1. GENERAL

1.1 RELATED REQIUREMENTS

.1 Section 31 05 16 – Aggregate Materials

.2 Section 31 23 10 – Site Excavation, Filling and Grading

.3 Section 31 23 13 – Subgrade Preparation

1.2 SECTION INCLUDES

.1 Spreading and compacting imported aggregate into a base or sub-base.

.2 Scarifying, shaping and compacting existing granular base or sub-base.

.3 Windrowing existing gravel, preparing the subgrade and spreading and compacting granular base or sub-base.

1.3 DEFINITION

.1 Maximum Density: The dry unit mass of a sample at optimum moisture content as determined in the laboratory to ASTM D698 Method A.

1.4 QUALITY ASSURANCE

.1 Testing Frequency:

.1 The quality assurance laboratory will take a minimum of one field density test on a compacted granular lift for each 1 500 m^2 of road or parking and 500 m^2 of walk, monolithic walk, curb ramp, alley crossing, commercial crossing, private crossing, or median or island strip, according to ASTM D1556, ASTM D2167, or ASTM D2922 for comparison with a maximum density determined according to ASTM D698 Method A.

.2 Required Density:

.1 The compacted lift thickness of a granular course shall not exceed 150 mm, or as directed by the Consultant. The required density of granular base courses is a minimum of 98.0% of the maximum density for each 150 mm lift.

2. PRODUCTS

2.1 MATERIALS

.1 Granular Materials: to Section 31 05 16, Designation 3, classes as indicated on the Drawings.

2.2 EQUIPMENT

.1 Equipment: Graders, rollers and other equipment of adequate design and capacity to produce a granular base or subbase as specified.

3. EXECUTION

3.1 PREPARATION

.1 The prepared subgrade shall be inspected by the Consultant before placing the granular course.

3.2 NEW GRANULAR BASE OR SUBBASE COURSE

.1 Deposit aggregate and spread uniformly in lifts not exceeding 150 mm thickness when compacted.

.2 Segregation: If segregation occurs:

.1 In Class 25 aggregate: blade the lift and mix thoroughly before final spreading and shaping to crown and grade.
.2 In Class 80 aggregate: remove and replace the segregated material.

3.3 COMPACTION

.1 Bring the moisture content of the aggregate to near optimum.

.2 Non-compliance: If a density test result is less than the required density, that test result is to be recorded as "failed" and a retest shall be performed on the area represented by the failed test. If the retest is less than the required density, the area shall be reworked to the full depth of the lift, the soil moisture altered as necessary and recompacted to the required density.

.3 The Contractor shall assume the risk of uncovering and reworking the granular base if it is covered before the Consultant has accepted test results thereof.

3.4 FIELD QUALITY CONTROL

.1 Check finished surface of granular base to ensure that it meets the following tolerances:

.1 Surface Tolerance: 15 mm maximum variation under 3 m straightedge.
.2 Grade Tolerance: 6 mm maximum variation above designated elevation and 15 mm maximum variation below designated elevation.

.2 When Tolerance Exceeded:

.1 Trim high spots and refinish surface to within tolerance.
.2 Add approved aggregate to low areas, scarify, blend, respread and recompact to required density and refinish surface. Alternatively, compensate low areas with extra thickness of subsequent granular base course.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 American Society for Testing and Materials International, (ASTM).
.1 ASTM A 53/A 53M-02, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
.2 ASTM A 90/A 90M-01, Standard Test Method for Weight Mass of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings.
.3 ASTM A 121-07, Standard Specification for Metallic Coated Steel Barbed Wire.
.4 A653/A653M-03, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
.5 ASTM C 618-03, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
.6 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.

1.2 SUBMITTALS

.1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Shop Drawings to indicate: fence layout, fully detailed fence components, finishes, materials, erection. Locate gate and openings.

1.3 HEALTH AND SAFETY

.1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Dispose of waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

1.5 SCHEDULING

.1 Erection of fencing shall not begin until all earthwork, grading, and paving involving vehicular equipment and machinery, is completed.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Concrete mixes and materials: to CAN/CSA-A23.1.
.1 Nominal coarse aggregate size: 20 mm.
.2 Compressive strength: 20 MPa minimum at 28 days.
.3 Cement: Type MS sulphate resistant cement.
.4 Slump: 50 to 80 mm.
.5 Air Entrainment: 6%

.2 Chain-link fence fabric: to CAN/CGSB-138.1.
.1 50 mm diamond mesh, interwoven 3.5 mm thick wire, top selvage twisted tight; bottom selvage knuckle end closed.
.2 Height of fabric: 2440mm.

.3 Posts, braces and rails: to CAN/CGSB-138.2, galvanized steel pipe, butt welded, type E standard weight, schedule 40 pipe. Dimensions as indicated.
.1 Line Posts: 60 mm O.D., 5.43 kg/m.
.2 Terminal Posts (end, corner and straining): 89 mm O.D., 11.28 kg/m.
.3 Gate Posts: 89 mm O.D., 11.28 kg/m.
.4 Top and Bottom Rails: 42 mm O.D., 3.38 kg/m, plain end, sleeve coupled.

.4 Bottom tension wire: to CAN/CGSB-138.1, Table 2, single strand, galvanized steel wire, 5 mm diameter.

.5 Tie wire fasteners: to CAN/CGSB-138.1, Table 2, single strand, galvanized steel wire.

.6 Tension bar: to ASTM A 653/A 653M, 5 x 20 mm minimum galvanized steel.

.7 Gates: to CAN/CGSB-138.4.

.8 Gate frames: to ASTM A 53/A 53M, 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.
.2 Fasten fence fabric to gate with twisted selvage at top.
.3 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.
.4 Furnish double gates with chain hook to hold gates open and centre rest with drop bolt for closed position.

.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: sized to suit post diameter to provide waterproof fit, set screw retained, to fasten securely over posts and to carry top rail.
.3 Turnbuckles to be drop forged.
.4 Line Post Eye Tops: cast aluminum or hot dip galvanized pressed steel.
.5 Rail Ends: hot dip galvanized pressed steel.
.6 Fittings: sleeves, bands, clips, tension bars, fasteners and fittings, hot dip galvanized steel.

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

.11 Grounding rod: 16 mm diameter copperwell rod, 3 m long to Section 26 05 27 - Grounding - Primary.

.12 Padlock: keyed cylinder, solid brass body, stainless steel shackles, Schlage 45-101/28-001 or approved equal. Keyed as directed by Departmental Representative.

2.2 FINISHES

.1 Galvanizing:
- .1 For chain link fabric: to CAN/CGSB-138.1 Grade2, 490 g/m^2
- .2 For pipe: 550 g/m^2 minimum to ASTM A 90.
- .3 For other fittings: to CAN/CSA-G164.

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 Excavate post holes to dimensions indicated by methods approved by Departmental Representative.

.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.

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

.7 Install end posts at end of fence and at buildings.
.1 Install gate posts on both sides of gate openings.

.8 Set posts in cylindrical cast-in-place concrete footings sized as follows:
.1 Fence height up to 2440 mm high, 200 mm diameter.
.2 Line posts: 950 mm deep, 250 mm diameter.
.3 Gate and Terminal Posts: 1200 mm deep, 300 mm diameter.

.9 Place concrete in post holes then embed posts into concrete to within 150 mm of bottom of concrete footing.
.1 Align top of posts to ensure that top rail varies gradually with ground elevations.
.2 Extend concrete 50 mm above ground level and slope to drain away from posts.
.3 Brace to hold posts in plumb position and true to alignment and elevation until concrete has set.

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

.11 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.

.12 Install caps.

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

.14 Pass top rail through posts to form continuous bracing. Fasten securely to posts and secure waterproof caps. Install 175 mm long couplings at midspan of pipe ends.

.15 Install bottom tension wire, stretch tightly and fasten securely to end, corner, gate and straining posts with turnbuckles and tension bar bands.

.16 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 selvage at bottom.
.2 Twisted selvage at top.
.3 Install fabric between 30mm and 50 mm above grade.

.17 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.

.18 Install grounding rods as recommended by manufacturer.

3.3 INSTALLATION OF GATES

.1 Install gates in locations and sizes as indicated. Use fabric to match fence. Install hardware specified.

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

.3 Install gate stops.

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 as indicated in accordance with Section 09 91 13 - Exterior Painting.
.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 gravel surfaces directed by Departmental Representative.

END