

**PART E**  
**SPECIFICATIONS**

## PART E - SPECIFICATIONS

### GENERAL

#### E1. APPLICABLE SPECIFICATIONS, STANDARD DETAILS AND DRAWINGS

- E1.1 *The City of Winnipeg Standard Construction Specifications* in its entirety, whether or not specifically listed on Form B: Prices, shall apply to the Work.
- E1.1.1 *The City of Winnipeg Standard Construction Specifications* is available in Adobe Acrobat (.pdf) format on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division internet site at <http://www.winnipeg.ca/matmgt>.
- E1.1.2 The version in effect three (3) Business Days before the Submission Deadline shall apply.
- E1.1.3 Further to GC:2.4(d), Specifications included in the Bid Opportunity shall govern over *The City of Winnipeg Standard Construction Specifications*.
- E1.2 The following Drawings are applicable to the Work:

<u>Drawing No.</u>	<u>Drawing</u>
SK-1	Location Plan, Brooklands/Brooklands West/Burrows/Manitoba Wastewater Sewer Districts
SK-2	Location Plan, Ash Combined Sewer District
SK-3	Location Plan, Doncaster/Tuxedo Combined Sewer Districts
SK-4	Location Plan, Roland Combined Sewer District
SK-5	Location Plan, Clifton Combined Sewer District
SK-6	Location Plan, Mager Drive Sewer District
SK-7	Location Plan, Baltimore Sewer District
SK-8	Location Plan, Douglas Park Sewer District
SK-9	Location Plan, Linden Combined Sewer District
SK-10	Location Plan, Hart Combined Sewer District
SK-11	Typical Existing Brick to Concrete Sewer Repairs

#### E2. SEWER REPAIRS

- E2.1 Description
- E2.1.1 Sewer repairs and assistance with equipment retrieval on an emergency basis shall be carried out on sewers within the Ash, Doncaster/Roland/Tuxedo, Clifton, Baltimore/Douglas Park, Mager Drive, Linden and Hart Combined Sewer Districts and the Brooklands/Brooklands West/Burrows/Manitoba Wastewater Sewer Districts as well as locations identified during previous inspection contracts in other Combined Sewer Districts. The majority of the repair locations will be identified during sewer cleaning and inspection work being performed by Contractors during 2004/2005. The sewer cleaning and inspection Contractors and/or the Contract Administrator will identify and mark the repair locations and the Contract Administrator will notify the repair Contractor of the requirement for emergency services in conformance with D13.
- E2.1.2 Further to the requirements of D13 the repair Contractor shall be required to begin on-site work on the repair on the second calendar day after notification. On-site work shall be deemed to be full mobilization of equipment to the Site and the commencement of cutting, breaking, and removal of existing pavement operations or in the case of an emergency repair in a boulevard, the commencement of excavation operations.

- E2.1.3 Should two or more repairs be identified at the same time the Contract Administrator will prioritize the repair sequence for the Contractor.
- E2.1.4 The scope of work involved in sewer repairs is as follows:
- (a) Secure the Site and provide temporary traffic control;
  - (b) Obtain all necessary underground clearances;
  - (c) Cut, break and remove existing pavement as required;
  - (d) Excavate and repair the designated length of sewer;
  - (e) Backfill as specified and carry out all surface restorations.
- E2.2 Construction Methods
- E2.2.1 Bedding and Backfilling
- (a) At locations where surface restoration must commence immediately following the sewer repair, the backfill above 200 mm above the top outside of the pipe shall be Class 1 as shown in Standard Drawing SD-002 and specified in CW 2030.
  - (b) At locations where surface restoration may commence within 7 Calendar Days of the completion of the sewer repair, the backfill above 200 mm above the top outside of the pipe shall be Class 3 as shown in Standard Drawing SD-002 and specified in CW 2030.
- E2.2.2 Intruding Water Service Repair
- (a) At locations where existing water services are through an existing sewer, the existing water connection shall be cut, extended with copper piping, lowered and reconfigured to avoid the sewer main and reconnected with the appropriate brass flared unions or copper to lead flanged adapters. The sewer shall be repaired as specified for "Sewer Repairs".
  - (b) Where water connections are shallow the contractor may be directed to insulate the connection with rigid polystyrene (100mm thickness). The Contract Administrator will advise the Contractor as to the extent and configuration of insulation required.
- E2.2.3 Cleaning and Inspection Equipment Retrieval
- (a) The contractor shall assist the sewer cleaning and inspection Contractors with retrieval of cleaning or televising equipment that may become lodged in the sewer pipe. The Contractor shall excavate at the location of the lodged equipment, remove a portion of the sewer main, allow the cleaning and inspection contractor with safe access to the Site and assist with the retrieval of the equipment. Upon retrieval of the lodged equipment the damaged pipe shall be replaced as specified for "Sewer Repairs".
  - (b) The means, methods, and techniques utilized for removing a portion of the existing sewer main shall ensure that the Cleaning and Inspection Contractor's equipment is not damaged during retrieval operations.
- E2.3 Quality Control
- E2.3.1 Repair Acceptance
- (a) Upon completion of the designated repair by the Contractor the Contract Administrator will arrange to inspect and videotape the sewer repair at no expense to the Contractor. Sewer inspections shall be completed subsequent to completion of all surface restoration.
  - (b) Acceptance criteria for line and grade of the repaired sewer shall conform to CW 2130 including the requirement that sharp bends shall not be permitted even though

adherence to line and grade may be within specified tolerances. In this context this shall include defects such as offsets and misalignment at the point of reconnection to the existing sewer.

- (c) The Contractor shall not be responsible for defects in existing unrepaired sewer lines unless those defects are a direct result of the Contractor's operation.

#### E2.3.2 Correction of Deficiencies

- (a) If deficiencies are found in the repaired section the Emergency Repair Contractor shall bear all costs of correcting the deficiencies including the cost of re-inspection to confirm that the deficiencies are rectified in accordance with these specifications.

#### E2.4 Method of Measurement and Basis of Payment

##### E2.4.1 Cement Stabilized Fill

- (a) Cement stabilized fill for Class 1 Backfill shall be measured on a volume basis. The volume paid for shall be the total number of cubic metres that are installed as computed from measurements made by the Contract Administrator.
- (b) Payment shall be made at the Contract Unit Price per cubic metre for "Cement Stabilized Fill", measured as specified, which price shall be payment in full for supplying all materials and for performing all excavation and backfilling and performing all other operations herein described and all other items incidental to the Work included in this Specification.

##### E2.4.2 Water Connection Piping Modifications

- (a) Water connection piping modifications shall be measured on a unit basis.
- (b) Payment shall be made for each acceptably modified water connection. Payment shall be compensation in full for all excavation, cutting and extending the water connection as required, reconnection and backfill as specified and all other operations required to acceptably modify the existing water connection in accordance with the specifications.

##### E2.4.3 Cleaning and Inspection Equipment Retrieval

- (a) Cleaning and inspection equipment retrieval shall be considered incidental to the cost of the sewer repair and no separate measurement or payment will be made for this Work.

### **E3. SEWER STABILIZATION**

#### E3.1 Description

E3.1.1 Sewer stabilization shall mean the internal repair of sewers and manholes by man entry techniques. Sewer stabilization shall be classified by the diameter range or height of the pipe being repaired and shall broadly be grouped into man-accessible sewers, 600-1050mm diameter or height, or man-entry, 1200mm diameter or height and larger, or manholes. Repairs are varied and may consist of holes with voids in sewers, missing bricks in sewers, obstructions and manhole base or riser repairs.

E3.1.2 Sewer stabilization on an emergency basis shall be carried out on sewers and manholes within the Ash, Doncaster/Roland/Tuxedo, Clifton, Baltimore/Douglas Park, Mager Drive, Linden and Hart Combined Sewer Districts and the Brooklands/Brooklands West/Burrows/Manitoba Wastewater Sewer Districts as well locations identified during previous inspection contracts in other Combined Sewer Districts. The majority of the repair locations will be identified during sewer cleaning and inspection work being performed by Contractors during 2004/2005. The sewer cleaning and inspection Contractors and/or the Contract Administrator will identify and mark the repair locations and the Contract

Administrator will notify the repair Contractor of the requirement for emergency services in conformance with D13.

E3.1.3 Further to the requirements of D13 the repair Contractor shall be required to begin on-site work on the repair on the second calendar day after notification. On-site work shall be deemed to be full mobilization of men, equipment, and materials to the Site and the commencement of repair operations.

E3.1.4 Should two or more repairs be identified at the same time the Contract Administrator will prioritize the repair sequence for the Contractor.

E3.1.5 The scope of work involved in sewer stabilization is as follows:

- (a) Secure the Site and provide temporary traffic control;
- (b) Obtain all necessary underground clearances;
- (c) Conduct a hazard assessment, including identification and evaluation;
- (d) Develop a safe work plan;
- (e) Implement the necessary procedures and controls to control hazards and maintain a safe working environment;
- (f) Enter the manhole/sewer and perform the required repairs.
- (g) Clean-up the Site.

## E3.2 Materials

### E3.2.1 Concrete

- (a) Concrete for large repairs to concrete and brick sewers and manholes shall conform to CW 2160.
- (b) Cement patching compound for smaller repairs shall conform to CW 2130 and be designed for underwater use, Duro-Crete by C C Chemicals or approved equal.

### E3.2.2 Void Filling

- (a) Polyurethane grout for interior void filling by pressure injection techniques shall be single component Diphenylmethane Diisocyanate (MDI) based, water activated, hydrophobic type Flexible Resin and Flexible Accelerator by Multiurethanes Limited or Hydro Active Flex LV and Hydor Active Flex Cat by DeNeef Construction Chemicals Inc. or approved equal.
- (b) Concrete for interior void filling shall conform to CW 2160.

## E3.3 Construction Methods

### E3.3.1 Hazard Assessment

- (a) In conjunction with securing of the Site and obtaining underground clearances, the Contractor shall conduct a hazard assessment for each site requiring a stabilization repair. The assessment shall identify and evaluate the hazards, including but not be limited to review of the following as it pertains to the Work to be performed:
  - (i) nature of the defect;
  - (ii) location of the defect in the sewer/manhole;
  - (iii) structural condition and amount of debris in the remaining sewer/manhole;
  - (iv) condition of the manholes up and downstream of the required repair;
  - (v) atmospheric conditions in the manholes up and downstream of the required repair;
  - (vi) condition of adjacent downstream sewers;

- (vii) flow in the sewer.
- (b) The hazard assessment shall be based on the Contractors review of video for the sewer(s) and site inspection of the manholes, sewers and external conditions. Prior to the inspection, the Contractor shall conduct the necessary atmospheric monitoring of the affected manholes and sewers to establish acceptable entry conditions.
- (c) Based on the results of the hazard assessment the Contractor shall determine if they can perform the stabilization repairs in a safe manner. If the Contractor decides to proceed with the internal repairs they shall prepare a safe work plan in accordance with E3.3.2 complete with the necessary controls and procedures required to maintain a safe working environment for the repair. Otherwise they shall notify the Contract Administrator and jointly the Contractor and the Contract Administrator shall review the nature of the defect and determine if a sewer repair shall be performed in accordance with CW 2130.

#### E3.3.2 Safe Work Plan

- (a) Subsequent to performing a hazard assessment a safe work plan shall be developed to address the potential hazards associated with each site. In addition to addressing the potential hazards the safe work plan shall address but not be limited to the following:
  - (i) guidelines for confined space entry work established by The Manitoba Workplace Safety and Health Act;
  - (ii) provision for emergency response;
  - (iii) training and duties for entry personnel;
  - (iv) rescue and emergency services;
  - (v) requirement for purging, ingesting, flushing and/or continuous ventilation to eliminate or control atmospheric hazards;
  - (vi) requirement for and provision of supplied air;
  - (vii) communication between members of the repair crew in the pipe and on the ground's surface;
  - (viii) current and forecasted weather conditions;
  - (ix) isolating the workspace by plugging of upstream sewers and monitoring of upstream flow levels;
  - (x) provision of back-up equipment;
  - (xi) method of ingress into the sewer;
  - (xii) method of egress out of the sewer – forward and backwards.
- (b) The Contactor shall not enter the sewer or manholes to begin the Work until they have completed a hazard assessment and safe work plan for the specific repair and reviewed said plans with their designated safety officer for acceptance. The safe work plan procedures and practices shall conform to all federal, provincial and municipal codes, regulations and guidelines including Manitoba Labour "Guidelines for Confined Space Entry".

#### E3.3.3 Equipment Set Up

- (a) In accordance with the safe work plan for the repair, the Contractor shall set up the required safety equipment and controls to safely perform the Work.
- (b) Specialized equipment to perform the repair work, such as lights, pressure washers, drills and chipping hammers shall in no way adversely affect the operation of the safety equipment required to perform the Work.
- (c) Subsequent to completion of the repairs the Contractor shall remove all equipment form the sewers and manholes.

#### E3.3.4 Enter the Manhole and Sewer

- (a) The Contractor shall enter the manhole/sewer and complete the Work in accordance with their safe work plan and requirements for the repair contained herein.
- (b) If at any time during the repair the attendant and/or Contractor believes he cannot safely perform the Work they shall immediately stop the Work and evacuate the sewer and manholes. The Contractor shall re-assess their safe work plan considering the reason for the work stoppage. The Work shall only be resumed when the Contractor has deemed it safe to return by completing a re-assessment and safe work plan revision, where necessary.
- (c) If the Contractor deems the Work cannot be safely completed by internal stabilization they shall notify the Contract Administrator and jointly the Contractor and the Contract Administrator shall review the nature of the defect and determine if a sewer repair shall be performed in accordance with CW 2130

#### E3.3.5 Sewer and Manhole Repairs

- (a) The Contractor shall repair the sewer fabric to restore the structural integrity of the sewer and provide a smooth flow surface conforming to the adjacent sewer/manhole cross-section and materials.
- (b) Large concrete repairs shall include a reasonable and limited level of surface preparation, including removal of unsound material and cleaning of the edges of the repair area, and setting of the required formwork and bracing. Concrete placement and finishing shall be done in accordance with CW 2160. All formwork and bracing shall be removed from the sewer/manhole at the completion of the Work.
- (c) Concrete patching shall include a reasonable and limited level of surface preparation, including removal of unsound material and cleaning of the edges of the repair area. The contractor shall apply the patching material in accordance with the manufacturer's printed instructions.
- (d) Small voids in the backfill shall be filled with concrete from the inside of the sewer prior to repairing the sewer fabric or by pressure grouting after completion of the repairs. The void shall be completely filled.
- (e) Pressure grouting shall be done in accordance with the manufacturer's printed instructions.
- (f) Large voids shall be filled from the ground surface after completion of the repairs. Holes shall be cored in the pavement or the pavement shall be saw cut and removed to permit vacuum excavation from the underside of the pavement to the void. The void shall then be completely filled with flowable cement-stabilized fill. Pavement removal and restoration shall be done in accordance with CW 2130

#### E3.4 Quality Control

##### E3.4.1 Repair Acceptance

- (a) Upon completion of the designated repair by the Contractor the Contract Administrator will arrange to inspect and videotape the sewer repair at no expense to the Contractor.
- (b) Acceptance testing shall conform to CW 2130 except that no deflection testing will be required and obstruction testing with only be carried out at the discretion of the Contract Administrator.
- (c) The Contractor shall not be responsible for defects in existing unrepaired sewer lines unless those defects are a direct result of the Contractor's operation.

#### E3.4.2 Correction of Deficiencies

- (a) If deficiencies are found in the repaired section the Emergency Repair Contractor shall bear all costs of correcting the deficiencies including the cost of re-inspection to confirm that the deficiencies are rectified in accordance with these specifications.

#### E3.5 Method of Measurement and Basis of Payment

##### E3.5.1 Man-Accessible Repairs (Sewers 600-1050 diameter or height)

- (a) "Man-Accessible Repairs (Sewers 600-1050 diameter or height)" shall be measured for payment on an hourly basis for a full-time four-man crew. The hourly rate shall include the direct cost of labour plus an allowance for supervision and payroll burden (including EI, CP, Payroll tax, Workers Compensation assessments and vacation pay) and all required safety equipment, traffic control equipment, transportation, and tools and consumables required for the crew to work.
- (b) The number of hours paid for "Man-Accessible Repairs (Sewers 600-1050 diameter or height)" shall be the actual total number of crew-hours worked on Site.
- (c) For each sewer repaired, one hour shall be paid as full compensation for securing of the Site, obtaining underground clearances, providing and setting of traffic control devices, and preparing of a hazard assessment and safe work plan. Only one hour shall be paid for each sewer and the adjacent up and downstream manholes regardless of the number of individual repairs to the manholes and sewer. One hour shall be paid for these items regardless of whether or not the repairs are completed by stabilization techniques.
- (d) Overtime shall be included in the hourly crew-rate bid for "Man-Accessible Repairs (Sewers 600 – 1050 diameter or height)".

##### E3.5.2 Man-Entry Repairs (Sewers 1200 diameter or height or larger)

- (a) Man-Entry Repairs (Sewers 1200 diameter or height or larger)" shall be measured for payment on an hourly basis for a full-time four-man crew. The hourly rate shall include the direct cost of labour plus an allowance for supervision and payroll burden (including EI, CP, Payroll tax, Workers Compensation assessments and vacation pay) and all required safety equipment, traffic control equipment, transportation, and tools and consumables required for the crew to work.
- (b) The number of hours paid for "Man-Entry Repairs (Sewers 1200 diameter or height or larger)" shall be the actual total number of crew-hours worked on site.
- (c) For each sewer repaired, one hour shall be paid as full compensation for securing of the Site, obtaining underground clearances, providing and setting of traffic control devices, and preparing of a hazard assessment and safe work plan. Only one hour shall be paid for each sewer and the adjacent up and downstream manholes regardless of the number of individual repairs to the manholes and sewer. One hour shall be paid regardless of whether or not the repairs are completed by stabilization techniques.
- (d) Overtime shall be included in the hourly crew-rate bid for "Man-Entry Repairs (Sewers 1200 diameter or height or larger)".

##### E3.5.3 Man-Entry Manhole Repairs

- (a) "Man-Entry Manhole Repairs" shall be measured for payment on an hourly basis for a full-time three or four-man crew. The hourly rate shall include the direct cost of labour plus an allowance for supervision and payroll burden (including EI, CP, Payroll tax, Workers Compensation assessments and vacation pay) and all required safety equipment, traffic control equipment, transportation, and tools and consumables required for the crew to work.



- (b) The number of hours paid for "Man-Entry Manhole Repairs" shall be the total actual number of crew-hours worked on site.
- (c) For each manhole repaired, one hour shall be paid as full compensation for securing of the Site, obtaining underground clearances, providing and setting of traffic control devices, and preparing of a hazard assessment and safe work plan. Only one hour shall be paid for these items for each sewer and the adjacent up and down stream manholes regardless of the number of individual repairs to the manholes and sewer. One hour shall be paid for these items regardless of whether or not the repairs are completed by stabilization techniques.
- (d) Overtime shall be included in the hourly crew-rate bid for "Man-Entry Manhole Repairs".

#### E3.5.4 Materials for Stabilization Repairs

- (a) Materials for stabilization shall be measured for payment in accordance with GC:7.4 (d), and substantiated in accordance with GC:7.9, and paid for out of the cash allowance for "Materials for Stabilization Repairs" as per D21. The Contractor shall be entitled to add 15% to the actual cost of the material. Only materials used to repair the fabric of the sewer or manhole or repair voids around the sewer or manhole such as concrete, brick and mortar, grout, and forming materials shall be measured for payment.
- (b) Materials required for traffic control, safety, and getting to and from the repair location shall be considered incidental to "Man Accessible Repairs (Sewers 600-1050 diameter or height)" or "Man-Entry Repairs (Sewers 1200 diameter or height and larger)".

### **E4. SEWER MANHOLES AND CATCHBASINS**

#### E4.1 Description

- E4.1.1 This Specification shall cover repairs and renewal of existing manholes and catchbasins and shall amend and supplement Standard Specification CW 2130.

#### E4.2 Materials

##### E4.2.1 Manhole Bases

- (a) Manhole bases shall be standard 1200mm diameter as per SD-10 or oversized 1.83 m high manhole bases with flat top reducers.
- (b) Stack opening size for oversized manhole bases shall be 1200 mm diameter.

##### E4.2.2 Manhole Risers

- (a) Manhole risers for new manholes shall be 1200 mm diameter complete with 1200x750mm flat top reducer as per SD-10.
- (b) Manhole risers for replacement on existing manholes shall be equal in diameter to the existing riser.

#### E4.3 Construction Methods

##### E4.3.1 Buried Manholes

- (a) Buried manholes as identified by the cleaning contractor and directed by the Contract Administrator shall be located, exposed and opened for evaluation of the type of manhole adjustment required.

E4.3.2 Manhole adjustments shall be either by the:

- (a) installation of cast iron ring inserts or
- (b) installation of concrete riser sections.

E4.4 Method of Measurement and Basis of Payment

E4.4.1 New Manholes on Existing Sewers

- (a) Measurement and payment for manhole installation will be measured on a vertical length basis as per CW2130. In addition to CW2130 all sewer main reconnections, piping up to 1m in length, and backfill shall be included in the price bid for "New Manholes on Existing Sewers".

E4.4.2 Manhole Risers

- (a) Measurement and payment for replacing existing manhole risers shall be on a vertical metre basis. Separate payment shall be made for each diameter:

E4.4.3 Manhole Adjustments

- (a) Manhole adjustments by installation of precast concrete ring sections up to a maximum height of 300mm will be measured for payment on a unit basis. Adjustments in excess of 300mm will be paid on a vertical metre basis as manhole risers.

E4.4.4 Manhole and Catchbasin Repairs

- (a) Measurement and payment for manhole and catchbasin repairs shall be as per CW 2130.

E4.4.5 Buried Manholes

- (a) Buried Manholes shall be measured on a unit basis and paid for at the Contract Unit Price for "Locate and Expose Buried Manholes".

## **E5. PROTECTION OF EXISTING TREES**

E5.1 The Contractor shall take the following precautionary steps to avoid damage from his construction activities to existing boulevard trees within and adjacent to the limits of construction:

- (a) The Contractor shall not stockpile materials and soil or park vehicles and equipment on boulevards within 2 metres of any tree.
- (b) Mature tree trunks shall be strapped with 25 x 150 x 2400 (1" x 6" x 8') wood planks. Smaller trees shall be similarly protected using appropriately sized wood planks.
  - (i) Excavations shall be carried out in such a manner so as to minimize damage to existing root systems. Roots over 50mm in diameter which must be cut to facilitate an excavation shall be neatly pruned with a saw prior to excavation and coated with an appropriate wound dressing to prevent infection.
  - (ii) Work on Site shall be carried out in such a manner so as to minimize damage to existing tree branches. Where damage to tree branches does occur, the Contractor shall neatly prune the damaged branch.
- (c) American elm trees are not to be pruned between April 1<sup>st</sup> and August 1<sup>st</sup> and Siberian elm trees between April 1<sup>st</sup> and July 1<sup>st</sup> of any year under provisions of The Dutch Elm Disease Act.

- E5.2 All damages to existing trees caused by the Contractor's construction activities shall be repaired to the requirements and satisfaction of the City of Winnipeg, Parks and Recreation Department, Forestry Branch.
- E5.3 No separate measurement or payment will be made for protection of trees. It shall be considered incidental to the Contract Work.