



Contract 3969P
Sanitary Sewer Assessment for the Terra Nova Study Area

1. Introduction

The City of Richmond proposes to engage the services of a Civil Engineering Consultant (the “Consultant”) to inspect and assess the gravity sanitary collection system in the Terra Nova Sanitary Sewer Study Area and recommend a sanitary sewer remediation program based on the condition assessment.

The objective of this request for proposal is to provide the City with qualified proponents capable of carrying out the work herein defined. The subsequent proponent submissions will form the basis for evaluation, interview and selection.

2. Definitions

2.1 Throughout this Request for Proposal the following definitions apply:

- a) “BC Bid” means the electronic tendering service maintained by the Province of British Columbia located online at www.bcbid.ca, or any replacement website;
- b) “City” means the City of Richmond, British Columbia;
- c) “Contract” means the written agreement resulting from this Request for Proposal executed by the City and the Vendor for the Work;
- d) “Lead Proponent” is the Proponent whose Proposal, as determined through the evaluation criteria described in this RFP, provides the best overall value in meeting the requirements of the RFP, and with whom a Contract will be considered;
- e) “Proposal” means a proposal submitted by a Proponent in response to this Request For Proposal;
- f) “Proponent” means an individual or a company that submits, or intends to submit, a Proposal in response to this Request for Proposal;

- g) “RFP” or “Request for Proposals” means this request for proposals, inclusive of all appendices and any addenda that may be issued by the Owner;
- h) “Shall”, “Will” and “Must” means a requirement that must be met in order for a Proposal to receive consideration;
- i) “Should” or “May” means a requirement having a significant degree of importance to the objectives of the Request for Proposal which will be considered in analysing the Proposals;
- j) “Submission” means a proposal submitted by a Proponent in response to this RFP;
- k) “Successful Proponent” means the same as “Vendor”
- l) “Vendor” means the Successful Proponent to this Request for Proposal who enters into a written Contract with the City to perform and to oversee the Work and
- m) “Work” means the provision of all labour, services, material and equipment, and any action as necessary for the Preferred Proponent to complete and perform its obligations in accordance with the terms and conditions of the Contract.

3. Submission Details

- 3.1 Three (3) copies of proposals marked “**Contract 3969P – Sanitary Sewer Assessment for the Terra Nova Study Area**” addressed to the Purchasing Section, will be received at the Information Counter, Main Floor, Richmond City Hall, 6911 No. 3 Road, Richmond BC V6Y 2C1, until 12:00pm, Local Time, on Thursday, February 10, 2011. Submissions received after this time will be returned to the sender.

4. Pre-Bid Meeting

4.1 Pre-Bid Meeting will be held:

Date: February 1, 2011

Time: 2:00pm – 4:00pm local time

Location: M 1.002 Meeting House, Richmond City Hall, 6911 No. 3 Road

5. Enquiries

5.1 Clarification of terms and conditions of the proposal process shall be directed to:

Purchasing

Sumita Dosanjh

Buyer II - Contracting Specialist

E-mail: purchasing@richmond.ca

Purchasing Section

City of Richmond

5.2 Enquiries will be received up end of business day February 3, 2011.

5.3 The City, its agents and employees shall not be responsible for any information given by way of oral or verbal communication.

5.4 The City will only respond to questions that are submitted in writing. Any questions that are received and answered by City of Richmond Staff that affect the Proposal Process, any interpretation of, additions to, deletions from, or any other corrections to the Request for Proposal document, may be issued as written addenda by the City of Richmond. It is the sole responsibility of the potential Proponents to check with the following websites to ensure that all available information has been received prior to submitting a proposal:

a) City of Richmond: <http://www.richmond.ca/busdev/tenders.htm>

b) BC Bid: <http://www.bcbid.gov.bc.ca/open.dll/welcome?language=En>

6. Terms of this Request for Proposal

6.1 Proposals shall be open for acceptance for 90 days following the submission closing date.

- 6.2 The City reserves the right to cancel this Request for Proposal for any reason without any liability to any proponent or to waive irregularities at its own discretion.
- 6.3 Proposals may be withdrawn by written notice only provided such notice is received at the office of the City's Purchasing Section prior to the date/time set as the closing time for receiving proposals.
- 6.4 Except as expressly and specifically permitted in these instructions, no Proponent shall have any claim for any compensation of any kind whatsoever, as a result of participating in the RFP, and by submitting a proposal each proponent shall be deemed to have agreed that it has no claim.
- 6.5 Proponents are advised that the City will not necessarily accept any Proposal and the City reserves the right to reject any or all Proposals at any time without further explanation or to accept any Proposal considered advantageous to the City.
- 6.6 A Proposal which contains an error, omission, or misstatement, which contains qualifying conditions, which does not fully address all the requirements of this RFP, or which otherwise fails to conform to the requirements in this RFP may be rejected in whole or in part by the City at its sole discretion.
- 6.7 The City may waive any non-compliance with the RFP, specifications, or any conditions including the timing of delivery of anything required by the RFP and may, at its sole discretion, elect to retain for consideration Proposals which are non-conforming, which do not contain the content or form required by the RFP or because they have not complied with the process for submission set out herein.
- 6.8 The City may choose, at its sole discretion, to proceed with all of the components of the Work, none of the components or selected components of the Work.
- 6.9 All Proposals will remain confidential, subject to the *Freedom of Information and Protection of Privacy Act* of British Columbia.

7. Negotiations

- 7.1 The award of the contract is subject to negotiations with the Lead Proponent. Such negotiations include, but are not limited to, the following:
- a) changes or work refinements in the service requirements or scope of work proposed by the Lead Proponent;
 - b) price – if directly related to a change or refinement in the proposed scope of work proposed by the Lead Proponent and

- c) specific contract details as deemed reasonable for negotiation by the City of Richmond.

7.2 If a written contract cannot be negotiated within 60 days of notification to the Lead Proponent, the City may, at its discretion at any time thereafter, terminate negotiations with the Lead Proponent and either enter into negotiations with the next qualified Proponent or cancel the RFP process and not enter into a contract with any Proponent.

8. Project Background

The Terra Nova Study Area is located in the north west corner of Richmond (Figure 1).

The Terra Nova Study Area is largely residential (single family, townhouse and medium density apartments) with some commercial and institutional development. In addition the study area includes open space and agricultural area.

The Terra Nova Study Area has 53,307 meters of gravity sanitary sewers and 925 manholes located within 17 sanitary pump stations catchment areas. There is a mix of polyvinyl chloride pipes and asbestos cement pipes in this study area.

As part of the City's Sanitary Sewer Master Plan and Liquid Waste Management Plan (LWMP) commitment, a closed circuit television (CCTV) inspection and condition assessment of the sanitary gravity sewer system and manholes are required in the Terra Nova study area to:

1. determine the structural and service condition of the system based on Water Research Council (WRC) methodology;
2. identify occurrences and potential sources of inflow and infiltration;
3. recommend a remediation program for the sanitary gravity system.

The project will not include evaluation of the system capacity. The recommended remediation strategies should consider trenchless solutions if they are more cost effective and less disruptive than open cut sewer repair and replacement methods.

9. Project Scope

The Consultant shall dedicate an experienced efficient team capable of undertaking a variety of tasks:

- review existing sanitary sewer system in the Terra Nova Study Area;
- collect and review all relevant data including record drawings;
- inspect and become familiar with site conditions and constraints;

- interview relevant City staff for background information;
- locate manholes and coordinate with the City Staff to locate any buried or missing manholes;
- notify residents and provide traffic control;
- comply with the City Supplemental Specifications and Standard Drawings (2005), Master Municipal Construction Document (Volume II, printed 2000);
- comply with applicable City Bylaws and codes including, but not limited to Workers Compensation Board Regulations and the City's Public Health Protection Bylaw;
- clean and flush approximately 53,307 meters of gravity sewer mains and 17 sanitary sewer pump stations;
- perform root and solid debris cutting as required during the cleaning process;
- perform CCTV inspection of approximately 53,307 meters of gravity sewer mains;
- conduct quality assurance/quality control on approximately 10% of inspected gravity sewers to ensure correct WRc standard coding for identified defects.
- assess approximately 53,307 meters of gravity sewer mains and approximately 925 sanitary sewer manholes using WRc standard codes;
- assign structural condition assessment grades and non-structural condition assessment grades and prioritise the results for the gravity mains and manholes;
- recommend remedial strategies for sanitary gravity mains and manholes;
- recommend maintenance strategies for sanitary gravity mains and manholes;
- provide Class C cost estimates for required rehabilitation strategies;
- provide final CCTV inspection and condition assessment report;
- attend meetings.

Specific tasks and objective are further outlined in Section 10 of this request for proposals.

Please refer to Figure 1 for the Terra Nova Sanitary Sewer Study Area Map in the Appendix A.

10. Consultant Duties

The City would like to conduct a CCTV inspection and condition assessment of the sanitary gravity sewer system and manholes in the Terra Nova Sanitary Sewer Study Area to develop a sanitary sewer remediation strategy complete with the Class C cost estimates.

The specific work tasks should include but not be limited to the tasks listed below:

BASE SCOPE

I. General

- Allow for minimum six meetings with City staff (project initiation meeting, four (4) progress meetings, final report submission review meeting);
- Comply with the City of Richmond Supplementary Specifications (2005) and the Master Municipal Construction Document (Volume II printed 2000);
- Comply with applicable City Bylaws;
- Comply with applicable Codes and Regulations including but not limited to Workers Compensation Board Regulations and the City's Public Health Protection Bylaw;
- Provide final reports signed and sealed by a Professional Engineer.

II. Compile Background Information and As-Built Drawings

- Collect and review all relevant data and drawings;
- Inspect and become familiar with site conditions and constraints;
- Interview relevant City staff for background information;
- Locate manholes and coordinate with the City Staff to locate any buried or missing manholes.

III. Notify Residents and Provide Traffic Control

- Notify all residents within work areas at least one (1) week in advance of cleaning and CCTV inspection activity, in the form of letters or door hangers;
- Identify locations where access into private property is required and provide a list of these addresses to the City prior to accessing the properties;
- Notify affected residents as instructed by City Staff prior to accessing sewers in right of ways within private property;
- Where there are obstructions on private property for access, coordinate with the residents and the City to have the obstructions relocated/removed;
- Regulate traffic in working areas per Traffic Control Guidelines (Appendix B) and obtain direction and approval from City's Traffic Department prior to commencement of work.

IV. Perform Sewer Cleaning and Grease Cutting

- Provide a sanitary sewer bypass where necessary, with prior approval from the City (see CCTV Standard Supplemental Specifications in Appendix C);
- Flush and clean the entire sanitary sewer system within the subject catchments as per Sewer Cleaning Supplementary Specifications in Appendix D;
- Coordinate cleaning of all gravity sewers within the study area with the City's Operation Staff;
- Coordinate cleaning of all pump stations within the study area with the City's Operation Staff;
- Note that only City forces shall operate City's fire hydrants. The Consultant will be required to apply for hydrant use permits, however, the City will waive the permit fee;
- Perform root and solid debris cutting as part of the cleaning process;
- Perform grease cutting where necessary.

V. CCTV Inspections and Manhole Inspections

- Perform CCTV inspection using WRc standard codes with an operator certified by the approved certification company;
- Perform manhole inspections as per Manhole Inspection Standard Supplementary Specifications in Appendix C;
- Video inspections to be done with high resolution camera video using NTSC standard, MPEG-2 video at 704x480. & above.
- Conduct quality assurance/quality control on 5,330 lineal meters of gravity sewers to ensure correct (WRc) standard coding for identified defects;
- Document and report all the discrepancies between the sanitary sewer locations shown on the City maps and the sanitary sewer locations in the field.

VI. Recommend a Remediation Strategy

- Review the existing condition of the pipe systems and manholes;
- Provide a methodology to assess and assign structural performance grades (SPG) and internal service grades (ISG) for gravity sewers and manholes;
- Assess rehabilitation of sewers and manholes required to address structural defects and inflow and infiltration concerns;
- Prepare a proposed prioritized rehabilitation program for gravity sewers and manholes;
- Provide colour coded maps that include the existing sanitary sewer network of the study area, location and type of proposed remediation and prioritization of repair.
- Provide CCTV inspection reports for all inspected sewers in digital files;
- Provide table summary of the remediation program that includes prioritization, location of repair, type of defect, description of pipe segment, recommendation, schedule and cost estimate in hard copy and digital database file;

- With each identified defect within the priority list, provide a separate detailed description including photos, exact location of needed repair, recommendations, schedule and Class C cost estimate;
- Compile a summary file in the acceptable digital format with all videos on defected areas in the sanitary sewers requiring major repairs in the remediation program;
- Provide Terra Nova Sanitary Sewer Study Area final report signed and sealed by Professional Engineer.

The City will not be providing services or equipment required to complete the scope of work listed above, unless stated otherwise.

11. Project Submissions

After completing CCTV inspection and the sanitary sewer assessment, the Consultant shall submit the following information:

- CCTV Inspection reports for each section of sanitary sewer from manhole to manhole in digital file format including but not limited to the location map for each sanitary sewer run, digital photographs of each observation point in (.jpg) format, CCTV inspection report in (.pdf) format complete with CCTV inspection video in acceptable digital format and digital data output files in a Microsoft Access database (.mdb) format. All materials to be submitted on a portable hard drive. The report will include the Consultant's recommendations for remediation of appropriate pipe segments;
- A manhole inspection report in digital file format including but not limited to location map, digital photographs in (.jpg) format, inspection report in (.pdf) and digital data output files in a Microsoft Access database (.mdb) format will be submitted on a portable hard drive. The report will include the Consultants recommendations for manhole remediation required;
- Quality Assurance/Quality Control Report to ensure proper WRC coding for the CCTV inspection portion of the work;
- Draft Sanitary Sewer Assessment Reports (3 hard copies and 1 PDF copy) summarizing the finding of CCTV Inspection, describing the sanitary sewer and manholes assessment methods and prioritization process, providing description of the proposed remediation solutions per each location and associated cost estimates for each location;
- Final Reports (3 hard copies and 1 PDF copy);
- Summary table database in the digital format file with all videos for each segment of pipe including pipe ID, "To" and "From" manhole ID, existing pipe size, pipe length, pipe material, installation year, video filepath, database filepath, address, area, Structural Performance Grade (SPG), Internal Service Grade (ISG), observation, rehabilitation

recommendations, estimated cost, cumulative cost including engineering fees and contingency. The table should also identify the level of priority for each recommended rehabilitation solution;

- Summary table database in the digital format file for each manhole including manhole ID Number, report filepath, catchment, address, observation, rehabilitation recommendation, estimated cost and cumulative cost including engineering fees and contingency. The table should also identify the level of priority for each recommended rehabilitation solution;
- Colour Coded Maps of the Terra Nova Study Area displaying the locations of various types of recommended rehabilitations for gravity pipes and manholes should be included in the report and also submitted electronically in ArcMAP GIS and PDF format;
- Cost estimates should be included in the report and also submitted electronically in XLS and PDF format;
- Provide report (hard copy and PDF format) for all the discrepancies between the sanitary sewer locations shown on the City maps and the sanitary sewer locations in the field.

12. City Provided Items

The City will provide the following items:

- Relevant as-built information and reports, upon request by the Consultant
- Sanitary Sewer section maps for the Terra Nova Study Area
- General Traffic Control Guidelines for the City of Richmond Roadways (Appendix B)
- CCTV Standard Supplemental Specifications (Appendix C)
- City of Richmond Supplementary Specifications to complement the Master Municipal Construction Documents (Appendix C):
 - Section 02734 – Sewer Cleaning
 - Section 02735 – Manhole Inspection
 - Section 02733 – CCTV Inspection
- City of Richmond Supplementary Specifications and Detail Drawings, June 2005.

The City will not provide its own software or sanitary sewer cleaning, flushing and CCTV equipment and labour to the successful consultant. The Consultant shall have their own software, equipment and manpower to complete this assignment.

13. Project Schedule

The project is to be completed by October 28, 2011. A project schedule is to be submitted with the proposal outlining the major milestones and tasks. All deliverables are required by the stated completion date.

14. Proposal Submissions

The submissions must include, but is not limited to, the following sections:

14.1 Project Understanding

The Consultant shall outline an approach to the undertaking of the project reflecting a clear understanding of the scope of work.

14.2 Methodology

The proposal shall describe in detail the steps taken to provide the modelling services for each type of utility. The Consultant shall include all corresponding fees for each of them.

14.3 Schedule

The project must be completed by October 28, 2011. If in the Consultant's opinion more time is required to achieve the specified objectives, this should be clearly indicated in the proposal.

The Consultant shall provide a preliminary schedule for all services to be provided and a summary of levels of effort of personnel, their rates, hours, and costs for each aspect of the project.

A statement of commitment to undertake the project and provide the staff with the necessary experience on time and on budget shall be included.

14.4 Company Experience

The Consultant shall describe the company involvement and relevant experience in similar projects and provide the list of projects completed in the past five years.

14.5 Project Team

The Consultant shall list the personnel and the related task they will be completing, including the project manager, who will be working on the project and provide resumes of previous experience for each of them, as well as a schedule of their hourly fees. A list of any sub-consultants with brief resume of relevant experience must be included.

The Consultant should also provide a minimum of three (3) client references from projects of a similar size and scope undertaken by key members of the project team.

14.6 Fees

The proposal shall include a summary of fees to provide the required services based on hourly rates for staff assigned to the project, broken down by the different phases of the work. The proposal shall include a maximum fee (upset price) for all services. All proposed fees shall be valid for a minimum of one calendar year.

Sewer Cleaning and CCTV Inspection Schedule of Quantities and Prices

The Consultant shall complete the Sanitary Sewer Cleaning and CCTV Inspection Schedule of Quantities and Prices (Appendix D) and include with their Proposal.

15. Review of Proposals

- 15.1 The City will review the Proposals submitted to determine whether, in the City's opinion, Proponents have demonstrated the required experience and qualifications to fulfill the obligations of the services identified in this RFP.
- 15.2 The City, in its sole discretion and without having any duty or obligation to do so, may conduct any inquiries or investigations, including but not limited to contacting references, to verify the statements, documents, and information submitted in connection with the Proposal and may seek clarification from the Proponent's clients regarding any financial and experience issues.
- 15.3 Proposals shall be evaluated to determine the best value offered to the City against conformance to the following criteria:
 - a) Understanding of project objectives/outcomes and vision
 - b) Project Methodology
 - c) Team Composition – Experience and Qualifications of those staff to be assigned to the project including sub-contractor
 - d) Company Experience
 - e) Project Deliverables
 - f) Value for Money
 - g) References
 - h) Project Timeline – Time is of the essence
- 15.4 Proponents may be scheduled for an interview at the discretion of the City.

16. Non-Conforming Proposals

- 16.1 Proposals which fail to conform to the Format Requirements or which fail to conform to any other requirement of this RFP may be rejected by the City.

Notwithstanding the foregoing or any other provision of this RFP, the City may at its sole discretion elect to retain for consideration Proposals which deviate either materially from the format requirements set out in hereto or which otherwise fail to conform to any other requirement of this RFP except the requirement of delivery of the Proposal prior to Closing Time.

17. RFP Process

17.1 The City may unilaterally take the following actions, and shall not be liable for any such actions:

- a) amend the scope and description of the products and services to be procured as described in this RFP, and the qualifications that may be required to meet those requirements;
- b) reject or accept any or all Submissions;
- c) cancel the RFP process at any time and reject all submissions; or
- d) cancel the RFP process and recommence in respect of the same RFP with the same or an amended set of documents, information and requirements.

17.2 The Proponent acknowledges and agrees that any RFP is in no way whatsoever an offer to enter into an agreement and submission of a Request of Proposal by any Proponent does not in any way whatsoever create a binding agreement. The Proponent acknowledges that the City has no contractual obligations whatsoever arising out of the RFP process.

18. Working Agreement

18.1 The successful proponent will enter into a contract for services with the City based upon the information contained in this request for proposal and the successful proponents submission and any modifications thereto. Draft Agreement is included as part of this RFP.

19. Information Disclaimer

19.1 The City and its directors, officers, employees, agents, consultants and advisors are not liable or responsible for any verbal or written information, or any advice, or any errors or omissions, which may be contained in this RFP or otherwise provided to any Proponent pursuant to this RFP.

19.2 The Proponent shall conduct its own independent investigations and interpretations and shall not rely on the City with respect to information, advice, or documentation provided by the City. The information contained in this RFP is provisional and will be superseded by other agreement documents.

- 19.3 The City makes no representation, warranty, or undertaking of with respect to this RFP and the City and its directors, officers, employees, agents, consultants and advisors, shall not be liable or responsible for the accuracy or completeness of the information in this RFP or any other written or oral information made available to any interested person or its advisors, and any liability however arising, is expressly disclaimed by the City.



This Agreement dated the ☼ day of November, 2010, at the City of Richmond, in the Province of British Columbia

Between:

City of Richmond
6911 No. 3 Road
Richmond, BC
V6Y 2C1

(the "City")

And:

☼

(the "Consultant")

Whereas:

- A. The City is ☼ (the "Event or Project");
- B. The City requires a ☼ the Event or Project;
- C. The City issued a Request for Quotation☼ for the supply and delivery of ☼;
- D. The Consultant is willing and prepared to deliver ☼;

NOW THEREFORE in consideration of the mutual covenants and agreements set out below, the parties covenant and agree as follows:

○ **Responsibilities and Duties**

- The Consultant shall be responsible for the following as per Request for Quotation☼/Proposal ☼ and the Consultant's submission dated ☼.

- ☼
- ☼
- ☼
- ☼
- ☼

- ✪
- ✪
- ✪

- The Consultant agrees to conduct himself professionally and with integrity so as not to embarrass or discredit the City throughout the performance of the duties and responsibilities set out in this agreement.

○ **Compensation**

- In exchange for carrying out the duties and responsibilities set out in this agreement, the City agrees to pay to the Consultant, the basic amount of \$✪.00 plus HST for the duration of the term of this agreement according to the following Fee Schedule:

Project Phase	Basic Consulting Fees
Phase 1 – ✪	\$✪.00
Phase 2 – ✪	\$✪.00
Phase 3 – ✪	\$✪.00
Phase 4 – ✪	\$✪.00
Total basic fees for Phases 1 – ✪	\$✪.00

- The total amount of payments shall not exceed the total upset amount of \$✪, plus HST, for the completion of Phases 1 through 3 inclusive.
- The fees for Phase 4 tasks will be compensated as required by the development of the Project. Phase 4 tasks will be completed by the Consultant only with written authorization of the City and according to the following fee schedule:

Project Phase(s)	Basic Consulting Fees
Phase ✪ – ✪	\$✪.00

- The total amount of payments shall not exceed the total upset amount of \$✪.00 plus HST, for the completion of Phase ✪ tasks.
- Any additional consulting services would be charged at the following hourly rates for the respective services:

Position	Rate
✪	\$✪00, not to exceed \$✪.00 per hour
✪	\$✪.00, not to exceed \$✪.00 per hour
✪	\$✪.00, not to exceed \$✪.00 per hour

- Every month, commencing no sooner than ✪, the Consultant shall submit to the City a written statement of account and setting out a detailed

summary of hours worked, meetings attended and the status of the Project (the “Statement of Account”).

- The Statement of Account must show the amount of HST charged and include the Consultant’s HST registration number and City Purchase Order number.
- The City agrees to make payments to the Consultant within Thirty (30) working days of receipt of the Consultant’s Statement of Account.
- Every month, the Consultant shall submit to the City a list of expenses incurred in carrying out the duties and responsibilities set out in this agreement and, upon approval of such expenses by the City, the City will reimburse the Consultant for such expenses.

○ **Performance Standards**

- The Consultant is responsible for meeting the following ☆ targets:
 - ☆
- The Consultant agrees to comply with following project deadlines:
 - ☆
- The Consultant shall prepare a report to the City on a monthly basis indicating ☆ what targets have been met over the preceding month and the status of efforts in relation to the targets set out.

○ **Benefits**

- The Consultant hereby waives all rights, claims, and entitlements whatsoever afforded to employees of the City pursuant to the Group Life Insurance Plan, Long Term Disability Plan and the Dental Plan and any other such benefits. The Consultant agrees to pay, as required by Federal or Provincial Statutes any payments for Income Tax, Workers Compensation, Unemployment Insurance, Canada Pension Plan, Superannuation and other such payments.

○ **Independent Contractor**

- The Consultant is an independent contractor and no agency, joint venture, association, partnership, employer-employee relationship is created between the City and the Consultant.

○ **Assignment And Subcontracting**

- The Consultant will not, without the prior written consent of the City, assign, either directly or indirectly, any right or obligation of the Consultant under this agreement.

- No sub-contract entered into by the Consultant will relieve the Consultant from any of his obligations or impose any obligation or liability upon the City to any such sub-contractor.
- **Indemnity**
 - The Consultant agrees to indemnify and hold harmless the City, its agents, employees, and elected officials, against any damages, liabilities, or costs, including reasonable attorney fees and defence costs, arising from or allegedly arising from or in any way connected with any act or omission by the Consultant, his employees, officers, volunteers, servants, or agents, or persons for whom the Consultant has assumed responsibility, in the performance or purported performance of this agreement.
- **Insurance**
 - The Consultant shall, at his own expense, carry and keep in force during the term of this agreement, the following coverage.
 - Professional liability insurance with a minimum limit of \$250,000.00 for each occurrence and \$500,000.00 aggregate.
 - Comprehensive general liability insurance with a minimum limit of \$2,000,000 per occurrence with a cross-liability clause.
 - The City may require a dedicated limit of the Consultant's professional liability policy be allocated to cover the Consultant's work while contracted by the City.
 - The City shall be added as an additional insured under the Consultant's comprehensive general liability insurance.
 - All insurance policies shall provide that they cannot be cancelled, lapsed or materially changed without at least 30 days' notice to the City.
 - Prior to the commencement of the services hereunder, the Consultant shall file with the City a copy of each insurance policy and certificate required. All such insurance shall be maintained until final completion of the service.
 - Consultant shall ensure that CCTV sub-contractor engaged by the Consultant shall carry and keep comprehensive general liability insurance with a minimum limit of \$5,000,000.00 per occurrence with a cross-liability clause. Prior to commencing services, the CCTV sub-contractor shall file with the Consultant a copy of the insurance policy. The insurance shall be maintained until final completion of the services.
- **Representation**
 - The parties hereto agree that for all purposes hereunder the City shall be represented by the ☒.

- **Ownership of Products**
 - The City shall take title to and ownership of all materials and products developed by the Consultant pursuant to this agreement, including reports, drawings, schematics, computer files, and designs developed, except those covered by copyright. All materials and products produced shall be provided to the City upon expiry of this agreement.
- **Confidentiality**
 - The Consultant shall not disclose any information provided by the City, specifically proprietary, sensitive, personal or confidential information or that developed resulting through the performance of this agreement to any other party without the express written consent of the City. All information provided to the Consultant or developed by the Consultant pursuant to this agreement shall be returned to the City upon the expiration of this agreement. The Consultant acknowledges that the City is subject to the Freedom of Information and Protection of Privacy Act of British Columbia.
- **Related Companies**
 - The Consultant shall not during the term of this agreement, perform a service for or provide advice to any person, firm or corporation where the performance of the service or the provision of the advice may or does, in the opinion of the City, give rise to a conflict of interest between the obligations of the Consultant to the City under this agreement and the obligations of the Consultant to such other person, firm or corporation.
- **Term**
 - This agreement is valid for the period commencing ☼ and ending ☼ (the “Expiration Date”), or such later date as may be mutually agreed upon.
- **Termination**
 - Notwithstanding any other provisions of this agreement, either party may terminate this agreement at any time upon at least two (2) weeks’ written notice delivered to the Parties at the addresses shown on the first page of this agreement, or such shorter time and in such a manner as may be agreed upon by the parties.
 - Notwithstanding the provisions of subsection 14.1, if in the opinion of the ☼, the Consultant has breached a material covenant, the City may cancel this Agreement immediately without notice.
- **Joint and Several Liability**
 - Any covenant, agreement, condition or proviso made by two (2) or more persons shall be construed as several as well as joint.

- **Severability**
 - In the event that any provision of this agreement shall be held to be invalid, void or unenforceable, then the remainder of this agreement shall not be affected, impaired or invalidated, and each such provision shall be valid and enforceable to the fullest extent permitted by law.
- **Non-Resident Withholding Tax**
 - If the Consultant is, at any time during the Term, a non-resident of Canada, within the meaning of the Income Tax Act of Canada as amended (the “Act”), then the City shall deduct from all monies payable under this Agreement and remit to Canada Customs and Revenue Agency sums required to be withheld and remitted by the Act.
 - The City shall receive full credit under this Agreement for monies withheld as of and from the date of the withholding.
- **Notices**
 - Any notices or other communications required or permitted hereunder shall be sufficiently given if delivered, or if sent by prepaid regular mail, to the addresses of the parties set out on the first page of this agreement, or to such other addressees as shall have been specified by notice in writing by either party to the other. Any such notice or communication shall be deemed to have been given, if delivered, and if mailed in Canada, on the fourth business day after the date of mailing.
- **Feminine/Masculine**
 - Wherever the singular or masculine is used throughout these Terms the same shall be construed as meaning the plural, the feminine or body corporate or politic where the context or the parties hereto so require and vice versa.
- **General**
 - This Agreement may be amended upon mutual agreement of the parties in writing.
 - This Agreement and the rights and obligations of the parties hereunder shall be governed by and construed in accordance with the laws of British Columbia.
 - This Agreement sets out the entire agreement of the parties and no representations, warranties or conditions have been made other than those expressed or implied herein. No agreement collateral hereto shall be binding upon the City unless made in writing and signed by the City.

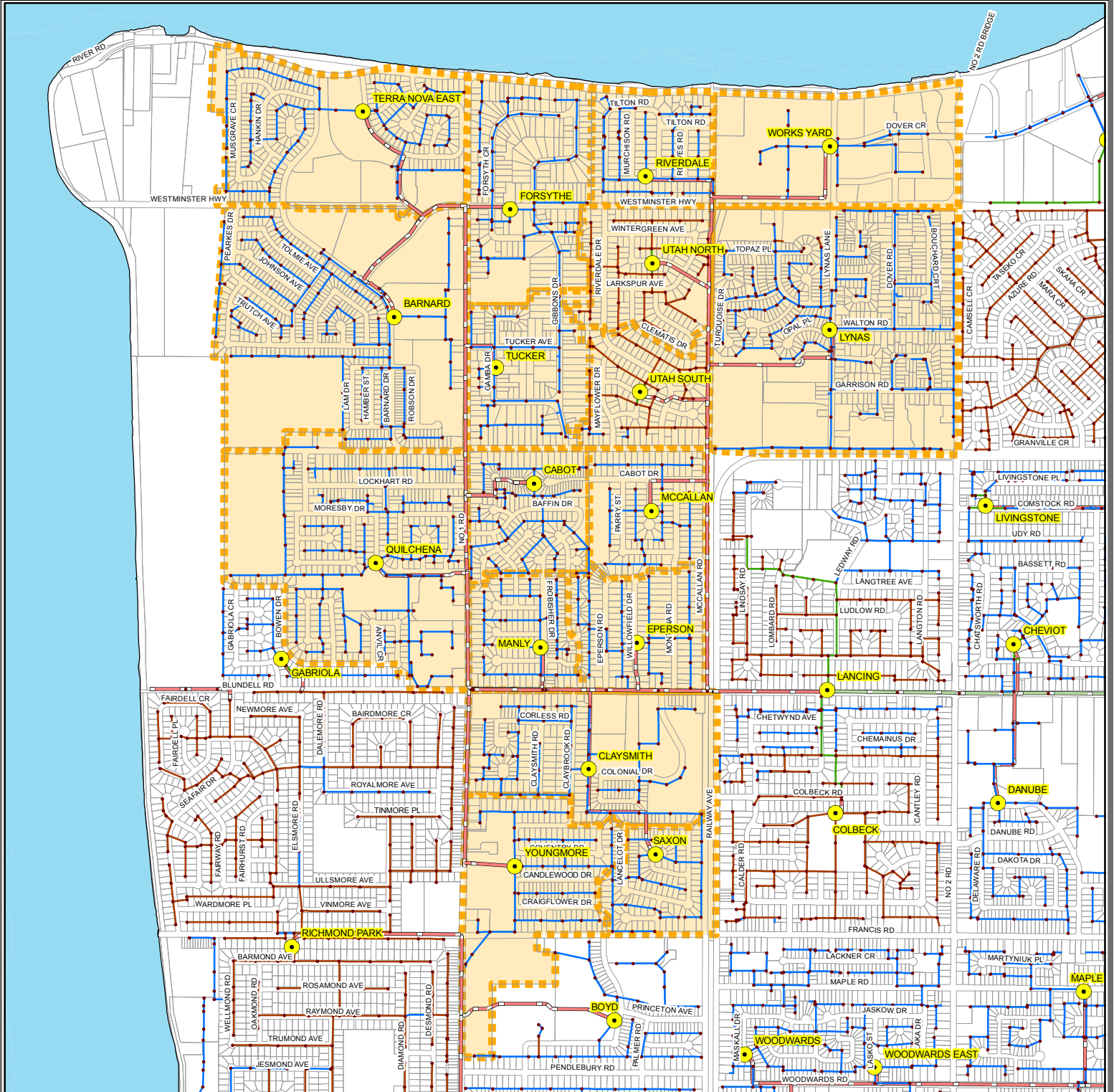
The City and the Consultant Agree to these Terms the day and year first above written.

City of Richmond

Consultant

APPENDIX A

- Terra Nova Sanitary Sewer Study Area Map



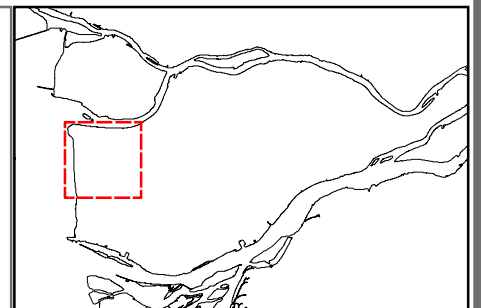
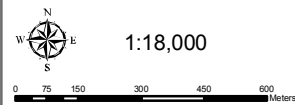
Legend

- Manhole (925)
- Asbestos Concrete (4100m)
- FRP (166m)
- PVC (49041m)
- Forcemain
- Trunk Sewer
- Sanitary Pumpstation Catchment

Data Snapshot Date: January 14, 2011
 Map Created By: spang
 Print Date: January 14, 2011
 Printed By: spang

Note:

The information shown on this map is compiled from various sources and the City makes no warranties, expressed or implied, as to the accuracy or completeness of the information. Users are reminded that lot sizes and legal description must be confirmed at the Land Title office in New Westminster. This IS NOT a legal document, and is published for information and convenience purposes only.
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APPENDIX B

General Traffic Control Guidelines for City of Richmond Roadways

GENERAL TRAFFIC CONTROL GUIDELINES FOR CITY OF RICHMOND ROADWAYS

In every case traffic control shall be conducted in accordance with the Ministry of Transportation Traffic Control Manual for Work on Roadways and WorkSafe BC requirements under Part 18 of the Occupational Health and Safety Regulation. Traffic control persons shall be certified by an approved agency.

Guidelines

1. Arterial Roads;

Traffic control may only be established on arterial roads between the hours of 0900 and 1500 but maybe further restricted under the following conditions;

- If > 400 vehs/hr are being restricted down to one lane, in each direction, between 0900 and 1500 hours then night work will be required. If the location is abutting a residential area then daytime work will be considered but additional advance warning requirements shall be required such as but not limited to signage, newspaper notices and radio announcements.
- If >800 vehs/hr are being restricted down to one lane in each direction between 0900 and 1500 hours then night work will be required even within a residential area.
- Adjustments to start or finish times are possible if that segment of the road does not have a heavy AM peak volume or a heavy PM peak volume.
- A night variance will be required from Public Works for all night work.

2. Collector Roads;

Traffic control maybe established during the authorized hours for construction, 0700 to 2000 hours Monday to Saturday and 0900 to 1800 hours on Sunday. Traffic control must maintain one lane in each direction at all time however, alternating traffic can be considered between 0900 to 1500 hours if traffic volumes allow. Adjustments to start or finish times for alternating traffic are possible if that segment of the road does not have a heavy AM peak volume or a heavy PM peak volume.

3. Local Roads;

Traffic control maybe established during the authorized hours for construction, 0700 to 2000 hours Monday to Saturday and 0900 to 1800 hours on Sunday and Statutory Holidays. Traffic control must maintain one lane in each direction at all time however, alternating traffic can be considered if traffic volumes allow.

4. Authority to Amend;

The above guidelines may be amended by the Director of Transportation if in his opinion traffic control needs to be more or less restrictive.

5. Road Closures;

Road closure requests are considered on a case by case basis due to the number of variables that can come into each possible scenario. The Director of Transportation is the only person authorized to permit a road closure. This operation requires considerable lead time, a minimum of two weeks in order to plan the detour routes, provide signage and issue newspaper and radio notices. (Police, Fire and emergency City utility repairs are exempt.)

6. General Considerations for Traffic Control;

- Large traffic generators such as malls or industrial sites,
- The proximity to schools and the level of the school, high school or elementary,
- Bike routes, is it a shared roadway or a bike lane,
- Pedestrian routes, is it a primary access for school children,
- if access is to be limited to a residence or business then prior arrangements are to be made with the affected resident(s) or business owner,
- Excavations;
 - i. Closed, make sure it's backfilled or plated with asphalt ramps (preferred),
 - ii. Open, ensure signage, lights, barricades, temporary curbs and fencing,
- Signalized intersection protection of loops and conduits. Do not locate vehicles over detection equipment and advise Signal Control Center.
- Transit operations;
 - i. If work is on a bus route contact CMBC a minimum 72 hours in advance of start of work so they are aware of possible delays and can advise the drivers,
 - ii. If the work is also within a bus stop then CMBC needs to know so they can place advisories at the stop and locate the nearest operating stop for the patrons,
- The proximity to an emergency services facility such as a fire hall of ambulance station, advise the service and determine if they have any concerns or requirements.

APPENDIX C

Supplementary Specifications to complement the Master
Municipal Construction Documents:

- Section 02734 – Sewer Cleaning
- Section 02735 – Manhole Inspection
- Section 02733 – CCTV Video Inspection

SEWER CLEANING

1.0 GENERAL

Section 02734 refers to those portions of the work that are unique to the requirements for cleaning new and existing sanitary, storm and combined sewer pipe and pipe culverts. Sewer cleaning shall remove all debris from sewers and manholes to alleviate blockages and prevent sewer backups, overflows and property damage, to restore hydraulic capacity, to reduce odours, to permit thorough condition inspection and to allow rehabilitation works to be performed. Definitions for debris are generally consistent with the nomenclature contained in the Water Research Centre (WRC) publication, "Manual of Sewer Condition Classification", Third Edition, August 1993. This section must be referenced to and interpreted simultaneously with all other sections pertinent to the works described herein.

1.1 Related Work

.1	Traffic Regulation	Section 01570
.2	Storm Sewers	Section 02721
.3	Pipe Culverts	Section 02723
.4	Manholes and Catchbasins	Section 02725
.5	Sanitary Sewers	Section 02731
.6	Sewage Forcemains	Section 02732
.7	CCTV Video Inspection	Section 02733
.8	Manhole Inspection	Section 02735

1.2 References

- .1 The abbreviated standard specifications for testing, materials, fabrication and supply, referred to herein, are fully described in References – Section 02000.

1.3 Work Regulations

- .1 Work is to conform to all applicable regulations of the Workers Compensation Board (WCB). Confirm training compliance in the following:
- .1 Confined space rescue
 - .2 Confined space entry
 - .3 Ventilation
 - .4 Atmospheric monitoring
 - .5 Self-contained breathing apparatus
 - .6 Personal protective equipment
- .2 Provide written confirmation to the Contract Administrator that workers have knowledge of confined space entry practices and of the equipment required for confined space entry.
- .3 Work is to conform to all applicable bylaws and regulations.

1.4 Scheduling of Work

- .1 Schedule work to minimize interruptions to existing services.
- .2 Schedule work to comply with City Noise Bylaws.

1.5 Measurement for Payment

- .1 All units of measurement for payment will be as specified herein unless shown otherwise in the Schedule of Quantities and Prices.
- .2 Payment for all work performed under this Section will be

SEWER CLEANING

made at the respective unit price bid in the Schedule of Quantities and Prices.

.3 Sewer Cleaning

Sewer cleaning will be measured on a length basis. The length paid will be the total number of lineal metres acceptably cleaned. Measurement will be made above ground from centre of manhole to centre of manhole as confirmed by steel tape measurement in conjunction with sewer inspection.

If cleaning is abandoned the length paid will be measured from the start manhole to the point of abandonment.

Manhole cleaning will not be measured for payment and will not be paid for separately. Payment is to be included in the prices bid for sewer cleaning.

.4 Reverse Set-Up

Separate payment will not be made for reverse set-up cleaning. Payment is to be included in the prices bid for sewer cleaning.

.5 Solid Debris Cutting (Provisional Item)

Solid debris cutting will be measured on a length basis. The length paid will be the total number of lineal meters acceptably cut, as computed by measurements taken from the sewer inspection.

No separate payment will be made for each size or size range of sewers.

.6 Flow Control and Traffic Control

Separate payment will not be made for flow control or traffic control. Payment is to be included in the prices bid for sewer cleaning.

SEWER CLEANING

2.0 PRODUCTS

- 2.1 High Velocity Cleaning Equipment** .1 High velocity sewer cleaning equipment is to be constructed for ease and safety of operation. The equipment is to have a selection of hydraulically or hydro dynamically propelled nozzles that are capable of producing a scouring action from 15 to 45 degrees, effectively scouring the sewer and transporting debris in all sizes of sewers to be cleaned. The equipment is to be capable of providing a minimum flow of 4.1 litres per second at 13,800 kPa. The equipment is to include a water tank, auxiliary engines, pumps, a hydraulically driven hose reel, a wash down gun for cleaning manholes and an approved back flow preventing device for water tank filling.
- 2.2 Debris Removal Equipment** .1 Debris removal equipment is to consist of a vacuum unit complete with positive displacement pumps or fans producing a minimum of 700 l/s air movement, a storage tank and hoses. The storage tank is to be water tight and configured in such a manner as to allow the liquid portion of the debris to be returned to the sewer. The suction hose is to have a minimum diameter of 150 mm. Equipment is to be capable of removing debris at a minimum of 4.5 metres of vertical head.
- 2.3 Solid Debris Cutting Equipment** .1 Solid debris cutting equipment is to be capable of removing heavy roots and solid debris such as encrustation and grease, and includes hydraulic cutters, saw or blade, and remotely operated robotic routers or grinders.
- 2.4 Sewer Plugs** .1 Sewer plugs are to be designed to stop or reduce flow from upstream sewer(s) and are to permit tethering to and be removable from the ground surface.
- 2.5 Intruding Sewer** .1 Intruding Sewer service pipe removal equipment to include remote controlled hydraulically driven cutters and reamers and remotely controlled routers or grinders capable of cutting back intruding sewer service pipes.
- 3.0 EXECUTION**
- 3.1 Sewer Cleaning** .1 Deliver City of Richmond notification letters to residents at least one week prior to commencing any cleaning work. Contact information for the CCTV Contractor will be provided in this initial notification letter. The Contractor may be required to provide further information and/or written notices to residents..
- .2 Provide a minimum of 24 hours notice to the Contract Administrator, of the locations where the cleaning will be performed on the following day(s).
- .3 Clean all pipelines using high velocity equipment. Take precautions to ensure that no flooding of public or private property occurs during the cleaning, taking particular care

SEWER CLEANING

with lots having short frontages.

- .3 Scour and remove all debris from the sewers and manholes including but not limited to sludge, dirt, sand, gravel, rocks, bricks, grease, roots and other solid and semi-solid materials. Some deposits such as heavy grease or root masses may require additional equipment and effort.
- .4 Begin cleaning with the upstream sewer in the system and proceed downstream. Scour clean manhole walls and benching prior to cleaning the downstream sewer. Cleaning is not to proceed downstream until all contributing upstream sewers have been cleaned. Sewers are to be cleaned in the direction of flow unless a reverse set-up is required..
- .5 If at any time during the cleaning operation pipe material or backfill is observed, immediately notify the Contract Administrator. Jointly, the Contractor and Contract Administrator will agree to:
 - complete or attempt to complete cleaning;
 - suspend cleaning operations and inspect the sewer;
 - simultaneously clean and inspect the sewer.
- .6 Advise Contract Administrator immediately if pipe material or backfill is observed during cleaning operations.

3.2 Reverse Set-Up

- .1 If cleaning of an entire sewer cannot be completed from the upstream manhole, move cleaning equipment to the downstream manhole and attempt cleaning again. Up to one hour is to be spent removing or attempting to remove a specific blockage in order to reduce upstream flow levels and permit complete sewer cleaning.

3.3 Debris Removal

- .1 Vacuum type debris removal equipment is to be on site and in operation in the downstream manhole at all times during sewer cleaning. Remove all debris from the downstream manhole of the sewer being cleaned and do not pass debris from manhole to manhole. Decant excess water and return to the sewer downstream of the sewer being cleaned.
- .2 Keep solid and semi-solid debris in totally enclosed containers at all times and remove from the site at the end of each day to be disposed of offsite.

SEWER CLEANING

- 3.4 Solid Debris Cutting**
- .1 Obtain the Contract Administrator's approval prior to undertaking any cutting and removal of excessive roots or solid debris from the sewer. The limits will be as identified by post cleaning sewer inspection and as directed by the Contract Administrator. Perform the work using remote controlled equipment and monitor and record the entire operation by CCTV. Consider the existing pipe material and condition in selecting equipment and take care not to damage the existing pipe during the cutting and removal operation.
- 3.5 Flow Control**
- .1 If sewer flows are hampering effective sewer cleaning, flow control measures are to be undertaken. Flow control measures include but are not limited to, off peak work or plugging. Provide the Contract Administrator with forty-eight hours notice prior to undertaking any flow control measures. Select a method that ensures flooding of public or private property does not occur. Monitor flow levels upstream of a plugged sewer at all times.
- 3.6 Supply of Water**
- .1 Water for sewer cleaning operations will be supplied from Municipal fire hydrants. Provide the Contract Administrator with three (3) days notification of intended hydrant location(s). The specific hydrant in the requested location will be selected and equipped with an appropriate back flow preventing device by City forces. The Contractor will be advised of the hydrant location. The back flow preventing device must be used at all times and the fire hydrant is not to be obstructed in the event of a fire in the area served by the hydrant.
- 3.7 Quality Control**
- .1 Acceptance of all work described in this section will be made upon successful inspection by the Contract Administrator. If the inspection reveals the work to be deficient, the sewer is to be re-cleaned and the work re-performed and re-inspected at the Contractor's expense until fully compliant with the specifications contained herein.
- 3.8 Root Removal**
- .1 Obtain Contract Administrator's approval prior to undertaking any root cutting.
 - .2 Run root cutter through entire section of pipeline from manhole to manhole or end of pipe to end of pipe.
 - .3 Use root cutter head appropriately sized for the diameter of the pipeline.
- 3.9 Sewer Flushing**
- .1 Remove foreign material from pipeline and related appurtenances by flushing with water. Flush main at water velocities as high as can be obtained from available water sources. Minimum velocity to be 0.8 m/s and/or in accordance with AWWA C651. Continue flushing at least until flow from most distant point has reached discharge point and until water discharged is clean and clear.
 - .2 Obtain municipal approval prior to discharging flushing water to municipal sewers.

SEWER CLEANING

- .3 The Contractor shall have due regard for the protection of the environment in the performance of the Work and shall not place any materials, or dispose of any materials, or perform any Work in a manner contrary to applicable Federal or Provincial or municipal environmental laws and regulations, either at the Place of the Work, or at any other place or property.

- .4 Provide Contract Administrator with all required approvals prior to discharging flushing water.

END OF SECTION

 MANHOLE INSPECTION

- 1 GENERAL**
- .1 Section 02735 refers to those portion of the work that are unique to the requirements for non-person-entry inspection of existing sanitary, storm and combined sewer manholes and inspection chambers. This section must be referenced to and interpreted simultaneously with all other sections pertinent to the works described herein.
- 1.1.1 Related Work**
- | | | |
|----|--------------------------|---------------|
| .1 | Traffic Regulation | Section 01570 |
| .2 | Storm Sewers | Section 02721 |
| .3 | Pipe Culverts | Section 02723 |
| .4 | Manholes and Catchbasins | Section 02725 |
| .5 | Sanitary Sewers | Section 02731 |
| .6 | Sewage Forcemains | Section 02732 |
| .7 | CCTV Video Inspection | Section 02733 |
| .8 | Sewer Cleaning | Section 02734 |
| .9 | Inclinometer Reporting | Section 02736 |
- 1.2 References**
- .1 The abbreviated standard specifications for testing, materials, fabrication and supply, referred to herein, are fully described in References - Section 02000.
- 1.3 Work Regulations**
- .1 Work is to conform with all applicable regulations of Workers Compensation Board (WCB). Confirm training compliance in the following:
- .1 Confined space rescue
 - .2 Confined space entry
 - .3 Ventilation
 - .4 Atmospheric monitoring
 - .5 Self-contained breathing apparatus
 - .6 Personal protective equipment
- .2 Provide written confirmation to the Contract Administrator that workers have knowledge of confined space entry practices and of equipment required for confined space entry.
- 1.4 Scheduling of Work**
- .1 Schedule work to minimize interruptions to existing services.
- 1.5 Measurement for Payment**
- .1 All units of measurement for payment will be as specified herein unless shown otherwise in the Schedule of Quantities and prices.
- .2 Payment for all work performed under this Section will be made at the respective unit price bid in the Schedule of Quantities and Prices. Measurement for manhole inspection will be for each complete inspection as described in Section 3.0 Execution.
- 2.0 PRODUCTS**
- 2.1 Equipment**
- .1 The digital camera is to be capable of producing clear, sharp images at a minimum resolution of 800 x 600.

 MANHOLE INSPECTION

3.0 EXECUTION

- 3.1 Inspection Process**
- .1 Report on and record the condition of all features on the inside of the manhole together with the ground level condition within a two (2) metre radius of the cover.
 - .2 Each manhole is to be observed and assessed according to the standard City of Richmond Manhole Inspection Report form, field check sheets and associated codes. Any variation from the standard report form is to be noted in the survey report.
- 3.2 Photographs and/or Digital Images**
- .1 Photograph the interior of each manhole perpendicular to the base with an approved digital camera.
 - .2 Photograph the ground level characteristic surrounding the cover such that any defects and physical ground features impacting the manhole at ground level are recorded.
 - .3 Photograph any manhole structural deterioration, iron/staining and infiltration defects with a rating of two (2) or greater to a maximum of two (2) additional images. These additional images are to be acknowledged in the Comments field.
 - .4 Overlay on each photograph the following data in alphanumeric form such that it will not interfere with the image of the defect condition reported:
 - .1 Inspection number
 - .2 Manhole number
 - .5 Include a white information board within the ground level photograph with the following data:
 - .1 Inspection number
 - .2 Manhole number
 - .6 Capture the photograph and alphanumeric data as a digital image in Joint Photographic Experts Group (JPEG) format (.jpg). Identify each image file by manhole number and alphabetic suffix. E.g.: SM001234-A
- 3.3 Site Coding Sheets**
- .1 Record the condition of each manhole according to the City of Richmond Manhole Inspection Report form and associated codes.
- 3.4 Inspection Reports & Digital Data**
- .1 Inspection reports are to consist of digital copy reports, digital data output files and digital photographs. Submissions are to be made biweekly upload to a FTP server on a continuous basis as the manhole inspection proceeds. Upon completion of the inspection, all materials are to be submitted to the City on a 3.5" portable hard drive.
 - .1 Digital reports are to be presented in accordance with the pre-designed City of Richmond Manhole Inspection Report forms.
 - .2 Digital data output files are to be presented in the City of Richmond's manhole inspection table configuration in Microsoft Access database (.mdb) file format. The

MANHOLE INSPECTION

- digital database file is to contain survey report information identical to the printed report, exclusive of photograph
- .3 Digital photographs are to be stored on a portable hard drive in JPEG (.jpg) format, and reference to the relevant section of the Manhole Inspection Report from the portable hard drive.
 - .4 All dimensions and chainages in the reports are to be in metric units.
- .2 Present digital inspection reports on portable hard drive. Files to be organised by catchment area or as specified in the contract documents.
 - .1 Create a separate folder to contain digital database files
 - .2 Create a separate folder to contain a digital manual of the portable hard drive.
 - .3 Create separate folders for inspection reports & digital photographs within the catchment area folder.
 - .4 Include City supplied, scale drawings in (.pdf) format highlighting inspected manholes in each relevant report folder.
 - .5 Include an index of all survey inspection reports contained within the hard drive.
 - .3 Attach identical identification labels on the backside of the portable hard drive with the following information:
 - .1 Contract/Project ID
e.g. City of Richmond Terra Nova Study Area 3969P
 - .2 Inclusive inspection/report numbers
e.g. MH001-MH100
 - .3 Contractor name
e.g. XYZ Ltd.
 - .4 Dates of inspection
e.g. 2011/02/14 – 2011/02/21

Digital photographs are to include photograph identification numbers on the file properties.

MANHOLE INSPECTION

3.5 Quality Control

- .1 At least two (2) weeks prior to beginning the inspection work, submit a sample hard copy inspection report and corresponding digital data files and digital photographs for review. The sample submission is to satisfy all of the specifications contained herein and the accepted report submission will be used as a benchmark for subsequent inspection report submissions.
- .2 No inspection surveys are to be carried out under this contract until an acceptable sample inspection report has been approved by the Contract Administrator.
- .3 Acceptance of all work described in this section will be made upon successful inspection by the Contract Administrator. If the inspection reveals the work to be deficient, the work is to be re-performed at the Contractor's expense until fully compliant with the specifications contained herein.

END OF SECTION

CCTV VIDEO INSPECTION

- 1.0 GENERAL**
- .1 Section 02733 refers to those portions of the work that are unique to the requirements for inspecting new and existing sanitary, storm, and combined sewer pipe, and pipe culverts by closed circuit television. Sewer inspections shall be performed to observe and record structural defects, service defects and construction features, to assess thoroughness of cleaning, and to verify quality of new installation and rehabilitation work prior to acceptance. All observations are to be coded in accordance with the Water Research Centre (WRc) publication, "Manual of Sewer Condition Classification" (MSCC) Third Edition, August 1993 and "Addendum" dated February 1996. This section must be referenced to and interpreted simultaneously with all other sections pertinent to the works described herein.
- 1.1 Related Work**
- | | | |
|----|--------------------------|---------------|
| .1 | Traffic Regulation | Section 01570 |
| .2 | Storm Sewers | Section 02721 |
| .3 | Pipe Culverts | Section 02723 |
| .4 | Manholes and Catchbasins | Section 02725 |
| .5 | Sanitary Sewers | Section 02731 |
| .6 | Sewage Forcemains | Section 02732 |
| .7 | Sewer Cleaning | Section 02734 |
| .8 | Manhole Inspection | Section 02735 |
- 1.2 References**
- .1 The abbreviated standard specifications for testing, materials, fabrication and supply, referred to herein, are fully described in References – Section 02000.
- .2 Reference standards, specifications or publications.
- .1 Water Research Centre (WRc) publication MSCC Manual of Sewer Condition Classification, Third Edition, 1993 Including Addendum February 1996.
- 1.3 Submission of Certification**
- .1 Submit copy of the CCTV operator's current NAAPI certification certificate to the Contract Administrator at least one week prior to the start of the CCTV inspection operations.
- .2 Submit copy of certificate for each CCTV operator working on the contract.
- 1.4 Work Regulations**
- .1 Work is to conform to all applicable regulations of the Workers Compensation Board (WCB). Confirm training compliance in the following:
- .1 Confined space rescue
 - .2 Confined space entry
 - .3 Ventilation
 - .4 Atmospheric monitoring
 - .5 Self-contained breathing apparatus
 - .6 Personal protective equipment
- .2 Provide written confirmation to the Contract Administrator that workers have knowledge of confined space entry practices and of the equipment required for confined space entry.

CCTV VIDEO INSPECTION

- .3 Work is to conform to all applicable bylaws and regulations.
- 1.5 Scheduling of Work**
- .1 Schedule work to minimize interruptions to existing services.
- .2 Schedule work to comply with City Noise Bylaws.
- 1.6 Measurement for Payment**
- .1 All units of measurement for payment will be as specified herein unless shown otherwise in the Schedule of Quantities and Prices.
- .2 Payment for all work performed under this Section will be made at the respective unit price bid in the Schedule of Quantities and Prices. CCTV video inspection will be measured on a length basis. The length paid will be the total number of linear metres acceptably inspected. Measurement will be made above ground from the centre of the start manhole to the centre of the finish manhole, as confirmed by steel tape or measuring wheel measurement.
- No payment will be made for any pre-repair inspection or for the one-year warranty inspection, as it is incidental to payment made in other sections. Note that the limits of work for the one-year maintenance period inspection need only be sufficient to inspect the repairs and sewer cleaning work carried out by the Contractor.
- .3 For sections of pipe where a blockage or obstruction occurs, measurement will be from the centre of the start manhole to the point of abandonment of survey.
- .4 For sections of pipe with the Water Research Centre (WRc) condition code CU (camera underwater) for a continuous distance greater than five (5) metres, the measurement above will be reduced by the distance in excess of five metres.
- .5 *Separate payment will not be made for flow control, with the exception of bypass pumping. Payment for bypass pumping as required, and where approved by the Contract Administrator, will be made on a per occurrence basis (refer to Clause 3.4).*
- .6 Separate payment will not be made for inspection reports, digital recordings, or photographs. Payment is to be included in the prices bid for CCTV video inspection.
- .7 Separate payment will not be made for reverse set-up inspection or traffic control. Payment is to be included in the prices bid for the CCTV video inspection.
- 1.7 Additional Work**
- .1 Additional work may be identified by the Contract Administrator after reviewing the inspection reports provided for those sections not inspected prior to tender. This work will be paid under tendered prices, where applicable, and will be covered by the contingency amount provided.
- .2 Schedule CCTV inspection of those sections not previously inspected at the start of work and provide for a two week

CCTV VIDEO INSPECTION

review period by the Contract Administrator once inspection reports have been submitted.

2.0 PRODUCTS**2.1 Inspection Unit**

- .1 The inspection unit is to consist of a self-contained vehicle with separate areas for viewing and equipment storage. All equipment utilized within the pipeline is to be stored outside of the viewing, recording and control area. External power sources from public or private sources are not permitted. Each inspection unit is to be equipped with a cellular telephone and suitable communication system linking all crew members. Each unit is to be equipped with fans and blowers to remove any fog that may be present in the sewer at the time of the inspection.
- .2 The viewing and control area is to be insulated against noise and extremes in temperature. Proper seating accommodation is to be provided to enable one person in addition to the operator to clearly view the monitor. External and internal sources of light are to be controllable to ensure that light does not impede the view of the monitor.

2.2 Inspection Equipment

- .1 Inspection equipment includes cameras, lighting, cables, power source, monitor, and other related equipment.
- .2 The camera is to be capable of producing high quality colour imagery and providing complete inspection and view of all laterals and deficiencies. Live picture is to be visible with no interference. The camera is to be pan and tilt type with panning capability of 360° and tilting capability of 270°. The focus and iris are to be remotely adjustable to allow optimum picture quality. The focal range is to be adjustable from 100 mm in front of the camera's lens to infinity. The digital camera is to be capable of producing clear, sharp images at a minimum resolution of 704x480.
- .3 The light source is to be remotely adjustable to allow an even distribution of light around the sewer perimeter without loss of contrast, flare out of picture or shadowing.
- .4 Digital equipment is to be capable of superimposing alphanumeric information onto the digital recording with a minimum of 15 lines of information, 30 characters per line (refer to Clause 3.3.2).
- .5 The camera is to be transported through the sewer by means of a crawler or rubber tired tractor. Mounting of the camera on a float or skid for towing through the sewer will only be permitted where the condition of the sewer or flow level precludes the use of a tractor. If the camera is towed the supporting equipment is not to impede the view of the camera and is to be stable to ensure steady and smooth progress.

CCTV VIDEO INSPECTION

- .6 The camera transport is to permit complete inspection of the sewer from the centre of the start manhole to the centre of the finish manhole. The camera transport and cable is to be capable of inspecting a minimum of 150 metres of sewer from a single access point. Each unit is to carry sufficient numbers of guides and rollers such that when surveying, all cables are supported away from pipe and manhole edges. All CCTV cables and lines used to measure the camera's location within the pipeline are to be maintained in a taut manner and set at right angles, where possible, to run through or over the measuring equipment. A remote reading counter is to be used to measure distance travelled from the centre of the start manhole. Measurements are to be recorded in metres to the nearest 0.1 m.
- .7 The camera height is to be adjustable so as to position the centre of the lens in the centre of circular sewers, and at 2/3 the height of the pipe measured from the invert for elliptical sewers.
- .8 Camera to be waterproof with a self-contained lighting system capable of being remotely adjusted. Lights to provide an even distribution of light around the pipeline perimeter without the loss of contrast or flare out of picture shadowing.
- 2.3 Sewer Plugs**
- .1 Sewer plugs are to be designed to stop or reduce flow from upstream sewer(s) and are to permit tethering to and be removable from the ground surface.
- 2.4 Bypass Pumping**
- .1 Bypass pumping equipment includes pumps, piping, tank trucks, and other related equipment. Equipment selection and configuration is to be reviewed on a site-specific basis.
- 3.0 EXECUTION**
- 3.1 Sewer Inspection Process**
- .1 Provide a minimum of 24 hours notice to the Contract Administrator, of the locations where the inspections will be performed on the following day(s).
- .2 Add the following amendments to the standard coding form shown on page 14 of the MSCC:
- .1 Line 2, field 8 (date) to be eight (8) characters in the format of yyyy.mm.dd (year, month, day).
- .2 Note observations as to the condition of service connections beyond the mainline in the remarks column using standard codes as per the Manual of Sewer Condition Classification.
- .3 Prior to CCTV video inspection, sewers are to be cleaned in accordance with Sewer Cleaning Supplementary Specifications - Section 02734.
- .4 Prior to beginning the inspection measure the distance on the ground surface between the centres of the start and finish

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manholes using a steel tape or measuring wheel. Ensure a minimum of 80% of the height of the sewer is visible for the entire inspection. Notify the Contract Administrator of excessive flows before implementing flow control measures (refer to Clause 3.4). Keep the camera lens clean at all times and the sewer clear of fog during the entire inspection by introducing forced air flow by means of fans or blowers.

- .5 Conduct all inspections in the direction of flow unless a reverse set-up is required. Inspections are generally to begin with the upstream sewer in the system and proceed downstream in a consecutive manner. Inspection is not to proceed downstream until all contributing upstream sewers have been cleaned.
- .6 The face of the start manhole is to be clearly visible at the start of the inspection and the inspection is to be performed from the centre of the start manhole to the centre of the finish manhole. Note the condition of pipe joints at manhole walls at the beginning and end of each pipeline. At the start of the inspection record the length of sewer from the centre of the manhole to the cable calibration point and adjust the distance reading at the cable calibration point such that zero is at the centre of the start manhole.
- .7 Automatic distance measurement is to be indicated on the screen during the entire inspection and should begin to move immediately as the camera moves.
- .8 The camera travel speed is limited to the following:
 - .1 0.10 m/s for pipeline diameter < 200 mm
 - .2 0.15 m/s for pipeline diameter 200 mm – 310 mm
 - .3 0.20 m/s for pipeline diameter > 310 mm
- .9 During the inspection the picture is to be in focus from the point of observation to a minimum of two pipe diameters ahead.
- .10 Stop the camera for a minimum of 2 seconds at rehabilitated sewer sections, any observed major defects, change of pipe condition, connections, junctions and major branches. Major defects include but are not limited to deformed sewers, displaced bricks, holes, large displaced joints, missing bricks, totally missing mortar, obstructions, and large open joints. Position the camera to provide a perpendicular view of major defects, connections, junctions, and major branches. Pan each service such that the camera looks down the centreline of the service and note the condition of the joint or pipe/service interface.
- .11 Photograph all major defects as defined in the MSCC by condition codes B, CC, CL, CM, CX, CXI, D, FC, FL, FM, H, IR, IG, JDM, JDL, JX, OB, OJL, RT, RM, and X.

Overlay on each photograph the following data in

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alphanumeric form such that it will not interfere with the defect condition reported:

- .1 Report/job number
- .2 Chainage
- .3 Manhole from/to numbers and/or pipe length reference number
- .4 Photograph number
- .5 Condition defect code

- .6 Date of survey (yyyy.mm.dd)

Capture the photograph and alphanumeric data as a digital image in Joint Photographic Experts Group (JPEG) format (.jpg) or as specified in the contract documents.

- .12 If inspection of an entire sewer cannot be completed due to collapse, excessive deformation or solid debris, intruding connections, obstructions or large displaced joints, move the equipment to the upstream manhole and attempt inspection again. If complete inspection still cannot be performed immediately notify the Contract Administrator. Jointly, the Contractor and Contract Administrator will decide to:
 - Abandon the inspection; or
 - Complete the inspection subsequent to:
 - Performing solid debris cutting;
 - Removing intruding connections;
 - Modifying the camera set-up (position and/or method of transport); and
 - Completion of emergency repairs.

- .13 If during the inspection clear water infiltration, flow disparity, a hole or missing bricks, collapse, void, or deformation greater than 10% is observed, capture an image (digital photograph or digital recording) and immediately notify the Contract Administrator. If a void is visible or suspected outside the pipe immediately place barricades around the location and notify the Contract Administrator or Emergency Services. If required, the Contract Administrator will coordinate emergency repairs by City forces or another Contractor.

3.2 Inspection Reports

- .1 Inspection reports are to consist of digital copy reports, digital data output files and digital photographs. Submissions are to be made biweekly upload to a FTP server on a continuous basis as the CCTV inspection proceeds. Upon completion of the inspection, all materials are to be submitted to the City on a 3.5" portable hard drive.
 - .1 Digital reports are to be presented in accordance with the pre-designed City of Richmond Pipeline Inspection Report forms.
 - .2 Digital data output files are to be presented in the City of Richmond's manhole inspection table configuration in Microsoft Access database (.mbd) file format. The digital database file is to contain survey report

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information identical to the printed report, exclusive of photograph

- .3 Digital photographs are to be stored on a portable hard drive in JPEG (.jpg) format, and reference to the relevant section of pipeline inspection report from the portable hard drive.
- .4 All dimensions and chainages in the reports are to be in metric units.
- .2 Present digital inspection reports on portable hard drive. Files to be organised by catchment area or as specified in the contract documents.
- .1 Create a separate folder to contain digital database files
- .2 Create a separate folder to contain a digital manual of the portable hard .
- .3 Create separate folders for inspection reports & digital photographs within the catchment area folder.
- .4 Include City supplied, scale drawings in (.pdf) format highlighting inspected pipeline in each relevant report folder.
- .5 Include an index of all survey inspection reports contained within the hard drive.

Attach identical identification labels on the back side of the portable hard drive with the following information:

- .1 Contract/Project ID
e.g. City of Richmond Central Catchment Area T-1525
- .2 Inclusive inspection/report numbers
e.g. 001-020
- .3 Inclusive DVD Identification number
e.g. DVD1 (MH2:MH20)
- .4 Contractor name
e.g. XYZ Ltd.
- .5 Dates of inspection
e.g. 2011/02/14 – 2011/02/21

Digital photographs are to include photograph identification numbers on the file properties.

3.3 Digital Recordings

- .1 Record the inspections in colour in MPEG 2 format on DVDs.
- .2 At the start of each survey clearly display the following alphanumeric information on the digital recording for a minimum of 30 seconds:
 - .1 Contract ID

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- e.g. City of Richmond T-1525
- .2 Inspection/report number
e.g. 001
- .3 Street name/location
e.g. 5th Avenue from 1st Street to 2nd Street
- .4 Sewer size (diameter)
e.g. 200 mm
- .5 Sewer pipe material
e.g. PVC
- .6 Type or use of pipe
e.g. sanitary
- .7 Start MH ID number
e.g. SMH0001234
- .8 Finish MH ID number
e.g. SMH0000567
- .9 Contractor name
e.g. XYZ Ltd.
- .10 Date and time of inspection
e.g. 2011/02/29-14:15
- .11 Direction of inspection
e.g. with flow/downstream
- .12 Cable calibration distance
e.g. 1.5 m
- .13 Verbal description of all the above on screen information

- .3 During the inspection clearly display the following information at the periphery of the monitor and digital recording, arranged such that interference with the inspection image is minimized:
 - .1 Automatic update of the camera's distance from the centre of the start manhole
e.g. 15.3 m
 - .2 Street name/location
e.g. 5th Avenue from 1st Street to 2nd Street
 - .3 Start MH ID number
e.g. SMH0001234
 - .4 Finish MH ID number
e.g. SMH0000567
 - .5 Inspection/report number of the run
e.g. 001

- .4 In addition to continuously displayed data, overlay WRc sewer condition codes on the monitor and digital recording at defects, connections and junctions.

3.4 Flow Control

- .1 Reduce flow in the pipeline to approximately 20% of the pipe diameter during CCTV inspection.

If sewer flows are hampering effective sewer inspection, flow control measures are to be undertaken. Flow control measures include, but are not limited to: off peak work; plugging or impeding flow; use of sewer cleaning equipment to lower downstream flow levels; and bypass pumping. Provide the Contract Administrator with forty-eight hours notice prior to

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undertaking any flow control measures. Select a method that ensures no flooding of public or private property occurs.

- .2 Prior to requesting the use of bypass pumping the Contractor must demonstrate that off peak work, plugging, sewer cleaning equipment, or a combination thereof cannot effectively reduce flow levels to the specified maximum. Temporary bypass hoses and pumps are to be of sufficient capacity to handle the peak flow, and all hoses and couplings are to be leak free. Approved bypass pumping is to be set up such that flow is pumped to a downstream manhole on the same system or run whilst the inspection takes place.
- .3 Monitor flow levels upstream of a plugged or bypassed sewer at all times.

3.5 Quality Control

- .1 Camera Position

Camera position tolerance is +/-10% of the vertical dimension of the sewer.

If the camera position does not satisfy the requirements the inspection is to be re-performed at the Contractor's expense.

- .2 Distance Accuracy

Distance measurement within the sewer is to be accurate to within 0.5% of the above ground measurement as confirmed by steel tape or measuring wheel measurement between start and finish manhole centres.

Check the chainage tolerance at the start of the contract and a minimum of once every two weeks thereafter, or every 5000 metres of pipeline inspected, whichever is greater.

If the distance measurement does not satisfy the accuracy requirements the inspection is to be re-performed at the Contractor's expense.

- .3 Recording Resolution

The minimum resolution for digital recordings is MPEG 2 format.

- .4 Operator Qualifications - Inspection and Condition Coding

Each inspection unit is to have a minimum of one operator on site at all times who has successfully attained the National Association of Sewer Service Company (NASSC) Level of Qualification for WRc Operators or an accepted alternate training program. Condition coding is to be performed by this duly qualified operator who is fully trained in all aspects of sewer inspection and is capable of making accurate observations and recordings of all conditions that may be encountered in the sewers.

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Submit a copy of each operator's current NASSC Qualifications for WRc Operators Certificate at least two (2) business days prior to the commencement of work.

If no NASSC certified operators are available on a given day, no inspection work is to be performed.

.5 Sample Inspection Report

At least two (2) weeks prior to beginning the inspection work submit a sample inspection report with corresponding digital data files, digital recordings and digital photographs on DVD for review. One submission is to be made for each camera proposed for use on the work. Clearly identify the camera make, model and serial number on each DVD. Demonstrate the resolution of each camera by performing a recording resolution test with the use of a Marconi or RETMA resolution chart. The camera is to be capable of providing a minimum resolution of MPEG 2 format. The sample submission is to satisfy all of the specifications contained herein and the accepted report submission will be used as a benchmark for subsequent inspection report submissions.

No inspection work is to be performed until an acceptable sample inspection report has been submitted and approved for each camera to be used in the completion of the work.

.6 Coding Accuracy

Coding accuracy is to be a function of the number of defects or construction features not recorded (omissions) and the correctness of the coding and classification recorded. Coding accuracy is to satisfy the following requirements:

- header accuracy 95%
- detail accuracy 85%

The Contractor is to implement a formal coding accuracy verification system at the onset of the work. Coding accuracy is to be verified by the Contractor on a random basis, on a minimum of 10% of the inspection reports. The Contract Administrator is entitled to review the accuracy verification system and results and to be present when the assessments are being conducted. A minimum of two accuracy verifications are to be performed for each operator for each working week.

Quality Assurance and Quality Control shall be implemented by the Contract Administrator on a random basis, on a minimum of 10% of the inspection reports.

Coding not satisfying the accuracy requirements are to be re-coded at the Contractor's expense, and the accuracy of the inspection report immediately preceding and following the non-compliant inspection is to be verified. This process is to be repeated until the preceding and subsequent inspections meet the accuracy requirements.

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Any operator failing to meet the accuracy requirements on two occasions will not be permitted to code on the remainder of the project until successfully re-attaining the NAAPI Level of Qualification for WRc Operators.

.7 Sewer Cleaning

For sewers that are deemed by the Contract Administrator to be unacceptably cleaned, CCTV video inspection reports will be rejected and the sewer is to be re-cleaned and re-videoed at the Contractor's expense.

.8 Report Submissions

Inspection reports, digital recordings, digital data files and digital photographs will be reviewed by the Contract Administrator to ensure compliance with the specifications. The frequency of review will be adjusted based on the results of the review. The Contract Administrator, at the Contractor's expense, will return non-compliant submissions for correction.

Corrected submissions are to be resubmitted within five working days.

END OF SECTION

APPENDIX D

- Sewer Cleaning and CCTV Inspection Schedule of Quantities and Prices
- Notice of No Bid

Sewer Cleaning and CCTV Inspection Schedule of Quantities and Prices Contract 3969P

(to be attached to proposal)

PROJECT TEAM

Prime Consultant: _____

Sub-consultants:

Responsibility (e.g. sewer cleaning, CCTV inspections, manhole inspections, solid debris cutting, traffic control, flow control and bypass pumping, etc.)	Name of Sub-Consultant

PROPOSED COST

SANITARY SEWER BASE ITEMS ITEM DESCRIPTION (refer to respective Supplementary Specifications in Appendix C for details on measurement of payment)	UNIT	ESTIMATED QUANTITY	UNIT PRICE \$	TOTAL AMOUNT \$
A-1. CCTV Inspections (includes but not limited to flow control, inspection reports, digital recordings, photographs, reverse set-up inspection and traffic control)	L.M.	53,307		
A-2. Manhole Inspections (includes but not limited to flow control, inspection reports, digital recordings, photographs, and traffic control)	EACH	925		

A-3. Sewer Cleaning (includes but not limited to flow control, high velocity cleaning, debris removal and disposal, flushing water disposal, reverse set-up, and traffic control)	L.M.	53,307		
SUB-TOTAL FOR SANITARY SEWER-BASE ITEM A (Carry Forward to Proposed Schedule of Fees Summary)				

SANITARY SEWER PROVISIONAL ITEMS ITEM DESCRIPTION (refer to respective Supplementary Specifications in Appendix C for details on measurement of payment)	UNIT	PROVISIONAL QUANTITY (FOR BID COMPARISON ONLY)	UNIT PRICE \$	TOTAL AMOUNT \$
B-1. Solid Debris / Grease and Root Cutting, Removal and Disposal (Provisional Item)	L.M.	8,000		
B-2. Bypass Pumping (Provisional Item)	EACH	10		
SUB-TOTAL FOR SANITARY SEWER PROVISIONAL ITEMS- ITEM B (Carry Forward to Proposed Schedule of Fees Summary)				