

Part 1 GENERAL**1.1 RELATED REQUIREMENTS**

- .1 Section 03 30 00 – *Cast in place concrete.*
- .2 Section 26 05 28 – *Grounding secondary.*

1.2 REFERENCE

- .1 American Society for Testing and Materials International, (ASTM).
 - .1 ASTM A 53/A 53M-18, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
 - .2 ASTM A 90/A 90M-13 (2018), Standard Test Method for Weight Mass of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings.
 - .3 ASTM A 121-13(2017), Standard Specification for Zinc-Coated (Galvanized) Steel Barbed Wire.
 - .4 ASTM A653/A653M-18, 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 Group (CSA)/CSA International.
 - .1 CAN/CSA-G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
- .4 Department of Justice Canada (Jus).
 - .1 Canadian Environmental Protection Act, 1999 (S.C. 1999, c. 33).
- .5 Health Canada - Workplace Hazardous Materials Information System (WHMIS).
 - .1 Safety data sheets (SDSs).
- .6 The Master Painters Institute (MPI) - Architectural Painting Specification Manual – (2014).
 - .1 MPI # 18, Organic Zinc Rich Primer.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - *Submittal Procedures.*
- .2 Shop drawings must show or indicate the following:
 - .1 Corner, line and straining posts.
 - .2 Chain link fence fabric for fences and barriers.

- .3 Bottom and top rails, tension bars, tension bar bands, post, tie wires and all other necessary accessories.
- .4 Barbed wire, barbed tape concertinas, steel arm posts.
- .5 Motorized sliding barriers, including control device, motor, self-closing device, security barriers.
- .6 Manual sliding barrier, including closing device.
- .7 Manual single swing gate for pedestrians, including closing device, hinges and locking system.
- .8 Manual double swing gate for pedestrians, including closing device, hinges and locking system.
- .9 Vehicular manual double swing gate, including closing device, hinges and locking system.

1.4 HEALTH AND SAFETY

- .1 Respect the professional health and safety rules and regulations in construction according to section 01 35 29.06 – *Health and safety*.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Do not store materials directly on the ground to keep it dry and clean.

1.6 WASTE MANAGEMENT AND DISPOSAL

- .1 Sort the waste for reuse and recycling in accordance with section 01 74 19 – *Waste management and disposal*.
- .2 Remove all packaging materials from site and forward to appropriate recycling facilities.
- .3 Unused paint and coatings must be directed to an approved hazardous materials collection site approved by Departmental Representative.
- .4 Fold metal strapping, flatten and place in designated areas for recycling.

Part 2 PRODUCTS

2.1 MATERIALS

- .1 Concrete mixes and concrete materials for sonotubes: in accordance with Section 03 30 00 - *Cast-in-place concrete*.
- .2 Chain link fence fabric: according to CAN / CGSB-138.1.
 - .1 Type 1, Class A, (zinc-Coated galvanized **before** weaving, hot dipped galvanized), minimal diameter of wire: 4,8 mm.
 - .2 Mesh size: 50,8 mm
 - .3 Height of fence fabric: 3,6 m.
 - .4 The average zinc coating weight shall not be less than 610 g / m² of uncoated wire.
 - .5 Minimum tensile strength: 10 000 N.



- .3 Posts, rails and bracing: galvanized steel pipes, according to CAN / CGSB-138.2, type 2 (minimal elastic limit of 344 MPa), dimensions shown on plans.
 - .1 Corner post: outside diameter of 168,3 mm, linear density 28,2 kg/m.
 - .2 Straining post: outside diameter of 114,3 mm, linear density 15,9 kg/m.
 - .3 Line post: outside diameter of 73 mm, linear density 8,6 kg/m.
 - .4 Bottom and top rails: outside diameter of 42,2 mm, linear density 3,4 kg/m.
 - .5 Bracing: outside diameter of 42,2 mm, linear density 3,4 kg/m.
- .4 Tie wires: 3.7 mm (9 gauge) galvanized steel.
- .5 Tension bars: Galvanized steel, according to ASTM A 653 / A 653M, at least 5 mm x 20 mm for a height of 3600 mm.
- .6 Barriers: in accordance with CAN / CGSB-138.4.
- .7 Barrier frame: in accordance with Section 08 42 29 – *Automatic entrances*.
- .8 Assembly and hardware parts in accordance with CAN / CGSB-138.2, galvanized steel.
 - .1 Galvanized steel tension bar band, minimum 3 mm x 20 mm.
 - .2 Galvanized steel post caps for water tightness, securely fastened to posts and carrying the top rail.
 - .3 Watertight overhead connections to secure top rails and post arms to support barbed wire.
 - .4 Post arms measuring 625 mm in length at a 45-degree angle from horizontal with fasteners or niches 450 mm apart to maintain 2 rows of barbed wire.
 - .5 Turnbuckles to be drop forged.
- .9 Zinc Rich Organic Coating: to CAN / CGSB-1.181.
- .10 2,5 mm diameter barbed wire made of galvanized zinc-coated steel in accordance to CAN / CGSB-138.2, with 4 tips every 150 mm.
- .11 Barbed tape consisting of 20 mm x 0.5 mm galvanized steel tape clenched around a galvanized spring steel core wire 2.5 mm in diameter to form a 710 mm nominal diameter concertina coil. When installed, the diameter of the coil stretched should be 630 mm and the space between the loops should not exceed 230 mm. Blades should be 20 mm from one end to the other and the barbed wire should be spaced approximately 45 mm from center to center.
- .12 Grounding Pins: in accordance with Section 26 05 28 – *Grounding secondary*.

2.2 FINISHES

- .1 Galvanizing
 - .1 For chain link fabric: to CAN/CGSB-138.1.
 - .2 For pipe: 610 g/m² minimum to ASTM A 90.
 - .3 For barbed wire: to CAN/CGSB-138.2.
 - .4 For other fittings: to ASTM A 123/A 123M.

Part 3 EXECUTION**3.1 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.

3.2 ERECTION OF FENCE

- .1 Erect fence along lines as indicated and to CAN/CGSB-138.3.
- .2 For the posts, dig holes 1,5 times the diameter of the sonotube to install, as requested in the plans. The sonotubes must be raised by 300 mm when pouring the concrete for the post bases.
- .3 Space line posts 2,5 m apart, measured parallel to ground surface.
- .4 Space straining posts at equal intervals not to exceed 30 m if distance between end or corner posts on straight continuous lengths of fence over reasonably smooth grade, is greater than 30 m.
- .5 Install additional straining posts at sharp changes in grade and where directed by Departmental Representative.
- .6 Install corner post where change in alignment is 45 degrees.
- .7 Install end posts at end of fence and at buildings.
 - .1 Install gate posts on both sides of gate openings.
- .8 Place concrete in post holes then embed posts into concrete to depths indicated.
 - .1 Extend concrete at 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.
- .9 Install fence fabric after concrete has cured, minimum of 5 days.
- .10 Install brace between end and gate posts and nearest line post, at inclination as indicated.
Braces must be welded to posts.
 - .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 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 Once the fence fabric has been installed, the tension must be checked by tensile tests. When a 12 kg pull is applied perpendicular to the middle of the fence fabric panel (between rails and posts), the fence must not move more than 30 mm from its resting position.
- .16 Install barbed wire strands and clip securely to lugs of each projection.
- .17 Lay the barbed tape concertina, fixed on the straight barbed wire, to obtain a loop diameter of 630 mm once installed.
- .18 Install grounding rods as indicated.

3.3 INSTALLATION OF GATES

- .1 Install gates in locations as indicated on plans and to section 08 42 29 – *Automatic entrances*.
- .2 Level the ground between the barrier posts and place the lower end of the barrier about 50 mm from the ground.

3.4 TOUCH-UP

- .1 Clean damaged surfaces with a wire brush to remove loose or cracked coating layers. Apply two layers of zinc rich organic paint to damaged surfaces.
 - .1 Before painting damaged surfaces, treat them in accordance with the manufacturer's instructions for applying zinc-rich paint.

3.5 CLEANING

- .1 Clean and treat areas where soil has been disturbed during construction.
 - .1 Dispose of surplus materials as directed by the Departmental Representative.

END OF SECTION