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:

Drawing No.	Drawing
	Cover Page
LD-3185	Elm Park Road LDS Outfall Gate Chamber - Site Plan
LD-3186	Elm Park Road LDS Outfall Gate Chamber - Details
LD-3187	River Point Drive LDS Outfall Gate Chamber - Site Plan
LD-3188	River Point Drive LDS Outfall Gate Chamber Details
LD-3190	Falconer Bay Gate Chamber – Miscellaneous Details
HF-2548	River Pointe Subdivision Control Chamber- Sheet 1 of 2
SK-SF1	Silt Fence

E2. SOILS INVESTIGATION REPORT

E2.1 Further to GC:3.1, of the General Conditions, a geotechnical soils investigation has been done in the vicinity of the proposed Works to determine the character of the subsurface soil to facilitate the design of the Work. The information is considered accurate at the locations indicated and at the time of the investigation. However, considerable variations in the soil conditions may exist between test holes and fluctuations in ground water levels can be expected seasonally. Test hole logs are included.

E2.2 Bidders are responsible for any interpretation they place on the supplied information and are expected to make such additional investigation of the soil as they feel necessary to satisfy themselves.

E2.3 Any test borings made by the bidder shall be done in accordance with the requirements of the appropriate authority of the City of Winnipeg. Bidders shall notify the Contract Administrator prior to starting any soil boring operation.

E3. DANGEROUS WORK CONDITIONS

E3.1 Further to clause GC 6.26 of the General Conditions, the Contractor shall be aware that underground chambers, manholes, and sewers are considered a confined space and shall follow the "Guidelines for confined Entry Work" as published by the Manitoba Workplace Safety and Health Division.

E3.2 The Contractor shall be aware of the potential hazards that can be encountered in gate chambers, manholes and sewers such as explosive gases, toxic gases and oxygen deficiency.

E3.3 The air in a confined space must be tested before entry and continuously during the time that personnel are inside the space. Equipment for continuous monitoring of gases must be explosion-proof and equipped with a visible and audible alarm. The principal tests are for oxygen deficiency, explosion range and toxic gases. Testing equipment must be calibrated in accordance with manufacturer's specifications.

E3.4 The Contractor shall ventilate all confined spaces including underground chambers, tunnels, pipes and shafts as required and approved by the Manitoba Workplace Safety and Health Act (the "Act"). If no ventilation is supplied, a Worker must wear a respirator or supplied air to enter the confined space.

E3.5 Workers must wear a respirator or supplied air at all times when entering a chamber, manhole or sewer where live sewage is present.

E3.6 The Contractor shall provide a photoionization detector (PID) on site at all times to monitor potential hydrocarbon vapours in the confined spaces. The gas detector and safety equipment conforming to the Act shall be made available to the Contract Administrator for his use during inspections. In addition, the Contract Administrator shall collect discrete air samples for laboratory analysis.

E3.7 The Contract Administrator may issue a stop Work order to the Contractor if the above guidelines are not being followed. The Contractor shall not resume his operations until the Contract Administrator is satisfied the Contractor is following the appropriate procedures. The Contractor shall have no claim for extra time or costs due to the stop Work order for not following these safety guidelines.

E4. MOBILIZATION AND DEMOBILIZATION

E4.1 Mobilization and demobilization will include but not be limited to start-up costs, equipment set-up and removal, field office and storage facilities set-up and removal and site cleanup.

E4.2 Mobilization and demobilization will be measured on a unit basis and paid for at the Contract Unit Price for "Mobilization and Demobilization" in accordance with this specification, accepted and measured by the Contract Administrator.

E4.3 50% of the Mobilization and Demobilization unit price will be paid on the first progress payment.

E4.4 The remaining 50% of the Mobilization and Demobilization unit price will be paid subsequent to the completion of the Work and restoration and clean up of all sites.

E5. PROTECTION OF EXISTING TREES

E5.1 Do not remove existing trees and take the following precautionary steps to avoid damage from construction activities to existing boulevard trees within the limits of the construction area.

E5.1.1 Do not stockpile materials and soil or park vehicles and equipment on boulevards within 2 metres of trees.

E5.1.2 Strap mature tree trunks with 25 x 150 x 2400 wood planks. Smaller trees shall be similarly protected using appropriately sized wood planks.

E5.1.3 Excavations shall be carried out in a manner to minimize damage to existing root systems. Where roots must be cut to facilitate an excavation they shall be neatly pruned at the face of the excavation.

E5.1.4 Work on site shall be carried out in a manner to minimize damage to existing tree branches. Where damage to tree branches does occur, the Contractor shall neatly prune the damaged branch.

E5.1.5 American elm trees shall not be pruned between April 1st and August 1st and Siberian elm trees between April 1st and July 1st of any year under provisions of The Dutch Elm Disease Act.

E5.2 All damage to existing trees due to construction activities shall be repaired to the requirements and satisfaction of the City of Winnipeg, Public Works Department, Forestry Branch at the Contractor's expense.

E5.3 Costs for protection of trees will be included in gate chamber construction.

E6. WATERWAY BY-LAW

E6.1 The Contractor shall note that all Works within 107 metres (350 feet) of a riverbank are within the jurisdiction of the Waterway By-law. The Contract Administrator will apply and pay for required Waterway Permits for the project. The Contractor shall adhere to restrictions imposed by the permit.

E6.2 Under no circumstances will stockpiling of any material be permitted on within 107 metres of a riverbank or dyke.

E7. SHOP DRAWINGS

E7.1 Description

(a) This Specification shall revise, amend and supplement the requirements of CW 1100.

(i) The term 'shop drawings' means drawings, diagrams, illustrations, schedules, performance charts, brochures, and other data, including site erection drawings which are to be provided by the Contractor to illustrate details of a portion of the Work.

(ii) The Contractor shall submit specified shop drawings to the Contract Administrator for review. All submissions must be in metric units. Where data is in imperial units, the correct metric equivalent shall also be show on all submissions for Engineering review.

(b) Shop Drawings

(i) Original drawings are to be prepared by Contractor, SubContractor, Supplier, Distributor, or Manufacturer, which illustrate appropriate portion of Work; showing fabrication, layout, setting or erection details as specified in appropriate sections.

(ii) Shop drawings for the following structural components shall bear the seal of a registered Engineer of Manitoba.

(a) Shoring.
(b) Reinforcing steel.
(c) Metal Fabrications.

(c) Contractor's Responsibilities

(i) Review shop drawings, product data and samples prior to submission and stamp and sign drawings indicating conformance to the Contract requirements.

(ii) Verify:
(a) Field measurements
(b) Field construction criteria
(c) Catalogue numbers and similar data

(iii) Coordinate each submission with requirements of Work and Contract Documents. Individual shop drawings will not be reviewed until all related drawings are available.

(iv) Notify Contract Administrator, in writing at time of submission, of deviations from requirements of Contract Documents.

(v) Responsibility for deviations in submission from requirements of Contract Documents is not relieved by Contract Administrator's review of submission, unless Contract Administrator gives written acceptance of specified deviations.

(vi) Responsibility for errors and omissions in submission is not relieved by Contract Administrator's review of submittals.

(vii) The Contractor shall make any corrections required by the Contract Administrator and shall resubmit the required number of corrected copies of Shop Drawings. The Contractor shall direct specific attention in writing or on resubmitted Shop Drawings to revisions other than the corrections requested by the Contract Administrator on previous submission.

(viii) After Contract Administrator's review and return of copies, distribute copies to sub-trades as appropriate.

(ix) Maintain one (1) complete set of reviewed shop drawings, filed by Specification Section Number, at the site of the Work for use and reference of the Contract Administrator and SubContractors.

(d) Submission Requirements

(i) Schedule submissions at least 14 Calendar Days before dates reviewed submissions will be needed, and allow for a 14 Calendar Day period for review by the Contract Administrator of each individual submission and re-submission, unless noted otherwise in the Contract Documents.

(ii) Submit five (5) paper prints of shop drawings. The Contractor is advised that the Contract Administrator will retain three (3) copies of all submittals and return two (2) copies to the Contractor.

(iii) Accompany submissions with transmittal letter, containing:
- (a) Date
- (b) Project title and Bid Opportunity number
- (c) Contractor's name and address
- (d) Number of each shop drawing, product data and sample submitted
- (e) Specification Section, Title, Number and Clause
- (f) Drawing Number and Detail/Section Number
- (g) Other pertinent data

(iv) Submissions shall include:
- (a) Date and revision dates.
- (b) Project title and Bid Opportunity number.
- (c) Name of:
  - (a) Contractor
  - (b) SubContractor
  - (c) Supplier
  - (d) Manufacturer
  - (e) Separate detailer when pertinent
- (d) Identification of product of material.
- (e) Relation to adjacent structure or materials.
- (f) Field dimensions, clearly identified as such.
- (g) Specification section name, number and clause number or drawing number and detail/section number.
- (h) Applicable standards, such as CSA or CGSB numbers.
- (i) Contractor's stamp, initialled or signed, certifying review of submission, verification of field measurements and compliance with Contract Documents.

(e) Other Considerations

(i) Fabrication, erection, installation or commissioning may require modifications to equipment or systems to conform to the design intent. Revise pertinent shop drawings and resubmit.

(ii) Material and equipment delivered to the site of the Works will not be paid for at least until pertinent shop drawings have been submitted and reviewed.

(iii) Incomplete shop drawing information will be considered as stipulated deductions for the purposes of progress payment certificates.

(iv) No delay or cost claims will be allowed that arise because of delays in submissions, re-submissions and review of shop drawings.

E8. FLOW CONTROL

E8.1 During winter months land drainage and storm relief sewers can receive flow of an undetermined amount from groundwater infiltration, watermain breaks, snow melt and other unforeseen sources.

E8.2 Provide flow control measures to contend with and maintain flow in the land drainage and storm relief sewers that are directed to the location where gate chambers are being constructed. Flow control measures shall include but not be limited to diversions, flumes and by-pass pumping.

E8.3 Discharge hoses for by-pass pumping shall not be laid across vehicle or pedestrian traffic areas and must be protected from freezing during winter months. Pumping equipment if used, shall be set-up in a location and in such a way to not be a noise problem for nearby residences

E8.4 Provide a flow control plan for each gate chamber location to the Contract Administrator for review before removing any existing sewer pipe.

E8.5 Costs for flow control will be included in gate chamber construction.

E8.6 In the event the river level becomes higher than the gate chamber activation level and flow in the sewer system is expected to exceed the sewer capacity due to spring runoff, the Contract Administrator may suspend Work activities that require temporary by-pass pumping and temporary shutdown of the site. Suspension of these activities will continue until the river level drops below flood pumping activation level and the high flow diminishes in the sewer.

E8.7 If in the opinion of the Contract Administrator suspension of Work activities that require temporary by-pass pumping and temporary shutdown of the site may cause a delay in completion of the Work through no fault of the Contractor, the completion date of the Work will be adjusted accordingly.

E9. PRE-CAST CONCRETE GATE CHAMBER CONSTRUCTION

E9.1 Description

(a) General

(b) This specification shall cover construction of pre-cast concrete gate chambers.

E9.2 Materials

(a) Pre-cast concrete manhole sections used for gate chambers shall be in accordance with section 2.7of CW 2130.

(b) Flexible Transition Pipe Couplings

(i) Flexible transition pipe couplings shall be in accordance with Clause 2.1 and 2.6 of CW 2130.

(c) Manhole Frames and Covers

(i) Cover: Unmarked Titan TF-114 cast iron solid cover.

(ii) Frame: 125 millimetre high cast iron frame.

(d) Cast Iron Flap Gates

(i) Cast iron flap gates and wall thimbles shall be in accordance with E11of this specification.

(e) Cast Iron Gate Valves

(i) Gate Valves shall be bronze mounted, cast iron body with flanged ends equipped with:

(a) outside rising stem, screw and yoke

(b) bronze trimmed cast iron wedge

(c) bronze stem

(d) double O-ring stem seals

(ii) Flanges shall conform in dimension and drilling to ANSI/ASME B15.1, Class 150.

(iii) Direction of opening shall be counter clockwise and shall be clearly stamped or indicated with raised letters and arrow.

(iv) Manufacturer's nameplate shall be attached to the valve body with stainless steel fasteners.

(v) Gate valves shall be as manufactured by Crane, Jenkins, Kennedy, Mueller, Clow or approved equal.

(vi) Submit shop drawings of gate valves in accordance with E7 of this specification.

(f) Gate Valve Stem Extension

(i) Gate valve stem extension shall be 38 millimetre diameter ASTM A276 Type 304 stainless steel, schedule 40 pipe with a 50 mm square operating nut.

(ii) Submit shop drawings of the valve stem extension in accordance with E7 of this specification.

(g) Stem Extension Guide and Wall Brackets

(i) Stem extension guide and wall brackets to be ASTM A276, Type 304 stainless steel suitable for keeping the stem extension plumb and centered in the valve box while not interfering with the operation of the valve stem.

(ii) Submit shop drawings of the stem extension guides and wall brackets in accordance with E7 of this specification.

(h) Flange Adapter

(i) Vanstone Flange or approved equal.

(i) Miscellaneous Metals and Accessories

(i) In accordance with E12 of this specification and as shown on the Drawings.

E9.3 Construction Methods

(a) Install pre-cast concrete gate chambers as shown on the Drawings in accordance with Clause 3.8 and 3.9 of CW 2130.

(b) Gate Valve Installation

(i) Install gate valves, flange adapters and valve stems as shown on the Drawings.

(ii) Gate valves shall be left in the open position at all times except when on site Working on the valve.

(c) Flap Gate Installation

(i) Install flap gates and wall thimbles as shown on the Drawings and in accordance with E11 of this specification.

(d) Miscellaneous Metal Fabrications

(i) Install miscellaneous metal fabrications as shown on the Drawings and in accordance with E12 of this specification.

E9.4 Measurement and Payment

(a) Construction of pre-cast concrete gate chambers will be measured on a unit basis and paid for at the Contract Unit Price for "Pre-cast Concrete Gate Chamber". The number of units to be paid for will be the total number of pre-cast concrete gate chambers constructed in accordance with this specification, accepted and measured by the Contract Administrator.

E10. CAST IRON SLUICE GATES

E10.1 Description

(a) General

(i) This Specification shall cover the supply, delivery, installation and testing of cast iron sluice gates, wall thimbles, mechanical lift operator, stems, wall brackets and accessories.

(b) General Design:

(i) Specification Standard: AWWA C560

(ii) Type: Rising stem with stop nut, flange back with standard bottom closure.

(iii) Mounting: Type F wall thimble

(iv) Seating Head: Maximum design seating head for all sluice gates will be from centreline of the gate to the top of the gate chamber unless noted otherwise on the Drawings.

(v) Operator and Lift: Enclosed gear lift with pedestal.

Operator to be finished with a 50 millimetre x 50 millimetre square nut suitable for attachment of an electric portable drill for opening.

Operator shall turn counter clock wise to open.

(vi) Stem Cover: Gear lift to be complete with stem cover with acrylic window with gradations in suitable increments for the entire range of gate operation.

(vii) Stem Guides: Adjustable in both the horizontal and vertical directions.

E10.2 Materials

(a)	Frame, Slide, guides and yoke	ASTM A48 Cast Iron, Class 30
(b)	Seating Faces	ASTM B21 Naval Bronze, Alloy 482
(c)	Wall Thimble	ASTM A48 Cast Iron, Class 30
(d)	Wedges	ASTM B564 Manganese Bronze, Alloy 865
(e)	Wedge Blocks	ASTM A48 Cast Iron, Class 30
(f)	Fasteners & Anchors	ASTM A276 Type 316 Stainless Steel
(g)	Stem	ASTM A276 Type 304 Stainless Steel
(h)	Stem Couplings	ASTM A276 Type 304 Stainless Steel
(i)	Stem Guide	ASTM A48 Cast iron, Class 30 with Bronze bushings
(j)	Operator Pedestal	ASTM A48 Cast Iron, Class 30 or Steel
(k)	Stem cover	Aluminium or galvanized steel

(l) Shop Drawings

(i) Submit shop drawings of cast iron sluice gates, wall thimbles, mechanical lift operator, stems, wall brackets and accessories in accordance with E7 of this specification.

(m) Operating and Maintenance Manuals

(i) Provide five (5) copies of all the manufacturer's brochures and technical literature detailing correct installation procedure and recommended operating and maintenance instructions. Manuals shall be bound with the project title and gate description identified on the front cover. One set of manuals shall be provided for each size of gate. Final payment for sluice gates will not be made until the above information has been provided to the Contract Administrator.

(n) Delivery and Shipping

(i) The Contract Administrator will examine the sluice gate assemblies, thimbles, frames, stems, operators and accessories upon delivery and will reject any equipment that is found to be damaged to the extent that, in the Contract Administrator's opinion, it cannot be put to the use for which it was intended. The Contractor shall arrange with the gate supplier to repair any superficially damaged equipment to the satisfaction of the Contract Administrator.

(ii) It shall be the responsibility of the Contractor to negotiate any claims for damage with the carrier and to make arrangements to have any rejected equipment replaced as soon as possible at no extra expense to the City.

E10.3 Construction Methods

(a) Installation

(i) Install cast iron sluice gates, wall thimbles, mechanical lift operator, stems, wall brackets and accessories as shown on the drawings and in accordance with the manufacturer's recommendations.

(ii) Make arrangements to have a qualified field representative of the sluice gate supplier/manufacturer inspect the installation during and after completion and provide a Certificate of Satisfactory Installation to the Contract Administrator.

(b) Removal and installation of sluice gate at River Point Drive.

(i) Neatly disconnect the existing mechanical lift operator from gate stem, ubolt from the existing grating and store in secure location where the operator will not be damaged

(ii) Make required measurements on the new sluice gate to attach the existing stem.

(c) Shop Testing

(i) The fully assembled gate shall be shop inspected, adjusted and tested for operation and leakage at the design head before shipping.

(ii) Provide the following information to the Contract Administrator prior to delivery of sluice gate and operator assemblies:

(a) A certified copy of the Chemical and Physical Analysis on all materials used in the manufacture of the sluice gate, wall thimble, stems, operator and accessories or certification that the materials used are in strict accordance with this specification.

(b) Copies of the test reports for Performance and Leakage tests. Included on the report shall be the signature of the official who is responsible for the gate assembly and testing.

(d) Field Testing

(i) Perform leakage tests in the Contract Administrator's presence once sluice gates have been installed to ensure compliance with the allowable leakage rate indicated in AWWA C501-92.

(ii) Arrange for a qualified field representative of the sluice gate supplier/manufacturer to be present during field testing.

(iii) Generally, the test for seating head will be performed by closing the gate against high river levels in the spring and measuring the leakage rate through the gate.

(iv) If it is not possible to use high river level, install an inflatable plug in the outfall, fill the chamber with water to the specified head and measure the leakage rate through the gate. Inflatable plug shall be inflated from, anchored to and removable from the ground surface.

(v) The test for the unseating head will be performed by closing the sluice gate and flap gate, filling the chamber between the gates with water to the specified head and measuring the leakage rate through the gates.

(vi) The Contractor will be responsible to pump river water or supply water from a hydrant into the chamber for testing purposes.

(vii) If a gate fails the field leakage test, the Contractor shall undertake adjustments, replacements or other modifications recommended by the sluice gate supplier/manufacturer's field representative and repeat the test. The sequence shall be repeated until the gate passes the allowable leakage rate.

E10.4 Measurement and Payment

(a) Supply, installation and testing of cast iron sluice gates, wall thimbles, mechanical lift operator, stems, wall brackets and accessories will be included in gate chamber construction.

E11. CAST IRON FLAP GATES

E11.1 Description

(a) General

(i) This Specification shall cover the supply, delivery, installation and testing of cast iron flap gates and wall thimbles.

(b) General Design:

(i) Leakage rate Specification Standard: AWWA C560

(ii) Type: Flange Back for mounting on a wall thimble or flat concrete wall.

(iii) Mounting: Type F wall thimble

(iv) Seating Head: Maximum design seating head for all flap gates will be from centreline of the gate to the top of the gate chamber unless noted otherwise on the Drawings.

(v) Cover: One piece cast iron with lifting eye for manual operation

(vi) Seat: One piece cast iron raised surface and inclined to assure positive closure.

(vii) Links: Complete with grease nipples at pivot pints and adjusting screws to align seating faces.

(viii) Pivot Lugs: One piece cast iron adjustable in the horizontal plane without removal of cover, complete with grease nipples.

E11.2 Materials

(a) Cast Iron pieces: ASTM A48 Cast Iron, Class 30

(b) Seating Faces: ASTM B21 Bronze, Alloy 482

(c) Links: Cast iron or high tensile Bronze B584 – C865

(d) Bushings: Bronze B21, Alloy 482

(e) Hinge Pins: ASTM A276, Type 316 stainless steel or silicon Bronze B98-CA655

(f) Fasteners: ASTM A276, Type 316 stainless steel

(g) Shop Drawings

(i) Submit shop drawings of cast iron flap gates and wall thimbles in accordance with E7 of this specification.

(h) Operating and Maintenance Manuals

(i) Provide five (5) copies of all the manufacturer's brochures and technical literature detailing correct installation procedure and recommended operating and maintenance instructions. Manuals shall be bound with the project title and gate description identified on the front cover. One set of manuals shall be provided for each size of gate. Final payment for flap gates will not be made until the above information has been provided to the Contract Administrator.

E11.3 Construction Methods

(a) Installation

(i) Install cast iron flap gates and wall thimbles as shown on the drawings and in accordance with the manufacturer's recommendations.

(ii) Make arrangements to have a qualified field representative of the flap gate supplier/manufacturer inspect the installation during and after completion and provide a Certificate of Satisfactory Installation to the Contract Administrator

(b) Delivery and Shipping

(i) The Contract Administrator will examine the flap gate assemblies and wall thimbles upon delivery and will reject any equipment that is found to be damaged to the extent that, in the Contract Administrator's opinion, it cannot be put to the use for which it was intended. The Contractor shall arrange with the gate supplier to repair any superficially damaged equipment to the satisfaction of the Contract Administrator.

(ii) It shall be the responsibility of the Contractor to negotiate any claims for damage with the carrier and to make arrangements to have any rejected equipment replaced as soon as possible at no extra expense to the City.

(c) Shop Testing

(i) The fully assembled gate shall be shop inspected, adjusted and tested for operation and leakage at the design head before shipping.

(ii) Provide the following information to the Contract Administrator prior to delivery of flap gate and wall thimble:

(a) A certified copy of the Chemical and Physical Analysis on all materials used in the manufacture of the flap gate and wall thimble or certification that the materials used are in strict accordance with this specification.

(b) Copies of the test reports for Performance and Leakage tests. Included on the report shall be the signature of the official who is responsible for the gate assembly and testing.

(d) Field Testing

(i) Perform leakage tests in the Contract Administrator's presence once flap gates have been installed to ensure compliance with the allowable leakage rate of 1.24L/min per metre of seated perimeter at any head.

(ii) Arrange for a qualified field representative of the flap gate supplier/manufacturer to be present during field testing.

(iii) The test for seating head will be performed by closing the flap gate and sluice gate, filling the chamber between the gates with water to the specified head and measuring the leakage rate through the gates.

(iv) The Contractor will be responsible to pump river water or supply water from a hydrant into the chamber for testing purposes.

(v) If a gate fails the field leakage test, the Contractor shall undertake adjustments, replacements or other modifications recommended by the flap gate supplier/manufacturer's field representative and repeat the test. The sequence shall be repeated until the gate passes the allowable leakage rate.

E11.4 Measurement and Payment

(a) Supply, installation and testing of cast iron flap gates and wall thimbles will be included in gate chamber construction.

E12. METAL FABRICATIONS

E12.1 Description

(a) General

(i) This Specification shall cover the supply, fabrication, transportation, handling, delivery and placement of metal fabrications.

E12.2 Materials

(a) All materials shall be of a type acceptable to the Contract Administrator, and shall be subject to inspection and testing by the Contractor Administrator.

(b) Material intended for use in the various assemblies shall be new, straight, clean, with sharply defined profiles.

(c) Steel Sections and Plates:to CAN/CSA G40.20/G40.21, Grade 300 W, except W, HP and HSS sections, which shall be Grade 350 W.

(d) Steel Pipe: to ASTM A53/A53M, seamless, galvanized, as specified by item.

(e) Welding materials: to CSA W59.

(f) Hot dipped galvanized steel repair material: Galvalloy and Gal-Viz

(g) Stud Anchors: to ASTM A108, Grade 1020.

(h) Aluminum: to CAN/CSA S157 and the Aluminum Association 'Specifications for Aluminum Structures'. Aluminum for plates shall be Type 6061-T651. Aluminium plate shall have an approved raised oval or multi-grip pattern.

(i) Isolating sleeves shall be "Nylite" – headed sleeve as manufactured by SPAE-Naur of Kitchener, Ontario, or approved equal.

(j) Anchor bolts and fasteners: ASTM A276, Type 316 stainless steel, of ample section to safely withstand the forces created by operation of the equipment or the load to which they will be subjected.

E12.3 Construction Methods

(a) Submittals

(i) The Contractor shall submit the qualifications of the fabricator and welders to the Contractor Administrator for acceptance.

(ii) Submit shop drawings in accordance with E7 clearly indicating materials, core thickness, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details and, accessories. Indicate field measurements on shop drawings.

(b) Fabrication

(i) Fabricate Work square, true, straight and accurate to required size, with joints closely fitted and properly secured. Assemble Work in such a way that no disfigurements will show in the finished Work, or impair the strength.

(ii) Confirm measurements for all fabrications before fabricating.

(iii) Cut aluminium plate with edges straight and true, and as far as practical, maintain continuity of the pattern at abutting edges.

(iv) Pieces shall be of the sizes indicated on the Drawings and shall not be built up from scrap pieces. Confirm sizes with field measurements.

(v) Where possible, fit Work and shop assemble, ready for erection.

(vi) Angle frames shall be of the same material as the cover plate, and cover plates shall be hinged and be supplied with lifting handles, as shown on the Drawings. Exterior covers shall be supplied with a hasp for a padlock.

(vii) Remove and grind smooth burrs, filings, sharp protrusions, and projections from metal fabrications to prevent possible injury. Correct any dangerous or potentially harmful installations as directed by Contract Administrator.

(viii) All steel welding shall conform to CSA Standard W.59. Fabricator shall be fully approved by the Canadian Welding Bureau, in conformance with CSA Standard W.47.1. Welding shall be done by currently licensed welders only.

(ix) All aluminium welding shall conform to Welding shall be in accordance with the requirements of CSA W59.2. The fabricator shall be fully certified in conformance with CSA Standard W47.2. All welding shall be done in a licensed welding shop, and no field welding will be permitted unless approved in writing, in advance, by the Contract Administrator.

(x) Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.

(xi) All steel shall be hot-dip galvanizing after fabrication, in accordance with CAN/CSA-G164, to a minimum net retention of 600 gm/m^2.

(xii) Seal exterior steel fabrications to provide corrosion protection in accordance with CAN3-S16.1.

(xiii) Use self-tapping shake-proof flat-headed screws on items requiring assembly by screws.

(c) Erection

(i) Do steel welding Work in accordance with CSA W59 and aluminium welding Work in accordance with CSA W59.2

(ii) Erect metalWork in accordance with reviewed shop drawings, square, plumb, straight, and true, accurately fitted, with tight joints and intersections.

(iii) Provide suitable means of anchorage acceptable to Contract Administrator such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles where not specifically indicated on the Drawings.

(iv) Provide components for building in accordance with shop drawings and schedule.

(v) Make field connections with bolts to CAN/CSA-S16, or weld.

(vi) Touch-up rivets, bolts and burnt or scratched surfaces that are to receive paint finish, with zinc primer after completion of erection.

(vii) Repair damaged galvanized surfaces and field welds with self-fluxing, low temperature, zinc-based alloy rods in accordance with ASTM A780, Repair of Damaged Hot Dip Galvanizing Coatings. The general procedure shall be to allow a small amount of the repair alloy to flow then spread by brushing briskly with a wire brush. Brushing shall be sufficient to obtain a bright finish. Repeat process three times to ensure a proper thickness is achieved. Temperatures shall be kept below 177ºC (350ºF) at all times. All heating of structural steelWork shall be done in the presence of the Contract Administrator.

(viii) Install access hatch frames square and level at the locations show on the Drawings. Embed anchors in concrete as shown on the Drawings. Install covers and adjust hardware to proper function.

(ix) All aluminium surfaces in contact with concrete shall be isolated using alkali-resistant bituminous paint meeting the requirements of CGSB 31-GP-3M.

(x) Install electrochemical isolation gaskets and sleeves to electrically isolate dissimilar metals.

E12.4 Measurement and Payment

(a) Supply, fabrication, transportation, handling, delivery and placement of metal fabrications will be included in gate chamber construction.

E13. TEMPORARY SURFACE RESTORATION AND MAINTENANCE

E13.1 Further to CW 1130, if the Contractor fails to maintain disturbed surfaces as directed and within the time period given by the Contract Administrator, the City or its designate may perform the Work required and the cost may be deducted from payments owed.

E13.2 Costs for temporary restoration and maintenance of disturbed surfaces will be included in gate chamber construction.

E14. SURFACE RESTORATION

E14.1 Restoration of all existing surface areas disturbed by construction activities including but not limited to areas disturbed by; construction equipment, placement of field office or equipment trailer, snow clearing and where construction materials were stockpiled, shall be restored as follows.

(a) Grassed areas: sodding using imported topsoil in accordance with CW 3510.

(b) Gravel surfaces: in accordance with CW 3150.

(c) Asphalt surfaces: match existing base course and asphalt thickness or a minimum of 150 millimetres of base course and 75 millimetres of Type 1A Asphaltic concrete whichever is greater, in accordance with CW 3410.

(d) Pavement slabs (including private approaches): in accordance with CW 3230.

(e) Miscellaneous concrete slabs (median slab, sidewalk, bullnose: in accordance with CW3235

(f) Concrete curb and gutter: in accordance with CW 3240.

E14.2 Restore berms constructed around finished gate chambers with sod using imported topsoil in accordance with CW 3510.

E14.3 Costs for permanent surface restoration will be included in gate chamber construction.

E15. SILT FENCE

E15.1 Description

(a) General

(i) This specification covers the erection of temporary silt fencing, which shall be installed and maintained at the locations shown on the drawings to control runoff and minimize the release of detrimental silt loadings to watercoursesThe scope Work included in this specification is as follows:

(a) Supply and Install temporary silt fencing at locations as indicated, in accordance with the detail drawing provided, prior to undertaking any other activities on the site where silt fencing is required.

(b) Maintain the silt fencing in serviceable condition throughout the entire duration of activities at the site where silt fencing is required, including final restoration and cleanup of the construction site.

(c) Remove the silt fencing and restore the area where the fencing was installed, without further disturbing the area and without releasing any deleterious substances to the adjacent watercourse.

E15.2 Materials

(a) Fence Posts

(i) Fence posts shall be 100 mm untreated wood posts or 50 mm steel posts, minimum length of 1.1 m.

(b) Filter Fabric

(i) Filter Fabric Shall be a woven geotextile material specifically designed for a silt fence applications, meeting the following minimum requirements:

Property	**Test Method**	**Value**
Grab Tensile Strength	ASTM D 4632	0.55 kN
Grab Tensile Elongation	ASTM D 4632	15%
Mullen Burst	ASTM D 3786	2060 kPa
Puncture	ASTM D 4833	0.285 kN
Trapezoid Tear	ASTM D 4533	0.285 kN
UV Resistance	ASTM D 4355	80% @ 500 hrs
Apparent Opening Size (AOS)	ASTM D 4751	0.60 mm
Flow Rate	ASTM D 4491	405 l/min/m²

Acceptable Product: “Amoco 2130 Silt Fence Fabric” or approved equal.

(c) Wire Mesh

(i) Wire mesh shall be galvanized or plain metal with wire gauge=3.0 mm, wire spacing @ 150 mm o/c.

(d) Fencing Material Fasteners

(i) Staples or wire ties of sufficient strength and spacing to withstand a 530N (120lbf) pull test at any point on the wire mesh.

E15.3 Construction Methods

(a) Ensure that no deleterious substances are discharged into the adjacent watercourse at any time during construction activities

(b) Silt Fence Installation

(i) Excavate 150 x 150 anchor trench along alignment of silt fence as indicated. Install fence posts as indicated. Ensure that fence posts are firmly driven into undisturbed soil, or are completely and firmly backfilled if installed via auger methods. Attach wire mesh as support backing for silt fence filter fabric with fasteners as specified in E17.2(c) Attach silt fence filter fabric on top of wire mesh in similar fashion. Overlap any fence seams (wire mesh or filter fabric) by 450 mm minimum. Ensure that wire mesh and filter fabric are installed on the upslope side of the post and are fully laid in anchor trench as shown.

(ii) Install and compact impermeable excavated materials into anchor trench and slope as indicated. Compact to 95% of maximum dry density (ASTM D-698).

(c) Silt Fence Maintenance

(i) Inspect silt fence daily, prior to starting any other construction activities. If fence posts are found loose or not upright, repair in accordance with installation procedure as specified in E17.3(b) If silt fence is found to be loose or torn, repair or replace as necessary to comply with E17.3(b).

(ii) If silt deposition at the fence is 300 mm or more in depth, carefully remove and dispose of silt offsite without disturbing silt fence.

(d) Silt Fence Removal

(i) Following completion of all site construction activities (including final restoration and cleanup), remove all fence posts, wire mesh, fabric and fasteners from site.

(ii) Restore areas disturbed without releasing any deleterious substances to the adjacent watercourse.

E15.4 Method of Measurement and Basis of Payment

(a) Supply, installation, maintenance and removal of temporary silt fencing for control of runoff and deleterious material discharge to adjacent water coarses will be included in gate chamber construction.