PART 1 GENERAL

1.1 Section Includes

.1 Materials and installation for chain link fences and gates.

1.2 Related Sections

.1 Section 01 33 00 – Submittal Procedures.

.2 Section 32 12 16.01 – Asphalt Pathways and Courts

1.3 References

.1 American Society for Testing and Materials International, (ASTM).
- .1 ASTM A 53/A53M-02, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
- .2 ASTM A 90/A90M-01, Standard Test Method for Weight Mass of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings.
- .3 A653/A653M-03, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .4 ASTM C 618-03, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
- .5 ASTM F 1664-01, Standard Specification for Poly(Vinyl Chloride) (PVC)-Coated Steel Tension Wire Used with Chain-Link Fence.

.2 Canadian General Standards Board (CGSB).
- .1 CAN/CGSB-138.1-96, Fabric for Chain Link Fence.
- .2 CAN/CGSB-138.2-96, Steel Framework for Chain Link Fence.
- .3 CAN/CGSB-138.3-96, Installation of Chain Link Fence.
- .4 CAN/CGSB-138.4-96, Gates for Chain Link Fence.
- .5 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.

.3 Canadian Standards Association (CSA International).
- .1 CAN/CSA-A23.1/A23.2-00(August 2001), Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.
- .2 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
- .3 CAN/CSA-A3000-98(R2002), Cementitious Materials Compendium. Includes:
  - .1 CAN/CSA-A23.5-98, Supplementary Cementing Materials

.4 Department of Justice Canada (Jus).
- .1 Canadian Environmental Protection Act (CEPA), 1999, c. 33.

.5 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
- .1 Material Safety Data Sheets (MSDS).

.6 The Master Painters Institute (MPI) - Architectural Painting Specification Manual - March 1998.
- .1 MPI # 18, Organic Zinc Rich Primer.

.7 Transport Canada (TC).
- .1 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.

1.4 Submittals

.1 Submittals in accordance with Section 01 30 00 – Administrative Requirements.

.2 Submit WHMIS MSDS - Material Safety Data Sheets.

.4 Shop Drawings to indicate: all hardware components.

,5 Paint specs – provide paint procedures and materials data sheets for review.

1.5 Quality Assurance

.1 Installer Qualifications
.1 Fencing shall be installed by mechanics having a minimum of 2 years documented experience in the installation of chain link fencing. Submit proof of experience to Consultant.

.2 Installation
.1 Fencing installation shall be performed in strict accordance with manufacturer's printed instructions, and in accordance with all warranty requirements.

.3 Pre-installation Meeting
.1 Convene a pre-installation meeting for the Products specified in this section. Attendees must include, as a minimum, representatives of the following:
.1 Contractor (Site Superintendent & Project Manager)
.2 Installation Subcontractor (Site Foreman & Project Manager)
.3 Product Manufacturer and/or Distributor (Technical Representatives)
.4 Related Subcontractors (ie. Landscape)
.5 Consultant

1.6 Health and Safety

.1 Do construction occupational health and safety in accordance with Section 01 50 00 Temporary Facilities and Controls.

1.7 Utilities

.1 Before commencing work, establish locations and extent of underground utility lines in area of excavation.

.2 Known underground and surface utility lines are indicated on drawings. No guarantee is given of completeness or accuracy.

.3 Relocate existing lines in area of excavation, which must remain active.

.4 Make good and pay for damage to existing utility lines resulting from work.

1.8 Delivery, Storage and Handling

.1 Store and manage hazardous materials to approval of Owner and Section 01 57 19 Temporary Environmental Controls.

.2 Fencing mesh shall be delivered to jobsite rolled and banded.

.3 Deliver and store posts, rails, and brackets so as not to damage factory finish.

1.9 SCHEDULING

.1 Schedule fencing installation to commence immediately after completion of topsoil and finish grading operations.

1.10 Waste Management and Disposal

.1 Separate waste materials for reuse and recycling according to project Waste Management Plan.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper plastic polystyrene corrugated cardboard packaging material in appropriate on-site bins for recycling.

.4 Separate for reuse and recycling and place in designated containers Steel Metal Plastic.

.5 Place materials defined as hazardous or toxic in designated containers.

.6 Handle and dispose of hazardous materials in accordance with CEPA , TDGA , Regional and Municipal regulations.

.7 Divert unused metal and wiring materials from landfill to metal recycling facility as approved by Departmental Representative.

.8 Divert unused concrete materials from landfill to local facility as approved by Departmental Representative.

.9 Unused paint or coating material must be disposed of at official hazardous material collections site as approved by Departmental Representative.

.10 Do not dispose of unused paint material into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.

.11 Fold up metal banding, flatten and place in designated area for recycling.

PART 2 PRODUCTS

2.1 Sustainable Requirements

.1 Where feasible, use materials and resources in a sustainable fashion.

2.2 Materials

.1 Concrete mixes and materials:
- .1 Nominal coarse aggregate size: 20mm maximum size, -5mm minimum size.
- .2 Compressive strength: 27 MPa minimum at 28 days.
- .3 Water/cement ratio to CAN3-A23.1-M77 Table 7 for Class A exposure and 60 mm slump at time and point of deposit. Air entrainment to CAN3-A23.1-M77 Table 8.

.2 Chain-link fence fabric: to CAN/CGSB-138.1.
- .1 All heights
  - .1 Vinyl coated, 6 gauge – black, (medium strength, 3.6mm core wire – before vinyl coating).
  - .2 Mesh: 51mm.
  - .3 Height of fabric: as indicated.

.4 Top and bottom selvedge shall have a knuckle / knuckle finish.

.3 Posts, braces and rails: to CAN/CGSB-138.2, galvanized steel pipe, schedule 40.
- .1 Dimensions as indicated.
  - .1 Top, Mid and Bottom Rails: 42.9mm O.D., 3.56mm wall thickness.
  - .2 Line Posts: 63.5mm O.D., 3.91mm wall thickness.
  - .3 Corner / Gate / End Posts: 88.9mm O.D., 5.49mm wall thickness.
  - .4 Colour to match fabric.
- .2 Top, Mid and Bottom Rail locations.
  - .1 Top & Bottom Rails: all fencing sections.
  - .2 1800 and 2400mm (nominal) ht fencing: mid / brace rails at all end and corner sections.
  - .3 3650mm (nominal) ht fencing at basketball: mid rails at all sections.
  - .4 4800mm (nominal) ht fencing: mid rails at all sections.

.5 Tie wire fasteners: to CSA G162.1M. Single strand, galvanized steel wire conforming to requirements of fence fabric.

.6 Tension bar: to ASTM A 653/A653M, 5 x 20 mm minimum galvanized steel. or 5 x 20 mm minimum aluminum, colour to match fabric.

.7 Tension bar bands: 3 x 20 mm minimum galvanized steel or 5 x 20 mm minimum aluminium, colour to match fabric.

.8 Gates: to CAN/CGSB-138.4 (schedule 40).
- .1 Single man gates: 1066mm in width, with self latching closures.
- .2 Double gates: 2400mm in total width with self latching closures.
- .3 Gate frame: to ASTM A 53/A53M, galvanized steel pipe, standard weight 45 mm outside diameter pipe for outside frame, 35mm outside diameter pipe for interior bracing. Colour to match fabric.
  - .1 Fabricate gates as indicated with electrically welded joints, and hot-dip galvanized after welding.
  - .2 Fasten fence fabric to gate with twisted selvage at top.
- .4 Gate hardware:
  - .1 Furnish gates with galvanized malleable iron hinges, latch and latch catch with provision for padlock which can be attached and operated from either side of installed gate.
  - .2 All gates to have self-latching closures that allow locking complete with heavy duty drop-latch and hinges. Furnish double gates with chain hook to hold gates open.
  - .3 All hardware to match posts and rails in finish and colour.

.9 Fittings and hardware: to CAN/CGSB-138.2, cast aluminum alloy or galvanized steel
- .1 Tension bar bands: 3 x 20 mm minimum galvanized steel or 5 x 20 mm minimum aluminum.
- .2 Post caps to provide waterproof fit, to fasten securely over posts and to carry top rail.
- .3 Turnbuckles to be drop forged.

.10 Organic zinc rich coating: to CAN/CGSB-1.181.

2.3 Finishes

.1 Galvanizing:
- .1 For chain link fabric: to CAN/CGSB-138.1, 1.2 oz. (34 grams).
- .2 For pipe: 550 g/m2 minimum to ASTM A90.
- .3 For other fittings: to CAN/CSA-G164.

.2 Vinyl coating:
- .1 0.045mm dry film thickness minimum.

.3 Painting:
- .1 Submit material data sheets for paint and outline process.
- .2 All posts, rails, tension bars and bands, gates, fittings, and hardware to be electrostatically painted black.
- .3 Paint to be Exterior Finishes Formula 37 for galvanized and zinc coated metals.
  - .1 Vinyl wash primer CGSB1-GP-121M.
  - .2 Steel primer CGSB1-GP-48M.
  - .3 Exterior enamel CGSB1-GP-61M.

PART 3 EXECUTION

3.1 Grading

.1 Remove debris and correct ground undulations along fence line to obtain smooth uniform gradient between posts.
- .1 Bottom of fence to be flush with ground surface where fence is installed in asphalt.
- .2 Provide clearance between bottom of fence and ground surface of 30 mm to 60 mm.

3.2 Erection of Fence

.1 Erect fence along lines as indicated or as directed by Consultant and to CAN/CGSB-138.3.

.2 Excavate post holes to the following depths:
- .1 Up to 2400mm ht fence:
  - .1 1100mm depth (of concrete) x 250mm diameter for line posts, and 1250mm depth (of concrete) x 350mm diameter for end, corner, and gate posts.
- .2 3650mm (12') ht fence:
  - .1 1250mm depth (of concrete) x 300mm diameter for line posts, 350mm diameter for end, corner, and gate posts..
- .3 4800mm (16') ht fence:
  - .1 1500mm depth (of concrete) x 450mm diameter for all posts.

.3 Space line posts 3 m apart, measured parallel to ground surface.

.4 Space straining posts at equal intervals not to exceed 150 m if distance between end or corner posts on straight continuous lengths of fence over reasonably smooth grade, is greater than 150 m.

.5 Install additional straining posts at sharp changes in grade and where directed by Departmental Representative or Consultant.

.6 Install corner post where change in alignment exceeds 10 degrees.

.7 Install end posts at end of fence and at buildings.

.8 Cut both sides of bottom section of sonotubes to allow bottom section to expand. Place sonotubes to bottom of post hole and 150 mm below grade. Place concrete in post holes then embed posts into concrete to the following depths: 840 mm depth for line posts, 910mm for end, corner, and gate posts. Finish concrete 150 mm below ground level and slope to drain away from posts. Brace to hold posts in plumb position and true to alignment and elevation until concrete has set. Fill remaining 150 mm with compacted screened topsoil and sod as required or finish concrete to top of asphalt surface & trowel smooth.

.9 Do not install fence fabric until concrete has cured minimum of 5 days.

.10 Install brace between end and gate posts and nearest line post, placed diagonally across panel.

.1 Install braces on both sides of corner and straining posts in similar manner.

.11 Install overhang tops and caps.

.12 Install top rail between posts and fasten securely to posts and secure waterproof caps and overhang tops.

.13 Install bottom rail between posts and fasten securely to posts.

.14 Lay out fence fabric on inside of enclosed area. Stretch tightly to tension recommended by manufacturer and fasten to end, corner, gate and straining posts with tension bar secured to post with tension bar bands spaced at 300 mm intervals.
.1 Knuckled selvedge at bottom.
.2 Twisted selvedge at top.

.15 Secure fabric to top rails, line posts and bottom rails with tie wires at 450 mm intervals.
.1 Give tie wires minimum two twists.

.16 Confirm by pull tests that a 12 kg perpendicular pull at mid-point of each mesh panel will displace mesh max. 50 mm from vertical plans.

.17 Face collar nuts to compound interior and torque tight.

3.3 Installation of Gates

.1 Install gates in locations as indicated or where directed by Consultant.

.2 Level ground between gate posts and set gate bottom approximately 40 mm above ground surface.

.3 Install gate stops where indicated.

3.4 Touch Up

.1 Clean damaged surfaces with wire brush removing loose and cracked coatings. Apply two coats of organic zinc-rich paint to damaged areas.
.1 Pre-treat damaged surfaces according to manufacturers' instructions for zinc-rich paint.

3.5 Cleaning

.1 Clean and trim areas disturbed by operations.
.1 Dispose of surplus material and replace damaged turf with sod or as directed by Departmental Representative or Consultant.

END OF SECTION