

PART 1 - GENERAL

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| <u>1.1 RELATED REQUIREMENTS</u> | .1 | Section 32 11 17 - Reshaping Granular Roadbed. |
|                                 | .2 | Section 32 11 23 - Aggregate Base Courses.     |

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| <u>1.2 REFERENCE STANDARDS</u> | .1 | ASTM International  |
|                                | .1 | ASTM C 117-04, Standard Test Methods for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.                                       |
|                                | .2 | ASTM C 131-06, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine. |
|                                | .3 | ASTM C 136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.   |
|                                | .4 | ASTM D 422-63(2007), Standard Test Method for Particle-Size Analysis of Soils.  |
|                                | .5 | ASTM D 698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort(600kN-m/m <sup>3</sup> ).            |
|                                | .6 | ASTM D 1557-09, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (2,700kN-m/m <sup>3</sup> ).           |
|                                | .7 | ASTM D 1883-07e2, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.  |
|                                | .8 | ASTM D 4318-10, 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.  |

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| <u>1.3 DELIVERY, STORAGE AND HANDLING</u> | .1 | Storage and Handling Requirements:                                 |
|   | .1 | Store materials in accordance with manufacturer's recommendations. |
|   | .2 | Replace defective or damaged materials with new.                   |

## 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 C 136 and ASTM C 117. Sieve sizes to CAN/CGSB-8.1 CAN/CGSB-8.2.
- .3 Table

Sieve Sizes	Granular 'A'	Granular 'B'	Granular 'C'
101.6 mm			100
76.1 mm			
50.8 mm		100	75-100
25.4		50-100	
19.0 mm	100		
15.9 mm			
9.51 mm	50-80		
4.76 mm	35-60	20-55	20-55
1.20 mm	15-35	10-35	10-35
.300 mm	5-20	5-20	5-20
.075 mm	2-6 (Pit Source)	2-6 (Pit Source)	0-12
.075 mm	2-8 (Rock Source)	2-8 (Rock Source)	

- .4 Other properties as follows:
  - .1 Liquid Limit: to ASTM D 4318, Maximum 25.
  - .2 Plasticity Index: to ASTM D 4318, Maximum 6.

## 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 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.

- 3.3 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 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.
  - .6 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
  - .7 Remove and replace portion of layer in which material has become segregated during spreading.

- 3.4 COMPACTION
- .1 Compaction equipment to be capable of obtaining required material densities.
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| <u>3.4 COMPACTION</u><br>(Cont'd) | .2 | Compact to density of not less than 98% corrected maximum dry density maximum dry density in accordance with ASTM D 698 ASTM D 1557.  |
|                                   | .3 | Shape and roll alternately to obtain smooth, even and uniformly compacted sub-base.   |
|                                   | .4 | Apply water as necessary during compaction to obtain specified density.   |
|                                   | .5 | In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Departmental Representative.                                     |
|                                   | .6 | Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.  |
| <u>3.5 CLEANING</u>               | .1 | Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.   |
| <u>3.6 SITE TOLERANCES</u>        | .1 | Finished sub-base surface to be within 10 mm of elevation as indicated but not uniformly high or low.   |
| <u>3.7 PROTECTION</u>             | .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. |

PART 1 - GENERAL

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|---------------------------------|----|--|
| <u>1.1 RELATED REQUIREMENTS</u> | .1 | Section 32 11 16.01 - Granular Sub-Base.   |
|                                 | .2 | Section 32 11 23 - Aggregate Base Courses. |
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|--------------------------------|----|--|
| <u>1.2 REFERENCE STANDARDS</u> | .1 | American Society for Testing and Materials International, (ASTM)   |
|                                | .1 | ASTM C 117-03, Test Method for Materials Finer than 75- $\mu$ m (No. 200) Sieve in Mineral Aggregates by Washing.                          |
|                                | .2 | ASTM C 131-03, Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine. |
|                                | .3 | ASTM C 136-01, Method for Sieve Analysis of Fine and Coarse Aggregates.  |
|                                | .4 | ASTM D 698-00a, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600kN-m/m <sup>3</sup> ).             |
|                                | .5 | ASTM D 4318-00, Test Method 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.  |

PART 2 - PRODUCTS

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| <u>2.1 MATERIALS</u> | .1 | Granular base material: to the following requirements:   |
|                      | .1 | Crushed stone or gravel consisting of hard, durable, angular particles, free from clay lumps, cementation, organic material and other deleterious materials. |
|                      | .2 | Graduations within limits specified when tested to ASTM C 136 and ASTM C 117. Sieve sizes to CAN/CGSB-8.1.   |
|                      | .3 | Gradation to:  |
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## 2.1 MATERIALS (Cont'd)

.1 (Cont'd)

<u>Sieve Designation</u>	<u>% Passing</u>
100 mm	-
75 mm	-
50 mm	-
38.1 mm	-
25 mm	-
19 mm	100
12.5 mm	-
9.5 mm	50-80
4.75 mm	35-60
1.20 mm	15-35
0.425 mm	-
0.180 mm	-
0.075 mm	-

.4 Gradation to: Newfoundland and Labrador Department of Transportation and Works, Granular Type 'A'.

.5 Other properties as follows:

.1 Liquid limit: ASTM D 4318, maximum 25.

.2 Plasticity index: ASTM D 4318, maximum 6.

.3 Los Angeles Degradation: ASTM C 131, maximum % loss by weight 45.

.4 Crushed particles: at least 50 % of particles by mass within 19.0 mm to 4.75 mm sieve designation range to have at least 1 freshly fractured face. Material divided into ranges using methods of ASTM C 136.

## PART 3 - EXECUTION

### 3.1 SEQUENCE OF OPERATION

.1 Scarifying and reshaping:

.1 Scarify roadbed to width as indicated unless directed otherwise by Departmental Representative and to minimum depth of 150 mm.

.2 Where deficiency of material exists, add and blend in new granular base material as directed by Departmental Representative. Ensure no frozen material is used.

.2 Compaction equipment:

.1 Compaction equipment capable of obtaining required material densities.

3.1 SEQUENCE OF  
OPERATION  
(Cont'd)

- .3 Compacting:
  - .1 Compact to density minimum 100 maximum dry density in accordance with ASTM D 698.
  - .2 Shape and roll alternately to obtain smooth, even and uniformly compacted base.
  - .3 Apply water as necessary during compaction to obtain specified density.
  - .4 Use mechanical tampers, approved by Departmental Representative to compact areas not accessible to rolling equipment to specified density.
- .4 Repair of soft areas:
  - .1 Correct soft areas by removing defective material to depth and extent directed by Departmental Representative. Replace with material acceptable to Departmental Representative and compact to specified density.
  - .2 Maintain reshaped surface in condition conforming to this section until succeeding material is applied or until acceptance by Departmental Representative.

3.2 SITE TOLERANCES

- .1 Reshaped compacted surface within plus or minus 10 mm of elevation as indicated.

PART 1 - GENERAL

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|---|----|---|
| <u>1.1 RELATED REQUIREMENTS</u>           | .1 | Section 32 11 16.01 - Granular Sub-Base.  |
|   | .2 | Section 32 11 17 - Reshaping Granular Roadbed.  |
| <u>1.2 REFERENCE STANDARDS</u>            | .1 | ASTM International  |
|   | .1 | ASTM C 117-04, Standard Test Methods for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.   |
|   | .2 | ASTM C 131-06, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.                       |
|   | .3 | ASTM C 136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.   |
|   | .4 | ASTM D 698-07e1, 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> ). |
|   | .5 | ASTM D 1557-09, 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> ).          |
|   | .6 | ASTM D 1883-07e2, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.  |
|   | .7 | ASTM D 4318-10, 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.  |
| <u>1.3 DELIVERY, STORAGE AND HANDLING</u> | .1 | Storage and Handling Requirements:  |
|   | .1 | Stockpile minimum 50% of total aggregate required prior to beginning operation.   |
|   | .2 | Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.  |
|   | .3 | Replace defective or damaged materials with new.  |



## PART 2 - PRODUCTS

### 2.1 MATERIALS .1 Granular base: material in accordance with the following requirements:

- .1 Crushed stone or gravel.
- .2 Gradations to be within limits specified when tested to ASTM C 136 and ASTM C 117 .
- Sieve sizes to CAN/CGSB-8.1 CAN/CGSB-8.2.

#### .1 Gradation Method #1 to:

Sieve Sizes	Granular 'A'	Granular 'B'	Granular 'C'
101.6 mm			100
76.1 mm			
50.8 mm		100	75-100
25.4		50-100	
19.0 mm	100		
15.9 mm			
9.51 mm	50-80		
4.76 mm	35-60	20-55	20-55
1.20 mm	15-35	10-35	10-35
.300 mm	5-20	5-20	5-20
.075 mm	2-6 (Pit Source)	2-6 (Pit Source)	0-12
.075 mm	2-8 (Rock Source)	2-8 (Rock Source)	

## PART 3 - EXECUTION

### 3.1 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.

### 3.2 PLACEMENT AND INSTALLATION .1 Place granular base after subgrade surface is inspected and approved by Departmental Representative.

3.2 PLACEMENT AND  
INSTALLATION  
(Cont'd)

- .2 Placing:
  - .1 Construct granular base to depth and grade in areas indicated.
  - .2 Ensure no frozen material is placed.
  - .3 Place material only on clean unfrozen surface, free from snow and ice.
- .3 Compaction Equipment:
  - .1 Ensure compaction equipment is capable of obtaining required material densities.
- .4 Compacting:
  - .1 Compact to density not less than 100% maximum dry density to ASTM D 698 ASTM D 1557.
  - .2 Shape and roll alternately to obtain smooth, even and uniformly compacted base.
  - .3 Apply water as necessary during compacting to obtain specified density.
  - .4 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved in writing by Departmental Representative.
  - .5 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.3 SITE TOLERANCES

- .1 Finished base surface to be within plus or minus 10 mm of established grade and cross section but not uniformly high or low.

3.4 CLEANING

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

3.5 PROTECTION

- .1 Maintain finished base in condition conforming to this Section until succeeding material is applied or until acceptance by Departmental Representative.

PART 1 - GENERAL

<u>1.1 RELATED REQUIREMENTS</u>	.1	Section 03 30 00.01 - Cast In Place Concrete Short Form.
<u>1.2 REFERENCE STANDARDS</u>	.1	ASTM International <ul style="list-style-type: none"><li>.1 ASTM A 53/A 53M-10, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.</li><li>.2 ASTM A 90/A 90M-09, Standard Test Method for Weight Mass of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings.</li><li>.3 ASTM A 121-07, Standard Specification for Zinc-Coated (Galvanized) Steel Barbed Wire.</li><li>.4 A653/A653M-10, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.</li><li>.5 ASTM C 618-08a, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.</li><li>.6 ASTM A 123/A 123M-09, Standard Specification for Zinc (Hot Dip Galvanized) coatings on Iron and Steel Products.</li></ul>
	.2	Canadian General Standards Board (CGSB) <ul style="list-style-type: none"><li>.1 CAN/CGSB-138.1-96, Fabric for Chain Link Fence.</li><li>.2 CAN/CGSB-138.2-96, Steel Framework for Chain Link Fence.</li><li>.3 CAN/CGSB-138.3-96, Installation of Chain Link Fence.</li><li>.4 CAN/CGSB-138.4-96, Gates for Chain Link Fence.</li><li>.5 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.</li></ul>
	.3	CSA International <ul style="list-style-type: none"><li>.1 CSA A23.1/A23.2-09, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.</li><li>.2 CAN/CSA-A3000-08, Cementitious Materials Compendium.</li></ul>
	.4	Master Painters Institute (MPI)

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1.2 REFERENCE STANDARDS <u>(Cont'd)</u>	.4 (Cont'd) .1 Architectural Painting Specification Manual - current edition.
1.3 ACTION AND INFORMATIONAL SUBMITTALS <u></u>	.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.
1.4 DELIVERY, STORAGE AND HANDLING <u></u>	.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 <u></u>	.1 Concrete mixes and materials: .1 Nominal coarse aggregate size: 20mm. .2 Compressive strength: 25 MPa minimum at 28 days.  .2 Chain-link fence fabric: to CAN/CGSB-138.1. .1 Type as indicated. .2 Height of fabric: as indicated.  .3 Posts, braces and rails: to CAN/CGSB-138.2, galvanized steel pipe. Dimensions as indicated.
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2.1 MATERIALS  
(Cont'd)

- .4 Top and bottom tension wire: to CAN/CGSB-138.2, single strand, galvanized steel wire.
- .5 Tie wire fasteners: 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 painted with zinc pigmented paint 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, galvanized steel.
  - .1 Tension bar bands: 3 x 20 mm minimum galvanized steel.
  - .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.

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| <u>2.1 MATERIALS</u><br>(Cont'd) | .11 Barbed wire: to ASTM A 121 2 mm diameter galvanized steel wire 4 point barbs 125 mm spacing.  |
|                                  | .12 Barbed wire: to CAN/CGSB-138.2, 2.5 mm diameter.  |
| <u>2.2 FINISHES</u>              | .1 Galvanizing: <ul style="list-style-type: none"><li>.1 For chain link fabric: to CAN/CGSB-138.1 Grade 2.</li><li>.2 For pipe: 550 g/m<sup>2</sup> minimum to ASTM A 90.</li><li>.3 For barbed wire: to ASTM A 121, Class 2 CAN/CGSB-138.2.</li><li>.4 For other fittings: to ASTM A 123/A 123M.</li></ul> |

### PART 3 - EXECUTION

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| <u>3.1 EXAMINATION</u> | .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. <ul style="list-style-type: none"><li>.1 Visually inspect substrate in presence of Departmental Representative.</li><li>.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.</li><li>.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.</li></ul> |
| <u>3.2 PREPARATION</u> | .1 Temporary Erosion and Sedimentation Control: <ul style="list-style-type: none"><li>.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.</li><li>.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.</li></ul>  |

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| 3.2 PREPARATION<br>(Cont'd) | .1 (Cont'd)<br>.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.   |
|                             | .2 Grading:<br>.1 Remove debris and correct ground undulations along fence line to obtain smooth uniform gradient between posts.<br>.1 Provide clearance between bottom of fence and ground surface of 30 mm to 50 mm.<br>.2 Ensure top of ground surface at fence is within 100mm of the top of adjacent service road surface.   |
| 3.3 ERECTION OF<br>FENCE    | .1 Erect fence along lines as indicated.<br>.2 Excavate post holes to dimensions indicated.<br>.3 Space line posts as noted on drawings, measured parallel to ground surface.<br>.4 Space straining posts at equal intervals not to exceed 100 m if distance between end or corner posts on straight continuous lengths of fence over reasonably smooth grade, is greater than 150 m.<br>.5 Install additional straining posts at sharp changes in grade and where directed by Departmental Representative.<br>.6 Install corner post where change in alignment exceeds 10 degrees.<br>.7 Install end posts at end of fence and at buildings.<br>.1 Install gate posts on both sides of gate openings.<br>.8 Place concrete in post holes then embed posts into concrete to depths indicated.<br>.1 Brace to hold posts in plumb position and true to alignment and elevation until concrete has set.<br>.9 Install fence fabric after concrete has cured, minimum of 5 days. |

3.3 ERECTION OF  
FENCE

(Cont'd)

- .10 Install brace between end and gate posts and nearest line post, placed in centre of panel and parallel to ground surface or inclination as indicated.
  - .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 tension wire, stretch tightly and fasten securely to end, corner, gate and straining posts with turnbuckles and tension bar bands.
- .14 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.
- .15 Secure fabric to top rails, line posts and bottom tension wire with tie wires at 300 mm intervals.
  - .1 Give tie wires minimum two twists.
- .16 Install barbed wire strands and clip securely to lugs of each projection.

3.4 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.
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3.5 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.  
.1 Pre-treat damaged surfaces according to manufacturer's instructions for zinc-rich paint.

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

PART 1 - GENERAL

<u>1.1 RELATED REQUIREMENTS</u>	.1	Section 03 30 00.01 - Cast In Place Concrete Short Form.
<u>1.2 REFERENCE STANDARDS</u>	.1	ASTM International
	.1	ASTM A 53/A 53M-10, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
	.2	ASTM A 121-07, Standard Specification for Zinc-Coated (Galvanized) Steel Barbed Wire.
	.2	CSA International
	.1	CSA A23.1/A23.2-09, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
	.2	CSA G42-1964 R1998, Galvanized Zinc-Coated Steel Farm-Field Wire Fencing.
<u>1.3 ACTION AND INFORMATIONAL SUBMITTALS</u>	.1	Product Data:
	.1	Submit manufacturer's instructions, printed product literature and data sheets for fences, gates, posts, and paint and include product characteristics, performance criteria, physical size, finish and limitations.
<u>1.4 DELIVERY, STORAGE AND HANDLING</u>	.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 gates from damage.
	.3	Replace defective or damaged materials with new.

## PART 2 - PRODUCTS

- 2.1 MATERIALS
- .1 Wire fence: Wildlife Fence.
    - .1 Wildlife fence type: to CSA G42, standard 748.
    - .2 Barbed wire: to ASTM A 121.
      - .1 Galvanized steel.
      - .2 Wire size: 2.5 mm diameter.
      - .3 Barbs: 4 point at 125 mm spacing.
  - .2 Gates:
    - .1 Frame: to ASTM A 53, galvanized steel pipe.
    - .2 Size: as indicated.
    - .3 Joints: electrically welded.
  - .3 Steel posts:
    - .1 Corner, end, gate and intermediate posts, projection arm with clips, corner and gate post braces, gate posts as indicated.
    - .2 Galvanizing: zinc coating, minimum 92 g/m<sup>2</sup> of surface area.
    - .3 Paint: to MPI EXT 5.3F.
    - .4 Concrete mixes and materials: to Section 03 30 00.01 Cast-in-Place Concrete CSA A23.1.
      - .1 Nominal coarse aggregate size: 20.
      - .2 Compressive strength: 25 MPa minimum at 28 days.
  - .4 Organic zinc-rich coating: to MPI EXT 5.5.

## 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.
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- 3.1 EXAMINATION  
(Cont'd)
- .1 (Cont'd)  
.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 Level ground along fence line in order to ensure that bottom wire of fence between posts can be maintained at not more than 50 mm above ground.  
.1 Ensure top of ground surface at fence is within 100mm of the top of the adjacent road surface.
- 3.3 ERECTION OF FENCE
- .1 Erect fence along lines as indicated.
- .2 Installation of posts:  
.1 Space intermediate posts at as noted on drawings.  
.2 Space corner, end and gate posts as noted on drawings.  
.3 Locate and erect gate posts as indicated.  
.4 Install posts true to line and plumb.
- .3 Fencing with steel posts:  
.1 Install steel posts to depths as indicated .  
.2 Set following items in concrete:  
.1 End, corner and gate posts.  
.2 Intermediate posts adjacent to end, corner and gate posts.
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- 3.3 ERECTION OF FENCE  
(Cont'd)
- .3 (Cont'd)
  - .2 (Cont'd)
    - .3 Intermediate posts every 100 m along fence line.
    - .4 Ends of braces for corner, end and gate posts.
    - .5 All post as indicated.
  - .3 Brace corner, end and gate posts as indicated.
  - .4 Clamp a studded steel projection arm to each post as indicated.
  - .5 Erect woven and barbed wire as indicated.
  - .6 Stretch wires to have uniform tension.
    - .1 Splice wires with standard wire splices.
  - .7 Attach wires to posts and projection arms with metal clips.
- 3.4 INSTALLATION OF GATES  
GATES
- .1 Install gates in locations as indicated.
  - .2 Install gates to prevent over-stress on gate posts when gates are open.
    - .1 Install on level ground with ground clearance of 50 mm maximum.
  - .3 Locate anchor pipe for drop bolt, and install pipe flush with grade surface.
- 3.5 CLEANING  
CLEANING
- .1 Leave Work area clean at end of each day.
  - .2 Clean and trim areas disturbed by operations. Dispose of surplus material.
  - .3 Touch Up:
    - .1 Clean damaged galvanized surfaces with wire brush removing loose and cracked coatings.
      - .1 Apply 2 coats of organic zinc-rich coating.
  - .4 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.