THE CITY OF WINNIPEG

TENDER

TENDER NO. 694-2024

BRANCH I AQUEDUCT UNDERDRAIN OUTFALL REPAIRS

TABLE OF CONTENTS

PART A - BID SUBMISSION

Form A: Bid/Proposal
Form B: Prices
Form G1: Bid Bond and Agreement to Bond

PART B - BIDDING PROCEDURES

B1. Contract Title 1
B2. Submission Deadline 1
B3. Site Investigation 1
B4. Enquiries 1
B5. Confidentiality 2
B6. Addenda 2
B7. Substitutes 2
B8. Bid Components 3
B9. Bid 3
B10. Prices 4
B11. Disclosure 4
B12. Conflict of Interest and Good Faith 5
B13. Qualification 6
B14. Bid Security 8
B15. Opening of Bids and Release of Information 8
B16. Irrevocable Bid 9
B17. Withdrawal of Bids 9
B18. Evaluation of Bids 9
B19. Award of Contract 9

PART C - GENERAL CONDITIONS

C0. General Conditions 1

PART D - SUPPLEMENTAL CONDITIONS

General

D1. General Conditions 1
D2. Form of Contract Documents 1
D3. Scope of Work 1
D4. Site Investigation Due Diligence and Risk 1
D5. Definitions 2
D6. Contract Administrator 3
D7. Contractor's Supervisor 3
D8. Accessible Customer Service Requirements 3
D9. Unfair Labour Practices 4
D10. Furnishing of Documents 5

Submissions

D11. Authority to Carry on Business 5
D12. Safe Work Plan 5
D13. Insurance 5
D14. Contract Security 6
D15. Subcontractor List 7
D16. Equipment List 7
D17. Detailed Work Schedule 7
D18. Requirements for Site Accessibility Plan 8

Schedule of Work

D19. Commencement 9
D20. Work By Others 9
D21. Working Days 9
D22. Schedule Restrictions 10

D23. Critical Stages 11
D24. Substantial Performance 12
D25. Total Performance 12
D26. Liquidated Damages 12
D27. Supply Chain Disruption Schedule Delays 12
D28. Scheduled Maintenance 13

Control of Work
D29. Job Meetings 13
D30. Prime Contractor – The Workplace Safety and Health Act (Manitoba) 14
D31. The Workplace Safety and Health Act (Manitoba) – Qualifications 14

Measurement and Payment
D32. Payment 14
D33. Fuel Price Adjustment 14

Warranty
D34. Warranty 15

Dispute Resolution
D35. Dispute Resolution 15

Indemnity
D36. Indemnity 16

Third Party Agreements
D37. Funding and/or Contribution Agreement Obligations 16

Form H1: Performance Bond 19

Form H2: Labour and Material Payment Bond 21
Form J: Subcontractor List 23
Form K: Equipment 24
Form L: Contractor Experience 26

PART E - SPECIFICATIONS

General
E1. Applicable Specifications and Drawings 1
E2. Soils Investigation Report 2

General Requirements
E3. Shop Drawings 2
E4. Expedited Shop Drawings 4
E5. Office Facilities 4
E6. Mobilization and Demobilization Payment 5
E7. Traffic Control 5
E8. Confined Space Entry and Inspection Support 9
E9. Environmental Protection 11
E10. Channel Protection 16
E11. Operating Constraints for Work in Close Proximity to the Branch I Aqueduct 16
E12. Excavation, Shoring, and Backfill 22
E13. Water Supply 23
E14. Suspension of Work Activities When Sewer Control Gates are Activated During Periods of High River Levels 23
E15. Riverbank Site Development 24
E16. Protection of Instrumentation 27
E17. Riverbank Excavation and Grading 27
E18. Underdrain and Outfall Repairs 30
E19. Trenchless Installation of Steel Casing Pipe 35
E20. Avenue Tache Underdrain Manhole 40
E21. Knife Gate Valves 46
E22. Manhole Insulation 49
E23. Underdrain Inspections 50
E24. Digital Panoramic Manhole Inspections 53

E25. Cured-In-Place Pipe 56
E26. Cast-In-Place Concrete 68
E27. Reinforcing Steel 70
E28. Cold Weather Concrete Work 71
E29. Riprap 72
E30. Tree Removals and Protection of Existing Trees 74
E31. Pruning of Existing Trees 76
E32. Winter Riverbank Seeding 77
E33. Hydroseeding 80
E34. Soil Amendments and Growth Medium 84
E35. Erosion Control Blanket (ECB) and Turf Reinforcement Mats (TRM) 86
E36. Silt Fence Barrier 89
E37. Straw Wattles 92
E38. Temporary Surface Restoration 94
E39. Permanent Restoration 95

PART F - SECURITY CLEARANCE

F1. Security Clearance 1

APPENDICES

Appendix A - Record Drawings
Appendix B - Site Photos
Appendix C - Stantec Confined Space Entry Policy
Appendix D - Geotechnical Reports
Appendix E - Underdrain Conditions and Repair Work Program
Appendix F - CIPP and TPR Design Conditions
Appendix G - CPKC Utility Corridor Access Application
Appendix H – Walking Path Detours

PART B - BIDDING PROCEDURES

B1. CONTRACT TITLE

B1.1 Branch I Aqueduct Underdrain Outfall Repairs

B2. SUBMISSION DEADLINE

B2.1 The Submission Deadline is 12:00 noon Winnipeg time, October 24, 2024.

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

B3. SITE INVESTIGATION

B3.1 Further to C3.1, the Contract Administrator or an authorized representative will be available at the Site at 9:00 am on October 8, 2024 to provide Bidders access to the Site. Bidders are to meet at the Rue Plinguet Outfall site on Rue Plinguet, west of Archibald St.

B3.1.1 Proponents attending the site investigation are required to register for the site investigation at least 48 hours prior to the site investigation by contacting the Contract Administrator identified in D6.1.

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

B3.3 Further to B3.1, the Bidder may view portions of the site located within public right of ways without making an appointment.

B3.4 The Bidder/Proponent is responsible for inspecting the Site, the nature of the Work to be done and all conditions that might affect their Bid/Proposal or their performance of the Work, and shall assume all risk for conditions existing or arising in the course of the Work which have been or could have been determined through such inspection

B4. ENQUIRIES

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

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

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

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

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

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

B5. CONFIDENTIALITY

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

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

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

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

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

B6. ADDENDA

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

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

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

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

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

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

B7. SUBSTITUTES

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

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

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

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

(a) provide sufficient information and details to enable the Contract Administrator to determine the acceptability of the Plant, Material or method as either an approved equal or alternative;

(b) identify any and all changes required in the applicable Work, and all changes to any other Work, which would become necessary to accommodate the substitute;

(c) identify any anticipated cost or time savings that may be associated with the substitute;

(d) certify that, in the case of a request for approval as an approved equal, the substitute will fully perform the functions called for by the general design, be of equal or superior substance to that specified, is suited to the same use and capable of performing the same

function as that specified and can be incorporated into the Work, strictly in accordance with the proposed work schedule and the dates specified in the Supplemental Conditions for Substantial Performance and Total Performance;

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

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

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

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

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

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

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

B8. BID COMPONENTS

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

(a) Form A: Bid/Proposal;

(b) Form B: Prices;

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

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

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

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

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

B9. BID

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

B10. PRICES

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

B10.1.1 Prices stated on Form B: Prices shall not include any costs which may be incurred by the Contractor with respect to any applicable funding agreement obligations as outlined in D37. Any such costs shall be determined in accordance with D37.

B10.2 The quantities listed on Form B: Prices are to be considered approximate only. The City will use said quantities for the purpose of comparing Bids.

B10.3 The quantities for which payment will be made to the Contractor are to be determined by the Work actually performed and completed by the Contractor, to be measured as specified in the applicable Specifications.

B10.4 Payments to Non-Resident Contractors are subject to Non-Resident Withholding Tax pursuant to the Income Tax Act (Canada).

B10.5 The Bidder shall enter the Total Bid Price from Form B: Prices into the Total Bid Price field in MERX.

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

B11. DISCLOSURE

B11.1 Various Persons provided information or services with respect to this Work. In the City's opinion, this relationship or association does not create a conflict of interest because of this full

disclosure. Where applicable, additional material available as a result of contact with these Persons is listed below.

B11.2 The Persons are:

(a) Capital Sewer Services Inc. – Constructability of TPRs in the Underdrain.

(b) EmPipe Infrastructure Group - Constructability of TPRs in the Underdrain.

B12. CONFLICT OF INTEREST AND GOOD FAITH

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

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

(a) other commitments;

(b) relationships;

(c) financial interests; or

(d) involvement in ongoing litigation; that could or would be seen to:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

B13. QUALIFICATION

B13.1 The Bidder shall:

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

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

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

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

(a) be responsible and not be suspended, debarred or in default of any obligations to the City. A list of suspended or debarred individuals and companies is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Purchasing Division website at https://www.winnipeg.ca/matmgt/Templates/files/debar.pdf

B13.3 The Bidder and/or any proposed Subcontractor (for the portion of the Work proposed to be subcontracted to them) shall:

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

(b) be fully capable of performing the Work required to be in strict accordance with the terms and provisions of the Contract; and

(c) have a written workplace safety and health program if required pursuant to The Workplace Safety and Health Act (Manitoba);

(d) have completed the Accessible Customer Service online training required by the Accessibility for Manitobans Act (AMA) (see B13.9 and D8)

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

B13.4 Further to B13.3, the Bidder and/or any proposed Subcontractor undertaking the Work shall, within five (5) Business Days of a request by the Contract Administrator, provide proof satisfactory to the Contract Administrator to demonstrate qualification of the Project Manager and Site Superintendent in planning and executing schedule critical work on major regional water infrastructure, including:

(a) Resume of Project Manager and Site Superintendent;

(b) Both shall have a minimum of three (3) examples of successful scheduling and execution of schedule critical construction work on regional water infrastructure, completed in the last ten (10) years.

B13.5 Further to B13.3, the Bidder and any Sub-Contractor completing excavations in close proximity (within 5 m) of the Branch I Aqueduct must be able to demonstrate the following specific qualifications in accordance with B13.10:

(a) a minimum of three (3) successful projects installing pressure pipe in diameters equal to or greater than 900 mm; and,

(b) a minimum of five (5) successful projects installing close fit shoring systems within 1.5 m of 600 mm diameter or larger pressure pipelines within the City of Winnipeg.

B13.6 Further to B13.3, the Bidder or any Sub-Contractor completing trenchless CIPP work must be able to demonstrate the following specific qualifications in accordance with B13.10:

(a) a minimum of ten (10) successful projects installing CIPP liners in the 200 to 300 mm size range in the past five (5) years;

(b) a minimum of 5,000 m of CIPP liner installed in the past five (5) years; and,

(c) be certified by the product manufacturers of all proposed systems.

B13.7 Further to B13.3, the Bidder or any Sub-Contractor completing Trenchless Point Repair (TPR) work must be able to demonstrate the following specific qualifications in accordance with B13.10:

(a) a minimum of ten (10) successful projects installing TPRs in the past five (5) years;

(b) a minimum of one hundred (100) TPR installations in the last five (5) years; and,

(c) be certified by the product manufacturers of all proposed systems.

B13.8 Further to B13.3(c), the Bidder shall, within five (5) Business Days of a request by the Contract Administrator, provide proof satisfactory to the Contract Administrator that the Bidder/Subcontractor has a workplace safety and health program meeting the requirements of The Workplace Safety and Health Act (Manitoba), by providing:

(a) written confirmation of a safety and health certification meeting SAFE Work Manitoba's SAFE Work Certified Standard (e.g., COR™ and SECOR™) in the form of:

(i) a copy of their valid Manitoba COR certificate and Letter of Good Standing (or Manitoba equivalency) as issued under the Certificate of Recognition (COR) Program administered by the Construction Safety Association of Manitoba or by the Manitoba Heavy Construction Association's WORKSAFELY™ COR™ Program; or

(ii) a copy of their valid Manitoba SECOR™ certificate and Letter of Good Standing (or Manitoba equivalency) as issued under the Small Employer Certificate of Recognition Program (SECOR™) administered by the Construction Safety Association of Manitoba or by the Manitoba Heavy Construction Association's WORKSAFELY™ COR™ Program; or

(b) a report or letter to that effect from an independent reviewer acceptable to the City. (A list of acceptable reviewers and the review template are available on the Information Connection page at The City of Winnipeg, Corporate Finance, Purchasing Division website at http://www.winnipeg.ca/matmgt/.

B13.9 Further to B13.3(d), the Bidder acknowledges they and all Subcontractors have obtained training required by the Accessibility for Manitobans Act (AMA) available at Accessibility Training for anyone that may have any interaction with the public on behalf of the City of Winnipeg.

B13.10 The Bidder shall submit, within three (3) Business Days of a request by the Contract Administrator, proof satisfactory to the Contract Administrator of the qualifications of the Bidder and of any proposed Subcontractor. The Bidder shall utilize Form L: Contractor Experience or provide similar project sheets containing all information identified in Form L: Contractor Experience. Experience provided for key project personnel must be accompanied by a project specific submission for each referenced project, complete with all identified reference contact information.

B13.11 The Bidder shall provide, on the request of the Contract Administrator, full access to any of the Bidder's equipment and facilities to confirm, to the Contract Administrator's satisfaction, that the Bidder's equipment and facilities are adequate to perform the Work.

B14. BID SECURITY

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

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

(a) The version submitted by the Bidder must have valid digital signatures and seals;

(b) The version submitted by the Bidder must be verifiable by the City with respect to the totality and wholeness of the bond form, including: the content; all digital signatures and digital seals; with the surety company, or an approved verification service provider of the surety company.

(c) The version submitted must be viewable, printable and storable in standard electronic file formats compatible with the City, and in a single file. Allowable formats include pdf.

(d) The verification may be conducted by the City immediately or at any time during the life of the bond and at the discretion of the City with no requirement for passwords or fees.

(e) The results of the verification must provide a clear, immediate and printable indication of pass or fail regarding B14.2(a).

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

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

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

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

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

B15. OPENING OF BIDS AND RELEASE OF INFORMATION

B15.1 Bids will not be opened publicly.

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

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

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

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

B16. IRREVOCABLE BID

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

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

B17. WITHDRAWAL OF BIDS

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

B18. EVALUATION OF BIDS

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

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

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

(c) Total Bid Price;

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

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

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

B18.4 Further to B18.1(c), the Award Authority may reject a submission as being non-responsive if it exceeds the funds available as shown in D3.3.

B18.5 Further to B18.1(c), the Total Bid Price shall be the sum of the quantities multiplied by the unit prices for each item shown on Form B: Prices.

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

B18.5.2 Further to B18.1(a), in the event that a unit price is not provided on Form B: Prices, the City may determine the unit price by dividing the Amount (extended price) by the approximate quantity, for the purposes of evaluation and payment.

B19. AWARD OF CONTRACT

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

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

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

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

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

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

(d) only one Bid is received; or

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

B19.3 If funding for the Work is provided to the City of Winnipeg by the Government of Manitoba and/or the Government of Canada, Bidders are advised that the terms of D37 shall immediately take effect upon confirmation of such funding, regardless of when funding is confirmed.

B19.4 Where an award of Contract is made by the City, the award shall be made to the qualified Bidder submitting the lowest evaluated responsive Bid, in accordance with B18.

B19.4.1 Following the award of contract, a Bidder will be provided with information related to the evaluation of their Bid upon written request to the Contract Administrator.

PART C - GENERAL CONDITIONS

C0. GENERAL CONDITIONS

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

C0.1.1 The *General Conditions for Construction* are available on the Information Connection page at The City of Winnipeg, Corporate Finance, Purchasing Division website at http://www.winnipeg.ca/matmgt/gen_cond.stm

C0.2 A reference in the Tender to a section, clause or subclause with the prefix "**C**" designates a section, clause or subclause in the *General Conditions for Construction*.

PART D - SUPPLEMENTAL CONDITIONS

GENERAL

D1. GENERAL CONDITIONS

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

D2. FORM OF CONTRACT DOCUMENTS

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

D3. SCOPE OF WORK

D3.1 The Work to be done under the Contract shall consist of repairs to the Branch I Aqueduct Underdrain and Underdrain outfalls.

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

(a) Replacement of the Rue Plinguet Underdrain Outfall complete with construction of a new Underdrain manhole and backflow prevention;

(b) Installation of a new Underdrain manhole on the Avenue Tache Underdrain Outfall;

(c) Renewal of the Rue Notre Dame Underdrain Outfall complete with construction of a new Underdrain manhole;

(d) Elimination of the cross connection between the Underdrain and the combined sewer system at Archibald Street and Rue Notre Dame;

(e) Elimination of the cross connection between the Underdrain and the combined sewer system at Dawson Road and Messier Street complete with new Underdrain manholes and new Underdrain along Dawson Road;

(f) External point repairs on the Underdrain at two locations on Rue Notre Dame;

(g) Trenchless point repairs on the Underdrain on Rue Notre Dame and McTavish Street;

(h) A hybrid trenchless repair with external soil grouting within the GWWD Railway Terminal; and

(i) Full segment CIPP lining of the Underdrain outfalls at the Rue Plinguet, Avenue Tache, and Rue Notre Dame sites.

D3.3 The funds available for this Contract are $3,500,000.00.

D4. SITE INVESTIGATION DUE DILIGENCE AND RISK

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

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

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

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

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

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

(f) all other matters which could in any way affect the performance of the Work; that could not have been "properly inferable", "readily apparent" and readily discoverable" using Good Industry Practice by the Contractor, results in additional Work which is a direct result of this newly discovered site condition, such additional Work will be considered by the City under Changes in Work.

D5. DEFINITIONS

D5.1 When used in this Tender:

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

(b) **"ACI"** means American Concrete Institute;

(c) **"AREMA"** means American Railway Engineering and Maintenance-of-Way Association;

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

(e) **"AWWA"** means American Water Works Association;

(f) **"Branch I Aqueduct"** means the branch aqueduct which runs between the Water Treatment Plant at Deacon's Reservoir and the McPhillips Reservoir and Pumping Station;

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

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

(i) **"CPKC"** means Canadian Pacific Kansas City Limited railway company;

(j) **"CSA"** means Canadian Standards Association;

(k) **"CSP"** means corrugated steel pipe;

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

(m) **"ECB"** means an erosion control blanket;

(n) **"External Point Repair (EPR)"** means a partial segment pipe repair installed by traditional excavation methods at an intermediate point between existing manholes;

(o) **"Fully Deteriorated (FD)"** means the host pipe is not structurally sound and cannot support soil and/or live loads, or is expected to reach this condition over the design life of the rehabilitated pipe. Liners for Fully Deteriorated pipes shall be designed to support all external loads, including: soil, live, external hydrostatic pressure, and internal pressure;

(p) **"GWWD"** means the Greater Winnipeg Water District;

(q) **"Host Pipe"** means the existing pipe intended for rehabilitation by installation and curing of a CIPP liner;

(r) **"ICRI"** means International Concrete Repair Institute;

(s) **"IGN"** means Information and Guidance Notes;

(t) **"ISO"** means International Organization for Standardization;

(u) **"Land Drainage Sewer (LDS)"** means a sewer conveying primarily land drainage (surface runoff) flows;

(v) **"Partially Deteriorated (PD)"** means the host pipe can support the soil and surcharge loads throughout the design life of the rehabilitated pipe. Liners for Partially Deteriorated pipes shall be designed to account for internal and externally hydrostatic pressure only;

(w) **"Pre-Approved Excavation Plan"** means a pre-approved excavation plan which has been prepared in conjunction with the existing conditions and objectives of the work and shows the general concept for completing excavations at specific locations for use by the Contractor in preparing their excavation and shoring plans;

(x) "**SSEMP"** means a Site Specific Environmental Management Plan;

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

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

(aa) **"Tree Protection Zone (TPZ)"** means a designated protection zone around a tree delineated by a barrier;

(bb) **"TRM"** means turf reinforcement mat;

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

(dd) **"Underdrain"** means the drainage pipe installed within the bedding on the Branch I Aqueduct as a means of controlling groundwater around the pipe; and

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

D6. CONTRACT ADMINISTRATOR

D6.1 The Contract Administrator is Stantec, represented by:

Adam Braun, P.Eng.
Senior Municipal Engineer

Telephone No. 204-977-8370
Email Address adam.braun@stantec.com

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

D7. CONTRACTOR'S SUPERVISOR

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

D8. ACCESSIBLE CUSTOMER SERVICE REQUIREMENTS

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

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

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

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

(b) providing reasonable accommodations;

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

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

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

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

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

D9. UNFAIR LABOUR PRACTICES

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

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

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

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

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

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

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

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

D10. FURNISHING OF DOCUMENTS

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

SUBMISSIONS

D11. AUTHORITY TO CARRY ON BUSINESS

D11.1 The Contractor shall be in good standing under The Corporations Act (Manitoba), or properly registered under The Business Names Registration Act (Manitoba), or otherwise properly registered, licensed or permitted by law to carry on business in Manitoba, or if the Contractor does not carry on business in Manitoba, in the jurisdiction where the Contractor does carry on business, throughout the term of the Contract, and shall provide the Contract Administrator with evidence thereof upon request.

D12. SAFE WORK PLAN

D12.1 The Contractor shall provide the Contract Administrator with a Safe Work Plan at least five (5) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 for the return of the executed Contract Documents, if applicable.

D12.2 The Safe Work Plan should be prepared and submitted in the format shown in the City's template which is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Purchasing Division website at http://www.winnipeg.ca/matmgt/Safety/default.stm

D12.3 Notwithstanding B13.8 at any time during the term of the Contract, the City may, at their sole discretion and acting reasonably, require an updated COR Certificate or Annual Letter of good Standing. A Contractor, who fails to provide a satisfactory COR Certificate or Annual Letter of good Standing, will not be permitted to continue to perform any Work.

D13. INSURANCE

D13.1 The Contractor shall provide and maintain the following insurance coverage:

(a) commercial general liability insurance, in the amount of at least five million dollars ($5,000,000.00) inclusive, with The City of Winnipeg and Canadian Pacific Railway Company added as an additional insured, with a cross-liability clause, such liability policy to also contain contractual liability, unlicensed motor vehicle liability, non-owned automobile liability, sudden and accidental pollution liability coverage, broad form property damage cover and products and completed operations, to remain in place at all times during the performance of the Work and throughout the warranty period. The certificate of insurance shall be endorsed to state that coverage includes work within fifty (50) feet of the railroad property;

(b) if applicable, Automobile Liability Insurance covering all motor vehicles, owned and operated and used or to be used by the Contractor directly or indirectly in the performance of the Work. The Limit of Liability shall not be less than $2,000,000 inclusive for loss or damage including personal injuries and death resulting from any one accident or occurrence;

(c) an all-risks Installation Floater carrying adequate limits to cover all supplies and/or materials intended to enter into and form part of any installation.

(d) Property insurance for all mobile offices, portable toilets, machinery and equipment.

D13.2 Deductibles shall be borne by the Contractor.

D13.3 All policies shall be taken out with insurers licensed to carry on business in the Province of Manitoba.

D13.4 All subcontractors performing work on the project shall provide the contractor with evidence of comparable insurances as outlined in D13.1(a) and D13.1(b) above and be registered with Workers Compensation Board of Manitoba and maintain insurance and workers compensation coverage throughout the performance of the Work, the Contractor shall provide the Contract Administrator with evidence of the same prior to the commencement of any Work by the subcontractors.

D13.5 The Contractor shall provide the City Solicitor with a certificate(s) of insurance, in a form satisfactory to the City Solicitor, at least two (2) Business Days prior to the commencement of any Work but in no event later than the date specified in C4.1 for the return of the executed Contract Documents, as applicable.

D13.6 The Contractor shall not cancel, materially alter, or cause each policy to lapse without providing at least thirty (30) Calendar Days prior written notice to the Contract Administrator.

D14. CONTRACT SECURITY

D14.1 The Contractor shall provide and maintain the performance bond and the labour and material payment bond until the expiration of the warranty period in the form of:

(a) a performance bond of a company registered to conduct the business of a surety in Manitoba, in the form attached to these Supplemental Conditions (Form H1: Performance Bond), in the amount of fifty percent (50%) of the Contract Price; and

(b) a labour and material payment bond of a company registered to conduct the business of a surety in Manitoba, in the form attached to these Supplemental Conditions (Form H2: Labour and Material Payment Bond), in an amount equal to fifty percent (50%) of the Contract Price.

D14.1.1 Where the contract security is a performance bond, it may be submitted in hard copy or digital format. If submitted in digital format the contract security must meet the following criteria:

(a) the version submitted by the Contractor must have valid digital signatures and seals;

(b) the version submitted by the Contractor must be verifiable by the City with respect to the totality and wholeness of the bond form, including: the content; all digital signatures and digital seals; with the surety company, or an approved verification service provider of the surety company.

(c) the version submitted must be viewable, printable and storable in standard electronic file formats compatible with the City, and in a single file. Allowable formats include pdf.

(d) the verification may be conducted by the City immediately or at any time during the life of the bond and at the discretion of the City with no requirement for passwords or fees.

(e) the results of the verification must provide a clear, immediate and printable indication of pass or fail regarding D14.1.1(b).

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

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

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

D14.3 The Contractor shall, as soon as practicable after entering into a contract with a Subcontractor:

(a) give the Subcontractor written notice of the existence of the labour and material payment bond in D14.1(b); and

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

D15. SUBCONTRACTOR LIST

D15.1 The Contractor shall provide the Contract Administrator with a complete list of the Subcontractors whom the Contractor proposes to engage (Form J: Subcontractor List) at least two (2) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in the General Conditions for the return of the executed Contract Documents, if applicable.

D16. EQUIPMENT LIST

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

D17. DETAILED WORK SCHEDULE

D17.1 The Contractor shall provide the Contract Administrator with a detailed work schedule at least ten (10) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 for the return of the executed Contract Documents if applicable.

D17.2 The detailed work schedule shall consist of the following:

(a) A critical path method (C.P.M.) schedule for the Work

(b) A Gantt chart for the work

(c) all acceptable to the Contract Administrator

D17.3 Further to D17.2(a), the C.P.M schedule shall clearly identify the start and completion dates of all of the following activities/tasks making up the Work as well as showing those activities/tasks on the critical path.

(a) Rue Pinguet Underdrain Outfall work;

(b) Avenue Tache Underdrain Outfall work;

(c) Rue Notre Dame Underdrain Outfall work;

(d) External Point Repairs;

(e) Trenchless Point Repairs;

(f) Full segment CIPP lining;

(g) Archibald Street cross connection work;

(h) Dawson Road cross connection work;

(i) All planned breaks in construction; and

(j) All Branch I Aqueduct shutdowns.

D17.4 Further to D17.2(b), the Gantt chart shall show the time on a weekly basis, required to carry out the Work of each trade, or specification division. The time shall be on the horizontal axis, and the type of trade shall be on the vertical axis.

D18. REQUIREMENTS FOR SITE ACCESSIBILITY PLAN

D18.1 The Contractor shall provide the Contract Administrator with an Accessibility Plan at least five (5) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 for the return of the executed Contract Documents, if applicable.

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

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

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

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

(d) How the Contractor will maintain cycling facilities.

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

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

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

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

(a) Signage

(b) Temporary Ramping

(c) Transit Stops

(d) Detour Signage

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

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

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

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

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

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

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

SCHEDULE OF WORK

D19. COMMENCEMENT

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

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

(a) the Contract Administrator has confirmed receipt and approval of:
  (i) evidence of authority to carry on business specified in D11;
  (ii) evidence of the workers compensation coverage specified in C6.15;
  (iii) the Safe Work Plan specified in D12;
  (iv) evidence of the insurance specified in D13;
  (v) the contract security specified in D14;
  (vi) the Subcontractor list specified in D15;
  (vii) the equipment list specified in D16;
  (viii) the detailed work schedule specified in D17;
  (ix) the Requirements for Site Accessibility Plan specified in D18; and
  (x) the direct deposit application form specified in D32.

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

(c) The Contractor has obtained all necessary Security Clearances in accordance with PART F - Security Clearances.

D19.3 The City intends to award this Contract by November 21, 2024.

D19.3.1 If the actual date of award is later than the intended date, the dates specified for Critical Stages, Substantial Performance, and Total Performance will be adjusted by the difference between the aforementioned intended and actual dates.

D20. WORK BY OTHERS

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

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

(a) Manitoba Hydro – Abandonment of 50 mm gas main on Rue Plinguet.

(b) City of Winnipeg – Installation of internal compression seals within the Branch I Aqueduct adjacent to UMH119-0114 and UMH119-0137 during the Branch I Aqueduct dewatered shutdown for the work at this site.

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

D21. WORKING DAYS

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

that must be able to work in order to meet the requirements of a Working Day may vary considerably from that specified in the General Conditions.

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

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

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

D21.5 Notwithstanding C1.1(tt), if the Contractor chooses to work on a Saturday, Sunday, or statutory or civic holiday and is able to complete at least seven (7) hours of work during the period between 7:00 a.m. Winnipeg time or the time the Contractor's operations normally commence, whichever is earlier, and 7:00 p.m. Winnipeg time the day shall be considered a Working Day.

D21.6 Working Days shall be incurred by the Contractor for every Working Day as defined herein. Working days shall be incurred starting on the date the Contractor commences work on site, or the date of commencement identified on the Contractors submitted schedule (D17), whichever occurs first.

D21.7 Planned Breaks in Construction:

(a) The Contractor will be permitted planned suspensions of on-site construction to facilitate the nature of the work and seasonal weather breaks where contract work is not or cannot be completed. Working Days will not be incurred during these periods.

(b) All planned breaks in on-site construction activity must be clearly identified in the Contractors detailed construction schedule (D17) and notice must be provided in writing a minimum of two (2) Business Days prior to the planned suspension of work. Failure of the Contractor to provide adequate notice, in the opinion of the Contract Administrator, may result in Working Days being incurred.

(c) Planned breaks in construction should be minimised to the greatest degree possible to promote the efficient and expedient completion of the Work. Individual days or repeated short duration breaks (less than five (5) Working Days) where work could otherwise be completed will not be accepted as planned breaks in construction. Outside of planned breaks in construction, consecutive Working Days will be applied.

(d) During these periods, the Site must be made secure, roadways completely operational, and all existing facilities and work in progress be protected from weather or other potentially harmful effects.

(e) Upon recommencement of site activities after long breaks (greater than 1 month), the Contractor shall provide an updated schedule and notification to the Contract Administrator a minimum of five (5) Business Days prior to recommencement of work.

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

D22. SCHEDULE RESTRICTIONS

D22.1 Branch I Aqueduct Shutdowns

D22.1.1 Branch I Aqueduct shutdowns will be scheduled based on a number of factors including routine maintenance and repair work, water demand, river levels, weather and other factors. The City shall endeavour to make the specified time periods available to the Contractor to schedule their Work requiring isolation and/or draining of the Branch I Aqueduct, without limiting the City's control over the operation of the regional water system

to complete other work, maintain adequate system service and maintain the integrity of the infrastructure. The City shall reserve the right to cancel and/or delay these schedule dates at any time, due to any circumstances that could adversely affect water supply system operation, including but not limited to high water demand, abnormal weather, failures of related water system components and/or security concerns.

D22.1.2 The Branch I Aqueduct shutdowns will only be permitted between September 1st (September Long Weekend) and May 16th (May Long Weekend) of a given year. Dewatered conditions will only be permitted up until the beginning of May of a given year.

D22.1.3 The Branch I Aqueduct will not be shutdown or operated under a modified operating mode except for the work items outlined in E11.4.

D22.1.4 The following schedule limitations are applicable to Branch I Aqueduct shutdowns:

(a) Modified Operation - The Branch I Aqueduct can be shutdown and isolated for up to three (3) Calendar Days. During this period the City will operate the Branch I Aqueduct between 5 pm and 6 am three days a week to maintain water quality and supply to the McPhillips Reservoir. Specific days of operation will maintained throughout the shutdown and discussed with the Contractor prior to commencement of the Work.

(i) Under modified operation conditions, the Branch I Aqueduct will not be locked out and only single blocking can be provided.

(b) Dewatered - The Branch I Aqueduct can be dewatered once throughout the course of the work for up to 5 Calendar Days.

(i) Under a dewatered state, the Branch I Aqueduct will be locked out. Only single blocking can be provided.

D22.2 Calendar Days for shutdowns will be counted starting the next Calendar Day after draining by City forces and notification for the Contractor to commence work and continue until the pipeline is handed back to the City for return to service.

D22.3 Refer to E11 for requirements for working around the Branch I Aqueduct and list of operations requiring a shutdown of the Branch I Aqueduct.

D23. CRITICAL STAGES

D23.1 The Contractor shall achieve critical stages of the Work in accordance with the following requirements:

(a) Critical Stage 1 – The following work shall be completed by March 15, 2025:

(i) All work at Rue Plinguet Underdrain Outfall site including permanent restoration below the top of the riverbank. The Critical Stage excludes restoration above the riverbank (e.g. roadway and sidewalks) and CIPP lining at the site.

(ii) Installation of the proposed manhole at the Avenue Tache Underdrain Outfall including all appurtenances within the manhole. The Critical Stage excludes permanent restoration and CIPP lining at the site.

(iii) All work at the Rue Notre Dame Underdrain Outfall. The Critical Stage excludes permanent restoration and CIPP lining at the site.

(b) Critical Stage 2 – Work requiring a shutdown (modified operation) of the Branch I Aqueduct to complete the tie-in to the Avenue Tache Surge Tower overflow shall be complete within three (3) Calendar Days of handover to the Contractor to complete the work as per D22.

(c) Critical Stage 3 – Work requiring dewatering of the Branch I Aqueduct (Branch I Aqueduct foundation stabilization) shall be complete within five (5) Calendar Days of handover to the Contractor to complete the work as per D22.

D24. SUBSTANTIAL PERFORMANCE

D24.1 The Contractor shall achieve Substantial Performance within seventy (70) consecutive Working Days of the commencement of the Work as specified in D19 or by June 20, 2025, whichever comes first.

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

D24.3 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.

D25. TOTAL PERFORMANCE

D25.1 The Contractor shall achieve Total Performance within eighty (80) consecutive Working Days of the commencement of the Work as specified in D19 or by July 25, 2025, whichever comes first.

D25.2 When the Contractor or the Contract Administrator considers the Work to be totally performed, the Contractor shall arrange, attend and assist in the inspection of the Work with the Contract Administrator for purposes of verifying Total Performance. Any defects or deficiencies in the Work noted during that inspection shall be remedied by the Contractor at the earliest possible instance and the Contract Administrator notified so that the Work can be reinspected.

D25.3 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.

D26. LIQUIDATED DAMAGES

D26.1 If the Contractor fails to achieve, Critical Stages, Substantial Performance or Total Performance in accordance with the Contract by the days fixed herein for same, the Contractor shall pay the City the following amounts per Working Day or Calendar Day as indicated below for each and every Working Day (or Calendar Day) following the days fixed herein for same during which such failure continues:

(a) Critical Stage 1 - Seven hundred dollars ($700) per Calendar Day;

(b) Critical Stage 2 – Eight hundred dollars ($800) per Calendar Day;

(c) Critical Stage 3 – One thousand, one hundred dollars ($1,100) per Calendar Day;

(d) Substantial Performance – Two thousand, two hundred dollars ($2,200) per Working Day; and,

(e) Total Performance – One thousand, two hundred dollars ($1,200) per Working Day.

D26.2 The amounts specified for liquidated damages in D26.1 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.

D26.3 The City may reduce any payment to the Contractor by the amount of any liquidated damages assessed.

D27. SUPPLY CHAIN DISRUPTION SCHEDULE DELAYS

D27.1 The City acknowledges that the schedule for this Contract may be impacted by the Supply Chain Disruption. Commencement and progress of the Work shall be performed by the

Contractor with due consideration to the delivery requirements and schedule identified in the Contract in close consultation with the Contract Administrator.

D27.2 If the Contractor is delayed in the performance of the Work by reason of the Supply Chain Disruption, the Work schedule may be adjusted by a period of time equal to the time lost due to such delay and costs related to such delay will be determined as identified herein.

D27.3 A minimum of seven (7) Calendar Days prior to the commencement of Work, the Contractor shall declare whether a Supply Chain Disruption will affect the start date. The Contractor shall provide sufficient evidence that the delay is directly related to a Supply Chain Disruption, including but not limited to ordering of Material or Goods, production and/or manufacturing schedules or availability of staff as appropriate.

D27.4 For any delay related to Supply Chain Disruption and identified after Work has commenced, the Contractor shall within seven (7) Calendar Days of becoming aware of the anticipated delay declare the additional delay and shall provide sufficient evidence as indicated in D27.3. Failure to provide this notice will result in no additional time delays being considered by the City.

D27.5 The Work schedule, including the durations identified in D23 to D25 where applicable, will be adjusted to reflect delays accepted by the Contract Administrator. No additional payment will be made for adjustment of schedules except where seasonal work, not previously identified in the Contract, is carried over to the following construction season.

D27.6 Where Work not previously identified is being carried over solely as a result of delays related to Supply Chain Disruption, as confirmed by the Contract Administrator, the cost of temporary works to maintain the Work in a safe manner until Work recommences, will be considered by the Contract Administrator. Where the Work is carried over only partially due to Supply Chain Disruption, a partial consideration of the cost of temporary works will be considered by the Contract Administrator.

D27.7 Any time or cost implications as a result of Supply Chain Disruption and in accordance with the above, as confirmed by the Contract Administrator, shall be documented in accordance with C7.

D28. SCHEDULED MAINTENANCE

D28.1 The Contractor shall perform the following scheduled maintenance in the manner and within the time periods required by the Specifications:

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

D28.2 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

D29. JOB MEETINGS

D29.1 Regular weekly job meetings will be held at the Site. These meetings shall be attended by a minimum of one representative of the Contract Administrator, one representative of the City and one representative of the Contractor. Each representative shall be a responsible person capable of expressing the position of the Contract Administrator, the City and the Contractor respectively on any matter discussed at the meeting including the Work schedule and the need to make any revisions to the Work schedule. The progress of the Work will be reviewed at each of these meetings.

D29.2 The Contract Administrator reserves the right to cancel any job meeting or call additional job meetings whenever they deem it necessary.

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

D30.1 Further to C6.26, the Contractor shall be the Prime Contractor and shall serve as, and have the duties of the Prime Contractor in accordance with The Workplace Safety and Health Act (Manitoba).

D31. THE WORKPLACE SAFETY AND HEALTH ACT (MANITOBA) – QUALIFICATIONS

D31.1 Further to B13.4, the Contractor/Subcontractor must, throughout the term of the Contract, have a Workplace Safety and Health Program meeting the requirements of The Workplace Safety and Health Act (Manitoba). At any time during the term of the Contract, the City may, at their sole discretion and acting reasonably, require updated proof of compliance, as set out in B13.4.

MEASUREMENT AND PAYMENT

D32. PAYMENT

D32.1 Further to C12, the City shall make payments to the Contractor by direct deposit to the Contractor's banking institution, and by no other means. Payments will not be made until the Contractor has made satisfactory direct deposit arrangements with the City. Direct deposit application forms are at https://winnipeg.ca/finance/files/Direct_Deposit_Form.pdf.

D33. FUEL PRICE ADJUSTMENT

D33.1 The Contract is subject to a fuel price adjustment which will be calculated monthly based on eligible Work completed utilizing the following mathematical formulas;

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

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

(i) BFI = base fuel index

(ii) CFI = current fuel index

(iii) FF = fuel factor

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

D33.1.1 Eligible Work will be determined in accordance with D33.4.

D33.1.2 The base fuel index (BFI) will be the retail price of fuel identified on the Submission Deadline based on latest published "Monthly average retail prices for gasoline and fuel by geography" for Winnipeg, published by Statistics Canada, Table 18-10-0001-01. The BFI is a blended rate based on 15% regular unleaded gasoline at self-service filling stations and 85% diesel fuel at self-service filling stations.

D33.1.3 The current fuel index (CFI) based on the above blended rate will be determined for each monthly progress estimate and applied on the following progress estimate as a change order once rates are published by Statistics Canada.

D33.1.4 A Fuel Factor (FF) rate of the monetary value of all eligible Work completed that month based on the Contract unit prices will be used to calculate the assumed apportioned cost of fuel.

D33.1.5 Fuel cost adjustments may result in additional payment to the Contractor or credit to the City within the Contract by way of a monthly change order.

D33.2 The fuel escalation or de-escalation adjustment will not be applied if the CFI is within ±15% of the BFI.

D33.3 Fuel escalation adjustments will not be considered beyond the Substantial Performance/Critical Stages except where those dates/Working Days are adjusted by change order. Fuel de-escalation adjustments will apply for Work that extends beyond the dates/Working Days specified for Substantial Performance/Critical Stages.

D33.4 The Fuel Factor (FF) rates will be set as follows:

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

WARRANTY

D34. WARRANTY

D34.1 Notwithstanding C13.2, the warranty period shall begin on the date of Total Performance and shall expire one (1) year thereafter unless extended pursuant to C13.2.1 or C13.2.2, in which case it shall expire when provided for thereunder.

D34.2 Notwithstanding C13.2 or D34.1, the Contract Administrator may permit the warranty period for a portion or portions of the Work to begin prior to the date of Total Performance if:

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

D34.2.1 In such case, the date specified by the Contract Administrator for the warranty period to begin shall be substituted for the date specified in C13.2 for the warranty period to begin.

DISPUTE RESOLUTION

D35. DISPUTE RESOLUTION

D35.1 If the Contractor disagrees with any opinion, determination, or decision of the Contract Administrator, the Contractor shall act in accordance with the Contract Administrator's opinion, determination, or decision unless and until same is modified by the process followed by the parties pursuant to D35.

D35.2 The entire text of C21.4 is deleted, and amended to read: "Intentionally Deleted"

D35.3 The entire text of C21.5 is deleted, and amended to read:

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

D35.4 Further to C21, prior to the Contract Administrator's issuance of a Final Determination, the following informal dispute resolution process shall be followed where the Contractor disagrees with any opinion, determination, or decision of the Contract Administrator ("Dispute"):

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

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

(i) The Contract Administrator;

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

(iii) Department Head.

D35.4.1 Names and positions of Contractor representatives equivalent to the above City position levels shall be determined by the Contractor and communicated to the City at the pre-commencement or kick off meeting.

D35.4.2 As these negotiations are not an adjudicative hearing, neither party may have legal counsel present during the negotiations.

D35.4.3 Both the City and the Contractor agree to make all reasonable efforts to conduct the above escalating negotiation process within twenty (20) Business Days, unless both parties agree, in writing, to extend that period of time.

D35.4.4 If the Dispute is not resolved to the City and Contractor's mutual satisfaction after discussions have occurred at the final escalated level as described above, or the time period set out in D35.4.3, as extended if applicable, has elapsed, the Contract Administrator will issue a Final Determination as defined in C1.1(v), at which point the parties will be governed by the Dispute Resolution process set out in C21.

INDEMNITY

D36. INDEMNITY

D36.1 Indemnity shall be as stated in C17.

D36.2 Notwithstanding C17.1, the Contractor shall save harmless and indemnify the City in the amount of twice the Contract Price or five million dollars ($5,000,000), whichever is greater, against all costs, damages or expenses arising from actions, claims, demands and proceedings, by whomsoever brought, made or taken as a result of negligent acts or negligent omissions of the Contractor, their Subcontractors, employees or agents in the performance or purported performance of the Work, and more particularly from:

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

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

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

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

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

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

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

D36.3 Further to C17, The City shall save harmless and indemnify the Contractor in the amount of twice the Contract Price or five million dollars ($5,000,000), whichever is greater, against all costs, damages or expenses arising from actions, claims, demands and proceedings, by whomsoever brought, made or taken as a result of negligent acts or negligent omissions of the City, their employees or agents in the performance of its obligation under the Contract.

THIRD PARTY AGREEMENTS

D37. FUNDING AND/OR CONTRIBUTION AGREEMENT OBLIGATIONS

D37.1 In the event that funding for the Work of the Contract is provided to the City of Winnipeg by the Government of Manitoba and/or the Government of Canada, the following terms and conditions shall apply, as required by the applicable funding agreements.

D37.2 Further to D37.1, in the event that the obligations in D37 apply, actual costs legitimately incurred by the Contractor as a direct result of these obligations ("Funding Costs") shall be determined by the actual cost to the Contractor and not by the valuation method(s) outlined in C7.4. In all other respects Funding Costs will be processed in accordance with Changes in Work under C7.

D37.3 For the purposes of D37:

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

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

D37.4 Modified Insurance Requirements

D37.4.1 If not already required under the insurance requirements identified in D13, the Contractor will be required to provide wrap-up liability insurance in an amount of no less than two million dollars ($2,000,000) inclusive per occurrence. Such policy will be written in the joint names of the City, Contractor, Consultants and all sub-contractors and sub-consultants and include twelve (12) months completed operations. The Government of Manitoba and their Ministers, officers, employees, and agents shall be added as additional insureds.

D37.4.2 If not already required under the insurance requirements identified in D13, the Contractor will be required to provide builders' risk insurance (including boiler and machinery insurance, as applicable) providing all risks coverage at full replacement cost, or such lower level of insurance that the City may identify on a case-by-case basis, such as an installation floater.

D37.4.3 The Contractor shall obtain and maintain third party liability insurance with minimum coverage of two million dollars ($2,000,000.00) per occurrence on all licensed vehicles operated at the Site. In the event that this requirement conflicts with another licensed vehicle insurance requirement in this Contract, then the requirement that provides the higher level of insurance shall apply.

D37.4.4 Further to D13.3, insurers shall provide satisfactory Certificates of Insurance to the Government of Manitoba prior to commencement of Work as written evidence of the insurance required. The Certificates of Insurance must provide for a minimum of thirty (30) days' prior written notice to the Government of Manitoba in case of insurance cancellation.

D37.4.5 All policies must be taken out with insurers licensed to carry on business in the Province of Manitoba.

D37.5 Indemnification By Contractor

D37.5.1 In addition to the indemnity obligations outlined in C17 of the General Conditions for Construction, the Contractor agrees to indemnify and save harmless the Government of Canada and the Government of Manitoba and each of their respective Ministers, officers, servants, employees, and agents from and against all claims and demands, losses, costs, damages, actions, suit or other proceedings brought or pursued in any manner in respect of any matter caused by the Contractor or arising from this Contract or the Work, or from the goods or services provided or required to be provided by the Contractor, except those resulting from the negligence of any of the Government of Canada's or the Government of Manitoba's Ministers, officers, servants, employees, or agents, as the case may be.

D37.5.2 The Contractor agrees that in no event will Canada or Manitoba, their respective officers, servants, employees or agents be held liable for any damages in contract, tort (including negligence) or otherwise, for:

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

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

(c) any obligation of any person, including, but not limited to, any obligation arising from a loan, capital lease or other long term obligation in relation to this Contract or the Work.

D37.6 Records Retention and Audits

D37.6.1 The Contractor shall maintain and preserve accurate and complete records in respect of this Contract and the Work, including all accounting records, financial documents, copies of contracts with other parties and other records relating to this Contract and the Work during the term of the Contract and for at least six (6) years after Total Performance. Those records bearing original signatures or professional seals or stamps must be preserved in paper form; other records may be retained in electronic form.

D37.6.2 In addition to the record keeping and inspection obligations outlined in C6 of the General Conditions for Construction, the Contractor shall keep available for inspection and audit at all reasonable times while this Contract is in effect and until at least six (6) years after Total Performance, all records, documents, and contracts referred to in D37.6.1 for inspection, copying and audit by the City of Winnipeg, the Government of Manitoba and/or the Government of Canada and their respective representatives and auditors, and to produce them on demand; to provide reasonable facilities for such inspections, copying and audits, to provide copies of and extracts from such records, documents, or contracts upon request by the City of Winnipeg, the Government of Manitoba, and/or the Government of Canada and their respective representatives and auditors, and to promptly provide such other information and explanations as may be reasonably requested by the City of Winnipeg, the Government of Manitoba, and/or the Government of Canada from time-to-time.

D37.7 Other Obligations

D37.7.1 The Contractor consents to the City providing a copy of the Contract Documents to the Government of Manitoba and/or the Government of Canada upon request from either entity.

D37.7.2 If the Lobbyists Registration Act (Manitoba) applies to the Contractor, the Contractor represents and warrants that it has filed a return and is registered and in full compliance with the obligations of that Act, and covenants that it will continue to comply for the duration of this Contract.

D37.7.3 The Contractor shall comply with all applicable legislation and standards, whether federal, provincial, or municipal, including (without limitation) labour, environmental, and human rights laws, in the course of providing the Work.

D37.7.4 The Contractor shall properly account for the Work provided under this Contract and payment received in this respect, prepared in accordance with generally accepted accounting principles in effect in Canada, including those principles and standards approved or recommended from time-to-time by the Chartered Professional Accountants of Canada or the Public Sector Accounting Board, as applicable, applied on a consistent basis.

D37.7.5 The Contractor represents and warrants that no current or former public servant or public office holder, to whom the Value and Ethics Code for the Public Sector, the Policy on Conflict of Interest and Post Employment, or the Conflict of Interest Act applies, shall derive direct benefit from this Contract, including any employment, payments, or gifts, unless the provision or receipt of such benefits is in compliance with such codes and the legislation.

D37.7.6 The Contractor represents and warrants that no member of the House of Commons or of the Senate of Canada or of the Legislative Assembly of Manitoba is a shareholder, director or officer of the Contractor or of a Subcontractor, and that no such member is entitled to any benefits arising from this Contract or from a contract with the Contractor or a Subcontractor concerning the Work.

FORM H1: PERFORMANCE BOND
(See D14)

KNOW EVERYONE BY THESE PRESENTS THAT

_____
(hereinafter called the "Principal"), and

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

_____

_____ dollars ($_____.____)

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

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

TENDER NO. 694-2024

Branch I Aqueduct Underdrain Outfall Repairs

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

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

(a) carry out and perform the Contract and every part thereof in the manner and within the times set forth in the Contract and in accordance with the terms and conditions specified in the Contract;

(b) perform the Work in a good, proper, workmanlike manner;

(c) make all the payments whether to the Obligee or to others as therein provided;

(d) in every other respect comply with the conditions and perform the covenants contained in the Contract; and

(e) indemnify and save harmless the Obligee against and from all loss, costs, damages, claims, and demands of every description as set forth in the Contract, and from all penalties, assessments, claims, actions for loss, damages or compensation whether arising under "The Workers Compensation Act", or any other Act or otherwise arising out of or in any way connected with the performance or non-performance of the Contract or any part thereof during the term of the Contract and the warranty period provided for therein;

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

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

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

_____ day of _____ , 20____ .

SIGNED AND SEALED
in the presence of:

_____
(Witness as to Principal if no seal)

_____
(Name of Principal)

Per: _____ (Seal)

Per: _____

_____
(Name of Surety)

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

FORM H2: LABOUR AND MATERIAL PAYMENT BOND
(See D14)

KNOW EVERYONE BY THESE PRESENTS THAT

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

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

_____

_____ dollars ($_____.____)

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

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

TENDER NO. 694-2024

Branch I Aqueduct Underdrain Outfall Repairs

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

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

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

    (ii) after the expiration of one (1) year following the date on which Principal ceased work on said Contract; including work performed under the guarantees provided in the Contract;

(iii) other than in a court of competent jurisdiction in the Province of Manitoba.

(d) The amount of this bond shall be reduced by and to the extent of any payment or payments made in good faith hereunder, inclusive of the payment by Surety of mechanics liens which may be filed of record against said improvement, whether or not claim for the amount of such lien be presented under and against this bond.

(e) The Surety shall not be liable for a greater sum than the specified penalty of this bond.

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

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

_____ day of _____ , 20____ .

SIGNED AND SEALED
in the presence of:

_____
(Witness as to Principal if no seal)

_____
(Name of Principal)

Per: _____ (Seal)

Per: _____

_____
(Name of Surety)

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

FORM J: SUBCONTRACTOR LIST

(See D15)

BRANCH I AQUEDUCT UNDERDRAIN OUTFALL REPAIRS

Name	Address

FORM K: EQUIPMENT
(See D16)

BRANCH I AQUEDUCT UNDERDRAIN OUTFALL REPAIRS

1. Category/type:

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

Registered owner: _____

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

Registered owner: _____

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

Registered owner: _____

2. Category/type:

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

Registered owner: _____

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

Registered owner: _____

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

Registered owner: _____

3. Category/type:

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

Registered owner: _____

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

Registered owner: _____

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

Registered owner: _____

FORM K: EQUIPMENT
(See D16)

BRANCH I AQUEDUCT UNDERDRAIN OUTFALL REPAIRS

4. Category/type:

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

Registered owner: _____

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

Registered owner: _____

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

Registered owner: _____

5. Category/type:

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

Registered owner: _____

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

Registered owner: _____

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

Registered owner: _____

6. Category/type:

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

Registered owner: _____

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

Registered owner: _____

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

Registered owner: _____

FORM L: CONTRACTOR EXPERIENCE
(See B13)

BRANCH I AQUEDUCT UNDERDRAIN OUTFALL REPAIRS

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

Project References:

Project Client/Contact: _____
(Name)

_____
(Address)

_____
(phone) (email)

Year	Description of Project	Value

Project References:

Project Client/Contact: _____
(Name)

_____
(Address)

_____
(phone) (email)

Year	Description of Project	Value

PART E - SPECIFICATIONS

GENERAL

E1. APPLICABLE SPECIFICATIONS AND DRAWINGS

E1.1 These Specifications shall apply to the Work.

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

E1.2.1 *The City of Winnipeg Standard Construction Specifications* is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Purchasing Division website at http://www.winnipeg.ca/matmgt/Spec/Default.stm

E1.2.2 The version in effect three (3) Business Days before the Submission Deadline shall apply.

E1.2.3 Further to C2.4(d), Specifications included in the Tender shall govern over *The City of Winnipeg Standard Construction Specifications*.

E1.3 Bidders are reminded that requests for approval of substitutes as an approved equal or an approved alternative shall be made in accordance with B7. In every instance where a brand name or design specification is used, the City will also consider approved equals and/or approved alternatives in accordance with B7.

E1.4 The following are applicable to the Work:

Appendix No.	Appendix Title
A	Record Drawings
B	Site Photos
C	Stantec Confined Space Entry Policy
D	Geotechnical Reports
E	Underdrain Conditions and Repair Work Program
F	CIPP and TPR Design Conditions
G	CPKC Utility Corridor Access Application
H	Walking Trail Detours

Sheet No.	Drawing No.	Drawing Name/Title
1	1-0751A-D0006-001	Cover Page
2	1-0751A-D0007-001	Index Page
3	1-0751N-C0001-001	Rue Plinguet Underdrain Outfall – Plan & Profile
4	1-0751N-C0002-001	Rue Plinguet Underdrain Outfall – Details
5	1-0751N-C0003-001	Avenue Tache Underdrain Outfall – Plan & Profile
6	1-0751N-C0004-001	Avenue Tache Underdrain Outfall – Details I
7	1-0751N-C0004-002	Avenue Tache Underdrain Outfall – Details II
8	1-0751N-C0005-001	Rue Note Dame Underdrain Outfall – Plan & Profile
9	1-0751N-C0006-001	Rue Notre Dame Underdrain Outfall – Details
10	1-0751N-C0007-001	Archibald Street Underdrain Cross Connection – Plan & Details
11	1-0751N-C0008-001	Dawson Road N Underdrain Cross Connection – Plan & Profile – 90m S of Messier St to 10m N of Messier St
12	1-0751N-C0009-001	Dawson Road N Underdrain Cross Connection – Plan & Profile – 10m N of Messier St to 275m S of Plinguet St
13	1-0751N-C0010-001	Dawson Road N Underdrain Cross Connection – Details
14	1-0751N-C0011-001	Dawson Road N Underdrain Cross Connection – GWWD Rail Crossing
15	1-0751N-C0012-001	Underdrain Repairs – Plan
16	1-0751N-C0013-001	Underdrain Repairs – Details I
17	1-0751N-C0013-002	Underdrain Repairs – Details II

E2. SOILS INVESTIGATION REPORT

E2.1 Further to C3.1, the following geotechnical reports have been prepared for this project and are attached in Appendix D:

(a) City of Winnipeg Branch I Aqueduct Underdrain Outfalls (RFP No 512-2023) – Rue Plinguet Outfall Geotechnical Report

(b) City of Winnipeg Branch I Aqueduct Underdrain Outfalls (RFP No 512-2023) - Avenue Tache Outfall Geotechnical Report

E2.2 Additional geotechnical information, beyond what is shown on the Drawings, is available for the Rue Notre Dame Underdrain Outfall site upon request.

GENERAL REQUIREMENTS

E3. SHOP DRAWINGS

E3.1 Description

E3.1.1 This Specification shall revise, amend, and supplement the requirements of CW 1110.

(a) The term “Shop Drawings” means drawings, diagrams, illustrations, schedules, performance charts, brochures, and other data, which are to be provided by the Contractor to illustrate details of a portion of the Work.

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

E3.1.2 Shop Drawings

(a) Original drawings are to be prepared by the Contractor, Subcontractor, Supplier, Distributor, or Manufacturer, which illustrate the appropriate portion of Work; showing fabrication, layout, setting, or erection details as specified in appropriate sections.

(b) Additional submittal requirements for each component of the Work may be listed within the relevant specification section.

E3.2 Contractor’s Responsibility:

(a) Review shop drawings, product data, and samples prior to submission and stamp and sign drawings indicating conformance to the Contract requirements.

(b) Verify:

(i) Field measurements

(ii) Field construction criteria

(iii) Catalogue numbers and similar data

(c) Coordinate each shop drawing submission with the requirements of the Work and Contract Documents. Shop drawings of separate components of a larger system will not be reviewed until all related drawings are available.

(d) Notify Contract Administrator, in writing at time of shop drawing submission, of deviations from requirements of Contract Documents.

(e) Responsibility for deviations in Shop Drawing submissions from the requirements of Contract Documents is not relieved by the Contract Administrator’s review of submission, unless the Contract Administrator gives written acceptance of specified deviations.

(f) Responsibility for errors and omissions in Shop Drawing submission is not relieved by the Contract Administrator’s review of the submittals.

(g) The Contractor shall make any corrections required by the Contract Administrator and shall resubmit the required number of corrected copies of Shop Drawings. The Contractor shall

direct specific attention in writing or on resubmitted Shop Drawings to revisions other than the corrections requested by the Contract Administrator on the previous submission.

(h) After the Contract Administrator has reviewed and returned the copies, distribute the copies to sub-trades as appropriate.

(i) Maintain one (1) complete set of reviewed shop drawings, filed by Specification Section Number, at the Site for use and reference by the Contract Administrator and Subcontractors.

E3.3 Submission Requirements

E3.3.1 Schedule submissions at least fourteen (14) Calendar Days before the dates the reviewed submissions will be needed and allow for a five (5) Business Day period for review by the Contract Administrator of each individual submission and re-submission, unless noted otherwise in the Contract Documents.

E3.3.2 Submit one (1) digital copy (PDF) of shop drawings.

E3.3.3 Accompany shop drawing submissions with a transmittal letter containing:

(a) Date

(b) Project title and Tender number

(c) Contractor's name and address

(d) Number of each shop drawing, product data, and sample submitted

(e) Specification Section, Title, Number, and Clause

(f) Drawing Number and Detail/Section Number

(g) Other pertinent data

E3.3.4 Shop drawing submissions shall include:

(a) Date and revision dates.

(b) Project title and Bid Opportunity number.

(c) Name of:

(i) Contractor

(ii) Subcontractor

(iii) Supplier

(iv) Manufacturer

(d) Separate detailer when pertinent

(e) Identification of product or material.

(f) Relation to adjacent structure or materials.

(g) Field dimensions, clearly identified as such.

(h) Specification section name, number and clause number or drawing number and detail/section number.

(i) Applicable standards, such as CSA or CGSB numbers.

(j) Contractor's stamp, initialled or signed, certifying review of submission, verification of field measurements, and compliance with Contract Documents.

E3.3.5 Shop Drawings not meeting the requirements of CW 1110 or the requirements specified herein will be returned to the Contractor without review for resubmission.

E3.3.6 Shop drawing submissions will be limited to two (2) reviews per shop drawing. This shall include a review of the initial submission and a review of the revised submission. Costs associated with subsequent reviews will be charged to the Contractor.

E3.4 Other Considerations:

(a) Fabrication, erection, installation, or commissioning may require modifications to equipment or systems to conform to the design intent. Revise pertinent shop drawings and resubmit.

(b) Material and equipment delivered to the Site will not be paid for until pertinent shop drawings have been submitted and reviewed.

(c) Incomplete shop drawing information will be considered as stipulated deductions for the purposes of progress payment certificates.

(d) No delay or cost claims will be allowed that arise because of delays in submissions, re-submissions, and review of shop drawings.

E3.5 Measurement and Payment

E3.5.1 Preparation and submission of Shop Drawings will be considered incidental to the Work and will not be measured for payment. No additional payment will be made.

E4. EXPEDITED SHOP DRAWINGS

E4.1 Further to E3, in order to expedite Shop Drawings with critical timelines, the lowest responsive Bidder, as outlined in B18, will be required, after receiving a written request from the Contract Administrator, to arrange for the preparation of Shop Drawings for the following items with critical timelines:

(a) Stainless steel knife gate valves (E21).

(b) Flexible rubber backflow valves (E18)

(c) Avenue Tache Underdrain Outfall Manhole Components (E20)

(d) 900 mm x 250 mm Tee for Avenue Tache Underdrain Outfall manhole (E20)

(e) Stainless Steel Piping Components for Avenue Tache Underdrain Outfall manhole (E20)

E4.2 Measurement and Payment

E4.2.1 If no Contract is awarded, then the City of Winnipeg will pay the requested Bidder up to a maximum of five hundred dollars ($500.00) for each of the requested submissions for the preparation and delivery of expedited Shop Drawings. Delivery of expedited Shop Drawings to the City and payment of the above amounts will constitute full and final consideration of each party to the other and neither party will have any further liability to the other with respect to this Bid Opportunity.

E4.2.2 If Award is made to the lowest responsive Bidder, then as per E3.5, expedited Shop Drawings will be considered incidental to the Work and will not be measured for payment. No additional payment will be made.

E5. OFFICE FACILITIES

E5.1 The Contractor shall supply office facilities meeting the following requirements:

(a) The field office shall be for the exclusive use of the Contract Administrator.

(b) The building shall be conveniently located near the site of the Work.

(c) The building shall have a minimum floor area of 25 square meters, a height of 2.4 m, two windows for cross-ventilation, and a door entrance with a suitable lock.

(d) The building shall be suitable for all weather use. It shall be equipped with an electric heater and air conditioner so that the room temperature can be maintained between either 16-18 °C or 24-25 °C.

(e) The building shall be adequately lighted with florescent fixtures and have a minimum of three wall outlets.

(f) The building shall be furnished with one desk, one drafting table, table 3m x 1.2m, one stool, one four-drawer legal size filing cabinet, and a minimum of 12 chairs.

(g) A portable toilet shall be located near the field office building. The toilet shall have a locking door and be for the exclusive use of the Contract Administrator and other personnel from the City.

(h) The field office building and the portable toilet shall be cleaned on a weekly basis immediately prior to each site meeting. The Contract Administrator may request additional cleaning when deemed necessary.

E5.2 Contractor shall coordinate or otherwise provide power for the office.

E5.3 The office facilities will be provided during the following periods of work at the following locations:

(a) During the outfall works (January to March 2025) – Office to be located at the Rue Plinguet Underdrain Outfall or at a mutually agreed upon location.

(b) During the Underdrain repair works (Spring 2025) – Office to be located on Dawson Road N or at a mutually agreed upon location.

E5.4 Measurement and Payment

(a) The Contractor shall be responsible for all installation and removal costs, all operating costs, and the general maintenance of the office facilities.

(b) The provision of a site office and associated facilities and work identified herein will be considered incidental to the Work and will not be measured for payment. No additional payment will be made.

E6. MOBILIZATION AND DEMOBILIZATION PAYMENT

E6.1 Description

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

E6.2 Requirements

(a) Refer to E15 for riverbank site development and temporary works.

E6.3 Measurement and Payment

E6.3.1 Mobilization and Demobilization

(a) Mobilization and demobilization will be measured on a lump sum basis and paid for at the Contract Lump Sum Price for “Mobilization and Demobilization” for each portion of the work as identified in Form B: Prices. Payment for Mobilization and demobilization shall include all costs associated with mobilization and demobilization, site set up, and cleanup. Payment will be made on the following schedule:

(i) 60% payment of the Mobilization and Demobilization lump sum price will be paid once the Contractor has completed the necessary site access modifications, site setup, and commenced with work on site.

(ii) The remaining 40% of the Mobilization and Demobilization lump sum price will be paid subsequent to the completion of the works, site cleanup, removal of temporary access roads, and restoration.

E7. TRAFFIC CONTROL

E7.1 Further to clauses 3.6, 3.7 and 3.8 of CW 1130:

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

(b) In accordance with the Manual of Temporary Traffic Control on City Streets (MTTC), the Contractor (“Construction Agency” in the manual) shall be responsible for supplying,

placing, maintaining and removing the appropriate temporary traffic control devices as specified by the MTTC, the Contract Drawings, Staging Plans, and Traffic Management Plans or by the Traffic Management Branch of the City of Winnipeg Public Works Department. The Contractor shall bear all costs associated with the supply, placement and maintenance of temporary traffic control devices by their own forces or subcontractor.

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

(i) Parking restrictions,

(ii) Stopping restrictions,

(iii) Turn restrictions,

(iv) Diamond lane removal,

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

(vi) Traffic routed across a median,

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

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

E7.2 Submissions

E7.2.1 Traffic Management Plans

(a) The Contractor shall submit a detailed traffic management plan for works at the sites identified below. The traffic management plan shall be submitted a minimum of forty (40) Business Days prior to commencement of work on each site to allow sufficient time for review by the Contract Administrator and Traffic Management department. Traffic control plans shall include, but not necessarily be limited to, the following:

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

(ii) Traffic control drawings with all signage.

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

(i) Archibald Street from Rue Plinguet to Mission Street.

(ii) Dawson Road from Dugald Road to Rue Plinguet.

E7.2.2 Any changes to approved traffic management plans must be submitted to the Contract Administrator a minimum of (five) 5 Working Days prior to the required change for approval.

E7.2.3 Lane Closure Requests

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

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

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

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

https://laneclosures.winnipeg.ca/

E7.2.4 All submitted traffic control plans are subject to review and acceptance by City of Winnipeg Traffic Management and Traffic Services divisions.

E7.3 General Requirements

E7.3.1 Refer to Drawings for site specific traffic control requirements.

E7.3.2 Intersecting private approach access shall be maintained at all times unless excavation operations require temporary closure.

E7.3.3 Should the Contractor be unable to maintain pedestrian or vehicular access to a residence or business, he/she shall review the planned disruption with the business or residence and the Contract Administrator and take reasonable measures to minimize the impact. The Contractor shall provide a minimum of 24 hours notification to the affected residence or business and the Contract Administrator, prior to disruption of access.

E7.3.4 The Contractor shall maintain access to all businesses during business hours, except where written authorization has been provided by the business.

E7.3.5 The Contractor shall maintain access to all schools, community centres, and other public buildings at all times.

E7.3.6 Bus traffic must be maintained at all times or as accepted by the Contract Administrator and Winnipeg Transit. Winnipeg Transit shall have the authority to determine the level of accommodation at bus stops in work zones. Bus stops may be closed, relocated, or maintained in a work zone at Winnipeg Transit's discretion.

E7.3.7 Ambulance/emergency vehicle access must be maintained at all times.

E7.3.8 Designated, permanent, and/or temporary bicycle routes shall be safely maintained throughout the work, or temporary traffic control put in place to reroute bicycle traffic around the work area. Temporary traffic control chosen for the closure or modification of an active transportation route shall match the level of safety provided by the route that is being closed or modified.

E7.3.9 Pedestrian access must be maintained on the one side at all times. One pedestrian crossing in the east-west direction and one pedestrian crossing in the north-south direction must be maintained at each intersection at all times. If this cannot be maintained, the Contractor shall provide flag persons to safely escort pedestrians across the intersection. The Contractor shall leave pedestrian crossing locations safe and free of equipment that may hamper pedestrians when no construction activities are being performed at a particular crossing location. Refer also to D8.

E7.3.10 Further to Clause 3.7 of CW 1130 of the General Requirements, should the Contractor be unable to maintain pedestrian or vehicular access to a residence or business, he/she shall review the planned disruption with the business or residence and the Contract Administrator, and take reasonable measures to minimize the impact. The Contractor shall provide a minimum of 24 hours notification to the affected residence or business and the Contract Administrator, prior to disruption of access.

E7.3.11 The Contractor is responsible for maintaining safe vehicular and pedestrian traffic through their work site as identified herein. The Contractor shall rectify any unsafe conditions immediately upon notification. This could include but is not limited to, providing flag persons, clearing debris and snow from sites, moving equipment, and erecting additional signage.

E7.3.12 During the project, temporary snow fence shall be installed adjacent to existing and temporary sidewalks as necessary to prevent access to the construction area and to provide separation from the excavation area. The Contractor shall be responsible for maintaining the snow fence in a proper working condition. No measurement for payment shall be made for this work.

E7.3.13 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.

E7.3.14 Flag persons may be necessary to maintain the flow of traffic during certain work operations.

E7.3.15 Notwithstanding the requirements noted herein and CW 1130, the Contractor shall maintain the minimum site-specific traffic control requirements indicated on the Drawings.

E7.4 Regional Streets

E7.4.1 The following traffic control requirements shall apply to work on Regional Streets under this contract.

E7.4.2 Regional Streets in this Contract are:

(a) Archibald Street

E7.4.3 The Contractor will have access to the open lane(s) of traffic provided flag persons are used in accordance with the most current edition of The City of Winnipeg Manual for Temporary Traffic Control on City Streets to maintain traffic safety.

E7.4.4 Further to E7.1, should the Contract Administrator require that Work on a Regional Street be carried out at night, on Sundays, on public holidays or that Work be restricted or suspended during peak traffic hours, the Contractor shall comply without any additional compensation being considered to meet these requirements.

E7.4.5 The City reserves the right to restrict, reject, or cancel Regional Street lane closures at any time due to the occurrence of special events or conflicting third party work.

E7.5 Residential Streets

E7.5.1 Traffic Control on Non-Regional Streets during construction shall be as follows:

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

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

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

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

(e) Where required, the Contractor shall provide notice of complete street shutdowns complete with dates and duration a minimum of five (5) Business Days prior to the street closures.

E7.6 Site Specific Traffic Control Requirements:

E7.6.1 Archibald St:

(a) The Contractor is encouraged to maintain two lanes of traffic if possible, however, a directional lane closure is expected to be required based on the location of the excavation within the roadway.

(b) Direction of the directional closure is to be reviewed with the Contact Administrator prior to preparation and submission of traffic management plans as it may change based on other closures at the time of construction.

E7.6.2 Dawson Rd N:

(a) Complete closure of Dawson Rd N. between the access for Bayview Construction and Messier St is permitted during construction.

(b) The Contractor shall maintain traffic on Dawson Rd N north of Messier St.

E7.6.3 Multi-Use Trail Closures:

(a) The Contractor may close multiuse trails as required to facilitate construction in accordance with the Manual of Temporary Traffic Control.

(b) Optional detour routing can be found in Appendix H. The Contractor may propose alternative rerouting options for consideration meeting the requirements identified herein.

E7.7 GWWD Railway

E7.7.1 The City requires use of the GWWD Railway tracks crossing Dawson Rd. N, south of Messier St, leading into the GWWD Railway Terminal throughout construction. Trains will need to operate several times a week. The City will coordinate with the Contract Administrator and the Contractor regarding operation times.

E7.8 Regulatory Signage

(a) Further to E7.1(c), the Contractor shall make arrangement with the Traffic Services Branch of the City of Winnipeg to supply regulatory signs as required.

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

(c) Further to E7.1(c)(iii) and E7.1(c)(iv) the Contractor shall make arrangements with the Traffic Services Branch of the City of Winnipeg to reinstall the permanent regulatory signs after the Contract Work is complete. At this time the Contractor shall make arrangements to drop off the stockpiled materials to Traffic Services at 495 Archibald Street.

E7.9 Maintenance of Traffic Control

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

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

E7.10 Measurement and Payment

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

E8. CONFINED SPACE ENTRY AND INSPECTION SUPPORT

E8.1 Description

(a) This specification covers provision of confined entry and access support for specialized inspection Contractors and inspection personnel.

E8.2 General

E8.2.1 The Contractor shall be aware that Hydrogen Sulphide Gas may be present in all underground structures in concentrations sufficient to cause serious harm or death to personnel who are not using adequate personal protective equipment.

E8.2.2 The Contractor’s attention is drawn to the Province of Manitoba Workplace Safety and Health Act (‘the Act”), and the Regulations and Guidelines there-under pertaining to Confined Space Entry Work and in particular the requirements for conducting hazard/risk assessments and providing personal protective equipment (PPE).

E8.2.3 Consultants and City personnel require dedicated confined entry support services for the purposes of inspection. The Contractor shall provide confined space support as required throughout the course of the Work.

E8.3 Methods

E8.3.1 Be fully responsible for confined entry access on site, in accordance to Manitoba Workplace Health and Safety Regulation 217/2006 and subsequent amendments.

E8.3.2 Safety Personnel shall be dedicated to confined entry access when inspection personnel are in confirmed areas.

E8.3.3 Maintain confined entry permit logs.

E8.3.4 Hazard Assessment

(a) In conjunction with securing the site and obtaining underground clearances, the Contractor shall conduct a hazard assessment for each site requiring work within a confined space. 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 work;

(ii) structural condition of the existing structure; and,

(iii) atmospheric conditions in the structure.

(b) The hazard assessment shall be based on the Contractors review of structures and external conditions. Prior to the inspection, the Contractor shall conduct the necessary atmospheric monitoring of the affected structures to establish acceptable entry conditions.

E8.3.5 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/trench and on the ground’s surface;

(viii) current and forecasted weather conditions;

(ix) provision of back-up equipment;

(x) method of ingress into the structure; and,

(xi) method of egress out of the structure.

(b) The Contactor shall not enter the structures to begin the work until they have completed a hazard assessment and safe work plan for the specific repair and reviewed the plans with their designated safety officer for acceptance. The safe work plan procedures and practices shall conform to all federal, provincial and municipal codes, regulations and guidelines including Manitoba Workplace Safety and Health Regulations.

E8.3.6 Third Party Inspections

(a) The Contractor’s safe work plan and confined space entry procedures for inspections involving Stantec or City personnel shall meet or exceed all requirements outlined in Stantec’s Safe Work Procedure, attached in Appendix C and those of any Inspection Contractors.

(b) The Contractor shall provide confined space support for third party inspections by Stantec and City personal. Stantec and City personal will provide personal PPE. Support shall include but is not limited to:

(i) Furnishing all confined space entry documentation and permits. Copies of the signed and closed out permits shall be provided to the Contract Administrator within five (5) Business Days of the confined space entry;

(ii) Provision of an attendant and supervisor dedicated to the confined space entry;

(iii) Provision of a retrieval tripod, complete with retractable winch line;

(iv) Provision of confined space harnesses. Harnesses shall be certified in accordance with the manufacturer's recommendations;

(v) Provision of atmospheric monitors for each entrant. Atmospheric monitors shall be calibrated and tested in accordance with the manufacturer's recommendations; and,

(vi) The Contractor shall complete and document atmospheric monitoring prior to and during entry in accordance with submitted confined space procedures.

(c) Inspections may be delayed or postponed where onsite confined space procedures, hazard mitigation measures, or confined space entry support do not meet the Contractor's submitted and accepted safe work plan and procedures until such a time that discrepancies have been addressed to the satisfaction of the entrants. Claims for delays resulting from improper confined space operations will not be considered.

E8.4 Measurement and Payment

(a) Confined entry support will be considered incidental to the Work and will not be measured for payment. No additional payment will be made.

E9. ENVIRONMENTAL PROTECTION

E9.1 The Contractor shall be aware that the Branch I Aqueduct and associated infrastructure is for potable water and no contamination by fuel, chemicals, etc. shall be permitted at any time. Fuels or chemicals shall not be stored within 30 metres of the existing chambers, excavations, etc.

E9.2 The Contractor shall plan and implement the Work of this Contract strictly in accordance with the requirements of the environmental protection measures as herein specified.

E9.3 The Contractor is advised that at least the following Acts, Regulations, and By-laws apply to the Work:

E9.3.1 Federal

(a) Canadian Environmental Protection Act (CEPA) c.16;

(b) Canadian Environmental Assessment Act (CEAA) c.37;

(c) Transportation of Dangerous Goods Act and Regulations c.34; and

(d) Migratory Birds Convention Act, 1994

(e) Fisheries Act (c. F-14)

(f) The Canadian Navigable Waters Act

E9.3.2 Provincial

(a) The Dangerous Goods Handling and Transportation Act D12;

(b) The Endangered Species Act E111;

(c) The Environment Act c.E125;

(d) The Fire Prevention Act F80;

(e) The Manitoba Heritage Resources Act H39.1;

(f) The Manitoba Noxious Weeds Act N110;

(g) The Manitoba Nuisance Act N120;

(h) The Public Health Act c.P210;

(i) The Workplace Safety and Health Act W210; and

(j) And current applicable associated regulations.

E9.3.3 Municipal

(a) The City of Winnipeg By-law no. 1/2008;

(b) The City of Winnipeg Waterway By-Law no. 5888/92; and

(c) Other applicable Acts, Regulations and By-laws.

E9.4 The Contractor is advised that the following environmental protection measures apply to the Work.

E9.4.1 Materials Handling and Storage

(a) Construction materials and debris shall be prevented from entering drainage pipes or channels.

(b) Construction materials and debris shall also be prevented from accumulating on local roadways and sidewalks when tracked out of the Site by trucks hauling excavated materials.

(c) The Contractor shall provide on-Site measures to mitigate the tracking of sediment off-Site and therefore reduce the amount of street cleaning required. These measures may take the form of a truck wheel wash (automated or manually operated) or other measures as approved by the Contract Administrator.

E9.4.2 Fuel Handling and Storage

(a) The Contractor shall obtain all necessary permits from Manitoba Conservation for the handling and storage of fuel products and shall provide copies to the Contract Administrator.

(b) All fuel handling and storage facilities shall comply with The Dangerous Goods and Transportation Act Storage and Handling of Petroleum Products Regulation and any local land use permits.

(c) Fuels, lubricants, and other potentially hazardous materials as defined in The Dangerous Goods and Transportation Act shall be stored and handled within the approved storage areas.

(d) The Contractor shall ensure that all fuel storage containers are inspected daily for leaks and spillage.

(e) Products transferred from the fuel storage area(s) to specific Work Sites shall not exceed the daily usage requirement.

(f) When servicing requires the drainage or pumping of fuels, lubricating oils or other fluids from equipment, a groundsheet of suitable material (such as HDPE) and size shall be spread on the ground to catch the fluid in the event of a leak or spill.

(g) Refuelling of mobile equipment and vehicles shall take place at least 100 metres from a watercourse.

(h) The area around storage Sites and fuel lines shall be distinctly marked and kept clear of snow and debris to allow for routine inspection and leak detection.

(i) A sufficient supply of materials, such as absorbent material and plastic oil booms to clean up minor spills shall be stores nearby on-site. The Contractor shall ensure that additional material can be made available on short notice.

E9.4.3 Waste Handling and Disposal

(a) The construction area shall be kept clean and orderly at all times during and at completion of construction.

(b) At no time during construction shall personal or construction waste be permitted to accumulate for more than one day at any location on the construction site, other than at a dedicated storage area as may be approved by the Contract Administrator.

(c) All resulting debris shall be deposited at a Waste Disposal Ground operating under the authority of Manitoba Regulation #150/91. Exceptions are liquid industrial and hazardous wastes which may require special disposal methods (see SC:21.4 D).

(d) Indiscriminate dumping, littering, or abandonment shall not take place.

(e) No burning of waste (on-site or elsewhere) is permitted.

(f) Waste storage areas shall not be located so as to block natural drainage.

(g) Run-off from a waste storage area shall not be allowed to cause siltation of a watercourse.

(h) Waste storage areas shall be left in a neat and finished appearance and/or restored to their original condition to the satisfaction of the Contract Administrator.

(i) Equipment shall not be cleaned near watercourses; contaminated water from onshore cleaning operations shall not be permitted to enter watercourses.

E9.4.4 Dangerous Goods/Hazardous Waste Handling and Disposal

(a) Dangerous goods/hazardous waste are identified by, and shall be handled according to, The Dangerous Goods Handling and Transportation Act and Regulations.

(b) The Contractor shall be familiar with The Dangerous Goods Handling and Transportation Act and Regulations.

(c) The Contractor shall have on-site staff that is trained and certified in the handling of the dangerous/hazardous goods, when said dangerous/hazardous goods are being utilized on-site for the performance of the Work.

(d) Different waste streams shall not be mixed.

(e) Disposal of dangerous goods/hazardous wastes shall be at approved hazardous waste facilities.

(f) Liquid hydrocarbons shall not be stored or disposed of in earthen pits on-site.

(g) Used oils shall be stored in appropriate drums, or tankage, until shipment to waste oil recycling centres, incinerators, or secure disposal facilities approved for such wastes.

(h) Used oil filters shall be drained, placed in suitable storage containers, and buried or incinerated at approved hazardous waste treatment and disposal facilities.

(i) Dangerous goods/hazardous waste storage areas shall be located at least 100 metres away from the high water line and be diked.

(j) Dangerous goods/hazardous waste storage areas shall not be located so as to block natural drainage.

(k) Run-off from a dangerous goods/hazardous waste storage area shall not be allowed to cause siltation of a watercourse.

(l) Dangerous goods/hazardous waste storage areas shall be left in a neat and finished appearance and/or restored to their original condition to the satisfaction of the Contract Administrator.

E9.4.5 Emergency Response

(a) The Contractor shall ensure that due care and caution is taken to prevent spills.

(b) The Contractor shall report all major spills of petroleum products or other hazardous substances with the potential for impacting the environment and threat to human health and safety to the Contract Administrator and Manitoba Environment, immediately after occurrence of the environmental accident, by calling the 24-hour

emergency telephone phone number (204) 945-4888. The Contract Administrator shall also be notified.

(c) The Contractor shall designate a qualified supervisor as the on-site emergency response coordinator for the project. The emergency response coordinator shall have the authority to redirect manpower in order to respond in the event of a spill.

(d) The following actions shall be taken by the person in charge of the spilled material or the first person(s) arriving at the scene of a hazardous material accident or the on-site emergency response coordinator:

(i) Notify emergency-response coordinator of the accident:
- identify exact location and time of accident
- indicate injuries, if any
- request assistance as required by magnitude of accident (Manitoba Environment 24-hour Spill Response Line (204) 945-4888, Police, Fire Department, Ambulance, company backup)

(ii) Attend to public safety:
- stop traffic, roadblock/cordon off the immediate danger area
- eliminate ignition sources
- initiate evacuation procedures if necessary

(iii) Assess situation and gather information on the status of the situation, noting:
- personnel on site
- cause and effect of spill
- estimated extent of damage
- amount and type of material involved
- proximity to waterways and the Aqueduct

(iv) If safe to do so, try to stop the dispersion or flow of spill material:
- approach from upwind
- stop or reduce leak if safe to do so
- dike spill material with dry, inert sorbent material or dry clay soil or sand
- prevent spill material from entering waterways and utilities by diking
- prevent spill material from entering Aqueduct manholes and other openings by covering with rubber spill mats or diking

(v) Resume any effective action to contain, clean up, or stop the flow of the spilled product.

(e) The emergency response coordinator shall ensure that all environmental accidents involving contaminants shall be documented and reported to the Manitoba Environment according to The Dangerous Goods Handling and Transportation Act Environmental Accident Report Regulation 439/87.

(f) When dangerous goods are used on-site, materials for containment and cleanup of spill material (e.g. absorbent materials, plastic oil booms, and oversized recovery drums) shall be available on-site.

(g) Minor spills of such substances that may be contained on land with no significant impact on the environment may be responded to with in-house resources without formal notification to Manitoba Environment.

(h) City emergency response, 9-1-1, shall be used if other means are not available.

(i) The on-site emergency response coordinator shall contact The Canadian Coast Guard, Selkirk (204) 785-6030, if the spill material reaches and is on or in the Seine or Red rivers.

E9.5 Vegetation

(a) Vegetation shall not be disturbed without written permission of the Contract Administrator. The Contractor shall protect plants which may be at risk of accidental damage. Such measures may include protective fencing or signage.

(b) Herbicides and pesticides shall not be used adjacent to any surface watercourses. Any application must be conducted by a licensed individual.

(c) All landowners adjacent to the area of application of herbicides or pesticides shall be notified prior to the Work.

(d) Trees and shrubs shall not be felled into watercourses.

(e) Areas where vegetation is removed during clearing, construction, and decommissioning activities, shall be revegetated as soon as possible in accordance with the requirements outlined herein, or as directed by the Contract Administrator.

E9.6 The Contractor is advised that the following environmental permits and submittals apply to the Work.

E9.6.1 Site Specific Environmental Management Plan (SSEMP)

(a) The Contractor will prepare a SSEMP specific to the Rue Plinguet, Avenue Tache, and Rue Notre Dame Underdrain Outfall sites. The plans will be submitted to the Contract Administer a minimum of fourteen (14) Calendar Days prior to construction start. Construction shall not commence until each plan has been reviewed and confirmed to be in compliance with the requirements of the contract. At a minimum, the SSEMP shall:

(i) Be site specific and prepared by the Contractor with detail on activities to facilitate both temporary and permanent works (e.g., water control plan, dewatering, discharge points, etc.).

(ii) Include details on erosion and sediment control products used, their placement location and maintenance. Include measures necessary to protect exposed areas in the work sites from erosion and potential sediment release considering precipitation events and freeze/thaw conditions. Describe how maintenance and removal or erosion and sediment control measures will be conducted to satisfy both contractual and regulatory requirements

(iii) Include a Site Plan providing sufficient detail, description, or illustration to clearly show all environmental management and protection measures to be used on the site(s) by the Contractor during construction. This includes spill containment, waste storage/handling, etc. Noting a mark up of general arrangement can form part of this information.

(iv) Identify all access, staging, laydown areas and applicable construction procedures and activities. Including sub-contractor activities

(v) Identify and describe how the installation of all environmental protection measures shall be in accordance with the manufacturers specifications / recommendations

(vi) Provide product data and specifications for environmental protection measures and products to be used on site

(vii) Contain an emergency response plan

(viii) Describe any proposed or required regulatory monitoring and reporting requirements

E9.7 Measurement and Payment

(a) The work covered in this section will be considered incidental to the Work and will not be measured for payment. No additional payment will be made.

E10. CHANNEL PROTECTION

E10.1 The ice surface and riverbank channel shall be cleared of construction materials prior to ice break-up. The Contractor shall clean up all materials, including but not limited to: soil, rip rap, snow fence, construction debris, etc. from this construction activity. All items that will have an adverse impact on the channel shall be removed. The Contractor will also adhere to any applicable conditions that may be stipulated in City waterway permitting.

E10.2 Measurement and Payment

(a) Channel Protection will be considered incidental to the Work and will not be measured for payment. No additional payment will be made.

E11. OPERATING CONSTRAINTS FOR WORK IN CLOSE PROXIMITY TO THE BRANCH I AQUEDUCT

E11.1 Description

(a) This Specification details operating constraints for all Work to be carried out in close proximity to the Branch I Aqueduct. Close proximity shall be deemed to be any construction activity within a 5 m horizontal offset from the centreline of the Branch I Aqueduct.

(b) The Branch I Aqueduct is constructed of precast reinforced concrete pipe, vintage 1918-1919. This pipeline contains crimped copper waterstops at pipe joints that are known to occasionally fail and which have limited capacity for vibration, movement, and heavy loading.

E11.2 General Considerations for Work in Close Proximity to the Branch I Aqueduct

E11.2.1 The Branch I Aqueduct is a critical components of the City of Winnipeg's regional water supply and distribution system and work in close proximity to it shall be undertaken with an abundance of caution. The Branch I Aqueduct typically cannot be taken out of service for extended periods to facilitate construction and inadvertent damage caused to the pipe would likely have catastrophic consequences.

E11.2.2 Work around the Branch I Aqueduct shall be planned and implemented to minimize the time period that Work is carried out in close proximity to it and to ensure that it is not subjected to excessive construction related loads, including excessive vibrations and/or concentrated or asymmetrical lateral loads during backfill placement.

E11.2.3 The Branch I Aqueduct has limited ability to withstand increased earth and live loading. Failure of the Branch I Aqueduct has the potential to cause extensive consequential damage to infrastructure. Therefore, every precaution must be undertaken to ensure that applied loading during all phases of construction is within accepted loading parameters.

E11.3 Submittals

E11.3.1 Submit proposed construction equipment specifications to the Contract Administrator for review a minimum of five (5) Business Days prior to construction. The equipment submission shall include:

(a) equipment operating and payload weights;

(b) equipment dimensions, including wheel or track base, track length or axle spacing, track widths or wheel configurations; and

(c) load distributions in the intended operating configuration.

E11.3.2 Submit a construction method statement to the Contract Administrator a minimum of five (5) business days prior to construction. The construction method statement shall contain the following minimum information:

(a) proposed construction plan including excavation locations, haul routes, excavation equipment locations, and loading positions;

(b) excavation plans, including shoring designs, for excavations occurring in close proximity to the Branch I Aqueduct (within 5 m horizontal of the pipe's centerline).

(c) any other pertinent information required to accurately describe the construction activities in close proximity to the Branch I Aqueduct and permit the Contract Administrator to review the proposed construction plans.

E11.3.3 Submit the following documentation for inclusion in the City's shutdown protocol for each planned shutdown a minimum of twenty (20) Business Days prior to the proposed shutdown and the Contractor should allow for a ten (10) Business Day review period by the City once accepted by the Contract Administrator.:

(a) a detailed schedule for the work, including a step by step list of a tasks to be undertaken during the shutdown;

(b) a contingency plan for any problems, issues, or unforeseen circumstance that might occur; and,

(c) check list of equipment, materials, tools required to complete the work that need to be on site prior to undertaking the shutdown.

E11.3.4 Excavation and shoring plans for work around the Branch I Aqueduct shall be prepared as specified herein.

E11.4 Branch I Aqueduct Shutdowns

E11.4.1 Refer to D22 for shutdown scheduling restrictions. Work shall be scheduled to minimize the duration of all shutdowns.

E11.4.2 The Contractor shall provide notice to the Contract Administrator in writing, a minimum of twenty (20) Business Days prior to requiring the shutdown. The City will endeavour to schedule the shutdown as requested, pursuant to D22.

E11.4.3 Shutdowns and excavation of the Branch I Aqueduct will not be permitted until all required submissions and protocols have been reviewed and accepted by the Contract Administrator and City.

E11.4.4 Isolation of critical pipelines will be completed by City forces using mainline valves and secondary valves wherever possible.

(a) Secondary blocking of the Branch I Aqueduct is not practical. Only single blocking will be provided.

E11.4.5 The City shall be responsible for dewatering of the Branch I Aqueduct.

E11.4.6 Branch I Shutdown Terminology:

(a) Modified Operation:

(i) The Branch I Aqueduct remains full of water but is isolated via system valves.

(ii) The City is required to operate the Branch I overnight, three (3) times a week to maintain water quality in the pipeline and maintain water levels at the in town reservoirs. Said operations is planned to occur between 5 pm and 6 am and will be coordinated with the Contractor.

(iii) During modified operation, system valves will not be locked out and no lockout tagout will be provided.

(b) Dewatered:

(i) The Branch I Aqueduct will be dewatered by the City and remain empty through the course of the work.

(ii) During a dewatered shutdown, associated valves will be locked out.

E11.4.7 Work requiring a Branch I Aqueduct Shutdown:

(a) Connection to the Avenue Tache Surge Tower Overflow – Modified Operation

(b) Replacement of UMH119-0114 and UMH119-0134 on Dawson Rd N:

(i) Completion of Branch I Aqueduct foundation stabilization work – Dewatered

(c) All other work is expected to be completed with the Branch I Aqueduct under live flow conditions.

E11.4.8 Work by City Forces:

(a) During the Dewatered shutdown for the Replacement of UMH119-0114 and UMH119-0134 on Dawson Rd N the City will install internal compression seals within the Branch I Aqueduct at the manhole locations.

E11.5 Lockout and Tagout Procedures

E11.5.1 The City of Winnipeg will endeavor to provide redundant valve closures (double blocking) of pressurized pipelines that enter the work space where possible. However, there are locations within the system where it is impractical to provide double blocking without widespread service disruption. Where regional water system network does not allow double blocking, non-redundant valve closures (single blocking) will be provided.

(a) Only single blocking is available on the Branch I Aqueduct.

(b) No lockout tagout is available during modified operation of the Branch I Aqueduct as noted above.

E11.5.2 At locations where only single valve blocking is practical and the pipeline will be open within a chamber or trench where workers are present, additional safety measures and monitoring will be required in order to provide a safe work environment for employees. Development of adequate safety plans in accordance to the Workplace Safety and Health Act and Regulation 217/06 are the responsibility of the Contractor, but as a minimum shall include:

(a) Provision of adequate egress from confined spaces including removal of removable roof slabs and manhole covers, and provision of ladders and other means of site exit.

(b) Use of body harnesses and safety hoisting equipment at all times when pressurized systems are disassembled and protected only by single block valves.

(c) Monitor and assess water leakage in closed system prior to disassembly of system. Monitor water leakage rate and advise Contract Administrator immediately of change in inflow rates. Evacuate confined space if necessary.

E11.5.3 The Contractor, City of Winnipeg Water and Waste Department, and Contract Administrator will all be required to lock out all valves closed in order to facilitate this work. Where site access and lockout space on system valves is limited, the following lockout/tag out procedures will be implemented;

(a) lockout locations for valves will be identified by the City;

(b) City of Winnipeg will provide a single lock, chains and other devices to adequately secure valves within pits and chambers. The Contractor has the right to inspect the installation and satisfy that the lockout system is adequate. All locks utilized will be commonly keyed;

(c) key(s) for single locked valves will be placed in secure lock box at the site. City staff, Contractors, and Contract Administrator will place personal/company locks complete with identification and tag out information on this lock box;

(d) key(s) placed within the secure lock box will not be removed until all City staff, Contractor, and Contract Administrator locks have been removed from the lock box, and verified that the work is completed; and,

(e) City staff will then unlock all valves, and will commence with restoration of the systems to service.

E11.6 Pre-Work, Planning and General Execution

E11.6.1 No work shall commence in close proximity to the Branch I Aqueduct until the equipment specifications and construction method statement have been submitted and accepted, and

feeder main locations have been clearly delineated in the field. Work over the Branch I Aqueduct shall only be carried out with equipment that has been reviewed and quantified in terms of its loading implications on the pipe.

E11.6.2 Notify the Contract Administrator five (5) Business Days prior to commencement of any work near the the Branch I Aqueduct.

E11.6.3 The Drawings provide the location of the Branch I Aqueduct through the construction site. The Branch I Aqueduct locations noted on the Drawings are based on the original record drawings. Locate the Branch I Aqueduct and confirm it's position horizontally and vertically (if required) prior to undertaking work. Visually delineate the Branch I Aqueduct on Site by use of paint, staking/flagging, construction fencing, snow fencing, or other suitable methods

E11.6.4 Only utilize construction practices and procedures that do not impart excessive vibratory loads on the Branch I Aqueduct or that would cause settlement of the subgrade below the Branch I Aqueduct.

E11.6.5 Where the existing road structure must be removed, crossing of the Branch I Aqueduct shall be prohibited from the time the existing roadway structure is removed until the completion of granular base construction. At all times prior to completion of final paving; reduce equipment speeds to levels that minimize the effects of impact loading on the Branch I Aqueduct.

E11.6.6 Only equipment and construction practices stipulated in the accepted construction method statement and the supplemental requirements noted herein may be utilized in close proximity to the Branch I Aqueduct.

E11.6.7 Construction operations should be staged in such a manner as to limit multiple construction loads at one time, (e.g., offset crossings sufficiently from each other, rollers should remain a sufficient distance behind spreaders to limit loads. A reasonable offset distance is 3 m between loads).

E11.6.8 Granular material, construction material, soil, and/or other material shall not be stockpiled on or within 5 m of the Branch I Aqueduct.

E11.6.9 The Contractor shall ensure that all crew members understand and observe the requirements of working near the Branch I Aqueduct. Prior to commencement of on-Site work, the Contractor shall jointly conduct an orientation meeting with the Contract Administer, all superintendents, foreman, and heavy equipment operators to make all workers on the Site fully cognizant of the limitations of altered loading on, the ramifications of inadvertent damage to, and the constraints associated with work in close proximity to the Branch I Aqueduct. New personnel introduced after commencement of the Project need to be formally orientated as outlined herein. It is recommended that restrictions associated with the crossing, consistent with the Contractor's submitted method statement be posted on Site and near the crossing.

E11.7 Demolition, Excavation, and Shoring

E11.7.1 Refer to requirements below for excavations around the Branch I Aqueduct.

E11.7.2 Ground thaw methods shall be employed prior to commencement of construction when excavations are completed while frost conditions exist on site.

E11.7.3 Use of pneumatic concrete breakers within 5 m of the Branch I Aqueduct is prohibited. Pavement shall be full depth sawcut and carefully removed. Use of hand held jackhammers for pavement removal will be allowed.

E11.7.4 Offset excavation equipment a minimum of 5 m from the centerline of the Branch I Aqueduct when undertaking excavations.

E11.7.5 Utilize only smooth edged excavation buckets, soft excavation, or hand excavation techniques where there is less than 1.5 m of earth cover over the Branch I Aqueduct. Where there is less than 1.0 m of soil cover above the Branch I Aqueduct, provide full time

supervision and complete the excavation utilizing hand excavation or soft excavation methods.

E11.7.6 Equipment should not be allowed to operate while positioned directly over a critical pipeline, except were permitted herein, outlined in the reviewed and accepted construction method statement.

E11.7.7 Excavations within 5 m of the outside edge of the Branch I Aqueduct (hydrovac holes for confirming trenchless installations excluded) and which extend below obvert of the Branch I Aqueduct shall utilize shoring methods that precludes the movement of native in-situ soils (i.e. a tight shoring system).

E11.7.8 Pre-bore all piles to below the invert of the Branch I Aqueduct within 5 m (horizontally) of the pipeline's outside edge. Piles shall have a minimum 500 mm clear separation from the Branch I Aqueduct.

E11.7.9 Offset pile driving equipment a minimum of 5 m (horizontally) from the centerline of the pipeline during piling operations.

E11.8 Branch I Aqueduct Excavations

E11.8.1 Excavations shall be completed in accordance with the submitted excavation and shoring plans.

E11.8.2 Notwithstanding the requirements herein, the following are key requirements and considerations for excavations near the Branch I Aqueduct:

(a) Shoring must be close fit to the in-situ soil preventing inadvertent movement of said soil and the risk of movement or damage to the pipe.

(b) Shoring shall not touch the pipe and must be restrained from inadvertent movement which could result in damage to the pipe.

(c) The pipe shall be unloaded on the non-working side to reduce side load on the pipe and reduce the potential for pipe movement during the course of the work. Bracing of the pipe is not an acceptable means of supporting the pipe or preventing lateral movement of the pipe.

(d) The pipe's foundation must be supported where excavations adjacent to the pipe must be progressed below the pipe's foundation. This must be completed with an abundance of caution and in accordance with the Drawings, complete with specified staging of the work. The Contractors excavation and shoring plans shall include provisions to complete the specified Branch I Aqueduct foundation support work.

E11.9 Branch I Aqueduct and GWWD Railway Aqueduct Monitoring During Construction

E11.9.1 Monitoring of the Branch I Aqueduct and GWWD Railway is required during the completion of the replacement of UMH119-0114 and UMH119-0137 and the casing installation beneath the GWWD rail tracks. Daily monitoring will be completed by the Contract Administrator, but the contractor shall complete the following,

(a) Facilitate access to the GWWD Railway for survey. This may include flagging where crossing active tracks.

(b) Facilitate access to the Branch I Aqueduct within the excavation(s) for installation of monitoring equipment and monitoring.

E11.9.2 The following movement tolerances will be in place for monitoring of the railway and pipe:

(a) GWWD Railway:
  (i) Threshold Value: 6 mm
  (ii) Response Value: 11 mm
  (iii) Shutdown Value: 22 mm

(b) Branch I Aqueduct Joints:
  (i) Threshold Value: 0.1 mm

(ii) Response Value: 0.5 mm

(iii) Shutdown Value: 1.5 mm

(c) When the instruments indicate movement equal to the Threshold Value, the Contractor shall meet with City to discuss their construction means and methods to determine what changes, if any, shall be made to better control ground movement. Instrument readings will continue to be taken on a daily basis

(d) When the instruments indicate movement equal to the Response Value, the Construction shall pause in conjunction with frequent monitoring. Construction may recommence once movement has ceased for an hour. The Contractor shall actively control ground movement in accordance with the reviewed plan to prevent reaching the Shutdown Value. Instrument reading frequency will increase until readings remain unchanged for five (5) consecutive days.

(e) When the instruments indicate movement equal to the Shutdown Value, the Contractor shall stop all work immediately, and meet with the Contract Administrator to develop a plan of action before work can be resumed.

E11.10 Backfill and Subgrade Construction

E11.10.1 Embedment of existing pipelines shall be completed with bedding sand meeting the requirements of CW 2030. Bedding sand shall be placed to a minimum of 150 mm above the pipe and 300 mm beyond the outer edges of the pipe except as shown on the Drawings.

E11.10.2 Subgrade, backfill, and base/subbase compaction within 5 metres (horizontal) of the Branch I Aqueduct shall be limited to non-vibratory methods only. Small walk behind vibratory packers will be permitted.

E11.10.3 Subgrade, sub-base and base course construction shall be kept in a rut free condition at all times. Construction equipment is prohibited from crossing the Branch I Aqueduct if the grade is insufficient to support the equipment without rutting.

E11.10.4 Subgrade conditions should be inspected by personnel with competent geotechnical experience (e.g. ability to adequately visually classify soils and competency of subgrade, subbase, and base course materials). In the event of encountering unsuitable subgrade materials above the Branch I Aqueduct, proposed design revisions shall be submitted to the Contract Administrator for review to obtain approval from the Water and Waste Department relative to any change in conditions.

E11.10.5 Fill and base material shall not be dumped directly on the Branch I Aqueduct but shall be stockpiled outside the limits noted in these recommendations and shall be carefully bladed in-place

E11.10.6 Only use compaction equipment approved by the Contract Administrator to compact fill materials above the Branch I Aqueduct. Compaction of fill materials shall be completed using static methods only, no vibratory compaction will be allowed within the limits noted in these recommendations.

E11.10.7 Construction operations shall be staged to minimize the time period between excavation to subgrade and placement of granular subbase materials. Should bare subgrade be left overnight, measures shall be implemented to protect the subgrade against inadvertent travel over it and to minimize the impact of wet weather.

E11.11 Paving

E11.11.1 When constructing asphalt pavements only non-vibratory compaction should be used within 5 m (horizontal) of the center of the Branch I Aqueduct.

E11.12 Measurement and Payment

(a) Protection of the Branch I Aqueduct will be considered incidental to the Work and will not be measured for payment. No separate payment will be made.

E12. EXCAVATION, SHORING, AND BACKFILL

E12.1 Description

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

E12.2 Submittals

(a) Shop Drawings for all excavations shall be prepared and submitted a minimum of fifteen (15) Business Days prior to undertaking the excavation and shoring installation. Shoring Shop Drawings shall be sealed by a Professional Engineer, registered in the Province of Manitoba, experienced in the design of excavation shoring systems.

E12.3 Shoring Design

(a) Shoring shall be provided for excavations in accordance with CW 2030 and E11 to accommodate the identified work herein and on the Drawings.

(b) All shoring systems shall comply with Manitoba Workplace Safety and Health requirements.

(c) Shoring systems located within a 1:1.5 (V:H) zone of influence of the edge of rail tracks shall also be designed to AREMA standards and applicable Transport Canada requirements. E80 railway loading to be assumed. Locations requiring shoring designed to accommodate railway loads include:

(i) Underdrain manhole replacement and Underdrain construction along Dawson Rd N.

E12.4 Excavation

(a) Materials shall not be stockpiled over pipelines.

(b) Excess excavation material from excavations shall be disposed of off-site.

(c) Granular bedding in the vicinity of existing pipelines shall be dewatered and stabilized prior to undermining pipes to prevent loss of granular pipe foundation.

(d) Carefully excavate to expose existing pipelines. Excavation within 1.0 m of the pipe shall be done using soft dig or hand excavation methods to prevent damage to the pipe.

(e) The Contractor shall undertake all efforts to prevent freezing of soils underlying existing pipelines, bedding and backfilling will not be permitted overtop of frozen soils. Excavations left open when nighttime atmospheric temperatures are expected to drop below 0°C shall be horded and heated as required to keep soils and pipelines from freezing.

(f) See E11 for additional restrictions when working in close proximity to critical water infrastructure.

E12.5 Backfill

E12.5.1 Unless otherwise stated, excavation backfill shall be completed as follows:

(a) Backfill within 1 m of existing and proposed pavements shall be completed to CW 2030, Class 3 standards unless otherwise specified.

(b) Backfill under paths and walkways shall be completed to CW 2030, Class 3 standards unless otherwise specified.

(c) Backfill within 1 metre of existing concrete structures shall be completed with free draining pit run granular material to CW 2030, Class 2 standards, unless otherwise specified.

(d) All other areas shall be backfilled with a Class 5 backfill, unless otherwise specified.

E12.5.2 The Contractor shall undertake all efforts to prevent excavated material intended for backfilling from freezing. Backfilling with frozen materials will not be permitted.

E12.6 Measurement and Payment

(a) Excavation, shoring, and backfilling for excavations will be considered incidental to the Work and will not be measured for payment. No separate payment will be made.

E13. WATER SUPPLY

E13.1 Further to specifications CW 1120, Section 3.1, CW 2140 and CW 2145, water supply for the Work may be taken from City of Winnipeg hydrants in accordance with the following:

(a) Only hydrants approved by Water Services Division shall be used for water supply.

(b) The Contractor shall supply and use a Backflow Protection Arrangement as shown on Standard Drawing SD-019 when taking water from City hydrants. Alternatively, the Contractor may rent the Backflow Protection Arrangement from the Water Services Division if available. Water Services Division will supply a meter and locks for the Backflow Protection Arrangement.

(c) The Contractor is permitted to turn approved hydrants on and off provided the Contractor has received training by the Water Services Division and the turn-ons and turn-offs are done in the presence of the Contract Administrator.

(d) Hydrants approved for use shall be considered to be “in the Contractor’s control” from the time the City has turned the hydrant on until the Contractor has notified the City the hydrant is no longer being used and the meter box has been removed.

(e) 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. Heating and hoarding of hydrants will be required by the Contractor.

(f) If a hydrant or appurtenance is damaged due to freezing or improper turn-on or turn-off procedures while in the Contractor’s control, Water Services Division will assess the damage and determine if Water Services Division will repair the damage or if the Contractor will be responsible to repair the damage. Costs for repairs completed by Water Services Division will be deducted from payments owing to the Contractor. Repairs completed by the Contractor will be at the Contractor’s expense.

(g) Erect and maintain signage (bump signs) warning oncoming traffic of hose crossings to the satisfaction of the Contract Administrator and the Manual of Temporary Traffic Control.

(h) Water Services Division may instruct the Contractor to make other arrangements for hydrant turn-ons and turn-offs.

E13.2 Measurement and Payment

(a) Costs associated with a water supply for the project will be considered incidental to the Work and will not be measured for payment. No additional payment will be made.

E14. SUSPENSION OF WORK ACTIVITIES WHEN SEWER CONTROL GATES ARE ACTIVATED DURING PERIODS OF HIGH RIVER LEVELS

E14.1 The Contractor is advised that as the elevation of the Red and Assiniboine Rivers rise from the normal winter or summer levels due to spring runoff or periods of heavy rainfall the City is required to close various control gates located on sewer system outfalls. Similarly, as the elevation of the rivers drop to normal levels, the City is required to open the control gates that have been closed. Control gates begin to be closed when river levels reach elevation 224.51 (James Avenue 9.0’). As well, higher river levels can cause the level of flow in sewers to be higher than normal.

E14.2 In the event the Red and Assiniboine Rivers rise to an elevation where the City has to begin closing control gates, the Contract Administrator will direct that work activities in any sewers affected by the gate closure be suspended and the risk of runoff causing flooding in the sewer evaluated. Work will continue to be suspended as long as there is a risk of the sewer being flooded while the control gate is closed unless the Contractor provides flow control measures

approved jointly by the Contract Administrator, City of Winnipeg Collection System and Flood Control Branch and Local Services Branch.

E14.3 Similarly, as river elevations drop and the City has to open control gates that have been closed, the Contract Administrator will direct that work activities in any sewers affected by the control gate opening be suspended due to the risk of the river flooding the sewer once the gate is opened. Work will continue to be suspended as long as the sewer is being flooded from the river unless the Contractor provides flow control measures approved jointly by the Contract Administrator, City of Winnipeg Collection System and Flood Control Branch and Local Services Branch.

E14.4 The Contractor will have no claim for extra Work or compensation as a result of suspension of Work due to the City closing and opening control gates during periods of rising and dropping river levels. If in the opinion of the Contract Administrator the suspension will cause the completion of the Work to occur after the specified date for Substantial Performance and the Contractor's schedule would have reasonably permitted completion of the Work before the required date, the date for Substantial Performance will be adjusted accordingly.

E14.5 The flood activation elevations for each site will be available upon request prior to construction.

E15. RIVERBANK SITE DEVELOPMENT

E15.1 Description

E15.1.1 This Specification shall cover the following site development items:

(a) Construction of temporary access ramps and site haul roads to undertake riverbank erosion protection works.

(b) Removal of existing trees and shrubs necessary for temporary access.

(c) Removal of temporary access ramps and bank reshaping prior to the spring freshet.

(d) Restoration of all areas disturbed by temporary access, staging and laydown.

E15.1.2 The work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all other things necessary for and incidental to the satisfactory performance and completion of all Work hereinafter specified.

E15.1.3 The riverbank area shall be any area within 30 m of the top of the river bank at any site.

E15.2 Submittals

E15.2.1 Site Access Plan

(a) At least twenty (20) Business Days prior to commencement of construction, submit a Site Access Plan for acceptance by the Contract Administrator to facilitate the identified work within the riverbank area. The Site Access Plan shall be sufficient to satisfy the Contract Administrator that the proposed access ramps, site haul roads, shoring works, and equipment staging will be in accordance with this Specification and will not adversely impact riverbank stability for the duration of the project. Acceptance of the Site Access Plan shall not diminish the Contractor's responsibility for development and maintenance of site access, and adherence to the conditions of the City of Winnipeg Waterway Permit.

(b) The Site Access Plan shall include a plan view layout, typical cross-section(s), and sequencing of any access ramps from the top of the bank area to the lower riverbank and any haul roads at the Site. Cuts and fill areas shall also be clearly shown in plan and cross-section.

(c) As the work proceeds, provide any changes to the Site Access Plan to the Contract Administrator for review and acceptance prior to modifying the access works.

(d) The Site Access Plan, and specifically the access ramp design and drawings, shall be signed and sealed by an experienced Geotechnical Engineer registered to practice in the province of Manitoba.

(e) The Contractor's Site Access Plan shall be included with the Waterways Access Permit application for temporary site access.

E15.3 Regulatory Permitting

E15.3.1 Works at the Rue Plinquet site are subject to provisions of the Fisheries Act. A Letter of Advice has been received by Fisheries and Oceans Canada which will be provided to the Contractor. Protections and mitigations outlined in this letter shall be adhered to by the contractor.

E15.3.2 Works at the Rue Plinquet site are subject to provisions of the Canadian Navigable Waters Act. A notification of a Minor Work has been posted for these works. The contractor is to be aware signage will be posted on site (by others).

E15.3.3 The Historic Resource Branch has reviewed the works and has issued their Clearance Letter.

E15.3.4 Waterways Permit for Temporary Access Works

(a) The Contractor shall note that all works within 106.7 m (350 ft) of the regulated summer water level of the Red River and Seine River within the City of Winnipeg are within the jurisdiction of the Waterway By-Law and requires a Waterway Permit prior to commencing construction.

(b) The Contract Administrator and City of Winnipeg Water & Waste Department shall be responsible for applying for and obtaining the necessary permits for the permanent Works to be constructed.

(c) The Contractor shall be responsible for applying for all required permits and permissions that are necessary for temporary Site access, including a Waterway Permit.

(i) The Contractor's construction access drawings will be submitted as part of the permit application, if required.

(ii) The Contractor shall be responsible for obtaining and providing any additional information that may be requested as part of the permit application process.

(iii) Under no circumstances will stockpiling of any material be permitted within the designated regulated waterway and adjacent lands.

E15.3.5 Frozen Waterways Permit

(a) The Contractor is responsible for obtaining a Frozen Waterway Permit for permission to Work on the river ice.

E15.4 Materials

E15.4.1 Fill Material

(a) The Contractor shall be responsible for supplying imported clean fill or granular materials, or other materials that the Contractor may deem suitable for its operations, for construction, and for maintenance of access ramps and haul roads. Native soil excavated to offset the weight of imported fill materials shall be hauled and disposed off-site immediately.

E15.5 Construction Methods

E15.5.1 Site Access Development

(a) The Contractor shall be responsible to develop and maintain suitable site access. This includes but is not limited to, temporary bridging over structures, temporary removal and reinstallation of safety fencing, removal of existing trees and shrubs, landscaping and grading repairs necessary to restore any Site, and construction access areas to their pre-existing topography, as accepted by the Contract Administrator.

(b) Temporary access ramps shall be cut into the existing bank above the normal summer river level. Placement of fill below the normal summer river shall consist of clean, crushed rock. Earthworks associated with access ramp construction shall not result in erosion and sedimentation into the river.

(c) The Contractor's site access routes shall minimize tree removal. Tree removals shall be performed in accordance with E30. Tree removals proposed by the Contractor shall be identified in the Site Access Plan for prior approval by the Engineer and the City's Forester.

(d) All access ramps and haul roads shall be removed prior to the spring.

E15.5.2 Vegetation and Debris Removal

(a) Existing ground vegetation shall not be removed without prior approval from the Contract Administrator. The Contractor shall load and haul off-site any removed vegetation and existing debris including deadfall and material deposited by the river. Stockpiling of vegetation or debris is not permitted, except as approved by the Contract Administrator.

(b) Tree stumps will be removed and/or ground out to a depth of 150 mm below the final grade including all surface roots. Immediately after grinding each stump, the grindings must be removed from the work area.

E15.5.3 Snow Removal

(a) Stockpile locations from snow clearing shall be subject to the acceptance of the Contract Administrator and shall not be located where loading or meltwater runoff may negatively impact riverbank stability (e.g. top of bank).

E15.5.4 Safety Fence

(a) Erect and maintain a safety fence for the duration of the project to prevent public access to hazardous areas of work (e.g., staging areas, temporary access locations). Appropriate signs shall be erected to warn all recreational users of the site that a hazard exists. Fence construction on the riverbank shall consist of orange plastic safety fence with a minimum height of 1.2 m supported by posts driven into the ground. The posts shall be sized and capable of maintaining the safety fence upright, regardless of conditions. Upon completion of the work, all fence materials shall be removed and disposed of off-site.

(b) Posts used to support any fencing or barriers on the river ice shall either be self supporting structures and placed on the surface of the ice, or be un-treated wood if embedded into the ice

(c) Fencing and/or flagging shall be erected to delineate the edges of the City's right of way and easements while working on riverbanks.

E15.5.5 Stockpiling

(a) The rate at which materials are delivered to the Site shall be controlled to minimize stockpiling and handling.

(b) All material stockpile locations shall be subject to prior approval by the Contract Administrator.

(c) Stockpiled material shall be handled and maintained in a manner that prevents contamination with other soils and materials, debris, and snow. Contaminated material shall be removed and replaced at the Contractor's expense.

(d) Prevent release of sediments from stockpile areas into the river.

E15.5.6 Site Access Restoration

(a) Remove temporary access upon completion of riverbank erosion protection works by reshaping to the original (pre-construction) riverbank grades shown on the Drawings.

(b) Prior to Total Performance, restore all riverbank areas disturbed by temporary construction access, staging and laydown to original (pre-construction) conditions.

E15.6 Measurement and Payment

E15.6.1 Site development will be considered incidental to the Work and will not be measured for payment. No separate payment will be made.

E16. PROTECTION OF INSTRUMENTATION

E16.1 The Contractor shall ensure that existing instrumentation located in the test holes shown on the Drawings are protected from damage due to construction activities. If instrumentation must be removed or rendered inoperable due to construction activities, it shall be clearly detailed on the required site development submittals for review and acceptance by the City.

E16.2 The Contractor will be responsible to replace destroyed instrumentation or repair any damages at his own cost, to the satisfaction of the Contract Administrator.

E17. RIVERBANK EXCAVATION AND GRADING

E17.1 Description

E17.1.1 This Specification shall cover all operations related to the excavation of and backfill material and general grading on riverbanks, including removal of topsoil and vegetation, and shall amend and supplement CW 3170.

E17.1.2 The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies, and all things necessary for and incidental to the satisfactory performance and completion of all Works as hereinafter specified.

E17.2 Scope of Work

E17.2.1 The Work under this Specification shall include:

(a) Excavating all material required to construct the Works to the lines and grades as shown on the Drawings;

(b) The design, fabrication and erection of all temporary shoring and such temporary protective measures as may be required to construct the Works;

(c) Clearing and grubbing operations in areas where excavation is required;

(d) Excavating topsoil where excavation is required;

(e) Off-site disposing of surplus and unsuitable material;

(f) Dewatering of all excavations, as required; and

(g) Complying with the requirements outlined in E9.

E17.2.2 Major components of the work include:

(a) Temporary site access, see E15.

(b) Excavations on or near the riverbank as required to install identified buried infrastructure.

(c) Installation of riprap.

(d) Localized grading work required for rip rap installation and restoration of the site.

E17.3 Materials

E17.3.1 Native Material to be Excavated

(a) The materials covered in this specification consist of the in-situ overburden soils and may include but not necessarily be limited to organic topsoil, clay, silt, sand, gravel, fill, rubble, roots, riprap, and concrete blocks.

(b) Excavated material shall be unclassified excavation and shall include the excavation and satisfactory disposal of any and all materials that may be encountered.

E17.3.2 Clay Backfill

(a) The impervious clay backfill to be used for riverbank regrading shall consist of a high plasticity clay material, with a liquid limit in excess of 50%. The clay shall be free of deleterious material such as roots, organic material, ice, snow or other unsuitable materials, and may be salvaged from the on-site excavation, as accepted by the Contract Administrator. Frozen material will not be accepted.

(b) Suitable clean clay fill material shall be used for areas requiring fill.

(c) Clay backfill shall be compacted to 95% SPDD.

E17.3.3 Testing

(a) All excavated materials shall be subject to inspection and testing by the Contract Administrator or by the Testing Laboratory designated by the Contract Administrator. There shall be no charge to the City for any materials taken by the Contract Administrator for testing purposes.

E17.4 Construction Methods

E17.4.1 Excavation – Alterations to Site

(a) The Contractor shall excavate only material that is necessary for the expeditious construction of the Works or as set out by the Contract Administrator in the field.

(b) Refer to E15 for additional specifications related to riverbank construction.

E17.4.2 Excavating Riverbank Material

(a) Prior to commencing any excavation Works, underground clearances shall be obtained from all applicable utilities by the Contractor. Due care and caution shall be taken by the Contractor to work around all identified underground utilities.

(b) Excavations shall be completed to the elevations required to construct the Works, to the lines and grades as shown on the Drawings, or to such other elevations as may be directed by the Contract Administrator in the field.

(c) Any riverbank excavation or regrading shall be done in a “top down” direction in order to maintain slope stability.

(d) All material shall be brought to the surface by approved method and shall be disposed of away from the Site and not into the existing water channel. Shored excavations shall be dewatered and maintained dewatered so that the material is excavated in its natural state. The bottom of the excavation shall be kept free from excessive moisture or free-flowing water.

(e) Double handling of excavated material may be required due to the depth of excavation and height of the bank, and material should be transferred up the slope in an expeditious manner. No temporary material piles may remain on the slope for longer than one hour during the transferring process. The Contractor should pace the excavation to keep up with the removal from Site.

(f) Areas for stockpiling of materials shall be proposed by the Contractor for approval by the Contract Administrator. No stockpiling shall be permitted without prior approval by the Contract Administrator.

E17.4.3 Excess Material

(a) All excess excavated material shall become the property of the Contractor and shall be removed from the Site.

(b) Excavated material shall not be stockpiled within 30 m of the riverbank slope. Excess materials shall be disposed of off site.

E17.4.4 Clearing and Grubbing

(a) Removal of brush and other vegetation may be required to facilitate the Works. Existing vegetation shall not be removed without prior approval from the Contract

Administrator. The Contractor shall load and haul any removed vegetation and dispose of the material off site.

E17.4.5 Excavating Topsoil

(a) Removal of vegetation and topsoil may be required to facilitate the Works. Existing vegetation shall not be removed without prior approval from the Contract Administrator. The Contractor shall load and haul any removed vegetation and dispose of the material off site.

E17.4.6 Excavation Backfill

(a) Excavations on riverbanks shall be backfilled to Class 5 standards utilizing clay backfill unless otherwise specified.

(b) Rue Plinguet Underdrain Outfall - As flood tamping is not practical prior to restoration, excavations are be mounded to permit settlement.

E17.4.7 Off-Site Disposing of Surplus and Unsuitable Material

(a) All excess excavated material shall become the property of the Contractor and shall be removed from the Site. Excavated material shall not be disposed of in a manner that will obstruct the flow of the waterway.

(b) Stockpiling of unsuitable material on site will not be permitted.

E17.4.8 Protection of Existing Embankment Slopes

(a) The Contractor shall not disturb the embankment slopes outside the excavation limits and shall not dump excavated material onto the roadway embankment or the riverbank.

(b) The Contractor shall be responsible for maintaining sediment control measures at the Site to prevent sediment releases into the waterway from areas disturbed as a result of the Work during and following construction.

(i) The Contractor shall monitor the Work and implement appropriate sediment control measures as Site conditions warrant. Such measures may include installation of silt fences, straw wattles, or other measures as required in the event that there is runoff from the Site.

(ii) Sediment and erosion control measures shall comply with the requirements of E9. Specific sediment and erosion control measures are outlined in E35 “Erosion Control Blanket (ECB)”, E36 “Silt Fence Barrier”, and E37 “Straw Wattles”.

(iii) The Contractor shall monitor, maintain, and repair all sediment control measures until vegetation has re-established in restored areas and there no longer is a potential for sediment releases due to construction.

(c) Disturbed riverbank areas shall be restored as per the Drawings.

E17.5 Measurement and Payment

E17.5.1 Excavations and Backfill

(a) Excavations and backfill required to complete the installation of underground infrastructure and site access works will be considered incidental to the Work and will not be measured for payment. No additional payment will be made.

E17.5.2 Riverbank Regrading for Riprap Installation

(a) Riverbank regrading and base preparation for riprap installation will be considered incidental to Supply and Place Class 350 Riprap and will not be measured for payment. No additional payment will be made.

E17.5.3 General Riverbank Regrading

(a) General riverbank regrading as specified on the drawings and required for restoration will be measured and paid on a lump sum basis at the Contract Unit Price identified in Form B: Prices. Payment shall include all materials and labour to complete the work.

E17.5.4 Stripping of topsoil shall not be measured or paid for directly and will be considered incidental to the Work.

E18. UNDERDRAIN AND OUTFALL REPAIRS

E18.1 Description

E18.1.1 A majority of this project is focused on the repair of Underdrain and associated outfalls. This includes repairs to three outfalls, elimination of cross connections to the combined sewer system, and repairs to the Underdrain itself at various locations. These repairs can be summarised as follows:

(a) Trenchless and open cut replacement of portions of the Underdrain, Underdrain manholes, and outfalls.

(b) External Point Repairs (EPR)

(c) Trenchless Point Repairs (TPR) – See E25

(d) Cured in Place Pipe (CIPP) - See E25

(e) New Avenue Tache Underdrain Outfall Manhole – See E20

E18.1.2 This section addresses all Underdrain repairs, except where noted above and includes stabilization of the Underdrain prior to trenchless repair work.

E18.1.3 Two options have been presented for the replacement of a portion of the Rue Notre Dame Underdrain Outfall as shown on the Drawings. The contractor shall complete the identified inspections and confirm with the Contract Administrator as to which option is be undertaken. Based on available information, Option 1, including an EPR and CIPP lining is the preferred option and anticipated work. Should the condition of the Underdrain be considerable worse than anticipated, then Option 2 will be implemented. All work associated specifically with Option 2 should be considered provisional. Similarly, should Option 2 be undertaken, none of the work specifically associated with Option 1 will be undertaken nor measured for payment.

E18.2 Submittals

E18.2.1 Submit shop drawings for all materials in accordance with E3.

E18.3 Materials

E18.3.1 Concrete

(a) For cast in place concrete works, refer to E26.

(b) Concrete for large internal repairs to the Underdrain and manholes and internal void filling shall be in conformance with Table CW 2160.1, Type B.

(c) Patching and grouting of repairs to the Underdrain and manholes shall be with a fast hardening high strength concrete repairing compound designed for underwater use

(i) Approved products: Duro-Crete by C Chemicals or approved equal in accordance with B7.

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

E18.3.2 All Underdrain components shall meet the requirements of CW 2130 except as specified herein.

E18.3.3 Manhole components shall conform to CW 2130.

E18.3.4 Solid wall Underdrain pipe shall be PVC SDR 35 conforming to CW 2130.

E18.3.5 Perforated Underdrain pipe shall conform to the requirements of CW 3120, sized to match the Underdrain being repaired.

E18.3.6 HDPE Underdrain/outfall pipe shall conform to the following:

(a) Pressure Class (DR rating) as shown on the Drawings.

(b) HDPE pipes: to AWWA C906, CAN/CSA B137.1, PE 4710 based on IPS outside diameter.

(c) Polyethylene to polyethylene joints: to be thermal butt fusion joined to ASTM D 2657.

(d) Polyethylene fittings: to CAN/CSA B137.1 or AWWA C901.

E18.3.7 CSP Underdrain/outfall pipe shall conform to CW 3610. Notwithstanding CW 3610, CSP components shall be supplied as follows:

(a) Minimum wall thickness of 1.6 mm.

(b) Complete with a polymer coating.

(c) Approved CSP product: Armtec Polymer Coated Trenchcoat Hel-Core Lockseam or approved equal in accordance with B7.

(d) Approved CSP couplings: Armtec Polymer Coated Trenchcoat H500 Hugger Band Couplers complete with O-ring Elastomeric Gaskets, or approved equivalent in accordance with B7.

E18.3.8 Sealed composite manhole lids shall be WD Industrial WD50SC without lifting holes or approved equal in accordance with B7.

E18.3.9 Flexible rubber backflow valves shall be CheckMate UltraFlex by Red Valve or approved equal in accordance with B7.

E18.3.10 PVC Backwater Valves and Piping

(a) PVC pipe and fittings shall conform to CSA B182.1 and B182.2.

(b) Drain piping shall utilize a solvent weld joint type.

(c) Piping conforming to CSA 182.2 shall have a dimension ratio of 35.

(d) The backwater valve shall utilize an EPDM seat rated to 275 kPa of back pressure.

(e) The backwater valve shall conform to ASME A112.14.1.

E18.3.11 Steel Casing Pipe

(a) Casing pipe shall conform to the following standards:
  (i) AREMA Manual for Railway Engineering
  (ii) Railway Association of Canada – TC-E-10

(b) Steel and steel pipe products shall conform to ASTM A36 or ASTM A525 with a minimum yield strength of 241 MPa.

(c) Minimum wall thickness for 500 mm casing: 9.5 mm
  (i) The minimum pipe strength and thickness is specified only for the permanent operating loads that are imposed on the pipe after the installation process. The pipe shall be additionally checked by the Contractor to safely withstand all anticipated temporary loads due to handling, shipping, storage, transport, and installation of the pipe in accordance with established practices, national standards, and the requirements as contained herein.

(d) Joints:
  (i) Welded (full penetration butt weld) in accordance with AWWA C200;
  (ii) Permalock style T5; or,
  (iii) Approved equal in accordance with B7.

(e) Interior and exterior coatings not required.

E18.3.12 Casing Spacers

(a) Casing spacers shall be constructed from steel or stainless and be capable of faciliating installation of the Underdrain on grade and the post installation annular grouting operation .

(b) The casing spacer supplier shall confirm the load carrying capacity of the spacer and provide maximum spacing recommendations based on the applied loads and capacity of the casing spacer to support loads from the grouting operation.

E18.4 Underdrain Repairs and Preparation Work

E18.4.1 Existing Underdrain Conditions

(a) The assessment of the liner system design conditions and site-specific repairs required to accommodate lining were based on the conditions observed from Underdrain inspections that were performed as part of the City of Winnipeg's Underdrain Inspection Program. Copies of these video inspections are available to the Contractor upon request by providing a portable hard disk drive (HDD) to the Contract Administrator. The Contract Administrator will copy the inspections onto the HDD and make available to the Contractor for review purposes.

(b) The Contractor shall be aware that the video inspections provided were completed immediately after Underdrain 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 Underdrains included in this Work.

(c) Observed Underdrain defects and cleaning/preparation works evident in the existing Underdrain inspection videos has been provided in Appendix E.

E18.4.2 Underdrain Cleaning

(a) Remove loose debris, solid debris, roots, and grease in accordance with E25 and CW 2140 in order to adequately prepare the Underdrain for lining.

(b) Contractors shall undertake cleaning activities with an abundance of caution. The Underdrain is constructed with open joints and excessive flushing could result in the loss of embedment material.

E18.4.3 The following stabilization, repairs, and preparation work can be reasonably assumed to be required and shall be completed prior to undertaking the identified trenchless rehabilitation work:

(a) General Preparation:

(i) Remove loose debris, solid debris, roots, and grease in accordance with CW 2140.

(ii) Remove any remaining organic or biological materials.

(iii) Remove any loose or damaged pipe and/or mortar.

(iv) Remove wall encrustations throughout.

(v) Remove encrustations at service connections.

(vi) Grout Underdrain services as required following encrustation removal.

(vii) Remove intruding connections in accordance with CW 2140.

E18.4.4 External Point Repairs

(a) The Contractor shall provide CCTV video of any proposed EPRs for review and acceptance by the Contract Administrator prior to undertaking the work to confirm the extents and location of the repair.

(b) Complete external point repairs as shown on the Drawings.

E18.4.5 New Underdrain and Underdrain Manholes

(a) New Underdrain pipe and manholes shall be installed in accordance with CW 2130 and as specified herein and on the Drawings.

E18.5 Construction Methods

E18.5.1 Complete all work in accordance with CW 2130 and as specified herein.

E18.5.2 Installation shall follow manufacturer's recommendations and the requirements specified herein and on the Drawings.

E18.5.3 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 Underdrain and manholes.

E18.5.4 Trenchless Pipe Installation

(a) The installation of pipe and fittings shall be the responsibility of Contractor in accordance with the minimum requirements as established in the project plans, specifications, pipe manufacturer's recommendations, and reviewed submittals. Do not damage pipe or pipe joints.

(b) Steel casing pipe installation shall meet the requirements of E19.

E18.5.5 Field Welding Pipe Joints

(a) Pipe Jointing –Welded joints

(i) Field welding of steel pipes shall conform to AWWA C206

(ii) Full penetration welds shall be completed in accordance with AWWA Manual of Practice 11: Steel Pipe – A Guide for Design and Installation.

(iii) Bevel joint ends for field welding butt joints as per AWWA C200-05 Sec. 4.13.2.

(iv) All welds shall be inspected using magnetic particle testing methods by a qualified inspector in accordance with ASTM E1444 prior to coating and installation.

(v) Where coatings are required, ensure that appropriate curing times as specified by coating manufacture are followed prior to installation of the pipe.

E18.5.6 Abandonment of Underdrains and Manholes

(a) Underdrains shall be abandoned as shown on the drawings and in accordance with CW 2130. Notwithstanding CW 2130, where specified, Underdrains shall be abandoned with flowable fill. All other locations Underdrains shall be abandoned in accordance with CW2130.

(b) Manholes shall be abandoned in accordance with CW 2130. Where specified, the manhole barrel shall be filled with flowable fill vs. granular backfill.

E18.5.7 Flow Control

(a) Contractor shall control flows in the Underdrain as required to facilitate the work. This may include blocking flows with upstream storage for short periods of time, or pumping to a nearby WWS or CS.

(b) Note, Underdrain flows may contain chlorine. If chlorine is not present, confirmed via testing, Underdrain flows may also be pumped to the environment.

E18.5.8 CCTV Underdrain and Panoramic Manhole Inspections

(a) CCTV and panoramic manhole inspections shall be completed for newly installed, repaired, and modified Underdrain and manholes in accordance with E23 and E24.

E18.6 Measurement and Payment

E18.6.1 External Point Repairs

(a) Completion of external point repairs will be measured and paid on a lump sum basis at the Contract Unit Price at the locations identified in Form B: Prices. Payment shall

include all materials and labour to complete the work including, but not limited to excavation, shoring, and Underdrain repairs.

E18.6.2 Installation of Underdrain/Outfall Pipe

(a) Installation of new Underdrain pipe will be measured and paid on a linear meter basis at the Contract Unit Price at the locations, installation types, material types, and diameters identified in Form B: Prices in accordance with CW 2130. Payment shall include all materials and labour to complete the work as specified in CW 2130 and herein, except post installation CCTV inspections which shall be paid in accordance with CW 2145.

(b) Annulus grouting for the Underdrain and steel casing crossing of the GWWD Railway will be considered incidental to the Underdrain installation and will not be measured for payment. No additional payment will be made.

(c) Installation of CSP end treatment will be measured and paid on a lump sum basis at the Contract Unit Price identified in Form B: Prices. Payment shall include all materials and labour to complete the work.

(d) Installation of Underdrain components will be measured and paid on a unit price basis at the Contract Unit Price for the component and at the locations identified in Form B: Prices. Payment shall include all materials and labour to complete the work including, but not limited to excavation, shoring, and identified connections to the Underdrain.

E18.6.3 New Underdrain Manholes

(a) Construction of new Underdrain manholes will be measured and paid on a lump sum basis at the Contract Unit Price at the locations identified in Form B: Prices. Payment shall include all materials and labour to complete the work including, but not limited to excavation, shoring, removal of existing manholes as required, abandonment/removal of portions of Underdrain within the manhole footprint and identified connections to the Underdrain.

(b) Installation of the new Underdrain manhole at the Avenue Tache Underdrain Outfall will be paid in accordance with E20.

E18.6.4 Flexible Rubber Backflow Valves

(a) Installation of rubber backflow valves will be measured and paid on a lump sum basis at the Contract Unit Price at the locations identified in Form B: Prices. Payment shall include all materials and labour to complete the work.

(b) Installation of the flexible rubber backflow valve at the Avenue Tache Underdrain Outfall will be considered incidental to Construct New Manhole at Avenue Tache Underdrain Outfall Site and will not be measured for payment. No additional payment will be made.

E18.6.5 Underdrain and Manhole Abandonments

(a) Abandoning Underdrain sections without flowable fill will be measured and paid on a lump sum basis at the Contract Unit Price at the locations identified in Form B: Prices. Payment shall include all materials and labour to complete the work.

(b) Abandoning Underdrain sections with flowable fill will be measured and paid on a cubic metre basis at the Contract Unit Price at the locations identified in Form B: Prices. Payment shall include all materials and labour to complete the work.

(c) Abandoning Underdrain manholes will be measured and paid on a lump sum basis at the Contract Unit Price at the locations identified in Form B: Prices. Payment shall include all materials and labour to complete the work.

(d) Flowable fill for manhole abandonment will be measured and paid on a cubic metre basis at the Contract Unit Price at the locations identified in Form B: Prices. Payment shall include all materials and labour to complete the work.

(e) Removal of existing manholes will be measured and paid on a lump sum basis at the Contract Unit Price at the locations identified in Form B: Prices. Payment shall include all materials and labour to complete the work.

(f) Removal of existing manholes where required to facilitate new manhole installations will be considered incidental to the work and will not be measured for payment. No additional payment will be made.

E18.6.6 Underdrain Preparation Work for Trenchless Repair

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

(b) Grease and roots cutting will be measured on a unit basis and paid for at the Contract Unit Price for "Removal of Grease and Roots (Per Underdrain Segment)". Grease and root removal will be measured per Underdrain segment where work is undertaken, accepted, and measured by the Contract Administrator. Only one item of payment will be made for grease and root removal per Underdrain segment.

E18.6.7 Underdrain Cleaning

(a) Underdrain cleaning will be measured and paid in accordance with CW2140, except as modified herein:

(b) The total length of cleaning to be paid will be the total length of Underdrain cleaned to the satisfaction of the Contract Administrator.

(i) The maximum length to be paid will be the manhole-to-manhole Underdrain length provided by the Contractor.

(ii) Where partial or incomplete cleaning is completed, the length of Underdrain cleaned will be the length recorded by the Contractors calibrated inspection equipment or as determined by the Contract Administrator.

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

(d) Where diameter changes have been identified mid-pipe, Underdrain cleaning for that asset will be paid at the Contract Rate listed for the largest identified diameter of that asset.

E18.6.8 Archibald Street Cross Connection

(a) Manhole and Underdrain modifications required to eliminate the cross connection on Archibald Street will be measured paid on a lump sum basis at the Contract Unit Price at the locations identified in Form B: Prices. Payment shall include all materials and labour to complete the work, including, but not limited to excavations, shoring, connections to the existing Underdrain, and reconstruction of the manhole as shown on the Drawings.

E18.6.9 Miscellaneous Work

(a) Removal of the existing gate valve and appurtenances from UMH-110-0001 will be measured paid on a lump sum basis at the Contract Unit Price at the locations identified in Form B: Prices. Payment shall include all materials and labour to complete the work.

(b) Internal Underdrain repair c/w external grouting on AQ-U00000181 will be measured paid on a lump sum basis at the Contract Unit Price at the locations identified in Form B: Prices. Payment shall include all materials and labour to complete the work.

E18.6.10 Flow Control

(a) Dewatering of the Underdrain and flow control required to complete the work will be considered incidental to the Work and will not be measured for payment. No additional payment will be made.

E19. TRENCHLESS INSTALLATION OF STEEL CASING PIPE

E19.1 Description

E19.1.1 This specification describes the requirements for installation of a steel casing beneath the GWWD Railway on Dawson Road N.

E19.1.2 The casing shall be installed using guided auger boring methods.

E19.2 General

E19.2.1 The Contractor shall furnish all labor, equipment, materials and incidentals necessary to install the force main pipeline in accordance with the requirements of this specification, and be responsible for the special requirements as defined herein.

E19.2.2 Provide auger boring equipment that meets the requirements of this specification.

E19.2.3 Construct access and launch shafts in accordance with E12.

E19.3 Submittals

E19.3.1 Submit the following in accordance with E3 a minimum of ten (10) Business Days prior to commencement of trenchless pipe installation work:

(a) Construction Method and Sequence of Operations:

(i) Provide a description of the proposed method of construction and the sequence of operations to be performed during construction. A general description and schedule of the Work, including but not limited to, construction of shafts, set-up of equipment, muck disposal, methods of protection and maintenance of project site, and ground and groundwater control methods.

(b) Site Layout:

(i) Location, layout and dimensions of launching and receiving shaft work sites showing equipment locations, materials storage, muck storage, site offices and facilities, and worksite access and egress routes.

(ii) Source of potable water to be used at each location, if required.

(c) Pipeline Installation Equipment

(i) Provide equipment manufacturer information, including machine specifications, installed options, operating instructions, and manuals.

(ii) Detailed shop drawings of the pipeline installation equipment, including configuration of cutter heads, casings, augers, and any other appurtenances required to complete the work. Include details of proposed overcut relative to pipeline OD.

(iii) Grade and alignment control system details with complete details on equipment capabilities and limitations.

(iv) Electrical system, lighting system, and on-site power generation. Also provide details of power supplied by utility provider.

(v) Submit alignment installations checks as required in this specification.

(d) Installation Procedures:

(i) Describe any modifications to the designed shoring required for launching of pilot tubes, casings, or pipe string, and when these modifications are to be in place.

(e) Submit details of any proposed lubricating system and cutting removal methods including slurry formulations that may be used.

(f) Jacking system details, including method of operation, thrust capacity, and sleeve details.

(i) Theoretical jacking force calculations shall be prepared and submitted in accordance with.

(ii) If the jacking force calculations are based upon the use of a lubricant, then the lubricant shall be used in accordance with the submitted calculations.

(iii) Contractor shall furnish product pipe submittals in accordance with appropriate pipe specifications.

(iv) Design of thrust accommodation at each launching shaft location.

(g) Equipment setup schedule and expected production rates for each phase of the work.

(h) Pipe lay schedule to complete the work, including tie-ins at all excavation locations.

(i) Survey plans including, but not limited to, the following:

(i) Verification of line and grade for pipeline installation.

E19.4 Materials

E19.4.1 The following pipe material shall be considered acceptable for use with guided auger boring on this project:

(a) Steel pipe supplied in accordance with E18.

E19.5 Installation Design

E19.5.1 Determine size of thrust wall at each launching shaft location. Demonstrate that the ground has sufficient reaction without excess deformation using not less than 300% of the maximum anticipated jacking loads. Fully describe any mitigation measures to be implemented, as necessary, such as pipe string lubrication and/or isolation of thrust wall.

E19.5.2 Existing Project Conditions

(a) Assess existing conditions, including property rights of adjacent properties whether private or public, for the possible effects of proposed temporary works and construction methods.

(b) Note that the trenchless pipeline installation will cross below the GWWD Railway and reduction of potential settlement of the rail tracks is a key objective of the work.

E19.6 Equipment

E19.6.1 The pipe installation equipment selected shall be specifically designed for the trenchless installation of pipe. This equipment shall be capable of satisfactorily installing the jacking pipe as contained herein.

(a) Requirements for the pipe installation equipment include:

(i) The equipment shall be able to maintain the alignment within the tolerances defined in E19.7.4.

(ii) The overcut of the casing shall not exceed the outside diameter of the pipe by more than 25 mm.

E19.6.2 Pipe Launching Equipment

(a) Provide a pipe jacking system with the following features:

(i) Hydraulic jacking system capable of installing the pipe string, with sufficient capacity to complete each installation in accordance with the Contractor's installation plan.

(ii) Sufficient bracing/anchorage to prevent misalignment of the pipe string.

(iii) Uniform distribution of jacking forces on the end of the pipe.

(iv) Monitored hydraulic pressure.

E19.6.3 Pilot Tube Guidance System

(a) Provide a guidance system compatible with the pipe installation system, capable of defining line and grade of the pipe installation within a tolerance as defined in E19.7.4.

E19.6.4 Augers

(a) The Contractor should consider the use of Teflon-tipped augers or other means to reduce potential for damage to the interior coatings of the casing pipe.

E19.7 Construction

E19.7.1 General

(a) Trenchless pipeline installation shall be completed by guided auger boring methods using purpose-built equipment.

(b) Use equipment that is in proper working order without excessive wear and/or malfunction history.

(c) Confine excavations and pipe installation operations to within reasonably justifiable limits required to complete the work.

(d) Plan the work to minimize the total number of excavations required to install the pipeline to the lines and grades as shown on the Drawings.

(e) Limit construction impacts to the site wherever possible.

(f) Restore the site conditions to pre-construction condition in accordance with the Specifications.

E19.7.2 Pipeline Installation

(a) The pipeline installation shall not commence until the appropriate receiving shaft is completed and the intended line and grade are verified and accepted by the Contract Administrator.

(b) Prior to commencing the pilot tube installation, The Contractor shall demonstrate that:

(i) The jacking loads can be safely maintained on the pipe using actual drive data.

(ii) The guidance system(s) is functioning properly and meets the requirements, as specified herein.

(iii) The lubrication system may be implemented if required.

(c) Do not damage the product pipes during the installation process.

(d) Establishing the Alignment: Contractor shall be responsible for adherence to the following requirements and conditions:

(i) Qualified surveyor for the Contractor shall perform all of the surveying and check baseline and benchmarks prior to pilot tube installation and report any errors or discrepancies to the Contract Administrator.

(ii) Use the baseline and benchmarks provided by the Contract Administrator to furnish and maintain reference control lines and grades for the Underdrain construction. Use these lines and grades to establish the exact location of the pipeline excavation and structures.

(iii) Establishing and maintaining the accuracy of control work to include alignment and grade of the Underdrain.

(iv) Establishing control points sufficiently far from the excavations and pipeline installation so as not to be affected by ground movement.

(e) Maintaining the Alignment: Contractor shall adhere to the following requirements and conditions:

(i) Pipe installation shall not vary by more than the allowable alignment deviations as specified herein.

(ii) Immediately correct any misalignment. When the installation is off line or grade, return to the design line and/or grade over the remaining portion of the drive and at a rate of not more than that specified in E19.7.4.

(iii) If alignment deviations are exceeded, Contractor shall undertake efforts for correction at no cost to the City.

(f) Contractor shall adhere to the following requirements and conditions:

(i) Conduct pipe installation operations in accordance with applicable safety rules and regulations, and use methods that include due regard for safety of workers and protection for adjacent structures, utilities, and the public.

(ii) Monitor for hazardous gas conditions; if encountered, take appropriate steps to ventilate the work area.

(iii) Keep excavations within the lines and grades as shown on the Drawings, and within the specified tolerances as defined herein.

(iv) Equipment powered by combustible fuels shall be located at suitable distances from the shafts as per written instructions from the dedicated site safety representative. These instructions shall be made immediately available to the Contract Administrator upon request.

(v) Synchronize the rate of advance of the pipe string with the rate of spoil removed to limit ground loss or heave.

(vi) Operate the pipe installation equipment within the operating parameters established in the specifications and accepted submittals.

(vii) Make the excavation of a minimum sufficient size to permit pipe installation by jacking in accordance with project conditions with allowance for injection of the lubricant, if required.

(viii) If the pipe “freezes” and the pipeline cannot be moved, a rescue pit may be allowed with the location subject to review and acceptance by the Contract Administrator. Rescue pit construction shall be performed as specified herein.

(g) Obstructions and Rescue Pits:

(i) Attempt to remove, clear, or otherwise make it possible for the pilot tube and pipe to progress past or through objects in accordance with the submitted contingency plan.

(ii) The object blocking the forward motion of the pilot tube or casing shall meet the definition of an obstruction and the following requirements shall be met:

- Notify Contract Administrator immediately upon encountering an object that prevents the forward progress.
- Proceed with removal of the object by means of obstruction removal procedures in accordance with contingency plans.
- The Contract Administrator shall be provided access to document the Work. No excavation shall take place without the Contract Administrator being present.
- The Contractor shall have on hand at all times and readily available: equipment, tools, materials, and labor appropriate for the effective and efficient work related to obstruction removal.

(iii) The proposal of alternative methods for removing, clearing, or otherwise making it possible for the equipment to progress past objects that do not allow for the visual observation and measurement of the nature of the object shall not be considered for additional payment.

(iv) If a rescue pit is requested, obtain written authorization from the Contract Administrator before beginning construction of this pit. The Contractor’s request shall include all necessary permits and approvals, minimize public inconvenience, and minimize impacting existing facilities. Additional shoring may be required.

E19.7.3 Disposal of Muck and Excess Material

(a) Remove muck and excavated material from the project site and dispose of spoils as noted below.

(b) Locate and utilize a site for the legal disposal of muck and excess excavated material and dispose of same in accordance with all applicable laws and regulations.

E19.7.4 Allowable Alignment Deviations and Return to Line and/or Grade

(a) Horizontal (Line): Do not exceed more than 100 mm from that depicted on the Drawings at any point along the alignment.

(b) Elevation (Grade): Do not exceed more than 25 mm above grade and 50 mm below grade at any location.

(c) When the excavation is off line or grade, return to the design line and/or grade over the remaining portion of the drive and at a rate of not more than 25 mm per 8 m.

E19.7.5 Surveys

(a) The qualified/professional surveyor for the Contractor shall conduct all of the surveys required for the Work. The Contract Administrator will provide location coordinates shown on the Drawings within five (5) days' notice of request for these coordinates. Attend a survey coordination meeting and adhere to the schedule established at that meeting.

E19.8 Measurement and Payment

E19.8.1 Trenchless Installation of Casing Pipe by Trenchless Methods

(a) Trenchless installation of casing pipe will be paid in accordance with E18.

E20. AVENUE TACHE UNDERDRAIN MANHOLE

E20.1 Description

E20.1.1 This section address construction of the new Underdrain manhole at the Avenue Tache Underdrain Outfall.

E20.2 Submittals

E20.2.1 Shop drawings for all piping components shall be provided in accordance with E3.

E20.2.2 Sealed structural design calculations shall be submitted for the roof slab. Designs shall be completed by an Engineer registered with the Province of Manitoba, experienced in the design of pre-cast concrete manhole systems.

E20.3 Materials

E20.3.1 Manhole Components

(a) Manhole components shall conform to CW 2130.

(b) Cast in place concrete shall conform to E26.

E20.3.2 Fasteners

(a) Steel Piping:

(i) Bolts for all flange connections shall be ASTM A307 or ASTM F568M, grade B.

(ii) Nuts for all flange connections shall be ASTM A563 or ASTM A563M, grade B.

(b) All stainless steel piping, sleeve couplings, and restraints:

(i) Bolts shall be ASTM F593 or ASTM F738M, type 316 stainless steel.

(ii) Nuts shall be ASTM F594 or ASTM F836M, type 316 stainless steel.

(c) Anti-seize compound shall be used on all bolts.

(d) Dielectric washers and sleeves meeting the requirements of E20.3.10 shall be used wherever stainless steel and ferrous metal components and hardware are used together.

(e) For flanged connections, bolt size, type and diameter shall be in accordance with AWWA C207. Bolt length suitable for coupling AWWA C207 Class D flange.

(f) All steel bolting hardware shall be liquid epoxy coated in accordance with AWWA C116, E20.3.9, and E20.4.1 after assembly.

E20.3.3 Flange Gaskets

(a) 3mm, full-faced, SBR rubber gaskets or neoprene in accordance with AWWA C207.

(b) Gaskets shall be one piece construction where possible.

(c) Segmented gaskets shall be constructed of a minimum number of segments and joints shall be of dovetailed construction, or other jointing methods approved by the Contract Administrator.

E20.3.4 Fabricated Steel Pipe and Fittings

(a) Steel pipe and fittings shall conform to AWWA C200, AWWA C208, and meet the following requirements:
  (i) Minimum steel yield strength of 240 MPa (35,000 psi)
  (ii) Minimum wall thickness of 9.5 mm for all sizes.

(b) Stainless steel piping and fittings shall conform to AWWA C220, AWWA C226 and meet the following minimum requirements:
  (i) 304 Stainless Steel.
  (ii) Schedule 80 wall thickness.

(c) Threaded steel nipples shall be Schedule 80 (minimum) conforming to ASTM A53.

(d) 900 x 250 mm steel tee for connection to the Avenue Tache Surge Tower Overflow
  (i) The 900 mm section of the tee shall be constructed to CIOD dimensions to facilitate a size on connection (or as close as practically necessary) to the existing cast iron pipe. Some record drawings indicate the pipe is “Class B”, though the exact pipe that was installed is currently unknown.
  (ii) 1910 CSCE standard Cast Iron Water Pipe and Special Castings (applicable at the time of construction) list the following outside diameters for 900 mm (36”) cast iron pipe. These diameters are consistent with newer standards, such as the 1939 American Standards Association Specifications for Cast Iron Pit Cast Pipe for Water or Other Liquids (A21.2-1939):
    - Class A – 964.18 mm (37.96”)
    - Class B – 972.82 mm (38.30”)
    - Class C – 982.98 mm (38.70”)
    - Class D – 994.66 mm (39.16”)
    - Class E (HP service) – 1005.84 mm (39.60”)
    - Class F (HP Service) – 1017.02 mm (40.40”)
  (iii) Based on references to the pipe class and the intended service conditions, the Contractor should assume the existing pipe is Class A through Class D pipe.
  (iv) The ability to access the overflow line to verify the outside diameter is limited and the Contractor shall select a combination of couplings (E20.3.7) and pipe outside to facilitate the connection within the range of potential outside diameters identified herein.

(e) Exterior coatings for steel piping components shall be liquid epoxy to AWWA C210, E20.3.8, and E20.4.1 or fusion bonded coated in accordance with AWWA C213, E20.3.9, and E20.4.1.

E20.3.5 Flanges for Pipe and Fittings

(a) Steel flanges shall conform to AWWA C207, minimum Class D Flange

(b) Stainless steel flanges shall conform to AWWA C228, minimum Class SD Flange.

(c) Threaded ductile iron flanges shall conform to AWWA C115 ASME/ANSI B16.1 Class 125.

E20.3.6 Steel Pipe Couplings

(a) Pipe sleeve couplings shall conform to AWWA C219.
  (i) Minimum requirements for sleeve couplings are:
    - Center sleeve length: 250 mm
    - Center sleeve thickness for steel couplings: 9.5 mm

- Couplings capable of accommodating up to 3 degrees deflection.
- Design pressure 150 psi.

(b) All hardware shall be Type 316 stainless steel in accordance with E20.3.2 and shall utilize di-electric insulating boots in accordance with E20.3.10.

(c) All couplings to be fusion bonded epoxy coated in accordance with E20.3.9 and E20.4.1.

E20.3.7 AWWA C227 Bolted Split Sleeve Couplings

(a) Couplings shall be a full circumference style coupling meeting the following:

(i) Coupling shall mee the requirements of AWWA C227.

(ii) 304 stainless steel body and bolting hardware.

(iii) EPDM gasket.

(iv) Differential OD capacity as required to make transition between existing CI and new steel fitting. A minimum of 6 mm of diameter difference between the pipe OD's is required to account for variation in the CI casting.

(v) Minimum pressure capacity of 345 kPa.

(vi) Minimum width: 200 mm.

(b) Approved Manufacturer: Arpol or approved equal in accordance with B7.

E20.3.8 Liquid Epoxy Coatings

(a) Liquid epoxy coatings shall conform to AWWA C210.

(b) NSF 61 certification is not required.

(c) All coatings shall be applied in a minimum of two (2) or more layers (5 mils dry film thickness minimum each coat) for a minimum final coating dry film thickness of the greater of 16 mils or the thickness recommended by the manufacturer for immersion service.

(d) Exterior coatings for all exposed steel, piping, valves, and actuators shall be Polyamide Epoxy. Approved products: Enviroline 230, Bar-Rust 234P, Specialty Polymer Coatings SP-7888, Tnemec Series 140F Pota-Pox Plus, Amerlock 2 or approved equal in accordance with B7.

(e) Submit product data for interior lining and exterior coating products.

E20.3.9 Fusion Bonded Epoxy Coatings

(a) Fusion bonded epoxy coatings shall conform to AWWA C213 for steel components and AWWA C116 for ductile iron fittings.

(b) NSF 61 certification is not required.

(c) The final minimum coating thickness shall be the greater of 10 mils or the thickness recommended by the manufacturer for immersion service.

(d) Submit product data for interior lining and exterior coating products.

E20.3.10 Flange Isolation Kits

(a) Flange isolation kits shall be used where noted, where dissimilar metal piping or fittings are joined.

(b) Flange isolation kits shall be to City of Winnipeg specification except as modified below.

(c) Each kit shall be double flange isolation kit with insulating sleeves and washers for each flange of the bolted connection.

(d) Bolt sleeves shall be comprised of G10 or G11 epoxy glass.

E20.3.11 Pipe Supports

(a) Construct as shown on the Drawings.

(b) Steel components shall be galvanized, or epoxy coated in accordance with these Specifications.

E20.3.12 Knife Gate Valves

(a) Knife gate valves in accordance with E21.

E20.3.13 Continuity Bonding

(a) Wires for continuity bonding shall be No.10 American Wire Gauge (AWG) 7-strand copper conductor with black TWU insulation.

(b) Thermite weld products shall be properly selected based on the wire size, pipe size and material.

(c) Thermite weld caps shall be constructed from 20 mil high-density polyethylene and may be either pre filled or field filled with a bituminous mastic coating or approved equal.

E20.3.14 Galvanic Anodes

(a) Galvanic anodes for cathodic protection of buried ferrous pipes and fittings shall be 10.9 kg pre-packaged zinc anodes to City of Winnipeg specification.

E20.3.15 Petrolatum Tape Corrosion Protection System

(a) All buried pipe couplers and flanged connections shall be protected against corrosion by a petrolatum tape corrosion protection system consisting of the following components:
  (i) Petrolatum paste primer
  (ii) Void-filling mastic filler
  (iii) Petrolatum tape
  (iv) Protective outerwrap

(b) Petrolatum tape systems shall conform to AWWA C217.

(c) Approved product: Petrolatum tape system manufactured by Denso North America Inc., Trenton Corporation, Petro Coating Systems Ltd, or approved equal in accordance with B7.

E20.3.16 Roof Hatches

(a) Roof Hatches shall meet the following requirements:
  (i) Cover and frame shall be aluminum.
  (ii) Hinges: Type 316 stainless steel.
  (iii) Slam lock with fixed interior handle and removable exterior turn and lift handle with removable gasketed screw plug, factory installed recessed padlock hasp, lift assistance and automatic hold open device: Type A316 stainless steel.
  (iv) All hardware to be Type 316 stainless steel.
  (v) All hatches exposed to ambient temperatures shall be insulated with 50 mm of concealed polystyrene foam.

(b) Approved Products: Bilco Type J-AL or approved equal in accordance with B7.

E20.3.17 Chamber Vent

(a) Steel pipe shall meet the requirements of ASTM A53.
  (i) Minimum wall thicknesses: Schedule 80.
  (ii) Minimum Grade: Grade A.

(b) Flanges: ASME B16.1 Class 125 flanges.

(c) Two-Way Air Damper, acceptable products:
  (i) FrostSafe by Val-Matic Valve and Manufacturing Corp,
  (ii) or approved equal in accordance with B7.

(d) Security Screen, acceptable products:

(i) VentSafe by Val-Matic Valve and Manufacturing Corp,

(ii) or approved equal in accordance with B7.

E20.3.18 Galvanizing:

(a) Where noted, piping and flanges shall be galvanized to ASTM A 123/A 123M.

(b) Unless otherwise noted, bolting hardware for galvanized components shall be galvanized to ASTM A 153/A 153M.

(c) Clean all members receiving galvanizing material to SSPC SP-10 “near white blast cleaning”.

E20.3.19 Polyurethane Roof Sealant

(a) Refer to E26.3(b).

E20.3.20 Electrical Conduit, Boxes, Fastenings, and Connections

(a) PVC Conduit shall meet CSA C22.2 No. 211.2.

(b) Conduit Boxes:

(i) Non-metallic PVC boxes with mounting feet for surface wiring of devices.

(ii) Shall be manufactured to CSA C22.2 No. 18.

(iii) NEMA 4X, unless otherwise indicated.

(c) Conduit fittings:

(i) Shal be manufactured for use with conduit specified.

(ii) Factory "ells" where 90° bends are required for 25 mm and larger conduits.

(iii) Watertight connectors and couplings for EMT. Set-screws are not acceptable.

(d) PVC Conduit fasteners:

(i) One hole steel straps to secure surface conduits 50 mm and smaller. Two hole steel straps for conduits larger than 50 mm.

(ii) Beam clamps to secure conduits to exposed steel work.

E20.3.21 Davit Mount Sleeve and Cap

(a) Davit mount sleeve shall be DBI Sala Advanced Flush Floor Mount Sleeve, Model # 8512828, stainless steel construction.

(b) Cap shall be DBI Sala Advanced Heavy Duty Sleeve Cap, Model #8510827, stainless steel construction.

E20.4 Methods

E20.4.1 Coatings

(a) Repair any damaged coatings as required.

(b) Prepare metal surfaces for coating using the following methods:

(i) Steel – Prepare steel surfaces for recoating by blast cleaning to near-white metal as specified by Joint Surface Preparation Standard NACE No.2/SSPC-SP10.

(ii) Cast and Ductile Iron – Prepare ductile iron surface in accordance with NAPF 500-03.

(iii) Remove all dust and loose residues from the prepared surfaces and surrounding area. The surface shall be roughened to a degree suitable for the coating system employed.

(c) Protect valve seals, machined surfaces, threads, and nameplates from sandblasting.

(d) Primer coat to follow immediately after completion of sandblasting and prep.

(e) Apply liquid epoxies of prepared surfaces in accordance with AWWA C210, E20.3.8, and the manufactures recommendations.

(f) Apply fusion bonded epoxies of prepared surfaces in accordance with AWWA C213, E20.3.9, and the manufactures recommendations.

(g) Provide adequate ventilation and heat to facilitate curing of coatings.

(h) Interior linings for pipes and fittings shall be applied and cured as recommended by the manufacturer prior to placing into service. Linings must be fully cured for immersion service prior to installation and reinstating the line into service. Where accelerated cure times are required for assembly and water immersion, a coating and curing plan shall be submitted to the Contract Administrator in accordance with E3 a minimum of five (5) Business Days prior to application.

E20.4.2 Assembly of Flanged Piping Systems

(a) All flanges shall be assembled in accordance with AWWA M11 and AWWA C604.

E20.4.3 Installation of Lead Wires, Continuity Bonding and Galvanic Anodes

(a) Anodes and continuity bonding shall be installed on new and existing pipes and fittings where shown on the Drawings or as directed by the Contract Administrator.

(b) Thermite Welding Procedure:

(i) Prepare steel surface to bare metal by grinding or filing. Remove all coatings, dirt, mill scale, oxide, grease, moisture, and other foreign matter from weld areas in an area required to complete the weld.

(ii) Before welding, remove wire insulation as required to fit mold, avoiding damage to the exposed copper wire. If wire is cut or nicked over halfway through its diameter, cut off and strip new end. If manufacturer requires the use of a copper sleeve, crimp it securely to wire and remove excess wire protruding from the end of the sleeve.

(iii) After charge is set, remove mold and slag from weld area with welder's hammer. Strike top and sides of weld with hammer to test secureness of connection. If weld does not hold, remove scrap weld material, clean, and begin weld process again.

(iv) After welding and before coating the cleaned weld area, the Contract Administrator may test the joint bond for and wires for electrical continuity.

(v) When the weld passes test for soundness and electrical continuity, repair the coating in the weld area with mastic and weld cap placed over the weld. Clean weld area to remove any loose material, and welding residuals. Cover exposed metal on the pipe and wire with mastic filled weld cap. Ensure weld cap covers the entire area of coating removed for installation of the thermite weld. If not, repair coating as per the coating manufactures recommendations prior to installing weld cap.

E20.4.4 Installation of Petrolatum Tape Corrosion Protection Systems

(a) Install in accordance with AWWA C217 and the manufactures recommendations.

(b) For all surfaces to be wrapped with the corrosion protection system, remove loose rust, paint and foreign matter by hand and/or power tool cleaning in accordance with SSPC-SP-2 or SSPC-SP-3.

(c) Apply a thin uniform coat of petrolatum paste primer, using a glove or brush, to all surfaces to be wrapped with the corrosion protection system.

(d) Apply void-filling mastic filler, by hand, to all flanges designated to be wrapped with the corrosion protection system. Mold the mastic to a rounded configuration around the flange, filling all spaces around fasteners and eliminating sharp edges and irregular shapes.

(e) Spirally wrap the petrolatum tape, using a minimum 25mm overlap, over the primed and mastic-filled pipe and flange surfaces. While wrapping, press out all air pockets and smooth all lap seams.

(f) Spirally wrap clear outerwrap, using sufficient tension to make a tight-fitting cover, over the petrolatum tape.

E20.5 Measurement and Payment

E20.5.1 Construction of new Underdrain Manhole at the Avenue Tache Underdrain Outfall

(a) Construction of new Underdrain manhole at the Avenue Tache Underdrain Outfall will be measured and paid on a lump sum basis at the Contract Unit Price identified in Form B: Prices. Payment shall include all materials and labour to complete the work including, but not limited to excavation, shoring, and identified connections to the Underdrain and surge tower overflow.

E21. KNIFE GATE VALVES

E21.1 Description

E21.1.1 This Specification shall cover the manufacture and installation of non rising stem stainless steel knife gate valves.

E21.1.2 All valves to be supplied under this Contract shall be designed and manufactured by a company having at least five (5) years prior experience in manufacturing these types of products in the sizes and to the pressure ratings as those specified herein.

E21.2 Submittals

E21.2.1 Submit Shop Drawings in accordance with E3.

E21.2.2 Provide Affidavit of Compliance, certifying that the gate valve conforms to the requirements of AWWA C520 and this Specification.

E21.2.3 Data for gate and actuator characteristics and performance.

E21.2.4 Manufacturer's recommended installation instructions.

E21.2.5 Operation and Maintenance Manual.

E21.3 Materials

E21.3.1 Stainless Steel Knife Gate Valves and Operators

(a) Provide Stainless Steel Knife Gate valves, complete with stainless steel bolts and two (2) face gaskets per valve.

(b) Stainless steel knife gate valves shall conform to AWWA C520.

(c) Laying lengths shall conform to AWWA C520.

(d) Valve body, gate, and all support structures shall be constructed from stainless steel.

(e) Stainless steel shall conform to ASTM A351, type 316 or ASTM A240, type 316.

(f) Valve shall be supplied with a resilient seat.

(g) All hardware to be type 316 stainless steel.

(h) Provide enclosed stem guard to protect shaft from debris accumulation in open position.

(i) Valves shall be capable of withstanding a minimum short term test pressure of 275 kPa (40 psi), and minimum operational pressure of 205 kPa (30 psi).

(j) The valve stem shall be a non-rising configuration fitting with a 50 mm AWWA operating nut, on top of shaft for connection of extension shaft.

(k) Approved product: Dezurik KGC-ES (with resilient seat) or approved equal in accordance with B7.

E21.3.2 Manual Operators

(a) Gearing and Enclosure

(i) Gate operator shall be supplied complete with gear reduction as required to operate gates under the operating head and design head, as specified and indicated, with no greater than a 177 N effort on the hand wheel.

(ii) Number of actuator turns to open or close the valve shall be kept to as few as possible to avoid over torquing and damage to the actuator.

(iii) The gearing enclosure shall have a submersible rating equal to IP68.

(b) Input Limit Stops

(i) Adjustable, external stop-limiting devices shall be provided on the actuators to prevent over-travel of the valve disc in the open and closed position.

(ii) Under circumstances where spur gear attachments are installed on the input side of the actuator to facilitate the maximum input operating torque of 356 Newtons (80 ft. pounds), input limit stops shall be installed on the input side of the spur gear attachment.

(iii) A shear pin or other torque regulating device shall be provided on the actuator or handwheel/operating nut as an extra precaution against actuators being over-torqued.

(c) Protective Coatings

(i) All external ferrous metal components including adaptor and mounting plates, shall be fusion bonded coated in accordance with AWWA C213, AWWA C550. NSF 61 certification is not required. The final minimum coating thickness shall be the greater of 10 mils or as recommended by the manufacturer for submerged applications.

(ii) Any touch-up paintwork required during installation shall be undertaken by the installation contractor. The touch-up paint shall be of the same color and compatible with the coating utilized for the floor stand operator.

(d) Provide mechanical seals on the operating nut and the pinion shafts to exclude moisture and dirt and prevent leakage of lubricant out of the hoist mechanism.

(e) Provide lubricating fittings for the lubrication of all gears and bearings.

E21.3.3 Valve Stems:

(a) A 50 mm diameter stainless steel extension shaft shall be supplied for surface operation as shown on the Drawings.

(b) The extension shaft shall be configured for a 50 mm AWWA operating nut.

(c) The extension shaft shall be sized to facilitate use of the position indicators and located a minimum of 150 mm and maximum of 300 mm from the proposed final grade.

(d) Extension shafts shall be supplied complete with valve stem support guides as recommended by the valve manufacturer.

E21.4 Valve Testing and Acceptance

E21.4.1 Factory Tests

(a) General

(i) All acceptance testing shall be completed in the presence of the Contract Administrator or the appointed representative, unless the Contract Administrator waives this requirement. Provide a minimum of two (2) weeks notice of testing schedule to the Contract Administrator.

- The Contract Administrator may attend the inspection remotely through a virtual platform such as Microsoft Teams or Zoom. The vendor, on

request of the Contract Administrator, shall arrange for live feed streaming of the testing, and follow instruction of the Contract Administrator with respect to witnessing of testing, viewing test gauges, seats, seals and other test apparatus. Cameras used shall be capable of high definition (HD) resolution.

(ii) Testing of valves and actuators, including pressure tests, paint and coatings and electrical tests shall be coordinated to minimize number of plant visits.

(iii) If the Contract Administrator chooses to waive witnessing of testing, provide all testing results to the Contract Administrator for review prior to shipping valves.

(iv) All valves shall be tested with mated actuators mounted and adjusted.

(v) All valves shall be tested with valves mounted in the intended operating orientation.

(vi) Testing shall be completed in accordance with the latest version of AWWA C520.

(vii) The following information shall be supplied by the Contractor prior to delivery of the valves:

- A certified copy of the chemical and physical analysis on all materials used in the manufacturer of the valve(s) or certification that the materials used are in strict accordance with this specification.
- Copies of the test reports for Performance, Leakage and Hydrostatic Tests performed in accordance with AWWA Standard C520. Included in the report shall be the signature of the official who is responsible for the valve assembly and testing.

E21.4.2 Field Tests

(a) The Contractor shall perform a hydrostatic leakage test, in the presence of the Contract Administrator, on all valves once they arrive in Winnipeg at a mutually agreed upon location.

(b) The Contractor shall provide a suitable blind flange for testing, which may also be used for the final installation of station piping.

(c) The Contractor shall provide two (2) 3 mm SBR gasket, bolts, and testing equipment, suitable to conduct tests. Bolts shall be of suitable length to mount an AWWA C207 Class D blind flange.

(d) The test shall be performed as follows:

(i) The valve shall be orientated in the intended operating orientation.

(ii) A gasketed, steel blind flange with a tapped fitting suitable for introduction of compressed water shall be bolted in place.

(iii) The space between the blind flange and valve disc shall be filled through the center port, and air bled off through the top port. Once all air has been expelled, the top test port shall be closed.

(iv) A pressure of 275 kPa (40 psi) shall be applied through the fitting and maintained for 10 minutes. Under this pressure the valve seat shall be perfectly watertight.

- The test shall be repeated for the opposite side.
- The test shall be repeated for each valve.

E21.4.3 The Contractor shall ensure a qualified representative of the valve manufacturer is present for the testing of the valves to correct any deficiencies found.

E21.5 Installation

E21.5.1 Install valves as shown on the Drawings and in accordance with manufacturer's recommendations.

E21.5.2 Provide manufacturer representative to attend valve commissioning. Allow 4 hours for on-site commissioning services.

E21.6 Commissioning

E21.6.1 The Contractor shall assist in operation of the valves for the purpose of commissioning.

E21.7 Measurement and Payment

E21.7.1 Supply and installation of knife gate valves will be considered incidental to Construction of new Underdrain Manhole at the Avenue Tache Underdrain Outfall and will not be measured for payment. No additional payment will be made.

E22. MANHOLE INSULATION

E22.1 Submittals: Submit Manufacturer's data sheets in accordance with E3.

E22.2 Materials

(a) 50 mm thick rigid insulation CAN/ULC-S701, Type 4 rigid, closed cell type, with integral high density skin, extruded polystyrene insulation, 610 mm wide x 2440 mm long, edge treatment: butt edge and ship lapped. As manufactured by Dow Chemical, Celfort, or approved equal in accordance with B7.

(b) Spray Foam Insulation

(i) Spray Foam Insulation: closed-cell foam with water-resistant outer skin when cured, Great Stuff as manufactured by Dow Chemical or approved equal in accordance with B7.

(c) Spray Applied Polyurethane Insulation

(i) Polyurethane foam shall be closed cell, less than 1% open cell content to ASTM D-6226.

(ii) Approved Products: BASF Walltite CM01 or approved equal in accordance with B7.

E22.3 Construction Method

(a) Installation of Rigid Insulation.

(i) Verify insulation boards are unbroken, free of damage, with face membrane undamaged.

(ii) Butt edges and ends tight to adjacent board and protrusions.

(iii) Ensure Rigid Insulation panels are tight to the substrate. No void is allowed between the Rigid Insulation panel and the substrate. Cut Rigid Insulation panels to suit substrate profile.

(iv) Secure the Rigid Insulation to the substrate utilizing the Rigid Insulation Manufacturer’s recommended wall adhesive for wet substates or other approved securement methods that will not deteriorate under wet conditions.

(v) Spray foam any voids between rigid insulation sheet joints, around manhole chimneys, and valve boxes.

(b) Spray Applied Polyurethane Insulation

(i) Spray applied polyurethane insulation shall be applied to the exterior of the manhole chamber as shown on the drawings.

(ii) Insulation shall be applied as per the manufacturer’s recommendations.

E22.4 Measurement and Payment

(a) Supply and installation insulation will be considered incidental to the Work and will not be measured for payment. No separate payment will be made.

E23. UNDERDRAIN INSPECTIONS

E23.1 Description:

(a) This specification describes the requirements for obtaining Underdrain measurements and CCTV inspections required to facilitate the specified rehabilitation work.

(b) This specification amends and supplements specification CW 2145.

E23.2 Methods

E23.2.1 Verification of Existing Underdrain Dimensions

(a) Verify Underdrain dimensions and depths prior to design as follows:

(i) Measure the distance from the center of the start manhole to center of the finish manhole using a steel tape, laser distance finder, or similar suitable measuring process. Length measurements must be accurate as they will be utilized for evaluating liner designs, and for payment, where applicable.

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

(ii) Manhole invert depths (from the manhole rim) at the upstream, downstream, and any intermediate manhole.

(iii) Measure the diameter and cross-section of the Underdrain at the upstream and downstream manholes and at a minimum distance of 500 millimetres inside the Underdrain from each manhole.

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

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

(b) Estimate the remainder of the Underdrain dimensional requirements based on dimensional checks and the CCTV Underdrain inspection videos.

(c) Submit host pipe lengths, depths, and dimensions to the Contract Administrator in conjunction with the design submission and pre-design inspection where required.

E23.2.2 Perform the following Underdrain inspections in accordance with CW 2145, E24, and as outlined herein:

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

(i) Perform prior to undertaking cleaning, repairs, or prep-work.

(ii) Except where identified in Appendix E, pre-repair inspections are not a pay item and shall be considered incidental to the cleaning and prep work operations.

(iii) Except where identified in Appendix E, submission of the pre-repair inspection is only required where Underdrain conditions differ from those identified during tendering and additional prep work was undertaken to complete the rehabilitation work.

(iv) Where identified in Appendix E, pre-repair inspections shall be completed and submitted to the Contract Administrator a minimum of twenty (20) Business Days prior to lining, for review prior to undertaking repairs or prep-work on the identified assets.

(v) No coding of the submission will be required.

(b) Pre-Lining Inspection:

(i) Perform after Underdrain cleaning, preparations and repairs. Pre-lining submissions are also specified after completion of EPR's where no lining has been specified to confirm acceptability of the work.

(ii) The Pre-Lining Inspection shall confirm:

- Necessary cleaning and pipe preparation work, including internal and external Underdrain repairs, have been satisfactorily completed.
- Condition of the Underdrain pipe is consistent with the design conditions and the Specifications. The Contractor shall advise the Contract Administrator of any condition that is contrary to the design conditions or assumptions made that may affect either long or short term performance of the liner prior to commencing lining.

(iii) Provide the Pre-Lining CCTV inspection a minimum of five (5) Business Days prior to lining for approval to proceed with the liner installation.

(iv) No coding of the submission will be required.

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

(c) Post-Lining Inspection:

(i) Perform immediately following installation of the liner, after completion of Underdrain service reinstatement, and while flow control measures are in place.

(ii) Perform Post-Lining Inspection where Regional Street lane closures are required within 24 hours of completing the installation of the liner.

(iii) Intent is to confirm the adequacy of Underdrain service reinstatements and the fit and finish of the liner.

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

(v) Full coding required.

(d) Warranty Inspection:

(i) Perform before expiration of the warranty period and final acceptance but not prior to 10 months after installation of the liner.

(ii) Underdrain shall be completely cleaned to facilitate the inspection.

(iii) Intention is to confirm the fit and finish of the liner, the need for any remedial work, and acceptance of any repair work performed during the warranty period.

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

(v) Full coding required.

E23.2.3 Submit all inspection videos to the Contractor Administrator for review in accordance with CW 2145 and as specified herein.

E23.3 Underdrain Inspection Reports

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

(i) Pre- and post-lining inspection and reports before acceptance of the Work for Total Performance.

(ii) Warranty inspection report before Final Acceptance of the Work.

E23.4 Underdrain Service Reports

(a) Except where noted, all service connections should be reinstated.

(b) Submit a written Underdrain Service Report for each liner location to the Contract Administrator with the pre-lining inspection. Pre-lining inspections will not be reviewed

without submission of the Underdrain service report. Provide the following information for each Underdrain service.

(i) Location of connection (chainage from upstream manhole and clock reference).

(ii) Diameter of Underdrain connection lateral.

(iii) Material type of Underdrain connection.

(iv) Observed condition of connection.

(v) Status of connection (active, inactive or unable to determine).

E23.5 Amendments and Supplements to CW 2145 for Underdrain Inspections:

E23.5.1 Further to Section 3.7.4, operators failing to provide copies of their NASSCO certification and / or meet the accuracy requirements on two occasions will not be permitted to code on the remainder of the Contract until they can demonstrate to the Contract Administrator that they can code in accordance with the requirements of the NASSCO PACP and MACP version 7.0.0 of the manual or greater.

E23.5.2 The Contract drawings are based on information contained in the City's GIS database. If the Contractor has trouble interpreting the drawings, or if they believe them to be wrong, the Contract Administrator shall be approached for assistance/clarification.

(a) The Contractor shall assist the Contract Administrator in making any required measurements for the correction of errors found on the Drawings.

E23.5.3 Replace Clause 3.11.1 with: Capture the inspections in digital format in colour from the live video source on HDD to the following minimum requirements.

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

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

(ii) Picture Size: NTSC 720 x 480 @ 29.97 frames per second.

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

E23.5.4 Further to Clause 3.8 and E23.6.3 video imagery must not contain black or other coloured or other erroneous columns or bands where formatting of lesser resolution camera lens recordings have been resized to meet the Picture Size requirements of this specification. Video will be reviewed by the Contract Administrator with the potential for rejection if these bands or columns are observed.

E23.6 Underdrain Inspection Equipment

E23.6.1 In-Line Underdrain inspection equipment shall be comprised of a self-propelled track-mounted platform bearing multiple inspection sensors / technologies that can undertake simultaneous remote inspection in Underdrains of all diameter ranges.

E23.6.2 In areas where a self-propelled track-mounted platform is not possible to use during the inspections, the inspections shall be performed using a float or skid system. The Contractor shall notify the Contract Administrator prior to the use of a float or skid platform, tethered by use of flusher hosing capable at distances stated in E23.6.3.

E23.6.3 In-Line CCTV Inspection Platform Minimum Requirements

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

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

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

(d) Tethered to facilitate the conveyance and extraction of the platform from the Underdrain, without causing damage to the Underdrain infrastructure, in the event the equipment fails or otherwise becomes uncontrollable within the Underdrain.

(e) Equipped with sufficient high intensity lighting to illuminate the Underdrain for visual inspection at the widest horizontal viewing angle and the pipe's side periphery.

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

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

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

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

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

E23.7 Measurement and Payment

E23.7.1 Underdrain CCTV Inspections

(a) Underdrain CCTV inspections will be measured and paid in accordance with CW 2145.

E23.7.2 Verification of Underdrain Dimensions:

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

E23.7.3 Underdrain Service Reports

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

(b) The Contractor is responsible for rectifying any damages caused or additional inspection work resulting from incomplete or erroneous Underdrain Service Reports.

E23.7.4 Underdrain Inspection Reports

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

E24. DIGITAL PANORAMIC MANHOLE INSPECTIONS

E24.1 Description:

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

E24.2 Digital Panoramic Manhole Inspection

E24.2.1 Notwithstanding CW 2145, inspect manholes using digital panoramic manhole inspection system such as the IBAK PANORAMO SI, RST Helix or equivalent shall meet the following criteria:

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

(b) Perform manhole condition coding in accordance with the requirements of the NASSCO MACP V7.00 or greater.

(c) Perform condition coding using operators who are certified in accordance with the National Association of Underdrain Service Companies (NASSCO) having attained and retained their “Manhole Assessment Certification Program” (MACP) certification.

(d) Operators failing to meet the accuracy requirements on two occasions will not be permitted to code on the remainder of the contract until they can demonstrate to the Contract Administrator that they can code in accordance with the requirements of the NASSCO MACP V7.0.0 manual or greater.

(e) The inspection camera system must have two independently or simultaneously controlled digital cameras, one facing in the downward direction and one facing in the upward direction. Each camera must have a minimum of 185 degree field of view.

(f) The inspection camera system must provide sufficient illumination of the interior of the manhole to obtain proper exposure without introducing any motion blur. The light shall be positioned to distribute the light evenly onto the structure walls. The lighting must be able to illuminate manholes without the need of any auxiliary lighting having a recommended contrast set to less than 1.5.

(g) The inspection system shall produce individual images or frames with no more than 0.001 inches (0.025mm) of movement during image or frame exposure to produce crisp, clear images. Inspections showing evidence of corrupt or erroneous imagery, scratched lenses or protective glass plate or similar due to poor handling and application shall be rejected.

(h) The inspection camera must provide a minimum of 3000 line of vertical resolution in the side view and a minimum of 500 lines in the perspective view.

(i) Contractor is responsible for reviewing collected data, coding observations, however the City must have the ability to view the digital film file in the way that the contractor can view them, including full control of the virtual pan and tilt.

(j) The digital film files will be captured to a “High Quality” setting that must include an unfolded view of the manhole with a minimum of 3000 lines of vertical resolution, providing all front, back and wrapped images that will be, at a minimum height and width of 1040x1040 pixels, to a resolution of 96 dots per inch. Latest 4k technologies will also be reviewed for acceptance.

(k) The digital film files must include the capability to produce a three dimensional representation of the manhole structure. This data shall be used to perform geometric measurements. This file shall be exportable to common CAD programs for further analysis.

(l) The digital file files must include a distortion-free virtual pan and tilt allowing the review of the manhole structure from any angle from any depth. The virtual pan and tilt must be able to view 360 degrees in any direction. The virtual pan and tilt must consist of views from the top and bottom camera, any virtual pan and tilts that artificially create this view from a single camera will be deemed unacceptable due to distorted images on the direct side view.

(m) The virtual pan and tilt and unfolded views must be able to be viewable by the City with all the required executable software included for each disc and HDD at no additional cost to the Contract Administrator or the City of Winnipeg.

(n) The Contractor shall provide the database.

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

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

(q) All chambers that exhibit weir wall or spill pipe weir levels as observed within the field or identified, but not limited to control structures or manholes identified within the Construction Drawings, must be recorded as an MGO and its measurement from manhole rim to weir crest recorded within the remarks field.

(r) Manhole condition coding shall be submitted to the Contract Administrator as per E23.3.

E24.3 Amendments and Supplements to CW 2145 for Digital Panoramic Manhole Inspections:

E24.3.1 Inspection of manholes will use side scanning imagery and point cloud collection equipment only to NASSCO MACP Level 2 inspections for the purposes of assessing thoroughness of cleaning, observing and recording structural and service defects and construction features of existing manhole and control structure assets and to verify new and rehabilitated Underdrain construction prior to acceptance.

E24.3.2 Replace Clause 3.6 with:

(a) Perform NASSCO MACP V7.0.0 or greater manhole condition Level 2 inspection and coding in general accordance with E24.3 of this specification and with the following additional requirements.

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

E24.3.3 Further to Section 3.6, Field 34-37 of the Measurements section shall be measured in whole numbers and expressed in millimetres.

E24.3.4 Further to Clause 3.17.8:

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

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

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

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

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

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

(vi) Spray paint a mark (with a colour consistent for the duration of the project and a different color to the North point) indicating the 6 o’clock position that is in reference to the first outgoing pipe (taken from north in a clockwise direction, as per NASSCO MACP requirements) visible on the surface and within the manhole frame. Plastic templates placed on the surface may also be used to represent the North point and the 6 o’clock position.

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

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

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

footage counter from the surface to validate the measurement available from the panoramic scan.

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

E24.3.5 Further to Clause 3.11.5 provide file names within the 360Player.exe software, manholes to be in alpha numeric order to ensure efficient reference.

E24.4 Measurement and Payment

E24.4.1 Digital panoramic manhole inspections will be measured and paid for in accordance with CW 2145.

E24.4.2 Manhole Inspection Reports

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

E25. CURED-IN-PLACE PIPE

E25.1 Description

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

E25.2 Definitions

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

(b) Full segment CIPP means CIPP extending from manhole to manhole or manhole to node (wye or tee connection to another Underdrain).

(c) Partial full segment CIPP means CIPP extending from a manhole to an intermediate point within the Underdrain and will generally be longer than ten metres in length.

(d) Internal point repair or trenchless point repair (TPR) means CIPP of a discrete length positioned and installed within the pipe at select locations, generally one to two meters in length.

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

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

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

E25.3 Submittals

E25.3.1 Installation of CIPP and TPR liner installations shall not commence prior to submission and review of the submissions identified herein by the Contract Administrator.

E25.3.2 Provide CIPP and TPR designs for review by the Contract Administrator in accordance with E3 and a minimum of ten (10) Business Days prior to starting lining operations. CIPP and TPR shop drawings shall including the following information and shall be sealed and signed by a Professional Engineer licensed to practice in the Province of Manitoba and experienced in the design of trenchless rehabilitation systems.

(a) CIPP and TPR thickness computations including all specified design checks identified in E25.4. Identify design assumptions based on a review of the Underdrain inspection that differ from the information provided in the Specifications for the existing Underdrain design conditions.

(b) Name and manufacturer of the resin and felt tube proposed for each CIPP and TPR installation.

(c) Means of liner installation and curing method (e.g. air/steam, water, air/UV).

(d) CIPP and TPR material properties used for design.

(e) Host pipe measurements identified in E23.2.1 including the following:

(i) Underdrain length;

(ii) Host pipe dimensions;

(iii) Underdrain invert depths

(f) Liner sizing. Identify under-sizing from the measured circumference and anticipated liner stretch to form a close fit with the host pipe.

(g) Other information that may reasonably be required by the Contract Administrator to confirm the CIPP or TPR design proposed conforms to the specified requirements and design intent.

E25.3.3 Provide resin samples within five (5) Business Days of a request by the Contract Administrator. Samples shall be provided as follows:

(a) Arrange for the manufacturer of the resin to forward a reference sample of each type of resin proposed for use on the works to a test laboratory designated by the Contract Administrator to be used as a comparative reference sample for infrared spectrum testing.

(b) When requested by the Contract Administrator, provide a representative sample from each batch of resin to be used on the project before adding the catalyst at the wet-out facility.

(c) The Contract Administrator will arrange and pay for an infrared analysis of the samples, if required for the project.

E25.3.4 Submit a liner impregnation protocol that provides information on the following a minimum of five (5) Business Days prior to wet out of liners:

(a) Resin impregnation method.

(b) Designated location of the wet-out facility.

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

(d) Volume and weight of resin to be impregnated into each liner and repair section including the proposed excess allowance for polymerization and migration (typically 7%) into cracks and joints of the host pipe.

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

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

E25.3.5 Submit a liner installation protocol that provides information on the following a minimum of five (5) Business Days prior to installation of CIPP or TPR:

(a) Proposed main line and Underdrain service flow control arrangements.

(b) Installation and curing method complete with proposed equipment.

(c) A full curing protocol, including:

(i) Curing times (heat up, curing, cool down)

(ii) Curing temperatures

(iii) Inversion and cure pressures (maximum and minimum)

(iv) Rate of travel of the UV light train and amount of lamps in operation in the case of UV cures.

(d) Provide the maximum allowable axial and longitudinal tensile stress for the fabric tube and the arrangement for monitoring pull-in forces during installation if liner insertion is to be by pull-in methods.

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

(f) Number and location of thermistors to be used for monitoring the temperature of the liner during the curing process.

(g) Estimated length of time required to reinstate the main line Underdrain and Underdrain services.

(h) Additional information may be required by the Contract Administrator for complex installations. This may include site setup details, over the hole wet-out procedures, and other information pertinent to the review and evaluation of the Contractors proposed construction methods.

E25.3.6 Submit a sampling protocol a minimum of five (5) Business Days prior to installation of the first CIPP and TPR liner. The protocol shall include:

(a) Detailed procedure for preparing plate samples, including a sample plate sample preparation quality control form. The Contractor shall provide a filled out plate sample preparation form for each plate sample provided, signed off by the wet out supervisor and project manager affirming the correct preparation of the samples. The form shall include the dimensions of the sample, direction of the circumferential fibres, and date of preparation, location of preparation.

(b) Sampling procedures for plate samples, confined pipe samples.

(c) Description of confined pipe forms to be utilized.

(d) Procedure, complete with diagram for placement of heat sink (sand bags) for confined pipe samples.

(e) Sizes for all samples to be obtained.

(f) Liner repair products and procedures for direct cut samples.

E25.3.7 Submit a styrene management plan in accordance with E25.6.9 a minimum of five (5) Business Days prior to installation CIPP liners requiring styrene management. All styrene management plans shall include sufficient details on:

(a) Regulatory compliance considerations for discharge based on the Contractor's proposed resin selection, curing method, and discharge location for steam condensate or cure water, first flush, etc.

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

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

(ii) Cure considerations to mitigate excessive styrene volatilization;

(iii) Handling considerations, post cure to mitigate levels discharged to aquatic or other environments that may be deleteriously impacted by excessive styrene levels.

E25.4 Design of CIPP Liners and TPRs

E25.4.1 Design Objectives

(a) Maximizing the structural enhancement of the Underdrain by installing a close-fit CIPP or TPR.

(b) Maximize the internal diameter of the rehabilitated Underdrain with as little impact on the hydraulic capacity of the Underdrain as possible.

(c) Reducing infiltration and exfiltration.

(d) Preventing root intrusion.

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

(f) Minimizing Underdrain service disruption during rehabilitation.

(g) Minimizing the time required to complete the Underdrain rehabilitation.

(h) Minimizing disturbance to pavements and boulevards.

(i) Minimizing disruption to vehicular and pedestrian traffic.

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

(k) Additional design objectives for TPRs include.

(i) Providing a smooth transition between the TPR and the host pipe to prevent the build-up of solids and minimize wear on the repair due to routine Underdrain cleaning and other maintenance activities.

(ii) Filling any existing voids outside the Underdrain at the point of repair.

(l) Select a CIPP product and construction approach for rehabilitation with the intent towards maximizing the achievement of these design objectives.

E25.4.2 General

(a) Chemical and mechanical properties of the liner based on the waste stream to establish and minimum design life of 50 years.

(b) Size CIPP in accordance with the design objectives to provide a close-fit to the host pipe with no annulus except for the maximum allowable diametric shrinkage due to curing permitted in ASTM D5813.

(c) Design features of internal point repair CIPP shall include:

(i) Design internal point repair CIPP as a gravity pipe in a fully deteriorated pipe condition and the depth of cover calculated based on the specific location of the repair in the Underdrain or Underdrain service.

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

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

(d) Long-term values for flexural modulus of elasticity and flexural strength will be considered to be the projected value at 50 years of a continuous application of the design load based on the specific resin and felt composite as established by ASTM D2990 (or equivalent ISO or otherwise accepted testing method) based on an applied stress level of 25% of the yield strength of the liner and approved for use in the pre-qualification process. A minimum test length of 10,000 hours is required. The Contractor shall provide supporting long term test data conforming to ASTM D2990 for any resin and felt composites not approved for use in the prequalification process. Where long-term flexural strength creep retention testing data is not available, long-term flexural modulus creep retention values shall be utilized for design for both properties.

(e) The Contractor shall also provide short term test data on the modulus of elasticity and flexural strength of the in place composite structure conforming to ASTM D790 for any resin and felt composites not approved for use in the prequalification process.

E25.4.3 Minimum Loading Assumptions:

(a) Unless otherwise specified, the groundwater table shall be assumed to be 2.0 m below the existing ground surface.

(b) Calculate soil loads based on saturated soil unit weight of 18.85 kN/m^3 (1922 kg/m^3).

(c) The following live loads shall be included in the design:

(i) Underdrains crossing beneath rail lines: Where identified, applied soil pressures from a Cooper E80 rail load shall be estimated and utilized in the

design of the CIPP liner. Rail loads shall include a track allowance dead load of 297 kg/m. Applied rail loads at depth shall be calculated using the Boussinesq solution for distribution of soil stresses from surface point loads. Impact factors for rail loads shall be calculated in accordance with the AREMA Manual for Railway Engineering.

(ii) All other Underdrains: The applied soil pressures from an AASHTO HS 25 design truck unless a higher or lower value is indicated in the contract specifications shall be estimated and utilized in the design of the CIPP liner. Applied soil pressures from AASHTO design truck loads shall be estimated in accordance with AASHTO LRFD Bridge Design Specifications, Seventh Edition (2014) assuming a flexible pavement condition.

(d) Unless otherwise specified, applied soil pressures at depth caused by superimposed surface loads shall be calculated using the Boussinesq solution for distribution of stresses from surface point loads.

E25.4.4 Hydraulic Design Checks

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

E25.4.5 Circular CIPP Design – Minimum Design Assumptions

(a) An enhancement factor (K) of 7, assuming a close fit with the host pipe.

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

(c) Modulus of soil reaction (E’s) will be assumed to be 6900 kPa unless otherwise specified.

(d) The following minimum values for ovality of the existing Underdrain shall be used unless otherwise specified or as determined from observation of the maintenance inspection:

(i) Partially deteriorated design – 3%

(ii) Fully deteriorated design – 2%

E25.4.6 Circular CIPP Design - Partially Deteriorated Condition

(a) Design CIPP for partially deteriorated pipe condition in accordance with Appendix X1 of ASTM F1216 and the following minimum design checks:

(i) Determine wall thickness by restrained buckling analysis.

(ii) Determine whether wall thickness will be governed by long-term flexural stress.

(iii) Determine whether any localized thickening is required for missing segments or holes in the host pipe.

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

- Buckling by assuming the flat functions as a pin-ended strut.
- Stress, by assuming the flat functions as a pinned member, subjected to axial and transverse loads.
- Deflection by assuming that allowable deflection is limited to 3% of the length of the flat.

E25.4.7 Circular Design – Fully Deteriorated Condition

(a) Design CIPP for fully deteriorated pipe condition in accordance with Appendix X1 of ASTM F1216 and the following minimum design checks:

(i) Determine wall thickness by restrained buckling analysis.

(ii) Check minimum wall thickness requirements.

(b) Applied external loads shall be estimated in accordance with Appendix X1 of ASTM F1216.

E25.4.8 Existing Underdrain Design Conditions

(a) The assessment of the liner system design conditions and site-specific repairs required to accommodate lining were based on the conditions observed from Underdrain inspections that were performed as part of the City of Winnipeg's Underdrain Inspection Program.

(b) Refer to E18 regarding obtaining copies of the existing inspections.

(c) The site-specific design conditions and repair requirements applicable to each CIPP lining location are shown in Appendix E and Appendix F.

E25.5 Materials

E25.5.1 Non-Reinforced CIPP Products

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

E25.5.2 Reinforced CIPP Products

(a) Reinforced CIPP and TPR products shall conform to the requirements of ASTM F2019 and D5813. Notwithstanding ATSM F2019, the fabric tube may be reinforced with either glass or carbon fibres, as required to achieve the desired short- and long-term material properties and may be installed via inversion methods.

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

E25.6 Construction Methods

E25.6.1 Verification of Existing Underdrain Dimensions

(a) Verify dimensional requirements of each Underdrain to be rehabilitated prior to manufacture of the CIPP tube in accordance with E23.2.1.

E25.6.2 Underdrain Cleaning

(a) Clean Underdrains in accordance with E18.

E25.6.3 Underdrain Preparation and Repairs Prior to Lining

(a) Perform Underdrain preparation and repairs as indicated in the specification and drawings.

(b) Complete the following internal host pipe repairs as indicated in Appendix E in accordance with E18 of this specification.

(i) Fill in holes and patch deteriorated sections of the host Underdrain pipe wall.

(ii) Fill voids in the surrounding backfill flush with the inside surface of the Underdrain pipe.

(iii) Reshape host Underdrain pipe invert to the original dimension and cross section at locations where the invert has completely deteriorated.

(iv) Remove intruding Underdrain services in accordance with CW 2140.

E25.6.4 Manhole and Catch Basin Modifications

(a) Remove and replace manhole frames, covers, rungs and risers required to facilitate the CIPP installation CW 2130. Manhole frames may not be removed when located on CPKC property.

E25.6.5 Flow Control

(a) Complete flow control in accordance with E18.

E25.6.6 Installation of CIPP

(a) Install liners by inversion methods in accordance with ASTM F1216 or by pull-in methods in accordance with ASTM F1743 or ASTM F2019.

(b) Full segment and partial full segment CIPP shall be cured by hot water, steam, or UV light sources.

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

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

(e) Fill annular spaces where the CIPP does not make an adequate seal with the host pipe at manholes, termination points and Underdrain services due to broken or misaligned pipe with a resin-rich mixture compatible with the CIPP.

(f) Extend limits for internal point repairs a minimum of 300 millimetres in each direction beyond the limits of the defect to be repaired. Extend internal point repairs that terminate at Underdrain service services a minimum distance of 300 millimetres beyond the limit of the service.

(g) Ensure termination points of internal point repairs provide a smooth and uniform flow transition to the host pipe for the full circumference of the repair.

E25.6.7 Reinstatement of Services

(a) Reinstate all active and indeterminate services to 100% of the original cross-sectional area.

(b) Cut out openings for services from inside the lined Underdrain 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) Ensure that all cut-outs for services are removed from the Underdrain and are prevented from being washed into the Underdrain system downstream of the repair location. Damages resulting from failure to capture CIPP cut-outs will be the direct responsibility of the Contractor.

E25.6.8 Annulus Grouting

(a) Complete annulus grouting in accordance with E18 where identified by the Contract Administrator during the Post Lining Video inspection.

E25.6.9 Styrene Management

(a) Under no circumstances shall cure water or condensate containing styrene be discharged downstream in the Underdrain or any other direct connection to surficial drainage courses or facilities.

(b) The Contractor shall develop and implement a styrene management plan for each site that could reasonably be impacted by planned or inadvertent discharge of styrene into the land drainage system, based on the site-specific conditions for the CIPP installation and boundary conditions at that site.

(c) The Contractor shall submit Styrene Management Plan(s) in accordance with E25.3.7 for each identified site a minimum of five (5) Business Days prior to lining.

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

- All Sites

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

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

(i) Use of styrene fee resins;

(ii) Use of on-site treatment systems where hot water curing methods are utilized;

(iii) 100% condensate capture and off-site disposal to the WWS system;

(iv) On-site monitoring to verify no residual styrene is discharged to the environment where UV curing methods are used;

(f) The Contractor shall be responsible to undertake sufficient monitoring to confirm and demonstrate that discharge levels are consistent with the styrene management plan's stated discharge limit objectives. Provide a report on styrene monitoring results upon completion of the liner installation.

E25.6.10 Quality Control Records

(a) Maintain the following Quality Control records of the work and provide to the Contract Administrator after completion of the work.

(i) Summary of the resin impregnation process including:

- Volume of resin supplied.
- Excess quantity of resin added during the wet out to account for polymerization and migration into the host pipe.
- Roller gap setting.
- Resin catalyst(s) used.
- Time and location of the wet out.
- Means taken to store and transport the resin impregnated CIPP from the wet-out facility to the job site.

(ii) Means of curing liners.

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

(iv) Pulling force used to pull or winch CIPP into place in the Underdrain and measured liner elongation.

(v) Continuous log of temperature at boiler in and out and at all thermistors placed between the host pipe and the liner at all manholes during the initial cure, cure, and cool down periods.

(vi) For UV cures, monitoring shall also include the rate of travel of the UV assembly and the amount of lamps in operation during the curing process.

(vii) Continuous temperature monitoring logs.

E25.6.11 CIPP Samples for Quality Assurance Purposes

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

(b) The Contractor shall provide one 200 mm confined pipe TPR sample as a Demonstration Test at the commencement of the project in accordance with E25.6.11(l).

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

(i) Confined test sample in accordance with E25.6.11(l);

(ii) Plate sample in accordance with E25.6.11(m).

(d) The Contractor shall provide plate samples in accordance with E25.6.11(m) for TPR installations a minimum of one (1) place sample shall be prepared per asset per day of lining on said asset. This plate sample will be applied to all TPR's installed on that asset for that day of lining. The Contractor may produce more test plates as desired.

(e) If it can be demonstrated that it is impractical to obtain confined test samples due to CIPP size and/or site-specific conditions, then results from test plate sample results modified in accordance with Clause E25.6.11(g) of this specification will be used to confirm flexural strength and flexural modulus.

(f) Schedule the installation of liners for which confined pipe samples are impractical to obtain after a minimum of three (3) previous CIPP linings on the same project have been completed and confined pipe and test plate samples have been secured to provide collaborative testing.

(g) Where plate sample test results are used for confirmation of CIPP physical strengths and/or design reconciliation purposes, they will be reduced by the statistical difference between plate and pipe sample testing results on the project as described in E25.6.11(f). Where no statistical correlation can be found due to poor testing results or lack of comparison samples, a 15% reduction will be applied to both flexural strength and modulus results obtained from plate sample testing.

(h) In larger pipe sizes where it is not possible to provide a full diameter confined test sample, and where requested by the Contract Administrator, the Contractor shall cut a sample directly from the installed CIPP liner in accordance with E25.6.11(n).

(i) Where confined test samples cannot be obtained, or where confined test samples forms do not match the inside dimensions of the host pipe, the Contractor shall obtain and provide the Contract Administrator with pre- and post-lining measurements taken in accordance with Clauses E25.6.1 and E23.2.1 of this specification to confirm in-place liner thickness.

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

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

(i) City of Winnipeg tender number

(ii) City of Winnipeg asset number

(iii) Date of installation

(iv) Street name

(l) Confined Test Samples

(i) Provide necessary forms of the same diameter as the host pipe and secure a minimum 300 millimetre long full diameter confined test sample from each CIPP and internal point repair. Large diameter CIPP liners utilizing reinforcing may require a longer sample length, confirm with the Contract Administrator.

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

(iii) Confined test sample forms shall be covered with sandbags or a similar medium to form a heat sink that approximates the install conditions of the CIPP liner in the host pipe.

(iv) Cut the CIPP sample to coincide with multi-piece form if used for CIPP larger than 450 millimetres in diameter to facilitate removal from the manhole.

(v) Identify the Underdrain where the liner sample is from on the form or sample itself if no form and provide to the Contract Administrator intact in the form.

(m) Test Plate Samples

(i) Produce and provide to the Contract Administrator test plate samples of each CIPP liner installed and as required for TPR installations.

(ii) Test plate samples shall be produced from a full thickness portion of the liner (where possible), shall contain the same resin and hardener ratios and volumes used in the CIPP and TPR liner wet-out. Ensure the test plate is clamped as close to the final installation thickness of the CIPP or TPR liner as possible.

(iii) For unreinforced liners the minimum dimension of test plate sample shall be 300mm x 300mm.

(iv) For reinforced liners the test plate sample shall be sized to accommodate a 32:1 span to depth (liner thickness) ratio. Circumferential reinforcing fibres shall be orientated in the long dimension of the test plate sample. Minimum dimensions for the test sample shall be as follows. Confirm the required test plate size for reinforced liners with the Contract Administrator prior to the CIPP or TPR installation.

- Width: 13 times the thickness of the liner

- Length: 35.2 times the thickness of the liner

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

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

(n) Direct Samples

(i) Where directed by the Contract Administrator, the Contractor shall obtain a sample of the installed CIPP or TPR liner from within the host pipe.

(ii) Direct samples of the CIPP and TPR liner shall be a minimum of 300mm x 300mm for unreinforced liners.

(iii) For reinforced liners, the sample shall be sized to accommodate a 32:1 span to depth (liner thickness) ratio. Circumferential reinforcing fibres shall be orientated in the long dimension of the sample. Minimum dimensions for the test sample shall be as follows. Confirm the required sample size for reinforced liners with the Contract Administrator prior to obtaining the sample.

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

(iv) Cut the test sample from a location where no defects were noted in Appendix E and at the 10:00 o'clock or 2:00 o'clock position in circular pipes. Direct samples from reinforced liners shall be oriented with the long dimension vertically in the straightest portion of the pipe or as directed by the Contract Administrator. Confirm sampling locations with the Contract Administrator prior to work.

(v) For repairs up to 25 mm in thickness, grout the area where test sample was taken with a resin-rich repair product such as an epoxy-based repair system that is compatible with the liner system and specifically designed for the nature, size and thickness of the patch being repaired to form a smooth watertight patch flush with liner.

- For repairs over 25 mm in thickness, polymer modified cementitious grout compatible with the liner materials may be used.

(vi) Where direct samples are taken and repaired, the Contractor shall submit CCTV inspection video clearly showing the sample location repair.

E25.6.12 Infrared Spectroscopy

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

E25.6.13 Post Construction Design Review and Reconciliation for Total Performance

(a) The Contract Administrator will review quality assurance testing results and inspection videos to confirm that the completed CIPP and TPR meets the 50-year design life structural requirements prior to issuance of Total Performance. The Contract Administrator will advise of any discrepancies between the constructed CIPP and TPR and the design requirements.

(i) Deficiencies in the physical testing results for CIPP and TPR liners indicating low material properties or thicknesses will be flagged for design reconciliation by the Contractor.

(ii) Defects in CIPP and TPR liners will be reviewed on a case-by-case basis by the Contract Administrator. The Contract Administrator will consult with the Contractor to assess the structural and performance ramifications of the defects, taking into account the condition of the host pipe prior to lining, the CIPP and TPR installation conditions, and the long-term use of the pipe.

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

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

(i) Complete a design reconciliation in accordance with E25.6.13(d) for each installed liner where sample test results indicate material properties or installed liner thicknesses lower than the required minimums in the accepted design submissions.

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

(iii) Repair sections of CIPP and TPR removed for supplemental testing by placing a full circumference internal point repair of the same thickness as the full segment liner over and extending 300 mm beyond each side of the cut section.

(iv) Install a supplemental CIPP or TPR of the required thickness to structurally enhance the installed CIPP or TPR if supplemental testing fails to confirm the CIPP or TPR will meet the 50-year design life requirement.

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

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

(d) Design Reconciliation

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

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

(iii) Short-term CIPP and TPR strength values shall be reduced to account for creep based on the creep retention values recommended in the pre-qualification submissions to assess the suitability of the liner to meet the 50-year design life requirement. Refer to E25.4.2(d).

(iv) In all cases, testing results from pipe samples shall govern over the results from plate samples for a given liner. The results from plate sample testing shall be reduced as per E25.6.11(g) for reconciliation purposes.

(v) The use of full enhancement factors in this analysis will be limited to liners that are confirmed by visual classification to be close-fit liners based on the post-lining Underdrain inspection.

(vi) Design reconciliation calculations shall be submitted in accordance with E3 and sealed by a Professional Engineer licensed in the Province of Manitoba and experienced in the design of CIPP liners.

E25.7 Site Specific Design and Installation Considerations

E25.7.1 Site specific design and installation conditions have been identified for the assets listed below:

(a) AQ-U00000174 – Railway live loading required

(b) AQ-U00000391 – Railway live loading required

(c) All Assets – Styrene management required

E25.8 Measurement and Payment

E25.8.1 Verification of Existing Underdrain and CIPP/TPR Dimensions

(a) Verification of existing Underdrain and CIPP/TPR dimensions will be considered incidental to the Work and will not be measured for payment. No separate payment will be made.

E25.8.2 Underdrain Cleaning

(a) Underdrain cleaning will be measured and paid for in accordance with E18.

E25.8.3 Underdrain Preparation and Repairs Prior to Lining

(a) Internal Underdrain pipe repairs will be measured and paid for in accordance with E18 for the type of work done.

E25.8.4 CIPP Installation

(a) Liner installation will be measured on a length basis for each size and paid for at the Contract Unit Price for “Full Segment CIPP Lining”. The length to be paid will be the total length of CIPP supplied and installed in accordance with this specification, accepted and measured by the Contract Administrator.

(b) Full segment CIPP measurement will be made horizontally at grade, above the centerline of the pipe from center to center of manholes. The maximum length to be paid will be the manhole-to-manhole Underdrain length provided by the Contractor.

(c) Payment for CIPP lining will be made on the following schedule:

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

(ii) The remaining 20% of the payment will be made upon confirmation of the CIPP strength and delivery and acceptance of all required submissions, shop drawings, and reports and rectification of all identified defects.

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

E25.8.5 TPR Installation

(a) TPR installation will be measured on a length basis for each size and paid for at the Contract Unit Price for “Trenchless Point Repairs (CIPP)”. Length to be paid will be the total length of TPR supplied and installed in accordance with this specification, accepted and measured by the Contract Administrator.

(b) TPR lengths will be measured by the post-lining CCTV inspection. TPRs installed beyond the limits identified by the Contract Administrator during review of the pre-lining video will not be measured for payment.

(c) Payment for TPR lining will be made on the following schedule:

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

(ii) The remaining 20% of the payment will be made upon confirmation of the TPR strength and delivery and acceptance of all required submissions, shop drawings, and reports and rectification of all identified defects.

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

E25.8.6 Quality Control Records

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

E25.8.7 Test Samples

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

E25.8.8 Styrene Management

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

E26. CAST-IN-PLACE CONCRETE

E26.1 Description

(a) This Specification shall cover the construction of all cast-in-place concrete work,

(b) This specification will cover concrete patch repairs.

(c) All cast-in-place concrete shall be carried out in accordance with CW 2160 and CSA A23.1, except as amended or supplemented herein.

E26.2 Submissions

E26.2.1 Construction Method Submission

(a) No Work shall commence until after the Contract Administrator's review of the Contractor's Construction Method submission.

(b) The Contractor shall prepare for the Contract Administrator's review a Construction Method submission detailing:

(i) Construction sequence to be followed including all methods to be employed to ensure no damage occurs to existing structures or adjacent properties within or adjacent to excavation.

(ii) Proposed method of construction.

(iii) Specialized equipment to be used.

(iv) Any design revisions proposed to accommodate the Contractor's proposed construction method.

(v) Flow control considerations including details on the Contractor's proposed method of flow control.

(vi) The Contractor shall respond to any concerns that may be raised by the Contract Administrator after review of the Construction Method submission.

E26.3 Materials

(a) Structural Concrete Mix Design

(i) Provide concrete mixed in accordance with requirements of CW 2160 and CSA-A23.2. Concrete shall conform to requirements of Type A concrete in accordance with Table CW 2160.1.

(ii) Structural concrete design shall be in accordance with performance specification having the following properties:

- Class of Exposure: S-1
- Minimum Compressive Strength @ 28 days: 35 MPa

(b) Polyurethane sealant for manhole construction

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

(c) Hydrophilic Waterstop

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

E26.4 Construction Methods

E26.4.1 Forming

(a) The Contractor shall be responsible for the design and installation of all necessary shoring, bracing and formwork.

(b) All shoring shall conform to CW 2160, CSA S269.3 and CSA C23.1.

E26.4.2 Cast-in-Place Concrete

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

E26.4.3 Refer to E28 for cold weather concrete requirements.

E26.4.4 Concrete Repairs

(a) General

(i) In no case will the Contractor be permitted to use removal equipment, or other equipment or methods which may cause damage to any remaining structural elements or to any new construction. In the event that any element is damaged, the Contractor shall repair such element at their own expense to the satisfaction of the Engineer.

(ii) All removed material shall become the responsibility of the Contractor.

(iii) The Contractor shall provide all necessary access to facilitate concrete removals and subsequent inspection of all the Works by the Engineer.

(iv) The Contractor shall only use methods of concrete removal that will not damage the existing structure to remain or new structures. Limits of demolition shall be straight and saw-cut to provide a clean edge at the extent of demolition.

(b) Preparation

(i) The Engineer will mark out areas requiring concrete repair. Additional areas may be added as the Work proceeds.

(ii) The resulting surface from concrete removals is to be roughened using hand operated power tools.

(iii) Limits of the repair areas are to be saw-cut to provide a well-defined interface and bonding surface with the existing sound concrete.

(iv) All exposed reinforcing steel shall be sand blasted to remove all corrosion and fitted with a Galvashield XPT anode or equivalent, installed in accordance with the manufacture’s specifications.

(v) Any reinforcing steel that is severed shall be replaced, with appropriate lap lengths, by the Contractor to the satisfaction of the Engineer at no additional cost to the City.

(c) Partial depth patch repairs

(i) Provide a minimum 20 mm sawcut around the perimeter of the repair area.

(ii) Remove all fractured or deteriorated concrete to sound concrete, a minimum of 30 mm deep, and 20mm past more than half depth exposed reinforcing bars.

(iii) Clean concrete repair area to be free of debris.

(iv) Install Galvashield XPT

- In accordance with manufacturers guidelines
- Max 300mm on centre around perimeter of repair area
- Max 300mm on centre grid pattern for interior of repair area

(v) The Contractor is responsible to create a bond between the new mortar/concrete and the existing substrates.

E26.4.5 Repair areas shall be filled with Structural Concrete.

(i) The Engineer shall inspect all repaired areas for bond using a hammer "sounding" method following cure.

(b) Full depth repairs

(i) Provide a minimum 20 mm sawcut around the perimeter of the repair area.

(ii) Remove all concrete within repair area.

(iii) Roughen perimeter around the repair area and install dowels as specified on the drawings.

(iv) Clean concrete repair area to be free of debris.

(v) Install Galvashield XPT anodes in accordance with manufacturers guidelines at a spacing of max 300mm on centre around perimeter of repair area

(vi) The Contractor is responsible to create a bond between the new mortar/concrete and the existing substrates.

(vii) Areas shall be filled with Structural Concrete as CW 2160.

E26.5 Measurement and Payment

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

E27. REINFORCING STEEL

E27.1 Description

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

E27.2 Submittals

(a) The Contractor shall submit reinforcing steel Shop Drawings in accordance with E3 a minimum of ten (10) Business Days prior to the fabrication of any reinforcing steel.

E27.3 Materials

E27.3.1 Reinforcing Steel

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

E27.3.2 Bar Accessories

(a) Bar accessories shall be of type approved by the Contract Administrator. They shall be made from a non-corroding material, and they shall not stain, blemish, or spall the concrete surface for the life of the concrete. Bar chairs are to be PVC; galvanized bar chairs are not acceptable.

(b) Bar accessories shall include bar chairs, spacers, clips, wire ties, wire (18 gauge minimum), or other similar devices that may be approved by the Contract Administrator. Bar accessories are not shown on the Contract Drawings. The supply

and installation of bar accessories shall be considered incidental to the supply and placing of reinforcing steel.

E27.4 Construction Methods

E27.4.1 Placing of Reinforcing Steel

(a) Placement of reinforcing steel shall be completed in accordance with CW 2160, CSA A23.1, and CSA A23.3.

(b) Lap splices in accordance with CSA A23.3

(c) Reinforcing steel shall be placed accurately in the positions shown on the Contract Drawings. Carefully adjust the location of reinforcing steel adjacent to openings to frame those openings in accordance with good practice, and maintain the bar spacing intent.

(d) Splices in reinforcing steel shall be made only where indicated on the Contract Drawings. Prior approval of the Contract Administrator shall be obtained where, in the opinion of the Contractor, other splices must be made. All splices shall have laps of at least 40 bar diameters. Welded splices shall not be used.

(e) A minimum of twenty-four (24) hours notice shall be given to the Contract Administrator prior to the pouring of any concrete to allow for inspection of reinforcing steel.

E27.4.2 Quality Control

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

E27.5 Measurement and Payment

(a) Supply and placement of reinforcing steel will be considered incidental to the Work and will not be measured for payment. No separate payment will be made.

E28. COLD WEATHER CONCRETE WORK

E28.1 Submittals

(a) The Contractor shall submit a cold weather concrete plan in accordance with E3.

E28.2 Construction Methods

E28.2.1 Should any concrete work be required to be caried out when the daily mean temperature is below 5°C or anticipated to be below 5°C within the next 24 hours, cold weather requirements as specified herein shall be followed.

E28.2.2 All freshly placed concrete shall be protected from the elements and from defacements due to construction operations.

E28.2.3 The following are minimum requirements for protecting concrete during and after placement during freezing weather, but mere adherence to these requirements does not relieve the Contractor of the necessity for producing concrete which as not been weakened or injured by frost or freezing, or replacement such damaged work at their own expense:

(a) Before any concrete is placed, all ice, snow, and frost shall be completely removed from all formwork and brought up above 7°C for twenty-four (24) hours minimum prior to placement of concrete. Where concrete is placed against the earth, the underlying soils shall be free of frost when the concrete is placed.

(b) Prior to mixing, concrete aggregates shall be thawed but heated to a temperature not exceeding 80°C.

(c) Concrete shall be placed at a temperature between 20°C and 30°C.

(d) Placed concrete shall be horded and kept at a temperature of not less than 20°C for five (5) Calendar Days or at a temperature of not less than 5°C for ten (10) Calendar Days. Hording enclosures shall be strong, wind-proof, and well ventilated. Heating units shall be placed to prevent local overheating or drying of the concrete and/or damage from combustion gases. Only indirect fired heaters may be utilized.

E28.3 Measurement and Payment

(a) Cold weather concrete requirements will be considered incidental to the Work and will not be measured for payment. No additional payment will be made.

E29. RIPRAP

E29.1 Description

(a) These Specifications govern all operations necessary for and pertaining to the supplying and placing of approved riprap as a protective covering along the side slopes and bases of river channels, or such other places as may be indicated on the plans or designated by the Contract Administrator in the field.

(b) This specification shall amend and supplement Specification No. CW 3615.

E29.2 Submittals

(a) The Contractor shall submit the proposed supplier(s) and location of quarry sites at least ten (10) business days prior to the supply of riprap to the Site, to confirm that sufficient quantity of specified rock is available.

(b) The Contractor shall arrange for a visit by the Contract Administrator to the proposed quarry Site(s) for inspection of the proposed riprap material and quarry faces a minimum of fourteen (10) days prior to supply and placement of riprap from each proposed quarry.

(c) The Contractor shall supply representative test results at least ten (10) business days prior to the supply of riprap to the Site, demonstrating that the material to be supplied is of adequate quality and gradation to satisfy the material specifications contained herein. Smaller size material as required for specific tests will be considered representative of the quarried riprap.

E29.3 Materials

E29.3.1 Rock Riprap

(a) The material used for the riprap shall be 450 mm down quarried rock manufactured from sound durable limestone or dolomite meeting the following properties:

(i) minimum bulk specific gravity of 2.6 (ASTM C127),

(ii) maximum Los Angeles abrasion loss of 32% (ASTM C131),

(iii) maximum soundness loss of 13% (ASTM C88)

(iv) maximum absorption of 2.5% (ASTM C127),

(v) gradation requirements, as follows:

(a) The Class 350 riprap shall be well graded having a full range and even distribution of sizes and shall conform to the following gradation:

GRADATION REQUIREMENTS FOR CLASS 350 RIPRAP

Diameter (mm)	Percent Passing by dry weight
350	100%
200	40-70%
75	10-25%

5	0-5%

(b) Individual particles shall be shaped such that no dimension is greater than four times the smallest dimension. Flat, elongated, or platy particle shapes will not be accepted.

(c) The diameter shall be taken as the average of the shortest and longest dimension measured on an individual piece of riprap.

(d) Riprap shall be free from sod, roots, organic material and debris prior to placement. Individual pieces of riprap shall be free of defects such as seams or cracks that would cause rapid or excessive deterioration or degradation.

(e) Contractors supplying riprap shall be responsible for demonstrating that the material is of adequate quality, gradation, and volume to meet the material specifications contained herein.

(f) All materials set forth in this Specification shall be subject to inspection and testing by the Contract Administrator or by the testing laboratory designated by the Contract Administrator.

(g) No supply and placement of riprap will be permitted prior to the Contract Administrator approving the source.

E29.3.2 Geotextile

(a) Geotextile for riprap installation shall consist of a separation/filtration geotextile fabric in accordance with CW 3130.

E29.4 Construction Methods

(a) Prior to placement, the riverbank shall be sub-excavated as required to achieve the lines and grades on the Drawings for the finished riprap surface.

(b) The subgrade shall be prepared in accordance with CW 3130 and covered in a heavy-duty non-woven geotextile. The geotextile shall be installed with joints overlapping a minimum of 600 m in a shingle pattern in both the direction of surface flow (upslope/downslope direction) and the direction of river flow (upstream/downstream). The geotextile shall be anchored in accordance with CW 3130.

(c) The riprap shall be dumped or placed in such a manner that the larger particles are uniformly distributed, the smaller particles serve to fill the spaces between the larger particles, and that excessive segregation of the various particle sizes does not occur. Riprap shall not be dumped directly onto geotextile, to prevent punching or tearing of geotextile fabric; in this regard, riprap shall be dumped on adjacent riprap and pushed onto exposed geotextile fabric.

(d) The riprap shall be placed to the grades and lines shown on the Drawings. Sufficient placing and leveling of riprap shall be done to produce a firmly bedded neat and uniform surface conforming to the thickness, shape, and dimensions shown on the plans.

(e) The Contractor is advised that it may be necessary to break ice to place the riprap to the dimensions shown on the drawings. In this case, the Contractor shall obtain a Frozen Waterway Permit to undertake the work, see E15.3.5. In particular, vehicular traffic on the ice surface is prohibited without this permit. The Contractor is required to supply and install the appropriate safety fences and signage for open water and thin ice conditions.

(f) The winter river level shown on the drawings is based on typical conditions. The Contractor is advised that these levels can vary above and below the level indicated.

E29.5 Measurement and Payment

(a) Supply and placement of riprap will be measured on a weight basis. Riprap will be paid at the contract unit price per tonne for “Supply and Place Riprap” for the total number of tonnes measured by truck weight scale tickets, supplied and placed as accepted by the Contract Administrator.

(b) The Contractor is to supply all truck weight scale tickets to the Contract Administrator by the end of each work day.

(c) Sub-excavation and disposal of excavated soil, shaping the riprap bed, supply and placement of geotextile, supplying, loading, hauling, and placing stone riprap will be considered incidental to the Work and will not be measured for payment. No additional payment will be made.

E30. TREE REMOVALS AND PROTECTION OF EXISTING TREES

E30.1 Description

(a) This Specification shall cover all operations relating to the protection of existing riverbank and boulevard trees during construction.

(b) The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all other things necessary for and incidental to the satisfactory performance and completion of all Work hereinafter specified.

E30.2 Construction Methods

E30.2.1 General

(a) Field-verify the presumed limits of work indicated on the Drawings, and flag all trees that require pruning or removal to facilitate the Work, subject to the Contract Administrator's approval. Overhanging branches in the work zone shall only be pruned if they interfere with the Work. No trees may be removed or pruned without written approval from the Contract Administrator.

(b) Trees within or adjacent to a construction area that are not approved for removal by the Contract Administrator must be protected during construction by means of a barrier surrounding a "Tree Protection Zone" (TPZ) as outlined in this specification.

(c) Activities which are likely to injure or destroy the tree are not permitted within the TPZ.

(d) Tree pruning or root pruning of City of Winnipeg owned trees may only be done by a Contractor approved by the project's certified arborist or Urban Forestry Branch.

(e) No objects may be attached to trees protected by City of Winnipeg by-laws without written authorization by the City of Winnipeg.

(f) No City of Winnipeg tree or tree protected by a City of Winnipeg by-law may be removed without the written permission of the City of Winnipeg.

(g) Tree Protection Zone:

(i) Table 1 shows the minimum distance for determining a Tree Protection Zone (TPZ). Minimum protection distances are to be measured from the outside edge of the tree base toward the drip line, and may be limited by an existing paved surface, provided that surface remains intact through the construction period.

(ii) Some site conditions may dictate the need for a smaller TPZ. The City of Winnipeg Urban Forestry Branch must be notified in these instances to determine if a smaller TPZ is acceptable in the specific circumstance and advise of any additional tree protection or removal requirements.

Table 1 – Tree Protection Zones

Trunk Diameter at Breast Ht. (DBH)	Minimum Protection Distance Required
<10 cm	2.0m
11-40cm	2.4m
41-50cm	3.0m
51-60cm	3.6m
61-70cm	4.2m
71-80cm	4.8m
81-90cm	5.4m

91-100cm+	6.0m

E30.2.2 Tree Protection Barriers

(a) Tree protection barriers shall be erected around trees to be protected to keep crowns and branching structure clear from contact by equipment, materials, and activities; to preserve roots and soil condition in an intact and non-compacted state; and to identify the Tree Protection Zone in which no soil disturbance is permitted and activities are restricted, unless otherwise approved by the Contract Administrator.

(b) The required barrier is a 1.2 m high orange plastic web snow fencing on 50 mm x 100 mm frame or as directed by the City of Winnipeg Urban Forestry Branch in accordance with the City of Winnipeg Protection of Existing Tree Specifications. The barrier can be lowered around branches lower than 1.2 m. The barrier location can be adjusted to align with curbs and edges at clear path of travel zones.

(c) Tree strapping material shall be installed on individual trees, in accordance with CW1140, where Work will be completed within the TPZ.

(d) Tree protection barriers shall be erected prior to the commencement of any construction or grading activities on the site and are to remain in place throughout the entire duration of any adjacent work. The Contractor shall notify the City of Winnipeg prior to commencing any construction activities to confirm that the tree protection barriers are in place. Tree protection barriers shall be removed prior to the spring freshet and re-established in areas of future adjacent work following recession of high river levels.

(e) All supports and bracing used to safely secure the barrier shall be located outside the TPZ and shall minimize damage to roots.

(f) No grade change, storage of materials or equipment is permitted within the Tree Protection Zone. The tree protection barrier must not be removed without the written authorization of the City of Winnipeg.

E30.2.3 The Contractor shall take the following precautionary steps to prevent damage to existing trees:

(a) Material shall not be stockpiled or vehicle and equipment parked on boulevards within 2 metres of trees.

(b) Where authorized, operation of equipment within the dripline of the trees shall be kept to the minimum required to perform the Work. Equipment shall not be parked, repaired, refuelled; construction materials shall not be stored, and earth materials shall not be stockpiled within the driplines of trees. The dripline of a tree shall be considered to be the ground surface directly beneath the tips of its outermost branches. The Contractor shall ensure that the operations do not cause flooding or sediment deposition on areas where trees are located.

(c) Take precautions to ensure tree limbs overhanging the Site are not damaged by construction equipment. Contact the Forestry Branch for consultation on pruning of overhanging or damaged limbs and branches and other unanticipated problems with trees during construction of the Works.

E30.2.4 Root Protection, Cutting and Care

(a) Avoid cutting roots. If root cutting appears to be necessary, obtain approval from the Contract Administrator before proceeding. If required and approved, root pruning must be performed under the direction of the Forestry Branch.

(b) Cut roots cleanly with sharp, sterilized hand tools to promote quick wound closure and regeneration.

(c) Minimize damage by avoiding excavation during hot, dry weather.

(d) Keep protected plants well watered before and after digging.

(e) Cover exposed roots with approved temporary root cover material such as soil, mulch, or damp burlap immediately after exposure. Temporary root covers shall be kept damp as long as they are in place.

E30.2.5 American elm trees are not to be pruned between April 1st and August 1st and Siberian elm trees between April 1st and July 1st of any year under provisions of The Dutch Elm Disease Act.

E30.2.6 All damage to existing trees caused by the Contractor's activities shall be repaired to the requirements and satisfaction of the Contract Administrator and the Forestry Branch. Damages must be repaired by an individual with a Manitoba Arborist licence or by the Forestry Branch.

E30.2.7 The Forestry Branch will remove and replace any trees deemed to have died or that are dying due to damage from carelessness during construction. Removal and compensation costs will be determined by size, market price of the largest transplantable tree of same or different species and may include appraised value of existing tree as determined by current International Society of Arboriculture evaluation procedure presently used by Forestry Branch in conjunction with City Claims Branch. Estimated compensation of a 250mm and 600mm diameter American elm on a boulevard will be approximately $4,700.00 and $27,000.00 respectively.

E30.3 Measurement and Payment

(a) Tree removals will be considered incidental to Mobilization and Demobilization and will not be measured for payment. No additional payment will be made.

(b) Tree protection will be considered incidental to the Work and will not be measured for payment. No additional payment will be made.

(c) Forestry compensation arising from damage or destruction of trees that are not approved for removal will be assessed by the Forestry Branch and shall be deducted from the Contractor's Progress Estimates.

E31. PRUNING OF EXISTING TREES

E31.1 Description

(a) Provide all labour, materials, methods, equipment and accessories for pruning of existing trees within the limit of Work.

E31.2 Quality Assurance

(a) Pruning shall be provided by a person with a Manitoba Arborists Certificate with demonstrable experience sourcing and Work.

(b) Contact the City of Winnipeg Forestry Branch at 204-986-2004 to arrange an on site meeting to review trees to be pruned. Meeting to include the Contract Administrator.

E31.3 Pruning Methodology

(a) Prune as required to remove dead, broken or damaged limbs.

(b) Prune back to healthy growth while maintaining balanced crown shape.

(c) Employ clean sharp tools.

(d) Make cuts smooth and flush with outer edge of branch collar near the main stem or branch.

(e) Cuts must be smooth and sloping to prevent accumulation of water on cut.

(f) Do not leave little stumps ("horns") on trunks or main branches.

(g) Prune according to accepted horticultural practices as outline in "The Pruning Manual", Publication No. 1505-1977 by Agriculture Canada.

E31.4 Measurement and Payment

(a) Tree Pruning will be considered incidental to the Work and will not be measured for payment. No additional payment will be made.

E32. WINTER RIVERBANK SEEDING

E32.1 Description

E32.1.1 This specification shall amend and supplement City of Winnipeg Standard Construction specification CW 3520 “Seeding” and shall cover all aspects of supply and installation of seed, including preparation of finished grade, hydro mulching, and maintenance.

E32.1.2 Referenced Standard Construction Specifications

(a) CW 3520-R7 – Seeding

(b) CW 3540-R5 – Topsoil and Finish Grading for Establishment of Turf Areas

E32.2 Scope of Work

E32.2.1 Riverbank areas disturbed by the work shall be restored by seeding in accordance with these Specifications.

E32.3 Materials

E32.3.1 All products shall be delivered to Site in the manufacturer’s unopened containers bearing original labels describing the content, quantity, analysis, and name of manufacturer.

E32.3.2 All materials shall be stored in designated areas and in such a manner as to protect from weather or other conditions that might decrease the effectiveness of the product.

E32.3.3 All seed supplied by the Contractor shall be Canada Certified No. 1 or Canada Certified No. 2 and come complete with a Certificate of Analysis verifying that quality standards for Canada Certified No. 1 or Canada Certified No. 2 seed are met. The Contractor shall submit the Certificates of Analysis to the Contract Administrator.

E32.3.4 Native Seed Mix

(a) The seed supplied shall be free of disease and mixed by percentage (%) weight to meet the following blends:

(i) Seed for naturalization area to be local native tall grass prairie seed with specific mixes for each slope, aspect and elevation. Contractor to supply a seed mix list prior to construction. Seed mix to include no greater than 34% of any one species and a minimum of 3 species from:

Western Wheatgrass	Slender Wheatgrass
Green Needlegrass	Canada Wild Rye
Fringed Brome	June Grass
Switch Grass	Big Bluestem
Tickle Grass	

(ii) No more than two (2) wheatgrass species shall be used in the mixture.

E32.3.5 Prior to payment for the seeding operation the Contractor shall provide the Contract Administrator with a copy of an invoice or a shipping bill received from the seed distributor specifying the quantities of each type of seed supplied for the Work Site and the delivery date.

E32.3.6 Any variations to the above referenced seed blends or mixtures shall be approved by the Contract Administrator prior to sowing.

E32.3.7 Herbicides shall be standard commercial products registered for sale and use in Canada under the Pest Control Products Act.

E32.3.8 Insecticides shall be standard commercial products registered for sale and use in Canada under the Pest Control Products Act.

E32.3.9 Growing medium as per E34.

E32.4 Construction Methods

E32.4.1 The Contractor shall not commence seeding operations until the finished grade is inspected and accepted by the Contract Administrator.

E32.4.2 Seeding

(a) Native Seed Mix: Imported Topsoil

(i) Seed shall be sown on 75mm compacted depth of imported topsoil and at rates suitable to the plant species and mix design. Seeding rates are to be included in seed mix design provided by Contractor.

(ii) To prevent the formation of depressions or water pockets, the Contractor shall smooth out any undulations or irregularities in the topsoil surface resulting from fertilizing, seeding, rolling or other operations.

(b) The Contractor shall sow the seed into the seed bed by using seeding equipment suitable for the area involved and to the satisfaction of the Contract Administrator.

(c) All seeded areas shall be rolled to form a uniform even surface, level with adjoining curbs, sidewalks or sod.

(d) Seeding operations shall be completed within two working days after the commencement of sowing operation. This shall include the application of seed, rolling and watering.

(e) Erosion control blankets shall be placed immediately following completion of seeding operations. Refer to E35.

(f) All initial sowing, seeding, and erosion protection operations at the Rue Plinguet Underdrain Outfall site shall be completed by Critical Stage 1 (D23.1(a)), and prior to the spring freshet.

E32.4.3 Commencement of Maintenance Period

(a) Immediately after the completion of the final seeding operation, to the satisfaction of the Contract Administrator, the Contractor shall commence and pay for continuous maintenance of the seeded area until the criteria specified for Termination of the Maintenance Period has been met.

(b) Following the spring freshet and river rise, seeded riverbank areas shall be inspected by the Contractor and Contract Administrator. Any deficient, damaged or vandalized areas shall be reseeded by the Contractor within three working days after receiving notification from the Contract Administrator and the areas reseeded shall be further maintained until it meets the criteria specified in Maintenance of Seeded Area.

E32.4.4 Reseeding and Spring Cleanup

(a) The Contractor shall complete all operations related to the cleanup of the Work Site the following spring. This shall include the cleaning and removal of all dead vegetation, leaves, debris, snowmold and any sand or gravel resulting from winter sanding/de-icing operations from turf areas to encourage healthy and uniform grass growth.

(i) Erosion control blankets placed during winter months shall remain in place and not be removed unless damaged or disturbed by the spring freshet. Do not disturb existing ECBs in areas where vegetation has already begun to establish.

(b) Review the condition of the riverbank restoration following the spring freshet. Schedule a site meeting at a mutually agreeable time with the Contract Administrator to inspect the riverbank restoration.

(c) Reseed any areas where winter seeding has not established using hydroseeding methods in accordance with E33.

E32.4.5 Maintenance of Seeded Area

(a) The Contractor shall water all seeded areas in sufficient quantities and at a frequency required to maintain soil under seeded area continuously moist to a minimum depth of 100 mm. Any damage, which may occur through washout of the soil during the maintenance period shall be repaired and maintained until it meets the criteria specified in E32.4.5.

(b) Seeded areas shall be mowed during the first growing season to control pioneering weeds and other competition. For the purposes of this project a weed is defined as any plant not included in the seed mix. Mowing should be done before the general height is 150 to 250 mm, or when the weedy foliar cover reaches 50 percent of the seeded area, or when the weed species begin to flower. The first mowing shall be set at a height of 75 mm with the following mowings to be set at a height of 100 to 200 mm. Rotary, flail, or sickle bar type mowing equipment is acceptable.

(c) All other maintenance of seeded area shall be in accordance with CW 3520.

E32.4.6 Termination of Maintenance Period

(a) The Contract Administrator will terminate the maintenance period after the following criteria has been met:

(i) The certified seed sowed meets the requirements specified in herein.

(ii) The seeded area has been rolled and has a firm, uniform even surface.

(iii) The seeded area has established into a healthy, vigorously growing condition.

(iv) The seeded area is free of bare and dead spots and without more than ten (10) broadleaf weeds per fifty (50) square metres.

(v) The seeded area has sufficient shoot growth density that no surface soil is visible.

(vi) Edges of established seeded areas adjacent to shrub and flower beds are well defined.

(b) When the Contractor considers that the seeded area meets the criteria listed above, they shall arrange, attend and assist in the inspection of the Work with the Contract Administrator for purposes of verifying whether the Maintenance Period can be terminated. Any deficient, damaged or vandalized areas may have to be reseeded within three working days after receiving notification from the Contract Administrator and the area so reseeded, shall be further maintained by and at the expense of the Contractor in accordance with Maintenance of Seeded Area herein.

(c) In situations where the termination of the maintenance period is not granted by the Contract Administrator before the end of a growing season, the maintenance period will commence as described herein.

E32.4.7 Site Clean Up

(a) During both seeding and maintenance operations, all sidewalks, streets, approaches, driveways and properties near the seeding operations shall be kept clean at all times by the Contractor.

(b) Upon completion of the project, the Contractor shall immediately remove all excess material and debris from the Work Site.

E32.5 Measurement and Payment

E32.5.1 Winter Seeding

(a) Initial seeding prior to spring freshet will be measured and paid on a square meter unit basis at the Contract Unit Rate for “Riverbank Winter Seeding” as listed in Form B: Prices. The area measured will be the number of square meters of seeding

completed, measured, and accepted by the Contract Administrator. Payment will be made on the following schedule:

(i) 65% payment following completion of seeding operation.

(ii) The remaining 35% following termination of the maintenance period.

(b) Payment for winder seeding shall include seed, soil amendments, herbicides, water, and all other materials and labour required for installation, maintenance, and warranty of the seeded area as specified herein.

(c) Spring cleanup and remedial hydroseeding will be measured and paid in accordance with E33.

E33. HYDROSEEDING

E33.1 Description

E33.1.1 This specification refers to those portions of the Work that are unique to the supply and application of seed, fertilizer, mulch, tackifier, and other materials used for revegetating disturbed areas by hydraulically spray-applied methods.

E33.1.2 This specification shall amend and supplement City of Winnipeg Standard Construction specification CW 3520 “Seeding” and shall cover all aspects of supply and installation of grass seed by hydroseeding methods.

E33.2 References

(a) CW 3520 – Seeding

(b) CW 3540 – Topsoil and Finish Grading for Establishment of Turf Areas

(c) Canada Seeds Act & Seeds Regulations

(i) https://laws-lois.justice.gc.ca/eng/acts/S-8/page-1.html#h-446516

(d) Canada Seeds Regulations

(i) https://laws.justice.gc.ca/eng/regulations/C.R.C.,_c._1400/

(e) Canada Fertilizers Act

(i) https://laws-lois.justice.gc.ca/eng/acts/F-10/page-1.html#h-222127

(f) Canada Fertilizer Regulations

(i) https://laws-lois.justice.gc.ca/eng/regulations/C.R.C.,_c._666/

E33.3 Scope

E33.3.1 Provide all materials, labour and equipment necessary to complete all work as shown on the Drawings and as specified herein, including but not limited to the following:

(a) Application of specified treatments to all disturbed riverbank areas.

(b) All other labour and materials reasonably incidental to the satisfactory completion of the Work, including cleanup of the Site.

E33.4 Submittals

E33.4.1 Submittals shall be provided in accordance with E3.

E33.4.2 The Contractor shall compile and submit a complete Hydroseeding Shop Drawing submission package to the Contract Administrator a minimum of five (5) Working Days prior to mixing of the proposed seed blend. The submittal shall contain the following information:

(a) Certificates of Analysis for each type of seed used in the proposed seed blend.

(b) Details on the seed blend to be provided, including:

(i) Supplier’s name and address.

(ii) Proposed seed mixture, including the type, grade, and percentage by weight of each individual seed species.

(iii) Total net weight of seed blend to be provided.

(iv) Date and location of packaging.

(c) Details on the fertilizer blend to be provided.

(d) Manufacturer's literature for mulches, binders, and tackifiers.

E33.4.3 Following acceptance of the proposed hydroseeding materials, a copy of an invoice or a shipping bill from the seed distributor specifying the quantities of each type of seed supplied for the Work Site and the delivery date shall be provided.

E33.4.4 The Contractor shall be prepared to provide additional information such as a letter of compliance, manufacturer's literature, product information sheets, material samples, or other product information upon request by the Contractor Administrator.

E33.5 Materials

E33.5.1 All materials shall be supplied by the Contractor and obtained from a recognized source.

E33.5.2 All products shall be delivered to Site in the manufacturer's unopened containers bearing original labels describing the content, quantity, analysis, and name of manufacturer.

E33.5.3 All materials shall be stored in designated areas and in such a manner as to protect from weather or other conditions that might decrease the effectiveness of the product.

E33.5.4 Samples and Testing

(a) The Contract Administrator reserves the right to request material samples for analysis for conformity to the Specifications at any time. On request, seed shall be delivered to a designated location to facilitate testing.

(b) Rejected materials shall be immediately removed from the Site and replaced at the Contractor's expense. The Contractor shall further pay the cost of testing replacement materials.

E33.5.5 Seed Mix

(a) Seed blend for hydroseeding shall be in accordance with E32.3.4.

(b) All supplied seed, either as individual species or as a seed mix, shall comply with the requirements of the Canada Seeds Act and Seeds Regulations.

(c) All seed supplied by the Contractor shall be Canada Certified No. 1 or Canada Certified No. 2 and come complete with a Certificate of Analysis verifying that quality standards for Canada Certified No. 1 or Canada Certified No. 2 seed are met.

(d) Seed mixes shall be free of plant species designated as noxious by the Province of Manitoba.

E33.5.6 Mulch

(a) Mulch shall be composed of cellulose or wood fiber products with no growth or germination inhibiting substances, and shall be manufactured in such a manner that when thoroughly mixed with seed, fertilizer, organic stabilizer, and water, in the proportions specified, will form homogeneous slurry which is capable of being sprayed to form a porous mat. The fibrous mulch in its air-dry state shall contain no more than 15% by weight of water.

(b) The fiber shall be dyed green with a water-soluble dye that will not stain masonry, concrete, asphalt, or painted surfaces, and shall be non-toxic to plant and animal life.

E33.5.7 Organic Stabilizer/Tackifier

(a) Stabilizer/Tackifier shall be an organic substance supplied in powder form and shall be packaged in clearly marked bags stating the contents of each package.

(b) Tackifiers shall be psyllium, guar gum, or starch based, and specifically designed for use in hydroseeding applications.

E33.5.8 Fertilizer

(a) Fertilizer blend shall be based upon soil testing in accordance with E34.3.5, or as recommended by the seed and/or fertilizer supplier(s) for use in riparian areas.

(b) Fertilizers shall be a coated, slow release formulation.

(c) Any fertilizer blend shall comply with the provisions of the Canada Fertilizer Act and Seeds Regulations.

E33.5.9 Water

(a) Water used for hydroseeding shall be free of impurities that would inhibit and growth, or which may be harmful to the environment.

(b) The Contractor shall be responsible for securing a water source for hydroseeding application, including any permits necessary for water drawn from water bodies.

(c) The Contractor shall be responsible for mobilizing water to the Site.

E33.5.10 Hydroseeding Slurry Mix

(a) Unless otherwise specified or recommended by the manufacturer(s), the mix ratio of hydroseeding materials shall be as follows:

(i) Seed Blend: 150 kg/ha
(ii) Fertilizer: 300 kg/ha
(iii) Mulch: 1500 kg/ha
(iv) Tackifier: Per Manufacturer's Recommendations

E33.6 Construction Methods

E33.6.1 General

(a) Areas to receive hydroseeding shall include all riverbank areas where winter seeding was not successfully established, areas damaged by spring freshet and flooding, and/or any other areas designated by the City or the Contract Administrator, and agreed to by the Contractor, as requiring supplementary spring reseeding.

E33.6.2 Spring Cleanup

(a) The Contractor shall visit the site to determine existing conditions, including means of access, the nature and extent of existing improvements on the Site and adjacent properties, and other factors that may affect the work of this section.

(b) The Contractor shall schedule an inspection of the Site with the Contract Administrator to determine the areas to receive remedial hydroseeding. The Contractor shall clearly mark or delineate the areas to be hydroseeded.

(c) Prior to hydroseeding, repair, regrade, and reestablish seed bed for any damaged riverbank areas in accordance with E32.4. Seed bed shall be scarified sufficiently to allow contact between seed and soil, and allow infiltration of water and plant roots.

(d) Remove all weed growth in areas to be hydroseeded.

(e) Following hydroseeding, repair or reinstall straw wattles for erosion control in accordance with E37.

E33.6.3 Equipment

(a) Equipment used for application of slurry shall be a commercial-type Hydro-Seeder and have a built-in agitation system with an operation capacity sufficient to agitate, suspend and homogeneously mix slurry prior to and during application.

(b) Equipment shall be adequately sized to the task, able to complete the work efficiently within the time frame specified and to permit application of hydroseeding materials without excess water being applied, or undue time lapse between operations.

(c) Distribution lines shall be large enough to prevent stoppage and allow for even distribution of slurry over the site.

(d) Pump shall be able to generate 150 psi at the nozzle.

E33.6.4 Scheduling

(a) Hydroseeding shall be scheduled to immediately follow topsoil replacement and repair of the seed bed, to limit risk of damage to the slope by wet weather events in the interim period. Contractor shall be responsible to repair damage to slopes between topsoil placement and hydroseeding application at their cost.

(b) Hydroseeding shall be scheduled during dry weather conditions with no rain forecasted for 24 hours to ensure proper curing of soil stabilizers and tackifiers.

(c) Work shall be scheduled to ensure a minimum duration of on-site storage of materials, minimum compaction of topsoil, and prompt seeding/mulching operations.

E33.6.5 Site Protection

(a) Existing site utilities, structures, riprap, landscaping, survey monuments, and other features shall be protected from hydroseeding application.

(b) Overspray shall not occur into water bodies or environmentally sensitive areas. When necessary to ensure protection of these areas, dry hand-broadcasting of materials may be employed.

(c) Hydroseeding material shall not be sprayed on objects not expected to support plant growth.

(d) The Contractor shall be responsible for any overspray or damage incurred during hydroseeding. Any overspray or damage shall be made good at no cost, and to the satisfaction of the Contract Administrator.

E33.6.6 Mixing

(a) All mixing of hydroseeding materials shall be done on site immediately prior to application.

(b) The required materials shall be mixed accurately by weight or by an acceptable system of mass-calibrated volume measurement, in accordance with the manufacturers specifications.

(c) Materials shall be thoroughly mixed to a homogenous slurry consistency for a minimum of 10 minutes prior to application of each load.

(d) Seed shall be added last when mixing, and shall not be left in the tank for unreasonable lengths of time prior to application, typically one to two hours maximum.

E33.6.7 Application

(a) Hydroseeding application shall be applied to form an even, uniform mat blended a minimum of 150 mm into adjacent vegetated areas.

(b) Hydroseeding slurry blend shall be applied at a rate of 3900 kg/ha.

(c) Broadcast dry seeding in sensitive or protected areas shall be applied in two intersecting directions, overlapping adjacent areas by 300 mm.

(d) The Contractor shall maintain a record of all pertinent application information.

(e) Unused hydroseeding mixture shall be removed from the Site and disposed of at the Contractor’s expense.

E33.6.8 Site Clean Up

(a) All surplus and waste materials shall be removed from the Site after hydroseeding is complete. Overspray on surfaces not designated for revegetation shall be removed in an appropriate manner.

(b) During both seeding and maintenance operations, all sidewalks, streets, approaches, driveways and properties near the seeding operations shall be kept clean at all times by the Contractor.

(c) Upon completion of the project, the Contractor shall immediately remove all excess material and debris from the Work Site.

E33.6.9 Maintenance of Seeded Area

(a) Maintenance of hydroseeded areas shall be in accordance with E32.4.5 and CW 3520.

E33.6.10 Termination of Maintenance Period

(a) Termination of maintenance period shall be in accordance with E32.4.6 and CW 3520.

(b) Where seed fails to germinate for any reason, the Contractor shall re-apply hydroseeding until acceptable germination takes place.

E33.7 Measurement and Payment

E33.7.1 Spring Hydroseeding

(a) Spring hydroseeding will be measured and paid on a square meter unit basis at the Contract Unit Rate for "Riverbank Spring Hydroseeding" as listed in Form B: Prices. The area measured for payment will be the number of square meters of hydroseeding completed, measured, and accepted by the Contract Administrator. Payment will be made on the following schedule:

(i) 65% payment following completion of seeding operation.

(ii) The remaining 35% following termination of the maintenance period.

(b) Payment for hydroseeding shall include minor restoration of spring flood damage, replacement of topsoil and preparation of areas to be hydroseeded, supply of seed, mulch, tackifier, soil amendments, herbicides, water, and all other materials and labour required for installation, maintenance, and warranty of the seeded area as specified herein.

(c) No additional payment will be made for spring cleanup operations, removal of construction debris, or other deleterious materials from the site.

E34. SOIL AMENDMENTS AND GROWTH MEDIUM

E34.1 Description

E34.1.1 This Specification shall amend and supplement City of Winnipeg Standard Specification CW 3540 “Topsoil and Finish Grading for Establishment of Turf Areas” and shall cover supply, preparation and placement of topsoil and growing medium, including preparation of existing grade, finish grading and fertilizer application for restoration seeding. Quality Control.

E34.2 Quality Control

E34.2.1 Testing and Samples:

(a) Submit to the Contract Administrator analyses of riverbank clay/silt to be used in creating growing medium, obtained for at least three separate samples taken from each area of the riverbank. The analysis shall be carried out by a qualified soil testing laboratory and shall include the percentage of organic material by weight, as well as recommendations for fertilizers and/or other soil ameliorants.

(b) Soil testing shall determine N, P, K, Na, Cl, Ca, Mg, organic matter, C.E.C., pH, bulk density and C/N ratio.

E34.2.2 Deliver and store fertilizer in waterproof bags showing weight, analysis and name of manufacturer.

E34.3 Materials

E34.3.1 Imported topsoil and fertilizer shall conform to CW 3540.

E34.3.2 Peatmoss shall be derived from partially decomposed species of Sphagnum Mosses, elastic and homogenous, brown in colour; free of decomposed colloidal residue, wood, sulphur and iron or other deleterious material which could affect healthy plant growth; containing a minimum 60% organic matter by weight, and moisture content not exceeding 15%. Shredded particles may not exceed 5 mm in size. Minimum pH value of peat, 4.5; maximum, 7.0.

E34.3.3 Sand shall be medium to coarse textured silica sand to CSA A82.56-M1976, well washed and free of impurities, chemical or organic matter.

E34.3.4 Bonemeal shall be raw bonemeal, finely ground with a minimum analysis of 3% nitrogen and 20% phosphoric acid.

E34.3.5 Fertilizer: chemical fertilizers shall have N-P-K compositions as recommended by an agricultural soil testing laboratory approved by the Contract Administrator, provided for each of the following:

(a) Seeded lawn turf with imported topsoil,

(b) Horticultural trees, shrubs and herbaceous material with growing medium,

(c) Native grasses and wildflowers seeding with growing medium.

E34.4 Construction Methods

E34.4.1 Preparation of Existing Grade:

(a) Rough grading shall be within 50 mm of the mud grade required prior to addition of peatmoss and sand to create the growing medium.

(b) Preparation of the existing grade shall conform to CW 3540.

E34.4.2 Growing Medium for Native Grass Seeding

(a) Growing medium for native grass seeding shall consist of a mix of 80% peat moss and 20% sand, loose by volume.

(b) Cross-cultivate the entire area of soil base (clay/silt) that is to receive soil amendments to a depth of 150 mm. Redo areas where equipment used for hauling and spreading has re-compacted sub-grade.

(c) Spread 40 mm of peat moss and 10 mm sand over the area of soil amendments.

(d) Roto-till or disc the peat moss and sand into the top 100 mm of base material and mechanically roll to obtain a level surface.

(e) Grade to eliminate rough spots and low spots and to maintain positive drainage.

(f) Consolidate seedbed to required bulk density using equipment approved by the Contract Administrator. Leave surfaces smooth, uniform and firm against deep foot-printing.

E34.4.3 Growing Medium for Planting Individual Trees and Shrubs:

(a) For planting trees and shrubs,

(i) 75% topsoil with 20% peatmoss, loose by volume. Incorporate 5% sand, or as required, to improve soil texture.

(b) Incorporate bonemeal into planting soil at rate of 3 kg/m3 of planting bed area.

E34.4.4 Fertilizer:

(a) Apply fertilizer at rates determined by the sub-soil analysis.

E34.5 Measurement and Payment

E34.5.1 Soil Amendments for Native Grass Seeding

(a) Soil amendments as specified herein will be considered incidental to restoration/seeding operations and will not be measured for payment. No additional payment will be made.

E35. EROSION CONTROL BLANKET (ECB) AND TURF REINFORCEMENT MATS (TRM)

E35.1 Description

E35.1.1 This Specification shall cover the supply, installation, and maintenance of Erosion Control Blanket (ECB) and Turf Reinforcement Mats (TRM), as herein specified.

E35.1.2 The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies, and all things necessary for and incidental to the satisfactory performance and completion of all Works as hereinafter specified.

E35.2 References

E35.2.1 All related Specifications and reference Standards are in accordance with the most current issue or latest revisions:

(a) ASTM D1117 – Standard Guide for Evaluating Nonwoven Fabrics;

(b) ASTM D1388 – Standard Test Method for Stiffness of Fabrics;

(c) ASTM D6525 – Standard Test Method for Measuring Nominal Thickness of Rolled Erosion Control Products;

(d) ASTM 6818 – Standard Test Method for Ultimate Tensile Properties of Rolled Erosion Control Products;

(e) Erosion Control Technology Council (ECTC) Guidelines.

E35.3 Scope of Work

E35.3.1 The Work under this Specification shall include the following items, to the limits as shown on the Drawings or as otherwise directed by the Contract Administrator:

(a) Supplying and installing erosion control blanket on disturbed slopes of the riverbanks above riprap limits associated with structural works and riverbank regrading.

(b) Supplying and temporarily installing erosion control blanket to protect disturbed slopes where sodding and permanent vegetation/restoration is eventually to take place associated with landscaping.

E35.4 Submittals

E35.4.1 The Contractor shall submit to the Contract Administrator for review and approval, at least ten (10) Business Days prior to the commencement of any scheduled Work on the Site, a proposed schedule, including methods and sequence of operations.

E35.4.2 The Contractor shall submit to the Contract Administrator for review and approval, at least ten (10) Business Days prior to the commencement of any scheduled Work on the Site, the proposed material(s) to undertake the Work. Data submitted shall summarize the physical, mechanical, and chemical characteristics of the material.

E35.5 Materials

E35.5.1 General

(a) All materials supplied under this Specification shall be of a type acceptable to the Contract Administrator, and shall be subject to inspection and testing by the Contract Administrator.

(b) The Contractor shall be responsible for the supply, safe storage and handling of all materials as set forth in this Specification. All materials shall be handled in a careful and workmanlike manner, to the satisfaction of the Contract Administrator.

E35.5.2 Erosion Control Blanket (ECB)

(a) ECBs shall be a machine-produced mat of biodegradable materials, consisting of seventy percent (70%) agricultural straw and thirty percent (30%) coconut blanket with a functional longevity of up to twenty-four (24) months. Suitable products include SC 150 Extended Term manufactured by North American Green, or approved equivalent in accordance with B7.

(b) The blanket shall be of consistent thickness with the straw and coconut evenly distributed over the entire area of the mat.

(c) The blanket shall be covered on the topside with heavyweight photodegradable polypropylene netting having ultraviolet additives to delay breakdown and a maximum 159 mm x 159 mm mesh and on the bottom side with a lightweight photodegradable polypropylene netting with a maximum 127 mm x 127 mm mesh. The blanket shall be sewn together on 381 mm centres (maximum) with degradable thread.

(d) Erosion Control Blanket shall have the following properties:

(i) Matrix seventy percent (70%) Straw Fibre (0.19kg/m2) and thirty percent (30%) Coconut Fibre (0.08kg/ m2);

(ii) Netting top side heavyweight photodegradable with UV additives (1.47 kg/100 m2);

(iii) Bottom side lightweight photodegradable minimum netting weight (0.73 kg/100m2); and

(iv) Degradable thread.

(e) Staples used to secure Erosion Control Blanket shall be as recommended by the Manufacturer.

E35.5.3 Turf Reinforcement Mat (TRM)

(a) TRMs shall be a machine-produced mat consisting of a non-biodegradable netting and optional biodegradable components providing long-term slope protection from erosion while permitting the growth of grasses and other vegetation.

(b) Approved products: Pyramat 75 as manufactured by Titan, or approved equivalent in accordance with B7.

(c) Erosion Control Blanket shall have the following properties:

(i) Functional longevity of seventy-five (75) years or greater.

(ii) Able to handle water flows with velocities up to 2.6 m/s prior to establishment of vegetation.

(iii) Structural netting constructed from UV stable polypropylene.

(iv) Colouring: Green or tan.

(d) Staples used to secure Turf Reinforcement Mat shall be as recommended by the Manufacturer.

E35.6 Equipment

E35.6.1 General

(a) All equipment shall be of a type acceptable to the Contract Administrator and shall be kept in good working order.

E35.7 Construction Methods

E35.7.1 General

(a) Erosion Control Blanket shall be placed on all disturbed and exposed riverbank slopes for which revegetation is required.

(b) The Contractor shall coordinate installation of erosion control blankets with that of silt fencing in accordance with E36 and straw wattles in accordance with E37.

E35.7.2 Handling and Storage of Materials

(a) All materials shall be handled and stored in a careful and workmanlike manner, to the satisfaction of the Contract Administrator.

E35.7.3 ECB and TRM Installation

(a) Shall be installed as per the manufacturer's recommendations and these specifications. The more stringent shall govern.

(b) Blankets/mats shall be installed after placement of top soil and completion of seeding.

(c) The blankets/mats shall be rolled out in the direction of the water flow and installed to achieve intimate contact with the underlying soil.

(d) The upper edges of the blanket on the side slopes and the edges at the terminal ends of the installation shall be placed in a 150 mm x 150 mm trench.

(e) The upper edges shall be stapled at 1000 mm intervals and the terminal edges shall be stapled at 300 mm intervals within the trench. The trench shall be then be backfilled and compacted. The side and end seams shall be overlapped edge over edge (shingle style) with an overlap of 150 mm. The side seams shall be stapled at 1000 mm intervals and the end seams shall be stapled at 300 mm intervals.

(f) At 10 m intervals, the Contractor shall place a double row of staggered staples to secure the blankets. The staples shall be spaced 100 mm apart. The remainder of the blanket shall be stapled at a rate of four (4) staples per m2. The blanket may have to be trimmed to size to conform to the area to be covered.

(g) Transverse joints and end seams in the Erosion Control Blanket shall have a minimum overlap of 150 mm and secured with 200 mm staples a maximum of 300 mm apart.

(h) Should the Contract Administrator determine that the Contractor has not installed the Erosion Control Blanket properly or has damaged the blankets from construction activities resulting in sediment releases beyond the Work area; the Contractor shall retrieve all sediment that has left the construction area, to the fullest extent possible, at his own cost. As a minimum, the Contractor shall remove all deltas and sediment deposited in drainage ways and re-grade the areas where sediment removal results in exposed soil. The removal and restoration shall take place within five (5) working days of discovery unless precluded by legal, regulatory, or physical access restraints. If precluded, removal and restoration must take place within five (5) working days of obtaining access. The Contractor is responsible for contacting all local, regional, provincial, and federal authorities before working in surface waters and for obtaining applicable permits. The Contractor's restoration Work to restore property outside of the designated Work area shall be at his own cost.

E35.7.4 Complying with Environmental Protection Requirements

(a) The Contractor shall be responsible for maintaining sediment control measures at the site to prevent sediment releases into Red River from areas disturbed as a result of his work during and following construction.

(b) The Contractor shall monitor his work and implement appropriate sediment control measures as site conditions warrant. Such measures may include installation of silt fences, straw bales, or other measures as required in the event that there is runoff from the site and to minimize airborne dust to adjacent properties and walkways.

(c) The Contractor shall monitor, maintain, repair all sediment control measures until vegetation has re-established in restored areas and there no longer is a potential for sediment releases due to construction.

(d) Disturbed areas shall be restored. Erosion control blankets, as approved by the Contract Administrator, shall be used to control potential erosion of areas where vegetation has been damaged, up until permanent vegetation has been re-established.

E35.8 Quality Control and Assurance

E35.8.1 Inspection

(a) All workmanship and all materials furnished and supplied under this Specification are subject to close and systematic inspection and testing by the Contract Administrator including all operations from the selection and production of materials through to final acceptance of the specified Work.

(b) The Contractor shall be wholly responsible for the control of all operations incidental thereto, notwithstanding any inspection or acceptance that may have been previously given. The Contract Administrator reserves the right to reject any materials or Works, which are not in accordance with the requirements of this Specification.

E35.9 Measurement and Payment

E35.9.1 Erosion Control Blanket

(a) Supplying and installing erosion control blanket associated with riverbank restoration will be measured on an area basis and paid for at the Contract Unit Price per square meter for “Supply and Install Erosion Control Blanket”, which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work included in this Specification, accepted and measured by the Contract Administrator.

E35.9.2 Turf Reinforcement Mat

(a) Supplying and installing turf reinforcement mat associated with riverbank restoration will be measured on an area basis and paid for at the Contract Unit Price per square meter for “Supply and Install Turf Reinforcement Mat”, which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work included in this Specification, accepted and measured by the Contract Administrator.

E36. SILT FENCE BARRIER

E36.1 Description

E36.1.1 This Specification shall cover all operations relating to the work necessary for the supply, installation, and maintenance of silt fence barrier, as herein specified.

E36.1.2 The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies, and all things necessary for and incidental to the satisfactory performance and completion of all Works as hereinafter specified.

E36.1.3 Silt fencing shall be installed where called for by the Contractors SSEMP.

E36.2 References

E36.2.1 The latest edition and subsequent revisions of the following:

(a) ASTM D698 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft3 (600 kN-m/m3);

(b) ASTM D3786 – Standard Test Method for Bursting Strength of Textile Fabrics—Diaphragm Bursting Strength Tester Method;

(c) ASTM D4355 – Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus;

(d) ASTM D4491 – Standard Test Methods for Water Permeability of Geotextiles by Permittivity;

(e) ASTM D4533 – Standard Test Method for Trapezoid Tearing Strength of Geotextiles;

(f) ASTM D4632 – Grab Breaking Load and Elongation of Geotextiles;

(g) ASTM D4751 – Standard Test Method for Determining Apparent Opening Size of a Geotextile;

(h) ASTM D4833 – Standard Test Method for Determining Apparent Opening Size of a Geotextile;

(i) CW 3550 – Chain Link and Drift Control Fence.

E36.3 Scope of Work

E36.3.1 The Work under this Specification shall include the following items, to the limits as shown on the Drawings or as otherwise directed by the Contract Administrator:

(a) Supplying and installing temporary silt fence barrier;

(b) Maintaining silt fence barrier until final site restoration;

(c) Removing silt fence barrier and restoring the area where the fencing was installed, without further disturbing the area and without releasing any deleterious substances to the adjacent watercourse;

E36.4 Submittals

E36.4.1 The Contractor shall submit to the Contract Administrator for review and approval, at least ten (10) Business Days prior to the commencement of any scheduled Work on the Site, a proposed schedule, including methods and sequence of operations.

E36.4.2 The Contractor shall submit Shop Drawings for the proposed material(s) to undertake the Work at least ten (10) Business Days prior to the commencement of any scheduled Work on the Site. Data submitted shall summarize the physical, mechanical, and chemical characteristics of the material.

E36.5 Materials

E36.5.1 General

(a) All materials supplied under this Specification shall be of a type acceptable to the Contract Administrator and shall be subject to inspection and testing by the Contract Administrator.

(b) The Contractor shall be responsible for the supply, safe storage and handling of all materials as set forth in this Specification. All materials shall be handled in a careful and workmanlike manner, to the satisfaction of the Contract Administrator.

E36.5.2 Handling and Storage of Materials

(a) All materials shall be handled and stored in a careful and workmanlike manner, to the satisfaction of the Contract Administrator.

E36.5.3 Fence Posts

(a) Fence posts shall be 38 mm x 38 mm untreated wood posts, 41 mm steel tee posts, or punched steel U posts, minimum length of 1.2 m.

E36.5.4 Filter Fabric

(a) Filter fabric shall be a woven geotextile material specifically designed for silt fence applications, meeting the following minimum requirements:

Table E52-3: Filter Fabric Requirements

Property	Test Method	Value
Grab Tensile Strength	ASTM D4632	0.55 kN
Grab Tensile Elongation	ASTM D4632	15%
Mullen Burst	ASTM D3786	2060 kPa
Puncture	ASTM D4833	0.285 kN
Trapezoid Tear	ASTM D4533	0.285 kN
UV Resistance	ASTM D4355	80% @ 500 hrs

Apparent Opening Size (AOS)	ASTM D4751	0.60 mm
Flow Rate	ASTM D4491	405 l/min/m^2

(b) The fabric shall be inert to commonly encountered soil chemicals, hydrocarbons, mildew and bacteria.

E36.5.5 Wire Mesh

(a) Wire mesh shall be galvanized or plain metal with 3.0 mm wire gauge and wire spacing at 150 mm o/c.

E36.5.6 Fencing Material Fasteners

(a) Staples or wire ties of sufficient strength and spacing to withstand a 530 N (120 lbf) pull test at any point on the wire mesh.

E36.6 Equipment

E36.6.1 General

(a) All equipment shall be of a type acceptable to the Contract Administrator and shall be kept in good working order.

E36.7 Construction Methods

E36.7.1 General

(a) Silt fencing shall be installed at the start of the work along areas where there is stripped or exposed soil where run-off would enter the river. Final locations of the silt fence barrier will be dependent upon site conditions and the Contractor's activities and methods, and may require adjustment throughout the course of the work.

(b) Locations of silt fence barrier will be confirmed on site with the Contract Administrator.

(c) Additional silt fence barrier shall be installed around the perimeter of material and soil stockpile areas, designated vehicle fueling and service areas, designated trash storage areas, and other locations as detailed in E9.

(d) Work shall be undertaken in accordance with E9 and all efforts made to prevent deleterious substances from entering into the river during construction.

E36.7.2 Silt Fence Barrier Installation

(a) Excavate a 150 mm x 150 mm anchor trench along alignment of silt fence barrier.

(b) Install fence posts in accordance with Manufacturer's recommended installation methods. Fence posts shall be firmly driven into undisturbed soil, or are completely and firmly backfilled if installed via auger methods.

(c) Attach wire mesh as support backing for silt fence barrier filter fabric with specified fasteners. Attach silt fence barrier filter fabric on top of wire mesh in similar fashion. Overlap any fence seams (wire mesh or filter fabric) by 450 mm minimum. Ensure that wire mesh and filter fabric are installed on the upslope side of the post and are fully laid within the anchor trench.

(d) Install and compact impermeable excavated materials into anchor trench and slope as required. Compact to ninety-five percent (95%) of maximum dry density in accordance with ASTM D-698.

E36.7.3 Silt Fence Barrier Maintenance

(a) Silt fence barrier shall be inspected daily and prior to commencing other construction activities.

(b) All silt fences shall be inspected immediately after runoff event and at least daily during prolonged rainfall or runoff. Any required repairs shall be made immediately. The silt fence barriers shall be maintained in place, without gaps, and without undermining, so as to prevent sediment passage through and under the barrier. Silt

fence barriers shall be maintained vertical without tears and without sagging. Fence posts shall remain upright and shall not be loosely placed into the ground.

(c) Accumulated sediment that is 300 mm or greater in depth shall be carefully removed and disposed of offsite without disturbing the silt fence barrier. Accumulated sediment shall also be removed as necessary to perform maintenance repairs. Accumulated sediment shall be removed immediately prior to removal of the silt fence barrier.

E36.7.4 Silt Fence Barrier Removal

(a) Remove silt fences following completion of all site construction activities (including final restoration and cleanup) and after installation of all permanent erosion control measures and satisfactory establishment of permanent vegetation.

(b) Restore areas disturbed, without releasing any deleterious substances to the adjacent watercourse.

E36.7.5 Complying with Environmental Protection Requirements

(a) The Contractor shall be responsible for maintaining sediment control measures at the site to prevent sediment releases into the River from areas disturbed as a result of his work during and following construction. Sediment and erosion control measures shall comply with the requirements of E9.

E36.8 Quality Control and Assurance

E36.8.1 Inspection

(a) All workmanship and all materials furnished and supplied under this Specification are subject to close and systematic inspection and testing by the Contract Administrator including all operations from the selection and production of materials through to final acceptance of the specified Work.

(b) The Contractor shall be wholly responsible for the control of all operations incidental thereto, notwithstanding any inspection or acceptance that may have been previously given. The Contract Administrator reserves the right to reject any materials or Works, which are not in accordance with the requirements of this Specification.

E36.9 Measurement and Payment

E36.9.1 Silt Fence Barrier

(a) Supplying, installing, maintaining, and removing silt fence barrier will be measured on a length basis and paid for at the Contract Unit Price per metre for “Supply and Install Silt Fence Barrier”, performed in accordance with this Specification and accepted by the Contract Administrator, which price shall be paid in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work.

(b) Payment for silt fence barrier shall be based on the following breakdown:

(i) Following supply and installation: Sixty percent (60%)

(ii) Following final removal: Forty percent (40%)

(c) Removal of accumulated sediment from the silt fence will be considered incidental to the Work and no separate measurement or payment shall be made.

(d) Temporary removal and reinstallation of the silt fence to facilitate other project activities will be considered incidental to the Work and no separate measurement or payment will be made.

E37. STRAW WATTLES

E37.1 Description

E37.1.1 This Specification shall cover the supply and installation of straw wattles required as erosion control measures to mitigate any deleterious materials from entering the and river, as specified herein.

E37.2 Materials

E37.2.1 The 300 mm diameter straw roll shall consist of straw or wood fibre that has been compressed and placed onto a biodegradable poly or plastic netting.

E37.2.2 Approved Products:

(a) Stenlog or approved equal in accordance with B7.

E37.2.3 Submit proposed straw wattle data sheet for review and acceptance at least five (5) Working Days prior to installation.

E37.3 Equipment

E37.3.1 General

(a) All equipment shall be of a type acceptable to the Contract Administrator and shall be kept in good working order.

E37.4 Construction Methods

E37.4.1 Install 300 mm straw wattle sediment control material in accordance with the manufacturer's specifications.

E37.4.2 Straw wattles shall be installed at the top of the riverbank slope and up-slope of all riprap areas within seeded areas, prior to spring thaw and demobilization from the site.

E37.4.3 Install 300 mm straw wattle sediment control material in accordance with the manufacturer's specifications wherever the Contract Administrator directs to prevent sediment from entering the river.

E37.4.4 Install straw wattles so that no gaps exist between the soil and the bottom of the wattle, and the ends of adjacent wattles are overlapped 150 mm minimum to prevent water and sediment passing. Achieve a tight seal between the wattle segments.

E37.4.5 Dogleg terminal ends of straw wattle up the slope to prevent channelling of sedimentation.

E37.4.6 Use 300 mm wooden stakes to fasten straw wattle to the soil. Place stakes on each side of the straw wattle, lying across the natural fibre twine, spaced 1200 mm on centre. Leave 30 to 50 mm of wood stake exposed above the wattle.

E37.4.7 Avoid damage to wattles. Damaged areas of wattles should be cut and tied off, then treated as terminal ends.

E37.4.8 Straw wattles may be left in place to deteriorate naturally after seeding has established.

E37.5 Quality Control and Assurance

E37.5.1 Quality Control

(a) All workmanship and all materials furnished and supplied under this Specification are subject to close and systematic inspection and testing by the Contract Administrator including all operations from the selection and production of materials through to final acceptance of the specified Work.

(b) The Contractor shall be wholly responsible for the control of all operations incidental thereto, notwithstanding any inspection or acceptance that may have been previously given. The Contract Administrator reserves the right to reject any materials or Works, which are not in accordance with the requirements of this Specification.

(c) Quality Assurance testing shall be undertaken by the Contract Administrator. Quality Control testing shall be undertaken by the Contractor.

E37.5.2 Quality Assurance

(a) All materials will be subject to physical inspection by the Contract Administrator and will be subject to rejection during the course of the Work and for the length of time as specified in the General Conditions, if, in the opinion of the Contract Administrator, the materials involved do not meet the requirements of the Drawings and this Specification.

(b) All materials shall be subject to testing by the Contract Administrator and will be approved only if the requirements of the Drawings, Standards and this Specification are met. The Contractor shall supply the specimens for testing in accordance with the requests of the Contract Administrator.

(c) The Contractor shall furnish facilities for the inspection of material and workmanship in the mill, shop and field, and the Contract Administrator shall be allowed free access to the necessary parts of the Works. The Contractor shall supply samples to the Contract Administrator or his inspector for testing purposes as required. There will be no charge to the City for samples taken.

E37.6 Measurement and Payment

E37.6.1 Supplying, installing, and maintaining straw wattle will be measured on a length basis and paid for at the Contract Unit Price per metre for “Supply and Install Straw Wattle”, performed in accordance with this Specification and accepted by the Contract Administrator, which price shall be paid in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work.

E38. TEMPORARY SURFACE RESTORATION

E38.1 Description

E38.1.1 This Specification shall cover the temporary restoration roadways and boulevards. Temporary restoration is required to facilitate construction staging and where atmospheric conditions do not permit permanent restoration upon completion of the work. Temporary restoration shall be completed as specified herein.

E38.2 General

E38.2.1 The Contractor is responsible for maintaining the roadway in an acceptable condition for traffic at all times while the Site is under the control of the Contractor. Temporary restoration of the roadway to permit traffic between completion of the work and permanent restoration shall be done in such a manner as to allow normal vehicle traffic. The Contractor shall be responsible for all maintenance of said restoration works.

E38.2.2 In all cases, boulevards and roadways must be made safe for vehicles and pedestrians whenever the Contractor is not actively working on site.

E38.3 Construction Methods

E38.3.1 Further to Clause 3.3 of CW 1130, the Contractor shall temporarily restore surfaces to the following minimum standards:

(a) Backfill and level boulevards and grassed areas to match existing surface elevations.

(b) Cap excavations in street pavement with 100 mm thick layer of “Concrete for Temporary Restoration of Utility Pavement Cuts” as specified in CW 3310.

(c) Cap excavations in sidewalk pavement with a 50 mm thick layer of “Concrete for Temporary Restoration of Utility Pavement Cuts” as specified in CW 3310 or 50 mm of asphalt paving in accordance with CW 3410.

(d) Where curb has been removed as part of the pavement cut, pour temporary curb using “Concrete for Temporary Restoration of Utility Pavement Cuts” as specified in CW 3310.

E38.3.2 Insulate temporary concrete where required during 24 hour curing period.

E38.3.3 Remove all temporary pavements prior to permanent restorations.

E38.3.4 The Contractor shall monitor and maintain temporarily restored surfaces as required until permanent restoration is complete.

E38.3.5 If, in the opinion of the Contract Administrator, temporarily restored surfaces are not being adequately maintained or were not properly constructed and pose a danger to the public, maintenance or reconstruction will be done by the City forces with no advance notification the Contractor. All costs associated with the maintenance or reconstruction of temporary pavement incurred by the City shall be deducted from future payments to the Contractor.

E38.4 Measurement and Payment

E38.4.1 Completion of all temporary restoration shall be considered incidental to the Work and will not be measured for payment. No separate payment will be made.

E39. PERMANENT RESTORATION

E39.1 Description

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

E39.2 Construction Methods

E39.2.1 Pavement Restoration

(a) The Contractor shall follow the City of Winnipeg Street By-law No. 1481/77 and current revision of the City of Winnipeg "Street Cuts Manual" found at https://winnipeg.ca/publicworks/permitsApprovals/pdf/Street-Cuts-Manual.pdf and for all pavement restoration unless otherwise shown on the drawing or specifications or as directed by the Contract Administrator.

(b) All street segments within the work area impacted by the Work shall be maintained and restored with the following additional requirements:

(i) Review and record the condition of each street segment with the Contract Administrator and a City Representative from Public Works prior to the initiation of the work. The surface restoration required for each street segment will be agreed upon at this time.

(c) The street material and condition within the project work area are classified as follows:

Street	Block	Pavement Type	Condition
Rue Plinguet	West of McTavish Street	Asphalt over concrete	Poor
Avenue Tache	Rue Herbert to Rue Messager	Chip seal	Unknown
Rue Notre Dame	Rue Maisonneuve to Rue Nadeau	Asphalt over concrete	Good
Rue Notre Dame	Rue Nadeau to Archibald Street	Concrete	Good
Rue Maisonneuve	Dumoulin Street to Rue Notre Dame	Concrete	Good
Archibald Street	Dumoulin Street to Mission Street	Asphalt over concrete	Fair
McTavish Street	Rue Plinguet to Provencher Blvd	Chip seal	Poor
McTavish Street	Provencher Blvd to Mission Street	Chip seal	Unknown
Dawson Road N	Van Hellegham Ave to Rue Plinguet	Asphalt over concrete	Poor

(d) Permanent pavement restoration shall be in accordance with the City of Winnipeg Street Cuts Manual (2022) for each applicable pavement type.

(i) Construct partial slab patches in accordance with CW 3230.

(ii) Construct miscellaneous concrete slab renewals in accordance with CW 3235.

(iii) Construct concrete curb renewal in accordance with CW 3240.

(iv) Construct asphaltic concrete patches (Type 1A) in accordance with CW 3240. Notwithstanding CW 3410, there will be no maximum width for an asphalt patch.

E39.2.2 Sidewalks:

(a) Reconstruct existing asphalt sidewalks with 75 mm of Type 1A asphaltic concrete pavement conforming to CW3410. The sidewalk shall be constructed with 50 mm (min) of compacted base material and 150 mm (min) of sub-base material.

(b) Reconstruct existing non reinforced concrete sidewalks with a 100 mm non-reinforced concrete conforming to CW3325 and SD-228A. The sidewalk shall be constructed with 100 mm (min) of compacted base material.

(c) Reconstruct of the existing reinforced concrete sidewalks with a 150 mm reinforced concrete conforming to CW3235 and SD-237. The sidewalk shall be constructed with 100 mm (min) of compacted base material. To be used for private approaches.

E39.2.3 Granular Path Restoration

(a) Granular paths shall be restored as per the Drawings.

E39.2.4 Grass and Riverbank Restoration

(a) Sod all maintained grassed areas in accordance with CW3510.

(b) Seed all identified riverbank areas in accordance with E32 and E33. Install erosion control blankets and turf reinforcement mats where identified in accordance with E35.

E39.2.5 Replacement of Jersey Barriers at Rue Plinguet Underdrain Outfall

(a) The contractor shall salvage existing concrete barriers at the Rue Plinguet Underdrain Outfall site for re-installation on site at the end of the project as shown on the Drawings.

(b) The Contractor shall coordinate with the Contract Administrator regarding the final placement of the barriers. In General, the installed barriers shall not block the existing fire hydrant and shall protect the existing geotechnical instrumentation.

E39.3 Schedule

E39.3.1 Riverbank Restoration:

(a) Rue Plinguet Underdrain Outfall riverbank – Restoration c/w winter seeding and placement of the erosion control blanket and turf reinforcement mats shall be completed by Critical Stage 1 (D23.1(a)), and before the spring freshet.

(b) Rue Note Dame Underdrain Outfall riverbank shall be temporarily restored as per the Drawings. Final restoration via hydroseeding shall be completed after the spring freshet.

E39.4 Measurement and Payment

E39.4.1 Partial Slab Patches

(a) Partial Slab Patches will be measured on an area basis and paid for at the Contract Unit Price per square meter for “Partial Slab Patches” as identified in Form B: Prices. Payment shall include all materials and labour required to complete the work as specified.

(b) All cost incurred for sub-base and base course materials shall be included in the unit price for “Partial Slab Patches”.

(c) Payment for Partial Slab Patches will only be considered for areas directly affected by the Work within the project limits. Any necessary restorations that fall outside of the

immediate project area may not be considered for payment, at the discretion of the Contract Administrator.

(d) No separate measurement or payment will be made for Drilled Dowels or Tie Bars, the cost for which shall be included in the prices bid for Partial Slab Patches.

E39.4.2 Concrete Curb Renewals

(a) Concrete curb renewal will be measured on a linear meter basis and paid for at the Contract Unit Price per linear meter for "Concrete Curb Renewals" as identified in Form B: Prices. Payment shall include all materials and labour required to complete the work as specified.

(b) All cost incurred for sub-base and base course materials shall be included in the unit price for "Concrete Curb Renewal".

(c) Payment for Concrete Curb Renewals will only be considered for areas directly affected by water main installation works within the project limits. Any necessary restorations that fall outside of the immediate project area may not be considered for payment, at the discretion of the Contract Administrator.

E39.4.3 Asphaltic Concrete Patches Type 1A

(a) Construction of Asphaltic Concrete Patches will be measured on an area basis and paid for at the Contract Unit Price per square meter for "Construction of Asphaltic Concrete Patches – Type A1". Payment shall include all materials and labour required to complete the work as specified.

(b) Payment for Construction of Asphaltic Concrete Patches will only be considered for areas directly affected by water main installation works within the project limits. Any necessary restorations that fall outside of the immediate project area may not be considered for payment, at the discretion of the Contract Administrator.

E39.4.4 Sidewalk and Path Patches

(a) Construction of sidewalk/path patches will be measured on a linear metre basis for each type of pavement/surface type at the Contract Unit Price for "Sidewalk Patches" as identified in Form B: Prices. Measurement will be made for each linear metre of sidewalk/path acceptably replaced. Payment shall include all excavation, base and sub-base preparation, supply and placement of concrete and asphalt pavements.

(b) Gravel trail restoration at the Rue Notre Dame Underdrain Outfall will be measured and paid on a Lump Sum basis at the contract price identified in Form B: Prices. Payment shall include all materials and labour to complete the work.

E39.4.5 Sodding

(a) Supply and installation of sod using imported topsoil will be measured and paid in accordance with CW 3510. Payment will be made at the Contract Unit Rates in Form B: Prices.

E39.4.6 Riverbank Seeding

(a) Winter riverbank seeding will be measured and paid in accordance with E32.

(b) Spring Hydroseeding will be measured and paid in accordance with E33.

E39.4.7 Reinstall Existing Jersey Barriers at the Rue Plinguet Underdrain Outfall

(a) Salvage and reinstallation of existing jersey barriers at the Rue Plinguet Underdrain Outfall site will be measured and paid on a lump sum basis at the Contract Unit Price identified in Form B: Prices. Payment shall include all materials and labour to complete the work

PART F - SECURITY CLEARANCE

F1. SECURITY CLEARANCE

F1.1 Each individual proposed to perform Work under this Contract shall be required to obtain a Global Sanctions & PEP Check **and** a Police Information Check as detailed below.

F1.1.1 The Global Sanctions & PEP Check must be obtained through Sterling BackCheck.

(a) A Sterling BackCheck account must be setup 72 hours prior to individual security clearances to allow sufficient time for activation of the contracting company's account. If the contracting company has an existing City of Winnipeg Sterling Backcheck vendor account, they may skip to (d) below.

(b) An authorized individual of the contracting company must complete the Sterling Backcheck Setup Form. There is no cost to the organization to set up the account. Click on the link below, complete the form, and hit submit. **(This form is to be completed by the company, not by the employee requiring the security clearances). https://forms.sterlingbackcheck.com/partners/platform2-en.php?&partner=winnipegcity

(c) Within 48 hours of completing the Sterling Backcheck Setup Form, the authorized individual of the contracting company will receive a Username and Password for Sterling Backcheck. It will appear in their inbox as a "Welcome to Sterling Backcheck" email. Upon receipt, the authorized individual of the contracting company will be asked to login to the Sterling Backcheck website to set their security questions and password. Once completed, individual security clearance requests can be submitted.

(d) In order to run a Global Sanctions & PEP Check and/or a Police Information Check, follow the steps below:

(i) Click on the sub-tab labelled "Order eConsent".

(ii) Fill out the required information about the employee proposed to perform Work under this Contract within City facilities (the person that requires the security clearances).

(iii) Select your location under the "Order Information" section and enter the organization's phone number, if required.

(iv) Select the required individual service(s) in the dropdown menu under the "Select Services" section. If both the Global Sanctions & PEP Check and the Police Information Check are required, select the Sterling Backcheck Package One (with electronic identity verification). Once selected, both the Global Sanctions & PEP Check and the Police Information Check should have a grey check mark beside them.

(v) Scroll down to the bottom and click the blue "Submit" button. The employee proposed to perform Work under this Contract within City facilities will be invited to complete their security clearance.

(vi) The employee will receive the invitation and must click on the link and complete their Global Sanctions & PEP Check and/or Police Information Check.

(vii) The results of the Global Sanctions & PEP Check and/or Police Information Check will go directly to the City of Winnipeg and to the authorized individual of the contracting company within 24 hours.

(e) Any questions related to the Sterling BackCheck process can be directed to Linda Ferens at 204-999-0912 or by email at: linda.ferens@sterlingcheck.com OR managedsupport@sterlingcheck.com

F1.1.2 The Police Information Check must be obtained from one of the following:

(a) Sterling BackCheck;

(i) See F1.1.1(a) thru (e) for instructions on how to set up an account and submit individuals for security checks; or

(b) A police service having jurisdiction at their place of residence;

(i) The original Police Information Check (Form P–612) will be provided by the Winnipeg Police Service to the individual applicant. The original has a validation sticker from the Winnipeg Police Service in the top right hand corner.

(ii) The applicant shall provide the original Police Information Check (Form P–612) to the Contract Administrator; or

(c) Commissionaires (Manitoba Division);

(i) Forms to be completed can be found on the website at: https://www.commissionaires.ca/en/manitoba/home

(ii) The applicant shall provide the original Police Information Check to the Contract Administrator; or

(d) FASTCHECK Criminal Record & Fingerprint Specialists;

(i) Forms to be completed can be found on the website at: https://myfastcheck.com

(ii) The applicant shall provide the original Police Information Check to the Contract Administrator.

F1.2 Any individual for whom a Global Sanctions & PEP Check and/or a Police Information Check is not provided will not be permitted to perform any Work.

F1.3 Individuals for whom a Global Sanctions & PEP Check indicates “CLEAR” and a Police Information Check demonstrates no previous convictions or pending charges will be permitted to perform Work as specified in F1.1.

F1.4 Individuals for whom a Global Sanctions & PEP Check does not indicate “CLEAR” and/or a Police Information Check demonstrates previous convictions or pending charges may not be permitted to perform any Work as specified in F1.1.

(a) Previous convictions or pending charges may be investigated and a determination will be made by the City as to whether the individual will be permitted to perform any Work.

(b) Convictions or pending charges that may preclude an individual from performing any Work include but are not limited to:

(i) convictions or pending charges related to property offences; and/or

(ii) convictions or pending charges related to crimes against another person.

(c) Where additional investigation related to a Global Sanctions & PEP Check or a Police Information Check is required by the City, no extension to critical stages, Substantial Performance, or Total Performance, as applicable, will be provided.

(d) Additional investigation by the City may take upwards of six weeks.

F1.5 Prior to the award of Contract, and during the term of the Contract, if additional or replacement individuals are proposed to perform Work within City facilities, the Contractor shall supply the Contract Administrator with a Global Sanctions & PEP Check and a Police Information Check satisfactory to the City obtained not earlier than one (1) year prior to the Submission Deadline, or a certified true copy thereof, for each individual proposed to perform the Work.

F1.6 Any Global Sanctions & PEP Check and Police Information Check determined to be satisfactory to the City will be deemed valid for the duration of the Contract subject to a repeated records search as hereinafter specified.

F1.7 Notwithstanding the foregoing, at any time during the term of the Contract, the City may, at their sole discretion and acting reasonably, require an updated Global Sanctions & PEP Check and/or a Police Information Check. Any individual F1.1 who fails to provide a Global Sanctions & PEP Check and/or a Police Information Check satisfactory to the City as a result of a repeated records search will not be permitted to continue to perform any Work as specified in F1.1.