

## **Part 1           General**

### **1.1           MEASUREMENT AND PAYMENT**

- .1   METHOD OF MEASUREMENT – No separate measurement of Granular Sub-base will be made and is incidental to “Concrete Slab” and “Utility Vaults”.
- .2   BASIS OF PAYMENT – No separate payment for Granular Sub-base shall be made and is incidental to “Concrete Slab” and “Utility Vaults”.

### **1.2           REFERENCES**

- .1   ASTM International
  - .1   ASTM C117-04, Standard Test Methods for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.
  - .2   ASTM C131-06, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
  - .3   ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .4   ASTM D422-63(2007), Standard Test Method for Particle-Size Analysis of Soils.
  - .5   ASTM D698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft<sup>3</sup>) (600kN-m/m<sup>3</sup>).
  - .6   ASTM D1557-09, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft<sup>3</sup>) (2,700kN-m/m<sup>3</sup>).
  - .7   ASTM D1883-07e2, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
  - .8   ASTM D4318-10, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
- .2   Canadian General Standards Board (CGSB)
  - .1   CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
  - .2   CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

### **1.3           ACTION AND INFORMATIONAL SUBMITTALS**

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

## **Part 2           Products**

### **2.1           MATERIALS**

- .1   Granular sub-base material: in accordance with the following requirements:

- .1 Crushed, pit run or screened stone, gravel or sand.
- .2 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1 CAN/CGSB-8.2.

.3 Table

Sieve Designation	% Passing
100 mm	-
75 mm	100
50 mm	-
37.5 mm	-
25 mm	55-100
19 mm	-
12.5 mm	-
9.5 mm	-
4.75 mm	25-100
2.00 mm	15-80
0.425 mm	4-50
0.180 mm	-
0.075 mm	0-8

- .4 Other properties as follows:
  - .1 Liquid Limit: to ASTM D4318, Maximum 25.
  - .2 Plasticity Index: to ASTM D4318, Maximum 6.
  - .3 Particles smaller than 0.02 mm: to ASTM D422, Maximum 3%.

### Part 3 Execution

#### 3.1 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrate previously installed under other Sections or Contracts are acceptable for granular sub-base 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.

#### 3.2 PLACING

- .1 Place granular sub-base after subgrade is inspected and approved by Departmental Representative.
- .2 Construct granular sub-base to depth and grade in areas indicated.
- .3 Ensure no frozen material is placed.
- .4 Place material only on clean unfrozen surface, free from snow or ice.
- .5 Place granular sub-base materials using methods which do not lead to segregation or degradation.

- .6 Place material to full width in uniform layers not exceeding 150 mm compacted thickness.
  - .1 Departmental Representative may authorize thicker lifts if specified compaction can be achieved.
- .7 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
- .8 Remove and replace portion of layer in which material has become segregated during spreading.

### **3.3 COMPACTION**

- .1 Compaction equipment to be capable of obtaining required material densities.
- .2 Efficiency of equipment not specified to be proved at least as efficient as specified equipment at no extra cost and written approval must be received from Departmental Representative before use.
- .3 Equipped with device that records hours of actual work, not motor running hours.
- .4 Compact to density of not less than 98% maximum dry density in accordance with ASTM D698 ASTM D1557.
- .5 Shape and roll alternately to obtain smooth, even and uniformly compacted sub-base.
- .6 Apply water as necessary during compaction to obtain specified density.
- .7 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Departmental Representative.
- .8 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

### **3.4 PROOF ROLLING**

- .1 For proof rolling use standard roller of 45400 kg gross mass with four pneumatic tires each carrying 11350 kg and inflated to 620 kPa. Four tires arranged abreast with centre to centre spacing of 730 mm maximum.
- .2 Obtain written approval from Departmental Representative to use non standard proof rolling equipment.
- .3 Proof roll at level in sub-base as indicated.
  - .1 If non standard proof rolling equipment is approved, Departmental Representative will determine level of proof rolling.
- .4 Make sufficient passes with proof roller to subject every point on surface to three separate passes of loaded tire.
- .5 Where proof rolling reveals areas of defective subgrade:
  - .1 Remove sub-base and subgrade material to depth and extent as directed by Departmental Representative.
  - .2 Replace sub-base material and compact.

- .6 Where proof rolling reveals areas of defective sub-base, remove and replace in accordance with this section at no extra cost.

### **3.5 SITE TOLERANCES**

- .1 Finished sub-base surface to be within 10 mm of elevation as indicated but not uniformly high or low.

### **3.6 PROTECTION**

- .1 Maintain finished sub-base in condition conforming to this section until succeeding base is constructed, or until granular sub-base is accepted by Departmental Representative.

**END OF SECTION**

## **1.1 MEASUREMENT AND PAYMENT**

- .1 METHOD OF MEASUREMENT – Measurement of "Chain Link Fences and Gates" as indicated on the plans and drawings and described in the Specifications shall be in linear metres along the centreline of the fence. Supply and installation of all posts, wire, and all other such works shall be incidental to "Chain Link Fences and Gates".
- .2 BASIS OF PAYMENT – Payment for " Chain Link Fences and Gates " shall be at the Contract Unit Price for "Chain Link Fences and Gates " measured as specified herein which shall be payment in full for those operations described in the Specifications and for those operations incidental to the Work for which no price or prices or provisions for payment are included in the Contract.

## **1.2 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-09, Standard Test Method for Weight 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 A653/A653M-10, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  - .5 ASTM C618-08a, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
  - .6 ASTM F1664-08, Standard Specification for Poly(Vinyl Chloride) (PVC)-Coated Steel Tension Wire Used with Chain-Link Fence.
  - .7 ASTM A123/A123M-09, Standard Specification for Zinc (Hot Dip Galvanized) coatings on Iron and Steel Products.
- .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.

## **1.3 ACTION AND INFORMATIONAL SUBMITTALS**

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

- .2 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.

#### **1.4 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 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 CSA A23.1.
  - .1 Compressive strength: 20 MPa minimum at 28 days.
- .2 Chain-link fence fabric: to CAN/CGSB-138.1.
  - .1 Type 1, Class A, medium.
  - .2 Height of fabric: 1.8 m.
- .3 Posts, braces and rails: to CAN/CGSB-138.2, galvanized steel pipe. Dimensions as indicated.
- .4 Bottom tension wire: to CAN/CGSB-138.2, single strand, galvanized steel wire.
- .5 Tie wire fasteners: steel wire.
- .6 Tension bar: to ASTM A653/A653M, 5 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.
  - .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, galvanized steel malleable, or ductile cast iron.
  - .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.

## **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 other fittings: to ASTM A123/A123M.

## **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.

### **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.
- .3 Space line posts 3 m apart, measured parallel to ground surface.
- .4 Place concrete in post holes then embed posts into concrete to depths indicated.
  - .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.
- .5 Install fence fabric after concrete has cured, minimum of 5 days.
- .6 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.
- .7 Install top rail between posts and fasten securely to posts and secure waterproof caps.
- .8 Install bottom tension wire, stretch tightly and fasten securely to end, corner, gate and straining posts with turnbuckles and tension bar bands.

- .9 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.
- .10 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.

### **3.3 INSTALLATION OF GATES**

- .1 Install gates in locations as indicated.
- .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.

### **3.4 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.

**END OF SECTION**



**Part 1 General**

**1.1 MEASUREMENT AND PAYMENT**

- .1 METHOD OF MEASUREMENT – Measurement of “Seeding” will be in square metres of actual surface measurements taken and computed by Departmental Representative. Mechanical seeding, watering, fertilizer, maintenance during warranty period shall be incidental to “Seeding”. Mechanical seeding of placed topsoil shall be conducted within the reservoir fence area, within the AAFC yard, and within the roadway right-of-ways.
- .2 BASIS OF PAYMENT – Payment for "Seeding" shall be at the Contract Unit Price for "Seeding" measured as specified herein which shall be payment in full for those operations described in the Specifications and for those operations incidental to the Work for which no price or prices or provisions for payment are included in the Contract.

**1.2 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for seed, and fertilizer.
  - .2 Submit electronic copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements 01 35 43 - Environmental Procedures of any fertilizers used.
- .3 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .4 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.

**1.3 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements:
  - .1 Labelled bags of fertilizer identifying mass in kg, mix components and percentages, date of bagging, supplier's name and lot number.
  - .2 Fertilizer must be dry.
- .3 Storage and Handling Requirements:
  - .1 Store fertilizer in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Replace defective or damaged materials with new.

**1.4 WARRANTY**

- .1 For seeding, 12 months warranty period.
- .2 End-of-warranty inspection will be conducted by Departmental Representative.

## **Part 2            Products**

### **2.1            GRASS SEED**

- .1      Canada "Certified" seed, "Canada No. 1 Lawn Grass Mixture" in accordance with Government of Canada "Seeds Act" and "Seeds Regulations".
- .2      In packages individually labelled in accordance with "Seeds Regulations" and indicating name of supplier.

### **2.2            WATER**

- .1      Free of impurities that would inhibit germination and growth.

### **2.3            FERTILIZER**

- .1      To Canada "Fertilizers Act" and Regulations.
- .2      Complete synthetic fertilizer with guaranteed minimum analysis as specified.

## **Part 3            Execution**

### **3.1            EXAMINATION**

- .1      Verification of Conditions: verify conditions of substrate previously installed under other Sections or Contracts are acceptable for mechanical seeding 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.

### **3.2            SEED BED PREPARATION**

- .1      Do not perform work under adverse field conditions as determined by Departmental Representative.
- .2      Remove and dispose of weeds; debris; stones 50 mm in diameter and larger.
- .3      Verify that grades are correct. If discrepancies occur, notify Departmental Representative and commence work when instructed by Departmental Representative.
- .4      Fine grade surface free of humps and hollows to smooth, even grade, surface draining naturally.

### **3.3            SEED PLACEMENT**

- .1      For mechanical seeding:
  - .1          Use equipment and method acceptable to Departmental Representative.
- .2      For manual seeding:
  - .1          Use equipment and method acceptable to Departmental Representative.
- .3      Incorporate seed by light raking in cross directions.

### **3.4 MAINTENANCE DURING ESTABLISHMENT PERIOD**

- .1 Perform following operations from time of seed application until acceptance by Departmental Representative:
  - .1 Water seeded area to maintain optimum soil moisture level for germination and continued growth of grass. Control watering to prevent washouts.
  - .2 Repair and reseed dead or bare spots to allow establishment of seed prior to acceptance.

### **3.5 FINAL ACCEPTANCE**

- .1 Seeded areas will be accepted by Departmental Representative provided that:
  - .1 Areas are uniformly established free of rutted, eroded, bare or dead spots and extent of weeds apparent in grass is acceptable.
  - .2 Areas have been fertilized.
- .2 Areas seeded in fall will be accepted in following spring, one month after start of growing season provided acceptance conditions are fulfilled.

### **3.6 MAINTENANCE DURING WARRANTY PERIOD**

- .1 Perform following operations from time of acceptance until end of warranty period.
  - .1 Water seeded area to maintain optimum soil moisture level for continued growth of grass. Control watering to prevent washouts.
  - .2 Repair and reseed dead or bare spots to satisfaction of Departmental Representative.
  - .3 Fertilize seeded areas.

**END OF SECTION**