DEPARTMENT OF TRANSPORTATION, INFRASTRUCTURE AND ENERGY
Province of Prince Edward Island

TENDER FORM AND AGREEMENT
Revision 0

THIS AGREEMENT made by and between ....., herein called the Contractor, the Party of the First Part and The Government of Prince Edward Island as represented by the Minister of the Department of Transportation, Infrastructure and Energy, herein called the Minister, the Party of the Second Part.

WITNESS, AS FOLLOWS:

1. Definitions

The definition of terms used in this Tender Form and Agreement shall conform in all respects to the definition of terms contained in the document entitled "General Provisions and Contract Specifications for Highway Construction," published by the Department of Transportation, Infrastructure and Energy of the Province of Prince Edward Island as amended on the date of closing of Tenders pursuant to this Agreement.

2. General Covenant

The Contractor hereby covenants and agrees with the Minister as herein provided in connection with the following work, namely:

Marion Drive Connection – Stratford 2020
District 6
Marion Drive Station 0+000 – 0+160
Marion Drive Connector Station 0+000 – 0+140

For a distance of 0.30 km

The project commences 720 metres east of the intersection of Stratford Road and Marion Drive and proceeds North for a distance of 300 metres.

Marion Drive Connection: Earth excavation; placing select borrow, placing granular A; placing asphalt base A; placing asphalt seal B, storm sewer installation, sanitary sewer installation, water line installation, shouldering; landscaping and all other work necessary to complete the Contract.

TENDER CLOSES:
2:00 p.m., Thursday, April 2nd, 2020
11 Kent Street, 3rd Floor Jones Building, Charlottetown, PE

3. No Implied Contract

It is hereby understood and agreed between the parties hereto that no implied Contract of any kind whatsoever, by, or on behalf, of the Minister shall arise or be implied from anything contained in this Contract, or from any position or situation of the parties at any time, and that this Contract made by the Minister is, and shall be, the only Contract upon which any rights against the Minister are to be founded.

4. How Party of the First Part is Read

Whenever this Contract is entered into by more than one party or parties of the first part, the word "Contractor" shall be read "Contractors," and pronouns in the Contract referring to the Contractors shall be read as plural and whenever a corporation is the Party of the First Part, the said pronouns shall be read accordingly.

5. Consideration of Clauses as Covenants

Wherever it is stipulated that anything shall be done or performed by either of the Parties hereto, it shall have the same effect and be constructed as if such Party had entered into a covenant with the other Party to do or perform the same, and as if such covenant had been expressly made on the part of the Contractor, not only on the Contractor's own behalf, but also on the behalf of the Contractor's legal representative, successors or assigns; and as if any such covenant on the part of the Minister has been made on behalf of the Minister, and the Minister's successors in office.

6. Contractors Submission Respecting the Agreement

The Contractor shall, as part of the Contractor's submission respecting this Contract, complete the attached Schedule B, Identification of Principles; Schedule C, Schedule of Tendered Unit Prices; Schedule D, Schedule of Equipment to be used on the work; and Schedule E, Schedule of Sub-Contractors.

The Contract including all appended schedules shall be completed in complete conformity with the instructions to bidders contained in the document entitled "General Provisions and Contract Specification for Highway Construction".

In presenting the Contractor’s submission for consideration by the Minister, the Contractor understands that until, and unless, the Contract is endorsed by the Minister, no Contract between the parties shall exist and the Minister shall not be bound to endorse any Contract.

7. Performance by Contractor

The Contractor, at the Contractor's own expense, shall, except as herein otherwise specifically provided, furnish and provide all and every kind of labour and superintendence, services, tools, implements, machinery, plant materials, articles and whatsoever is necessary for the due execution of the work. The Contractor shall fully construct and erect the work in the most thorough, professional and substantial manner, in every respect to the satisfaction and approval of the Engineer. The Contractor shall complete the work within the time specified herein and deliver it to the Minister in the manner and upon the terms and conditions of the Contract.

8. Bid and Performance Security

The Contractor hereby and herewith deposits with and delivers to the Minister, as security of the due fulfilment of the Contract, one of the following, which shall remain in effect for a minimum of 30 days after tender closing:

a) a certified cheque in the amount stipulated in Schedule A - Schedule of Special Provisions

OR

b) a bank draft in the amount stipulated in Schedule A - Schedule of Special Provisions

OR

c) a bid format irrevocable standby letter of credit on a government approved form in the amount stipulated in Schedule A - Schedule of Special Provisions

OR

d) a bid bond in the amount stipulated in Schedule A - Schedule of Special Provisions excluding HST. The bond shall be from a surety company authorized to carry on business in Canada guaranteeing to supply a performance bond equal to 50% of the Contract value, excluding HST and a labour and material bond equal to 25% of the Contract value

Performance security must be filed with the Department before work on the project commences. This security shall be held and retained by the Minister for the due and faithful performance, observance and fulfilment by the Contractor of all the covenants, provisos, agreements, conditions and reservations in this Contract contained on the part of the Contractors to be observed, performed and complied with shall be in the form of:

e) a certified cheque in the minimum amount of ten percent (10%) of the Contract value, excluding HST, which shall be retained until the warranty period (one (1) year after substantial completion) has elapsed.

OR

f) a bank draft in the minimum amount of ten percent (10%) of the Contract value, excluding HST, which shall be retained until the warranty period (one (1) year substantial completion) has elapsed.

OR

g) a performance format irrevocable standby letter of credit on a government approved form in the minimum amount of ten percent (10%) of the Contract value, excluding HST, which shall be retained until the warranty period (one (1) year after substantial completion) has elapsed.

OR

8. Bid and Performance Security (continued)

h) a performance bond equal to 50% of the Contract value, excluding HST and a labour and materials bond equal to 25% of the Contract value, excluding HST both of which shall be retained until the warranty period (one (1) year after substantial completion) has elapsed.

All performance security which has an expiry date which precedes the end of warranty date must be renewed prior to the time that the security would expire. The bidder will forfeit security to the Minister if the bidder fails to enter into or carry out the Contract when called upon to do so.

It is understood and agreed that the Contractor assumes risk and must bear any loss in respect to the performance security as aforesaid, occasioned by the failure or insolvency of the banks on which any cheque was drawn or in which any deposit was made in connection with the security aforesaid.

If at any time hereafter the said Contractor should make default under the said Contract, or if the Minister acting under the powers reserved in the said Contract shall determine that the said works, or any portion thereof remaining to be done, should be taken out of the hands of the Contractor and be completed in any manner or way whatsoever than by the Contractor, or if the Contractor refuses or neglects to pay for work done or materials supplied by any person in connection with the said work, the Minister may, in either case dispose of said security for the carrying out of the construction and completion of the work of the Contract or for paying any salaries or wages for work done, or any accounts for materials supplied for the said works that may be left unpaid by the said Contractor.

In the event of any breach, default or non-performance being made or suffered by the Contractor in or in respect of any of the terms and conditions, covenants, provisions, agreements, or restrictions herein contained, which on the part of the said Contractor should be observed, performed or complied with, the said security so delivered to or deposited with the Minister or by the Minister received in respect thereof, shall by the Contractor, be forfeited absolutely to the Minister.

Upon the due and faithful performance, observance and fulfilment by the Contractor of all the terms, provisions, covenants, agreements, conditions, reservations, hereinbefore contained, on the part of the Contractor to be observed, performed and complied with, the Minister shall surrender the performance security.

9. Minister Covenants to Pay

In consideration of the faithful performance by the Contractor of all and singular covenants, agreements and provisions of the Contract, the Minister hereby covenants and agrees with the Contractor that, on the full completion by the Contractor of all the work as specified in the Contract, within the time specified and limited for the final completion thereof, and to the entire satisfaction of the Engineer to be evidenced by the certificate of the Engineer in writing, the said Minister will well and truly pay, or cause to be paid, to the said Contractor the amount of the Contract price, representing the actual quantities in the several items in the Schedule of Prices, identified as Schedule C to this Contract, at the unit prices or lump sum prices quoted by the Contractor. This amount paid to the Contractor as above, shall include all and every kind of work, labour, superintendence, services, tools, implements, machinery, plant materials, articles and

things whatsoever necessary for the full execution and completion of the work to the entire satisfaction of the Engineer.

10. Final Payment

It is hereby agreed by the parties hereto that the payment of the final amount due under the Contract, and the adjustment and payment of any bills that may be rendered for work done, in accordance with any alteration in or addition to the same, shall release the Minister from any and all claims or liability on account of work performed under the said Contract or any alteration in or addition to the same.

11. No Waiver

It is hereby agreed that no condoning, excusing, or overlooking by the Minister, or any person acting on the Minister's behalf on previous occasions of breaches or defaults similar to that for which any action is taken or power is exercised, or forfeiture is claimed or enforced against the Contractor, shall be taken as a waiver of any provisions of the Contract, or as defeating, affecting or prejudicing in any way the right of the Minister under the Contract.

12. Components of the Contract

Any and all plans or drawings prepared by the Department, the document titled “General Provisions and Contract Specifications for Highway Construction”, the advertisement, the Tender Form and Agreement together with Schedule A, Schedule of Special Provisions; Schedule B, Identification of Principals; Schedule C, Schedule of Tendered Unit Prices; Schedule D, Schedule of Equipment; and Schedule E, Schedule of Sub-Contractors, as well as any addenda which may be issued by the Department pursuant to this Contract shall hereby be a part of this Contract as fully and to the same effect as if the same had been set forth at length in the body of the Contract.

13. Completion of Work

The Contractor agrees to complete the work on, or before **August 28, 2020.**

14. FOIPP Clause

1. By submitting your bid, you agree to disclosure of the information supplied, subject to the provisions of the Freedom of Information and Protection of Privacy Act (FOIPP).

2. Anything submitted in your bid that you consider to be "confidential information" because of its proprietary nature should be marked as "confidential" and will be subject to appropriate consideration under the Freedom of Information and Protection of Privacy Act.

3. During the delivery and installation of goods and/or services, you may have access to confidential or personal information. Should this occur, you must ensure that such information is not released to any third party or unauthorized individual.

4. Any information provided on this Contract may be subject to release under the Freedom of Information and Protection of Privacy Act. You will be consulted prior to the release of any information.

IN WITNESS WHEREOF the parties hereto have hereby caused these presents to be signed and sealed on the dates stated.

SIGNED, SEALED AND DELIVERED
by the Contractor on the [ ] day
of [ ], 20[ ].

.....
CONTRACTOR

In the presence of:

.....

SIGNED, SEALED AND DELIVERED
by the Minister on the [ ] day
of [ ], 20[ ].

.....
MINISTER

In the presence of:

.....

SCHEDULE A
SCHEDULE OF SPECIAL PROVISIONS

1) INSTRUCTIONS TO BIDDERS

The stipulated bid security amount shall be $40,000.00. Upon award, the successful Contractor shall replace the Bid Security with the Performance Security.

A mandatory preconstruction meeting between the successful Contractor and the Department shall be held at the Jones Building in advance of construction start up.

Contractor shall comply with all the Town of Stratford's requirements for the installation of the water and sanitary sewer components of the contract.

Access to the construction site via Glen Stewart Drive shall **not** be permitted.

2) SECTION 102.13 - SCHEDULING OF THE WORK

The number of working days stipulated for this Contract is **15**. These workings days shall be consecutive. Liquidated damages will be assessed beyond the approved schedule. Other utility crews and/or other contractors (Aliant, Maritime Electric, etc.) may be carrying out work on site at various stages of the project. The Contractor shall coordinate their work schedules with all these crews as no additional compensation will be provided for any delays.

A separate contract to construct MacKinnon Drive, consisting of storm sewer, water and sanitary installation, may be taking place concurrently. The contractor shall be expected to coordinate their work to ensure smooth transitions, connections, and that impacts to the public are limited. No additional compensation shall be provided for delays as a result of this ongoing work.

3) SECTION 204 – TOPSOIL REMOVAL AND REINSTATEMENT (Item 20401 – Topsoil: Remove & Reinstate)

Topsoil shall be stockpiled on the contract. This material shall be used to reinstate the areas on slopes and on adjacent land as determined by the Project Manager or the Engineer. Only the amount of topsoil reinstated will be paid for under this item. The remaining material shall be paid for under the item for excavation waste.

4) SECTION 301 - STORM SEWER INSTALLATION
(Item No. 30101- Storm Sewer: 300mm PCP)
(Item No. 30102- Storm Sewer: 375mm PCP)
(Item No. 30103- Storm Sewer: 450mm PCP)
(Item No. 30104- Storm Sewer: 525mm PCP)

Double Walled Polyethylene (DWP) pipe meeting the requirements in Section 301 may be used in place of PCP. No additional compensation shall be provided for the use of one material over the other.

Please note that all required excavation shall take place within the ROW, in areas where this cannot be accomplished, a trench box will be required.

5) SECTION 302 – CATCH BASIN INSTALLATION
(Item No. 30202 Catch Basin: 1050mm PCP)
All catch basin frame and grates shall be R-11.

6) SECTION 501 - ASPHALT CEMENT
(Item 50101 - Asphalt Cement)

Contractors shall note that for bidding purposes an artificial rack price of $900 per tonne shall replace the Government's posted Monthly Average Asphalt Binder Rack Price table for this Contract. The artificial rack price of $900 per tonne shall be used as the price index when calculating the liquid asphalt cement price adjustment.

7) SECTION 603 - HOT MIX ASPHALTIC CONCRETE
(Item 60350 - Asphalt Seal: B)

Asphalt Seal: C meeting the requirements in Section 603 may be used in place of Asphalt Seal: B. No additional compensation shall be provided for the use of one material over the other**.**

8) SECTION 907 - VEHICLE CONFIGURATIONS AND RESTRICTIONS

The SADT on this project shall be understood to be less than 1,000.

9) SECTION 908 - TRAFFIC CONTROL PLAN
(Item 90802 - Traffic Control Plan)

Work shall not proceed until all conditions of this section are met. Failure to meet these conditions shall result in a stop work order as per Section 106.07 Suspension of Work.

10) SECTION 1102 – CURB AND GUTTER
(Item 110101 Barrier Curb)

This curb (as per Detail 1, page 7 of 8) shall be placed directly on the Granular Base surface.

11) SECTION 1300 – SUPPLEMENTARY SPECIFICATIONS
(Item No. 130099 – Fire Hydrant)
(Item No. 132042 – Bends: Sup&Install 200mm x 45 degree)
(Item No. 132068 – Valve & Tapping Sleeve: 150x150mm)
(Item No. 132083 – Tapping Sleeve & Valve: 300x300x200)
(Item No. 136187 – Water Main:Sup&Install 200mm)
(Item No. 136188 – Water Main:Sup&Install 150mm)
(Item No. 136197 – Manhole: Supply& Install 1050mm)
(Item No. 136201 – Fittings: 200 x 150 Reducer)
(Item No. 136204 – Locate&Accomodate Exist Sewer)
(Item No. 136265 – Sanitary:200mm DR35)
(Item No. 136285 – Sewer Lateral: 150mm)
(Item No. 136424 – Manholes: 1200mm Fixed Quantities)

All work for the above noted items shall follow the supplemental specifications included in the contract in Appendix A - **Marion Drive Connection Water & Sanitary Sewer**

SCHEDULE B
IDENTIFICATION OF PRINCIPALS

Name of Contractor: _____

Mailing Address: _____

_____

_____

Telephone: _____

Fax: _____

Principal's Name: _____

Title: _____

Mailing Address: _____

_____

_____

If Contractor is a corporation in which province of Canada is the corporation registered:

_____

Department of Transportation Infrastucture & Energy
Province of Prince Edward Island

Schedule C
schedule of item for tender

Item Description and Price			Estimated Quantity	Contractor Total Price
GRUBBING				
Section: 202 Item: 20201				
		PER ha		
	$	PER ha	.30 $	
	100			
EXCAV:EARTH SURPLUS/SUITABLE				
Section: 203 Item: 20306				
		PER M3		
	$	PER M3	1,000.00 $	
	100			
EXCAVATION: EARTH WASTE				
Section: 203 Item: 20307				
		PER M3		
	$	PER M3	2,000.00 $	
	100			
TOPSOIL:REMOVE & REINSTATE				
Section: 204 Item: 20401				
		PER M3		
	$	PER M3	300.00 $	
	100			
BORROW: COMMON				
Section: 206 Item: 20601				
		PER Tonnes		
	$	PER Tonnes	550.00 $	
	100			
BORROW: SELECT				
Section: 206 Item: 20602				
		PER Tonnes		
	$	PER Tonnes	2,800.00 $	
	100			

Total Carried Forward $ _____
From Previous Page

Total Carried Forward $ _____

Item Description and Price			Estimated Quantity	Contractor Total Price
GRANULAR BASE: A				
Section: 207 Item: 20701				
		PER Tonnes		
	$ / 100	PER Tonnes	1,800.00 $	
GRANULAR BASE: D				
Section: 207 Item: 20710				
		PER Tonnes		
	$ / 100	PER Tonnes	100.00 $	
FINE GRADING				
Section: 208 Item: 20801				
		PER Square Metr		
	$ / 100	PER M2	1,800.00 $	
RANDOM RIP-RAP: R5				
Section: 213 Item: 21301				
		PER Tonnes		
	$ / 100	PER Tonnes	40.00 $	
DITCHING				
Section: 215 Item: 21501				
		PER Metres		
	$ / 100	PER M	100.00 $	
BEDDING MATERIAL: A				
Section: 220 Item: 22001				
		PER Tonnes		
	$ / 100	PER Tonnes	400.00 $	

Total Carried Forward From Previous Page $

Total Carried Forward $

Item Description and Price			Estimated Quantity	Contractor Total Price
STORM SEWER: 300MM PCP				
Section: 301 Item: 30101				
		PER Metres		
	$	PER M	20.00 $	
	100			
STORM SEWER: 375MM PCP				
Section: 301 Item: 30102				
		PER Metres		
	$	PER M	120.00 $	
	100			
STORM SEWER: 450MM PCP				
Section: 301 Item: 30103				
		PER Metres		
	$	PER M	25.00 $	
	100			
STORM SEWER: 525MM PCP				
Section: 301 Item: 30104				
		PER Metres		
	$	PER M	145.00 $	
	100			
CATCH BASIN: 1050MM PCP				
Section: 302 Item: 30202				
		PER unit		
	$	PER unit	9.00 $	
	100			
ADJUST MAN HOLE				
Section: 303 Item: 30302				
		PER unit		
	$	PER unit	1.00 $	
	100			

Total Carried Forward $ _____
From Previous Page

Total Carried Forward $ _____

Department of Transportation Infrastucture & Energy
Province of Prince Edward Island

Schedule C
schedule of item for tender

Item Description and Price			Estimated Quantity	Contractor Total Price
CULVERT REMOVAL				
Section: 308 Item: 30801				
		PER Metres		
	$	PER M	60.00 $	
	100			
ASPHALT CEMENT				
Section: 501 Item: 50101				
		PER Tonnes		
	$	PER Tonnes	60.00 $	
	100			
TACK COAT				
Section: 601 Item: 60101				
		PER Square Metr		
	$	PER M2	3,000.00 $	
	100			
ASPHALT BASE: A				
Section: 603 Item: 60301				
		PER Tonnes		
	$	PER Tonnes	450.00 $	
	100			
ASPHALT SEAL: B				
Section: 603 Item: 60350				
		PER Tonnes		
	$	PER Tonnes	400.00 $	
	100			
HMA DRIVEWAY MIX				
Section: 610 Item: 61003				
		PER Tonnes		
	$	PER Tonnes	50.00 $	
	100			

Total Carried Forward $ _____
From Previous Page

Total Carried Forward $ _____

Item Description and Price			Estimated Quantity	Contractor Total Price
COLD PLANE CONST. JOINT				
Section: 705	Item: 70501			
		PER Square Metr		
	$ _____ / 100	PER M2	20.00 $	_____
POLYSTYRENE INSULATION				
Section: 708	Item: 70803			
		PER Square Metr		
	$ _____ / 100	PER M2	50.00 $	_____
CUTTING PAVEMENT				
Section: 710	Item: 71001			
		PER Metres		
	$ _____ / 100	PER M	160.00 $	_____
WATER FOR DUST				
Section: 802	Item: 80201			
		PER kl		
	$ _____ / 100	PER kl	100.00 $	_____
HYDROSEEDING				
Section: 803	Item: 80302			
		PER Square Metr		
	$ _____ / 100	PER M2	1,000.00 $	_____
MULCHING				
Section: 805	Item: 80501			
		PER Square Metr		
	$ _____ / 100	PER M2	200.00 $	_____

Total Carried Forward From Previous Page $ _____

Total Carried Forward $ _____

Item Description and Price			Estimated Quantity	Contractor Total Price
SILT FENCE				
Section: 806 Item: 80601				
		PER Metres		
	$	PER M	50.00 $	
	100			
SODDING				
Section: 809 Item: 80901				
		PER Square Metr		
	$	PER M2	1,200.00 $	
	100			
STRAW BALE BARRIER				
Section: 811 Item: 81101				
		PER bale		
	$	PER bale	10.00 $	
	100			
SIGNALLERS				
Section: 901 Item: 90101				
		PER hrs		
Nineteen Dollars and 78 Cents	$ 19.78	PER hrs	80.00 $	1,582.40
	100			
TRAFFIC CONTROL PLAN				
Section: 908 Item: 90802				
		PER hrs		
Twenty-Five Dollars and 00 Cents	$ 25.00	PER hrs	20.00 $	500.00
	100			
CONCRETE CURB AND GUTTER				
Section: 1102 Item: 110201				
		PER Metres		
	$	PER M	280.00 $	
	100			

Total Carried Forward From Previous Page $

Total Carried Forward $

Item Description and Price			Estimated Quantity	Contractor Total Price
FIRE HYDRANT				
Section: 1300 Item: 130099				
		PER unit		
	$	PER unit	2.00 $	
	100			
REMOVE MISC. STORM SEWER				
Section: 1301 Item: 130108				
		PER Metres		
	$	PER M	70.00 $	
	100			
BENDS:SUP&INSTALL 200MM X 45DEGREES				
Section: 1320 Item: 132042				
		PER unit		
	$	PER unit	2.00 $	
	100			
VALVE & TAPPING SLEEVE: 150X150MM				
Section: 1320 Item: 132068				
		PER unit		
	$	PER unit	1.00 $	
	100			
TAPPING SLEEVE & VALVE:300x300x200: SUP				
Section: 1320 Item: 132083				
		PER L.S.		
	$	PER L.S.	1.00 $	
	100			
WATER MAIN:SUP&INSTALL 200MM				
Section: 1361 Item: 136187				
		PER Metres		
	$	PER M	155.00 $	
	100			

Total Carried Forward $ _____
From Previous Page

Total Carried Forward $ _____

Item Description and Price			Estimated Quantity	Contractor Total Price
WATER MAIN:SUP&INSTALL 150MM				
Section: 1361 Item: 136188				
		PER Metres		
	$	PER M	3.00 $	
	100			
MANHOLE: SUPPLY& INSTALL 1050 MM				
Section: 1361 Item: 136197				
		PER unit		
	$	PER unit	1.00 $	
	100			
FITTINGS: 200 X 150 REDUCER				
Section: 1361 Item: 136201				
		PER unit		
	$	PER unit	1.00 $	
	100			
LOCATE&ACCOMMODATE EXIST SEWER MAI				
Section: 1362 Item: 136204				
		PER L.S.		
	$	PER L.S.	1.00 $	
	100			
SANITARY:200MM DR35				
Section: 1362 Item: 136265				
		PER Metres		
	$	PER M	80.00 $	
	100			
SEWER LATERAL: 150MM				
Section: 1362 Item: 136285				
		PER Metres		
	$	PER M	45.00 $	
	100			

Total Carried Forward $ _____
From Previous Page

Total Carried Forward $ _____

Department of Transportation Infrastucture & Energy
Province of Prince Edward Island

Schedule C
schedule of item for tender

Item Description and Price	Estimated Quantity	Contractor Total Price
MANHOLES: 1200mm FIXED QUANTITIES		
Section: 1364 Item: 136424		
PER unit		
$ PER unit	1.00 $	
100		

Total Carried Forward From Previous Page $ _____

Total Carried Forward $ _____

HST $ _____

Grand Total $ _____

SCHEDULE D

SCHEDULE OF EQUIPMENT TO BE USED ON THE WORK

SCHEDULE E

SCHEDULE OF SUB-CONTRACTORS

Concord Properties

APPENDIX A - Marion Drive Connection – Stratford 2020

Marion Drive Connection Water & Sanitary Sewer

CBCL LIMITED
Consulting Engineers

Issued for Approval and Tender

March 2020
Contract 192637.03

Concord Properties

Marion Drive Connection
Water & Sanitary Sewer

Issued for Approval and Tender			
Issue or Revision	***Reviewed By:***	***Date***	***Issued By:***
CBCL LIMITED Consulting Engineers			

Issued Approval and Tender
CBCL No: 192637.03

END OF SECTION

1. GENERAL

1. The project is located in Stratford, PEI, and is part of an overall project to construct a new street connection between Marion Drive and MacKinnon Drive. The project is being administered by the PEI Department of Transportation, Infrastructure, and Energy (PEI TIE). It generally includes construction of a new street, including an active transportation (AT) trail, storm sewer and municipal services infrastructure. The street, AT trail, and storm sewer are covered by PEI TIE's General Provisions and Contract Specifications for Highway Construction. The municipal services component of the project, including sanitary sewer main, manholes and services, water main, fire hydrants, and connections to existing systems, is covered by the specifications herein. In the case of overlapping information between the specifications documents, the CBCL specifications shall govern for any aspect of the water and sanitary sewer construction.

2. LIST OF DRAWINGS

DRAWING NO.	TITLE
-	Cover
1	Overall Site Plan
2	Existing Conditions and Removals
3	Plan/Profile – Marion Drive Connection – STA. -0+010 to 0+180
4	Plan/Profile – Marion Drive Storm – STA. -0+010 to 0+160
5	Typical Cross Section and Alignment Report
6	Pavement Markings Plan
7	Miscellaneous Civil Details 1
8	Miscellaneous Civil Details 2

END OF SECTION

1.1 DESCRIPTION OF WORK

.1 The work to be done and list of contract drawings are set forth in 00 21 10 - Description of Work and List of Drawings.

1.2 FAMILIARIZATION WITH SITE

.1 Before submitting a bid, it is recommended that bidders visit the site to review and verify the form, nature and extent of the work, materials needed, the means of access and the temporary facilities required to perform the Work.

1.3 CODES AND STANDARDS

.1 Perform work in accordance with the 2010 National Building Code of Canada and any other code of provincial or local application, including all amendments up to bid closing date, provided that in any case of conflict or discrepancy, the more stringent requirement shall apply.

.2 Materials and workmanship must meet or exceed requirements of specified standards, codes and referenced documents.

1.4 INTERPRETATION OF DOCUMENTS

.1 Supplementary to the Order of Precedence article of the General Conditions of the Contract, the Division 01 sections take precedence over the technical specification sections in other Divisions of the Specification Manual.

1.5 TERM ENGINEER OR OWNER'S REPRESENTATIVE

.1 Unless specifically stated otherwise, the term Engineer or Owner's Representative where used in the Specifications and on the Drawings shall mean the Consultant as defined in the General Conditions of the Contract.

1.6 SETTING OUT WORK

.1 The Contractor will set stakes to define location, alignment and elevations of work, and measurement of the work.

.2 Supply such devices as straight edges and templates required to facilitate Owner's Representatives inspection of work.

1.6 SETTING OUT WORK (Cont'd)

.3 Supply stakes and other survey markers required for laying out work.

1.7 MEASUREMENT FOR PAYMENT

.1 Notify Owner's Representative sufficiently in advance of operations to permit required measurements for payment.

1.8 MAINTENANCE OF WORK DURING CONSTRUCTION

.1 Maintain work during construction. Undertake continuous and effective maintenance work day by day, with adequate equipment and forces so that the roadway or structures are continuously kept in a condition satisfactory to Owner's Representative.

1.9 CODES

.1 Perform work in accordance with Code of Practice of the Department of Communities, Land and Environment as it pertains to the Temporary Workplace Traffic Control Manual (Department of Transportation, Infrastructure and Energy and any other code of federal, provincial or local application provided that in any case of conflict or discrepancy, the more stringent requirements shall apply.

.2 Materials and workmanship must conform to or exceed applicable standards of Canadian General Standards Board (CGSB), Canadian Standards Association (CSA), American Society for Testing and Materials (ASTM) and other standards organizations.

.3 Conform to latest revision of any referenced standard as re-affirmed or revised to date of specification. Standards or codes not dated shall be deemed editions in force on date of tender advertisement.

1.10 DOCUMENTS REQUIRED

.1 Maintain at job site, one copy each of following:
- .1 Contract drawings.
- .2 Specifications.
- .3 Addenda.
- .4 Reviewed drawings.
- .5 Change orders.
- .6 Other modifications to Contract.

1.10 DOCUMENTS REQUIRED (Cont'd)

.1 (Cont'd)
.7 Copy of approved work schedule.

1.11 SITE CONDITIONS

.1 The Contractor will be responsible to visit the site and review existing site conditions.

1.12 CONSULTANT

.1 Consultant can be contacted at:
CBCL Limited
135 St. Peters Road, Suite 201
Charlottetown, PEI C1A 5P3
Telephone: (902)892-0303, Facsimile: (902)368-3444

1.13 WORK SCHEDULE

.1 Provide to the Owner's Representative in writing and within 5 working days after Contract award, a detailed construction schedule and traffic control plan. The schedule shall show proposed work to be undertaken and anticipated completion dates for each category of work in the Unit Price Table.

.2 After receiving the Contractor's plan and prior to start of construction, a pre-construction meeting involving Contractor and Owner's Representative will be held at a place and time to be determined by the Owner's Representative. This meeting will review implications of the contract, design, schedule of work, methods of construction, environment protection methods and traffic control.

.3 Interim reviews of work progress based on work schedule will be conducted as decided by Owner's Representative and schedule updated by Contractor in conjunction with and to approval of Owner's Representative.

.4 No work will begin until the pre-construction meeting is held.

.5 Following the pre-construction meeting and approval of the schedule and traffic control plan, the work will be so scheduled to meet the time restraints and have the project completed on time.

1.14 SANITARY SERVICES

.1 The Contractor shall provide and maintain sanitary facilities for the use of workers at locations specified by the Owner's Representative. Provision of sanitary facilities shall meet requirements of provincial government and municipal statutes and authorities.

1.15 CONTRACTOR'S USE OF SITE

.1 Use of site: for execution of work within roadway right of way and those areas specified by the Owner's Representative.

1.16 PROJECT MEETINGS

.1 Consultant will arrange project meetings and assume responsibility for setting times and recording and distributing minutes.

1.17 EXISTING SERVICES

.1 Carry out work at times directed by authorities having jurisdiction, with minimum of disturbance to pedestrian and vehicular traffic.

.2 Before commencing work, establish location and extent of service lines in area of work and notify Owner's Representative of findings.

.3 Submit schedule to and obtain approval from Owner's Representative for any shut down or closure of active service or facility. Adhere to approved schedule and provide notice to affected parties.

.4 Where unknown services are encountered, immediately advise Owner's Representative and confirm findings in writing.

.5 Record locations of maintained, re routed and abandoned service lines.

.6 Ensure that at least one lane of traffic is maintained at construction sites at all times.

.7 Ensure pedestrian and other traffic is not unduly impeded, interrupted or endangered by execution or existence of work or plant.

1.17 EXISTING SERVICES (Cont'd)

.8 Maintain existing signs at all times. When it is necessary to temporarily remove a sign, it shall be dismantled and re-established on a temporary post or stand set back from construction area. The work is considered to be incidental and no separate payment will be made for maintaining or moving signs.

.9 Verify locations of any underground utilities.

1.18 ADDITIONAL DRAWINGS

.1 Owner's Representative may furnish additional drawings for clarification. These additional drawings have same meaning and intent as if they were included with plans referred to in Contract documents.

1.19 RELICS, ANTIQUES AND WILDLIFE HABITAT

.1 Protect relics, antiquities, wildlife habitat, items of historical or scientific interest such as cornerstones and contents, animal nesting sites, commemorative plaques, inscribed tablets, and similar objects found during course of work.

.2 Give immediate notice to Owner's Representative and await Owner's Representative's written instructions before proceeding with work in this area.

.3 Relics, antiquities and items of historical or scientific interest remain her Majesty's property.

1.20 MEASUREMENT OF QUANTITIES

.1 Linear: Items which are measured by metre (m) or kilometre (km), such as pipe will be measured along centreline of installation unless otherwise shown on plans.

.2 Area:
.1 Longitudinal and transverse measurements for areas to be measured horizontally in metres (m).
.2 Longitudinal and transverse measurements for such items as topsoil and hydroseeding to be made on actual flat or sloped surface seeded or sodded.

.3 Volume:
.1 In computing volumes of excavation, average end area method will be used unless otherwise directed by Owner's Representative in writing.

1.20 MEASUREMENT OF QUANTITIES (Cont'd)

.3 (Cont'd)
.2 Term: cubic metres or C.M.
.3 All volume measurements refer to in place measure unless specified elsewhere in specification.

.4 Mass:
.1 Term "tonne" shall mean 1000 kg.
.2 Materials which are specified for measurement by mass shall be weighed on scales approved by and at locations designated by Owner's Representative. Units used to haul material being paid for by mass shall bear legible identification numbers plainly visible to scale person as it approaches and leaves scale-house.

.5 Time:
.1 Unless otherwise provided for elsewhere or by written authority of Owner's Representative, hourly rental of equipment will be measured in actual working time and necessary travelling time of equipment within limits of project at an all-inclusive rate. Equip each unit of mobile equipment with an approved device to register hours of operation. Devices which only measure hours of running of motor will not be accepted. Cost for operator of equipment will be included in the hourly rate.

1.21 PERMITS/ AUTHORITIES

.1 The Contractor shall obtain, and pay for, permits from authorities as required for all operations and construction. He shall also comply with all pertinent regulations of all authorities having jurisdiction over the work. The Contractor shall provide copies of all permits to the Owner prior to starting the work. The Contractor shall be responsible for obtaining all applicable permits, inspections and approvals required and shall pay all charges in connection therewith.

1.22 EQUIPMENT RENTAL RATES

.1 Upon written request, the Contractor will supply the Owner's Representative with a list of the rental equipment to be used on work beyond the scope of bid items. Equipment rental rates will be in accordance with current rates published by the PEI Department of Transportation, Infrastructure and Energy.

END OF SECTION

PART 1 - GENERAL

1.1 Project Particulars

.1 Construction of MacKinnon Drive and the roundabout is ongoing. Coordinate with PEI TIE's Contractor for that project as needed.

1.2 Measurement

.1 The method of measurement shall be as stated hereinafter for the individual items.

.2 Items paid for on a linear basis shall be measured horizontally.

.3 Measurement will be jointly made, and agreed on at the time, by the Consultant and the Contractor.

.4 The unit or lump sum prices for all items shall be full compensation for the work of the Contract and shall include the cost of furnishing all materials, labour, tools and equipment necessary to complete the work in accordance with the Contract, the Drawings and Specifications, and shall cover all costs of surety, mobilization, attention on the Consultant, Contractor's construction road,s and the like. Each item shal include for all necessary supervision, labour, materials, test pits, plant and services and all operatiosn and allowances customary and necessary to complete each item and the Contract as a whole notwithstanding the fact that not every such necessary operation is mentionedor included specifically for measurement.

.5 Provisional items are included in the Contract to establish a unit rate and an amount to do particular work. Include unit price and amount as tendered in Tender Price. The Owner reserves the right to delete all or portions of this item from the total Contract Price.

1.3 Pay Items

.1 Locate and Accommodate Existing Systems:
.1 The unit of measurement will be the LUMP SUM (L.S.).

1.3 Pay Items (Cont'd)

.1 (Cont'd)

.2 This item includes: locating and accommodating all existing infrastructure, for all costs to liaise with all utilities (Maritime Electric, Bell Aliant and Eastlink) to locate the existing systems, protect, relocate and accommodate them during construction and maintain service to customers, and return systems all to the satisfaction of the Utility. The price shall include for having the proper utility remove, replace and/or accommodate utility poles, guys and anchors during construction and trace existing buried cables and pipelines. The price shall include all costs associated with reinstatement of areas disturbed by accommodating the existing system. Also inlcuded shall be all costs to excavate test pits to locate infrastructure in plan and profile at crossing points with the proposed pipework and/or services.

.2 Sanitary Sewerage System

.1 Unit of Measurement: METRE (m) and UNIT.

.2 This item includes: connecting to existing infrastructure, including repair of any existing infrastructure, excavating, trucking, sheeting and shoring, trench box, pumping and draining, bedding, backfilling, compaction, maintenance of surface level, disposal of surplus and unsuitable material, fittings (including sweeps, sleeves, plugs and tees), pipe, service markers, supplying and placing of bedding material, lowering into the trench; bringing the pipe into alignment; jointing, manholes (including precast concrete, grade rings, watertight seals, gaskets, frames and covers, plastic sheeting, unshrinkable fill, waterproofing, grouting and bedding material), testing, and all other work and materials necessary for a complete installation.

.3 Water System:

.1 Unit of Measurement: METRE (m) and UNIT.

1.3 Pay Items (Cont'd)

.3 (Cont'd)

.2 This item includes: connecting to existing infrastructure, including repair of any existing infrastructure, excavating, trucking, sheeting and shoring, trench box, pumping and draining, bedding, backfilling, compaction, maintenance of surface level, disposal of surplus and unsuitable material, pipe, valves, tapping tees, hydrants (including marker, tee, valve, piping, thrust blocking, insulation, tracing wire, polyethylene wrap, geotextile fabric, excavation, bedding, backfilling, embanking and reinstatement, hydrant depth of bury changes up to 150 mm from depth shown on the drawings will be considered incidental to the cost of work), metal detector conductor, and fittings (including tees, tapped couplings, bends, caps and sleeves) supplying and placing of bedding material, lowering into the trench; bringing the pipe into alignment; jointing, thrust blocks, testing, disinfection and all other work necessary for a complete installation. The price shall also include for installation of water services including copper piping, curb stops, main stops, and all other materials and work required to complete the work as indicated.

PART 2 - PRODUCTS

2.1 PRODUCTS .1 Not Applicable

PART 3 - EXECUTION

3.1 EXECUTION .1 Not Applicable

END OF SECTION

1.1 RELATED SECTIONS

.1 Section 01 78 00 - Closeout Submittals.

1.2 SUBMITTAL

.1 Submit to Owner's Representative for reivew requested submittals specified in various sections of the specifications, including shop drawings, samples, permits, compliance certificates, test reports, work management plans and other data required as part of the work.

.2 Submit with reasonable promptness and in orderly sequence so as to allow for Owner's Representative's review and not cause delay in Work. Failure to submit in ample time will not be considered sufficient reason for an extension of Contract time and no claim for extension by reason of such default will be allowed.

.3 Do not proceed with work until relevant submissions have been reviewed.

.4 Present shop drawings, product data, samples and mock-ups in SI Metric units.

.5 Where items or information is not produced in SI Metric units, provide soft converted values.

.6 Review submittals prior to submission. Ensure that necessary requirements have been determined and verified and that each submittal has been checked and coordinated with requirements of Work and Contract Documents.

.1 Submittals not stamped, signed, dated and identified as to specific project will be returned unexamined by Owner's Representative and considered rejected.

.7 Verify field measurements and affected adjacent Work are coordinated.

.8 Notify Owner's Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

1.2 SUBMITTAL (Cont'd)

.9 Contractor's responsibility for errors, omissions or deviations in submission from requirements of Contract Documents is not relieved by Owner's Representative's review.

.10 Submittal format: paper originals, or alternatively clear and fully legible photocopies of originals. Facsimiles are not acceptable, except in special circumstances pre-approved by Owner's Representative. Poorly printed non-legible photocopies or facsimiles will not be accepted and will be returned for resubmission.

.11 Make changes or revision to submissions which Owner's Representative may require, consistent with Contract Documents and resubmit as directed by Owner's Representative. When resubmitting, identify in writing of any revisions other than those requested.

.12 Keep one reviewed copy of each submittal document on site for duration of Work.

1.3 SHOP DRAWINGS AND PRODUCT DATA

.1 The term "shop drawings" means fabrication drawings, erection drawings, diagrams, illustrations, schedules, performance charts, technical product data, brochures, specifications, test reports installation instructions and other data which are to be provided by Contractor to illustrate compliance with specified materials and details of a portion of work.

END OF SECTION

1.1 SUBMITTALS

.1 Submit to Owner's Representative copies of the following documents, including updates:
.1 Site Specific Health and Safety Plan.
.2 Name and qualifications of person to be retained full time as H&S Co-ordinator.

1.2 COMPLIANCE REQUIREMENTS

.1 Comply with the Occupational Health and Safety Act for the Province of Prince Edward Island, and the Occupational Health and Safety Act Regulations made pursuant to the Act.

.2 Comply with Canada Labour Code Part II, and the Canada Occupational Safety and Health Regulations made under Part II of the Canada Labour Code.

.3 Observe and enforce construction safety measures required by:
.1 National Building Code of Canada;
.2 Provincial Worker's Compensation Board;
.3 Municipal statutes and ordinances.

.4 In event of conflict between any provisions of above authorities the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, Owner's Representative will advise on the course of action to be followed.

.5 Maintain Workers Compensation Coverage for duration of Contract. Submit Letter of Good Standing to Owner's Representative upon request.

1.3 RESPONSIBILITY

.1 Be responsible for health and safety of persons on site, of property and for protection of persons and public circulating adjacent to work operations to extent that they may be affected by conduct of the Work.

.2 Enforce compliance by all workers, sub-contractors and other persons granted access to work site with safety requirements of Contract Documents, applicable Federal, Provincial, and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.4 SITE CONTROL AND ACCESS

.1 Control work site and entry points to construction areas.
.1 Delineate and isolate construction areas from other areas of site by use of appropriate means.
.2 Post notices and signage at entry points and at other strategic locations identifying entrance onto site to be restricted to authorized persons only.
.3 Signage must be professionally made, bilingual in both official languages or display internationally understood graphic symbols.

.2 Approve and grant access to site only to workers and authorized persons.
.1 Immediately stop non-authorized persons from circulating in construction areas and remove from site.
.2 Provide site safety orientation to all persons before granting access. Advise of site conditions, hazards and mandatory safety rules to be observed on site.

.3 Secure site at night time to extent required to protect against unauthorized entry.

.4 Ensure persons granted access to site wear appropriate personal protective equipment (PPE) suitable to work and site conditions.
.1 Provide such PPE to authorized persons who require access to perform inspections or other approved purposes.

1.5 PROTECTION

.1 Carry out work placing emphasis on health and safety of the Public, Facility personnel, construction workers and protection of the environment.

.2 Erect safety barricades, lights and signage on site to effectively delineate work areas, protect pedestrian and vehicular traffic around and adjacent to work and to create a safe working environment.

.3 Should unforeseen or peculiar safety related hazard or condition become evident during performance of work, immediately take measures to rectify the situation and prevent damage or harm. Advise Owner's Representative verbally and in writing.

1.6 FILING OF NOTICE

.1 File Notice of Project and other Notices with Provincial authorities prior to commencement of Work.

1.7 PERMITS

.1 Post on site permits, licenses, compliance certificates specified in section 01 10 10.

.2 Where particular permit or compliance certificate cannot be obtained at the required stage of work, notify Owner's Representative in writing and obtain his/her approval to proceed before carrying out that portion of work.

1.8 HAZARD ASSESSMENTS

.1 Conduct site specific health and safety hazard assessment before commencing project and during course of the work. Identify risks and hazards resulting from site conditions, weather conditions and work operations.

.1 Also, conduct assessment when the scope of work has been changed by Change Order and when potential hazard or weakness in current health and safety practices are identified by Owner's Representative or by an authorized safety Representative.

.2 Record results in writing and address in Health and Safety Plan.

.3 Keep copy of all assessments on site.

1.9 PROJECT/SITE CONDITION

.1 The following are known or potential project related health, environmental and safety hazards at site which must be properly managed if encountered during course of work:

.1 Existing hazardous products are:

.1 Petroleum products and fuels for equipment.

.2 Above list shall not be construed as being complete and inclusive of potential health, and safety hazards encountered during work. Include above items into hazard assessment process.

1.10 HEALTH AND SAFETY MEETINGS

.1 Conduct a pre-construction health and safety meeting. Have following persons in attendance:
.1 Site Superintendent.
.2 Health & Safety Site Coordinator.
.3 Owner's Representative .

1.11 SAFETY SUPERVISION AND INSPECTIONS

.1 Designate one person to be present on site at all times, responsible for supervising health and safety of the Work.
.1 Person to be competent in Occupational Health and Construction Safety as defined in the Provincial Occupational Health and Safety Act.

.2 Assign responsibility, obligation and authority to such designated person to stop work as deemed necessary for reasons of health and safety.

.3 Conduct regularly scheduled informal safety inspections of work site on a minimum bi-weekly basis.
.1 Note deficiencies and remedial action taken in a log book or diary.

.4 Keep inspection reports on site.

1.12 TRAINING

.1 Ensure that all workers and other persons granted access to site are competently trained and knowledgeable on:
.1 Safe use of tools and equipment.
.2 How to wear and use personal protective equipment (PPE).
.3 Safe work practices and procedures to be followed in carrying out work.
.4 Site conditions and minimum safety rules to be observed on site, as given at site orientation session.

1.13 MINIMUM SITE SAFETY RULES

.1 Notwithstanding the requirement to abide by federal and provincial health and safety regulations, the following safety rules shall be considered minimum requirements to be obeyed by all persons granted site access:

1.13 MINIMUM SITE SAFETY RULES (Cont'd)

.1 (Cont'd)

.1 Wear personnel protective equipment (PPE) appropriate to function and task on site; the minimum requirements being hard hat, safety footware and eye protection.

.2 Immediately report unsafe activity or condition at site, near-miss accident, injury and damage.

.3 Maintain site in tidy condition.

.4 Obey warning signs and safety tags.

.2 Brief workers on site safety rules.

1.14 ACCIDENT REPORTING

.1 Investigate and report the following incidents and accidents:

.1 Those as required by Provincial Occupational Safety and Health Act and Regulations.

.2 Injury requiring medical aid as defined in the Canadian Dictionary of Safety Terms-1987, published by the Canadian Society of Safety Engineers (C.S.S.E)as follows:

.1 Medical Aid Injury: any minor injury for which medical treatment was provided and the cost of which is covered by Workers' Compensation Board of the province in which the injury was incurred.

.2 Those which require notification to Workers Compensation Board or other regulatory agencies as stipulated by applicable law or regulations.

.2 Send written report to Owner's Representative for all above cases.

1.15 TOOLS AND EQUIPMENT SAFETY

.1 Routinely check and maintain tools, equipment and machinery for safe operation.

.2 Conduct checks as part of site safety inspections. When requested, submit proof that checks and maintenance have been carried out.

.3 Tag and immediately remove from site items found faulty or defective.

1.16 HAZARDOUS PRODUCTS

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS).

.2 Keep MSDS data sheets for all products delivered to site. Post on site. Submit copy to Owner's Representative upon receipt.

1.17 CONFINED SPACES

.1 Carry out work in confined spaces in compliance with:
.1 Provincial Occupational Safety and Health Regulations and;
.2 Canada Occupational Safety and Health Regulations (COSH) made under the Canada Labour Code - Part II.

.2 Conduct hazard assessment and address in Safety Plan before entering confined space.

1.18 POSTING OF DOCUMENTS

.1 Post on site safety documentation as stipulated by Authorities having jurisdiction and as specified herein. Place in a common visible location.

1.19 SITE RECORDS

.1 Maintain on site a copy of all health and safety documentation and reports specified to be produced as part of the work and received from authorities having jurisdiction.

.2 Upon request, make available to Owner's Representative and to other authorized safety representative for review. Provide copy when directed by Owner's Representative.

1.20 NON COMPLIANCE AND DISCIPLINARY MEASURES

.1 Immediately address and correct health and safety violations and non-compliance issues.

END OF SECTION

1.1 RELATED SECTIONS

.1 Section 01 33 00 Submittal Procedures

1.2 INSPECTION

.1 Give timely notice requesting inspection of Work designated for special tests, inspections or approvals by Owner's Representative or by inspection authorities having jurisdiction.

.2 In accordance with the General Conditions, Owner's Representative may order any part of Work to be examined if Work is suspected to be not in accordance with Contract Documents.

.3 If Contractor covers or permits to be covered Work designated for special tests, inspections or approvals before such is made, uncover Work until particular inspections or tests have been fully and satisfactorily completed and until such time as Owner's Representative gives permission to proceed.

.4 Pay costs to uncover and make good work disturbed by inspections and tests.

1.3 TESTING

.1 The Contractor shall retain a Geotechnical Engineer to carry out the required testing as outlined in the specification.

.2 Tests on materials, as specified in various sections of the Specifications is the responsibility of the Contractor except where stipulated otherwise.
.1 Provide all necessary instruments, equipment and qualified personnel to perform tests.

.3 At completion of tests, turn over 2 sets of fully documented tests reports to the Owner's Representative. Submit in accordance with Section 01 33 00.
.1 Obtain additional copies for inclusion of a complete set in each of the maintenance manuals specified in Section 01 78 00.

.4 Unspecified tests may also be made by Owner's Representative, at the discretion of the Owner's Representative. The costs of these tests will be paid for by the Owner's Representative.

1.3 TESTING (Cont'd)

.5 Where tests or inspections reveal work not in accordance with contract requirements, Contractor shall pay costs for additional tests and inspections incurred by Owner's Representative as required to verify acceptability of corrected work.

1.4 INDEPENDENT INSPECTION AGENCIES

.1 When specified or directed, submit Representative samples of materials, in required quantities, to Testing Agency for testing purposes. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in Work.

.2 Provide labour and facilities to obtain, handle and deliver samples.

.3 Provide sufficient space on site for Testing Agency's exclusive use to store equipment and cure test samples.

1.5 ACCESS TO WORK

.1 Facilitate Owner's Representative's access to Work. If part of Work is being fabricated at locations other than construction site, make preparations to allow access to such Work whenever it is in progress.

.2 Furnish labour and facility to provide access to the work being inspected and tested.

.3 Co-operate to facilitate such inspections and tests.

1.6 REJECTED WORK

.1 Remove and replace defective Work, whether result of poor workmanship, use of defective or damaged products and whether incorporated in Work or not, which has been identified by Owner's Representative as failing to conform to Contract Documents.

.2 Make good damages to new construction and finishes resulting from removal or replacement of defective work.

END OF SECTION

1.1 SECTION INCLUDES

.1 Administrative procedures preceeding inspection and acceptance of Work by Owner's Representative.

1.2 RELATED SECTIONS

.1 Closeout Submittals: Section 01 78 00

1.3 INSPECTION AND DECLARATION

.1 Contractor's Inspection: Coordinate and perform, in concert with subcontractors, an inspection and check of all Work. Identify and correct deficiencies, defects, repairs and perform outstanding items as required to complete work in conformance with Contract Documents.

.1 Notify Owner's Representative in writing when deficiencies from Contractor's inspection have been rectified and that Work is deemed to be complete and ready for Owner's Representative's inspection of the completed work.

.2 Owner's Representative's Inspection: Accompany Owner's Representative during all substantial and final inspections of the Work.

.1 Address defects, faults and outstanding items of work identified by such inspections.

.2 Advise Owner's Representative when all deficiencies identified have been rectified.

.3 Note that Owner's Representative will not issue a Certificate of Substantial Performance of the work until such time that Contractor performs following work and turns over the specified documents:

.1 Compliance certificates from applicable authorities;

.2 Reports resulting from designated tests;

.4 Correct all discrepancies before Owner's Representative will issue the Certificate of Completion.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Two weeks prior to Substantial Performance of the Work, submit to the Consultant, five final copies of operating and maintenance manuals in English.

.3 Provide spare parts, maintenance materials and special tools of same quality and manufacture as products provided in Work.

.4 Provide evidence, if requested, for type, source and quality of products supplied.

1.3 FORMAT

.1 Organize data as instructional manual.

.2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.

.3 When multiple binders are used correlate data into related consistent groupings.
.1 Identify contents of each binder on spine.

.4 Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.

.5 Arrange content by systems, under Section numbers and sequence of Table of Contents.

.6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.

.7 Text: manufacturer's printed data, or typewritten data.

.8 Drawings: provide with reinforced punched binder tab.

1.3 FORMAT (Cont'd)

.8 (Cont'd)
.1 Bind in with text; fold larger drawings to size of text pages.

1.4 CONTENTS - PROJECT RECORD DOCUMENTS

.1 Table of Contents for Each Volume: provide title of project;
.1 Date of submission; names.
.2 Addresses, and telephone numbers of Consultant and Contractor with name of responsible parties.
.3 Schedule of products and systems, indexed to content of volume.

.2 For each product or system:
.1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

.3 Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.

.4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

.5 Typewritten Text: as required to supplement product data.
.1 Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

1.5 EQUIPMENT AND SYSTEMS

.1 For each item of equipment and each system include description of unit or system, and component parts.
.1 Give function, normal operation characteristics and limiting conditions.
.2 Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

.2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.

.3 Include installed colour coded wiring diagrams.

1.5 EQUIPMENT AND SYSTEMS (Cont'd)

.4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences.
.1 Include regulation, control, stopping, shut-down, and emergency instructions.
.2 Include summer, winter, and any special operating instructions.

.5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

.6 Provide servicing and lubrication schedule, and list of lubricants required.

.7 Include manufacturer's printed operation and maintenance instructions.

.8 Include sequence of operation by controls manufacturer.

.9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

.10 Provide installed control diagrams by controls manufacturer.

.11 Provide Contractor's co-ordination drawings, with installed colour coded piping diagrams.

.12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

.13 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.

.2 Store in original and undamaged condition with manufacturer's seal and labels intact.

1.6 DELIVERY, STORAGE AND HANDLING (Cont'd)

.3 Store components subject to damage from weather in weatherproof enclosures.

.4 Store paints and freezable materials in a heated and ventilated room.

.5 Remove and replace damaged products at own expense and for review by Consultant.

1.7 WARRANTIES AND BONDS

.1 Develop warranty management plan to contain information relevant to Warranties.

.2 Submit warranty management plan, 30 days before planned pre-warranty conference, to Consultant approval.

.3 Warranty management plan to include required actions and documents to assure that Departmental Representative DCC Representative Consultant receives warranties to which it is entitled.

.4 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.

.5 Assemble approved information in binder, submit upon acceptance of work and organize binder as follows:
.1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
.2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
.3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of applicable item of work.
.4 Verify that documents are in proper form, contain full information, and are notarized.
.5 Co-execute submittals when required.
.6 Retain warranties and bonds until time specified for submittal.

.6 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.

1.7 WARRANTIES AND BONDS (Cont'd)

.7 Conduct joint 9 month warranty inspection, measured from time of acceptance, by Consultant.

.8 Include information contained in warranty management plan as follows:

.1 Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Contractors, subcontractors, manufacturers or suppliers involved.

.2 Listing and status of delivery of Certificates of Warranty for extended warranty items, to include pumps, motors, transformers, and commissioned systems.

.3 Provide list for each warranted equipment, item, feature of construction or system indicating:

.1 Name of item.

.2 Model and serial numbers.

.3 Location where installed.

.4 Name and phone numbers of manufacturers or suppliers.

.5 Names, addresses and telephone numbers of sources of spare parts.

.6 Warranties and terms of warranty: include one-year overall warranty of construction. Indicate items that have extended warranties and show separate warranty expiration dates.

.7 Cross-reference to warranty certificates as applicable.

.8 Starting point and duration of warranty period.

.9 Summary of maintenance procedures required to continue warranty in force.

.10 Cross-Reference to specific pertinent Operation and Maintenance manuals.

.11 Organization, names and phone numbers of persons to call for warranty service.

.12 Typical response time and repair time expected for various warranted equipment.

.4 Contractor's plans for attendance at 9 month post-construction warranty inspections.

.5 Procedure and status of tagging of equipment covered by extended warranties.

.6 Post copies of instructions near selected pieces of equipment where operation is critical for warranty and/or safety reasons.

.9 Respond in timely manner to oral or written notification of required construction warranty repair work.

1.7 WARRANTIES AND BONDS (Cont'd)

.10 Written verification to follow oral instructions.
.1 Failure to respond will be cause for the Departmental Representative DCC Representative Consultant to proceed with action against Contractor.

1.8 WARRANTY TAGS

.1 Tag, at time of installation, each warranted item. Provide durable, oil and water resistant tag approved by Consultant.

.2 Attach tags with copper wire and spray with waterproof silicone coating.

.3 Leave date of acceptance until project is accepted for occupancy.

.4 Indicate following information on tag:
.1 Type of product/material.
.2 Model number.
.3 Serial number.
.4 Contract number.
.5 Warranty period.
.6 Inspector's signature.
.7 Construction Contractor.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

.1 This Section specifies requirements for furnishing all materials, labour, tools and equipment and performing all operations necessary to strip topsoil from areas designated, complete excavation of all types of material encountered, placing of excavated material as backfill in trenches and embankments, disposal of unsuitable material, spreading of suitable surplus material,and furnishing backfill material as specified below, all as shown on the Drawings and as specified.

.2 The work generally includes, but is not necessarily limited to, the following items:
.1 Trench excavation and backfilling for structures, pipelines, conduit and appurtenances.
.2 Structure excavation and backfilling for manholes, catch basins.
.3 Control of water by dewatering.
.4 Providing borrow material when required.
.5 Removal and disposal of unsuitable material.
.6 Spreading suitable surplus material as shown on the Drawings.
.7 Sheeting, shoring, trench box and bracing to support trench walls, sides of excavations, existing structures or utilities.
.8 Stripping, stockpiling and replacing topsoil.

1.2 RELATED SECTIONS

.1 Watermains: Section 33 11 00

.2 Sanitary Sewer: Section 33 31 00

1.3 REFERENCES

.1 ASTM C117-90. Test Method for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.

.2 ASTM C136-84a. Method for Sieve Analysis of Fine and Coarse Aggregates.

.3 ASTM D698-91. Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m3).

1.4 DEFINITIONS

.1 Excavation: excavation of materials of whatever nature including dense tills, hardpan, frozen materials, boulders, bedrock, debris and all other materials encountered on the site.

.2 Selected Backfill: excavated on-site material suitable for grading work.

1.5 PROTECTION OF EXISTING FEATURES

.1 Existing buried utilities and structures:
.1 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed. Carry out test digs as required to locate services, etc.

1.6 SHORING AND BRACING

.1 Comply with Section 01 35 28 Health and Safety Requirements and applicable local regulations.

.2 Provide shoring and bracing as required to prevent movement, failure or settlement, to safeguard and maintain integrity of structures, utilities, earth, benchmarks, services and adjacent grades.

.3 Engage services of qualified Professional Engineer registered in the Province of Prince Edward Island to inspect and approve shoring equipment required for work.

1.7 SAMPLES

.1 When requested submit samples in accordance with Section 01 33 00 - Submittal Procedures.

.2 At least 2 weeks prior to commencing work, inform Consultant of proposed source of bedding, backfill or cover materials and provide access for sampling.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Common Borrow: where material additional to that obtained from excavation on site is required to complete trench backfilling the Contractor will provide this material from his own sources as an extra to the Contract. Material shall be as per DOTIE requirements Division 206.

.2 Select Backfill Material: approved material from site excavation or borrow pits. Such material shall be free from stumps, trees, roots, sod, muck or other deleterious material, and shall not contain rock, boulders or masonry larger than 150 mm diameter. The material shall be free from frost, and shall not be placed on frozen ground or in water. It must have a moisture content that will allow compaction to the specified densities.

.3 Gravel Bedding: shall be as per DOTIE requirements for Class A, Division 401.

.4 Sand bedding material: hard, granular, sharp material, well graded from coarse to fine, free from impurities, chemicals or organic matter, chloride content to be less than 250 ppm and graded as follows:

Sieve Square Opening	% Passing (by weight)
4.75 mm	100
2.00 mm	90-96
0.85 mm	75-94
0.425 mm	45-82
0.250 mm	18-40
0.150 mm	10-17
0.075 mm	0-5

.5 Select Borrow: shall be as per DOTIE requirements Division 206.

.6 Geotextile fabric: non woven geotextile terrafix 270R or equivalent.

.7 Rip-Rap: Class 1 as per PEI DOTIE Specification 213 for R-25 random Rip-Rap.

2.1 MATERIALS (Cont'd)

.8 Clear stone: Hard durable clear stone 6 mm to 19 mm, crushed and screened, free from clay and organic matter.

PART 3 - EXECUTION

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways in accordance with PEI DOTIE and Department of Communities,Land and Environment.

.2 Inspect, repair and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 SITE PREPARATION

.1 Remove obstructions from surfaces to be excavated within limits indicated.

.2 Cut pavement or sidewalk neatly along limits of proposed excavation in order that surface may break evenly and cleanly.

3.3 STOCKPILING

.1 Stockpile fill materials in areas designated by Owner's Representative. Stockpile granular materials in manner to prevent segregation.

.2 Protect fill materials from contamination.

3.4 STRIPPING OF TOPSOIL

.1 Strip all surficial vegetation, rootmat and topsoil. Do not mix topsoil.

3.5 PREPARATION/ PROTECTION

.1 Keep excavations clean, free of standing water and loose soil.

3.5 PREPARATION/ PROTECTION (Cont'd)

.2 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.

.3 Protect buried services that are required to remain undisturbed.

3.6 SHORING AND BRACING

.1 Construct temporary works to depths, heights and locations as indicated or directed by the Professional Engineer responsible for the design of the shoring or bracing.

.2 During backfill operation:
.1 Unless otherwise indicated or as directed by Owner's Representative, remove sheeting and shoring from excavations.
.2 Do not remove bracing until backfilling has reached that specified by the Professional Engineer responsible for the design of the shoring or bracing.
.3 Pull sheeting in increments that will ensure compacted backfill is maintained at an elevation at least 500 mm above toe of sheeting.

.3 When sheeting is required to remain in place, cut off tops at elevations as directed by Consultant.

.4 Upon completion of substructure construction:
.1 Remove shoring and bracing.
.2 Remove excess materials from site and restore conditions indicated or as directed by Consultant.

3.7 DEWATERING

.1 Conduct dewatering operations in accordance with Section 01 35 44 - Environmental Protection.

.2 Keep all excavations and trenches free of water at all times. Control excavations to prevent surface water running into excavated areas.

.3 Do all work in connection with dewatering and supply and maintain on the work site, pumps, in number and capacity sufficient to keep bottom of all excavations dry and free from water at all times so placing of pipe and concrete will be done in the dry. Operate all equipment for as long as necessary.

3.7 DEWATERING (Cont'd)

.4 Dispose of water removed from excavations in a manner that will prevent injuries to public health or private property or to any operation of the work completed or under construction. Pumping of water containing silt or other material in suspension into streams or drainage courses is prohibited.

.5 Ensure that all sub-drains, sump holes, wells or the like required for dewatering shall not endanger the stability of the Works. On completion of the work completely backfill and consolidate excavations.

.6 Excavate, remove or thaw out frozen ground as necessary.

3.8 EXCAVATION

.1 Carry out excavations and removals. Excavate to lines, grades, elevations and dimensions as indicated.

.2 Remove rubble and other obstructions encountered during excavation.

.3 For trench excavation, unless otherwise authorized by Consultant in writing, do not excavate more than 30 m of trench in advance of installation operations.

.4 Dispose of surplus and unsuitable excavated material in approved location off site in accordance with PEI Owner's of Environment regulations.

.5 Do not obstruct flow of surface drainage.

.6 Earth bottoms of excavations to be solid undisturbed soil, level, free from loose, soft or organic matter.

.7 Notify Consultant when soil at bottom of excavation appears unsuitable and proceed as directed by Owner's Representative.

.8 Obtain Consultant's approval of completed excavation.

.9 Remove unsuitable material from trench bottom to extent and depth as directed by Consultant.

3.8 EXCAVATION (Cont'd)

.10 Where required due to unauthorized over excavation, correct as follows:
.1 Fill under bearing surfaces and footings with approved structure fill compacted to 100% Standard Proctor Dry Density.
.2 Fill under other areas compacted to a minimum of 95% Maximum Dry Density.

.11 Hand trim, make firm and remove loose material and debris from excavations. Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.

.12 Obtain excavation permit prior to starting any on-site excavations.

3.9 FILL TYPES AND COMPACTION

.1 Use fill of types as indicated or specified below. Compaction densities are percentages of maximum densities obtained from ASTM D698.

.2 Within trenches:
.1 For pipes, cables, ducts, fittings and appurtenances, install bedding as follows: Provide min. 150 mm bedding layer of bedding sand under pipes, cables, ducts, fittings and appurtenances. Compact to 95% of Maximum Dry Density. Side fill to top of utility or service manually with beddings and in uniform lifts not exceeding 150 mm. Hand tamp only.

.3 Backfill: provide min. 300 mm protective backfill cover over bedding cover, hand-place. Compact to 95% of Maximum Dry Density. For remainder of trench backfill to underside of sub-base course or of surface restoration in lifts not to exceed 200 mm. Compact to 95% of Maximum Dry Density.

.4 Notify Consultant four hours prior to backfilling of trenches.

3.10 BACKFILLING

.1 Do not proceed with backfilling operations until Owner's Representative has inspected and approved installation.

.2 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.

3.10 BACKFILLING (Cont'd)

.3 Do not use backfill material which is frozen or contains ice, snow or debris.

.4 Backfilling around installations.
.1 Place bedding and surround material as specified elsewhere.
.2 Do not backfill around or over cast-in-place concrete within 24 hours after placing of concrete.

.5 Place layers simultaneously on both sides of installed work to equalize loading. Difference not to exceed 225 mm.

.6 Where earth pressures are liable to develop permit concrete to cure for minimum 28 days to withstand earth and compaction pressures. Do not install earth or backfill until concrete has cured completely.

.7 Place protective material layer under, around and over minor installations until 600 mm of cover is provided. Dumping material directly on installations will not be permitted.

.8 Place backfill materials of earth fill around structure in uniform layers not exceeding 200 mm compacted thickness up to finish grade. Compact each layer replacing succeeded layer.

.9 Where new services cross under existing services, compact bedding for existing service pipe to 150 mm below bottom of pipe and provide a cast-in-place cradle for length of unsupported pipe.

3.11 INSPECTION AND TESTING

.1 The Contractor shall submit gradation curves for proposed materials to demonstrate compliance with specifications. Pay all costs for gradation curves.

.2 Have an independent testing laboratory carry out testing of materials and compaction. Frequency of tests will be determined by Consultant.

.3 Where tests or inspections by designated testing laboratory reveal work not in accordance with contract requirements, Contractor shall pay costs for additional tests or inspections as Consultant may require to verify acceptability of corrected work.

3.12 RESTORATION

.1 Upon completion of work, remove surplus materials and debris, trim slopes, and correct defects noted by Consultant.

.2 Clean and reinstate areas affected by work as directed by Consultant.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

.1 This section specifies the requirements for constructing water mains and service connections. Work includes supply, installation and testing of pipe, fittings and related appurtenances.

1.2 RELATED SECTIONS

.1 Excavation, Trenching and Backfilling: Section 31 23 10

1.3 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01 33 00 for all pipe, fittings, valves and all other items necessary for a complete water main installation.

1.4 CERTIFICATES

.1 Submit manufacturer's test data and certification that products and materials meet requirements of this Section in accordance with Section 01 33 00.

1.5 HANDLING AND STORAGE

.1 Handle and store pipe, valves and fittings, in such manner as to avoid shock and damage. Do not use chains or cables passing through pipe bore. Do not damage coatings or linings.

.2 Store gaskets in cool location, out of direct sunlight, and away from petroleum products.

.3 Store hydrants and valves to prevent retention of water and damage by freezing.

PART 2 - PRODUCTS

2.1 POLYVINYL CHLORIDE PIPE

.1 Polyvinyl chloride pressure pipe: to AWWA C900, Class 235 and CSA B137.3. Push on joint with continuous rubber-moulded lining gasket to AWWA C111.

2.2 FITTINGS

.1 Fittings 200 mm dia. and smaller shall be PVC. Fittings 250 mm dia. and larger can be PVC or DI.

.2 AWWA C153, cement mortar lined to AWWA C104 and coated outside with standard coatings. Lead tipped gasket not permitted.

.3 PVC conforming to AWWA C907 certified to CSA Standard B137.3.

2.3 HYDRANTS

.1 Dry barrel type: to AWWA C502 and as follows:
  .1 Depth of bury: as per drawings.

.2 Barrel: two-piece with safety break-away flange stem.

.3 Main valve: compression type, 134 mm minimum diameter.

.4 Inlet connection: mechanical joint, 150 mm diameter.

.5 Nozzles: two hoses and one pumper to Town of Stratford Standard.

.6 Direction of opening: counterclockwise.

.7 Operating nut: 19 mm pentagon.

.8 Acceptable products:
  .1 McAvity Brigadier 'M67'

.9 Hydrant marker: fabricate from 40 mm O.D. polyethylene pipe, with ductile iron base plate. Pipe shall be fluorescent orange in colour and have an overall height of 1.8 M. Standard of acceptance: as manufactured by CKT Investments, Winnipeg, Manitoba.

2.4 GATE VALVES

.1 Standard buried type: to AWWA C509 up to and including 300 mm, minimum working pressure rating 1380 kPa and as follows:
  .1 Body: cast-iron with mechanical joint ends.
  .2 Mechanism: solid resilient wedge, epoxy coated, bonnet, S.S., packing gland nuts and bolts, non-rising spindle, and O-ring seals.
  .3 Direction to close: clockwise.
  .4 Operating nut: 50 mm square.
  .5 Taping valve: with mechanial joint x flanged end.
  .6 Acceptable products:
    .1 Clow McAvity F-6100 Resilient Seat Valve
    .2 Mueller A2361 Resilient Wedge Valve

.2 Epoxy coat all gate valves with minimum 150 microns coating.

2.5 TAPPING SLEEVES

.1 Tapping sleeve: type 304 stainless steel to AWWA C223 for ductile iron and polyvinvyl chloride (PVC) pipe.
  .1 Body: stainless steel per ASTM A 240/A 240M type 304.
  .2 Outlet: integral MJ outlet.
  .3 Testing plug: ¾" NT type 304 stainless steel, plub threads coated to prevent galling.
  .4 Bolts/nuts/washers: type 304 stainless steel, coated to prevent galling.
  .5 Gaskets: nitrile (Buna-N) NSF 61 listed per ASTM D 2000.

.1 Acceptable Products:
.1 Mueller H-304(ss).
.2 Smith Blari 662.
.3 Romac SST420.
.4 Robar 6606 (ss).
.5 Ford FTSS.

2.6 VALVE BOXES

.1 To AWWA C500 and as follows:
.1 Two piece sliding type with cover and centering disc, adjustable for depth of pipe below finished grade.
.2 Covers marked "Water".
.3 Lugged to prevent turning and rolling of cover, and cover notched to suit.
.4 Have clear opening of 135 mm.
.5 Bonnet on the bottom section which is capable of enclosing the packing gland section of the gate valve.
.6 Acceptable products:
.1 Mueller MVB composite valve box.

2.7 BOLTS FOR BURIED SERVICE

.1 T-head bolts and nuts:
.1 Low alloy Corten steel

2.8 SERVICE PIPE AND FITTINGS

.1 Service connections 100 mm and larger refer to pipe specifications subsection 2.1.

.2 Domestic services 50 mm and smaller:
.1 Copper tubing: to ASTM B 88, type K annealed, minimum pressure rating 1035 kPa.
.2 Joints: compression type, minimum pressure rating 1035 kPa.
.3 Corporation stop: brass to ASTM B 62, compression type, inlet threads to AWWA C800, minimum pressure rating of 1035 kPa.
.1 Acceptable products:
.1 19-50mm Mueller H15008
.4 Curb stop and drain: brass to ASTM B 62, compression type joints. Minimum pressure rating of 1035 kPa.
.1 Acceptable products:
.1 19-50mm Mueller H15219 (Oriseal)
.5 Tapped coupling: PVC conforming to AWWA C907 and certified to CSA Standard B137.3.
.6 Service Box: adjustable type, cast iron bottom section, stainless steel operating rod and cotter pin, cast iron lid with recessed pentagon nut and internal stem to suit depth of bury. Service boxes are to be magnetized to facilitate future locates. Service box to have appropriate foot piece. 38 mm and 50 mm curb stops to be fitted with full size valve boxes.

.1 Acceptable products:
.1 Mueller 726 (19 and 25 mm dia.)
.2 Mueller 728 (38 and 50 mm dia.)

2.0 COUPLINGS

.1 Mechanical joint sleeve type: to AWWA C110; use on new ductile iron pipe. Provide spacer ring between pipe ends. Where gap between pipe ends is less than 10 mm, spacer not required.

2.10 THRUST RESTRAINT

.1 Thrust blocks and anchors: Minimum 25 mpa compressive strength.

.2 Joint restraint device: 100 mm to 600 mm joint restraint device to AWWA C111 and C153 for mechanical or push-on joints with multiple wedge or gripper ring restraining mechanism, minimum working pressure rating 2410 KPa and minimum safety factor of 2:1. No special tools shall be required for installation.
.1 Acceptable products:
.1 Ebba Iron Megalug
.2 Clow
.3 Sigma
.4 Uni-Flange

2.11 DISINFECTANT

.1 Sodium hypochlorite or calcium hypochlorite: to AWWA B300.

.2 Liquid chlorine: to AWWA B301.

2.12 REDUCING AGENT

.1 Hydrogen peroxide, 35% by mass commercial grade.

2.13 INSULATION

.1 Rigid polystyrene insulation to CGSB-51.20, type 4, minimum compressive strength 41.5 KPG (60 psi). Standard of Acceptance: HI60 by Dow Chemical Canada.

2.14 MARKER STAKE

.1 Timber marker stake - 40 mm x 90 mm painted blue. Must be installed as location marker for end of service at property line.

2.15 GEOSYNTHETIC

.1 Synthetic fibre, rot proof, unaffected by action of oil or salt water and not subject to attack by insects or rodents. Non-woven construction, with minimum thickness of 2 mm and minimum density of 200 g/m2.

2.16 MARKER TAPE AND TRACING WIRE

.1 Underground warning tape: minimum 75 mm wide, metal detector tape, clearly marked "Caution - Buried Waterline", Colour Blue.

2.17 PIPE BEDDING

.1 Sand Bedding: as per Section 31 23 10.

PART 3 EXECUTION

3.1 PREPARATION

.1 Carefully inspect products for defects and remove defective products from site.

.2 Ensure that pipe, fittings, valves and hydrants are clean before installation.

3.2 TRENCHING, BEDDING AND BACKFILLING

.1 Provide trenching, bedding and backfilling to Section 31 23 10.

.2 Use sand bedding for pipe bedding and protection unless otherwise specified.

.3 Clear stone may be used in wet or freezing conditions only where specified or with the prior approval of the engineer.

3.3 BURIED PIPE INSTALLATION

.1 Lay and join pipe, fittings, and valves, as specified herein and according to manufacturer's published instructions.

.2 Do not lay pipe and fittings when trench bottom is frozen, under water or when trench conditions or weather are unsuitable.

.3 Lay pipe and fittings on prepared bed, true to line and grade indicated, within the following tolerances:
.1 Horizontal Alignment: 150 mm
.2 Vertical Alignment: 75 mm

.4 Face bell ends in direction of laying. On grades of 5% or greater, lay pipe up grade. For grades exceeding 16%, install appropriately designed gradient thrust restraint.

.5 Prevent entry of bedding material, water or other foreign matter into pipe. Use temporary watertight bulkheads when pipe laying is not in progress.

.6 Do not use excessive force to join pipe sections.

.7 Install gaskets in accordance with manufacturer's published instructions. Use only lubricant

approved for potable water. During cold weather, store gaskets in heated area to assure that gaskets remain flexible.

.8 Align pipes carefully before joining.

.9 Support pipes as required to assure concentricity until joint is properly completed.

.10 Keep pipe joints free from mud, silt, gravel or other foreign materials.

.11 Avoid displacing gasket or contaminating with dirt, or other foreign material. Remove, clean, re-install and lubricate gaskets so disturbed. Do not reuse a gasket that has been contaminated with petroleum products.

.12 Complete each joint before laying next length of pipe.

.13 Where deflection at joints is permitted by the Engineer, deflect only after spigot is fully inserted in bell. Do not exceed 50% of joint deflection recommended by manufacturer.

.14 At structures, provide flexible joint not more than 300 mm from outside face of structure. Support pipe between structure wall and first joint with 20 MPa concrete

.15 Cut pipe as required for fittings or closure pieces, square to centerline, and as recommended by manufacturer. Do not damage pipe lining or coating. Leave smooth bevelled edge.

3.4 HYDRANT INSTALLATION

.1 Install hydrants at locations indicated or where directed.

.2 Install 150 mm gate valve and valve box on hydrant anchor tee, as indicated.

.3 Set hydrant plumb, with hose outlets parallel to roadway, pumper connection facing roadway and breakaway flange.

.4 Provide mechanical joint restraint on all joints from the hydrant tee to the hydrant. In addition to joint restraint, provide concrete thrust blocks on all hydrants. Do not obstruct drain holes.

.5 Provide drainage not less than 0.5 m^3 in volume and backfill with clear stone to a level 150 mm above top of hydrant lead from hydrant to main.

.6 Place geosynthetic over clear stone from hydrant to main.

.7 Where water table is above drain holes, notify Consultant. Where hydrant cannot be appropriately relocated, plug drain holes and advise Consultant.

3.5 TAPPING SLEEVE

INSTALLATION

.1 All mains are subjected to a visual inspection by Engineers Representative prior to the proposed tap to confirm the structural condition of the pipe is adequate for tapping.

.2 Tapping fees to be paid by the Contractor.

.3 Provide a minimum 1.0 metre workign space along the main and 150 mm clearance around the main for tapping. Clean the exterior of the main to be tapped. Grind or file any protrusions or irregularities on the pipe exterior which may interfere with uniform seating of gaskets or clamping bands. In accordance with AWWA C651, dust interior surface of the tapping sleeve annulus with calcium hypochlorite powder before attaching to the main.

.4 Test the tapping valves and sleeves before tapping of main form both directions. Water services must witness all tests prior to tapping. The Owners Representative must witness all tests prior to tapping.

.5 Do not perform within 1.0 metre of an adjacent Water Serivce Connections or pipe joints.

3.6 VALVES AND VALVE BOXES

.1 Install valves at locations indicated. Joints and bedding as specified for pipe and fittings.

.2 On direct buried valves, install valve boxes plumb and centered over operating nut, and true to line and grade.

.3 Place select backfill material, maximum size 50 mm around valve box to subgrade.

.4 When valves are installed with cover in excess of 2.0 m, provide a valve stem extension.

3.7 THRUST RESTRAINT

.1 Provide formed thrust blocks to undisturbed ground on all tees, bends, reducers, plugs and caps. Keep joints and couplings free of concrete and construct, so as to avoid conflict with manholes in dual pipe trenches.

.2 Backfill over thrust blocks when concrete has sufficient strength and can withstand earth pressure.

.3 Provide mechanical joint restraint devices where specified.

.4 Place double polyethylene on bend before pouring concrete thrust block.

3.8 SERVICE LATERAL CONNECTIONS

.1 General:
- .1 Services shall not be installed in driveways or parking areas.
- .2 Water services to maintain 1.5 m horizontal separation from electrical conduit, communications, steam or hot water piping, transformer pads, utility poles, gas lines, or other utilities.
- .3 Maintain minimum of 1.8 metre ground cover on service connections. Maximum depth of bury shall not exceed 2m.
- .4 Lay service pipe in a smooth trench bottom with sand bedding 150 mm below the pipe and a minimum 300 mm over the pipe.

.5 Backfill with well graded Selected Backfill.

.6 Install service box over curb stop, set plumb with the top of service box flush with finished grade. Where grade has not been finalized or established, leave the top of service box 150 mm above top of curb or edge of asphalt. Place select backfill material, maximum size 50 mm, around the service box to subgrade.

.7 Leave corporation stop fully open. Operate curb stop to ensure flow, then close curb stop and leave closed.

.8 Place temporary marked stake at end of each service lateral, extending from pipe end at pipe level to 600 mm above grade. Paint exposed portion of stake blue.

.9 Tapped couplings are to be used for service connections to the new watermain.

.1 Follow manufacturer's instructions including installing to recommended torque. Check torque for each installation.

.2 Maintain minimum 1000 mm between adjacent service coupling, fitting or pipe joint. Roll coupling so that corporation stop is orientated at the 2:00 o'clock or 10:00 o'clock position.

.3 Leave corporation stop fully open.

3.9 COMMISSIONING PLAN

.1 The Contractor shall provide a Water System Commissioning Plan outlining the measures that will be taken for the hydrostatic testing, chlorination and disinfection of the water system. This plan is to indicate the areas to be tested, the sequence of testing and the sample locations for bacteriological tests. This plan shall follow all requirements set forth in this specification and be provided to and approved by the Engineer prior to any testing taking place. Unless otherwise approved, the maximum length of water main that can be tested shall be limited to 450m.

3.10 LEAKAGE

.1 Provide labour, equipment and materials required to perform hydrostatic test.

.2 The operation of any existing valve not part of the new construction, shall be by Utility staff. 24 hours notice is required by the Utility for all filling, flushing or chlorination operations for new construction.

.3 All services, hydrants, mains and other appurtenances shall be included in the system test.

.4 Perform tests in presence of the Engineer or his representative.

.5 All valves must be pressure tested, including hydrant valves.

.6 Where hydrant extensions are required, install extensions prior to testing.

.7 Open all valves in test section.

.8 Expel air from main by slowly filling with potable water. Install corporation stops at high points where no air-vacuum release valves are installed.

3.11 PIPEWORK

.1 Test pipework after backfilling.

.2 Ensure all air release valves on section being tested are installed and operational before testing. Fill watermain, for testing. Pipeline to remain filled for not less than 24 hours prior to pressure test. Ensure all air is purged before starting pressure and leakage tests.

.3 Gradually increase water pressure inside pipe until it reaches 1035 kPa at the lowest location under test. Maintain pressure test for two hours.

.4 Measured leakage of water as measured by a water meter approved by the Consultant.

$$Qm = (LDP^{.5}) / 795{,}000$$

Where: Qm = allowable leakage, in litres/hr.
L = length of pipeline in metres
D = diameter of pipe in millimetres
P = average test pressure in kilopascales

.5 The allowable leakage shall not be exceeded between adjacent valves.

.6 Replace, at no cost to Contract, all pipes, valves, fittings and couplings which are defective. Perform test at no cost to Contract until pipeline is approved by Consultant.

3.12 TESTS TO BE REPEATED

.1 Should tests disclose leakage, locate and repair defective pipes, or joints, to approval of Consultant.

.2 Tests to be carried out, at Contractor's expenses to determine success or otherwise of remedial measure applied to pipework. These tests to be repeated at Contractor's expense until results show that remedial measures have been successful.

.3 Following acceptance of field tests, should the Consultant suspect the watermain, for any reason, no longer complies with requirement of the test, he may order a second test and should the length of pipeline prove defective, Contractor shall repair or make good defect at his own expense.

.4 Cost of this second test to be borne by Contractor if test proves a defect. However, if this second test shows pipe to be satisfactory, cost of second test will be borne by Authority.

3.13 FLUSHING AND DISINFECTION

.1 Chlorination of any water system can proceed only after system has been successfully pressure tested. The chlorination test is to be witnessed by the Engineer.

.2 Flush and disinfect water mains to AWWA C651 and as herein specified. Notify the Engineer 24 hours in advance of flushing and disinfection.

.3 Flush water mains with potable water through available outlets until foreign materials have been removed and water is clear. The size and number of taps should conform to Table 3 of AWWA C651.

Pipe Diameter		Flow Required to Produce 2.5 ft/s (approx.) Velocity in Main		Size of Tap, In. (mm) 1(25)	1½(38)	2(51)	Number of 2½" (64mm) Hydrant Outlets
In. (mm)		Gpm	(L/s)	Number of Taps on Pipe			
4	(100)	100	(6.3)	1	-	-	1
6	(150)	200	(12.6)	-	1	-	1
8	(200)	400	(25.2)	-	2	1	1
10	(250)	600	(37.9)	-	3	2	1
12	(300)	900	(56.8)	-	-	2	2
16	(400)	1600	(100.9)	-	-	4	2

.4 Slowly open and close valves and hydrants to ensure thorough flushing.

.5 If satisfactory results cannot be achieved by flushing, swab pipe by approved methods and re-flush.

.6 Disinfect water main upon completion of flushing using chlorine solution distributed throughout entire system.

.7 Inject 1% chlorine solution through a corporation stop in the top of newly laid pipe, at point close to where main is being filled and at rate proportioned to filling rate. Prepare stock chlorine with concentration of 1% free chlorine by volume as follows:

Product	Amount Of Compound	Quantity of Water (litre)
high test calcium hypochlorite (67-70%C1)	1.0 kg	60 litres
liquid laundry bleach (5.25% CI)	1.0 litre	3.5 litres
3.5 litres (10.5% C1)	1.0 litre	7.0 litres

.8 Calcium hypochlorite is not to be used when water temperature is less than 5 C.

.9 The following table indicates the quantity of 1% chlorine stock solution required per 100 metre length of pipe.

Pipe Diameter (mm)	1% Hydrogen Peroxide Solution (litres)
100	4.9
150	10.9
200	19.4
250	30.4
300	42.9
350	58.4
400	76.3

.10 Operate valves, hydrants, and appurtenances while main contains chlorine solution.

.11 Take water samples at all hydrants and termination points, in suitable sequence, to test chlorine residual. When tests indicate minimum chlorine residual of 50 mg/L, leave system charged with disinfectant solution for 24 hours. At the end of this 24-hour period, the treated water in all portions of the main shall have a residual of not less than 25 mg/L. If the residual has fallen below 25 mg/L the system shall be rechlorinated.

.12 Flush disinfectant solution from line after 24 hours. Under no circumstances shall disinfectant solution remain in the line longer than 48 hours. Add 1.0% hydrogen peroxide reducing agent to the disinfectant solution at point of discharge or within a retention facility such that the solution is disposed to the environment with a total chlorine residual no greater than 0.0 mg/L in accordance with the requirements of the Department of Environment, Labour and Justice. Check chlorine residuals before disposal and at regular intervals during disposal to ensure compliance. This de-chlorination requirement can only be excluded with the written consent of the Department of Environment, Labour and Justice.

.13 Dispose of de-chlorinated disinfectant solution. Where disposing to the environment, disposal of the de-chlorinated solution must be at least 100 meters from the nearest watercourse.

.14 Where disinfectant solution is de-chlorinated at point of discharge, inject stock reducing agent at a rate proportioned to discharge rate. Injection and discharge rates must be monitored continuously to ensure proper proportioning.

.15 Prepare stock reducing agent with concentration of 1% Hydrogen Peroxide (H_2O_2) by volume, as follows:

Liquid Reducing Agent	Amount of Agent (litres)	Quantity of Water (litres)
Hydrogen Peroxide (35% H_2O_2 by mass)	1.0	34.0
34.0		

.16 The following table indicates quantity of 1% Hydrogen Peroxide required to reduce total chlorine residual of disinfectant solution contained per 100 metre length of pipe, from 50 mg/L to 0.0 mg/L.

Pipe Diameter (mm)	1% Hydrogen Peroxide Stock Solution (litres)
100	4.5
150	10.2
200	18.1
250	28.2
300	40.6
350	55.3
400	72.3

.17 Where total chlorine residual of disinfectant solution exceeds 50 mg/L, quantity of stock reducing agent for de- chlorination can be increased in direct proportion to the quantity indicated in the above table.

.18 After disinfectant solution is flushed from water main, assist Engineer's representative in obtaining two water samples on each of two consecutive days (at least 24 hours apart) for bacteriological tests. Hydrants shall not be used as sampling points. Repeat disinfection procedure if bacteriological tests fail.

.19 Bacteriological samples are to be obtained from a test sampling tap or a copper service lateral if available. Sampling shall take place from every 366m (1200 ft) of new water main, plus one set from the end of the line and from every branch (See AWWA C651-99, Section 5.1). Coliform tests must indicate 0 on two consecutive days combined with background count of less than 150.

.20 Should any of the test results be positive, repeat disinfection, flushing, sampling and analysis.

.21 After testing and submission of the written results for the passing of the bacteriological tests, remove corporation stops and install plugs. Check visually for leakage after plugs are installed with water main under normal operating pressure.

3. 14 CONNECTIONS TO EXISTING MAIN

.1 Connect new mains to existing mains as indicated.

.2 Do not make a connection to an existing main within 1.0 m of a fitting, pipe joint or another service.

.3 The Utility does not guarantee leak tight operation of existing valves.

.4 No work will be performed on existing main until all items required to complete the connection are on site and the outside diameter and type of pipe have been confirmed.

.5 The Utility will operate valves in the existing system.

.6 When a connection is made to an exiting main (ie. inserting a new tee) an inspection of the joints for leakage must be made by the Utility, while the main is under operating pressure, prior to backfilling.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED WORK

.1 Excavating, Trenching and Backfilling: Section 31 23 10

.2 Precast Structures: Section 33 39 00

1.2 REFERENCES

.1 CAN/CSA-B1800-06,Thermoplastic Nonpressure Piping Compendium.

1.3 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01 33 00.

.2 Submit shop drawings for all pipe, fittings, valves, and all other items necessary for a complete installation. Include details showing dimensions and tolerance of pipe and joint proposed.

1.4 MATERIAL CERTIFICATIONS

.1 Submit manufacturer's test data and certification that products and materials meet requirements of this Section.

.2 Ensure certification is marked on pipe.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Handle and store pipe, valves, fittings, in such a manner as to avoid shock and damage and as per manufacturer's recommendations. Do not use chains or cables passed through pipe bore.

.2 Store gaskets in cool location, out of direct sunlight, and away from petroleum products.

1.6 SCHEDULING OF WORK

.1 Schedule Work to minimize interruptions to existing services and maintain existing flows during construction.

.2 Submit schedule of expected interruptions for approval and adhere to approved schedule.

1.6 SCHEDULING OF WORK (Cont'd)

.3 Notify Engineer 24 hours minimum in advance of any interruption in service.

PART 2 - PRODUCTS

2.1 SEWER PIPE

.1 PVC pipe and fittings: type PSM polyvinyl chloride, to CAN/CSA-B1800, DR35, complete with bell and spigot joints with locked in rubber gaskets.

.2 Sewer laterals:
.1 Shall be type PSM polyvinyl chloride, to CAN/CSA-B1800, DR28 (white), complete with bell and spigot joints with locked in rubber gaskets.

2.2 PIPE BEDDING MATERIAL

.1 Sand bedding material: as specified in Section 31 23 10.

PART 3 - EXECUTION

3.1 PREPARATION

.1 Clean pipes and appurtenances of accumulated debris and water before installation. Carefully inspect materials for defects. Remove defective materials from site.

.2 Obtain Engineer's approval of pipes and fittings prior to installation.

.3 Provide proper implements, tools and facilities approved by the Engineer, for the safe and convenient prosecution of the Work.

.4 Take every precaution to prevent foreign material from entering the pipe.

3.2 TRENCHING AND BACKFILLING

.1 Provide trenching, excavating and backfilling to Section 31 23 10.

3.3 BEDDING

.1 Provide bedding to Section 31 23 10.

3.4 PIPE BEDDING

.1 Place bedding depth indicated.

.2 Shape bed true to grade to provide continuous uniform bearing surface for pipe exterior, including spading under the pipe haunches. Do not use blocks when bedding pipe.

.3 Shape transverse depressions in bedding as required to make joints.

.4 Carry bedding material horizontally across actual trench width. Mounding bedding material will not be permitted.

.5 After pipe installation place remainder of bedding in layers over pipe to dimensions indicated.

.6 Where gravel bedding is used, install geotextile fabric before placing overtopping bedding.

.7 Compact each layer of bedding to 95% Standard Proctor Density.

3.5 PIPE LAYING

.1 Carefully lower pipe into the trench. Do not drop or dump materials into the trench.

.2 Lay and join pipes, fittings and valves as specified herein and according to manufacturer's published instructions.

.3 Lay pipe and fittings on prepared bed, true to line and grade indicated, within following tolerances:
.1 Horizontal Alignment: 50 mm.
.2 Vertical Alignment: the lesser of 12 mm or one half the rise per pipe length.

.4 Commence laying at outlet and proceed in upstream direction with bell ends of pipe facing upgrade.

.5 Prevent entry of bedding material, water or other foreign matter into pipe. Use temporary water-tight bulkheads when pipe laying is not in progress.

3.5 PIPE LAYING (Cont'd)

.6 Do not lay pipe when the trench bottom is frozen, underwater or when trench conditions or weather are unsuitable.

3.6 PIPE JOINTING

.1 Install gaskets in accordance with manufacturer's published instructions. During cold weather store gaskets in heated area to assure flexibility.

.2 Align pipe carefully before joining. Do not use excessive force to join pipe sections.

.3 Support pipes as required to assure concentricity until joint is properly completed.

.4 Keep pipe joints free from mud, silt, gravel or other foreign material.

.5 Avoid displacing gasket or contaminating with dirt, petroleum products, or other foreign material. Remove, clean, reinstall and lubricate gaskets so disturbed.

.6 Where deflection at joints is permitted, deflect only after joint is completed. Do not exceed maximum joint deflection recommended by manufacturer.

.7 Cut pipe as required for fittings or closure pieces, square to centreline, and as recommended by manufacturer.

.8 Make watertight connections to manholes and structures.

.9 At structures provide flexible joint not more than 300 mm from outside face of structure, or as otherwise indicated.

3.7 PIPE BACKFILL

.1 As specified in Section 31 23 10.

3.8 PIPE CLEANING

.1 Prior to testing, clean gravity sewer to remove foreign materials.

3.9 TESTING SANITARY GRAVITY SEWER

.1 Tests for PVC sanitary sewers:

.1 All PVC saniary sewers including services shall be tested for watertightness by an air test after backfilling.

.2 The test shall be conducted between two consecutive manholes.

.3 The test section shall be plugged at each end with one of the plugs equipped for the air inlet. All services, stubs and fittings into the sewer test section shall be properly capped or plugged and braced to prevent leakage.

.4 The air control equipment shall consist of valves and pressure gauges used to control the air entry rate and to monitor the air pressure. The air Control equipment shall include a shut-off valve, pressure regulating valve, pressure reduction valve and a monitoring pressure gauge having minimum divisions of 69 KPa and accuracy of .28 KPa.

.5 Air shall be supplied to the test section slowly, filling the pipe until a constant pressure of 24 KPa is maintained. The air pressure must be regulated to prevent the pressure inside the pipe from exceeding 34 KPa.

.6 When constant pressure of 24 KPa is reached, throttle the air supply to maintain the internal pressure above 21 KPa for a minimum of 5 minutes to permit the temperature of the entering air to equalize with the pipe wall temperature. Check for leakage with a soap solution. If leakage is evident, release the pressure in the line, tighten leaky caps and plugs and repressurize as before.

.7 After a stabilization period, adjust the air pressure to 24 KPa and shut off the air supply. Observe the gauge until the air pressure reaches 20.5 KPa, then commence timing with a stop watch until the pressure drops to 17 KPa. The time required for this pressure loss of 3.5 KPa is outlined in the Unibell Handbook of PVC Pipe, October 1986 - Table 68, P313.

.2 Elevation and location:

.1 Provide Consultant with a high powered battery operated lamp for visual examination of all sewers. The lamp will be shone through the sewer from manhole to manhole. At least half diameter of the end of the pipe at the light source at one manhole shall be visible from the other manholes when viewed from either direction. Also, the viewing is to observe any standing water.

3.10 DEFLECTION TESTING - PVC PIPE

.1 Measure deflection by pulling a deflection gauge through each pipe from manhole to manhole after backfilling.

.2 Provide deflection gauges to measure a 5% and 7-1/2% deflection. Gauges to be a "Go-No-Go" device.

.3 Thirty days after installation, pull a deflection gauge measuring 5% deflection through the installed section of pipeline. If this test fails proceed with 7-1/2% deflection test.

.4 Thirty days prior to completion of Warranty Period Maintenance, pull a deflection gauge measuring 7-1/2% deflection through the installed section of pipeline.

.5 If 7-1/2% deflection test fails, locate defect and repair. Retest to satisfaction of Engineer.

3.11 CLOSED CIRCUIT TELEVISION INSPECTIONS

.1 Contractor shall arrange and pay for television camera inspection of installed sanitary pipeline, 200 mm and larger.

.2 Scheduling:
.1 The video inspection shall be first performed when the sanitary sewer has been cleaned and all manhole adjustments and street reinstatement have been completed.
.2 The entire system shall also be video inspected a second time eleven months after substantial completion.

.3 Equipment:
.1 Provide equipment meeting following requirements:
.1 Self-contained monitoring unit and camera with remotely controlled lighting system capable of varying the illumination.
.2 Picture quality shall produce continuous 600-line resolution picture, showing entire periphery of pipe.
.3 A meter device with readings above ground or marking on cable to clearly identify exact location of camera.

.4 Definition of fault:

3.11 CLOSED CIRCUIT TELEVISION INSPECTIONS (Cont'd)

.4 (Cont'd)
.1 Any pipe joint which displays a gap or spread, offset, gasket, or signs of infiltration.
.2 Any section of pipeline which is crushed, broken or displays cracks.
.3 Any variance in grade of pipeline.
.4 Any gravel, roots, or foreign material which may impede flow.
.5 Any deformation in shape of pipe.

.5 Inspection:
.1 Perform inspection of pipe by passing TV camera through pipeline in direction of flow.

.6 Records:
.1 Maintain inspection record in log form, during television inspection.
.2 Log to include location of each fault.
.3 Photograph fault from the television screen using a digital camera or provide hard copy stills directly from system if possible. All photographs to be clear and precise with distinct definition of fault.
.4 Include detailed technical description with photographs as supporting data for each fault.
.5 All photos and videos to be in colour.

.7 Reports:
.1 Provide a composite report of TV inspection. Enclose report in binder on letter size paper. Include following pages and information.
.1 Title page identifying project, camera operator and dates of inspection.
.2 Index page identifying pipeline, page number or numbers where information for section is contained.
.2 Report on each pipeline to contain:
.1 Heading:
.1 Street name.
.2 Manhole numbers applicable to section.
.3 Reference drawing number, if applicable.
.4 Weather on the day of inspection.
.5 Statement of soil condition in area of inspection, i.e., dry, damp, wet, frozen.
.6 Date of inspection.

3.11 CLOSED CIRCUIT TELEVISION INSPECTIONS (Cont'd)

.7 (Cont'd)

.2 (Cont'd)

.2 Key Plan showing magnetic north, horizontal distance, pipe and material and direction of flow.

.3 Inspection findings for each pipeline to include:

.1 Location of all faults.

.2 One photograph each of typical joint and flanged connection.

.4 Mount photographs on left-hand page and place corresponding description on right- hand page. Number all photographs in order. Number beside photograph to correspond with description number.

.5 Enclose all pages of report in transparent sheet protector.

.6 Provide copy of video tape to Engineer.

3.12 TESTS TO BE REPEATED

.1 Should testing or inspection disclose non-conformance, locate and repair defective pipe or joint to the approval of the Engineer.

.2 Re-test to determine success or otherwise of remedial measures applied to pipework. These re-tests are to be repeated at no extra cost to Contract until results show that remedial measures have been successful.

.3 In the event the Engineer suspects the sanitary gravity sewer no longer complies with requirement of the test, the Engineer may order additional testing. Should the length of pipeline prove defective, the Contractor shall repair or make good the defect at no extra cost to Contract.

.4 Cost of additional testing to be at no extra cost to Contract if test proves a defect. However, if this testing shows pipe to be satisfactory, cost of second test will be borne by Engineer.

3.13 CLEANUP

.1 Upon completion of testing of each section remove all ancillary equipment and plug holes. Do not backfill around test plugs until inspected by Engineer.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED WORK

.1 Excavating, Trenching and Backfilling: Section 31 23 10

1.2 REFERENCES

.1 ASTM C478M-2009, Specification for Precast Reinforced Concrete Manhole Sections.

.2 ASTM C858-2010, Standard Specification for Underground Precast Concrete Utility Structures.

.3 CAN/CGSB 51.34-M86, Vapour Barrier, Polyethylene Sheet for use in Building construction.

.4 CAN/CSA-A23.1-04/A23.2-09, Concrete Materials and Methods for Concrete Construction.

.5 CAN/CSA-A3000-2008, Cementitious Materials.

1.3 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01 33 00.

.2 Submit manufacturer's test data and certification that materials meet requirements of this section. Include manufacturer's drawings, information, size of components, dimensions and details where pertinent.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Precast manhole and catch basin sections: to ASTM C478M, circular. Manhole top sections shall be eccentric cone type where identified on Drawings. Precast concrete bases to be approved by Engineer.

.2 Joints: to be made watertight using rubber O-rings.

.3 Mortar:
.1 Cement: to CAN/CSA-A3000.

.4 Adjusting rings: precast concrete, to ASTM C478.

2.1 MATERIALS (Cont'd)

.5 Frames and covers: to dimensions as indicated and following requirements:
.1 Metal gratings and covers to bear evenly on frames. A frame with grating or cover to constitute one unit. Assemble and mark unit components before shipment.
.2 Gray iron castings: to ASTM A48.
.3 Bearing surfaces to be ground to eliminate surface imperfections.
.4 Manhole frames and covers: heavy duty municipal type for road service and as indicated on the drawings.
.1 Acceptable product: IMP Group Ltd. Type R10.

.6 Catch basin frames and grates: IMP R-11.

.7 Gravel bedding material: as specified in Section 31 23 10.

PART 3 - EXECUTION

3.1 EXCAVATION AND BACKFILLING

.1 Provide excavating and backfilling in accordance with Section 31 23 10.

.2 Obtain approval of Engineer before installing, manholes or catch basins.

3.2 CONCRETE WORK

.1 Do concrete work in accordance with Section 03 30 00.

.2 Position metal inserts in accordance with dimensions and details as indicated.

3.3 INSTALLATION

.1 Construct units in accordance with details indicated, plumb and true to alignment and grade.

.2 Complete manholes and catch basins as pipe laying progresses.

3.3 INSTALLATION (Cont'd)

.3 Dewater excavation as directed by Engineer and remove soft and foreign material before placing concrete base.

.4 Set precast concrete base on 150 mm minimum of granular bedding compacted in accordance with Section 31 23 10.

.5 Set riser sections on precast base and make joint watertight with O-ring gaskets. Grout joints inside and out with non-shrink grout.

.6 Plug lifting holes with non-shrink grout.

.7 Place stub outlets at elevations and in position indicated. Provide type of gasket connection as indicated.

.8 Install manhole benching where shown on the Drawings using concrete suitable for exposure classification C-2 as specified in CSA-A23.1.

.9 Install frames and covers on applicable top sections to elevation shown on Drawings or as directed.

.10 Clean units of debris and foreign materials. Remove fins and sharp projections. Prevent debris from entering system.

.11 Apply waterproofing for sanitary manholes as indicated in Section 07 11 00.

.12 Install frost barrier to depth shown on Drawings and band minimum three locations to manhole wall.

3.4 SYSTEM CLEANLINESS

.1 Upon manhole adjustment, removal of catchment device and all works associated with restoration around the manhole, the contractor shall provide all testing equipment, labour, incidentals, traffic control, etc., required to undertake an inspection of the system to verify its cleanliness. This inspection must be done in the presence of the Engineer.

3.5 MANHOLE TESTING (SANITARY ONLY)

.1 No test shall be carried out on a manhole structure until it has developed sufficient strength to withstand stresses produced by such test.

3.5 MANHOLE TESTING (SANITARY ONLY) (Cont'd)

.2 All incoming and outgoing sewers and service lines shall be plugged, the plugs restrained and the vacuum tester head placed on the manhole frame and sealed. A vacuum of 250 mm Hg shall then be drawn on the manhole and the time measured for the vacuum to drop to 225 mm Hg. This time shall not be less than 40 seconds for manhole diameters up to 1200 mm. For manholes deeper than 6 m, the test times shall be increased by 2 seconds per 300 mm of additional manhole depth.

.3 Should any leakage take place, take necessary measures approved by the Consultant to make them completely watertight.

END OF SECTION