrustation at joint at 4:00
17.9	Solid debris removal, roots on pipe wall from 2:00 to 5:00
21.3	Solid debris removal, encrustation at joint at 8:00
42.8	Solid debris removal, encrustation at joint from 4:00 to 8:00
43.6	Solid debris removal, encrustation at joint from 3:00 to 9:00
48.3	Solid debris removal, encrustation at service from 3:00 to 5:00
48.9	Solid debris removal, encrustation at joint from 4:00 to 5:00
49.7	Solid debris removal, encrustation at joint at 2:00
52.7	Solid debris removal, roots at joint from 4:00 to 8:00
53.6	Solid debris removal, encrustation at joint from 2:00 to 3:00

Berwick PI (Asset No. MA60012094)	MH at Berwick PI (W Leg) (Asset No. MH60010293) to MH at Berwick PI (E Leg) (Asset No. MH60010295)
Size/Shape	300mm
Material	Concrete
Total Length	52.9m
Sewer Depth to Invert – maximum	4.54m
Design Condition	
Partially Deteriorated 3%	
Site Specific Repairs	
Location	Required Action
Distance From MH60010293	
2.3	Solid debris removal, encrustation at joint at 8:00
10.5	Hole at 6:00 – Line over

Borebank St (Asset No. MA60006172)	1st MH S of Corydon Av (Asset No. MH60004837) to 2nd MH S of Corydon Av (Asset No. MH60004814)
Size/Shape	450mm
Material	Concrete
Total Length	98.3m
Sewer Depth to Invert – maximum	4.02m
Design Condition	
Partially Deteriorated 8%	
Site Specific Repairs	
Location	Required Action
Distance From MH60006172	
3.9	Solid debris removal, roots at service from 2:00 to 5:00
16.4	Solid debris removal, roots at joint at 8:00
17.1	Solid debris removal, roots at joint at 9:00
24.2	Solid debris removal, roots at joint at 9:00
29.7	Solid debris removal, roots at joint at 9:00
30.6	Solid debris removal, roots at joint at 9:00
31.2	Solid debris removal, roots at joint from 3:00 to 9:00
32.1	Solid debris removal, roots at joint from 8:00 to 9:00
37.2	Remove intruding service at 9:00
69.1	Solid debris removal, roots at service at 2:00
79.3	Solid debris removal, roots at service from 7:00 to 10:00
82.9	Solid debris removal, roots at service from 2:00 to 5:00

Brock St (Asset No. MA60005572)	1st MH N of Grant Av (Asset No. MH60004249) to 2nd MH N of Grant Av (Asset No. MH60004256)
Size/Shape	375mm
Material	Vitrified Clay
Total Length	96.9m
Sewer Depth to Invert – maximum	4.35m
Design Condition	
Partially Deteriorated 8%	

Site Specific Repairs	
Location	Required Action
Distance From MH60005572	
2.7	Solid debris removal, roots at service from 7:00 to 10:00
5.1-8.8	Solid debris removal, roots on pipe wall from 8:00 to 9:00
9.4	Solid debris removal, roots at joint at 4:00
12.6	Solid debris removal, roots at joint at 8:00
13.5	Solid debris removal, roots at joint from 4:00 to 8:00
15.0	Solid debris removal, roots at joint from 4:00 to 8:00
17.2	Solid debris removal, roots at joint at 4:00
68.0	Solid debris removal, roots at joint at 9:00

Carpathia Rd (Asset No. MA60007776)	2nd MH N of Tuxedo Av (Asset No. MH6006305) to 3rd MH N of Tuxedo Av (Asset No. MH6006304)
Size/Shape	375mm
Material	Vitrified Clay
Total Length	54.9m
Sewer Depth to Invert – maximum	4.1m
Design Condition	
Fully Deteriorated 10%	

Site Specific Repairs	
Location	Required Action
Distance From MH	
25.9	Solid debris removal, roots at joint from 4:00 to 8:00
28.7-37.9	EPR – D>15-20% but TBO in 2017

Carpathia Rd (Asset No. MA60007773)	3rd MH N of Tuxedo Av (Asset No. MH6006304) to MH at Willow Av (Asset No. MH6006293)
Size/Shape	450mm
Material	Vitrified Clay

Total Length	100.4m
Sewer Depth to Invert – maximum	4.58m
Design Condition	
Fully Deteriorated 10%	
Site Specific Repairs	
Location	Required Action
Distance From MH60006304	
51.1	Solid debris removal, encrustation at joint from 5:00 to 7:00
56.6	Solid debris removal, encrustation at joint from 6:00 to 7:00
59.5	Solid debris removal, roots at joint from 4:00 to 8:00

Churchill Dr (Asset No. MA60012320)	2nd MH W of Osborne St (Asset No. MH60010622) to 3rd MH W of Osborne St (Asset No. MH60010516)
Size/Shape	450mm
Material	Vitrified Clay
Total Length	104.9m
Sewer Depth to Invert – maximum	4.02m
Design Condition	
Fully Deteriorated 10%	
Site Specific Repairs	
Location	Required Action
Distance From MH60010622	
21.3	Remove intruding service at 2:00
53.6	Remove intruding service at 12:00

Clare Av (Asset No. MA60012584)	MH at Casey St (Asset No. MH60010763) to 1st MH E of Casey St (Asset No. MH60010760)
Size/Shape	450mm
Material	Vitrified Clay
Total Length	85.9m
Sewer Depth to Invert – maximum	4.06m
Design Condition	

Fully Deteriorated 10%	Excessive roots entire length
Site Specific Repairs	
Location	Required Action
Distance From MH60010763 76.5	Remove intruding service at 10:00

Clare Av (Asset No. MA60012610)	1st MH E of Casey St (Asset No. MH60010760) to MH at Fisher St (Asset No. MH60010789)
Size/Shape	450mm
Material	Vitrified Clay
Total Length	86.1m
Sewer Depth to Invert – maximum	4.3m
Design Condition	
Partially Deteriorated 5%	Excessive roots entire length
Site Specific Repairs	
Location	Required Action
Distance From MH60010760 No preparatory work required.	

Community Row (Asset No. MA60000082)	2nd MH N of Ridgewood Av (Asset No. MH60000018) to 3rd MH N of Ridgewood Av (Asset No. MH60000017)
Size/Shape	200mm
Material	Concrete
Total Length	102.2m
Sewer Depth to Invert – maximum	5.24m
Design Condition	
Partially Deteriorated 5%	
Site Specific Repairs	
Location	Required Action
Distance From MH60000082 0.0-0.6 4.0 5.3	Solid debris removal, encrustation on pipe wall from 6:00 to 4:00 Solid debris removal, encrustation at service from 8:00 to 5:00 Solid debris removal, encrustation at service from 9:00 to 3:00

14.1	Solid debris removal, encrustation at joint from 8:00 to 3:00
18.7	Solid debris removal, encrustation at joint from 8:00 to 4:00
23.6	Solid debris removal, encrustation at joint from 7:00 to 5:00
31.1	Solid debris removal, encrustation at joint from 6:00 to 4:00
32.5	Solid debris removal, encrustation at joint from 8:00 to 4:00
35.8	Solid debris removal, encrustation at joint from 8:00 to 4:00
37.0	Solid debris removal, encrustation at joint from 8:00 to 4:00
37.4	Solid debris removal, encrustation at joint from 6:00 to 7:00
41.2	Solid debris removal, encrustation on pipe wall from 8:00 to 11:00
41.9	Solid debris removal, encrustation at joint from 8:00 to 4:00
46.6	Solid debris removal, encrustation at service from 6:00 to 7:00
47.9	Solid debris removal, encrustation at service from 8:00 to 4:00
49.1	Solid debris removal, encrustation at joint from 9:00 to 3:00
56.1	Solid debris removal, encrustation at joint from 8:00 to 4:00
58.3	Solid debris removal, encrustation at joint from 8:00 to 4:00
67.9	Solid debris removal, encrustation at service from 8:00 to 4:00
69.0	Solid debris removal, encrustation at joint from 8:00 to 4:00
70.8	Solid debris removal, encrustation at service from 8:00 to 4:00
80.1	Solid debris removal, encrustation at service from 8:00 to 4:00
81.0-82.0	Solid debris removal, encrustation on pipe wall from 8:00 to 4:00
90.6	Solid debris removal, encrustation at service from 8:00 to 4:00
95.0	Solid debris removal, encrustation at joint from 8:00 to 4:00
95.3	Solid debris removal, encrustation at joint from 8:00 to 4:00
100.00	Solid debris removal, encrustation at service from 8:00 to 4:00
101.2	Solid debris removal, encrustation at joint from 9:00 to 4:00
102.0	Solid debris removal, encrustation at joint from 8:00 to 4:00

MH60000104) to 3rd MH S of Betsworth Av (Asset No. MH60000102)	
Size/Shape	200mm
Material	Concrete
Total Length	130.7m
Sewer Depth to Invert – maximum	5.24m
Design Condition	
Partially Deteriorated 5%	
Site Specific Repairs	
Location	Required Action
Distance From MH60000104	
0.0	Solid debris removal, encrustation at joint from 8:00 to 4:00
3.7	Solid debris removal, encrustation at joint from 8:00 to 12:00
17.0	Solid debris removal, encrustation at service from 8:00 to 4:00
21.5	Solid debris removal, encrustation at service from 8:00 to 4:00
22.0	Solid debris removal, encrustation at service from 8:00 to 5:00
27.3	Solid debris removal, encrustation at joint from 8:00 to 3:00
35.3	Solid debris removal, encrustation at service from 8:00 to 5:00
39.7	Solid debris removal, encrustation at service from 8:00 to 4:00
42.7	Solid debris removal, encrustation at joint from 8:00 to 4:00
50.3	Solid debris removal, encrustation at joint from 9:00 to 3:00
52.0	Solid debris removal, encrustation at service from 8:00 to 4:00
52.8	Solid debris removal, encrustation at service from 8:00 to 4:00
58.1	Solid debris removal, encrustation at service from 8:00 to 3:00
59.1-59.7	External Point Repair
72.0	Solid debris removal, encrustation at service from 8:00 to 4:00
74.0	Solid debris removal, encrustation at joint from 8:00 to 3:00
76.5	Solid debris removal, encrustation at service from 8:00 to 4:00
86.6	Solid debris removal, encrustation at joint from 8:00 to 4:00
95.0	Solid debris removal, encrustation at service from 8:00 to 4:00
95.8	Solid debris removal, encrustation at service from 8:00 to 4:00
105.4	Solid debris removal, encrustation at service from 8:00 to 4:00
106.7	Solid debris removal, encrustation at

115.0	service from 8:00 to 4:00 Solid debris removal, encrustation at service from 8:00 to 4:00
122.9	Solid debris removal, encrustation at joint from 8:00 to 4:00

Cordova St (Asset No. MA60008192)	2nd MH N of Corydon Av (Asset No. MH60006682) to 3rd MH N of Corydon Av (Asset No. MH60006672)
Size/Shape	450mm
Material	Concrete
Total Length	95.4m
Sewer Depth to Invert – maximum	5.77m
Design Condition	
Partially Deteriorated 8%	Excessive roots entire length
Site Specific Repairs	
Location	Required Action
Distance From MH60006682	
3.4	Solid debris removal, encrustation at joint at 8:00
5.5	Solid debris removal, roots at service from 7:00 to 11:00
5.8	Solid debris removal, encrustation at service at 5:00
18.0	Solid debris removal, roots at service from 7:00 to 11:00
30.2	Solid debris removal, roots at service from 7:00 to 11:00
43.5	Solid debris removal, roots at service from 7:00 to 10:00
50.6-51.2	External Point Repair
57.0	Solid debris removal, roots at service from 7:00 to 11:00
59.4	Solid debris removal, encrustation at joint at 4:00
69.4	Solid debris removal, roots at service from 7:00 to 11:00
85.4	Solid debris removal, encrustation at joint at 4:00

Dowker Av (Asset No. MA60017509)	MH at Crowson by (W Leg) (Asset No. MH60015135) to MH at Crowson By (E Leg) (Asset No. MH60015155)
Size/Shape	300mm
Material	Concrete

Total Length	97.2m
Sewer Depth to Invert – maximum	4.62m
Design Condition	
Partially Deteriorated 5%	
Site Specific Repairs	
Location	Required Action
Distance From MH60015135	
28.9	Remove intruding service at 10:00
76.7	Solid debris removal, encrustation on pipe wall at 8:00

Ducharme Av (Asset No. MA60022781)	MH at Houde Dr (E Leg) (Asset No. MH60019114) to MH at Villeneuve By (Asset No. MH)
Size/Shape	250mm
Material	Concrete
Total Length	85.3m
Sewer Depth to Invert – maximum	4.12m
Design Condition	
Partially Deteriorated 5%	
Site Specific Repairs	
Location	Required Action
Distance From MH60019114	
0.6	Solid debris removal, encrustation at pipe wall at 9:00
13.8	Solid debris removal, encrustation at joint from 12:00 to 4:00
16.2	Solid debris removal, encrustation at joint from 9:00 to 12:00
33.8	Solid debris removal, encrustation at service from 3:00 to 6:00
36.0	Solid debris removal, encrustation at joint from 8:00 to 4:00
43.4	Solid debris removal, encrustation at joint from 7:00 to 1:00
47.0	Solid debris removal, encrustation at joint from 8:00 to 4:00
49.4	Solid debris removal, encrustation at joint from 8:00 to 4:00
51.6	Solid debris removal, encrustation at joint from 4:00 to 8:00
63.1	Solid debris removal, encrustation at joint from 8:00 to 4:00
66.8	Solid debris removal, encrustation at service at 3:00

70.4	Solid debris removal, encrustation at joint from 1:00 to 4:00 Solid debris removal, encrustation at joint from 8:00 to 12:00 Solid debris removal, encrustation at joint from 9:00 to 12:00
74.1	
76.6	

Fisher St (W Leg) (Asset No. MA60008855)	1st MH S of Baltimore Av (Asset No. MH60007294) to MH at Ashland Av (Asset No. MH60007266)
Size/Shape	300mm
Material	Vitrified Clay
Total Length	91.1m
Sewer Depth to Invert – maximum	4.55m
Design Condition	
Partially Deteriorated 3%	
Site Specific Repairs	
Location	Required Action
Distance From MH60007294	
7.4	Solid debris removal, encrustation at joint at 4:00

Girton Bv (Asset No. MA60007412)	3rd MH S of Wellington Cr (Asset No. MH60006002) to 4th MH S of Wellington Cr (Asset No. MH60005984)
Size/Shape	300mm
Material	Vitrified Clay
Total Length	91.8m
Sewer Depth to Invert – maximum	4.19m
Design Condition	
Partially Deteriorated 8%	
Site Specific Repairs	
Location	Required Action
Distance From MH60006002	
0.6	Solid debris removal, roots at joint from 4:00 to 8:00
2.3	Remove intruding service at 2:00
3.0	Solid debris removal, roots at service at 10:00
3.7	Solid debris removal, roots at

4.3	joint at 3:00 Solid debris removal, roots at joint at 2:00
5.0	Solid debris removal, roots at joint from 10:00 to 2:00
32.9	Solid debris removal, roots at joint at 8:00
33.4	Solid debris removal, roots at joint at 4:00
62.3	Remove intruding service at 2:00
76.9	Solid debris removal, roots at joint from 3:00 to 9:00
78.8	Solid debris removal, roots at joint from 3:00 to 9:00
79.3	Solid debris removal, roots at joint from 3:00 to 9:00
80.0	Solid debris removal, roots at joint from 3:00 to 9:00
85.8	Remove intruding service at 2:00

Girton Av (Asset No. MA60007423)	4th MH S of Wellington Cr (Asset No. MH60005986) to MH at Nanton Bv (Asset No. MH60005990)
Size/Shape	300mm
Material	Vitrified Clay
Total Length	91.3m
Sewer Depth to Invert – maximum	4.94m
Design Condition	
Fully Deteriorated 10%	
Site Specific Repairs	
Location	Required Action
Distance From MH60005986	
5.6	Solid debris removal, roots at service from 2:00 to 5:00
6.2	Solid debris removal, roots at joint from 7:00 to 8:00
33.4	Solid debris removal, roots at joint at 4:00
45.0	Solid debris removal, roots at joint from 6:00 to 7:00
51.0	Remove intruding service at 2:00

Handsart Bv (Asset No. MA60007339)	3rd MH N of Corydon Av (Asset No. MH60005899) to MH at Nanton Bv (Asset No. MH60005893)
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Size/Shape	300mm
Material	Vitrified Clay
Total Length	117.3m
Sewer Depth to Invert – maximum	4.69m
Design Condition	
Partially Deteriorated 8%	Excessive roots entire length
Site Specific Repairs	
Location	Required Action
Distance From MH60005899 83.3	Solid debris removal, encrustation at joint at 4:00

Hector By (S Leg) (Asset No. MA60011306)	MH at Hector By (W Leg) (Asset No. MH60009568) to MH at Hector By (E Leg) (Asset No. MH60009683)
Size/Shape	300mm
Material	Concrete
Total Length	90.6m
Sewer Depth to Invert – maximum	4.05m
Design Condition	
Fully Deteriorated 10%	
Site Specific Repairs	
Location	Required Action
Distance From MH60009568 46.1 46.6 47.4 52.7 56.6 84.6	Solid debris removal, encrustation at service from 7:00 to 9:00 Solid debris removal, encrustation at joint from 4:00 to 5:00 Solid debris removal, encrustation at joint from 4:00 to 8:00 Solid debris removal, encrustation at joint from 4:00 to 8:00 Solid debris removal, encrustation at joint from 4:00 to 8:00 Solid debris removal, encrustation at service from 3:00 to 5:00

Lanark St (Asset No. MA60006841)	MH at Wellington Cr S (Asset No. MH60005455) to 1st MH S of Wellington Cr S (Asset No. MH60005452)
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Size/Shape	450mm
Material	Vitrified Clay
Total Length	85.3m
Sewer Depth to Invert – maximum	5.25m
Design Condition	
Fully Deteriorated 10%	
Site Specific Repairs	
Location	Required Action
Distance From MH60005455	
10.5	Solid debris removal, encrustation at joint from 2:00 to 10:00
13.5	Solid debris removal, encrustation at joint from 2:00 to 3:00
41.6	Solid debris removal, encrustation at service at 2:00

Lanark St (Asset No. MA60006752)	2nd MH N of Kingsway Av (Asset No. MH60006530) to 3rd MH N of Kingsway (Asset No. MH60005380)
Size/Shape	450mm
Material	Vitrified Clay
Total Length	72.7m
Sewer Depth to Invert – maximum	5.0m
Design Condition	
Fully Deteriorated 10%	
Site Specific Repairs	
Location	Required Action
Distance From MH60006530	
4.1	Solid debris removal, encrustation at joint from 2:00 to 3:00
8.4	Remove intruding service at 2:00
22.6	Remove intruding service at 2:00

Lanark St (Asset No. MA70042901)	1st MH N of Grosvenor Av (Asset No. MH60006506) to 2nd MH N of Grosvenor Av (Asset No. MH60006510)
Size/Shape	300mm
Material	Vitrified Clay
Total Length	103.8m

Sewer Depth to Invert – maximum	4.14m
Design Condition	
Fully Deteriorated 10%	
Site Specific Repairs	
Location	Required Action
Distance From MH60006506	
6.3	Solid debris removal, roots at service at 4:00
13.5	Solid debris removal, roots at service at 4:00
14.9	Solid debris removal, roots at service at 4:00
16.7	Solid debris removal, roots at joint from 4:00 to 8:00
22.0	Solid debris removal, roots at joint from 7:00 to 8:00
25.7	Solid debris removal, roots at joint at 9:00
28.9	Solid debris removal, roots at joint from 2:00 to 3:00
30.0	Solid debris removal, roots at service at 3:00
93.5	Solid debris removal, roots at joint at 8:00
103.4	Remove intruding service at 2:00

Lilac St (Asset No. MA60012014)	1st MH S of Beresford Av (Asset No. MH70017698) to MH at Beresford Av (Asset No. MH60010218)
Size/Shape	300mm
Material	Concrete
Total Length	51.3m
Sewer Depth to Invert – maximum	4.0m
Design Condition	
Fully Deteriorated 11%	
Site Specific Repairs	
Location	Required Action
Distance From MH70017698	
No preparatory work required.	

Lindsay St (Asset No. MA60006129)	2nd MH S of Corydon Av (Asset No. MH60004771) to 3rd MH S of Corydon Av
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(Asset No. MH60004774)	
Size/Shape	450mm
Material	Concrete
Total Length	95.3m
Sewer Depth to Invert – maximum	4.68m
Design Condition	
Partially Deteriorated 8%	
Site Specific Repairs	
Location	Required Action
Distance From MH60004771	
91.2	Solid debris removal, encrustation at joint at 8:00

Mc Naughton Av (Asset No. MA60012329)	1st MH E of Daly St S (Asset No. MH60010531) to MH at Daly St S (Asset No. MH60010438)
Size/Shape	375mm
Material	Vitrified Clay
Total Length	113.6m
Sewer Depth to Invert – maximum	4.55m
Design Condition	
Fully Deteriorated 10%	
Site Specific Repairs	
Location	Required Action
Distance From MH60010531	
18.6	Remove intruding service at 10:00
19.4	Remove intruding service at 10:00
34.7	Remove intruding service at 10:00
54.3	Solid debris removal, encrustation at joint from 5:00 to 8:00
78.5	Solid debris removal, encrustation at service from 3:00 to 5:00
98.7	Remove intruding service at 10:00

Michigan Av (Asset No. MA60019026)	MH at Louisiana PI (Asset No. MH60016490) to MH at Rice Rd (Asset No. MH60016457)
Size/Shape	250mm

Material	Concrete
Total Length	102.8m
Sewer Depth to Invert – maximum	5.46m
Design Condition	
Partially Deteriorated 5%	
Site Specific Repairs	
Location	Required Action
Distance From MH60016490	
0.2	Solid debris removal, encrustation at joint from 5:00 to 8:00
12.7	Solid debris removal, encrustation at joint from 7:00 to 10:00
18.0	Solid debris removal, encrustation at service from 7:00 to 3:00
20.2	Solid debris removal, encrustation at joint from 1:00 to 6:00
30.0	Solid debris removal, encrustation at joint from 7:00 to 11:00
32.5	Solid debris removal, encrustation at joint from 1:00 to 5:00
36.0	Solid debris removal, encrustation at service from 8:00 to 11:00
52.7	Solid debris removal, encrustation at service from 7:00 to 1:00
54.2	Solid debris removal, encrustation at service from 8:00 to 4:00
69.9	Solid debris removal, encrustation at joint from 8:00 to 4:00
72.8	Solid debris removal, encrustation at service from 8:00 to 3:00
75.7	Solid debris removal, encrustation at service from 1:00 to 5:00

Montrose St (Asset No. MA60005810)	2nd MH S of Corydon Av (Asset No. MH60006458) to 3rd MH S of Corydon Av (Asset No. MH60004466)
Size/Shape	450mm
Material	Concrete
Total Length	100.5m
Sewer Depth to Invert – maximum	4.37m
Design Condition	
Fully Deteriorated 10%	
Site Specific Repairs	
Location	Required Action
Distance From MH60006458	
6.3	Solid debris removal, encrustation at joint at 8:00

10.2	Solid debris removal, roots at joint at 4:00
18.6	Solid debris removal, roots at service from 1:00 to 3:00
35.7	Solid debris removal, roots at joint at 4:00
49.1	Solid debris removal, roots at service at 2:00
71.8	Solid debris removal, roots at joint at 3:00
72.5	Solid debris removal, roots at joint from 9:00 to 3:00
73.8	Remove intruding service at 3:00

Nassau St (Asset No. MA60012300)	MH at Kylemore Av (Asset No. MH60010504) to MH at Walker Av (Asset No. MH60012280)
Size/Shape	300mm
Material	Vitrified Clay
Total Length	76.9m
Sewer Depth to Invert – maximum	4.95m
Design Condition	
Fully Deteriorated 11%	
Site Specific Repairs	
Location	Required Action
Distance From MH60010504 42.2-44.7	External Point Repair

Nassau St S (CL) (Asset No. MA60009340)	1st MH S of Hethrington Av (Asset No. MH60007727) to MH at Hethrington Av (Asset No. MH60007736)
Size/Shape	300mm
Material	Vitrified Clay
Total Length	73.7m
Sewer Depth to Invert – maximum	4.15m
Design Condition	
Fully Deteriorated 10%	
Site Specific Repairs	
Location	Required Action
Distance From MH60007727	

63.9	Solid debris removal, encrustation at service at 2:00

North Dr (Asset No. MA60013207)	2nd MH E of Lyon St (Asset No. MH60011346) to 1st MH E of Lyon St (Asset No. MH60011347)
Size/Shape	200mm
Material	Concrete
Total Length	17.9m
Sewer Depth to Invert – maximum	4.1m
Design Condition	
Partially Deteriorated 5%	
Site Specific Repairs	
Location	Required Action
Distance From MH60011346	
17.8	Solid debris removal, concrete at joint from 4:00 to 8:00
21.2	Solid debris removal, encrustation at joint from 1:00 to 2:00
21.9	Solid debris removal, encrustation at joint from 8:00 to 4:00
22.9	Solid debris removal, encrustation at joint from 8:00 to 4:00

Oakwood Av (Asset No. MA60008899)	MH at Casey St (Asset No. MH60007307) to MH at Fisher St (Asset No. MH60007361)
Size/Shape	450mm
Material	Vitrified Clay
Total Length	126.3m
Sewer Depth to Invert – maximum	4.2m
Design Condition	
Partially Deteriorated 8%	
Site Specific Repairs	
Location	Required Action
Distance From MH60007307	
30.1	Solid debris removal, roots at joint from 7:00 to 8:00
30.8	Solid debris removal, roots at joint at 4:00
31.5	Solid debris removal, roots at

123.4	joint from 4:00 to 8:00 Dimension change to 375mm

Oakwood Av (Asset No. MA60008803)	MH at Hay St (Asset No. MH60007219) to 1st MH E of Hay St (Asset No. MH60007217)
Size/Shape	375mm
Material	Vitrified Clay
Total Length	83.7m
Sewer Depth to Invert – maximum	5.19m
Design Condition	
Fully Deteriorated 10%	
Site Specific Repairs	
Location	Required Action
Distance From MH60007219	
41.5	Remove intruding service at 3:00
49.3	Solid debris removal, roots at joint from 2:00 to 5:00
66.1	Solid debris removal, encrustation at service at 8:00

Park Bv N (Asset No. MA60004275)	3rd MH S of Corydon Av (Asset No. MH60003122) to MH at Cuthbertson Av (Asset No. MH60003075)
Size/Shape	200mm
Material	Concrete
Total Length	86.6m
Sewer Depth to Invert – maximum	4.05m
Design Condition	
Partially Deteriorated 3%	
Site Specific Repairs	
Location	Required Action
Distance From MH60003122	
82.7	Solid debris removal, encrustation at joint from 7:00 to 8:00

Queenston St (Asset No. MA60005573)	1st MH N of Grant St (Asset No. MH60004248) to 2nd MH N of Grant St (Asset No. MH60004255)
Size/Shape	375mm
Material	Vitrified Clay
Total Length	97.0m
Sewer Depth to Invert – maximum	4.42m
Design Condition	
Partially Deteriorated 8%	
Site Specific Repairs	
Location	Required Action
Distance From MH60004248	
10.7	Solid debris removal, encrustation at service at 10:00
16.2	Solid debris removal, encrustation at joint from 7:00 to 8:00
32.2	Solid debris removal, roots at joint at 4:00
33.1	Solid debris removal, roots at joint at 4:00
36.5	Solid debris removal, roots at service at 10:00
48.3	Solid debris removal, roots at joint at 8:00
57.1	Solid debris removal, roots at service at 2:00
72.9	Solid debris removal, roots at service at 10:00
73.7	Solid debris removal, roots at service from 2:00 to 3:00
89.4	Solid debris removal, encrustation at joint at 4:00

Rathgar Av (Asset No. MA60012381)	MH at Nassau St S (Asset No. MH60010478) to 1st MH E of Nassau St S (Asset No. MH60010568)
Size/Shape	375mm
Material	Vitrified Clay
Total Length	96.6m
Sewer Depth to Invert – maximum	4.38m
Design Condition	
Fully Deteriorated 11%	
Site Specific Repairs	
Location	Required Action
Distance From MH60010478	

17.7-18.7	External Point Repair
25.3	Remove intruding service at 2:00
40.1	Remove intruding service at 2:00
41.4	Solid debris removal, encrustation at service from 7:00 to 11:00

Riley Cr (N Leg) (Asset No. MA60017523)	MH at Riley Cr (W Leg) (Asset No. MH60015151) to MH at Wicklow St (Asset No. MH60015221)
Size/Shape	250mm
Material	Concrete
Total Length	86.4m
Sewer Depth to Invert – maximum	5.35m
Design Condition	
Partially Deteriorated 3%	
Site Specific Repairs	
Location	Required Action
Distance From MH60015151	
5.1	Solid debris removal, encrustation at joint from 7:00 to 5:00
9.1	Solid debris removal, encrustation at joint from 1:00 to 5:00
19.2	Solid debris removal, encrustation at joint from 1:00 to 6:00
26.5	Solid debris removal, encrustation at service from 7:00 to 11:00
27.3	Remove intruding service at 11:00
34.1	Solid debris removal, encrustation at joint from 11:00 to 5:00
41.3	Remove intruding service at 10:00
52.0-56.1	Solid debris removal, encrustation on pipe wall from 8:00 to 4:00
73.1	Solid debris removal, encrustation at joint from 1:00 to 5:00
73.9	Solid debris removal, encrustation at joint from 12:00 to 5:00
80.7	Remove intruding service at 2:00
80.7	Solid debris removal, encrustation at joint from 2:00 to 5:00
85.6	Solid debris removal, encrustation at joint at 6:00

Riverside Dr (Asset No. MA60021827)	1st MH SW of Riverside Dr (E Leg) (Asset No. MH60011296) to MH at Riverside Dr (E Leg) (Asset No. MH60010181)
Size/Shape	200mm
Material	Concrete
Total Length	38.3m
Sewer Depth to Invert – maximum	5.63m
Design Condition	
Fully Deteriorated 10%	
Site Specific Repairs	
Location	Required Action
Distance From MH60011296	
No preparatory work required.	

Robindale Rd (Asset No. MA60000350)	1st MH S of Betsworth Av (Asset No. MH60000350) to MH at Betsworth Av (Asset No. MH60000198)
Size/Shape	200mm
Material	Concrete
Total Length	119.8m
Sewer Depth to Invert – maximum	5.3m
Design Condition	
Partially Deteriorated 5%	
Site Specific Repairs	
Location	Required Action
Distance From MH60000350	
2.8	Solid debris removal, gasket at joint from 10:00 to 4:00
4.4	Solid debris removal, encrustation at joint from 8:00 to 11:00
10.5	Solid debris removal, encrustation at joint from 8:00 to 4:00
18.8	Solid debris removal, encrustation at service from 8:00 to 3:00
21.4	Solid debris removal, encrustation at joint from 7:00 to 4:00
29.5	Solid debris removal, encrustation at service from 10:00 to 4:00
31.5	Solid debris removal, encrustation at service from 10:00 to 5:00
32.1	Solid debris removal, encrustation at joint from 12:00 to 6:00

33.6	Solid debris removal, encrustation at joint from 10:00 to 4:00
36.7	Solid debris removal, encrustation at joint from 1:00 to 5:00
39.8	Solid debris removal, encrustation at joint from 8:00 to 4:00
43.1	Solid debris removal, encrustation at joint from 10:00 to 5:00
47.5	Solid debris removal, gasket at joint from 9:00 to 4:00
50.6	Solid debris removal, encrustation at joint from 8:00 to 4:00
53.6	Solid debris removal, encrustation at joint from 7:00 to 5:00
56.8	Solid debris removal, encrustation at joint from 7:00 to 5:00
59.1	Solid debris removal, encrustation at service from 8:00 to 4:00
61.4	Solid debris removal, encrustation at joint from 8:00 to 4:00
69.5	Solid debris removal, encrustation at service from 8:00 to 4:00
75.3	Solid debris removal, encrustation at joint from 8:00 to 4:00
78.4	Solid debris removal, gasket at joint from 1:00 to 5:00
79.9	Solid debris removal, encrustation at joint from 7:00 to 12:00
83.0	Solid debris removal, encrustation at joint from 8:00 to 4:00
99.4	Solid debris removal, encrustation at service from 7:00 to 12:00
103.6	Solid debris removal, encrustation at joint from 7:00 to 2:00
105.2	Solid debris removal, encrustation at joint from 12:00 to 5:00
106.7	Solid debris removal, gasket at joint from 11:00 to 4:00
117.5	Solid debris removal, encrustation at joint from 8:00 to 4:00

Rosedale Av (Asset No. MA60012047)	2nd MH W of Cockburn St S (Asset No. MH60010253) to 1st MH W of Cockburn St S (Asset No. MH60010265)
Size/Shape	375mm
Material	Vitrified Clay
Total Length	86.3m
Sewer Depth to Invert – maximum	5.48m
Design Condition	
Partially Deteriorated 8%	
Site Specific Repairs	
Location	Required Action

Distance From MH60010253	
13.1	Solid debris removal, roots at joint at 7:00

Rosedale Av (Asset No. MA60012052)	1st MH E of Lilac St (Asset No. MH60010257) to 2nd MH W of Cockburn St (Asset No. MH60010253)
Size/Shape	375mm
Material	Vitrified Clay
Total Length	86.7m
Sewer Depth to Invert – maximum	5.0m
Design Condition	
Fully Deteriorated 10%	
Site Specific Repairs	
Location	Required Action
Distance From MH60010257	
17.2	Solid debris removal, bolt at 6:00
30.7	Solid debris removal, encrustation at joint from 7:00 to 10:00
34.0	Remove intruding service at 2:00

Ryerson Av (Asset No. MA60019024)	1st MH N of Miami Pl (Asset No. MH60016449) to MH at Rice Rd (Asset No. MH60016456)
Size/Shape	200mm
Material	Concrete
Total Length	84.0m
Sewer Depth to Invert – maximum	4.37m
Design Condition	
Partially Deteriorated 5%	
Site Specific Repairs	
Location	Required Action
Distance From MH60010257	
0.0	Solid debris removal, encrustation at joint from 8:00 to 4:00
0.6	Solid debris removal, encrustation at joint from 8:00 to 4:00

16.2	Solid debris removal, encrustation at service from 8:00 to 4:00
17.4	Solid debris removal, encrustation at service from 8:00 to 4:00
19.1-19.5	Solid debris removal, encrustation on pipe wall from 8:00 to 4:00
35.4	Solid debris removal, encrustation at service from 8:00 to 4:00
36.9	Solid debris removal, encrustation at service from 8:00 to 4:00
40.0	Solid debris removal, gasket at joint from 4:00 to 8:00
53.3	Solid debris removal, encrustation at service from 8:00 to 4:00
54.1	Solid debris removal, encrustation at service from 8:00 to 4:00
73.0-74.0	Solid debris removal, encrustation on pipe wall from 8:00 to 4:00

Shaftsbury Bv (Asset No. MA60004381)	3rd MH N of Grant Av (Asset No. MH60003178) to 4th MH N of Grant Av (Asset No. MH60003176)
Size/Shape	300mm
Material	Concrete
Total Length	69.9m
Sewer Depth to Invert – maximum	4.44m
Design Condition	
Fully Deteriorated 10%	
Site Specific Repairs	
Location	Required Action
Distance From MH60003178	
17.3	Solid debris removal, encrustation at joint at 4:00
18.1	Solid debris removal, encrustation at joint at 4:00
23.4	Solid debris removal, encrustation at joint from 7:00 to 4:00
35.9	Solid debris removal, encrustation at joint from 8:00 to 4:00
38.9	Solid debris removal, encrustation at service from 1:00 to 5:00
39.0	Solid debris removal, encrustation at joint from 8:00 to 4:00
64.4	Solid debris removal, encrustation at joint from 7:00 to 3:00

South Dr (Asset No. MA60013484)	MH at Wildwood J Pk (S Leg) (Asset No. MH60015381) to MH at Wildwood J Pk (N
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Leg) (Asset No. MH60015496)	
Size/Shape	200mm
Material	Vitrified Clay
Total Length	81.2m
Sewer Depth to Invert – maximum	3.69m
Design Condition	
Partially Deteriorated 3%	
Site Specific Repairs	
Location	Required Action
Distance From MH60015381	
30.3	Solid debris removal, encrustation at joint at 10:00
41.1	Solid debris removal, encrustation at joint at 8:00
68.3	Solid debris removal, encrustation at joint at 10:00

South Dr (EPL) (Asset No. MA60018377)	MH at Kebir PI (Asset No. MH60015925) to MH at Dove By (Asset No. MH60015934)
Size/Shape	375mm
Material	Concrete
Total Length	115.3m
Sewer Depth to Invert – maximum	3.41m
Design Condition	
Fully Deteriorated 10%	
Site Specific Repairs	
Location	Required Action
Distance From MH60015925	
53.8	Solid debris removal, roots at joint from 3:00 to 9:00
63.0	Solid debris removal, roots at joint from 3:00 to 9:00
64.6	Solid debris removal, roots at joint from 7:00 to 9:00
76.8-87.0	Solid debris removal, roots on pipe wall from 3:00 to 9:00
89.0	Solid debris removal, roots at joint from 2:00 to 10:00
96.7	Solid debris removal, roots at joint from 2:00 to 9:00
98.1	Solid debris removal, roots at joint from 1:00 to 4:00
101.3	Solid debris removal, roots at joint from 1:00 to 3:00
105.8	Solid debris removal, roots at

110.5	joint from 2:00 to 4:00 Solid debris removal, roots at joint at 9:00

Southboine Dr (Asset No. MA60001431)	MH at Orchard Park Bv (Asset No. MH60001061) to 1st MH E of Orchard Park Bv (Asset No. MH60001064)
Size/Shape	250mm
Material	Concrete
Total Length	57.7m
Sewer Depth to Invert – maximum	3.85m
Design Condition	
Fully Deteriorated 5%	Excessive grease entire length
Site Specific Repairs	
Location	Required Action
Distance From MH60001061	
15.9	Solid debris removal, gasket at joint from 1:00 to 6:00

Thatcher Dr (Asset No. MA60016097)	4th MH E of Pembina Hy (Asset No. MH60013855) to MH at University Cr (Asset No. MH60013858)
Size/Shape	375mm
Material	Concrete
Total Length	54.8m
Sewer Depth to Invert – maximum	3.32m
Design Condition	
Fully Deteriorated 10%	
Site Specific Repairs	
Location	Required Action
Distance From MH60013855	
0.6	Solid debris removal, roots at joint from 8:00 to 4:00
9.5	Solid debris removal, roots at joint from 5:00 to 11:00
25.0	Solid debris removal, encrustation at joint at 6:00
28.9	Solid debris removal, encrustation at joint from 1:00 to 4:00

30.5	Solid debris removal, encrustation at joint at 3:00
32.0	Solid debris removal, encrustation at joint at 1:00
34.2	Solid debris removal, encrustation at joint from 8:00 to 10:00
36.6	Solid debris removal, encrustation at joint at 3:00
44.2	Solid debris removal, encrustation at joint from 2:00 to 4:00

Walker Av (Asset No. MA60012255)	2nd MH W of Nassau St S (Asset No. MH60010453) to 1st MH W of Nassau St S (Asset No. MH60010477)
Size/Shape	300mm
Material	Vitrified Clay
Total Length	73.0m
Sewer Depth to Invert – maximum	4.06m
Design Condition	
Fully Deteriorated 10%	
Site Specific Repairs	
Location	Required Action
Distance From MH60010453	
23.0	Solid debris removal, encrustation at service from 3:00 to 4:00
39.6	Solid debris removal, encrustation at joint at 9:00

Walker Av (Asset No. MA60012080)	2nd MH W of Cockburn St S (Asset No. MH60010283) to 1st MH W of Cockburn St S (Asset No. MH60010274)
Size/Shape	375mm
Material	Vitrified Clay
Total Length	85.8m
Sewer Depth to Invert – maximum	4.41m
Design Condition	
Fully Deteriorated 10%	
Site Specific Repairs	
Location	Required Action
Distance From MH60010283	
0.1	Solid debris removal, encrustation at

3.2	joint from 4:00 to 7:00
6.4	Solid debris removal, roots at service from 8:00 to 10:00
7.2	Solid debris removal, roots at service at 8:00
11.2	Solid debris removal, roots at joint from 4:00 to 8:00
82.3	Solid debris removal, roots at joint at 4:00
82.9	Solid debris removal, roots at service at 3:00
	Solid debris removal, roots at joint at 10:00

Walker Av (Asset No. MA60012301)	MH of Nassau St S (Asset No. MH60010473) to 1st MH E of Nassau St S (Asset No. MH60010581)
Size/Shape	375mm
Material	Vitrified Clay
Total Length	97.4m
Sewer Depth to Invert – maximum	4.95m
Design Condition	
Fully Deteriorated 10%	Excessive roots entire length
Site Specific Repairs	
Location	Required Action
Distance From MH60012301	
38.7	Solid debris removal, encrustation at joint at 8:00
68.3-71.0	External Point Repair
88.8-91.9	External Point Repair
96.1-97.4	External Point Repair

Weatherdon Av (Asset No. MA60011542)	1st MH E of Wilton St (Asset No. MH60009787) to MH at Guelph St (Asset No. MH60009786)
Size/Shape	375mm
Material	Vitrified Clay
Total Length	85.7m
Sewer Depth to Invert – maximum	4.33m
Design Condition	
Fully Deteriorated 10%	

Site Specific Repairs	
Location	Required Action
Distance From MH60009787	
0-20.0	Solid debris removal, grease on pipe wall from 4:00 to 8:00
27.4	Solid debris removal, encrustation at joint at 7:00
28.6	Solid debris removal, encrustation at joint at 7:00
37.4	Remove intruding service at 10:00
47.8	Solid debris removal, encrustation at joint at 4:00
48.3	Solid debris removal, encrustation at joint at 4:00
51.2	Solid debris removal, encrustation at joint at 8:00
77.3	Solid debris removal, encrustation at service from 2:00 to 5:00

Weatherdon Av (Asset No. MA60011632)	1st MH E of Guelph St (Asset No. MH60000871) to MH at Harrow St (Asset No. MH60009955)
Size/Shape	375mm
Material	Vitrified Clay
Total Length	86.0m
Sewer Depth to Invert – maximum	5.26m
Design Condition	
Fully Deteriorated 10%	
Site Specific Repairs	
Location	Required Action
Distance From MH60000871	
4.7	Remove intruding service at 10:00
61.7	Solid debris removal, encrustation at service from 7:00 to 11:00
72.1	Solid debris removal, encrustation at service from 2:00 to 8:00

Wedgewood Dr (Asset No. MA60016821)	1st MH S of Thatcher Dr (Asset No. MH60014476) to MH at Thatcher Dr (Asset No. MH60014475)
Size/Shape	200mm

Material	Vitrified Clay
Total Length	92.5m
Sewer Depth to Invert – maximum	3.5m
Design Condition	
Deteriorated %	
Site Specific Repairs	
Location	Required Action
Distance From MH60014476	
1.6	Remove intruding service at 10:00
16.9	Solid debris removal, encrustation at service from 2:00 to 4:00
40.5	Remove intruding service at 10:00
51.1	Remove intruding service at 2:00
57.8	Remove intruding service at 2:00
57.3	Remove intruding service at 10:00
80.6	Solid debris removal, encrustation at service from 2:00 to 5:00

Wellington Cr (Asset No. MA60006822)	1st MH W of Renfrew St (Asset No. MH60005460) to MH at Lanark St (Asset No. MH60005434)
Size/Shape	300mm
Material	Vitrified Clay
Total Length	86.8m
Sewer Depth to Invert – maximum	4.45m
Design Condition	
Fully Deteriorated 10%	
Site Specific Repairs	
Location	Required Action
Distance From MH60005460	
0.6	Solid debris removal, encrustation at joint from 5:00 to 7:00
10.0-12.0	Solid debris removal, encrustation on pipe wall from 5:00 to 7:00
14.8	Solid debris removal, encrustation at joint at 8:00
27.0	Solid debris removal, encrustation at joint at 8:00
29.9-32.4	Solid debris removal, encrustation on pipe wall from 4:00 to 7:00
36.7	Solid debris removal, encrustation at

41.0	joint from 7:00 to 8:00
42.0-43.6	Solid debris removal, encrustation at joint at 8:00
44.6	Solid debris removal, encrustation on pipe wall from 5:00 to 7:00
51.5	Solid debris removal, encrustation at joint at 6:00
	Solid debris removal, encrustation at joint at 7:00

Wellington Cr (Asset No. MA60007191)	MH at Oak St (Asset No. MH60005828) to 1st MH W of Oak St (Asset No. MH60005757)
Size/Shape	375mm
Material	Vitrified Clay
Total Length	67.5m
Sewer Depth to Invert – maximum	4.81m
Design Condition	
Fully Deteriorated 10%	Excessive roots entire length
Site Specific Repairs	
Location	Required Action
Distance From MH60005828	
No preparatory work required.	

Wellington Cr (Asset No. MA60007254)	MH at Elm St (Asset No. MH60005819) to 1st MH W of Elm St (Asset No. MH60005826)
Size/Shape	375mm
Material	Vitrified Clay
Total Length	62.5m
Sewer Depth to Invert – maximum	4.33m
Design Condition	
Partially Deteriorated 5%	
Site Specific Repairs	
Location	Required Action
Distance From MH60005819	
43.1	Solid debris removal, encrustation at joint at 8:00
52.2	Solid debris removal, encrustation at joint at 8:00
52.7	Solid debris removal, roots at service at 10:00

57.8	Solid debris removal, roots at joint at 4:00
58.5	Solid debris removal, roots at joint at 4:00
59.8	Solid debris removal, roots at joint from 4:00 to 8:00
60.1	Solid debris removal, roots at joint at 4:00

Willow Av (Asset No. MA60007619)	MH at Carpathia St (Asset No. MH60006186) to MH at Kenaston Bv (E of CL) (Asset No. MH60006221)
Size/Shape	300mm
Material	Vitrified Clay
Total Length	112.9m
Sewer Depth to Invert – maximum	4.68m
Design Condition	
Partially Deteriorated 3%	
Site Specific Repairs	
Location	Required Action
Distance From MH60006186	
17.5	Solid debris removal, encrustation at joint at 4:00
46.3	Solid debris removal, encrustation at joint at 4:00
55.7-57.3	External Point Repair