PART C

TECHNICAL REQUIREMENTS

C1. General

1.1 The City has identified the following list of proposed projects, Table C1.1, for CIPP Rehabilitation and anticipates the projects will be grouped in seven or eight Bid Opportunities for construction prior to June 15, 2005.The list of projects shall be considered preliminary and the City may at their discretion add or delete projects from the list.

Table C1.1

Entity ID	Street Name	Location	Flow Type	Height	Width	Material	Length	*Max. Depth	Traffic Count (vpd)	Work Description
7455	PORTAGE AV (N OF CL)	MH AT EDMONTON ST TO MH AT KENNEDY ST (W PL)	CS	300		VC	104.7	4.9	20000+	FULL SEGMENT LINING
15732	MAIN ST (E OF CL)	MH AT SEVEN OAKS AV TO NODE AT JEFFERSON AV (N LEG)	CS	300		VC	89.9	5.9	20000+	FULL SEGMENT LINING
20019	BIRCHDALE AV (CL)	MH AT LYNDALE CR TO 1ST MH N OF LYNDALE CR	CS	300		CO	22	3.5	00000-04999	FULL SEGMENT LINING
2377	CUMBERLAND AV	MH AT CARLTON ST (E PL) TO 1ST MH E OF CARLTON ST	CS	375		VC	69.6	4.3	07500-09999	FULL SEGMENT LINING
18032	ABERDEEN AV	1ST MH E OF SALTER ST TO MH AT AIKINS ST	CS	375		VC	100.6	5.3	00000-04999	FULL SEGMENT LINING
9345	WALL ST	3RD MH S NOTRE DAME AV TO 2ND MH S NOTRE DAME AV	CS	450		CO	97.9	3.9	07500-09999	FULL SEGMENT LINING
9486	ALVERSTONE ST	1ST MH S MCINTYRE AV TO MH AT SARGENT AV	CS	450		VC	30	6.7	00000-04999	FULL SEGMENT LINING
8770	BURNELL ST	1ST MH N OF PORTAGE AV TO MH AT PORTAGE AVE	CS	600		CO	116.1	7.6	00000-04999	FULL SEGMENT LINING
8772	BURNELL ST	MH AT EINARSON AV TO 1ST MH N OF PORTAGE AV	CS	600		CO	114	7.2	00000-04999	FULL SEGMENT LINING
8776	BURNELL ST	MH AT ST MATTHEWS AV TO 1ST MH S ST MATTHEWS AV	CS	600		CO	117.9	6.9	00000-04999	FULL SEGMENT LINING
8779	BURNELL ST	1ST MH S ST MATTHEWS AV TO 2ND MH S ST MATTHEWS AV	CS	600		CO	59.4	6.9	00000-04999	FULL SEGMENT LINING
8781	BURNELL ST	2ND MH S ST MATTHEWS AV TO MH AT ST PAUL AV	CS	600		CO	57.9	7.0	00000-04999	FULL SEGMENT LINING
8860	LOGAN AV	MH AT WORTH ST TO MH AT SMART ST	CS	600		CO	34.4	4.6	12500-14999	FULL SEGMENT LINING
8862	LOGAN AV	MH AT SMART ST TO MH AT MILTON ST	CS	600		CO	76.8	4.8	12500-14999	FULL SEGMENT LINING
17429	MOUNTAIN AV (CL)	MH AT PENNINGHAME ST TO 1ST MH E OF PENNINGHAME ST	CS	600		CO	71.8	5.3	07500-09999	FULL SEGMENT LINING
17431	MOUNTAIN AV (CL)	1ST MH E OF PENNINGHAME ST TO MH AT CAIRNSMORE ST (CL)	CS	600		CO	13.5	5.3	07500-09999	FULL SEGMENT LINING
17970	POWERS ST	MH AT ABERDEEN AV (CL) TO MH AT REDWOOD AV	CS	600		CO	103.6	5.5	00000-04999	FULL SEGMENT LINING
8882	LOGAN AV	MH AT ELECTA ST TO MH AT BLAINE ST	CS	750		CO	18.8	5.4	12500-14999	FULL SEGMENT LINING
12363	WELLINGTON	1ST MH NE OF GROSVENOR TO MH AT GROSVENOR (AT ARBUTHNOT)	CS	750		CO	39.1	6.6	12500-14999	FULL SEGMENT LINING

Entity ID	Street Name	Location	Flow Type	Height	Width	Material	Length	*Max. Depth	Traffic Count (vpd)	Work Description
17165	SCOTIA ST	MH AT MCADAM AV TO NODE AT MATHESON AV (CL)	CS	750		CO	98.7	3.6	00000-04999	FULL SEGMENT LINING
18710	ROW (S OF HUGO ST S)	MH AT BERWICK PL TO MH AT KYLEMORE AV	CS	750		CO	87.2	7.4	00000-04999	FULL SEGMENT LINING
19087	PORTAGE AV	MH AT ST JAMES ST (CL) TO MH AT RICHMOND ST	CS	750		CO	88.82	7.1	20000+	FULL SEGMENT LINING
224	WELLINGTON	MH AT GROSVENOR AV TO 1ST MH E GROSVENOR AV	CS	900		CO	83.2	6.5	12500-14999	FULL SEGMENT LINING
228	WELLINGTON	1ST MH E COCKBURN ST TO MH AT HUGO ST	CS	900		CO	88.2	6.8	15000-17499	FULL SEGMENT LINING
14315	PRITCHARD AV	1ST MH W OF RAILWAY ST TO MH AT RAILWAY ST (W PL)	CS	900		CO	84.7	5.8	00000-04999	FULL SEGMENT LINING
16459	GERTRUDE	MH AT HUGO ST TO 1ST MH E HUGO ST	CS	900		CO	80.1	6.8	15000-17499	FULL SEGMENT LINING
17077	MAIN ST (CL)	MH AT MCADAM AV (CL) TO MH AT MATHESON AV E	CS	900		CO	95.7	7.3	20000+	FULL SEGMENT LINING
17087	MAIN ST (CL)	MH AT MATHESON AV E TO MH AT CARRUTHERS AV	CS	900		CO	52.8	7.4	20000+	FULL SEGMENT LINING
18724	COCKBURN ST S	MH AT KYLEMORE AV (E PL) TO MH AT WALKER AV	CS	900		CO	80.5	7.8	00000-04999	FULL SEGMENT LINING
18744	COCKBURN ST S	MH AT WALKER AV TO MH AT RATHGAR AV	CS	900		CO	79.2	8.2	00000-04999	FULL SEGMENT LINING
18764	COCKBURN ST S	MH AT RATHGAR AV TO MH AT BERESFORD AV	CS	900		CO	98.6	7.8	00000-04999	FULL SEGMENT LINING
18792	COCKBURN ST S	MH AT BERESFORD AV TO MH AT ROSEDALE AV	CS	900		CO	102.4	9.0	00000-04999	FULL SEGMENT LINING
7351	ARCHIBALD ST	MH AT KAVANAGH ST TO 1ST MH N KAVANAGH ST	CS	1200	900	CO	76.2	5.5	10000-12499	FULL SEGMENT LINING
19261	DE LA MORENIE ST	1ST MH S OF HAMEL AV TO 2ND MH S OF HAMEL AV	CS	1200	750	CO	106.4	5.5	00000-04999	FULL SEGMENT LINING
16757	POLSON AV	1ST MH E OF AIRLIES ST TO 2ND MH E OF AIRLIES ST	CS	1550	1200	CO	100.3	6.4	00000-04999	FULL SEGMENT LINING
16768	POLSON AV	3RD MH E OF AIRLIES ST TO MH AT SINCLAIR ST (E PL)	CS	1550	1200	CO	100.6	7.4	00000-04999	FULL SEGMENT LINING
17342	POLSON AV	MH AT SCOTIA ST TO 1ST MH E OF SCOTIA ST	CS	2175	1750	CO	25.5	0.0	00000-04999	FULL SEGMENT LINING
18696	BERWICK PL	1ST MH W OF DALY ST S TO 2ND MH W OF DALY ST S	CS	300		CO	95	5.9	00000-04999	FULL SEGMENT LINING WITH EXTERNAL POINT REPAIR
18843	MONTAGUE AV	1ST MH W OF OSBORNE ST TO MH AT CHURCHILL DR	CS	300		VC	90.1	6.1	00000-04999	FULL SEGMENT LINING WITH EXTERNAL POINT REPAIR
17256	LUXTON AV (ROW)	4TH MH E OF MAIN ST TO MH AT ST CROSS ST (CL)	CS	375		VC	111.84	4.5	00000-04999	FULL SEGMENT LINING WITH EXTERNAL POINT REPAIR
17988	BOYD AV	MH AT MCGREGOR ST TO 1ST MH E OF MCGREGOR ST	CS	375		VC	99.7	4.0	00000-04999	FULL SEGMENT LINING WITH EXTERNAL POINT REPAIR
18139	CHURCH AV	1ST MH E OF ANDREWS ST TO MH POWERS ST	CS	375		VC	100.6	5.4	00000-04999	FULL SEGMENT LINING WITH EXTERNAL POINT REPAIR
18853	DALY ST S	MH AT MCNAUGHTON AV TO MH AT CHURCHILL DR	CS	375		VC	72.5	6.4	00000-04999	FULL SEGMENT LINING WITH EXTERNAL POINT REPAIR

Entity ID	Street Name	Location	Flow Type	Height	Width	Material	Length	*Max. Depth	Traffic Count (vpd)	Work Description
16838	LANSDOWNE AV	1ST MH E OF ARLINGTON ST TO MH AT PARR ST	CS	450		CO	97.3	5.7	00000-04999	FULL SEGMENT LINING WITH EXTERNAL POINT REPAIR
20029	BIRCHDALE AV (CL)	1ST MH N OF CONISTON ST TO MH AT HIGHFIELD ST (CL)	CS	450		CO	33	4.6	00000-04999	FULL SEGMENT LINING WITH EXTERNAL POINT REPAIR
18184	AIKINS ST	MH AT BANNERMAN AV TO MH AT CATHEDRAL AV	CS	600		CO	101.5	4.9	00000-04999	FULL SEGMENT LINING WITH EXTERNAL POINT REPAIR
14313	PRITCHARD AV	1ST MH E OF LEO NOVAK ST TO 2ND MH E OF LEO NOVAK ST	CS	900		CO	98.7	5.5	00000-04999	FULL SEGMENT LINING WITH EXTERNAL POINT REPAIR
18718	KYLEMORE AV	2ND MH W OF DALY ST S TO 3RD MH W OF DALY ST S	CS	900		CO	69.6	7.5	00000-04999	FULL SEGMENT LINING WITH EXTERNAL POINT REPAIR
18720	KYLEMORE AV	3RD MH W OF DALY ST S TO MH AT COCKBURN ST S (E PL)	CS	900		CO	90.5	7.8	00000-04999	FULL SEGMENT LINING WITH EXTERNAL POINT REPAIR
17773	ARLINGTON ST	1ST MH N OF COLLEGE AV TO MH AT MOUNTAIN AV (S PL)	CS	300		VC	1	5.6	07500-09999	TRENCHLESS POINT REPAIR
19061	ST JAMES ST	5TH MH S OF ST MATTHEWS AV TO 4TH MH S OF ST MATTHEWS AV	CS	300		CO	3	3.2	12500-14999	TRENCHLESS POINT REPAIR
19061	ST JAMES ST	5TH MH S OF ST MATTHEWS AV TO 4TH MH S OF ST MATTHEWS AV	CS	300		CO	1.6	3.2	12500-14999	TRENCHLESS POINT REPAIR
19990	LYNDALE CR (CL)	MH AT LANE BETWEEN BALSAM AND BEECHWOOD TO MH AT HIGHFIELD (CL)	CS	300		CO	2.9	4.2	00000-04999	TRENCHLESS POINT REPAIR
14412	MAGNUS AV	MH AT MCNICHOL AV TO 1ST MH E OF MCNICHOL AV	CS	375		VC	1	5.8	00000-04999	TRENCHLESS POINT REPAIR
18951	ST JAMES ST	2ND MH N OF WELLINGTON AV TO 1ST MH N OF WELLINGTON AV	CS	375		CO	3	4.0	10000-12499	TRENCHLESS POINT REPAIR
18951	ST JAMES ST	2ND MH N OF WELLINGTON AV TO 1ST MH N OF WELLINGTON AV	CS	375		CO	2.4	4.0	10000-12499	TRENCHLESS POINT REPAIR
18951	ST JAMES ST	2ND MH N OF WELLINGTON AV TO 1ST MH N OF WELLINGTON AV	CS	375		CO	5	4.0	10000-12499	TRENCHLESS POINT REPAIR
18951	ST JAMES ST	2ND MH N OF WELLINGTON AV TO 1ST MH N OF WELLINGTON AV	CS	375		CO	3.8	4.0	10000-12499	TRENCHLESS POINT REPAIR
19816	TACHE AV	MH AT KITSON ST (S OF CL) TO MH AT HANBURY ST	CS	375		VC	1	2.8	07500-09999	TRENCHLESS POINT REPAIR
8884	LOGAN AV	MH AT BLAINE ST TO 1ST MH E OF BLAINE ST	CS	750		CO	3	5.6	12500-14999	TRENCHLESS POINT REPAIR
8884	LOGAN AV	MH AT BLAINE ST TO 1ST MH E OF BLAINE ST	CS	750		CO	2	5.6	12500-14999	TRENCHLESS POINT REPAIR

* hydrostatic head for design purposes shall be the maximum depth less two metres.

C2. Supplier - Materials

2.1 The materials of the Liner System, Tube and Resin, shall comply with the requirements of ASTM D5813 Sections 5, 6, 7, and 8, unless noted otherwise.

2.2 The Tube shall consist of one or more layers of fabric that are compatible with the Resin used and are capable of supporting and carrying Resin. The Tube should be capable of withstanding installation procedures and curing temperatures.

2.3 The Resin shall be a thermosetting polyester or vinyl ester.

2.4 If a calibration hose is used for inflation of the Liner System, it shall comply with the requirements of ASTM F1743 or ASTM F2019.

2.5 Prior to construction, the Resin manufacturer shall be required to submit a resin sample for infrared analysis. The infrared spectrum generated from this sample will be compared to the spectrum obtained from samples of the actual Resin used to wet-out the liner.

2.6 The minimum structural properties of the Liner System shall satisfy the requirements of Table C2.1 as per ASTM F1216, or Table C2.2 as per ASTM F2019:

Table C2.1

Component	Structural Property	Minimum Value (MPa)
Tube	Tensile Strength	5
Liner System	Flexural Strength	31
Liner System	Flexural Modulus	1724

Table C2.2

Component	Structural Property	Minimum Value (MPa)
Tube	Tensile Strength	5
Liner System	Flexural Strength	45
Liner System	Flexural Modulus	5000

2.7 The required portions of Form B shall be completed for each proposed Liner System or Resin and Tube combinations thereof.

2.8 Verification of structural properties shall be made by attaching relevant third party test results. Reports verifying structural properties shall conform to the requirements of Table C2.3

Table C2.3

Structural Property	Applicable Standard	Report Requirements
Tensile Strength (Tube)	ASTM D5035	Section 13 of ASTM D5035
Flexural Strength and Flexural Modulus (Liner System)	ASTM D790	Section 13 of ASTM D790
Long Term Flexural Creep Modulus (Liner System)	ASTM D2990	Section 13 of ASTM D2990

2.9 The Supplier shall submit chemical resistance results for each proposed Liner System.

2.10 Third party test results that do not implicitly indicate the resin and tube name on the actual laboratory report shall be supported by the following backup documentation:

- a certificate of compliance signed by a representative of the Supplier and a public notary indicating the Resin and Tube name tested on said reports, or
- copies of the appropriate contract specifications or approved shop drawings clearly indicating the tube and resin used on and subsequently tested and reported on said reports.

C3. Supplier - Design

3.1 The Liner System thickness shall be designed in accordance with the requirements of ASTM F1216 Appendix X1, unless noted otherwise.

3.2 The Liner System shall have minimum thickness of 4.0mm, and have a maximum SDR value of 100.

3.3 The Supplier shall complete the required portions of Form B for the proposed Liner Systems or Resin and Tube combinations thereof.

3.4 The Supplier shall include a copy of an actual design procedure with calculations for a past project for circular and non-circular liners.

3.5 In addition to the foregoing, the Supplier shall submit the design procedures and formulas applicable to:

(a) Assessment of pre and post-relining hydraulic capacity
(b) Structural design for
  i) partially deteriorated pipe condition
  ii) fully deteriorated pipe condition
  iii) segment missing from host pipe
  iv) small holes in host pipe
  v) non-circular cross sections

3.6 Upon award of the Contract(s), the Supplier of the Liner System shall prepare structural design calculations for the liner thickness. It will be a requirement of the work that a Professional Engineer, licensed to practice in the Province of Manitoba, seal the designs.

C4. Supplier - Experience

4.1 For a Supplier to be considered qualified, each Liner System proposed shall satisfy all the requirements of this specification as well as the following:

Table C4.1

Sewer Diameter or Height (mm)	Minimum Length Installed (metres)*
less than or equal to 900	10,000
greater than 900	1,000
non-circular cross sections	1,000

*in North America

4.2 If requested, the Supplier shall provide a list of projects completed (prior to December 31, 2001) to explicitly satisfy the minimum length installed requirements of Table C4.1.

4.3 The Supplier shall identify technical personnel responsible for Liner System design, installation, and quality control procedures.

4.4 The Supplier shall complete Form B for each of the proposed Liner System, or Resin and Tube combination thereof.

4.5 Suppliers not satisfying the above requirements shall not be pre-qualified.

C5. Supplier - Installation

5.1 The Liner System shall be installed in accordance with ASTM F1216, ASTM F1743, and/or ASTM F2019 and the Supplier's written instructions.

5.2 The Supplier shall provide details of the quality control procedures to be employed and monitored during the wet out and installation of the Liner System.

C6. Installer - Experience

6.1 In order to demonstrate their experience with Liner Systems, the Installer shall complete Form C.

6.2 For an Installer to be considered qualified, they shall have direct experience with Liner System installation during at least two separate construction seasons and the minimum length requirements stipulated in Table C6.2.

Table C6.2

Sewer Diameter or Height (mm)	Minimum Length Installed (metres)*
less than or equal to 900	5,000
greater than 900	500
non-circular cross sections	500

*in North America

6.2.1 The Installer shall provide details, on Form C, of projects completed to explicitly satisfy the minimum length requirements of Table C6.2.

6.2.2 Installers not satisfying the above requirements shall not be pre-qualified.

6.3 The Installer shall have in their employ, either as a direct employee or as a specialist sub-contractor, an individual(s), who will be on site at all times for work performed in the City, that has the required experience in the wet-out and installation of any large diameter and/or non-circular CIPP liners.

6.4 If the Installer is working under license to a Supplier, provide a copy of the license or certificate detailing the conditions of the License.

6.5 Upon award of the Contract(s), the Installer shall be required obtain a Sewer and Water license to work in the City and become registered to conduct business in the Province of Manitoba.