

**Part 1 General****1.1 REFERENCES**

- .1 ASTM International
  - .1 ASTM A53/A53M-10, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
  - .2 ASTM A90/A90M-11, Standard Test Method for Weight [Mass] of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings.
  - .3 ASTM A121-07, Standard Specification for Zinc-Coated (Galvanized) Steel Barbed Wire.
  - .4 ASTM A123/A123M-12, Standard Specification for Zinc (Hot Dip Galvanized) coatings on Iron and Steel Products.
  - .5 ASTM A653/A653M-11, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .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 CSA International
  - .1 CSA A23.1/A23.2-09, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
  - .2 CAN/CSA-A3000-08, Cementitious Materials Compendium.

**1.2 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for concrete mixes, fences, posts and gates and include product characteristics, performance criteria, physical size, finish and limitations.

**1.3 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirement and 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 in accordance with manufacturer's recommendations.
  - .2 Store and protect fence and gate materials from damage.
  - .3 Replace defective or damaged materials with new.

**Part 2 Products****2.1 MATERIALS**

- .1 Concrete mixes and materials: in accordance with Section 03 30 00 - Cast-in-Place Concrete.
  - .1 Nominal coarse aggregate size: 20-5.
  - .2 Compressive strength: 20 MPa minimum at 28 days.
  - .3 Additives: fly ash to CSA A3000.
- .2 Chain-link fence fabric: to CAN/CGSB-138.1.
  - .1 Heavy Grade – Gauge 10-12
  - .2 Height of fabric: as indicated.
- .3 Posts, braces and rails: to CAN/CGSB-138.2, galvanized steel pipe. Dimensions as indicated.
- .4 Top and bottom tension wire: to CAN/CGSB-138.2, single strand, galvanized steel wire.
- .5 Tie wire fasteners: aluminum wire, aluminum alloy wire.
- .6 Tension bar: to ASTM A653/A653M, 3 x 20 mm minimum galvanized steel.
- .7 Gates: to CAN/CGSB-138.4.
- .8 Gate frames: to ASTM A53/A53M, galvanized steel pipe, standard weight 45 mm outside diameter pipe for outside frame, 35 mm outside diameter pipe for interior bracing.
  - .1 Fabricate gates as indicated with electrically welded joints, and hot-dip galvanized after welding. Fasten fence fabric to gate with twisted selvage at top.
  - .2 Furnish double 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.
  - .3 Furnish double gates with chain hook to hold gates open and centre rest with drop bolt for closed position.
  - .4 Double gates must have hasps and staples for high security keyed padlocks, keyed differently.
  - .5 Furnish single gates with exterior panic set and hydraulic closers complete with galvanized steel plates as required to mount hardware.
- .9 Fittings and hardware: to CAN/CGSB-138.2, 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 Overhang tops to provide waterproof fit, to hold top rails and an outward projection to hold barbed wire overhang.
  - .4 Include projection with clips or recesses to hold 3 strands of barbed wire spaced 100 mm apart.
  - .5 Projection of approximately 300 mm long to project from fence at 45 degrees above horizontal.
  - .6 Turnbuckles to be drop forged.

- .10 Organic zinc rich coating: to CAN/CGSB-1.181, MPI #18.
- .11 Barbed wire : to ASTM A121 2.5 mm diameter galvanized steel wire 4 point barbs 125 mm spacing.
- .12 Barbed wire: to CAN/CGSB-138.2, 2.5 mm diameter.
- .13 Grounding rod: 16 mm diameter copperwell rod, 3 m long.

## **2.2 FINISHES**

- .1 Galvanizing:
  - .1 For chain link fabric: to CAN/CGSB-138.1 Grade 2.
  - .2 For pipe: 550 g/m<sup>2</sup> minimum to ASTM A90.
  - .3 For barbed wire: to ASTM A121, Class 2 and CAN/CGSB-138.2.
  - .4 For other fittings: to ASTM A123/A123M.
- .2 Aluminum coating:
  - .1 For barbed wire: to ASTM A121, Class 2.

## **Part 3 Execution**

### **3.1 EXAMINATION**

- .1 Verification of Conditions: verify conditions of substrate previously installed under other Sections or Contracts are acceptable for fence and gate installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Departmental Representative.
  - .2 Inform Departmental Representative 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 Departmental Representative.

### **3.2 PREPARATION**

- .1 Temporary Erosion and Sedimentation Control:
  - .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.
  - .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
  - .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

- .2 Grading:
  - .1 Remove debris and correct ground undulations along fence line to obtain smooth uniform gradient between posts.
  - .1 Provide clearance between bottom of fence and ground surface of 30 mm to 50 mm.

### 3.3 ERECTION OF FENCE

- .1 Erect fence along lines as indicated or as directed by Departmental Representative and to CAN/CGSB-138.3.
- .2 Excavate post holes to the required depth or as directed by Departmental Representative.
- .3 Space line posts 3 m apart, measured parallel to ground surface.
- .4 Install additional straining posts at sharp changes in grade and where directed by Departmental Representative.
- .5 Install corner post where change in alignment exceeds 10 degrees.
- .6 Install end posts at end of fence and at buildings.
  - .1 Install gate posts on both sides of gate openings.
- .7 Place concrete in post holes then embed posts into concrete to the required depth.
  - .1 Extend concrete 50 mm above ground level and slope to drain away from posts.
  - .2 Brace to hold posts in plumb position and true to alignment and elevation until concrete has set.
- .8 Install fence fabric after concrete has cured, minimum of 5 days.
- .9 Install brace between end and gate posts and nearest line post, placed in centre of panel and parallel to ground surface.
  - .1 Install braces on both sides of corner and straining posts in similar manner.
- .10 Install overhang tops and caps.
- .11 Install top rail between posts and fasten securely to posts and secure waterproof caps and overhang tops.
- .12 Install bottom tension wire, stretch tightly and fasten securely to end, corner, gate and straining posts with turnbuckles and tension bar bands.
- .13 Lay out fence fabric. 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.
- .14 Secure fabric to top rails, line posts and bottom tension wire with tie wires at 450 mm intervals.
  - .1 Give tie wires minimum two twists.
- .15 Install barbed wire strands and clip securely to lugs of each projection.
- .16 Install grounding rods as indicated.

**3.4            INSTALLATION OF GATES**

- .1      Install gates in locations as indicated or where directed by Departmental Representative.
- .2      Level ground between gate posts and set gate bottom approximately 40 mm above ground surface.
- .3      Determine position of centre gate rest for double gate.
  - .1          Cast gate rest in concrete as directed.
  - .2          Dome concrete above ground level to shed water.
- .4      Install gate stops where indicated.

**3.5            TOUCH UP**

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

**3.6            CLEANING**

- .1      Progress Cleaning:
  - .1          Leave Work area clean at end of each day.
- .2      Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

**END OF SECTION**