

Part 1 General

1.1 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
 - .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 D698-07e2, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft³) (600kN-m/m³).
 - .5 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-8.2-M88, Sieves, Testing, Woven Wire, Metric.

1.2 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00- Common Product Requirements and with manufacturer's written instructions.
- .2 Storage and Handling Requirements:
 - .1 Store materials in accordance with manufacturer's recommendations as well as erosion and sedimentation control plan.
 - .2 Replace defective or damaged materials with new.

1.3 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2 Divert unused granular material from landfill to local facility as approved by Departmental Representative.

Part 2 Products

2.1 MATERIALS

- .1 Granular sub-base material: in accordance with Section 31 05 16 - Aggregate Materials and 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-8.2.
 - .3 Table

Sieve Designation	% Passing (1)	(2)	(3)	(4)
100 mm	-	-	-	-
75 mm	100	100	100	-
50 mm	-	-	-	100
37.5 mm	-	-	-	-
25 mm	55-100	-	-	60-100
19 mm	-	-	-	-
12.5 mm	-	-	-	38-70
9.5 mm	-	-	-	-
4.75 mm	25-100	25-85	-	22-55
2.00 mm	15-80	-	-	13-42
0.425 mm	4-50	5-30	0-30	5-28
0.180 mm	-	-	-	-
0.075 mm	0-8	0-10	0-8	2-10

.4 Other Properties as follows:

- .1 Liquid Limit: to ASTM D4318, Maximum 25.
- .2 Plasticity Index: to ASTM D4318, Maximum 6.
- .3 Los Angeles degradation: to ASTM C131. Max% Loss by mass: 40.

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: to Section 01 52 00 - Construction Facilities.

3.3 PLACING

- .1 Place granular sub-base after sub-grade 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 For spreading and shaping material, use spreader boxes having adjustable templates or screeds which will place material in uniform layers of required thickness.
- .7 Place material to full width in uniform layers not exceeding 150 mm compacted thickness. Departmental Representative may authorize thicker lifts if specified compaction can be achieved.
- .8 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
- .9 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.
- .2 Compact to density of not less than 96% maximum dry density in accordance with ASTM D698.
- .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.

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 COMPACTION TESTING

- .1 Compaction testing will be performed during fill material placement operations to ensure that specified minimum compaction requirements are met.
- .2 Testing to be carried out by independent testing laboratory in accordance with Section 01 45 00- Quality Control.
- .3 Costs of tests to be paid by Contractor.

3.7 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.
 - .1 Leave Work area clean at end of each day.

- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11- Cleaning.
- .3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 19- Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.8 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

Part 1 General

1.1 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
 - .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 D698-12e2, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft³) (600kN-m/m³).
 - .5 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-8.2-M88, Sieves, Testing, Woven Wire, Metric.

1.2 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00- Common Product Requirements and with manufacturer's written instructions.
- .2 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.
 - .3 Replace defective or damaged materials with new.

1.3 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2 Divert unused granular material from landfill to local facility as approved by Departmental Representative.

Part 2 Products

2.1 MATERIALS

- .1 Granular base: material in accordance with Section 31 05 16 - Aggregate Materials and following requirements:
 - .1 Crushed stone or gravel.
 - .2 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.2.

.1 Gradation Method # 1 to:			
Sieve Designation	% Passing		
	(1)	(2)	(3)
100 mm	-	-	-
75 mm	-	-	-
50 mm	100	-	-
37.5 mm	70-100	-	-
25 mm	-	100	-
19 mm	50-75	-	100
12.5 mm	-	65-100	70-100
9.5 mm	40-65	-	-
4.75 mm	30-50	35-60	40-70
2.00 mm	-	22-45	23-50
0.425 mm	10-30	10-25	7-25
0.180 mm	-	-	-
0.075 mm	3-8	3-8	3-8
.2 Material to level surface depressions to meet gradation (2) limits in accordance with Method #1.			
.3 Liquid limit: to ASTM D4318, maximum 25			
.4 Plasticity index: to ASTM D4318, maximum 6			
.5 Los Angeles degradation: to ASTM C131. Max. % loss by weight: 45			
.6 Crushed particles: at least 60% of particles by mass within each of following sieve designation ranges to have at least 1 freshly fractured face. Material to be divided into ranges using methods of ASTM C136.			
Passing			Retained on
50 mm	to		25 mm
25 mm	to		19.0 mm
19.0 mm	to		4.75 mm

Part 3 Execution

3.1 PREPARATION

- .1 Temporary Erosion and Sedimentation Control: to Section 01 52 00 - Construction Facilities.

3.2 PLACEMENT AND INSTALLATION

- .1 Place granular base after sub-base surface is inspected and approved by Departmental Representative.
- .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.
 - .4 Place material using methods which do not lead to segregation or degradation of aggregate.

- .5 For spreading and shaping material, use spreader boxes having adjustable templates or screeds which will place material in uniform layers of required thickness.
- .6 Place material to full width in uniform layers not exceeding 150 mm compacted thickness. Departmental Representative may authorize thicker lifts (layers) 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 that portion of layer in which material becomes segregated during spreading.
- .3 Compaction Equipment
 - .1 Compaction equipment to be capable of obtaining required material densities.
- .4 Compacting
 - .1 Compact to density not less than 100% maximum dry density in accordance with ASTM D698.
 - .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 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 COMPACTION TESTING

- .1 Compaction testing will be performed during fill material placement operations to ensure that specified minimum compaction requirements are met.
- .2 Testing to be carried out by independent testing laboratory in accordance with Section 01 45 00- Quality Control.
- .3 Costs of tests to be paid by Contractor.

3.5 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11- Cleaning.
- .3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 19- Waste Management and Disposal.

- .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.6 PROTECTION

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

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-16.3-M90, Asphalt Cements for Road Purposes.

1.2 SAMPLES

- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit to Departmental Representative, samples of material for sieve analysis at least 2 weeks before beginning Work.

1.3 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard and packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4 Place materials defined as hazardous or toxic in designated containers.
- .5 Divert unused aggregate materials from landfill to facility for reuse as approved by Departmental Representative.
- .6 Divert unused asphalt from landfill to facility capable of recycling materials.
- .7 Fold up metal banding, flatten and place in designated area for recycling.
- .8 Divert unused asphalt from landfill to facility capable of recycling materials.

Part 2 Products

2.1 MATERIALS

- .1 Primer: Homogeneous medium curing liquid asphalt MC-30 or MC-250 as required.
- .2 Tack Coat: SS-1 diluted 50/50.
- .3 Asphalt Cement: CAN/CGSB-16.3.
- .4 Aggregate for Mix: 13 mm maximum size.
- .5 Fine Aggregate: sand.

- .6 Mineral Filler: Finely ground particles of limestone, hydrated lime, or other approved mineral dust, free of foreign matter.
- .7 Pit Run Gravel (Sub-Base course): Type 2 aggregate graded as outlined in Section 32 11 16.01.
- .8 Crushed Gravel (Base course): Type 1 aggregate graded as outlined in Section 32 11 23.

Part 3 Execution

3.1 FOUNDATIONS

- .1 Foundations to comprise of:
 - .1 300 mm compacted thickness of sub-base gravel.
 - .2 150 mm compacted thickness of crushed base gravel.

3.2 SUB-BASE COURSE CONSTRUCTION

- .1 Following preparation of subgrade by proof rolling and by removing soft spots, commence sub-base course construction.
- .2 Place bed of pit run gravel to all areas receiving paving. Compact to requirements of Section 32 11 16.01 – Granular Sub-Base.

3.3 BASE COURSE CONSTRUCTION

- .1 Over all sub-base course construction, place layer of crushed gravel and compact to requirements of Section 32 11 23 – Aggregate Base Courses.

3.4 PRIMING

- .1 Prior to application of the asphaltic concrete, apply a prime coat to the base course of the areas to be paved, consisting of one distributor pass over the completed base course.
- .2 Properly prepare, clean, and uniformly dampen the surface of the gravel base course, in accordance with manufacturer's instructions.
- .3 Apply a uniform coat of primer by means of a pressure-type distributor.
- .4 Spread primer on granular base at 2 L/m².
- .5 Apply primer at a temperature of 20°C to 50°C. Protect joints to prevent overlapping of prime coat.
- .6 Apply prime coat over the full width of the areas to receive asphalt pavement.
- .7 Allow primer to set until it is absorbed completely. Allow prime coat to cure for a minimum of two hours before commencement of paving. Extend the time of curing if conditions require a longer curing period. Do not place more primer than will be covered before end of day.

- .8 Coat surfaces of manhole and catch basin frames with oil to prevent bond with asphalt paving. Coat edges of existing asphalt paving where new asphalt paving is to connect to existing. Ensure new asphalt paving is flush with existing adjacent paving to remain such as at adjacent streets.
- .9 Take necessary measures to prevent soiling of finished concrete and other finished surfaces during priming and remove any asphalt overspray from such surfaces.

3.5 TRANSPORTATION OF ASPHALT HOT MIX

- .1 Transport the mixture to the work in vehicles with tight metal boxes, previously cleaned of all foreign materials.
- .2 Boxes may be lightly lubricated with an approved thin oil. Do not solvent clean tools or containers which will contact the mix.
- .3 During adverse weather conditions, and when air temperature is below 15°C, cover each load with a waterproof tarpaulin of sufficient size for the full protection of the load.
- .4 Do not send out loads so late in the day as to prevent spreading and compaction of the mixture during daylight hours unless adequate artificial lighting has been provided and approved.
- .5 Ensure that temperature of the mix at the time of discharge into the spreader are as follows, and do not exceed 10°C variance between consecutive loads:
 - .1 At site air temperature above 15°C: 115°C to 146°C.
 - .2 At site air temperature below 15°C: 137°C to 160°C.

3.6 SPREADING THE MIXTURE

- .1 Over the primed gravel base course install a course of asphaltic concrete.
- .2 Place asphalt concrete within 24 h of priming base surfaces.
- .3 Lay the mixture on a dry base, under suitable weather conditions, cleaned of all loose or foreign material. Obtain Departmental Representative's acceptance primer prior to placing asphalt.
- .4 Apply asphalt in single lifts of specified compacted thicknesses, minimum, laid to indicated elevations and grades.
- .5 Place asphalt mix only when base of previous course is dry, and within two hours of placing and compacting binder course.
- .6 Do not lay asphalt when the site air temperature is below 5°C.
- .7 Spread the mixture for compaction by means of an approved self-propelled mechanical spreader to uniform section depth to result in the minimum thickness specified after consolidation.
- .8 Compact each course with roller as soon as it can support roller weight without undue displacement.

- .9 Do not place asphalt when the temperature of the surface on which asphalt is placed is less than 5°C.
- .10 Carefully make longitudinal and transverse joints, well bonded and sealed. Make joints between old and new pavement or between successive day's work, in such a manner to ensure continuous profile and grade as well as adequate bond.
- .11 Where paving is laid in two courses, overlap the horizontal joints 600 mm minimum.

3.7 THICKNESS

- .1 Required paving thickness: base course of 50 mm compacted thickness and topping course of 50 mm; compact all courses to 97% of Marshall design density (total thickness to be 90 mm).

3.8 COMPACTION

- .1 After spreading, uniformly compact the mixture by an approved steel roller, as soon after spreading as it will bear the roller without undue cracking or displacement.
- .2 Overlap rolling in successive trips by at least one-half the width of a rear wheel.
- .3 Do not exceed roller speed of 5 km/h nor slow enough to avoid displacement of the mixture. Correct any displacement at once by the use of rakes and addition of fresh mixture.
- .4 Continue rolling until all roller marks are eliminated and any further compression is not possible.
- .5 Sparingly lubricate roller wheels with water to prevent adhesion of mixture.
- .6 Along curbs, headers, manholes, or similar structures or against buildings not accessible to the roller, compact using a vibrating plate compactor or hand tamper, to achieve thorough compaction, with effective seal of all joints.
- .7 Finish paving smooth and true to established crown and grade. Immediately remedy low or defective areas either by cutting out and replacing with fresh hot mixture or if approved, by the addition of further hot mixture. Compact such areas to conform with, and bond to, the surrounding area.
- .8 Slope finished asphalt paving surfaces to drains.
- .9 Ensure that the field density of the finished pavement is an average of 97% of the laboratory compacted Marshall density of the design mix and 97% minimum at any one location.

3.9 TOLERANCES

- .1 Compacted thickness: + 10 mm of design thickness.
- .2 Flatness: maximum variation of 6 mm under a 3 m straight edge laid in any direction; no ponding.

- .3 Variation of True Elevation: Within 12 mm.

3.10 CONTACT FACES WITH ASPHALT SURFACE

- .1 Cut bituminous course to full depth in neat lines to expose fresh vertical surfaces. Remove broken and loose material.
- .2 Patch and make good existing asphalt paving surfaces where damaged or disturbed by the work of this contract. Neatly join new paving to existing on the Departmental Representative's property, and where new paving adjoins municipal roads. Apply asphalt to edges of existing asphalt surfaces where new paving meets existing to ensure a good bond between the surfaces.
- .3 Clean and uniformly paint contact faces of curbs, gutters, manholes, sidewalks with hot asphalt cement or emulsified asphalt primer before placing any asphalt cement mixture to ensure a tight bond between pavement and contact surface.
- .4 Carefully place and compact hot asphaltic material against joints.

3.11 PROTECTIVE SEAL COATING

- .1 Upon completion of the asphaltic concrete surface course, evenly apply a fog seal coat. Dilute to as required with Departmental Representative's approval.

3.12 FIELD TESTING

- .1 Inspection and testing of asphalt pavement will be carried out by independent testing laboratory in accordance with Section 01 45 00- Quality Control.
- .2 Costs of tests to be paid by Contractor.
- .3 Take samples and perform tests in accordance with AI MS-2.

3.13 TRAFFIC

- .1 Keep vehicular traffic off newly paved areas until surface temperature has cooled below 38°C. Do not permit stationary loads on the pavement until 24 hours after placements.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 The work in this section shall include furnishing all labor, materials, equipment and appliances necessary to complete all enclosed drive motorized sliding gate(s) suited for detention applications and as required for this project in strict accordance with this section of specifications and drawings.
- .2 All detention motor box locks shall be shipped with a construction core and one key code for construction only. Installation contractor shall review specific key code requirements with facility to furnish facility specific lock cylinders, related lock hardware and keys to meet key code requirements.

1.2 REFERENCES

- .1 American Welding Society
 - .1 AWS D1.1 / D1.1M Structural Welding Code
- .2 ASTM International
 - .1 ASTM A53/A53M-10, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
- .3 The Master Painters Institute (MPI)
 - .1 Architectural Painting Specification Manual – current edition.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Include details of construction relative to materials, dimensions of individual components, and gate. Provide roughing-in diagrams, operating instructions, and maintenance information. Include the following:
 - .1 Setting drawings, templates, and installation instructions for built-in or embedded anchor devices.
 - .2 Motors: Indicate nameplate data and ratings; characteristics; mounting arrangements; size and location of winding termination lugs, conduit entry, and grounding lug; and coatings.
 - .3 Detailed description of operation.
 - .2 Shop Drawings: For special components and installations not dimensioned or detailed in manufacturer's data sheets.
 - .1 Wiring Diagrams: Detail wiring for power, signal, and control systems. Differentiate between manufacturer-installed and field-installed wiring and between components provided by gate operator manufacturer and those provided by others.
 - .2 Foundation details for gate system.

1.4 CONTRACT CLOSEOUT SUBMITTALS

- .1 Refer to Section 01 78 00 – Closeout Submittals.
- .2 Operation and Maintenance Data for each Gate Type: Deliver 3 copies of instructions for operation, maintenance, recommendations, and parts manuals covering the installed products to the Departmental Representative. Include name, address and telephone number of nearest fully equipped service organization.

1.5 MAINTENANCE

- .1 Spare Parts: Furnish the following and store at the site where directed:
 - .1 Sliding Gate – Mechanical: One reduction gear assembly, one full-length chain and repair links and one crank handle.
 - .2 Sliding Gate – Electrical: one motor, two limit switches, four limit nuts, one relay overload, two relay motor OPEN/CLOSE-solid state, one transformer, one circuit board-VS, one disconnect switch 30 amp, thermostat, one status/limit switch and one heater gearbox immersion.
- .2 Required amounts of recommended lubricants for 3 years of service.

1.6 CERTIFICATIONS

- .1 The steel factory welders must be certified per Article 2.1.1.2.

Part 2 Products

2.1 VEHICLE SLIDING GATE LOCKING SYSTEM

- .1 Manufacturer:
 - .1 Gate manufacturer shall provide independent certification as to the use of a documented Welding Procedure Specification and Procedure Qualification Record to insure conformance with the AWS D1.1 welding code. Individual Certificates of Welder Qualification documenting successful completion of the requirements of the AWS D1.1M code shall also be provided.
- .2 System Dimensions:
 - .1 Each overhead locking system shall have a clear opening height and clear opening width as shown on the detail drawings.
- .3 System Functions:
 - .1 System is designed to operate overhead sliding locking device.
 - .2 System shall be designed so that gate movement from the closed position is impossible except by electric or mechanical means.
- .4 Variable Speed-Rate of Travel:
 - .1 The vehicle locking system shall have the ability to achieve a maximum gate speed of 610 mm per second, and shall be equipped with soft-start and soft-stop function to prevent shock load to the gate panel and locking system. Gate speed shall be adjustable and as selected by the facility at the project site.

- .5 Motor:
 - .1 Motor Size: The electrical motor shall be 1 HP, 208VAC, 3 Phase as produced by a nationally recognized manufacturer.
 - .2 AC Drive: The variable frequency drive unit shall allow for programmable speeds and programmable soft-start and soft-stop features.
 - .3 Overload Protection: Motors shall be protected against overload by either a thermal or a current sensing overload device.
 - .4 Gear (Box) Reducer: The self-enclosed gear-head gearbox shall be manufactured as a single unit, and shall consist of hardened steel, machine cut worm and mating bronze gear running in oil bath. Oil shall be #634 specialty oil with a fluid pour point of -42 degrees C. The gearbox shall perform the following functions:
 - .1 Adjustable Clutching Device.
 - .1 If an obstruction is placed in the path of a gate, the operator must be capable of being stalled indefinitely without harming the device. On removal of the obstruction, the gate shall resume movement in the selected direction.
 - .2 Whenever a door is stopped in any intermediate position, it shall be possible to manually move the door to the full open or full closed position and the door will automatically deadlock.
 - .3 The door will only automatically deadlock in the fully closed position.
 - .2 Manual disconnect by crank handle.
 - .5 Gear Box Heater: Operator shall include internal gearbox heater and a heater strip for the control box.
 - .1 Manufacturer to size heater and heating strip to allow gearbox and control box equipment to operate as intended when ambient temperatures are -40C.
 - .6 Manual Operation: A crank handle, located at ground level in the motor box, shall provide a two-step emergency procedure for manual operation:
 - .1 Unlock and open motor-box door.
 - .2 Fold out handle and crank gate opened or closed.
 - .7 Limits: The operator shall be equipped with an integral limit system, providing accurate settings to control the open and close positions of the gate, and shall not be affected by manual operation or motor removal.
 - .8 Control Circuit: U.L. listed operator shall have 5v dc controls.
 - .9 Control wiring: The electrical contractor shall supply all exterior control wiring.
 - .10 Audio Alarm: This alarm shall have a dual function.
 - .1 The first function shall be as a warning prior to gate movement. When the motor control board recognizes a command, this alarm shall be activated three (3) seconds before the motor is energized and the gate begins to move. This shall be continuously activated while the gate is in motion.
 - .2 For UL Class IV operation only, the audio alarm shall be an entrapment notification alarm. This alarm shall sound as a result of a second activation of the external primary entrapment prevention device before

an end limit (open or close) is reached. The pulsing rate of the alarm in the entrapment notification mode shall be faster than the pulsing rate when in the warning mode prior to gate movement.

- .11 Main Power Disconnect Switch and Wiring Compartment: When this switch is in the OFF position, the main power shall be disconnected from the Variable Speed Drive, Motor Control Board and power transformer(s).
- .12 Speed: The gate operator speed shall be fully programmable allowing a maximum speed of 610 mm per second.
- .13 Transformer: Operators shall have an isolated low voltage (24V) secondary circuit supplied by a Class II transformer (minimum of 40va) to provide separate power for external control devices.
- .14 Terminations: all terminations to be on terminal strips and to be labelled.
- .6 Motor Housing:
 - .1 Water Resistant Motor Box: The motor box shall be constructed of 10-gauge sheet steel, hot-dip galvanized per ASTM 123, gasketed and located at ground level for easy maintenance.
 - .2 Security Hinges and Tamper Resistant Security Screws: Security hinges and screws shall be furnished to secure operator enclosure components.
 - .3 Motor Box: Provide Open and Close switches inside box for maintenance of the sliding gate.
 - .4 Motor Box Lock: Motor box shall be locked with a prison dead bolt. Three (3) mogul keys shall be provided per construction key code as noted in Part 1.
- .7 System Components:
 - .1 Track:
 - .1 Overhead track shall consist of two 254 mm structural steel channels joined together as shown on the drawings, weighing a minimum of 55kg/m.
 - .2 All individual welders shall be tested to conform with AWS D1.1 / D1.1M structural welding code - steel. The manufacturer shall provide individual qualification test records.
 - .2 Trolley: Heavy duty wheels shall be milled from a single block of hardened stainless steel and use 2 sealed ball bearings per wheel, 6 wheels per trolley.
 - .3 Bottom Guides: Bottom guides on plates: bottom guides shall be constructed of 9.525 mm x 63.5 mm flat steel, welded to a 6 mm x 127 mm x 254 mm steel plate, shall be lagged to the concrete footing or as otherwise specified for vehicle crash gates.
 - .4 Locking Column: The locking column is constructed of a W-5 "H" beam @ 101.6 mm x 19.3 kg/m with a removable steel cover, secured with security screws.
 - .5 Locking Tangs: Three locking tangs to be affixed to the leading edge of the gate panel to provide positive locking into the locking column.
 - .6 Posts: Double set of support posts shall be minimum 102 mm galvanized steel with concrete foundation as indicated on structural drawings.
 - .7 Drive Chain: Drive chain shall be #60 roller chain.

- .8 Gate Guide Angle: Gate guide angle shall consist of a 63.5 mm x 38 mm x 6.4 mm steel angle attached to the bottom of the gate panel running its full length or as otherwise specified for vehicle crash gates.
- .8 Chain Link Panel:
 - .1 Chain link gate panel shall be manufactured with galvanized steel tube to ASTM A53/A53M and meeting the manufacturer's requirements.
 - .2 Outer Support Members: Galvanized steel tube 73 mm outside diameter around perimeter of chain link panel.
 - .3 Inner Support Member: Galvanized steel tube 73 mm outside diameter and spaced as shown on drawings.
 - .4 Chain Link Gate Panel Fabric: refer to Section 32 31 13 – Chain Link Fences and Swing Gates.
 - .1 Height of fabric: as indicated.
 - .2 Tension bars: refer to Section 32 31 13 – Chain Link Fences and Swing Gates.
 - .5 Chain Link Fence Fabric Curved Galvanized Steel Clips (for fastening chain link fence fabric to inner supports, top and bottom framing members of sliding gates only): 38 mm long x 13 mm wide x 4.5 mm thick curved galvanized steel clips. See architectural drawing A1.2 for further details.
- .9 Concertina: refer to Section 32 31 13 – Chain Link Fences and Swing Gates.
- .10 Barbed wire: refer to Section 32 31 13 – Chain Link Fences and Swing Gates.
- .11 Fittings and hardware for chain link fence and concertina installation: refer to Section 32 31 13 – Chain Link Fences and Swing Gates.
- .12 Galvanized steel arms with integral post top combination: refer to Section 32 31 13 – Chain Link Fences and Swing Gates.
- .13 Custom galvanized steel arms: for mid-point support of concertina above gate clear opening of south sallyport chain link panel gate. Design to suit. Submit shop drawing for approval.

2.2 CONTROLS

- .1 Unsupervised Application – Momentary Pressure:
 - .1 Vehicle Sallyport Gate(s): Momentary pressure on the pushbutton control commences gate movement. When the pushbutton is released, the gate will continue to move until an internal limit switch is tripped. Secondary entrapment protection to be provided by use of two photobeams for the open and close direction of travel.

2.3 FINISH

- .1 Galvanizing:
 - .1 All exposed system parts shall be zinc galvanized and colour coated to match the colour of the existing IPF and EPF fences as indicated.

Part 3 Execution

3.1 SITE INSPECTION

- .1 Coordinate with other trades for conduit placement prior to pouring of foundation concrete or paving.
- .2 Final grades and installation conditions shall be examined. Installation shall not begin until all unsatisfactory conditions are corrected.

3.2 INSTALLATION

- .1 Equipment in this section shall be installed in strict accordance with the manufacturer's printed instructions unless otherwise shown on the contract drawings.

3.3 CHAIN LINK FENCE FABRIC

- .1 Secure chain link fence fabric to pipe gate framing with curved galvanized steel clips at 200 o/c max. Weld clips on non-inmate side of fence. Touch-up welds with galvanizing touch-up paint as specified.

.2 BARBED WIRE AND CONCERTINA

- .3 Installation of Barbed Wire And Concertina:
 - .1 Install overhang tops and caps on sliding gate posts as indicated.
 - .2 Install barbed wire and concertina as indicated on the Drawings, reviewed shop drawings and as directed by the Departmental Representative in accordance with CSC standards and Section 32 31 13 – Chain Link Fences and Swing Gates.
 - .3 Install custom galvanized steel arms as per approved shop drawings.

3.4 TOUCH UP

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

3.5 FIELD QUALITY CONTROL

- .1 Preliminary System Test:
 - .1 Preparation: Adjust the complete system and then operate it long enough to assure that it is performing properly.
 - .2 Run a preliminary test for each system:
 - .1 Determine whether the system is in a suitable condition to conduct the acceptance test.
 - .2 Check and adjust equipment.
 - .3 Train facility personnel.
- .2 System Acceptance Test:

- .1 Preparation: Notify the Owner's Representative at least three working days prior to the test so arrangements can be made to have a Facility Representative witness the test.
- .2 Test each system function step by step.
- .3 Supply all equipment necessary for system adjustment and testing.
- .4 Test and Explain Safety Features:
 - .1 Each system feature and device is a separate component of the gate system.
 - .2 Ensure that all instructions for mechanical components, safety devices and the gate operator are available for everyone who will be using the gate system.
 - .3 The warning signs shipped with the gate operator must be installed in prominent position on both sides of the gate.
- .5 Ensure the owner is clear with regard to the safety points concerning the basic operational guidelines of the safety features of the gate operator system. These safety points are listed in the operator manual and must be read prior to system use.
- .6 Installer shall conduct an equipment training course for facility maintenance staff.
- .7 Submit written report of test results signed by the installer and the Owner's representative.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

- .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-01, 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 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.
- .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 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 swing 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 Requirements 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.

- .4 Packaging Waste Management: remove for reuse and return by manufacturer of padding, crates, packaging materials and pallets in accordance with Section 01 74 21- Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 MATERIALS

- .1 Concrete mixes and materials:
 - .1 Refer to Section 03 30 00 – Cast-in-Place Concrete and piling concrete notes on structural drawings.
- .2 Chain-link fence fabric:
 - .1 To CAN/CGSB-138.1: galvanized steel:
 - .1 Wire size: 4.8 mm minimum (6 gauge).
 - .2 Size of mesh: 50.8 mm.
 - .3 Height of fence fabric: as indicated.
 - .4 Barbed edges: top and bottom.
 - .5 Average mass of zinc coating: not less than 610 g/sq. m. of uncoated wire.
 - .6 Breaking tensile strength: 10,000 N minimum.
- .3 Posts, braces and rails: to CAN/CGSB-138.2, galvanized steel pipe. Dimensions as indicated.
- .4 Tie wire fasteners: galvanized steel wire, 3.7 mm diameter (9 gauge) galvanized steel wire, to secure chain link fabric to bottom rail, top rail and line posts at 300 mm spacing. Provide minimum 3 full twists at back (non-inmate side of posts and rails). Bend twisted wire ties back to face of posts and rails.
- .5 Tension bar: to ASTM A653/A653M, galvanized steel, used for holding the ends of the fence fabric at strain posts, corner and gate posts, to be 5 mm x 20 mm x full height of fence fabric.
- .6 Swing Gate frames: to ASTM A53/A53M, galvanized steel pipe, pipe dimensions as indicated, pipe welded and drained.
 - .1 Fabricate gates as indicated with electrically welded joints, and hot-dip galvanized after welding.
 - .2 Fasten fence fabric to gate with barbed edges at top and bottom.
 - .3 Furnish pedestrian swing 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 vehicle swing gates with the number of galvanized malleable iron hinges indicated and a three-point locking heavy-duty galvanized steel cremone bolt as indicated.
- .7 Fittings and hardware: to CAN/CGSB-138.2.

- .1 Tension bar bands: 3 mm x 20 mm minimum, galvanized steel, spaced vertically at 300 mm o.c.
- .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 a galvanized steel arm projecting inward to hold barbed wire overhang.
- .4 Include galvanized steel arm with recesses to hold 2 strands of barbed wire spaced as follows:
 - .1 First recess to be located at a maximum distance of 125 mm from the base of the galvanized steel arm.
 - .2 Second recess to be located sufficiently away from the first recess so as to allow the barbed tape concertina to be installed at a diameter of 630 mm and as indicated.
 - .3 Length of galvanized steel arm: to suit.
 - .4 Galvanized steel arm projection angle: 45 degrees above horizontal.
- .8 Barbed wire: for concertina coil support at fence top, two barbed wires stretched and fixed to galvanized steel arms as indicated, to consist of two strands of 2 mm (12 gauge) diameter galvanized steel wire with 4 point barbs at 130 mm spacing, to ASTM A121.
- .9 Barbed Tape Concertina (B.T.C.): 20 x 0.5 mm galvanized tape clenched around a 2.5 mm diameter spring steel galvanized core wire to form a concertina coil with a nominal exterior coil diameter of 710 mm. The coil, when installed, shall have a minimum diameter of 635 mm. The barbed concertina shall have a 20 mm long blade type barbs measured from tip to tip of the blade, and barb clusters shall be spaced approximately 45 mm on centre. The concertina shall be formed by clipping adjacent loops of single helical coils together at a minimum of three (3) points on the circumference. Clips shall be galvanized. The resulting coil, when stretched, shall form a cylindrical pattern. The loop spacing shall not exceed 230 mm.

2.2 FINISHES

- .1 Galvanizing:
 - .1 For chain link fabric: as indicated above.
 - .2 For pipe: 550g/m² minimum to ASTM A90.
 - .3 For barbed wire: to CAN/CGSB-138.2.
 - .4 For other fittings: to ASTM A123/A123M.
- .2 Galvanizing Touch-up Paint: Make good corrosive protection after welding where burnt by welding operations and where removed to facilitate welding operations, using zinc touch-up primer and finish coat. Use as per manufacturer's instructions.
 - .1 Acceptable products:
 - .1 Primer Coat: Sprayon S00740 or equal.
 - .2 Finish Coat: Krylon Industrial Silver Zinc or equal.
- .3 Painting:
 - .1 Paint fencing black where indicated.
 - .2 Fence painting to Section 09 91 99 - Painting for Minor Works.

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 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 50 mm unless indicated otherwise.

3.3 ERECTION OF FENCE

- .1 Erect fence along lines as indicated and to CAN/CGSB-138.3.
- .2 Excavate post holes to dimensions and depth indicated.
- .3 Space line posts as indicated, 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 depths specified.
 - .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 5days.
- .9 Install overhang tops and caps.
- .10 Install top and bottom rail between posts. Secure top rail to posts through post top holes and bottom rail to post sleeves. Ensure expansion and contraction is provided for top and bottom rails. Secure waterproof caps and overhang tops.
- .11 Lay out fence fabric to inmate side of posts. Stretch tightly and fasten to end, corner, gate and straining posts with tension bar secured to post with tension bar bands spaced at 300 mm intervals. Ensure distance between tension bar and posts does not exceed 13 mm.

- .1 Fence fabric shall be pulled taut before fixing in place. Tautness, when fixed in place, is to be established by pull tests. The application of a 12 kg perpendicular pull at the midpoint of the mesh panel (midpoint of posts/rails) shall show a displacement of no more than 30 mm from the fence at rest plane.
- .12 Secure fabric to top rails, line posts and bottom rail with tie wires:
 - .1 Give tie wires three complete rotation twists at back (non-inmate side) of posts and bend into post.
- .13 Install barbed wire strands as indicated.
- .14 The barbed tape concertina is to be supported and tied at 230 mm spacing onto each of the barbed wire strands.

3.4 INSTALLATION OF GATES

- .1 Install gates in locations as indicated.
- .2 Level ground between gate posts and set gate bottom as indicated above ground surface.
- .3 Determine position of centre gate rest for double gate.
 - .1 Cast gate rest in concrete as indicated.
 - .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. Apply galvanizing touch-up paint as specified.
 - .1 Pre-treat damaged surfaces according to manufacturers' instructions.

3.6 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11- Cleaning.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21- Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

- .1 Agriculture and Agri-Food Canada
 - .1 The Canadian System of Soil Classification, Third Edition, 1998.

1.2 DEFINITIONS

- .1 Compost:
 - .1 Mixture of soil and decomposing organic matter used as fertilizer, mulch, or soil conditioner.
 - .2 Compost is processed organic matter containing 40% or more organic matter as determined by Walkley-Black or Loss On Ignition (LOI) test.
 - .3 Product must be sufficiently decomposed (i.e. stable) so that any further decomposition does not adversely affect plant growth (C:N ratio below (25) (50)), and contain no toxic or growth inhibiting contaminants.
 - .4 Composed bio-solids to: CCME Guidelines for Compost Quality, Category (A) (B).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00- Submittal Procedures.
- .2 Quality control submittals:
 - .1 Soil testing: submit certified test reports showing compliance with specified performance characteristics and physical properties as described in PART 2 - SOURCE QUALITY CONTROL.
 - .2 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.4 QUALITY ASSURANCE

- .1 Pre-installation meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements in accordance with Section 01 32 16.07- Construction Progress Schedules - Bar (GANTT) Chart.

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for recycling in accordance with Section 01 74 21- Construction/Demolition Waste Management and Disposal.
- .2 Divert unused soil amendments from landfill to official hazardous material collections site approved by Departmental Representative.
- .3 Do not dispose of unused soil amendments into sewer systems, into lakes, streams, onto ground or in locations where it will pose health or environmental hazard.

Part 2 Products

2.1 TOPSOIL

- .1 Topsoil for turf: mixture of particulates, micro organisms and organic matter which provides suitable medium for supporting intended plant growth.
 - .1 Soil texture based on The Canadian System of Soil Classification, to consist of 20 to 70% sand, minimum 7% clay, and contain 2 to 10% organic matter by weight.
 - .2 Contain no toxic elements or growth inhibiting materials.
 - .3 Finished surface free from:
 - .1 Debris and stones over 50 mm diameter.
 - .2 Course vegetative material, 10 mm diameter and 100 mm length, occupying more than 2% of soil volume.
 - .4 Consistence: friable when moist.

Part 3 Execution

3.1 PREPARATION OF EXISTING GRADE

- .1 Verify that grades are correct.
 - .1 If discrepancies occur, notify Departmental Representative and do not commence work until instructed by Departmental Representative.
- .2 Grade soil, eliminating uneven areas and low spots, ensuring positive drainage.
- .3 Remove debris, roots, branches, stones in excess of 50 mm diameter and other deleterious materials.
 - .1 Remove soil contaminated with calcium chloride, toxic materials and petroleum products.
 - .2 Remove debris which protrudes more than 75 mm above surface.
 - .3 Dispose of removed material off site.
- .4 Cultivate entire area which is to receive topsoil to minimum depth of 100 mm.
 - .1 Cross cultivate those areas where equipment used for hauling and spreading has compacted soil.

3.2 PLACING AND SPREADING OF TOPSOIL/PLANTING SOIL

- .1 Place topsoil after Departmental Representative has accepted subgrade.
- .2 Spread topsoil in uniform layers not exceeding 150 mm.
- .3 For sodded areas keep topsoil 15 mm below finished grade.
- .4 Spread topsoil to following minimum depths after settlement.
 - .1 135mm for sodded areas.
- .5 Manually spread topsoil/planting soil around trees, shrubs and obstacles.

3.3 FINISH GRADING

- .1 Grade to eliminate rough spots and low areas and ensure positive drainage.
 - .1 Prepare loose friable bed by means of cultivation and subsequent raking.
- .2 Consolidate topsoil to required bulk density using equipment approved by Departmental Representative.
 - .1 Leave surfaces smooth, uniform and firm against deep footprinting.

3.4 ACCEPTANCE

- .1 Departmental Representative will inspect and test topsoil in place and determine acceptance of material, depth of topsoil and finish grading.

3.5 SURPLUS MATERIAL

- .1 Dispose of materials except topsoil not required off site.

3.6 CLEANING

- .1 Proceed in accordance with Section 01 74 11- Cleaning.
- .2 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE REQUIREMENTS

- .1 Scheduling:
 - .1 Schedule sod laying to coincide with preparation of soil surface.
 - .2 Schedule sod installation when frost is not present in ground.
 - .3 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements in accordance with Section 01 31 19- Project Meetings.

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 sod and fertilizer and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06- Health and Safety Requirements.
- .3 Samples.
 - .1 Submit:
 - .1 Sod for each type specified.
 - .1 Install approved samples in 1 square metre mock-ups and maintain in accordance with maintenance requirements during establishment period.
 - .2 0.5kg container of each type of fertilizer used.
 - .2 Obtain approval of samples by Departmental Representative.
- .4 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements of seed mix, seed purity, and sod quality.
- .5 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties of seed mix, seed purity, and sod quality.

1.3 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Landscape Contractor: to be a Member in Good Standing of the Saskatchewan Turfgrass Association.
 - .2 Landscape Planting Supervisor: Landscape Industry Certified Technician with Softscape Installation designation.

- .3 Landscape Maintenance Supervisor: Landscape Industry Certified Technician with Turf Maintenance designation.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00- Common Product Requirements and 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 supplier's recommendations.
 - .2 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove for reuse by manufacturer and return of pallets, padding, crates, packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 21- Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 MATERIALS

- .1 Number One Turf Grass Nursery Sod: sod that has been especially sown and cultivated in nursery fields as turf grass crop.
 - .1 Turf Grass Nursery Sod types:
 - .1 Number One Kentucky Bluegrass Sod: Nursery Sod grown solely from seed of cultivars of Kentucky Bluegrass, containing not less than 50% Kentucky Bluegrass cultivars.
 - .2 Number One Kentucky Bluegrass Sod - Fescue Sod: Nursery Sod grown solely from seed mixture of cultivars of Kentucky Bluegrass and Chewing Fescue or Creeping Red Fescue, containing not less than 40% Kentucky Bluegrass cultivars and 30% Chewing Fescue or Creeping Red Fescue cultivars.
 - .3 Number One Named Cultivars: Nursery Sod grown from certified seed.
 - .2 Turf Grass Nursery Sod quality:
 - .1 Not more than 1 broadleaf weed and up to 1% native grasses per 40 square metres.
 - .2 Density of sod sufficient so that no soil is visible from height of 1500 mm when mown to height of 50 mm.
 - .3 Mowing height limit: 35 to 65 mm.
 - .4 Soil portion of sod: 6 to 15 mm in thickness.
- .2 Fertilizer:
 - .1 To Canada "Fertilizers Act" and Fertilizers Regulations.
 - .2 Complete, synthetic, slow release with 65 % of nitrogen content in water-insoluble form.

2.2 SOURCE QUALITY CONTROL

- .1 Obtain written approval from Departmental Representative of sod at source.
- .2 When proposed source of sod is approved, use no other source without written authorization from Departmental Representative.

Part 3 Execution

3.1 INSTALLERS

- .1 Use installers who are Member in Good Standing of the Saskatchewan Turfgrass Association.

3.2 EXAMINATION

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

3.3 PREPARATION

- .1 Verify that grades are correct and prepared in accordance with Section 32 91 19.13- Topsoil Placement and Grading. If discrepancies occur, notify Departmental Representative and commence work when instructed by Departmental Representative.
- .2 Do not perform work under adverse field conditions such as frozen soil, excessively wet soil or soil covered with snow, ice, or standing water.
- .3 Fine grade surface free of humps and hollows to smooth, even grade, to contours, to tolerance of plus or minus 15 mm for Commercial Grade Turf Grass Nursery, surface to drain naturally.
- .4 Remove and dispose of weeds; debris; stones 50 mm in diameter and larger; soil contaminated by oil, gasoline and other deleterious materials; off site, in accordance with Section 01 74 21- Construction/Demolition Waste Management And Disposal.

3.4 SOD PLACEMENT

- .1 Ensure sod placement is done under supervision of certified Landscape Planting Supervisor.
- .2 Lay sod within 24 hours of being lifted if air temperature exceeds 20 degrees C.
- .3 Lay sod sections in rows, joints staggered. Butt sections closely without overlapping or leaving gaps between sections. Cut out irregular or thin sections with sharp implements.

- .4 Roll sod as directed by Departmental Representative. Provide close contact between sod and soil by light rolling. Use of heavy roller to correct irregularities in grade is not permitted.

3.5 FERTILIZING PROGRAM

- .1 Fertilize during establishment and warranty periods as directed by Departmental Representative:

3.6 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.
 - .1 Leave Work area clean at end of each day.
 - .2 Keep pavement and area adjacent to site clean and free from mud, dirt, and debris at all times.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11- Cleaning.
 - .1 Clean and reinstate areas affected by Work.
- .3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21- Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling and compost containers and bins from site and dispose of materials at appropriate facility.
 - .2 Divert unused fertilizer from landfill to official hazardous material collections site approved by Departmental Representative.

3.7 PROTECTION BARRIERS

- .1 Protect newly sodded areas from deterioration with snow fence on rigid frame as directed by Departmental Representative.
- .2 Remove protection 2 weeks after installation and after inspection by Departmental Representative.

3.8 MAINTENANCE DURING ESTABLISHMENT PERIOD

- .1 Perform following operations from time of installation until acceptance.
 - .1 Water sodded areas in sufficient quantities and at frequency required to maintain optimum soil moisture condition to depth of 75 to 100 mm.
 - .2 Cut grass to 50 mm when or prior to it reaching height of 75 mm.
 - .3 Maintain sodded areas weed free 95%.
 - .4 Fertilize areas in accordance with fertilizing program. Spread half of required amount of fertilizer in one direction and remainder at right angles and water in well.
 - .5 Temporary barriers or signage to be maintained where required to protect newly established sod.

3.9 ACCEPTANCE

- .1 Turf Grass Nursery Sod areas will be accepted by Departmental Representative provided that:
 - .1 Sodded areas are properly established.
 - .2 Sod is free of bare and dead spots.
 - .3 No surface soil is visible from height of 1500 mm when grass has been cut to height of 50 mm.
 - .4 Sodded areas have been cut minimum 2 times prior to acceptance.
- .2 Areas sodded in fall will be accepted in following spring one month after start of growing season provided acceptance conditions are fulfilled.
- .3 When environmental conditions allow, all sodded areas showing shrinkage cracks shall be top-dressed and seeded with a seed mix matching the original.
- .4 Areas sodded in fall will be accepted in following spring one month after start of growing season provided acceptance conditions are fulfilled.

3.10 MAINTENANCE DURING WARRANTY PERIOD

- .1 Perform following operations from time of acceptance until end of warranty period:
 - .1 Water sodded Turf Grass Nursery Sod areas at weekly intervals to obtain optimum soil moisture conditions to depth of 100 mm.
- .2 Repair and resod dead or bare spots to satisfaction of Departmental Representative.
- .3 Cut grass and remove clippings that will smother grass as directed by Departmental Representative to height as follows:
 - .1 Turf Grass Nursery Sod:
 - .1 50 mm during normal growing conditions.
 - .2 Cut grass at 2 week intervals or as directed by Departmental Representative, but at intervals so that approximately one third of growth is removed in single cut.
 - .3 Fertilize areas in accordance with fertilizing program. Spread half of required amount of fertilizer in one direction and remainder at right angles and water in well.
 - .4 Eliminate weeds by mechanical means to extent acceptable to Departmental Representative.

END OF SECTION