

PART E
SPECIFICATIONS

PART E - SPECIFICATIONS

GENERAL

E1. APPLICABLE SPECIFICATIONS, STANDARD DETAILS AND DRAWINGS

E1.1 *The City of Winnipeg Works and Operations Division Standard Construction Specifications* in its entirety, whether or not specifically listed on Form B: Prices, shall apply to the Work.

E.1.1.1 Division 2 - Standard Provisions, Provision CW 1100 of *The City of Winnipeg Works and Operations Division Standard Construction Specifications* shall apply to the Work.

E.1.1.2 Further to GC:2.4(d), Specifications included in the Tender Package shall govern over *The City of Winnipeg Works and Operations Division Standard Construction Specifications*.

E1.2 The following Drawings are applicable to the Work:

<u>Drawing No.</u>	<u>Drawing</u>
LD-2983	Site Plan Showing Location of Riverbank Improvements
LD-2984	Sections A, B and C
LD-2985	Rue Dumoulin Outfall (RR-57)
LD-2986	Radcliffe Road Outfall (RR-10)
LD-2987	Shenfield Road Outfall (RR-27)
LD-2988	Debris Grate Details
LD-2989	Hand Rail Details

E2. GEOTECHNICAL INFORMATION

E2.1 Further to GC:3.1, geotechnical information from the testholes located in the work area are included as Appendix A. The full geotechnical report is available for viewing at the KGS Group office, 3rd Floor - 865 Waverley St., Winnipeg, Manitoba R3T 5P4 during normal business hours.

E3. VERIFICATION OF WEIGHTS

E3.1 All Material which is paid for on a weight basis shall be weighed on a scale certified by Consumer & Corporate Affairs, Canada.

E3.1.1 All weight tickets shall have the gross weight and the time and date of weighing printed by an approved electro/mechanical printer coupled to the scale.

E3.1.2 The tare weight and net weight may either be hand written or machine printed. All weights, scales and procedures shall be subject to inspection and verification by the Contract Administrator. Such inspection and verification may include, but shall not be limited to:

- (a) checking Contractor's scales for Consumer & Corporate Affairs certification seals;
- (b) observing weighing procedures;

random checking of either gross or tare weights by having such trucks or truck/trailer(s) combinations as the Contract Administrator shall select weighed at the nearest available certified scale;

- (c) checking tare weights shown on delivery tickets against a current tare.

E3.2 The Contractor shall ensure that each truck or truck/trailer(s) combination delivering Material which is paid for on a weight basis carries a tare not more than one (1) month old.

- E3.2.3 The tare shall be obtained by weighing the truck or truck/trailer(s) combination on a certified scale and shall show:
- (a) upon which scale the truck or truck/trailer(s) combination was weighed;
 - (b) the mechanically printed tare weight;
 - (c) the license number(s) of the truck and trailer(s);
 - (d) the time and date of weighing.

E4. REVIEW OF SHOP DRAWINGS AND MATERIALS

E4.1 Shop Drawings

The Contractor will be allowed one submission of Shop Drawings for review by the Contract Administrator, and a second review for confirmation of revisions only. Subsequent reviews will be made at the Contractor's expense.

E4.2 Material Samples

Material samples for the Contract Administrators review which require a third or subsequent resubmission will be reviewed at the Contractor's expense.

E5. TRUCK WEIGHT LIMITS

- E5.1 The City shall not pay for any portion of Material which results in the vehicle exceeding the maximum gross vehicle weight allowed under The City of Winnipeg Traffic By-Law, unless such vehicle is operating under special permit.

E6. SITE DEVELOPMENT AND RESTORATION

E6.1 Description

This Specification shall cover all aspects of the Site Development and restoration work, including equipment mobilization and demobilization, erection and maintenance and removal of safety fencing, sediment control works, snow clearing, general access development, access maintenance and removal, Contract Administrator's site trailer, and site restoration.

The work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, and all things necessary for and incidental to the satisfactory performance and completion of all work as hereinafter specified.

E6.2 Equipment

All equipment, implements, tools and facilities used shall be of a size and type as required to complete the work in a reasonable time, approved by the Contract Administrator. The Contractor shall keep all equipment in good working order, and have sufficient standby equipment available at all times, as required.

E6.3 Mobilization / Demobilization

The mobilization and demobilization of all equipment necessary to complete the work is covered under this specification, including installation, maintenance and removal of the Contract Administrator's site trailer.

E6.4 Site and Construction Access

E6.4.1 The Contractor shall be responsible to develop suitable site access, this shall include but is not limited to, temporary bridging over structures, temporary removal and reinstallation of fencing, any landscaping and grading repairs, restoration of sod, etc. necessary to restore any site and construction access areas to their pre-existing condition.

All construction access ramps from the top of bank area down to the edge of the river shall be constructed by excavating to the necessary ramp grade and disposing of the material off site. Under no circumstances will the excavated material or any additional material be placed as fill in the ramp area. Detailed construction access ramp drawings are to be submitted to the Contract Administrator for approval a minimum seven (7) days prior to any construction activity on site. The contractor is responsible for obtaining all required permits and permissions that are necessary for site access, including a Waterways Construction Permit, if required by the Waterways Authority.

E6.4.2 The locations of the Contractor's construction access ramps shall be restored to the same condition or better than it was prior to the initiation of any work.

E6.5 Vegetation Removal

Some vegetation (small trees and sod) removal will be permitted in order to facilitate site access. Existing vegetation shall not be removed without prior approval from the Contract Administrator. The Contractor shall load and haul any removed vegetation, and dispose of the materials off site immediately upon collection. Stockpiling shall not be permitted.

E6.6 Snow and Ice Removal

E6.6.1 Snow cover shall be cleared from the riverbank prior to placement of the rockfill riprap. The methodology to clear the snow shall be subject to the approval of the Contract Administrator. The Contractor will also be responsible for all snow clearing along site access points for equipment access.

E6.6.2 Ice at the shoreline of the River shall be broken and cleared before the placement of riprap below ice level. Care shall be taken to ensure that the ice is removed, and does not become trapped below rockfill riprap placement, as identified in E8 Rockfill Riprap of this Specification.

E6.7 Safety Fence

The Contractor shall erect and maintain for the duration of the project, a safety fence to restrict access to all areas of ice removal for riprap placement. The fencing shall enclose all areas of open water, with appropriate gates or openings that are closed at the end of each work day. Appropriate signs shall be erected to warn all recreational users of the river that an open water hazard exists. This shall include but not be limited to snowmobilers and skiers. The installed fencing shall consist of Dupont Number L70 orange plastic safety fence or approved equal, with a mesh spacing of 45 mm and a minimum height of 1.2 metres supported by steel posts driven into the ice surface. If ice conditions will not support the posts, temporary supports shall be provided. The steel posts shall be sized and capable of maintaining the snow fence material upright, regardless of conditions. Upon complete of the work, the fence shall be removed and disposed off site.

E6.8 Environmental Regulations

E6.8.1 The Contractor shall adhere to all relevant Federal and Provincial environmental regulations during the entire duration of construction process.

- E6.8.2 The Contractor shall plan to work in accordance with the current environmental regulations of "Manitoba Stream Crossing Guidelines for the Protection of Fish and Fish Habitat", Fisheries and Oceans, and Manitoba Natural Resources.
- E6.8.3 The Contractor will supply, in writing, prior to commencement of work on-site, a detailed plan for sediment control on this project.
- E6.8.4 The Contractor shall ensure that a sufficient supply of suitable spill kits are on site to clean-up minor spills, should they occur. The Contractor shall supply the name, address and phone number of a local supplier, where additional kits are available on short notice, on the Emergency Phone List specified in D12.
- E6.9 General site Clean-up
- All areas of the construction site shall be restored to a condition at least equivalent to its original condition prior to initiation of work. This may include, but is not necessarily limited to the Contractor's lay down area, the removal of the Contract Administrator site trailer, and removal of all temporary fencing.
- E6.10 Topsoil and Sod
- A limited amount of topsoil and sod has been included in the Contract for the restoration above the Overflow pipe. All other areas to be restored to existing condition or better using topsoil and sod in accordance with CW 3510-R7. No payment will be made for topsoil and sod outside of the limit for the pipe restoration as specified in E13.
- E6.11 Method of Measurement
- The site development and restoration will be paid for on a lump sum basis. The work to be paid for shall be the total work constructed in accordance with this Specification and accepted by the Contract Administrator. No measurement will be made for this work.
- E6.12 Basis of Payment
- The site development and restoration will be paid for at the Contract Lump Sum Price for " Site Development and Restoration", which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the work included in this Specification. The maximum amount tendered for mobilization and demobilization shall not exceed 5% of the Total Bid Price.
- E7. GEOTEXTILE**
- E7.1 Description
- This Specification shall cover the supply and placement of the geotextile fabric to be used as a separator between the rockfill riprap and the surrounding native soil material.
- The work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, and all things necessary for and incidental to the satisfactory performance and completion of all work as hereinafter specified.
- E7.2 Materials
- E7.2.1 Handling and Storage of Materials
- All materials shall be handled and stored in a careful and workman-like manner, to the satisfaction of the Contract Administrator.

E7.2.2 Testing

There shall be no charge for any materials taken by the Contract Administrator for testing purposes.

E7.2.3 Geotextile

The geotextile material shall be a nonwoven geotextile filter fabric at least 4.6 m in width. All physical property requirements are minimum average roll values and shall conform to:

- (a) Tensile Strength 890 N (ASTM D4632 Grab test or CSGB Standard 4-GP-2 Method 9.2);
- (b) Trapezoid Tear 360 N (ASTMD4533 or CSGB Standard 4-GP-2, Method 11.2);
- (c) Equivalent Opening Size 0.210 mm (ASTM D4751);

Approved products shall be Amoco 4553, Armtec 250, or approved equal.

E7.2.4 Submittals

The Contractor shall submit all manufacturer recommendations for storage, handling, installation and splicing to the Contract Administrator.

E7.3 Equipment

All equipment, implements, tools and facilities used shall be of a size and type as required to complete the work in a reasonable time, approved by the Contract Administrator. The Contractor shall keep all equipment in good working order, and have sufficient standby equipment available at all times, as required.

E7.4 Construction Methods

E7.4.1 General

All work related to the geotextile storage, handling, and installation shall comply with the procedures and recommendations of the manufacturers.

E7.4.2 Placing of Fabric

Prior to laying the fabric, the riverbank shall be cleared of snow and all deleterious materials (rocks, roots, branches, bricks, glass, etc.) down to the bare in-situ soil surface, and graded to provide a smooth uniform surface to prevent puncturing or tearing the fabric.

The fabric shall be loosely laid in order to allow conformity to the riverbank surface. Folds and wrinkles in the fabric shall be avoided. Pins, nails or weights, as recommended by the manufacturer, shall be installed to hold the fabric in place. A minimum of 300 millimetres of rockfill riprap material shall be placed over the fabric prior to any equipment passage. The fabric shall be overlapped in a downstream direction (upstream panel overtop of downstream panel). All joints shall be overlapped a minimum of 600 millimetres. The overlap shall be pinned or secured.

Damaged geotextile shall be repaired immediately. All fill material shall be cleared a minimum of 1 metre around the damaged area. The damaged area shall be covered with a geotextile patch extending 1 metre beyond the perimeter of the damage. The fill material shall be replaced and compacted to the specified density.

E7.5 Quality Control**E7.5.1 Inspection**

Workmanship and materials used and placed under this Specification are subject to inspection and testing by the Contract Administrator, including all operations from the selection and separation of the materials, through to final acceptance of the specified work. The Contractor shall be wholly responsible for the control of all operations incidental thereto, notwithstanding any inspection or approval that may have previously been given. The Contract Administrator reserves the right to reject any materials or works which are not in accordance with the requirements of this Specification. All materials shall be approved by the Contract Administrator at least five (5) days before any construction is undertaken.

E7.5.2 Access

The Contract Administrator shall be afforded full access for the inspection and control testing of materials at the site to determine whether the material is being selected and placed in accordance with this Specification.

E7.6 Method of Measurement**E7.6.1 Geotextile**

The supply and placement of the geotextile will be measured on an area basis. The area to be paid for shall be the total number of square metres of ground covered by the geotextile (ie. Overlap at all joints shall be considered a single layer), placed in accordance with this Specification, acceptable to the Contract Administrator, as computed from measurements made by the Contract Administrator.

E7.7 Basis of Payment**E7.7.1 Geotextile**

Geotextile will be paid for at the Contract Unit Price for " Geotextile", measured as specified herein, which price shall be payment in full for performing all operations and providing all other items incidental to the work included in this Specification.

E8. ROCKFILL RIPRAP**E8.1 Description**

This Specification shall cover the supply and placement of the rockfill riprap material.

The work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all things necessary for and incidental to the satisfactory performance and completion of all work as hereinafter specified.

E8.2 Materials**E8.2.1 Handling and Storage of Materials**

All materials shall be handled and stored in a careful and workman-like manner, to the satisfaction of the Contract Administrator.

E8.2.2 Testing and Approval

All materials supplied under this Specification shall be subject to inspection and testing by the Contract Administrator or by the Testing Laboratory designated by the Contract

Administrator. There shall be no charge to the City for any materials supplied for testing purposes.

E8.3 Rockfill Riprap

The rockfill material for use as riprap shall consist of a clean free draining material, free from organics, roots, silts, sand, clay, snow, ice or any other material that would detract from the strength and drainage characteristics of clean rockfill. The rockfill material shall meet the following requirements:

- (d) maximum aggregate size of 450 millimetres;
- (e) minimum bulk specific gravity of 2.6 (ASTM C127);
- (f) maximum Los Angeles abrasion loss of 30% (ASTM C131);
- (g) maximum soundness loss of 13% (ASTM C88);
- (h) maximum absorption of 25% (ASTM C127)
- (i) gradation requirements as measured in the smallest dimension;

<u>Canadian Metric Sieve Size millimetres)</u>	<u>Percent of Total Dry Weight Passing Each Sieve</u>
450	100%
300	50 - 70%
200	25 - 40%
100	10 - 20%
50	0 - 5%

The riprap shall be durable, comprised of either limestone, granite, or other quality dense crushed rock. Should the Contractor choose to use limestone, it shall be durable white crystalline limestone. Softer buff to yellow dolomite or dolostone will not be accepted. No rockfill will be permitted for use without providing the source and supplier.

Individual particles shall be shaped such that the longest dimension does not exceed two times the minimum dimension. Flat, platy, or elongated particle shapes shall not be acceptable. Rounded field stones will not be acceptable.

E8.3.1 Submittals

Rock samples shall either be submitted to the Contract Administrator for approval a minimum of ten (10) days prior to their use, or the Contract Administrator shall visit the quarry for inspection a minimum of ten (10) days prior to use.

E8.4 Equipment

All equipment, implements, tools and facilities used shall be of a size and type as required to complete the work in a reasonable time, approved by the Contract Administrator. The Contractor shall keep all equipment in good working order, and have sufficient standby equipment available at all times, as required.

E8.5 Construction Methods

The rockfill shall be pushed or rolled into place in such a manner that the larger rocks are uniformly distributed and the smaller rocks serve to fill the places between the larger stones, and that excessive segregation of the various particle sizes does not occur. Sufficient levelling

shall be done to procure a neat and uniform surface, conforming to the shape and dimensions shown on the Drawings, and accepted by the Contract Administrator. The allowable fill tolerances shall be within 50 millimetres of the grade and thickness as shown on the Drawings. Care shall be taken when placing the outside edges of the riprap to provide a smooth flow transition from the existing river bottom to the riprap areas, as identified on the Drawings.

The existing ground above the winter ice level shall be subcut prior to the riprap placement, as shown on the drawings. All excavated material shall be disposed off site immediately upon excavation. The excavation subcutting shall be considered incidental to the riprap placement on no separate measurement or payment will be made.

E8.6 Quality Control

E8.6.1 Inspection

All workmanship and all materials furnished and supplied under this Specification are subject to close and systematic inspection and testing by the Contract Administrator including all operations from the selection and production of materials through the final acceptance of the specified work. The Contractor shall be wholly responsible for the control of all operations incidental thereto notwithstanding any inspection or approval that may have been previously given.

E8.6.2 Access

The Contract Administrator shall be afforded full access for the inspection and control testing of materials at the site to determine whether the material is being selected and placed in accordance with this Specification.

E8.7 Method of Measurement

E8.7.1 Rockfill

The supply and placement of the Rockfill Riprap will be measured on a weight basis. The weight to be paid for shall be the total number of metric tonnes of Rockfill Riprap material, supplied and placed in accordance with this Specification, acceptable to the Contract Administrator, as measured on a certified weigh scale.

The Contractor shall provide the weigh tickets to the Contract Administrator for the material supplied to the site at the time of delivery. No payment will be made for any weigh tickets that are not supplied at the time of delivery.

E8.8 Basis of Payment

E8.8.1 Rockfill Riprap

Rockfill Riprap will be paid for at the Contract Unit Price for "Rockfill Riprap", measured as specified herein, which price shall be payment in full for performing all operations and providing all other items incidental to the work included in this Specification.

E9 ROCKFILL TRENCH SHEAR KEY

E9.1 Description

This Specification shall cover the supply and placement of the Rockfill Trench Shear Key.

The work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all things necessary for and incidental to the satisfactory performance and completion of all work as hereinafter specified.

E9.2 Materials

E9.2.1 Handling and Storage of Materials

All materials shall be handled and stored in a careful and workman-like manner, to the satisfaction of the Contract Administrator.

E9.2.2 Testing and Approval

All materials supplied under this Specification shall be subject to inspection and testing by the Contract Administrator or by the Testing Laboratory designated by the Contract Administrator. There shall be no charge to the City for any materials supplied for testing purposes.

E9.2.3 Rockfill

Rockfill for back-filling the trench shear key shall consist of a blasted or crushed rockfill material, free from organics, roots, sand, silt, clay, snow, ice or any other material that would detract from the strength and drainage characteristics of rockfill. The rockfill for the rockfill trench shear key shall conform to the following specifications:

- a) minimum bulk specific gravity of 2.6 (ASTM C127);
- b) maximum Los Angeles abrasion loss of 30% (ASTM C131);
- c) maximum soundness of loss of 13% (ASTM C88);
- d) maximum absorption of 2.5% (ASTM C127)
- e) gradation requirements:

the rockfill backfill material shall be a well graded crushed material ranging in size from 50 mm to 150 mm in diameter with less than 5% finer than 5 mm.

The rockfill shall be durable, comprised of either limestone, granite, or other quality dense rock. Should the contractor choose to use limestone, it shall be durable white crystalline limestone. Softer buff to yellow dolomite or dolostone will not be acceptable. No rockfill will be permitted without providing the source and supplier.

E9.2.4 Clay Cap

The impervious clay cap at the top of the rockfill trench shear key shall consist of a high plasticity clay material with a Liquid Limit in excess of 60%. The clay shall be free of deleterious material such as roots, organic material, ice, snow or other unsuitable materials and may be salvaged from the on-site excavation, as approved by the Contract Administrator. Frozen material will not be accepted. The supply and placement of the impervious clay cap shall be considered incidental to the rockfill column installation, and no separate measurement or payment will be made.

E9.3 Equipment

All equipment, implements, tools and facilities used shall be of a size and type as required to complete the work in a reasonable time, approved by the Contract Administrator. The Contractor shall keep all equipment in good working order, and have sufficient standby equipment available at all times, as required.

E9.4 Construction Methods

E9.4.1 General

The excavation shall be supervised at all times, and open excavations shall be adequately guarded or covered to protect worker safety.

E9.4.2 Shear Key Construction

The shear key excavation shall be excavated to the depths and widths, and in the locations shown on the Drawings. An adequate volume of rockfill for backfilling shall be on-site prior to excavation of each incremental length of the trench shear key. The excavation shall proceed in a timely manner and rockfill must be placed as soon as excavation takes place. Stockpiling of excavated material on the riverbank will not be permitted. The maximum open length of the shear key shall be 2 metres along the bottom of the excavation. The Contractor shall maintain the excavation in dry condition and shall be required to prevent surface water from entering the excavation.

In no case shall the shear key be left open at the end of the day. The shear key must be filled with rockfill at the end of each day.

After placement of the rockfill to the required dimensions shown on the Drawings, the impervious clay cap shall be placed in layers not exceeding 200 millimetres, and compacted to a minimum of 95% of the Standard Proctor Maximum Dry Density. The clay cap shall be located within undistributed native material surrounding the trench. Care shall be taken to ensure that an effective seal results between the wall of the excavation and the clay material placed to protect against water infiltration into the trench, as approved by the Contract Administrator.

Water infiltration and bottom blow out may occur as the bottom of the trench approaches the till. The top elevation of the trench excavation shall be located to minimize the risk of river-water entering the excavation. Discharge of water contained within the trench excavation from displacement of the rockfill during backfill will be acceptable. The Contractor shall be responsible to contain and direct any displaced water such that it will not affect other construction work or cause excessive erosion of the native riverbank soils. The control of the water shall be the responsibility of the Contractor and shall be considered incidental to the work.

E9.4.3 Supply of Rockfill

The Contractor shall monitor the supply rate of the rockfill material to ensure that the backfilling and compacting operations are not delayed.

E9.4.4 Stockpiling of Rockfill Material

The stockpiling of rockfill material on the lower bank will not be permitted at locations where the trench shear key has not been installed. The methodology for the stockpiling of rockfill at the lower bank area at locations where the trench shear key has been installed shall be subject to the approval of KGS Group. The cost for these approvals shall be considered incidental to the cost for installation of the Rockfill Trench Shear Key. Stockpiles of rockfill for the Rock Columns and Trench Shear Key shall be kept separate.

E9.4.5 Contaminated Rockfill Material

Where crushed rockfill has become contaminated with silt, clay, or other deleterious material due to the Contractor's method of operation, negligence, failure to backfill in a timely manner, etc. the material shall be classified as rejected backfill. The contaminated material shall be weighed and deducted from the total weight of crushed limestone measured for payment, prior to disposal. The cost to have the contaminated material weighed shall be the responsibility of the Contractor.

E9.5 Quality Control

E9.5.1 Inspection

All workmanship and all materials furnished and supplied under this Specification are subject to close and systematic inspection and testing by the Contract Administrator including all operations from the selection and production of materials through the final acceptance of the specified work. The Contractor shall be wholly responsible for the control of all operations incidental thereto notwithstanding any inspection or approval that may have been previously given.

E9.5.2 Access

The Contract Administrator shall be afforded full access for the inspection and control testing of materials at the site to determine whether the material is being selected and placed in accordance with this Specification.

E9.6 Method of Measurement

E9.6.1 Shear Key Excavation

The excavation for the shear key construction will be measured on a volume basis. The volume to be paid shall be the total number of cubic metres of material excavated and disposed of in accordance with this Specification, and as computed from measured depth and length, fixed base width and 0.25H:IV side slopes as shown on the Drawings.

E9.6.2 Rockfill

The supply and placement of the Rockfill will be measured on a weight basis. The weight to be paid for shall be the total number of metric tonnes of Rockfill material, supplied and placed in accordance with this Specification, acceptable to the Contract Administrator, as measured on a certified weigh scale. The Contractor shall provide the weigh tickets to the Contract Administrator for the material supplied to the site at the time of delivery. No payment will be made for any weigh tickets that are not supplied at the time of delivery.

E9.7 Basis of Payment

E9.7.1 Trench Shear Key Excavation

Trench Shear Key Excavation will be paid for at the Contract Unit Price "Excavation" , measured as specified herein, which price shall be payment in full for performing all operations and providing all other items incidental to the work included in this Specification.

E9.7.2 Rockfill Backfill

The supply and placement of Rockfill in the Trench Shear Key Excavation will be paid for at the Contract Unit Price per tonne for "Rockfill", measured as specified herein, which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the work included in this Specification.

E10 CLEARING AND GRUBBING

E10.1 Description

This specification shall amend and supplement Standard Specifications CW3010-R4.

E10.2 Method of Measurement

E10.2.1 Clearing and Grubbing

Clearing and grubbing will be measured on a lump sum basis. The lump sum to be paid for shall be to amount of trees cleared and grubbed as directed by the Contract Administrator.

E10.3 Basis of Payment

E10.3.1 Clearing and Grubbing

Clearing and grubbing will be paid for at the Contract Unit Price for "Clearing and Grubbing", measured as specified herein, which price shall be payment in full for performing all operations described and all other items incidental to the work included in the Specification.

E11 OUTFALL SEWER REPAIRS

E11.1 Description

This specification shall amend and supplement Standard Specifications CW 2130-R5 and CW 610-R3.

The work to be done by the Contractor under this specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies, and all things necessary for an incidental to the satisfactory performance and completion of all work hereinafter specified.

E11.2 Materials

E11.2.1 Handling and Storage of Materials

All materials shall be handled and stored in a careful and workman-like manner, to the satisfaction of the Contract Administrator.

E11.2.2 Testing and Approval

All materials supplied under this Specification shall be subject to inspection and testing by the Contract Administrator or by the Testing Laboratory designated by the Contract Administrator. There shall be no charge to the City for any materials supplied for testing purposes.

E11.2.3 Slip Joint

Shop drawings shall be submitted for the slip joint at the outfall. The slip joint shall be installed as shown on the drawings.

E11.2.4 Galvanized Primer

Galvanized primer for repair of damaged coating shall be zinc rich, ready mix to CGSB-1-GP-181 M.

E11.2.5 Bedding and Backfill Material

Sand bedding and Modified Class 2 backfill material as per CW 2030-R4, with 0.6 m of compacted excavated site select material as opposed to the detailed 0.3 m of compacted excavated material.

E11.2.6 CSP Outfall Pipe

Shall be the wall thickness' as shown on the construction drawings, CSP as per Clause 5.3 of CW 3610-R3.

E11.2.7 CSP Couplers

Material for CSP to CSP connections shall conform to CSA Specification CAN3-G401.

E11.2.8 Debris Grating

Shop drawings shall be submitted for the debris gratings and shall be installed as shown on the drawings. Galvanizing shall be hot-dip conforming to requirements of CSA G164-N1981 to a minimum net retention of 600 g/m². All bolts and nuts shall be galvanized steel conforming to ASTM A-325. All welding shall be fully approved by the Canadian Welding Bureau in conformance with CSA Standard W47.1. Welding shall be done by currently licensed welders only. Welding splatter and other fabricator burrs, where exposed, shall be ground off and/or filed smooth, and left ready for subsequent operations. All miscellaneous metal, after fabrication, shall be hot-dip galvanized. No separate measurement will be made for hot-dip galvanizing.

E11.2.9 Handrails and Plate Sleeve

Shop drawings shall be submitted for the three-rail handrail and pipe sleeve and shall be installed as shown on the drawings. Galvanizing shall be hot-dip conforming to requirements of CSA G164-N1981 to a minimum net retention of 600 g/m². All bolts, nuts, and plates shall be galvanized steel conforming to ASTM A-325. All welding shall be fully approved by the Canadian Welding Bureau in conformance with CSA Standard W47.1. Welding shall be done by currently licensed welders only. Welding splatter and other fabricator burrs, where exposed, shall be ground off and/or filed smooth, and left ready for subsequent operations. All miscellaneous metal, after fabrication, shall be hot-dip galvanized. No separate measurement will be made for hot-dip galvanizing.

E11.3 Equipment

All equipment, implements, tools and facilities used shall be of a size and type as required to complete the work in a reasonable time, approved by the Contract Administrator. The Contractor shall keep all equipment in good working order, and have sufficient standby equipment available at all times, as required

E11.4 Construction Methods**E11.4.1 Excavation, Bedding and Backfill**

Excavation, bedding, and backfill shall be completed in accordance with CW 2030-R4, unless otherwise indicated by the Contract Administrator.

Ensure bedding is thoroughly tamped and that the pipe is uniformly supported throughout.

Bedding and initial backfill up to 100 mm above the pipe crown shall be hand tamped by mechanical means to 90% maximum dry density as determined by the Standard Proctor Compaction Test.

Backfill around the pipe in, maximum 300 mm lifts, alternating from side to side. At no time should the difference in backfill elevation on either side of the pipe be greater than 450 mm.

Backfilling above the pipe shall be in accordance with CW 2030-R4 for Modified Class 2 backfill. The top 600mm of backfill is to be site select excavated material, as approved on site by the Contract Administrator, not the standard 300mm excavated material. The Contractor shall ensure the compaction equipment utilized, is consistent with degree of compactive effort required to achieve the specified densities, and adequately protects against overloading the pipe.

Where construction operations are restricted by existing trees and structures, the minimum required trench width shall be dug and maintained using a wood or steel shoring, designed and sealed by a Structural Professional Engineer who is a member of the Association of Professional Engineers and Geoscientists of the Province of Manitoba (APEGM). The Contractor shall provide shop drawings to the Contract Administrator, for review, prior to the start of excavation. Design and construction of the trench structure shall be considered incidental to the cost of the pipe installation and no payment will be made for this work.

The Contractor shall take precautionary steps to prevent damage from construction activities to adjacent private property. All damage to adjacent private property caused by the Contractor's activities shall be repaired to, equal or better condition than prior to construction, as approved by the Contract Administrator. No separate measurement or payment will be made for the protection of adjacent private property.

E11.4.2 Diversion of Flows

Flows such as snow melt, rainfall, watermain break, or any other flow travelling through the outfall shall be diverted during construction. The cost of the flow diversion is considered incidental to the installation of the pipe.

E11.4.3 Temporary Shoring

Any temporary shoring installed during the construction operations must be removed upon completion of construction and is considered incidental to the installation of the pipe

E11.4.4 Removal of Existing Pipe and Debris Grate

CSP field cuts shall be straight circumferential cuts. Clean all ends free of burrs etc., and touch up all areas affected by work with galvanized primer.

The Contractor shall excavate and dispose of the existing outfall piping and debris grate in accordance with Section 9 of Specification CW 2030-R4.

E11.4.5 Installation of CSP

All sewer pipes shall be installed as shown on the drawings and in accordance with the City of Winnipeg Construction Specifications.

All pipe shall be laid to the established line and grade.

E11.4.6 Connections

Where the drawings indicate connection to an existing pipe, the Contractor shall carefully expose the end of the existing pipe.

Where the existing pipe has a damaged end, sufficient length of the damaged pipe shall be removed to provide a straight end in acceptable condition. The cut end of the CSP pipe shall be coated with a galvanizing compound approved by the Contract Administrator.

E11.4.7 Installation of Debris Gate

Debris Gates shall be install in the location as shown on the drawings.

E11.4.8 Shop Drawings

Submit prepared shop drawings for the, slip joint, debris grate, handrail and plate sleeve details in accordance with Clause No. 3 of CW 1100-R4.

E11.5 Method of Measurement**E11.5.1 Removal of Existing CSP and Debris Gate**

The removal of existing CSP will be measured on a linear basis. The length to be paid for shall be the total number of lineal meters of existing CSP removed, in accordance with this Specification, acceptable to the Contract Administrator, as computed from measurements made by the Contract Administrator.

Removal of existing debris grate will be measured on a per unit basis. No measurement will be made for removal of the existing debris grate as it shall be considered incidental to the cost of the removal of the existing CSP.

E11.5.2 Supply and Installation of Slip Joints

Supply and Installation of Slip Joints shall be considered incidental to the cost of the installation of the CSP. No measurement will be made for the supply and installation of the Slip Joints.

E11.5.3 Supply and Installation of CSP

The supply and installation of the CSP shall be measured on a linear basis. The length to be paid for shall be the total number of lineal meters of CSP, measured from the tie-in point to the tip of the manufactured bevelled end section, horizontally above the center of the pipe, installed in accordance with this Specification, acceptable to the Contract Administrator, as computed from measurements made by the Contract Administrator. The bevelled end section shall be considered incidental to the installation of the CSP and no separate payment will be made.

E11.5.4 Supply and Installation of Debris Gate

The supply and installation of the Debris Gate shall be measured on a unit basis. The units to be paid for shall be the total number of units of Debris Gate, installed in accordance with this Specification, acceptable to the Contract Administrator, as computed from measurements made by the Contract Administrator.

E11.5.5 Supply and Installation of Handrails and Pipe Sleeves

The supply and installation of the Handrails and Pipe Sleeves including all required accessories will be measured on a lump sum basis. The lump sum to be paid for shall be the total work constructed in accordance with this Specification, and accepted by the Contract Administrator, as computed from measurements made by the Contract Administrator.

E11.6 Basis of Payment**E11.6.1 Removal of Existing CSP and Debris Gate**

Removal of Existing CSP and Debris Gate will be paid for at the Contract Unit Price for "Removal of Existing CSP and Debris Gate", measured specified herein, which price shall be payment in full for performing all operations described and all other items incidental to the work included in the Specification.

E11.6.2 Supply and Installation of CSP

Supply and Installation of CSP will be paid for at the Contract Unit Price for "Supply and Installation of CSP ", measured specified herein, which price shall be payment in full for performing all operations described and all other items incidental to the work included in the Specification.

E11.6.3 Supply and Installation of Debris Grate

Supply and Installation of Debris Grate will be paid for at the Contract Unit Price for "Supply and Installation of Debris Grate", measured as specified herein, which price shall be payment in full for performing all operations described and all other items incidental to the work included in the Specification.

E11.6.4 Supply and Installation of Handrails and Pipe Sleeves

Supply and Installation of Handrails and Pipe Sleeves will be paid for at the Contract Unit Price for "Supply and Install Handrails", measured as specified herein, which price shall be payment in full for performing all operations described and all other items incidental to the work included in the Specification.

E12 CHANNEL PROTECTION

The ice surface and riverbank channel shall be cleared prior to ice break-up. The Contractor shall clean up all materials, including but not limited to, soil, snow fence, construction debris, etc. from his construction activity. All items that will have an adverse impact on the channel shall be removed. Channel Protection shall be considered incidental to the works of this Contract and no measurement or payment will be made for this item.

E13 TOPSOIL AND SODDING

Topsoil and sod to be installed in accordance with CW 3510-R7. A limited amount of topsoil and sod has been included in the Contract for the restoration above the overflow pipe. All other areas to be restored to existing condition or better. No payment will be made for topsoil and sod outside of the limit for the overflow easement.

E14 BENTONITE CLAY MIXTURE CUT-OFF WALL**E14.1** Description

This Specification shall cover the installation of the Bentonite Clay Mixture Cut-off Wall.

The work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all things necessary for and incidental to the satisfactory performance and completion of all work as hereinafter specified.

E14.2 Materials**E14.2.1** Handling and Storage of Materials

All materials shall be handled and stored in a careful and workman-like manner, to the satisfaction of the Contract Administrator.

E14.2.2 Testing

There shall be no charge for any materials taken by the Contract Administrator for testing purposes.

E14.2.3 Bentonite Clay Mixture

The Bentonite Clay Mixture shall be comprised of:

- 1 part Bentonite (by volume)
- 3.5 parts Base Coarse Material (by volume)

The bentonite clay shall be a medium to high yield bentonite powder material free from organic or other deleterious material and contaminants, as approved by the Contract Administrator.

The base course material shall conform to CW 3110-R5 clause 5.5.

The mixing of the material shall be carried out in an approved mechanical mixer. The mixed material shall be left to cure for a minimum period of 24 hours prior to placement.

The permeability as determined from the falling head permeameter shall not exceed 1×10^{-5} mm/s.

E14.3 Construction Methods

E14.3.1 Installation

The Bentonite Clay Mixture Cut-off Wall shall be installed as a dry-pack material, kept from freezing during installation, and compacted in place to 90% Standard Maximum Dry Density.

E14.4 Basis of Payment

E14.4.1 Cut-off walls, Bentonite and clay, shall be incidental to the cost of pipe installation.