Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 05 50 00 – Metal Fabrications

1.2 REFERENCES

.1 ASTM International Inc.

.1 ASTM A36/A36M-08, Standard Specification for Carbon Structural Steel.

.2 ASTM A193/A193M-08, Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature or High-Pressure Service and Other Special Purpose Applications.

.3 ASTM A307-07b, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.4 ASTM A325-07a, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

.5 ASTM A325M-08, Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Minimum Tensile Strength (Metric).

.6 ASTM A490M-04ae, Standard Specification for High-Strength Steel Structural Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints (Metric).

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-85.10-99, Protective Coatings for Metals.

.3 Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturers Association (CPMA).

.1 Handbook of the Canadian Institute of Steel Construction.

.2 CISC/CPMA Standard 2-75, Quick-Drying Primer for use on Structural Steel.

.4 Canadian Standards Association (CSA International)

.1 CSA G40.20/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.2 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

.3 CAN/CSA-S16-01(R2007), Limit States Design of Steel Structures.

.4 CAN/CSA-S136-07, North American Specifications for the Design of Cold Formed Steel Structural Members.

.5 CSA W47.1-03, Certification of Companies for Fusion Welding of Steel.

.6 CSA W48-06, Filler Metals and Allied Materials for Metal Arc Welding.

.7 CSA W55.3-1965(R2003), Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.

.8 CSA W59-03, Welded Steel Construction (Metal Arc Welding).

.5 Master Painters Institute

.1 MPI-INT 5.1-08, Structural Steel and Metal Fabrications.

.2 MPI-EXT 5.1-08, Structural Steel and Metal Fabrications.

.6 The Society for Protective Coatings (SSPC) and National Association of Corrosion Engineers (NACE) International

.1 NACE No. 3/SSPC SP-6-06, Commercial Blast Cleaning.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Division 1.

.2 Shop Drawings:

.1 Provide drawings in accordance with Division 1 of this specification.

.3 Erection drawings:

.1 Submit erection drawings indicating details and information necessary for assembly and erection purposes including:

.1 Description of methods.

.2 Sequence of erection.

.3 Type of equipment used in erection.

.4 Temporary bracings.

.4 Fabrication drawings:

.1 Submit fabrication drawings showing designed assemblies, components and connections are stamped and signed by qualified professional engineer licensed in the Province of Manitoba, Canada.

.5 Source Quality Control Submittals:

.1 Submit copies of mill test reports 4 weeks prior to fabrication of structural steel.

.1 Mill test reports to show chemical and physical properties and other details of steel to be incorporated in project.

.6 Fabricator Reports:

.1 Provide structural steel fabricator's affidavit stating that materials and products used in fabrication conform to applicable material and products standards specified and indicated.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer’s recommendations.

.2 Deliver materials in manufacturer's original, undamaged containers with identification labels intact.

Part 2 Products

2.1 MATERIALS

.1 Structural steel – W-Shapes: to CSA-G40.20/G40.21 Grade 350W.

.2 Structural steel – Rolled shapes and plates: to CSA-G40.20/G40.21 Grade 300W.

.3 Structural steel – HSS sections: to CSA-G40.20/G40.21 Grade 350W Class C.

.4 Standard Pipe: to ASTM A53

.5 Cold Formed Steel: to CSA-S136.

.6 Anchor bolts: to ASTM A307.

.7 Bolts, nuts and washers: to ASTM A325/A325M.

.8 Welding materials: to CSA W59 and certified by Canadian Welding Bureau.

2.2 FABRICATION

.1 Fabricate structural steel in accordance with CAN/CSA-S16, and in accordance with approved shop drawings.

.2 Continuously seal members by continuous welds where indicated. Grind smooth.

2.3 SHOP PAINTING (INTERIOR STEEL)

.1 Clean members, remove loose mill scale, rust, oil, dirt and foreign matter. Prepare surface according to NACE No.3/SSPC-SP-6.

.2 Apply one coat of primer in shop to steel surfaces to achieve minimum dry film thickness of 2.5 mils, except:

.1 Surfaces to be encased in concrete.

.2 Surfaces and edges to be field welded.

.3 Faying surfaces of slip-critical connections.

.4 Below grade surfaces in contact with soil.

.3 Apply paint under cover, on dry surfaces when surface and air temperatures are above 5 degrees C.

.4 Maintain dry condition and 5 degrees C minimum temperature until paint is thoroughly dry.

.5 Strip paint from bolts, nuts, sharp edges and corners before prime coat is dry.

2.4 GALVANIZING

.1 Hot Dip Galvanizing of all exterior exposed steel to CAN/CSA-G164, minimum zinc coating of 600 g/m^2.

.2 Field touch-ups to galvanizing with galvanizing solder to match finish. Acceptable product: Gal-viz. Use as per manufacturer’s recommendations.

Part 3 Execution

3.1 APPLICATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 GENERAL

.1 Structural steel work: in accordance with CAN/CSA-S16 and CAN/CSA-S136.

.2 Welding: in accordance with CSA W59.

.3 Companies to be certified under Division 1 or 2.1 of CSA W47.1 for fusion welding of steel structures and/or CSA W55.3 for resistance welding of structural components.

3.3 CONNECTION TO EXISTING WORK

.1 Verify dimensions and condition of existing work, report discrepancies and potential problem areas to Contract Administrator for direction before commencing fabrication.

3.4 MARKING

.1 Mark materials in accordance with CSA G40.20/G40.21. Do not use die stamping. When steel is to be left in unpainted condition, place marking at locations not visible from exterior after erection.

.2 Match marking: shop mark bearing assemblies and splices for fit and match.

3.5 ERECTION

.1 Erect structural steel, as indicated and in accordance with CAN/CSA-S16 and in accordance with approved erection drawings.

.2 Field cutting or altering structural members: to approval of Contract Administrator.

.3 Clean with mechanical brush and touch up shop primer to bolts, rivets, welds and burned or scratched surfaces at completion of erection.

.4 Continuously seal members by continuous welds where indicated. Grind smooth.

3.6 FIELD QUALITY CONTROL

.1 Inspection and testing of materials and workmanship will be carried out by testing laboratory designated by Contract Administrator as required.

.2 Provide safe access and working areas for testing on site, as required by testing agency and as authorized by Contract Administrator.

.3 Submit test reports to Contract Administrator within 2 weeks of completion of inspection.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 05 50 00 – Metal Fabrications

1.2 REFERENCES

.1 ASTM International

.1 ASTM B209M-07, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate Metric.

.2 ASTM B210M-05, Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes Metric.

.3 ASTM B211M-03, Standard Specification for Aluminum and Aluminum Alloy Bar, Rod and Wire Metric.

.4 ASTM F593-02(2008), Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.

.2 American Welding Society (AWS)

.1 AWS - A5.10/A5.10M 1999(R2007), Specification for Bare Aluminum and Aluminum Alloy Welding Electrodes and Rods.

.3 CSA International

.1 CAN/CSA-S157/S157.1-05, Strength Design in Aluminum/Commentary on CAN/CSA-S157, Strength Design in Aluminum.

.2 CSA W47.2-M1987(R2008), Certification of Companies for Fusion Welding of Aluminum.

.3 CSA W59.2-M1991(R2008), Welded Aluminum Construction.

.4 Master Painters Institute (MPI)

.1 MPI - EXT 5.5D, Bituminous Finish.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Division 1.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for structural aluminum and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Submit drawings in accordance with Division 1 of this specification.

.2 Submit shop drawings to include fabrication and erection documents consisting of connection and design details, shop details, erection diagrams, erection procedures and material lists.

.3 Indicate cuts, copes, connections, holes, threaded fasteners, rivets, welds and other items. Indicate welds using welding symbols as shown in Appendix A of CSA W59.2.

.4 Include description of methods, sequence of erection and type of equipment to be used in erecting structural aluminum.

1.4 QUALITY ASSURANCE

.1 Submit copies of mill test reports showing chemical and physical properties and other details of aluminum to be incorporated into work, at least 4 weeks prior to fabrication of structural aluminum.

.2 Fabricator of structural aluminum to provide an affidavit stating that materials and products used in fabrication conform to applicable material and products standards called for by design drawings and specifications.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials off ground, in dry location, and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect structural aluminum from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

.1 Aluminum bar, rod, wire: to ASTM B211M, Alloy 6061-T6511.

.2 Aluminum and Aluminum-Alloy Extruded Bar, Rods, Wire, Shapes, and Tubes: to ASTM B221M, Alloy 6061-T6.

.3 Aluminum sheet or plate: to ASTM B209M, Alloy 6061-T651.

.4 Aluminum drawn tubes: to ASTM B210M, Alloy 6061.

.5 Aluminum pipe: to ASTM B221, Alloy 6061-T6.

.6 Aluminum welding wire: to AWS - A5.10/A5.10M.

.7 Stainless steel bolts: to ASTM F593, Type 316.

.8 Bituminous paint: MPI - EXT 5.5D, without thinner.

2.2 FABRICATION

.1 Fabricate to CAN/CSA-S157 and in accordance with approved shop drawings.

2.3 FINISHES

.1 Finish: plain mill.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for structural aluminum installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Contract Administrator.

.2 Inform Contract Administrator of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Contract Administrator.

3.2 INSTALLATION

.1 Do structural aluminum work: to CAN/CSA-S157.

.2 Do welding: to CSA W59.2.

.3 Companies to be certified under Division 1 or 2.1 of CSA W47.2 for fusion welding of aluminum, and CSA W55.3 for resistance welding of structural components.

.4 Aluminum in contact with dissimilar metal anchor bolts to be installed with nylon isolation gaskets. Acceptable product: Nyltite Electrochemical Isolation Gaskets.

3.3 ERECTION

.1 Erect structural aluminum as indicated and to CAN/CSA-S157 and approved erection drawings.

.2 Field cutting or altering structural members: to approval of Contract Administrator.

3.4 FIELD QUALITY CONTROL

.1 Inspection and testing of materials and quality of work will be carried out by testing laboratory designated by Contract Administrator as required.

.2 Provide safe access and working areas for testing on site, as required by testing agency and as directed by Contract Administrator.

3.5 JOINT SEALING AND PAINTING

.1 Surface preparation of aluminum in contact with or embedded in dissimilar materials: to CAN/CSA-S157. Treat locations as if there is moisture present.

.2 Paint to CAN/CSA-S157.

3.6 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by structural aluminum for buildings installation.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 05 12 23 – Structural Steel

.2 Section 05 14 11 – Structural Aluminum

1.2 REFERENCES

.1 ASTM International

.1 ASTM A53/A53M-07, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.

.2 ASTM A269-08, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.

.3 ASTM A307-07b, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.2 CSA International

.1 CSA G40.20/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.2 CAN/CSA G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

.3 CSA S16-09, Design of Steel Structures.

.4 CSA W48-06, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).

.5 CSA W59-M03(R2008), Welded Steel Construction (Metal Arc Welding) Metric.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Division 1.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for sections, plates, pipe, tubing, bolts and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Submit drawings in accordance with Division 1 of this Specification.

.2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials off ground in dry location, and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

.1 Steel sections and plates: to CSA G40.20/G40.21, Grade 300W or 350W, as applicable.

.2 Steel pipe: to ASTM A53/A53M, galvanized finish.

.3 Welding materials: to CSA W59.

.4 Welding electrodes: to CSA W48 Series.

.5 Bolts and anchor bolts: to ASTM A307.

.6 Stainless steel tubing: to ASTM A269, Type 316

2.2 FABRICATION

.1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.

.2 Use self-tapping shake-proof flat headed screws on items requiring assembly by screws or as indicated.

.3 Where possible, fit and shop assemble work, ready for erection.

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

2.3 FINISHES

.1 Galvanizing: hot dipped galvanizing with zinc coating 600 g/m^2 to CAN/CSA-G164.

.2 Chromium plating: chrome on steel with plating sequence of 0.009 mm thickness of copper 0.010 mm thickness of nickel and 0.0025 mm thickness of chromium.

.3 Shop coat primer: in accordance with chemical component limits and restrictions requirements and VOC limits of CCD-047a.

.4 Zinc primer: zinc rich, Interzinc 52 or approved equivalent, 2.5 mil DFT.

2.4 ISOLATION COATING

.1 Isolate aluminum from following components, by means of bituminous paint:

.1 Dissimilar metals except stainless steel, zinc, or white bronze of small area.

.2 Concrete, mortar and masonry.

.3 Wood.

2.5 SHOP PAINTING

.1 Primer: VOC limit 250 g/L maximum to GS-11.

.2 Apply one shop coat of primer to metal items, with exception of stainless steel, aluminum, galvanized or concrete encased items.

.3 Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7 degrees C.

.4 Clean surfaces to be field welded; do not paint.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for metal fabrications installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Contract Administrator.

.2 Inform Contract Administrator of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Contract Administrator.

3.2 ERECTION

.1 Do welding work in accordance with CSA W59 unless specified otherwise.

.2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.

.3 Provide suitable means of anchorage acceptable to Contract Administrator such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.

.4 Exposed fastening devices to match finish and be compatible with material through which they pass.

.5 Supply components for work by other trades in accordance with shop drawings and schedule.

.6 Make field connections with bolts to CSA S16, or Weld field connection if applicable.

.7 Deliver items over for casting into concrete and building into masonry together with setting templates to appropriate location and construction personnel.

.8 Touch-up rivets, field welds, bolts and burnt or scratched surfaces with primer.

.9 Touch-up galvanized surfaces with galvanizing solder where burned by field welding.

3.3 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by metal fabrications installation.

END OF SECTION

Part 1 General

1.1 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit shop drawings of stainless steel slide gates, wall thimbles, manual lift operators, stems, wall brackets, and accessories in accordance with Division 1.

.2 Submit Operating and Maintenance Manuals in accordance with Division 1.

.3 Provide 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 slide gates will not be made until the above information has been provided to the Contract Administrator.

.4 Provide the following information to the Contract Administrator prior to the delivery of slide gate and operator assemblies in accordance with Division 1.

.1 A certified copy of the Chemical and Physical Analysis on all materials used in the manufacture of the slide gate, wall thimbles, stems, operator and accessories or certification that the materials used are in strict accordance with this specification.

.2 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.

Part 2 Products

2.1 DESIGN

.1 Specification Standard: AWWA C561-14.

.2 Gate Opening Sizes & Style

.1 Gate Chamber: 762 mm X 762 mm (30" x 30") square, regular mount

.2 Effluent Station Wet Well: 305 mm X 305 mm (12" x 12") square with flush bottom seal

.3 Mounting: Type F wall thimble

.1 Gate Chamber: 762mm Square flange, with 762mm round opening suitable for transition to a 762mm (30") precast concrete sewer pipe.

.2 Effluent Station Wet Well: 305mm Square flange, 305mm square opening.

.4 Seating Head: Maximum design seating head will be as shown on the design drawings.

.5 Operator and Lift:

.1 Gate Chamber: Enclosed rising stem 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 counterclockwise to open.

.2 Effluent Station Wet Well: Enclosed rising stem lift with pedestal. Operator to be furnished with an aluminum handle for opening. Operator shall turn counterclockwise to open.

.6 Stem Cover: Gear lift to be complete with stem cover with acrylic window with gradations in 76 mm (3") increments for the entire range of gate operation.

.7 Stem: The stainless steel stem shall be designed so the slenderness ratio (kL/r) does not exceed 200.

.8 Stem Guides: Adjustable in both horizontal and vertical directions.

.9 Acceptable Leakage as per AWWA C561-14.

.10 UHMW PE shall be used to form a seal between the frame and thimble.

.11 Flush bottom seal: Neoprene

.12 Quantity and spacing of fasteners shall be as recommended by the gate manufacturer.

.13 The slide gate shall be as manufactured by Hydro Gate, Fontaine, Waterman or approved equivalent in accordance with B7.

2.2 MATERIALS

.1 Fasteners and anchor bolts: ASTM A276 Stainless Steel Type 316

.2 Liners and seals: UHMW PE (Ultra high molecular weight polymer)

.3 Thimble, frame, guides, slide, and stem guides: ASTM A276 Stainless Steel Type 316L

.4 Wedges and wedge blocks: ASTM A276 Stainless Steel Type 316

.5 Stem: ASTM A276 Stainless Steel Type 316

.6 Stem couplings: ASTM A276 Stainless Steel Type 316

.7 Operator pedestal: ASTM 126 Class B Cast Iron

.8 Stem cover: ASTM A276 Stainless Steel Type 316 or Galvanized A53 Steel

.9 Seats: UHMW PE (Ultra high molecular weight Polyethylene)

.10 Shop Drawings

.1 Submit shop drawings of the wall thimble, stainless steel slide gate, manual lift operator, stems, wall brackets and accessories in accordance with Division 1 of this Specification.

.11 Operating and Maintenance Manuals

.1 Provide copies of all the manufacturer's brochures and technical literature detailing correct installation procedures and recommended operating and maintenance instructions. Manuals shall be bound with the project title and gate description identified on the front cover. Final payment for slide gates will not be made until the above information has been provided to the Contract Administrator.

.12 Delivery and Shipping

.1 The Contract Administrator will examine the wall thimble, slide gate assembly, frame, stem, operator 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 Contractor to repair or replace any superficially damaged equipment to the satisfaction of the Contract Administrator.

.2 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.

.13 Shop Testing

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

.2 Provide the following information to the Contract Administrator prior to delivery of the slide gate and operator assemblies:

.3 A certified copy of the Chemical and Physical Analysis on all materials used or certification that the materials used are in strict accordance with this specification.

.4 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.

.14 Installation

.1 Install the slide gate, wall thimbles, actuators and all associated appurtenances in accordance with the manufacturer's instruction and recommendations.

.2 Coordinate to have the field representative of the slide gate manufacturer to inspect the installation during and after completion and provide a Certificate of Satisfactory Installation.

.15 Field Testing

.1 Perform leakage tests in the Contract Administrator's presence once slide gates have been installed to ensure compliance with the allowable leakage indicated in AWWA C561-14.

.2 The Contractor shall coordinate and arrange for a qualified field representative of the slide gate supplier/manufacturer to be present prior to and during field testing. The field representative shall complete required adjustments prior to field testing.

.3 If the gate fails the field leakage test, the field representative shall undertake adjustments, replacements or other modifications prior to repeating the test. The sequence shall be repeated until the gate passes the allowable leakage test.

END OF SECTION