THE CITY OF WINNIPEG

BID OPPORTUNITY

BID OPPORTUNITY NO. 429-2006

2006 SEWER RENEWALS BY CIPP LINING - CONTRACT 14

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PART B - BIDDING PROCEDURES

B1. PROJECT TITLE

B1.1 2006 SEWER RENEWALS BY CIPP LINING - CONTRACT 14

B2. SUBMISSION DEADLINE

B2.1 The Submission Deadline is 12:00 noon Winnipeg time, July 18, 2006.

B2.2 Bid Submissions determined by the Manager of Materials to have been received later than the Submission Deadline will not be accepted and will be returned upon request.

B2.3 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 GC:3.1, the Bidder may view the Site without making an appointment.

B3.2 The Bidder is advised that that video inspections of all sewers included in this contract are available from the Contract Administrator on digital video disk in MPEG format. The corresponding inspection condition coding reports are also available.

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 Bid Opportunity, 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 Bid Opportunity 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 Bid Opportunity 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.

B5. ADDENDA

B5.1 The Contract Administrator may, at any time prior to the Submission Deadline, issue addenda correcting errors, discrepancies or omissions in the Bid Opportunity, or clarifying the meaning or intent of any provision therein.

B5.2 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.

B5.2.1 Addenda will be available on the Bid Opportunities page at The City of Winnipeg, Corporate Finance, Materials Management Branch internet site at http://www.winnipeg.ca/matmgt.

B5.2.2 The Bidder is responsible for ensuring that he has received all addenda and is advised to check the Materials Management Branch internet site for addenda shortly before submitting his Bid.

B5.3 The Bidder shall acknowledge receipt of each addendum in Paragraph 10 of Form A: Bid. Failure to acknowledge receipt of an addendum may render a Bid non-responsive.

B6. SUBSTITUTES

B6.1 The Work is based on the Plant, Materials and methods specified in the Bid Opportunity.

B6.2 Substitutions shall not be allowed unless application has been made to and prior approval has been granted by the Contract Administrator in writing.

B6.3 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.

B6.4 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.

B6.5 The Contract Administrator, after assessing the request for approval of a substitute, may in his 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.

B6.6 The Contract Administrator will provide a response in writing, at least two (2) Business Days prior to the Submission Deadline, only to the Bidder who requested approval of the substitute.

B6.6.1 The Bidder requesting and obtaining the approval of a substitute shall be entirely responsible for disseminating information regarding the approval to any person or persons he wishes to inform.

B6.7 If the Contract Administrator approves a substitute as an “approved equal”, any Bidder may use the approved equal in place of the specified item.

B6.8 If the Contract Administrator approves a substitute as an “approved alternative”, any Bidder bidding that approved alternative shall base his 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 B15.

B6.9 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.

B7. BID SUBMISSION

B7.1 The Bid Submission consists of the following components:

(a) Form A: Bid;

(b) Form B: Prices;

(c) Form G1: Bid Bond and Agreement to Bond, or
Form G2: Irrevocable Standby Letter of Credit and Undertaking, or
a certified cheque or draft;

B7.2 All components of the Bid Submission 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 in ink, to constitute a responsive Bid.

B7.3 The Bid Submission shall be submitted enclosed and sealed in an envelope clearly marked with the Bid Opportunity number and the Bidder's name and address.

B7.3.1 Samples or other components of the Bid Submission which cannot reasonably be enclosed in the envelope may be packaged separately, but shall be clearly marked with the Bid Opportunity number, the Bidder's name and address, and an indication that the contents are part of the Bidder’s Bid Submission.

B7.4 Bid Submissions submitted by facsimile transmission (fax) or internet electronic mail (e-mail) will not be accepted.

B7.5 Bid Submissions shall be submitted to:

The City of Winnipeg
Corporate Finance Department
Materials Management Branch
185 King Street, Main Floor
Winnipeg MB R3B 1J1

B8. BID

B8.1 The Bidder shall complete Form A: Bid, making all required entries.

B8.2 Paragraph 2 of Form A: Bid shall be completed in accordance with the following requirements:

(a) if the Bidder is a sole proprietor carrying on business in his own name, his 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 own, the business name and the name of every partner or corporation who is the owner of such business name shall be inserted.

B8.2.1 If a Bid is submitted jointly by two or more persons, each and all such persons shall identify themselves in accordance with B8.2.

B8.3 In Paragraph 3 of Form A: Bid, the Bidder shall identify a contact person who is authorized to represent the Bidder for purposes of the Bid.

B8.4 Paragraph 12 of Form A: Bid shall be signed in accordance with the following requirements:

(a) if the Bidder is a sole proprietor carrying on business in his 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 and the corporate seal, if the corporation has one, should be affixed;

(d) if the Bidder is carrying on business under a name other than his 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.

B8.4.1 The name and official capacity of all individuals signing Form A: Bid shall be printed below such signatures.

B8.4.2 All signatures shall be original and shall be witnessed except where a corporate seal has been affixed.

B8.5 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 Submission and the Contract, when awarded, shall be both joint and several.

B9. PRICES

B9.1 The Bidder shall state a price in Canadian funds for each item of the Work identified on Form B: Prices.

B9.1.1 Notwithstanding GC.12.2.3(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.

B9.2 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.

B9.3 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. QUALIFICATION

B10.1 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;

(b) be responsible and not be suspended, debarred or in default of any obligation to the City;

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

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

(e) have successfully carried out work, similar in nature, scope and value to the Work;

(f) employ only Subcontractors who:

(i) are responsible and not suspended, debarred or in default of any obligation 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 Branch internet site at http://www.winnipeg.ca/matmgt); and

(ii) have successfully carried out work similar in nature, scope and value to the portion of the Work proposed to be subcontracted to them, and are fully capable of performing the Work required to be done in accordance with the terms of the Contract;

(g) have a written workplace safety and health program in accordance with The Workplace Safety and Health Act (Manitoba);

(h) only CIPP suppliers and installers under City of Winnipeg "Request for Qualifications for the Supply and Installation of Cured in Pipe (CIPP) Bid Opportunity No. 253-2006" shall be eligible to perform CIPP renovation in the City of Winnipeg during 2006.

B10.2 Further to B10.1(g), the Bidder shall, within three (3) Business Days of a request by the Contract Administrator, provide proof satisfactory to the Contract Administrator that the Bidder has a workplace safety and health program meeting the requirements of The Workplace Safety and Health Act (Manitoba), by providing:

(a) a valid COR certification number under the Certificate of Recognition (COR) Program - Option 1 administered by the Manitoba Heavy Construction Association's Safety, Health and Environment Program; or

(b) a valid COR certification number under the Certificate of Recognition (COR) Program administered by the Manitoba Construction Safety Association; or

(c) 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 Branch internet site at http://www.winnipeg.ca/matmgt.)

B10.3 The Bidder shall be prepared to 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.

B10.4 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.

B11. BID SECURITY

B11.1 The Bidder shall provide bid security in the form of:

(a) a 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 the form included in the Bid Submission (Form G1: Bid Bond and Agreement to Bond); or

(b) an irrevocable standby letter of credit, in the amount of at least ten percent (10%) of the Total Bid Price, and undertaking issued by a bank or other financial institution registered to conduct business in Manitoba and drawn on a branch located in Winnipeg, in the form included in the Bid Submission (Form G2: Irrevocable Standby Letter of Credit and Undertaking); or

(c) a certified cheque or draft payable to "The City of Winnipeg", in the amount of at least fifty percent (50%) of the Total Bid Price, drawn on a bank or other financial institution registered to conduct business in Manitoba.

B11.1.1 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.

B11.2 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 executed by the successful Bidder and the performance security furnished as provided herein. The bid securities of all other Bidders will be released when a Contract is awarded.

B11.2.1 Where the bid security provided by the successful Bidder is in the form of a certified cheque or draft pursuant to B11.1(c), it will be deposited and retained by the City as the performance security and no further submission is required.

B11.2.2 The City will not pay any interest on certified cheques or drafts furnished as bid security or subsequently retained as performance security.

B11.3 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 Bid Opportunity.

B12. OPENING OF BIDS AND RELEASE OF INFORMATION

B12.1 Bid Submissions will be opened publicly, after the Submission Deadline has elapsed, in the office of the Corporate Finance Department, Materials Management Branch, or in such other office as may be designated by the Manager of Materials.

B12.1.1 Bidders or their representatives may attend.

B12.1.2 Bid Submissions determined by the Manager of Materials, or his designate, to not include the bid security specified in B11 will not be read out.

B12.2 After the public opening, the names of the Bidders and their Total Bid Prices as read out (unevaluated, and pending review and verification of conformance with requirements) will be available on the Closed Bid Opportunities (or Public/Posted Opening & Award Results) page at The City of Winnipeg, Corporate Finance, Materials Management Branch internet site at http://www.winnipeg.ca/matmgt.

B12.3 After award of Contract, the name(s) of the successful Bidder(s) and the Contract Amount(s) will be available on the Closed Bid Opportunities (or Public/Posted Opening & Award Results) page at The City of Winnipeg, Corporate Finance, Materials Management Branch internet site at http://www.winnipeg.ca/matmgt.

B12.4 The Bidder is advised that any information contained in any Bid Submission may be released if required by City policy or procedures, by The Freedom of Information and Protection of Privacy Act (Manitoba), by other authorities having jurisdiction, or by law.

B13. IRREVOCABLE BID

B13.1 The Bid(s) submitted by the Bidder shall be irrevocable for the time period specified in Paragraph 11 of Form A: Bid.

B13.2 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 executed and the performance security 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.

B14. WITHDRAWAL OF BIDS

B14.1 A Bidder may withdraw his Bid without penalty by giving written notice to the Manager of Materials at any time prior to the Submission Deadline.

B14.1.1 Notwithstanding GC:23.3, the time and date of receipt of any notice withdrawing a Bid shall be the time and date of receipt as determined by the Manager of Materials.

B14.1.2 The City will assume that any one of the contact persons named in Paragraph 3 of Form A: Bid or the Bidder's authorized representatives named in Paragraph 12 of Form A: Bid, and only such person, has authority to give notice of withdrawal.

B14.1.3 If a Bidder gives notice of withdrawal prior to the Submission Deadline, the Manager of Materials shall:

(a) retain the Bid Submission until after the Submission Deadline has elapsed;

(b) open the Bid Submission to identify the contact person named in Paragraph 3 of Form A: Bid and the Bidder's authorized representatives named in Paragraph 12 of Form A: Bid; and

(c) if the notice has been given by any one of the persons specified in B14.1.3(b), declare the Bid withdrawn.

B14.2 A Bidder who withdraws his Bid after the Submission Deadline but before his Bid has been released or has lapsed as provided for in B13.2 shall be liable for such damages as are imposed upon the Bidder by law and subject to such sanctions as the Chief Administrative Officer considers appropriate in the circumstances. The City, in such event, shall be entitled to all rights and remedies available to it at law, including the right to retain the Bidder's bid security.

B15. EVALUATION OF BIDS

B15.1 Award of the Contract shall be based on the following bid evaluation criteria:

(a) compliance by the Bidder with the requirements of the Bid Opportunity (pass/fail);

(b) qualifications of the Bidder and the Subcontractors, if any, pursuant to B10 (pass/fail);

(c) Total Bid Price;

(d) economic analysis of any approved alternative pursuant to B6.

B15.2 Further to B15.1(a), the Award Authority may reject a Bid as being non-responsive if the Bid Submission 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 if the interests of the City so require.

B15.3 Further to B15.1(b), the Award Authority shall reject any Bid submitted by a Bidder who does not demonstrate, in his Bid Submission or in other information required to be submitted, that he is responsible and qualified.

B15.4 Further to B15.1(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.

B15.4.1 If there is any discrepancy between the Total Bid Price written in figures, the Total Bid Price written in words and the sum of the quantities multiplied by the unit prices for each item, the sum of the quantities multiplied by the unit prices for each item shall take precedence.

B16. AWARD OF CONTRACT

B16.1 The City will give notice of the award of the Contract by way of a letter of intent, or will give notice that no award will be made.

B16.2 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 responsible and qualified, and the Bids are determined to be responsive.

B16.2.1 Without limiting the generality of B16.2, 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.

B16.3 Where an award of Contract is made by the City, the award shall be made to the responsible and qualified Bidder submitting the lowest evaluated responsive Bid.

PART C - GENERAL CONDITIONS

C1. GENERAL CONDITIONS

C1.1 The *General Conditions for Construction Contracts* (Revision 2000 11 09) are applicable to the Work of the Contract.

C1.1.1 The *General Conditions for Construction Contracts* are available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Branch internet site at http://www.winnipeg.ca/matmgt.

PART D - SUPPLEMENTAL CONDITIONS

GENERAL

D1. GENERAL CONDITIONS

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

D1.2 The General Conditions are amended by striking out "The City of Winnipeg Act" wherever it appears in the General Conditions and substituting "The City of Winnipeg Charter".

D1.3 The General Conditions are amended by striking out "Tender Package" wherever it appears in the General Conditions and substituting "Bid Opportunity".

D1.4 The General Conditions are amended by striking out "Tender Submission" wherever it appears in the General Conditions and substituting "Bid Submission".

D1.5 The General Conditions are amended by deleting GC:6.16 and GC:6.17. The City of Winnipeg is now within the jurisdiction of the Manitoba Ombudsman pursuant to The Ombudsman Act.

D2. SCOPE OF WORK

D2.1 The Work to be done under the Contract shall consist of combined sewer rehabilitation by cured-in-place-pipe (CIPP) methods.

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

(a) Ashland Avenue – approx. 82m of 375mm dia. CIPP liner
(b) Avondale Avenue – approx. 149m of 250mm dia. CIPP liner
(c) Carlaw Avenue – approx. 193m of 450mm dia. CIPP liner
(d) Cunnington Avenue – approx. 117m of 250mm dia. CIPP liner
(e) Jubilee Avenue – approx. 109m of 300mm dia. CIPP liner
(f) Jubilee Avenue – approx. 200m of 375mm dia. CIPP liner
(g) Jubilee Avenue – approx. 194m of 450mm dia. CIPP liner
(h) Osborne Street – approx. 169m of 600mm dia. CIPP liner
(i) Regal Avenue – approx. 164m of 250mm dia. CIPP liner
(j) Rosewarne Avenue – approx. 115m of 1350mm dia. CIPP liner
(k) St. Mary's Road – approx. 173m of 900mm dia. CIPP liner
(l) St. Anne's Road – approx. 249m of 1050mm dia. CIPP liner
(m) Ashland Avenue – approx. 2m of 300mm dia. CIPP point repair
(n) Balfour Avenue – approx. 3m of 300mm dia. CIPP point repair
(o) Blenheim Avenue – approx. 4m of 300mm dia. CIPP point repair
(p) Brandon Avenue – approx. 2m of 375mm dia. CIPP point repair
(q) Dakota Avenue – approx. 1m of 250mm dia. CIPP point repair
(r) Fermor Avenue – approx. 2m of 375mm dia. CIPP point repair
(s) Handyside Avenue – approx. 4m of 300mm dia. CIPP point repair
(t) Maplewood Avenue – approx. 6m of 450mm dia. CIPP point repair

(u) McNaughton Avenue – approx. 5m of 450mm dia. CIPP point repair

(v) Rathgar Avenue – approx. 2m of 375mm dia. CIPP point repair

(w) St. Anne's Road – approx. 2.5m of 300mm dia. CIPP point repair

D3. DEFINITIONS

D3.1 When used in this Bid Opportunity:

(a) "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. 168-2005" shall be approved for the 2005 sewer lining projects in the City of Winnipeg.

D4. CONTRACT ADMINISTRATOR

D4.1 The Contract Administrator is:

Mr. Terry Whiteside, C.E.T.
Design and Specifications Coordinator
The City of Winnipeg
Water and Waste Department
849 Ravelston Avenue West
Winnipeg, Manitoba
R3W 1S8
Telephone No. (204) 986-4451
Facsimile No. (204) 986-5345

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 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 GC:23.2.2, 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.

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, D6.4 or elsewhere in the Contract, shall be sent to the attention of the Contract Administrator at the address or facsimile number identified in D4.1.

D6.3 All notices of appeal to the Chief Administrative Officer shall be sent to the attention of the Chief Financial Officer at the following address or facsimile number:

The City of Winnipeg
Chief Administrative Officer Secretariat
Administration Building, 3rd Floor
510 Main Street

Winnipeg MB R3B 1B9

Facsimile No.: (204) 949-1174

D6.4 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 address or facsimile number:

The City of Winnipeg
Corporate Services Department
Legal Services Division
185 King Street, 3rd Floor
Winnipeg MB R3B 1J1

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 Bid Opportunity. If the Contractor requires additional sets of the Bid Opportunity, they will be supplied to him at cost.

SUBMISSIONS

D8. SAFE WORK PLAN

D8.1 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 GC:4.1 for the return of the executed Contract.

D8.2 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 Branch internet site at http://www.winnipeg.ca/matmgt.

D9. INSURANCE

D9.1 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) all inclusive, with The City of Winnipeg being added as an additional insured, with a cross-liability clause, such liability policy to also contain a contractual liability, an unlicensed motor vehicle liability and a products and completed operations endorsement to remain in place at all times during the performance of the Work and throughout the warranty period;

(b) automobile liability insurance for owned and non-owned automobiles used for or in connection with the Work in the amount of at least two million dollars ($2,000,000.00) at all times during the performance of the Work and until the date of Total Performance;

D9.2 Deductibles shall be borne by the Contractor.

D9.3 The Contractor shall provide the City Solicitor with a certificate of insurance of each policy, in a form satisfactory to the City Solicitor, 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 GC:4.1 for the return of the executed Contract.

D9.4 The Contractor shall not cancel, materially alter, or cause each policy to lapse without providing at least fifteen (15) Calendar Days prior written notice to the Contract Administrator.

D10. PERFORMANCE SECURITY

D10.1 The Contractor shall provide and maintain performance security 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; or

(b) an irrevocable standby letter of credit issued by a bank or other financial institution registered to conduct business in Manitoba and drawn on a branch located in Winnipeg, in the form attached to these Supplemental Conditions (Form H2: Irrevocable Standby Letter of Credit), in the amount of fifty percent (50%) of the Contract Price; or

(c) a certified cheque or draft payable to "The City of Winnipeg", drawn on a bank or other financial institution registered to conduct business in Manitoba, in the amount of fifty percent (50%) of the Contract Price.

D10.1.1 Where the performance security is in the form of a certified cheque or draft, it will be deposited by the City. The City will not pay any interest on certified cheques or drafts furnished as performance security.

D10.2 If the bid security provided in his Bid Submission was not a certified cheque or draft pursuant to B11.1(c), the Contractor shall provide the City Solicitor with the required performance security within seven (7) Calendar Days of notification of the award of the Contract by way of letter of intent and prior to the commencement of any Work on the Site but in no event later than the date specified in GC:4.1 for the return of the executed Contract.

D11. SUBCONTRACTOR LIST

D11.1 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 GC:4.1 for the return of the executed Contract.

D12. EQUIPMENT LIST

D12.1 The Contractor shall provide the Contract Administrator with a complete list of the equipment which the Contractor proposes to utilize (Form K: Equipment List) at least two (2) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in GC:4.1 for the return of the executed Contract.

D13. DETAILED WORK SCHEDULE

D13.1 The Contractor shall provide the Contract Administrator with a detailed work schedule at least two (2) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in GC:4.1 for the return of the executed Contract.

D13.2 The detailed work schedule shall consist of the following:

(a) a Gantt chart for the Work

all acceptable to the Contract Administrator.

D13.3 Further to D13.2(a), the Gantt chart shall show the time on a weekly basis, required to carry out the Work of each activity or task. The time shall be on the horizontal axis, and the activity or task shall be on the vertical axis.

D14. SECURITY CLEARANCE

D14.1 Each individual proposed to perform Work:

(a) on private property;

shall be required to obtain a Criminal Record Search Certificate from the police service having jurisdiction at his place of residence.

D14.2 Prior to the commencement of any Work, 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 Criminal Record Search Certificate obtained not earlier than one (1) year prior to the Submission Deadline, or a certified true copy thereof, for each individual proposed to perform Work within City facilities or on private property.

D14.3 Any individual for whom a Criminal Record Search Certificate is not provided, or for whom a Criminal Record Search Certificate indicates any convictions or pending charges related to property offences or crimes against another person, will not be permitted to perform any Work within City facilities or on private property.

D14.4 Any Criminal Record Search Certificate obtained thereby will be deemed valid for the duration of the Contract subject to a repeated records search as hereinafter specified.

D14.5 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 criminal records search. Any individual who fails to provide a satisfactory Criminal Record Search Certificate as a result of a repeated criminal records search will not be permitted to continue to perform Work under the Contract within City facilities or on private property.

SCHEDULE OF WORK

D15. COMMENCEMENT

D15.1 The Contractor shall not commence any Work until he is in receipt of a letter of intent from the Award Authority authorizing the commencement of the Work.

D15.2 The Contractor shall not commence any Work on the Site until:

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

(i) evidence that the Contractor is 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;

(ii) evidence of the workers compensation coverage specified in GC:6.14;

(iii) the Safe Work Plan specified in D8;

(iv) evidence of the insurance specified in D9;

(v) the performance security specified in D10;

(vi) the Subcontractor list specified in D11;

(vii) the equipment list specified in D12;

(viii) the detailed work schedule specified in D13; and

(ix) the security clearances specified in D14.

(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.

D15.3 Commencement of the Work shall be at the discretion of the Contractor provided the commencement date will allow the achievement of Substantial Performance of the work in accordance with D17.

D16. CRITICAL STAGES

D16.1 The Contractor shall achieve critical stages of the Work in accordance with the following requirements:

(a) Inspection of catch basin leads by September 15, 2006.

(b) Filling of voids in host pipe wall to be completed by October 1, 2006.

D17. SUBSTANTIAL PERFORMANCE

D17.1 The Contractor shall achieve Substantial Performance by June 15, 2007.

D17.2 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 re-inspected.

D17.3 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.

D18. TOTAL PERFORMANCE

D18.1 The Contractor shall achieve Total Performance by June 30, 2007.

D18.2 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 re-inspected.

D18.3 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.

D19. LIQUIDATED DAMAGES

D19.1 If the Contractor fails to achieve, Substantial Performance or Total Performance in accordance with the Contract by the dates fixed herein for same, the Contractor shall pay the City the following amounts per Calendar Day for each and every Calendar Day following the dates fixed herein for same during which such failure continues:

(a) Substantial Performance – One Thousand dollars ($1,000.00);

(b) Total Performance - Five Hundred dollars ($500.00).

D19.2 The amounts specified for liquidated damages in D19.1 are based on a genuine pre-estimate of the City's losses in the event that the Contractor does not achieve critical stages, Substantial Performance or Total Performance by the days fixed herein for same.

D19.3 The City may reduce any payment to the Contractor by the amount of any liquidated damages assessed.

D20. SCHEDULED MAINTENANCE

D20.1 The Contractor shall perform the following scheduled maintenance in the manner and within the time periods required by the Specifications:

(a) Warranty lining inspection as specified in E2.

D20.2 Determination of Substantial Performance and Total Performance shall be exclusive of scheduled maintenance identified herein. All scheduled maintenance shall be completed prior to the expiration of the warranty period. Where the scheduled maintenance cannot be completed during the warranty period, the warranty period shall be extended for such period of time as it takes the Contractor to complete the scheduled maintenance.

CONTROL OF WORK

D21. JOB MEETINGS

D21.1 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 and one representative of the Contractor. Each representative shall be a responsible person capable of expressing the position of the Contract Administrator 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.

D21.2 The Contract Administrator reserves the right to cancel any job meeting or call additional job meetings whenever he deems it necessary.

D22. PRIME CONTRACTOR – THE WORKPLACE SAFETY AND HEALTH ACT (MANITOBA)

D22.1 Further to GC:6.26, 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).

D23. TRAFFIC CONTROL

D23.1 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 as follows.

D23.2 Regional Streets

(a) Dakota Street
    (i) Maintain a minimum of one lane of traffic in each direction.
(b) Fermor Avenue
    (i) Maintain a minimum of two lanes of traffic westbound.
(c) Jubilee Avenue
    (i) Maintain a minimum of one lane of traffic in each direction.
(d) Osborne Street
    (i) Maintain a minimum of one lane of traffic in each direction.
(e) St. Mary's Road
    (i) Maintain a minimum of one lane of traffic southbound.
(f) St. Anne's Road

(i) Maintain one lane of traffic in each direction.

D23.3 Residential Streets

(a) Ashland Avenue, Avondale Avenue, Balfour Avenue, Blenheim Avenue, Brandon Avenue, Carlaw Avenue, Cunnington Avenue, Handyside Avenue, Maplewood Avenue, McNaughton Avenue, Rathgar Avenue, Regal Avenue and Rosewarne Avenue

(i) Maintain at least one lane of traffic, street may signed as “Road Closed - Local Access Only”.

D23.4 Maintain access for approaches, driveways, public lanes and crossing streets for all locations.

D23.5 Further to Section 3.7 of CW 1130 of the General Requirements and Section 2.05 of The City of Winnipeg, "Manual of Temporary Traffic Control in Work Areas on City Streets", should the Contract Administrator require that Work on Regional Streets be carried out at night, on Sundays, on public holidays or that Work be restricted or suspended during peak traffic hours, the Contractor shall comply without additional compensation being considered to meet these requirements.

D23.6 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.

D23.7 The Contractor will have access to the open lanes of traffic during non-restricted hours provided flag persons are used in accordance with Section 3.12 of The City of Winnipeg, "Manual of Temporary Traffic Control in Work Areas on City Streets to maintain traffic safety.

D23.8 Preparation work for CIPP liner installation on Fermor Avenue, Jubliee Avenue, Osborne Street, St. Mary’s Road and St. Anne’s Road shall be done on a weekday after 17:30 hours and completed by 07:00 hours the following day including traffic barricade removal.

D23.9 Installation of the full segment CIPP liners on St. Mary’s Road and the CIPP point repair on Fermor Avenue shall be scheduled to be done on a weekend, ie. Between 17:30 hours Friday and 07:00 hours Monday.

D23.10 Installation of adjacent full segment CIPP liners on Jubilee Avenue, Osborne Street, St. Mary’s Road and St. Anne’s Road shall be scheduled to be done consecutively without removing and replacing traffic barricades until after the last segment is completed.

D23.11 Further to Section 3.6 of CW 1130 of the General Requirements, the Contractor shall maintain safe pedestrian crossing 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.

D23.12 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.

D24. WATER SUPPLY

D24.1 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.

D24.2 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.

D24.3 The Contractor shall make the following arrangements for hydrant turn on and turn off.

(a) Contact the 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 the City arrives to turn on or turn off the hydrant.

D24.4 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.

D24.5 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.

D24.6 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.

D24.7 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.

FORM H1: PERFORMANCE BOND
(See D10)

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 dated the

_____ day of _____ , 20____ , for:

BID OPPORTUNITY NO. 429-2006

2006 SEWER RENEWALS BY CIPP LINING - CONTRACT 14

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)

_____
(Name of Principal)

Per: _____ (Seal)

Per: _____

_____
(Name of Surety)

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

FORM H2: IRREVOCABLE STANDBY LETTER OF CREDIT
(PERFORMANCE SECURITY)
(See D10)

_____
(Date)

The City of Winnipeg
Corporate Services Department
Legal Services Division
185 King Street, 3rd Floor
Winnipeg MB R3B 1J1

RE: PERFORMANCE SECURITY - BID OPPORTUNITY NO. 429-2006

2006 SEWER RENEWALS BY CIPP LINING - CONTRACT 14

Pursuant to the request of and for the account of our customer,

_____ ,
(Name of Contractor)

_____
(Address of Contractor)

WE HEREBY ESTABLISH in your favour our irrevocable Standby Letter of Credit for a sum not exceeding in the aggregate

_____

_____ Canadian dollars.

This Standby Letter of Credit may be drawn on by you at any time and from time to time upon written demand for payment made upon us by you. It is understood that we are obligated under this Standby Letter of Credit for the payment of monies only and we hereby agree that we shall honour your demand for payment without inquiring whether you have a right as between yourself and our customer to make such demand and without recognizing any claim of our customer or objection by the customer to payment by us.

The amount of this Standby Letter of Credit may be reduced from time to time only by amounts drawn upon it by you or by formal notice in writing given to us by you if you desire such reduction or are willing that it be made.

Partial drawings are permitted.

We engage with you that all demands for payment made within the terms and currency of this Standby Letter of Credit will be duly honoured if presented to us at:

_____
(Address)

and we confirm and hereby undertake to ensure that all demands for payment will be duly honoured by us.

All demands for payment shall specifically state that they are drawn under this Standby Letter of Credit.

Subject to the condition hereinafter set forth, this Standby Letter of Credit will expire on

_____ .
(Date)

It is a condition of this Standby Letter of Credit that it shall be deemed to be automatically extended from year to year without amendment from the present or any future expiry date, unless at least 30 days prior to the present or any future expiry date, we notify you in writing that we elect not to consider this Standby Letter of Credit to be renewable for any additional period.

This Standby Letter of Credit may not be revoked or amended without your prior written approval.

This credit is subject to the Uniform Customs and Practice for Documentary Credit (1993 Revision), International Chamber of Commerce Publication Number 500.

_____
(Name of bank or financial institution)

Per: _____
(Authorized Signing Officer)

Per: _____
(Authorized Signing Officer)

FORM J: SUBCONTRACTOR LIST

(See D11)

2006 SEWER RENEWALS BY CIPP LINING - CONTRACT 14

Name	Address

FORM K: EQUIPMENT
(See D12)

2006 SEWER RENEWALS BY CIPP LINING - CONTRACT 14

1. Category/type:

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

Registered owner: _____

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

Registered owner: _____

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

Registered owner: _____

2. Category/type:

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

Registered owner: _____

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

Registered owner: _____

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

Registered owner: _____

3. Category/type:

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

Registered owner: _____

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

Registered owner: _____

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

Registered owner: _____

FORM K: EQUIPMENT
(See D12)

2006 SEWER RENEWALS BY CIPP LINING - CONTRACT 14

4. Category/type:

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

Registered owner: _____

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

Registered owner: _____

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

Registered owner: _____

5. Category/type:

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

Registered owner: _____

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

Registered owner: _____

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

Registered owner: _____

6. Category/type:

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

Registered owner: _____

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

Registered owner: _____

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

Registered owner: _____

PART E - SPECIFICATIONS

GENERAL

E1. APPLICABLE SPECIFICATIONS, STANDARD DETAILS AND DRAWINGS

E1.1 *The City of Winnipeg Standard Construction Specifications* in its entirety, whether or not specifically listed on Form B: Prices, shall apply to the Work.

E1.1.1 *The City of Winnipeg Standard Construction Specifications* is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Branch internet site at http://www.winnipeg.ca/matmgt.

E1.1.2 The version in effect three (3) Business Days before the Submission Deadline shall apply.

E1.1.3 Further to GC:2.4(d), Specifications included in the Bid Opportunity shall govern over *The City of Winnipeg Standard Construction Specifications*.

E1.2 The following Drawings are applicable to the Work:

Drawing No.	Drawing Name/Title
	Cover Sheet
05866	Ashland Avenue - 1st MH E of Hay St to MH at Casey St (WPL)
05867	Avondale Avenue - 1st MH W of Des Meurons to 2nd MH W of Des Meurons
05868	Carlaw Avenue - 1st MH E of Nassau St S to 2nd MH E of Nassau St S
05869	Carlaw Avenue – 2nd MH E of Nassau St S to MH at Osborne St
05870	Cunnington Avenue - 3rd MH W of Killarney St to 2nd MH W of Killarney St S
05871	Jubilee Avenue - 2nd MH W of Nassau St S to 1st MH W of Nassau St S
05872	Jubilee Avenue - 1st MH W of Nassau St S to MH at Nassau St S (WPL)
05873	Jubilee Avenue - MH at Nassau St (CL) to 2nd MH E of Nassau St S
05874	Jubilee Avenue – 2nd MH E of Nassau St to MH at Osborne St (CL)
05876	Osborne Street - MH at Woodward Ave to MH at Brandon Ave
05877	Osborne Street - MH at Brandon Ave to MH at Carlaw Ave
05878	Regal Avenue - 1st MH W of Des Meurons to 2nd MH W of Des Meurons
05879	Rosewarne Avenue - MH at Kingston Rw to 1st MH E of Kingston Rw
05880	St. Anne's Road - MH at Handyside Ave to MH at Humbolt Ave
05881	St. Anne's Road - MH at Handyside Ave to MH at Bank Ave
05882	St. Anne's Road - MH at Bank Ave to MH at Avondale Ave
05883	St. Mary's Road - MH at Fifth Ave to MH at Guay Ave
05884	St. Mary's Road - MH at Guay Ave to MH at Morier Ave
05885	Ashland Avenue - MH at Mabel St to 1st MH W of Mabel St
05886	Balfour Avenue - MH at Osborne St (EPL) to 1st MH E of Osborne St
05887	Blenheim Avenue - MH at St. Anne’s Rd to 1st MH E of St. Anne’s Rd
05888	Brandon Avenue - MH at Nassau St S to 1st MH E of Nassau St S
05889	Dakota Street - 1st MH N of Beliveau Rd to MH at St. Mary’s Rd
05890	Fermor Avenue (WCL) - 2nd MH W of St. Thomas Rd to MH at St. Mary’s Rd (EPL)
05891	Handyside Avenue - 3rd MH W of Des Meurons St to MH at St. Anne’s Rd
05892	Maplewood Avenue - MH at Casey St to 1st MH E of Casey St
05893	McNaughton Avenue - 2nd MH E of Nassau St S to MH at Osborne St (E of CL)
05894	Rathgar Avenue - 2nd MH E of Nassau St to MH at Osborne St (WPL)
05895	St. Anne's Road - MH at Wingham Ave to MH at Portland Ave

E2. CURED-IN-PLACE-PIPE (CIPP)

E2.1 DESCRIPTION

E2.1.1 This specification covers the supply and installation of full segment, partial full segment (blind shot) and internal point repairs using cured-in-place pipe (CIPP).

E2.2 DEFINITIONS

E2.2.1 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.

E2.2.2 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 2006 is included in the Specifications.

E2.2.3 Full segment CIPP means CIPP extending from manhole to manhole or manhole to node (wye or tee connection to another sewer).

E2.2.4 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.

E2.2.5 Internal point repair CIPP means CIPP a short length or multiples of short length CIPP to repair localized defects anywhere within a sewer or sewer service. Internal point repairs are generally be one to ten metres in length.

E2.2.6 Minimum material requirements for CIPP shall conform to ASTM D5813-95 "Standard Specification for Cured-In-Place Thermosetting Resin Sewer Pipe" and the supplemental requirements noted herein.

E2.3 MATERIALS

E2.3.1 Pre-Approved CIPP Suppliers and Installers and Materials

(a) The following is a list of sewer lining systems – suppliers and 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" for 2006 City of Winnipeg sewer rehabilitation projects.

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

Applicant	***Insituform Technologies Limited***	***Capital Commercial Pipe Services***	***Nelson River Construction Inc.***	***Michels Canada***
Contact	Mark Brand 780-413-0200	Brian Ratchford 905-522-0522	Brad Morton 204-949-8700	Kelly Odel 920-583-3132
Supplier	Insituform Technologies Inc.	Capital Commercial Pipe Services	C.I.P.P. Corporation	Premier Pipe
Installer	Insituform Technologies Limited	Capital Commercial Pipe Services	Nelson River Construction Inc.	Michels Canada
Liner Name	Standard Insituform® CIPP	National Liner	C.I.P.P. Corp Liner	Premier Pipe

E2.3.2 CIPP Design Objectives

(a) Design objectives for CIPP include.

(i) Maximizing the structural enhancement of the sewer by installing a close-fit CIPP.

(ii) Providing no impact or increasing the hydraulic capacity of the rehabilitated sewer.

(iii) Reducing infiltration and exfiltration.

(iv) Preventing root intrusion.

(v) Providing sufficient chemical resistance to prevent further sewer pipe degradation related to the conveyance of sewage.

(vi) Minimizing sewer service disruption during rehabilitation.

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

(viii) Minimizing disturbance to pavements and boulevards.

(ix) Minimizing disruption to vehicular and pedestrian traffic.

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

(b) 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.

(c) Select CIPP and plan approach to rehabilitation toward maximizing the achievement of these design objectives.

E2.3.3 CIPP Design – General

(a) Design full segment and partial full segment CIPP in accordance with Appendix X1 of ASTM F1216 and these specifications as a gravity pipe in a partially or fully deteriorated pipe condition in accordance with design conditions noted in the Drawings and Specifications.

(b) Design internal point repair CIPP in accordance with Appendix X1 of ASTM F1216 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.

(c) 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.

(d) Perform a design check to confirm 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 an “n” value for the existing section estimated on the observed condition of the pipeline from the Sewer Maintenance Inspection.

(e) Design features of internal point repair CIPP are to also include.

(i) Tapered end sections to promote a smooth transition from the repair to the host pipe.

(ii) A means to facilitate flow through by-pass the existing dry weather flow during the course of the repair.

E2.3.4 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.

(b) Perform supplemental design checks where the host pipe has invert "flats" to determine whether wall thickness will be governed by one of the following:

(i) Buckling by assuming the flat functions as a pin-ended strut.

(ii) Stress, by assuming the flat functions as a pinned member, subjected to axial and transverse loads.

(iii) Deflection by assuming that allowable deflection is limited to 3% of the length of the flat.

(c) Use the following minimum design assumptions.

(i) Groundwater table is 2.0 m below the existing ground surface.

(ii) An enhancement factor (K) of 7.

(iii) 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 approved for use in the pre-qualification process.

(iv) Minimum value for ovality of the existing sewer will be 3% unless a greater value is indicated in the contract specifications or as determined from observation of the maintenance inspection.

(v) Minimum factor of safety (N) of 2 for restrained buckling analysis.

E2.3.5 CIPP 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 assumptions.

(i) Include an allowance for an AASHTO HSS25 concentrated live load in the total external pressure on the pipe. Calculate minimum live load surcharge based on Cooper E80 distributed load for portions of CIPP installed under railway lines.

(ii) Calculate dead load based on soil density of 1920 kg/m^3.

(iii) Groundwater table is 2.0 m below the existing ground surface.

(iv) Minimum value for ovality of the existing sewer will be 2% unless a greater value is indicated in the contract specifications or as determined from observation of the maintenance inspection.

(v) Long-term value for flexural modulus of elasticity 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 and approved for use in the pre-qualification process.

(vi) Modulus of soil reaction (E's) will be assumed to be 6900 kPa unless a higher or lower value is indicated in the contract specifications.

(vii) Minimum factor of safety (N) of 2.

E2.3.6 Existing Sewer Design Conditions

(a) The assessment of liner system design conditions and site-specific repairs required to accommodate lining were based on the conditions observed from sewer inspections that were performed in 2004 and 2005 as part of the City of Winnipeg's Sewer Cleaning and Inspection Programs. Copies of these video inspections are available to the Contractor in digital format on DVDs.

(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 following specific design conditions and site specific repair requirements apply to the work.

Table E2.3.6: Specific Design Conditions and Site Specific Repairs

Full Segment Renovations

Ashland Av (Asset No. MA70018591)	**1st MH E of Hay St (Asset No. MH60007275) to MH at Casey St (Asset No. MH70006789)**
Size/Shape	375mm
Material	Vitrified Clay
Total Length	82.1m
Sewer Depth to Invert – maximum	4.07m
Design Condition MH60007275 – 12.9m 12.9m – 47.9m 47.9m – MH70006789	 Partially deteriorated – 5% Ovality Fully deteriorated – 10% Ovality Partially deteriorated – 5% Ovality
Site Specific Repairs	
Location	**Required Action**
Distance From MH60007275	
0.0m – 8.0m	Solid debris removal – roots at joints from 9:00 to 3:00
10.5m	Solid debris removal – roots in service at 9:00
11.7m – 12.3m	Solid debris removal – encrustation on pipe wall at 9:00
12.3m – 20.7m	Solid debris removal – roots at joints from 9:00 to 3:00
13.6m	Solid debris removal – roots at joints from 9:00 to 3:00
14.6m	Solid debris removal – roots at joints from 9:00 to 3:00
15.3m	Solid debris removal – displace pipe at 12:00
24.7m – 25.8m	Solid debris removal – roots on pipe wall from 7:00 to 10:00
30.3m	Solid debris removal – displace pipe at 12:00
32.3m	Solid debris removal – roots on pipe wall at 3:00
40.6m	Solid debris removal – roots at joints from 7:00 to 8:00
40.6m	Solid debris removal – roots at joints from 2:00 to 4:00
57.6m – 59.9m	Solid debris removal – roots at joints from 7:00 to 8:00
60.3m	Solid debris removal – roots at service at 9:00
60.8m	Solid debris removal – roots at joint at 3:00

61.9m	Solid debris removal – roots at joint at 3:00
64.1m	Solid debris removal – piece of broken pipe in service at 3:00
79.8m	Material change to PVC

Avondale Av (Asset No. MA50013144)	**1st MH W of Des Meurons (Asset No. MH50010561) to 2nd MH W of Des Meurons (Asset No. MH50010560)**
Size/Shape	250mm -300mm
Material	Concrete
Total Length	149.17m
Sewer Depth to Invert – maximum	3.38m
Design Condition	
MH50010561 – 17.0m	Partially deteriorated – 5% Ovality
17.0m – 67.8m	Fully deteriorated – 10% Ovality
67.8m – 111.9m	Partially deteriorated – 5% Ovality
111.9m – 118.0m	Fully deteriorated – 10% Ovality
118.0m – MH50010560	Partially deteriorated – 5% Ovality
Site Specific Repairs	
Location	**Required Action**
Distance From MH50010561	
12.0m	Remove intruding service at 2:00
29.6m – 30.3m	Solid debris removal – displace pipe at 8:00
33.4m	Solid debris removal – encrustation at joint at 6:00
34.2m	Solid debris removal – encrustation at joint at 6:00
39.1m – 40.6m	Solid debris removal – encrustation on pipe wall at 8:00
40.4m	Solid debris removal – encrustation at joint at 6:00
42.0m – 43.0m	Solid debris removal – displace pipe at 7:00
44.2m	Solid debris removal – encrustation at joint at 6:00
44.6m – 45.2m	Solid debris removal – displace pipe at 7:00
45.6m	Solid debris removal – displace pipe at 5:00
49.7m	Solid debris removal – displace pipe at 6:00
53.6m	Solid debris removal – displace pipe at 6:00
56.7m	Solid debris removal – encrustation at joint at 6:00
59.1m	Solid debris removal – encrustation at

	joint at 6:00
63.6m	Solid debris removal – encrustation at joint at 6:00
65.6m	Remove intruding service at 2:00
67.5m	Solid debris removal – encrustation at joint at 6:00
75.2m	Solid debris removal – encrustation at joint from 7:00 to 8:00
77.6m	Solid debris removal – encrustation at joint from 4:00 to 5:00
77.6m	Solid debris removal – encrustation at joint at 7:00
83.1m	Solid debris removal – encrustation at joint from 5:00 to 7:00
85.5m	Solid debris removal – encrustation at joint at 7:00
87.0m	Solid debris removal – encrustation at joint at 5:00
87.7m	Solid debris removal – encrustation at joint from 5:00 to 6:00
90.2m	Solid debris removal – encrustation at joint from 5:00 to 6:00
92.5m – 92.9m	Solid debris removal – encrustation on pipe wall at 8:00
96.7m – 97.3m	Solid debris removal – encrustation on pipe wall from 8:00 to 9:00
103.3m	Dimension change from 250mm to 300mm
106.5m	Solid debris removal – encrustation at joint from 5:00 to 7:00
111.6m	Solid debris removal – encrustation at joint from 6:00 to 7:00
113.6m	Solid debris removal – displace pipe at 6:00
114.7m	Solid debris removal – displace pipe at 7:00
123.5m	Solid debris removal – encrustation at joint from 4:00 to 6:00
124.4m	Solid debris removal – encrustation at joint from 5:00 to 6:00
126.0m	Solid debris removal – encrustation at joint at 6:00
126.8m	Solid debris removal – encrustation at joint at 6:00
128.2m	Solid debris removal – encrustation at joint at 4:00

Carlaw Av (Asset No. S-MA60009356)	**1st MH E of Nassau St (Asset No. MH60007743) to 2nd MH E of Nassau St (Asset No. MH60007776)**
Size/Shape	450mm dia.
Material	Vitrified Clay

Total Length	96.8m
Sewer Depth to Invert – maximum	4.49m
Design Condition MH60007743 – 81m 81m – MH60007776	 Partially Deteriorated – 5% Ovality Fully Deteriorated – 10% Ovality
Site Specific Repairs	
Location	**Required Action**
Distance From MH60007743 12.3m – 12.8m – 15.7m 13.8m 25.0m 40.1m 42.0m 44.3m 44.3m 47.0m 47.3m – 52.3m 81.1m 82.7m 83.9m 86.9m 88.6m – 91.7m 87.9m	 Steel liner Solid debris removal – granular material bottom of pipe Remove intruding service at 2:00 Open joint Solid debris removal – encrustation at service at 2:00 Remove intruding service at 11:00 Remove intruding service at 2:00 Solid debris removal – roots at service at 2:00 Solid debris removal – roots at joint at 9:00 Solid debris removal – roots at joint Remove intruding service at 2:00 Solid debris removal – roots at joint Solid debris removal – roots at joint Solid debris removal – displaced pipe at 12:00 Solid debris removal – roots at joint Solid debris removal – displaced pipe at 6:00

Carlaw Av (Asset No. MA60009412)	**MH at Osborne St (Asset No. MH60007776) to 1st MH W of Osborne St (Asset No. MH60007812)**
Size/Shape	450mm dia.
Material	Vitrified Clay
Total Length	96.4m
Sewer Depth to Invert – maximum	5.29m
Design Condition MH60007776 – 81.4m 81.4m – MH60007812	 Fully deteriorated – 10% Ovality Partially deteriorated – 5% Ovality
Site Specific Repairs	
Location	**Required Action**
Distance From MH60007776	

0.6m – 7.4m	Solid debris removal – roots at joints
3.7m	Solid debris removal – roots at service at 10:00
46.0m	Solid debris removal – roots at joint
53.2m	Remove intruding service at 10:00
72.5m	Solid debris removal – displaced pipe from 11:00 to 5:00
75.9m	Solid debris removal – roots at joint at 9:00
77.8m – 81.4m	Solid debris removal – roots at joint at 9:00
90.3m	Remove intruding service at 10:00
Reverse Set-up	
Distance from MH60007812	
3.5m	Solid debris removal – encrustation at service at
15.1m	Solid debris removal – roots

Cunnington Av (Asset No. MA50014331)	**3rd MH W of Killarney St (Asset No. MH50011454) to 2nd MH W of Killarney St (Asset No. MH50011455)**
Size/Shape	250mm
Material	Concrete
Total Length	118.15m
Sewer Depth to Invert – maximum	4.53m
Design Condition	
MH50011454 – 15.0m	Partially deteriorated – 5% Ovality
15.0m – 98.0m	Fully deteriorated – 10% Ovality
98.0m – MH50011455	Partially deteriorated – 5% Ovality
Site Specific Repairs	
Location	**Required Action**
Distance From MH50011454	
9.1m	Remove intruding service at 2:00
24.2m	Remove intruding service at 10:00
39.3m – 41.9m	Material change to PVC
59.2m	Remove intruding service at 1:00
59.2m	Solid debris removal – displaced pipe at 6:00
67.0m	Solid debris removal – encrustation on service at 2:00
72.5m	Dimension change from 250mm to 300mm

96.1m – 97.1m	Solid debris removal – displaced pipe at 6:00
99.8m – 100.5m	Solid debris removal – displaced pipe at 6:00
103.1m	Remove intruding service at 2:00

Jubilee Av (Asset No. MA60012349)	**2nd MH W of Nassau St S (Asset No. MH60010442) to 1st MH W of Nassau St S (Asset No. MH60010540)**
Size/Shape	300mm dia.
Material	Vitrified Clay
Total Length	109.4
Sewer Depth to Invert – maximum	2.92m
Design Condition MH60010442 – 59.1m 59.1m – 78.9m 78.9m – MH60010540	 Partially deteriorated – 5% Ovality Fully deteriorated – 10% Ovality Partially deteriorated – 5% Ovality
Site Specific Repairs	
Location	**Required Action**
Distance From MH60010442	
9.7m	Solid debris removal – displaced pipe at 6:00
10.2m	Solid debris removal – encrustation on pipe wall from 8:00 to 12:00
10.6m	Solid debris removal – encrustation on pipe wall from 7:00 to 9:00
27.0m	Solid debris removal – encrustation at joint from 7:00 to 9:00
30.9m	Solid debris removal – encrustation at joint from 7:00 to 9:00
31.1m	Solid debris removal – encrustation on pipe wall from 3:00 to 5:00
31.6m – 32.5m	Solid debris removal – encrustation on pipe wall from 8:00 to 4:00
33.1m	Solid debris removal – encrustation on pipe wall from 2:00 to 4:00
55.7m	Solid debris removal – encrustation at joint from 8:00 to 10:00
64.0m – 71.1m	Solid debris removal – encrustation on pipe wall at 4:00 and 8:00
72.6m – 74.4m	Solid debris removal – displaced pipe at 6:00
92.4m	Remove intruding service and encrustation at 2:00
96.3m	Solid debris removal – encrustation at joint from 8:00 to 11:00
96.8m	Solid debris removal – encrustation on pipe wall at 9:00 and 12:00

97.1m	Solid debris removal – encrustation at joint from 9:00 to 12:00
100.3m	Solid debris removal – encrustation at joint from 8:00 to 9:00
103.9m	Solid debris removal – encrustation at joint at 8:00
104.7m	Solid debris removal – encrustation at joint from 8:00 to 4:00

Jubilee Av (Asset No. MA60012345)	**1st MH W of Nassau St S(Asset No. MH60010540) to MH at Nassau (Asset No. MH70000365)**
Size/Shape	375mm dia.
Material	Vitrified Clay
Total Length	104.0m
Sewer Depth to Invert – maximum	3.77m
Design Condition MH60010540 –17.2m 17.2m –46.3m 46.3m – 70.2m 70.2m – MH70000365	 Fully deteriorated – 10% Ovality Partially deteriorated – 5% Ovality Fully deteriorated – 10% Ovality Partially deteriorated – 5% Ovality
Site Specific Repairs	
Location	**Required Action**
Distance From MH60010540 0.5m – 3.0m	 Solid debris removal – encrustation on pipe wall from 8:00 to 10:00
3.2m	Solid debris removal – encrustation at joint from 8:00 to 12:00
7.5m	Solid debris removal – displaced pipe at 6:00
9.6m – 10.3m	Solid debris removal – encrustation on pipe wall at 9:00
16.8m	Solid debris removal – displaced pipe at 6:00
20.9m	Solid debris removal – encrustation on pipe wall from 3:00 to 5:00
37.9m	Solid debris removal – encrustation on pipe wall at 3:00
40.7m	Solid debris removal – encrustation at joint from 8:00 to 4:00
41.5m	Solid debris removal – displaced pipe at 6:00
44.8m	Solid debris removal – encrustation on pipe wall from 11:00 to 4:00
50.2m	Solid debris removal – encrustation on pipe wall at 9:00
52.7m	Solid debris removal – encrustation at

	joint from 8:00 to 4:00
54.1m	Solid debris removal – encrustation at service at 10:00
54.9m	Solid debris removal – encrustation at joint from 9:00 to 4:00
55.5m	Solid debris removal – encrustation on pipe wall from 8:00 to 12:00
56.0m	Solid debris removal – encrustation at joint from 8:00 to 4:00
56.6m	Solid debris removal – encrustation at joint from 8:00 to 4:00
57.2m	Solid debris removal – encrustation at joint from 8:00 to 4:00
57.7m – 58.3m	Solid debris removal – encrustation on pipe wall from 7:00 to 9:00
59.2m	Solid debris removal – encrustation on pipe wall from 8:00 to 2:00
60.4m	Solid debris removal – encrustation at joint from 8:00 to 10:00
61.2m	Solid debris removal – encrustation at joint from 12:00 to 4:00
63.0m – 63.6m	Solid debris removal – displaced pipe at 5:00
65.9m	Solid debris removal – encrustation on pipe wall from 12:00 to 4:00
67.5m	Solid debris removal – displaced pipe at 8:00
69.0m	Solid debris removal – encrustation at service from 2:00 to 5:00
70.2m	Solid debris removal – encrustation at joint from 12:00 to 4:00
80.0m – 80.9m	Solid debris removal – encrustation on pipe wall from 12:00 to 4:00
80.9m – 81.6m	Solid debris removal – encrustation on pipe wall from 8:00 to 12:00
84.6m	Solid debris removal – encrustation at joint from 8:00 to 4:00
92.2m – 94.0m	Solid debris removal – encrustation on pipe wall from 8:00 to 4:00
102.4m	Material change to PVC

Jubilee Av (Asset No. MA60012350)	**MH at Nassau St (Asset No. MH60010545) to 1st MH E of Nassau St (Asset No. MH60010591)**
Size/Shape	375mm
Material	Vitrified Clay
Total Length	96.6
Sewer Depth to Invert – maximum	4.14m
Design Condition MH60010545 – 55.6m 55.6m – 73.9m 73.9m – MH60010591	 Partially deteriorated – 5% Ovality Fully deteriorated – 10% Ovality Partially deteriorated – 5% Ovality

Site Specific Repairs	
Location	**Required Action**
Distance From MH60010545	
5.6m – 6.8m	Solid debris removal – encrustation on pipe wall from 2:00 to 4:00
10.2m	Solid debris removal – encrustation on pipe wall from 8:00 to 12:00
10.5m	Solid debris removal – encrustation from service at 2:00
19.5m – 19.9m	Solid debris removal – displaced pipe at 5:00
24.9m	Solid debris removal – encrustation on pipe wall from 8:00 to 11:00
35.8m	Solid debris removal – encrustation at joint from 7:00 to 9:00
36.5m	Solid debris removal – encrustation at joint from 3:00 to 5:00
36.6m – 37.0m	Solid debris removal – encrustation on pipe wall from 1:00 to 3:00
37.0m	Solid debris removal – encrustation at joint from 7:00 to 5:00
38.3m	Solid debris removal – encrustation at joint from 7:00 to 9:00
38.7m	Solid debris removal – encrustation on pipe wall from 1:00 to 5:00
48.7m – 49.7m	Solid debris removal – encrustation on pipe wall from 12:00
49.4m	Solid debris removal – encrustation on pipe wall from 12:00 to 3:00
50.1m	Solid debris removal – encrustation from service at 10:00
50.4m	Solid debris removal – encrustation on pipe wall from 9:00 to 11:00
50.8m	Solid debris removal – encrustation from service from 3:00 to 4:00
55.3m	Solid debris removal – encrustation on pipe wall from 9:00 to 12:00
56.9m	Solid debris removal – encrustation on pipe wall from 7:00 to 11:00
57.7m	Solid debris removal – encrustation at joint from 8:00 to 9:00
57.7m	Solid debris removal – encrustation at joint from 3:00 to 4:00
64.6m	Dimension change at PVC repair – 375mm to 300mm
Reverse Set-up	
Distance From MH60010591	
7.1m	Solid debris removal – encrustation at service
25.9m	Solid debris removal – displaced pipe at

	5:00
27.7m	Solid debris removal – displaced pipe at 4:00
28.7m	Dimension change at PVC repair – 375mm to 300mm

Jubilee Av (Asset No. MA60012400)	**1st MH E of Nassau St (Asset No. MH60010591) to 2nd MH E of Nassau St (Asset No. MH60010588)**
Size/Shape	450mm dia.
Material	Vitrified Clay
Total Length	97.18
Sewer Depth to Invert – maximum	4.65m
Design Condition MH60010591 –28.2m 28.2m –63.2m 63.2m –95.3m 95.3m – MH60010588	 Partially deteriorated – 5% Ovality Fully deteriorated – 10% Ovality Partially deteriorated – 5% Ovality Fully deteriorated – 10% Ovality
Site Specific Repairs	
Location	**Required Action**
Distance From MH60010591 29.8m 30.4m 35.0m 38.3m 51.9m – 53.4m 54.1m 80.8m	 Solid debris removal – displaced pipe at 6:00 Solid debris removal – displaced pipe at 6:00 Solid debris removal – displaced pipe at 6:00 Solid debris removal – displaced pipe at 6:00 Solid debris removal – displaced pipe at 6:00 Material change – PVC repair Solid debris removal – encrustation on pipe wall from 8:00 to 11:00

Jubilee Av (Asset No. MA60012396)	**2nd MH E of Nassau St (CL) (Asset No. MH60010588) to MH at Osborne St (Asset No. MH60010669)**
Size/Shape	450mm dia.
Material	Vitrified Clay
Total Length	97.2m
Sewer Depth to Invert – maximum	4.71m

Design Condition MH60010588 –42.2m 42.2m –44.2m 44.2m – MH60010669	 Partially deteriorated – 5% Ovality Fully deteriorated – 10% Ovality Partially deteriorated – 5% Ovality
Site Specific Repairs	
Location	**Required Action**
Distance From MH60010588 3.3m 3.3m 55.1m 69.6m – 69.9m Reverse Set-up Distance from MH60010669 8.5m 11.4m 12.3m 24.5m 27.4m	 Solid debris removal – roots in service at 1:00 Solid debris removal – encrustation on pipe wall from 4:00 to 5:00 Solid debris removal – roots in service at 11:00 Solid debris removal – encrustation at service from 7:00 to 10:00 Remove intruding service at 10:00 Solid debris removal – encrustation at service from 8:00 to 11:00 Solid debris removal – encrustation at service from 2:00 to 4:00 Solid debris removal – encrustation at joint from 7:00 to 11:00 Solid debris removal – encrustation at service from 1:00 to 5:00

Osborne St (Asset No. MA60009420)	**MH at Woodward Av (Asset No. MH60007802) to MH at Brandon Av (Asset No. MH60007808)**
Size/Shape	600mm
Material	Concrete
Total Length	86.7m
Sewer Depth to Invert – maximum	5.38m
Design Condition MH60007802 – 2.5m 2.5m – 5.0m 5.0m – MH60007808	 Partially deteriorated – 5% Ovality Fully deteriorated – 5% Ovality Partially deteriorated – 5% Ovality
Site Specific Repairs	
Location	**Required Action**

Distance From MH60007802	
MH60007802 – 2.8m	Material change to PVC
2.8m	Offset joint at end of PVC repair
2.8m – 5.0m	Grout pipe wall from 3:00 to 9:00
3.8m – 5.0m	Fill void from 9:00 to 11:00
20.5m – 21.8m	Solid debris removal – encrustation on pipe wall from 3:00 to 4:00
23.0m	Solid debris removal – encrustation on pipe wall at 3:00
34.8m	Solid debris removal – encrustation on pipe wall at 3:00
42.2m – 44.0m	Solid debris removal – encrustation on pipe wall from 3:00 to 4:00
46.0m	Solid debris removal – encrustation on pipe wall at 3:00
47.2m – 47.5m	Solid debris removal – encrustation on pipe wall from 2:00 to 3:00
49.8m – 50.4m	Solid debris removal – encrustation on pipe wall from 3:00 to 5:00
50.2m – 50.4m	Solid debris removal – encrustation on pipe wall from 8:00 to 9:00
54.4m – 54.6m	Solid debris removal – roots at service from 1:00 to 5:00
57.8m – 58.0m	Solid debris removal – encrustation at service from 8:00 to 10:00
60.1m – 60.3m	Solid debris removal – encrustation on pipe wall from 1:00 to 3:00
60.5m – 60.9m	Solid debris removal – encrustation on pipe wall at 11:00
61.7m – 61.9m	Solid debris removal – encrustation at service from 8:00 to 11:00
61.7m – 61.9m	Solid debris removal – encrustation at service from 2:00 to 4:00
62.4m – 63.1m	Solid debris removal – encrustation on pipe wall from 8:00 to 10:00
63.1m – 63.3m	Solid debris removal – encrustation on pipe wall from 1:00 to 2:00
64.9m – 65.5m	Solid debris removal – encrustation on pipe wall from 1:00 to 5:00
64.9m – 65.5m	Solid debris removal – encrustation on pipe wall from 9:00 to 11:00
69.3m – 69.5m	Solid debris removal – encrustation at service from 2:00 to 4:00
76.6m	Solid debris removal – encrustation at service from 2:00 to 5:00
81.3m – 86.6m	Grout pipe wall from 2:00 to 3:00 and from 8:00 to 9:00

Osborne St (Asset No. MA60009426)	MH at Brandon Av (Asset No. MH60007808) to MH at Carlaw Av (Asset No. MH60007812)
Size/Shape	600mm
Material	Concrete
Total Length	83.2m
Sewer Depth to Invert – maximum	5.29m
Design Condition MH60007808 – MH60007812	 Partially deteriorated – 10% Ovality
Site Specific Repairs	
Location	**Required Action**
Distance From MH60007808	
MH60007808 – 9.7m	Material change – steel liner
2.6m	Solid debris removal – roots in service at 11:00
6.7m	Solid debris removal – piece of steel liner at 7:00 to 8:00
7.7m	Solid debris removal – encrustation at joint from 3:00 to 5:00
8.5m	Solid debris removal – encrustation at joint from 4:00 to 5:00
9.7m – 10.0m	Fill void and grout pipe wall from 8:00 to 10:00
10.4m – 10.6m	Fill void and grout pipe wall from 3:00 to 4:00
10.8m – 13.4m	Material change – steel liner
14.9m	Solid debris removal – roots in service at 3:00
14.9m	Solid debris removal – roots in service at 10:00
23.1m	Solid debris removal – roots in service at 11:00
31.5m	Solid debris removal – roots in service at 11:00
48.5m	Solid debris removal – encrustation at service from 3:00 to 5:00
49.2m	Grout around sewer service at 2:00
53.9m	Solid debris removal – encrustation on pipe wall from 3:00 to 4:00
53.9m	Solid debris removal – encrustation on pipe wall from 8:00 to 9:00
72.2m – 73.0m	Grout pipe wall from 7:00 to 9:00

72.2m – 73.0m	Grout pipe wall from 3:00 to 5:00
73.9m	Solid debris removal – roots at and in service at 12:00
73.9m	Grout around service at 12:00
77.0m – 77.4m	Solid debris removal – encrustation on pipe wall from 7:00 to 11:00
81.8m – MH60007812	Approximately 7.5mm increase in pipe diameter from 10:00 to 4:00

Regal Av (Asset No. MA50013141)	**1st MH W of des Meurons (Asset No. MH50010557) to 2nd MH W of Des Meurons (Asset No. MH50010554)**
Size/Shape	250mm
Material	Concrete
Total Length	164.32m
Sewer Depth to Invert – maximum	3.1m
Design Condition	
MH50010557 – 34.0m	Partially deteriorated – 5% Ovality
34.0m – 106.2m	Fully deteriorated – 5% Ovality
106.2m – MH50010554	Partially deteriorated – 5% Ovality
Site Specific Repairs	
Location	**Required Action**
Distance From MH50010557	
0.0m	Fill void from 4:00 to 8:00
45.8m	Remove intruding service at 3:00
86.3m	Solid debris removal – encrustation at joint from 8:00 to 11:00
115.5m	Solid debris removal – encrustation at joint from 8:00 to 11:00
117.9m	Solid debris removal – encrustation at joint from 7:00 to 10:00
118.6m	Solid debris removal – encrustation at joint from 7:00 to 9:00
122.0m	Solid debris removal – encrustation at service at 10:00
153.1m	Remove intruding service at 2:00

Rosewarne Av (Asset No. MA50017756)	**MH at Kingston Rw (Asset No. MH50011711) to 1st MH E of Kingston Rw (Asset No. MH50014367)**
Size/Shape	1350mm x 900mm egg shape

Material	Concrete
Total Length	114.98m
Sewer Depth to Invert – maximum	4.80m
Design Condition MH50011711 – MH50014367	 Partially deteriorated - 5% Ovality
Site Specific Repairs	
Location	**Required Action**
Distance From MH50011711 No preparatory work required.	

St. Anne's Road (Asset No. MA50013519)	**MH at Bank Av (Asset No. MH50010566) to MH at Handyside Av (Asset No. MH50010567)**
Size/Shape	1050mm dia.
Material	Vitrified Clay Tile
Total Length	85.25m
Sewer Depth to Invert – maximum	6.71m
Design Condition MH50010559 – MH50010566	 Partially Deteriorated – 5% Ovality
Site Specific Repairs	
Location	**Required Action**
Distance From MH50010566 2.6m 51.8m 72.7m	 Solid debris removal – encrustation on service at 11:00 Solid debris removal – encrustation on service from 7:00 to 11:00 Solid debris removal – encrustation on service from 8:00 to 11:00

St. Anne's Road (Asset No. MA50013520)	**MH at Handyside Av (Asset No. MH50010567) to MH at Humbolt Av (Asset No. MH50010576)**
Size/Shape	1050mm dia.
Material	Vitrified Clay Tile

Total Length	82.51m
Sewer Depth to Invert – maximum	6.68m
Design Condition MH50010567 – MH50010576	 Partially Deteriorated – 5% Ovality
Site Specific Repairs	
Location	**Required Action**
Distance From MH50010567 1.7m – 10.8m 8.8m 12.5m – 18.6m 20.6m – 22.0m 20.9m 20.9m – 25.7m 27.3m – 33.4m	 Solid debris removal – roots on pipe wall from 3:00 to 4:00 Solid debris removal – roots on pipe wall at 8:00 Solid debris removal – roots on pipe wall at 8:00 Grout pipe wall where tiles are missing from 1:00 to 4:00 Grout pipe wall where tiles are missing from 8:00 to 10:00 Solid debris removal – roots on pipe wall at 8:00 Solid debris removal – roots on pipe wall at 8:00

St. Anne's Road (Asset No. MA50013584)	**MH at Avondale Av (Asset No. MH50010559) to MH at Bank Av (Asset No. MH50010566)**
Size/Shape	1050mm dia.
Material	Vitrified Clay Tile
Total Length	81.15m
Sewer Depth to Invert – maximum	6.24m
Design Condition MH50010559 – MH50010566	 Partially Deteriorated – 5% Ovality
Site Specific Repairs	
Location	**Required Action**
Distance From MH50010559 23.0m 45.0m 50.7m	 Solid debris removal – encrustation on service at 10:00 Remove intruding service at 10:00 Remove intruding connection (450mm diameter) at 9:00

St. Mary's Rd (Asset No. MA50019851)	MH at Fifth Av (Asset No. MH50008551) to MH at Guay Av (Asset No. MH50008547)
Size/Shape	900mm x 600mm
Material	Concrete
Total Length	89.7m
Sewer Depth to Invert – maximum	4.67m
Design Condition MH50008551 – MH50008547	 Partially deteriorated – 5% Ovality
Site Specific Repairs	
Location	**Required Action**
Distance From MH50008551	
3.1m	Solid debris removal – encrustation on pipe wall from 1:00 to 4:00
10.3m	Solid debris removal – encrustation on pipe wall from 12:00 to 5:00
11.2m	Solid debris removal – encrustation on pipe wall from 3:00 to 5:00
12.3m – 13.4m	Solid debris removal – encrustation on pipe wall from 3:00 to 5:00
14.0m	Solid debris removal – encrustation on pipe wall from 12:00 to 4:00
14.6m	Solid debris removal – encrustation on pipe wall from 8:00 to 12:00
16.8m	Solid debris removal – encrustation on pipe wall from 3:00 to 5:00
19.6m – 24.5m	Solid debris removal – encrustation on pipe wall from 3:00 to 5:00
23.7m	Solid debris removal – encrustation on pipe wall from 12:00 to 4:00
24.4m	Solid debris removal – encrustation on pipe wall from 1:00 to 4:00
26.3m	Solid debris removal – encrustation on pipe wall from 7:00 to 9:00
28.5m	Solid debris removal – encrustation on pipe wall from 4:00 to 5:00
31.1m	Solid debris removal – encrustation on pipe wall from 8:00 to 11:00
31.9m	Solid debris removal – encrustation at service from 1:00 to 2:00
33.2m	Solid debris removal – encrustation on pipe wall from 7:00 to 9:00
33.2m	Solid debris removal – encrustation on pipe wall from 3:00 to 5:00
38.7m	Remove intruding service at 9:00
43.3m	Solid debris removal – encrustation at service from 9:00 to 12:00

45.9m	Solid debris removal – encrustation at service from 1:00 to 3:00
50.0m – 70.0m	Grout pipe wall from 5:00 to 7:00
72.5m	Remove intruding service at 2:00

St. Mary's Rd (Asset No. MA50010556)	**MH at Guay Av (Asset No. MH50008547) to MH at Morier Av (Asset No. MH50008562)**
Size/Shape	900mm x 600mm egg shape
Material	Concrete
Total Length	83.0m
Sewer Depth to Invert – maximum	5.05m
Design Condition MH50008547 – MH50008562	 Partially deteriorated – 5% Ovality
Site Specific Repairs	
Location	**Required Action**
Distance From MH50008547	
3.1m	Solid debris removal – encrustation on pipe wall from 1:00 to 3:00
13.5m	Solid debris removal – encrustation at service from 9:00 to 11:00
18.7m	Solid debris removal – encrustation at service from 1:00 to 4:00
25.6m	Solid debris removal – encrustation at service from 1:00 to 4:00
28.2m	Grout pipe wall from 2:00 to 4:00
33.9m	Solid debris removal – encrustation at service from 1:00 to 4:00
41.2m	Solid debris removal – encrustation at service from 1:00 to 4:00
56.1m	Solid debris removal – encrustation at service from 9:00 to 11:00
56.5m	Solid debris removal – encrustation at service from 1:00 to 4:00
57.7m – 60.3m	Grout pipe wall from 8:00 to 10:00
57.7m – 60.3m	Grout pipe wall at 3:00
64.2m	Solid debris removal – encrustation at service from 8:00 to 11:00
78.9m	Solid debris removal – encrustation at service from 1:00 to 4:00

Internal Point Repairs by CIPP

Ashland Av (Asset No. MA60008995)	**MH at Mabel St (Asset No. MH60007402) to 1st MH W of Mabel St (Asset No. MH60007396)**
Size/Shape	300mm
Material	Vitrified Clay
Total Length	74.0m
Sewer Depth to Invert – maximum	4.11m
Design Condition MH60007402 – 2.0m	 Partially deteriorated – 5% Ovality
Site Specific Repairs	
Location	**Required Action**
Distance From MH60007402 No preparatory work required.	

Balfour Av (Asset No. MA60012479)	**MH at Osborne St (Asset No. MH70002734) to 1st MH E of Osborne St (Asset No. MH60010661)**
Size/Shape	300mm
Material	Vitrified Clay
Total Length	76.5m
Sewer Depth to Invert – maximum	2.82m
Design Condition 65.0 – MH60010661	 Fully deteriorated – 10%
Site Specific Repairs	
Location	**Required Action**
Distance From MH70002734 68.1m – 68.9m 69.5m – 70.3m 72.4m 72.4m 73.2m 73.9m 73.9m	 Solid debris removal – displaced pipe at 7:00 Solid debris removal – displaced pipe at 11:00 Solid debris removal – roots at joint at 3:00 Solid debris removal – roots at joint at 9:00 Solid debris removal – roots at joint at 8:00 Solid debris removal – roots at joint at 9:00 Solid debris removal – roots at joint at 3:00

74.8m 74.8m	Solid debris removal – roots at joint at 9:00 Solid debris removal – roots at joint at 3:00

Blenheim Av (Asset No. MA50015625)	**1st MH E of St. Anne's Rd (Asset No. MH50012514) to MH at St. Anne's Rd(Asset No. MH50010829)**
Size/Shape	300mm
Material	Vitrified Clay
Total Length	95.35m
Sewer Depth to Invert – maximum	5.16m
Design Condition 54.0m – 55.0m 65.0m – 68.0m	 Partially deteriorated – 5% Ovality Fully deteriorated – 10% Ovality
Site Specific Repairs	
Location	**Required Action**
Distance From MH50012514 54.1m 65.5m 66.8m 83.1m 83.1m	 Remove intruding service at 10:00 Solid debris removal – encrustation on pipe wall from 1:00 to 4:00 Solid debris removal – displaced pipe at 7:00 Remove intruding service at 2:00 Solid debris removal – encrustation on pipe wall from 3:00 to 4:00

Brandon Av (Asset No. MA60009275)	**MH at Nassau St (Asset No. MH60007671) to 1st MH E of Nassau St (Asset No. MH60007762)**
Size/Shape	375mm
Material	Vitrified Clay
Total Length	95.5m
Sewer Depth to Invert – maximum	3.54m
Design Condition 93.6m – MH60007762	 Partially deteriorated – 5% Ovality
Site Specific Repairs	
Location	**Required Action**

Distance From MH60007671 No preparatory work required.	

Dakota St (Asset No. MA50015103)	**1st MH N of Beliveau Rd (Asset No. MH50012117) to MH at St. Mary's Rd (Asset No. MH50012113)**
Size/Shape	250mm
Material	Concrete
Total Length	121.5m
Sewer Depth to Invert – maximum	3.32m
Design Condition MH50012117	Partially deteriorated – 5% Ovality
Site Specific Repairs	
Location	**Required Action**
Distance From MH50012117 15.4	Remove intruding service at 2:00

Fermor Av (W of CL) (Asset No. MA50009882)	**2nd MH W of St. Thomas Rd (Asset No. MH50008128) to MH at St. Mary's Rd (Asset No. MH50008129)**
Size/Shape	375mm
Material	Vitrified Clay
Total Length	96.8m
Sewer Depth to Invert – maximum	4.57m
Design Condition 71.0m – 72.5m	Fully deteriorated – 10% Ovality
Site Specific Repairs	
Location	**Required Action**
Distance From MH50008128 71.3m 75.8m 75.8m 78.3m 89.4m	Solid debris removal – displaced pipe at 6:00 Remove intruding service at 2:00 Solid debris removal – encrustation on pipe wall from 8:00 to 4:00 Remove intruding service at 12:00 Solid debris removal – encrustation at

91.2m	joint from 2:00 to 4:00 Solid debris removal – encrustation at joint from 2:00 to 4:00

Handyside Av (Asset No. MA50013156)	**3rd MH W of Des Meurons St (Asset No. MH50010571) to MH at St. Anne's Rd (Asset No. MH50010567)**
Size/Shape	300mm
Material	Concrete
Total Length	155.3m
Sewer Depth to Invert – maximum	4.84m
Design Condition 25.0m – 28.0m	 Fully deteriorated – 10% Ovality
Site Specific Repairs	
Location	**Required Action**
Distance From MH50010571 8.1m 18.5m 18.7m 2.7m	 Solid debris removal – encrustation on pipe wall from 2:00 to 4:00 Solid debris removal – encrustation on pipe wall from 9:00 to 2:00 Solid debris removal – encrustation on pipe wall from 9:00 to 2:00 Solid debris removal – encrustation on pipe wall from 9:00 to 12:00

Maplewood Av (Asset No. MA60008911)	**MH at Casey St (Asset No. MH60007318) to 1st MH E of Casey St (Asset No. MH60007322)**
Size/Shape	450mm
Material	Vitrified Clay
Total Length	86.84m
Sewer Depth to Invert – maximum	3.55m
Design Condition MH60007318 – 7.0m Reverse set-up MH60007322 – 5.0m	 Fully deteriorated – 5% Ovality Partially deteriorated – 5% Ovality
Site Specific Repairs	
Location	**Required Action**
Distance From MH60007318	

5.0m	150mm PVC watermain through top of pipe
Reverse set-up Distance from MH60007322	
2.5m	Solid debris removal – roots at joint at 12:00

McNaughton Av (Asset No. MA60012408)	**2nd MH E of Nassau St S (Asset No. MH60010600) to MH at Osborne St (E of CL) (Asset No. MH60010673)**
Size/Shape	450mm
Material	Vitrified Clay
Total Length	99.6m
Sewer Depth to Invert – maximum	4.13m
Design Condition 20.7m – 25.3m	 Fully deteriorated – 10% Ovality

Site Specific Repairs	
Location	**Required Action**
Distance From MH60010600	
8.1m	Remove intruding service at 10:00
18.7m	Solid debris removal – encrustation at service from 8:00 to 10:00
22.3m	Solid debris removal – displaced pipe at 11:00
22.8m	Solid debris removal – displaced pipe at 6:00

Rathgar Av (Asset No. MA60012373)	**2nd MH E of Nassau St (Asset No. MH60010564) to MH at Osborne St (WPL) (Asset No. MH60010620)**
Size/Shape	375mm
Material	Vitrified Clay
Total Length	97.0m
Sewer Depth to Invert – maximum	5.95m
Design Condition	

49.4m – 51.0m	Partially deteriorated – 5% Ovality
Site Specific Repairs	
Location	**Required Action**
Distance From MH60010564 77.2m 84.2m	 Solid debris removal – encrustation on pipe wall from 3:00 to 5:00 Solid debris removal – encrustation at joint from 12:00 to 6:00

St. Anne's Rd (Asset No. MA50018732)	**MH at Wingham Av (Asset No. MH50011580) to MH at Portland Av (Asset No. MH50014462)**
Size/Shape	300m
Material	Concrete
Total Length	21.80m
Sewer Depth to Invert – maximum	3.36m
Design Condition 19.5m – MH50014462	 Partially deteriorated – 5% Ovality
Site Specific Repairs	
Location	**Required Action**
Distance From MH50011580 20.0m 20.1m	 Solid debris removal – displaced joint at 8:00 to 10:00 Solid debris removal – inner tube lodged in joint at 8:00

E2.3.7 Submittals Before Starting Work

(a) Provide the required submittals to the Contract Administrator a minimum of 10 days before starting the lining.

(b) Submit the CIPP design Shop Drawings in accordance with CW1110 and sealed and signed by a Professional Engineer licensed to practice in the Province of Manitoba. Include the following information.

(i) CIPP thickness computations including all specified design checks. 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.

(ii) Calculations showing the hydraulic capacity of the CIPP sewer will be equal to or greater than the existing sewer.

(iii) Name and manufacturer of the resin and tube proposed for each CIPP.

(iv) CIPP curing schedule provided by the resin supplier indicating the temperature, staging, duration and pressure required to achieve a proper cure of the resin and fabric tube composite.

(v) 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.

(c) Resin Samples

(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) 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.

(d) Submit an operations protocol that provides information on the following.

(i) Resin impregnation method.

(ii) Designated location of the wet out facility.

(iii) Documentation the resin to be used has not exceeded its shelf life as recommended by the manufacturer of the resin.

(iv) Volume 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.

(e) Submit a construction protocol that provides information on the following.

(i) Proposed main line and sewer service flow control arrangements.

(ii) Minimum pressure to hold the tube tight against the existing sewer and the maximum pressure to not damage the sewer or uncured liner.

(iii) 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.

(iv) Number and location of heat source monitor gauges.

(v) Minimum and maximum allowable temperature during each phase of the cure period as measured at the heat source return line.

(vi) Number of stages and anticipated time for each stage of the curing period based on resin supplier's recommendations.

(vii) Estimated length of time required to reinstate the main line sewer and sewer services.

(f) Provide the following additional information for internal point repair CIPP.

(i) Limiting capacity of the flow through by-pass piping.

(ii) Details of the internal point repair CIPP installation method.

(iii) Means of curing such as ambient, steam or hot water and quality assurance procedures in-place to determine curing requirements are achieved.

(iv) Estimated length of time for installation of the internal point repair and to reinstate service services.

E2.4 CONSTRUCTION METHODS

E2.4.1 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.

(iii) Use calibrated callipers or other suitable measuring device capable of measuring accurately to +/- 1 millimetre to confirm cross section geometry at clock positions of:

- 12:00 to 6:00,
- 2:00 to 8:00,
- 3:00 to 9:00 and
- 4:00 to 10:00.

(iv) Estimate the remainder of the sewer dimensional requirements based on dimensional checks and the Sewer Maintenance Inspections.

(b) 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 end.

(ii) Continuous or discontinuous (every 5 metres) measurement of the height and width of the sewer along the entire length of the sewer. The actual measurements and distance of the measurements from the upstream manhole are to be visible on the measuring tape or device and recorded on a Pre-Design Inspection and the Post Lining Inspection.

E2.4.2 Sewer Cleaning

(a) Remove loose and solid debris and intruding connections in accordance with CW 2140 to adequately prepare the sewer for lining.

E2.4.3 Sewer Inspections

(a) Perform the following sewer inspections in accordance with CW 2145 in the presence of the Contract Administrator. Water level in pipe during inspections must be no more than 5% of pipe diameter or height.

(i) Pre-Sewer Repair Inspection, where required, before starting any excavation. No coding submission will be required.

(ii) Pre-Design Inspection, where required, prior to preparing the CIPP design. No coding of the submission will be required.

(iii) Pre-Lining Inspection after sewer cleaning and preparation. No coding of the submission will be required.

(iv) Post-Lining Inspection subsequent to installing the CIPP and sewer service reinstatement. Full coding required.

(v) Warranty Inspection before expiration of the warranty period and acceptance. Full coding required.

(b) Review the Pre-Sewer Repair Inspection video with the Contract Administrator before starting the repair work to confirm the extent and precise location of external sewer repairs.

(c) Review the Pre-Design Inspection video to confirm the height and width of sewers larger than 600 millimetres in diameter and non-circular sewers.

(i) Provide a copy of the video to the Contract Administrator.

(ii) 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 CIPP prior to liner design.

(d) Review the Pre-Lining Inspection videotape with the Contract Administrator at least 24 hours before installing the CIPP and obtain approval to install the CIPP. The Pre-Lining Inspection shall confirm:

(i) Necessary cleaning and pipe preparation work, including internal and external sewer repairs, have been satisfactorily completed.

(ii) Condition of the sewer pipe is consistent with the design conditions and the Specifications. 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 CIPP prior to commencing lining.

(iii) Location, condition and operational status of all sewer services.

(iv) The limit and precise location for each internal point repair.

(v) Review Sewer Service Reports while reviewing the Pre-Lining Inspection.

(e) Post-Lining Inspection is to confirm the adequacy of sewer service reinstatements and the fit and finish of the CIPP including continuous or discontinuous (every 5 metres) measurement of the height and width of large diameter and non-circular sewers along the entire length of the sewer. The actual measurements and distance of the measurements from the upstream manhole are to be visible on the measuring tape or device and recorded on the Post Lining Inspection.

(f) Warranty Inspection to confirm the fit and finish of the CIPP, need for any remedial work and acceptance of any repair work performed during the warranty period. Sewer cleaning in accordance with CW 2140 is required to obtain a satisfactory inspection.

E2.4.4 Sewer Service Report

(a) Confirm exact location of all sewer services connected to the sewer being lined by dye testing methods.

(b) Submit a written Sewer Service Report for each CIPP location to the Contract Administrator providing the following information for each sewer service.

(i) Operational status of each sewer service (live or out of service). For live services indicate the property address of structure serviced.

(ii) Distance from the upstream manhole in metres and clock reference of the connection position to the sewer.

(iii) Diameter in millimetres.

(iv) Material type.

(v) Observed condition of the sewer service.

E2.4.5 Flow Control

(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) 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.

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

(e) 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. Provide necessary supplies for portable toilets and clean as often as required while in use. Remove portable toilets promptly once sewer service is reinstated.

(f) 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.

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

(h) Restore the surface in accordance with CW 2130 and the following specifications:

(i) Boulevard areas in accordance with CW 3510.

(ii) Concrete pavement in accordance with CW 3230.

(iii) Asphaltic pavement in accordance with CW 3410.

(iv) Concrete sidewalk and interlocking paving stone in accordance with CW 3325 and CW 3330.

E2.4.6 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 in accordance with E3 of this specification.

(i) Fill holes in 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.

(c) Removal of Intruding Sewer Services and Solid Debris Cutting

(i) Remove intruding sewer services and solid debris in accordance with CW 2140.

(d) Sewer Service Grouting

(i) Fill voids around sewer services with a non-shrink, watertight cement grout, an appropriate polyurethane grout compound, or other approved grouting product to form a smooth watertight connection.

E2.4.7 Manhole and Catch Basin Repairs

(a) Complete manhole and catch basin repairs as indicated in the Specifications and Drawings in accordance with CW 2130.

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

E2.4.8 Weather

(a) Review the Environment Canada weather forecast with the Contract Administrator before starting CIPP lining installation.

(b) Delay installation of CIPP when the anticipated weather conditions are such that anticipated sewer flow will exceed the flow control measures provided.

E2.4.9 Installation of CIPP

(a) Install liners by inversion methods in accordance with ASTM F1216 or by pull-in methods in accordance with ASTM F1743-96.

(i) Full segment and partial full segment CIPP shall be cured by hot water or steam.

(ii) Internal point repair CIPP shall be ambient, hot water or steam cured.

(b) Carry out workmanship in accordance with ASTM D5813.

(c) Trim ends of CIPP neatly to fit flush with interior vertical surface and manhole benching and seal to make watertight.

(d) 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 mixture compatible with the CIPP.

(e) 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.

(f) 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.

E2.4.10 Reinstatement of Sewer Services

(a) Reinstate live sewer services 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) Fill voids between the CIPP and the host pipe at sewer service openings with a non-shrink, watertight cement grout or an appropriate polyurethane grout compatible with the liner system, or other approved grouting product to form a smooth watertight connection.

(ii) Locations for sewer service grouting shall be identified by the Contract Administrator during review of Post Lining Video Inspection.

(iii) 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.

(iv) Repair of defective or incomplete sewer service grouting shall be at the Contractors own expense.

E2.4.11 Sewer Inspection Reports

(a) Provide the Contract Administrator with the following sewer inspection reports prepared in accordance with CW 2145.

(i) Submit pre-sewer repair inspection and pre and post-lining inspection and reports before Total Performance of Work.

(ii) Submit a warranty inspection report before Final Acceptance of Work.

E2.4.12 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.
- Means of curing internal point repair liners.

(ii) Continuous log of pressure maintained in the liner during the curing period.

(iii) Pulling force used to pull or winch CIPP into place in the host sewer and measured liner elongation.

(iv) 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.

E2.4.13 Confined Test Samples

(a) 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.

(b) Locate the test sample from in an intermediate manhole or at a termination point and invert through the form.

(c) 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.

(d) Identify the location where the liner sample is from on the form and provide to the Contract Administrator intact in the form.

(e) 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.

(f) If it can be demonstrated that it is impractical to obtain confined test samples due to CIPP size and site specific conditions then results from test plate samples modified in accordance with Clause E2.4.14 (iv) of this specification will be used to confirm flexural strength and flexural modulus.

E2.4.14 Test Plate Samples

(i) Obtain and provide the Contract Administrator with test plate samples of each CIPP.

(ii) Prepare test plate samples on-site from the actual CIPP and cure in a clamped mold placed in the downtube or manhole.

(iii) The Contract Administrator will coordinate and pay for test plate sample testing to confirm the flexural strength, flexural modulus and thickness in accordance with the requirements of ASTM D5813, D790, and D3567.

(iv) Flexural strength and flexural modulus results obtained from test plates will be reduced by the maximum percentage difference of the confined pipe and test plate samples prepared from the same CIPP system for at least 3 previous CIPP linings on the same project.

(v) Schedule installation of liners for which confined pipe samples are impractical to obtain after at least 3 other CIPP linings on the same project have been completed and confined pipe and test plate samples have been secured to provide collaborative testing.

(vi) Obtain and provide the Contract Administrator with pre and post lining measurements taken in accordance with Clause E2.4.1 of this specification to confirm in-place liner thickness.

(vii) The Contract Administrator will review liner thickness results taken from test plates or unconfined samples on a case-by-case basis.

E2.4.15 Infrared Spectroscopy

(a) The Contract Administrator will arrange and pay 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.

E2.4.16 Post Construction Design Review for Total Performance

(a) The Contract Administrator will perform a post-construction design review to ensure that the completed CIPP meets the 50 year design life structural requirements prior to 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) 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.

(e) 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.

(f) 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.

(g) Review remedial action with the Contract Administrator prior to implementation.

(h) Perform further testing, monitoring and calculations and install structural enhancements at own cost.

E2.5 MEASUREMENT AND PAYMENT

E2.5.1 Mobilization and Demobilization

(a) Mobilization and demobilization will be measured on a unit basis and paid for at the Contract Unit Price for “Mobilization and Demobilization”. Number of units to be paid for will be the total number of units of equipment set-up and removed, personnel, office and storage facilities to the job site and site clean up supplied and delivered in

accordance with this specification, accepted and measured by the Contract Administrator.

(b) 50% of the Mobilization and Demobilization unit price will be paid on the first progress payment.

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

E2.5.2 Verification of Existing Sewer Dimensions

(a) Verification of existing sewer dimensions including the pre-design inspection will not be measured for separate payment and will be included with CIPP installation.

E2.5.3 Submittals Before Starting Work

(a) Submittals required before starting work including CIPP design, resin samples, operations protocol and construction protocol will not be measured for separate payment and will be included with CIPP installation.

E2.5.4 Sewer Cleaning

(a) Sewer cleaning will be measured and paid for in accordance with CW 2140.

E2.5.5 Sewer Inspections

(a) Sewer inspections will be measured and paid for in accordance with CW 2145.

E2.5.6 Sewer Service Reports

E2.5.7 Sewer service reports will not be measured for separate payment and will be included with CIPP installation.

E2.5.8 Flow Control

(a) Flow control measures necessary for mainline and all sewer services will be measured on a unit basis and paid for at the Contract Unit Price for “Flow Control”. 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) 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.

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

E2.5.9 Sewer Preparation and Repairs Prior to Lining

(a) Internal sewer pipe repairs will be measured and paid for in accordance with E3.

(b) Removal of intruding sewer services and solid debris cutting will be measured and paid for in accordance with CW 2140.

(c) 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”. 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.

E2.5.10 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) Internal Point Repairs CIPP measurement will be made along the length of the internal point repair CIPP as measured by the post ling video inspection. Internal point repair CIPP 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.

E2.5.11 Reinstatement of Sewer Services

(a) Reinstatement of sewer services will be measured on a unit basis and paid for at the Contract Unit Price for "Reinstatement of Sewer Services". Number of units to be paid for will be the total number of units reinstated in accordance with this specification, accepted and measured by the Contract Administrator.

(b) Where additional payment is to be made for sewer service grouting it shall be measured and paid as "Sewer Service Grouting – After Lining".

E2.5.12 Sewer Service Grouting After Lining

(a) Sewer service grouting will be measured on a unit basis and paid for at the Contract Unit Price for "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.

E2.5.13 Sewer Inspection Reports

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

E2.5.14 Quality Control Records

(a) Quality control records will not be measured for separate payment and will be included with payment for CIPP installation.

E2.5.15 Test Samples

(a) CIPP test samples will not be measured for separate payment and will be included with payment for CIPP installation.

E2.5.16 Manhole Repairs

(a) Manhole frames, covers, rungs and risers removed and replaced to facilitate the CIPP installation will not be measured for separate payment and will be included with payment for CIPP installation.

E3. INTERNAL POINT REPAIRS BY CIPP METHODS

E3.1 Description

(a) This Specification shall cover the repair of defective sewers at select locations by trenchless methods utilizing CIPP products.

(b) The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, material, equipment, tools, supplies, and all other

things necessary for and incidental to the satisfactory performance and completion of all Works shown on the Drawings and hereinafter specified.

E3.2 Materials

E3.2.1 CIPP Point Repair Products

(a) Minimum material requirements for Internal CIPP point repairs shall conform to ASTM D5813 “Standard Specification for Cured-In-Place Thermosetting Resin Sewer Pipe” and the supplemental requirements noted herein.

(b) In accordance with ASTM D5813 and the supplemental requirements noted herein, CIPP point repairs shall be designed as Type III for end use in a fully deteriorated conduit. CIPP point repairs shall be carried out with Grade 1 – thermosetting polyester resin or Grade 2 – epoxy resin.

(c) Ambient cure resins shall be permitted.

E3.2.2 Verification of Existing Sewer Dimensions

(a) Prior to manufacture of the point repair fabric tube for any location the Contractor shall site verify dimensional requirements (diameter, length, etc.) for each section of sewer where point repairs are proposed.

(b) At each location a minimum of 2 sets of measurements shall be made on each pipe to confirm the existing pipe’s cross section dimensions. The measurements shall be made at the entrance to the pipe and at a distance of 500 mm or greater within the section.

(c) Cross section dimensions shall be obtained by the use of a set of calibrated calipers, a steel tape, or other suitable measuring device. A cloth or non-calibrated tape is not suitable for use. The measurements shall be accurate to +/- 1 mm.

(d) Dimensional requirements for the remainder of the pipe shall be estimated based on the dimensional checks and the maintenance inspections provided herein.

E3.3 Design Requirements

E3.3.1 Design Objectives

(a) The design objectives for carrying out internal point repairs by CIPP methods include:

(i) Maximize the structural enhancement of the point repair system by provision of a close-fit liner with no annulus between the liner and the host pipe.

(ii) Provide minimal impact or increase the hydraulic capacity of the rehabilitated sewer.

(iii) Provide a smooth transition between the point repair and the host pipe to prevent the build-up of solids and minimize wear on the point repair system due to routine sewer cleaning and maintenance activities

(iv) Eliminate infiltration and exfiltration at the point of repair

(v) Fill any existing voids outside the pipeline at the point of repair

(vi) Prevention of root intrusion

(vii) Provide sufficient chemical resistance to prevent future materials degradation related to the conveyance of sewage.

(viii) Minimize sewer service disruption as a result of the repair.

(ix) Minimize the time required to complete the repair.

(x) Minimize disruption to vehicular and pedestrian traffic.

(xi) Minimize the impact of construction on commercial, industrial, and institutional enterprises.

(b) The point repair system selected for use and the Contractor's approach to effecting internal point repairs shall be geared towards maximizing the achievement of these design objectives.

E3.3.2 Point Repair Liner Design

(a) Point repair liners shall be designed in accordance with Appendix X1 of ASTM F1216 as a gravity pipe in a partially or fully deteriorated pipe condition and the supplemental requirements herein. The required design condition (partially or fully deteriorated) for each repair area is noted in Appendix A – 2005 TPR Locations and Design Conditions of these Specifications.

(b) The liner shall be sized in accordance with the design objectives to provide a close-fit with the host pipe with no annulus with the exception of the maximum allowable diametric shrinkage due to curing permitted in ASTM D5813.

(c) For both partially and fully deteriorated designs a design check shall be performed to confirm that the rehabilitated section of pipe will have a hydraulic capacity equal to or greater than the existing pipeline. This design check shall be based on full flow capacity and the use of Manning's formula. The assumed long-term Manning's 'n' for the CIPP section shall be 0.012. The roughness of the existing section shall be estimated based on the observed condition of the pipeline from the maintenance inspection.

(d) The design features of the point repair system shall also include:

(i) Tapered end section to promote a smooth transition from point repair to host pipe.

(ii) A means to facilitate flow through by-pass of existing wastewater during the course of the repair.

E3.3.3 Point Repair Design – Partially Deteriorated

(a) Partially deteriorated design, where specified, shall be designed in accordance with Appendix X1 of ASTM F1216 and the following minimum design checks:

(i) Wall thickness determination by restrained buckling analysis.

(ii) A design check to determine whether wall thickness will be governed by long term flexural stress.

(iii) Design checks to determine whether any localized thickening is required for missing segments or holes.

(b) In the case of a pipeline with invert "flats" supplemental design checks shall be carried out to determine whether wall thickness is governed by:

(i) Buckling, by assuming the flat functions as a pin-ended strut.

(ii) Stress, by assuming the flat functions as a pinned member, subjected to axial and transverse loads.

(iii) Deflection, by assuming that allowable deflection is limited to 3% of the length of the flat.

(c) For partially deteriorated design the following minimum design assumptions shall be employed:

(i) The groundwater load shall be calculated based on the assumption that the groundwater table is 2.0 m below the existing ground surface.

(ii) The combined loading shall include an allowance for an AASHTO HSS25 concentrated live load.

(iii) An enhancement factor (K) of 7.

(iv) The value assumed for ovality of the existing conduit shall be a minimum of 3% unless a greater value is specified in Table E2.3.6 or warranted based on the

Contractor's observation of the CCTV inspection prior to effecting the point repair.

(v) The long-term value for the flexural strength shall be deemed to be:
- the projected value at 50 years of continuous application of the design load based on the specific resin and felt composite proposed for use as established by ASTM D2990 - Standard Test Methods for Tensile, Compressive, and Flexural Creep and Creep-Rupture of Plastics
- In the case of having no ASTM D2990 values, 25% of the flexural strength value as established by ASTM D790 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials

(vi) The minimum factor of safety (N) to be utilized in the restrained buckling analysis shall be 2.

E3.3.4 Point Repair Design - Fully Deteriorated

(a) Fully deteriorated design, where specified, shall be based on the modified AWWA formula as detailed in Appendix X1 of ASTM F1216 and the following minimum design assumptions shall be employed:

(i) The total external pressure on the pipe shall include an allowance for an AASHTO HSS25 concentrated live load.

(ii) The minimum soil density utilized in computation of the dead load shall be 1920 kg/m3.

(iii) The height of water above the pipe shall be based on the assumption that the groundwater table is 2.0 m below the existing ground surface.

(iv) The ovality reduction factor shall be based on a minimum value of 2% unless a greater value is specified in Table E2.3.6 or warranted based on the Contractor's observation of the maintenance inspection prior to effecting the point repair.

(v) The long-term value for the flexural strength shall be deemed to be:
- the projected value at 50 years of continuous application of the design load based on the specific resin and felt composite proposed for use as established by ASTM D2990 - Standard Test Methods for Tensile, Compressive, and Flexural Creep and Creep-Rupture of Plastics,
- in the case of having no ASTM D2990 values, 25% of the flexural strength value as established by ASTM D790 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials

(vi) The modulus of soil reaction (E's) shall be assumed to be 6900 kPa unless a higher or lower value is specified herein.

(vii) The minimum factor of safety (N) to be utilized in the fully deteriorated design analysis shall be 2.

E3.3.5 Existing Sewer Design Conditions

(a) The assessment of liner system design conditions and site specific repairs required to accommodate lining were based on the conditions observed from sewer inspections that were performed in 2004 and 2005 as part of the City of Winnipeg's Sewer Cleaning and Inspection Programs. Digital copies of these inspections may be obtained upon request.

(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 specific repair requirements are shown in Table E2.3.6

E3.3.6 Submittals

(a) At least 15 days prior to commencing the Work, the following submittals are required.

(i) Design Submission

- A design submission detailing all point repair thickness computations in accordance with these specifications and the Contractor's interpretation of the condition of the sewer from the maintenance/pre-lining video inspections sealed by a Professional Engineer licensed to practice in the Province of Manitoba.
- Independent third party verification of the flexural strength of the composite fabric tube and resin system(s) proposed for use based on ASTM D790 or ASTM D2990. If independent third party testing results are not available for the proposed fabric tube and resin system(s), samples of said system shall be provided to the Contract Administrator for independent test verification.
- Samples shall be provided in accordance with the requirements of E3.5.3 (full diameter confined sample). The samples shall be provided a minimum of three weeks in advance of the repair system being used on the Works of this project. The samples shall originate from a "sample repair" performed in the Contractors shop or from an "actual repair" (extension of repair at manhole) being performed on another project. The Contract Administrator shall be notified of the date and location of the sample preparation in order that they may witness the sample preparation if they choose to do so. The Contractor shall be responsible for transporting the sample to Winnipeg for testing.

(ii) Resin Samples

- The Contractor shall arrange for the manufacturer of the resin to forward a reference sample of each resin proposed for use to a test laboratory designated by the Contract Administrator to be used as a comparative reference sample for infrared spectrum testing. The supply and delivery of the sample shall be at no cost to the City. The cost of the infrared testing shall be borne by the City.
- The Contractor, at his own expense, shall deliver a sample of each resin to be used on the project, from the wet-out facility to a test laboratory designated by the Contract Administrator. The resin shall be a representative sample of the resin proposed for use prior to the addition of the catalyst. The Contract Administrator will coordinate an infrared analysis of the sample(s). The cost of the infrared testing shall be borne by the City.

(iii) The Contractor shall submit an Operations Protocol outlining:

- Details of the wet-out operation.
- Documentation that the resin proposed for use has not exceeded its shelf life as recommended by the manufacturer of the resin.
- The volume of resin to be impregnated at each repair location including the proposed excess allowance for polymerization and migration into cracks and joints of the host pipe.

(iv) The Contractor shall submit a Construction Protocol identifying:

- Limiting capacity of the flow through by-pass piping.
- Details of the proposed liner installation method.
- Means of curing proposed (ambient, steam, etc.) and quality assurance procedures in-place to determine curing requirements are achieved.

- The minimum pressure to hold the tube tight against the existing conduit and the maximum pressure so as not to damage the conduit.
- Anticipated timing for execution of the point repair and, if appropriate, for service lateral reinstatement

E3.4 Construction Methods

E3.4.1 Sewer Cleaning and Preparation

(a) The Contractor shall remove all loose and solid debris and intruding connections, in accordance with the requirements of CW 2140. Sewer Cleaning and Preparation, to adequately prepare the sewer for internal point repairs.

E3.4.2 Sewer Inspection and Identification of Point Repair Requirements

(a) The Contractor shall perform all sewer inspections in accordance with CW 2145. A minimum of three sewer inspections shall be performed during the course of the Work:

(i) pre-point repair inspection - after sewer cleaning and preparation for lining (WRc coding not required)

(ii) post-point repair inspection - subsequent to execution of the repairs and any service lateral reinstatement

(iii) warranty inspection –final acceptance prior to expiration of the warranty.

(b) The pre-point repair inspection shall confirm:

(i) That all necessary cleaning and pipe preparation work has been satisfactorily completed and that the condition of the pipe is consistent with the specific design conditions shown in Table E2.3.6. Upon review of the pre-point repair inspection the Contractor shall advise the Contract Administrator of any condition that is contrary to the specific design conditions or the assumptions made by the Contractor, that may affect either long or short term performance of the repair. The Work shall not commence until the sewer has been inspected and the Contractor has provided his comment.

(ii) Sewer connection lateral locations, their condition, and operational status.

(iii) Upon review of the pre-point repair inspection the Contract Administrator will advise the Contractor of the limits required for each specific point repair. In general, the limits specified for repair will extend to a minimum of 300 mm in each direction beyond the limits of any defect that warrants repair. In the case of point repairs that terminate at sewer connections the length of the point repair shall extend a minimum distance of 300 mm beyond the limit of the connecting pipe.

The pre-point repair inspection shall be reviewed with the Contract Administrator at least 24 hours prior to performing the Work.

(c) The post-point repair inspection shall confirm the fit and finish of the point repair system and the adequacy of any connection piping reinstatements.

(d) The warranty lining inspection shall confirm the fit and finish of the point repair system and any repair work performed during the warranty period.

E3.4.3 Sewer Connections Laterals

(a) The Contractor shall confirm the exact location of all live sewer connection laterals by dye testing methods within the point repair areas.

(b) The Contractor shall submit to the Contract Administrator a sewer connection lateral report for each sewer repair area. The report will provide the following information:

(i) Property serviced including the address;

(ii) Location of connection (chainage and clock reference);
(iii) Diameter of sewer connection lateral;
(iv) Material type of sewer connection;
(v) Observed condition of connection;
(vi) Status of connection (live or dead).

E3.4.4 Existing Sewer Flow during Construction

(a) If the prevailing flow condition in the sewer to be repaired is substantially in excess of the flow through capacity of the Contractor's proposed point repair system the Contractor shall be responsible for bypassing existing sewer flow from upstream sewers during construction around the point of repair. Under no circumstances shall sewer flow be diverted directly to the environment, Land Drainage Sewers, or Storm Relief sewers.

E3.4.5 Weather

(a) The Contractor shall review the Environment Canada weather forecast with the Contract Administrator prior to commencement of point repair operations.

(b) Where the anticipated weather conditions are such that the sewer flow will substantially exceed the flow through capacity of the Contractor's proposed point repair system commencement of construction shall be delayed until favourable weather is forecast.

E3.4.6 Sealing at Manholes

(a) At manhole entrances and exits, the interface between the exterior surface of the repair and the manhole shall be made watertight. The ends of the point repair shall be neatly trimmed so the liner fits flush with the manhole interior surface. Where required, the benching of the manhole shall be restored to conform to the point repair shape and the standard requirements for manhole benching.

(b) If the point repair fails to make an adequate seal at manholes (e.g. due to broken or misaligned pipe) the Contractor shall apply a seal at that point with a resin mixture compatible with the liner.

E3.4.7 Reinstatement of Sewer Connection Laterals

(a) After the point repair has adequately cured, the Contractor shall reinstate existing active sewer connection laterals and catchbasin leads. Reinstatement shall be performed from the interior of the pipeline by means of a television camera and a remote controlled cutting device. Sewer connection reinstatement (including catchbasin leads) shall fully restore 100% of the original cross sectional area of the connection. Sewer connection reinstatement may be made by manual means in man accessible and man entry diameter ranges subject to the access requirements.

(b) If there appear to be any voids between the liner and the existing sewer wall after connection reinstatement, these voids are to be filled with a non-shrink, watertight cement grout, an appropriate polyurethane grout, a resin mixture compatible with the liner system, or other approved grouting product.

(c) If the voids are due to the condition of the existing connection and host pipe, grouting shall be measured and paid for under sewer connection lateral grouting. If the voids are due to the Contractor's method of reinstatement, deficiencies in the liner installation, or any other reason related to the Contractor's workmanship or method of operations, they shall be filled at the Contractor's expense.

E3.4.8 Sewer Inspections

(a) Upon completion of the Work, the Contractor shall provide the Contract Administrator with an inspection report, prepared in accordance with CW 2145, containing the Pre

and Post-Point Repair Inspections. The inspections shall be submitted prior to Total Performance. An inspection report containing the Warranty Inspection shall be submitted prior to Final Acceptance.

E3.5 Quality Control

E3.5.1 The following quality control records shall be compiled by the Contractor and submitted to the Contract Administrator subsequent to completion of the construction.

(a) Resin Impregnation Summary

(i) A summary of the resin impregnation including the name and volume of resin supplied, the excess quantity of resin added to during the wet out to account for polymerization and migration into the host pipe, the catalyst used, the method of impregnation, the tube name and type, the method of curing, and the time and location of the operation.

(b) Curing

(i) The resin supplier shall provide a curing schedule (duration and pressure) required to effect a proper cure of the resin and fabric tube composite.

E3.5.2 Workmanship

(a) Completed workmanship shall conform to Clause 6.2 of ASTM D5813 and the supplementary requirements noted herein.

(b) If the point repair liner does not fit tight against the host pipe at its termination points or at connecting pipe(s), the annular space shall be completely filled with a resin mixture compatible with the point repair system.

(c) The termination points of the repair shall provide a smooth and uniform flow transition from the host pipe to the repair for the full circumference of the repair.

(d) Repairs requiring multiple lengths of tube shall use a minimum tube length of 2.5m. Repair joints shall be minimized, and provide an overlap of 150mm.

E3.5.3 Physical Samples

(a) Physical samples of point repairs shall be taken from:

(i) At locations where the point repair terminates at a manhole, point repair samples shall be secured from a section of cured liner cut from the manhole. The sample shall consist of a section of liner that has been inverted through a like-diameter form.

(ii) The minimum sample size shall be 250 mm in length by the full diameter. The sample shall be provided to the Contract Administrator in tact in the form. The Contractor shall provide the necessary forms for sample forming and secure the samples. The Contract Administrator shall coordinate and pay for material testing.

(b) The Contractor shall be prepared to construct at least one sample of each size CIPP internal point repair during the course of the Work at locations where repairs do not terminate at or in close proximity to a manhole. Field samples" shall be prepared at locations designated by the Contract Administrator. Samples shall consist of a section of repair material that has be inserted through a like diameter form and cured in the invert of the manhole under existing flow conditions.

(c) A plate sample shall be prepared for each point repair undertaken in addition to the physical samples noted above from material taken from the actual repair (tube and resin) and cured in a manhole section adjacent to the repair for the duration of the repair.

(d) Where feasible, connection coupons of sufficient size shall be obtained from connection reinstatement operations.

(e) All physical samples shall be tested to confirm the flexural strength and flexural modulus in accordance with the requirements of ASTM D5813 and D790.

(f) The point repair liner thickness will be measured in accordance with the requirements of ASTM D5813 and ASTM D3567 for conformance with the design requirements.

E3.5.4 Sewer Inspections

(a) Upon completion of the Work, the Contractor shall provide the Contract Administrator with an inspection report, prepared in accordance with CW 2145, containing the pre and post-lining inspections prior to Total Performance. An inspection report containing the warranty inspection shall be submitted prior to Final Acceptance.

E3.5.5 Sewer Connections

(a) The liner shall be cut to reinstate the full diameter of the existing sewer connections. The finish of the cut out shall provide a smooth transition from the connection to the liner.

E3.5.6 Infrared Spectroscopy

(a) The infrared spectrum of the field samples (based on the Contractor-supplied resin from the wet-out) will be compared to the reference spectrum generated from the resin sample provided by the resin manufacturer to verify the installed material acceptability.

E3.5.7 Post Construction Design Review for Total Performance

(a) The Contract Administrator will perform a post-construction design review to ensure that the completed design meets the 50 year design life structural requirements prior to Total Performance. The design review shall utilize the measured values for flexural strength, flexural modulus, and liner thickness from the confined pipe or test plate sample testing.

(b) The design strength values shall be further reduced to account for creep based on the creep reduction values recommended through ASTM D2990 testing or 75% reduction in the case of no ASTM D2990 testing to assess the suitability of the liner to meet the 50 year design life requirement. The use of full enhancement factors in this analysis shall be limited to point repairs that are confirmed by visual classification to be close-fit liners based on the post-lining sewer inspection.

(c) The Contractor will be advised of any discrepancies between the constructed point repairs and the design requirements.

(d) The Contractor shall be required to confirm that any point repair deemed as structurally deficient will comply with the 50 year design life requirement through further testing (e.g. confirmation of actual ovality, determination of a more representative groundwater elevation locally through monitoring, further strength testing and thickness measurements, etc.).

(e) If further testing fails to confirm the point repair will meet the 50-year design life requirement, the Contractor shall be required to structurally enhance the installed point repair (e.g. by adding a supplemental point repair) to meet the design requirements specified herein.

(f) Any remedial action shall be reviewed with the Contract Administrator prior to implementation.

(g) All costs associated with further testing, monitoring or structural enhancement shall be borne entirely by the Contractor.

E3.6 Method of Measurement and Basis of Payment

E3.6.1 Internal Point Repairs

(a) Internal Point Repairs shall be measured on a length basis for each size of internal point repair acceptably installed. The length to be paid for shall be the total number of linear metres of point repair carried out but not greater than the specified length identified for repair during the review of the pre-repair inspection.

(b) Payment shall be at the Contract unit price for "Internal Point Repairs" for each size of repair and shall be full compensation for the supply of all equipment and materials and the performing of all operations to complete the Work as specified including any items incidental to the Work.

E3.6.2 Submittals Before Starting Work

(a) Submittals required before starting work including CIPP design, resin samples, operations protocol and construction protocol will not be measured for separate payment and will be included with CIPP installation.

E3.6.3 Sewer Cleaning

(a) Sewer cleaning will be measured and paid for in accordance with CW 2140.

E3.6.4 Sewer Inspections

(a) Sewer inspections will be measured and paid for in accordance with CW 2145.

E3.6.5 Sewer Service Reports

E3.6.6 Sewer service reports will not be measured for separate payment and will be included with CIPP installation.

E3.6.7 Sewer Preparation and Repairs Prior to Lining

(a) Internal sewer pipe repairs will be measured and paid for in accordance with E3.

(b) Removal of intruding sewer services and solid debris cutting will be measured and paid for in accordance with CW 2140.

(c) 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". 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.

E3.6.8 Reinstatement of Sewer Connections

(a) The reinstatement of sewer connections shall be measured on a unit basis for each sewer connection that is acceptably reconnected.

(b) Payment shall be at the Contract unit price for the "Reinstatement of Sewer Connections" and shall be compensation in full for the supply of all equipment and materials and the performing of all operations to complete the Work as specified including any items incidental to the Work.

(c) Where additional payment is to be made for grouting at sewer connections, it shall be measured and paid for as "Sewer Connection Grouting".

E3.6.9 Manhole Repairs

(a) Manhole frames, covers, rungs and risers removed and replaced to facilitate the CIPP installation will not be measured for separate payment and will be included with payment for CIPP installation.

E3.6.10 Flow Control

(a) Flow control shall not be measured for payment and shall not be paid separately. Payment shall be included in the prices bid for Internal Point Repairs.

E4. SEWER STABILIZATION

E4.1 Description

E4.1.1 Sewer 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 Table E2.3.6 prior to performing sewer lining.

E4.1.2 The scope of work involved in sewer stabilization is as follows:

(a) Secure the site and provide temporary traffic control;

(b) Obtain all necessary underground clearances

(c) Conduct a hazard assessment, including identification and evaluation;

(d) Develop a safe work plan;

(e) Implement the necessary procedures and controls to control hazards and maintain a safe working environment

(f) Enter the manhole/sewer and perform the required repairs.

(g) Clean-up the site.

E4.2 Materials

E4.2.1 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, Duro-Crete by C C Chemicals or approved equal.

(c) Flowable cement-stabilized fill for external void filling from the ground surface shall be in conformance with Table CW 2160.1, Type D.

E4.3 Construction Methods

E4.3.1 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 E4.3.2 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 CW2130.

E4.3.2 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 Contactor shall not enter the sewer or manholes to begin the work until they have completed a hazard assessment and safe work plan for the specific repair and reviewed the plans with their designated safety officer for acceptance. The safe work plan procedures and practices shall conform to all federal, provincial and municipal codes, regulations and guidelines including Manitoba Labour "Guidelines for Confined Space Entry".

E4.3.3 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 form the sewers and manholes.

E4.3.4 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.

E4.3.5 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. Pavement removal and restoration shall be in accordance with CW 2130.

E4.3.6 Internal Manhole Repairs

(a) Complete manhole repairs identified in the Specifications or on the Drawings in accordance with CW 2130.

E4.4 Quality Control

E4.4.1 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.

E4.4.2 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.

E4.5 Measurement and Payment

E4.5.1 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.

E4.5.2 Reinstatement of Sewer Services

(a) Reinstatement of sewer services will be measured on a unit basis and paid for at the Contract Unit Price for "Reinstatement of Sewer Services". Number of units to be paid for will be the total number of units reinstated in accordance with this specification, accepted and measured by the Contract Administrator.

(b) Where additional payment is to be made for sewer service grouting it shall be measured and paid as "Sewer Service Grouting – After Lining".

E4.5.3 Sewer Service Grouting After Lining

(a) Sewer service grouting will be measured on a unit basis and paid for at the Contract Unit Price for "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.

E4.5.4 Sewer Inspection Reports

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

E4.5.5 Quality Control Records

(a) Quality control records will not be measured for separate payment and will be included with payment for CIPP installation.

E4.5.6 Test Samples

(a) CIPP test samples will not be measured for separate payment and will be included with payment for CIPP installation.

E4.5.7 Internal Manhole Repairs

(a) Internal manhole repairs will be measured and paid for in accordance with CW 2130.

E5. CATCH BASIN LEAD INSPECTIONS

E5.1 Description

E5.1.1 This specification shall cover the cleaning and inspection of all catch basin leads connected to sewers included in this contract to be lined with a CIPP for the purposes of determining whether the catch basin lead requires repair work.

E5.2 Construction Methods

E5.2.1 Cleaning

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

E5.2.2 Video Inspections and Inspection Reports

(a) Perform video inspection from catch basin to mainline sewer and provide inspection reports in accordance with CW2145.

E5.2.3 Repair Work

(a) The Contract Administrator will review the video inspections of the catch basin leads to determine if and what type of repair work is required.

(b) Catch basin leads determined to require full segment, partial full segment or internal point repair CIPP lining shall be done in accordance with E2 of this specification.

(c) Catch basin leads determined to require replacement or external point repairs will be done by others outside of this Contract.

E5.3 Measurement and Payment

E5.3.1 Cleaning

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

E5.3.2 Video Inspection

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

E5.3.3 CIPP Lining

(a) Full segment, partial full segment and internal point repair CIPP lining of catch basin leads shall be measured and paid for in accordance with E2.