

Part 1 General

1.1 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 19 – Waste Management and Disposal.
- .2 Divert any unused granular material from site to local facility as approved by Departmental Representative.

1.2 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver and stockpile aggregates in accordance with Section 31 05 16 - Aggregate Materials.

Part 2 Products

2.1 MATERIALS

- .1 Granular base: material shall conform to Section 31 05 16 – Aggregates and the 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-8.1,
 - .1 Gradation to Type 33 Saskatchewan Highways and Transportation Granular Base Course:

Sieve Designation	Percent By Weight Passing
	TYPE
	33
25 mm	
20 mm	100.0
12.5 mm	81.0-100.0
5 mm	50.0-80.0
2 mm	32.0-52.0
800 µm	18.0-33.0
400 µm	15.0-25.0
160 µm	11.0-19.0
80 µm	7.0-11.0
Plasticity Index	0-6.0

- .2 CBR: Minimum 60
- .3 The percentage passing the designated sieve sizes for any representative sample, when plotted on a semi-log grading chart, shall show a free flowing concave curve without sharp breaks, within the limits specified above.

- .4 Liquid limit: to ASTM D4318, maximum 25.
- .5 Plasticity index: to ASTM D4318, maximum as noted in Table.
- .6 Crushed particles: at least 60% of particles by mass within each of the following sieve designation ranges to have at least 1 freshly fractured face. Material to be divided into ranges using methods of ASTM C 136.

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 SEQUENCE OF OPERATION

- .1 Place granular base after sub-base or subgrade surface is inspected and approved by Departmental Representative.
- .2 Placing
 - .1 Construct granular base to depth and grade in areas indicated or to match existing.
 - .2 Ensure no frozen material is placed, base course shall not be compacted when the atmospheric temperature is below 2°C.
 - .3 Place material only on clean unfrozen surface, free from snow and ice.
 - .4 Begin spreading base material on crown line or on high side of one-way slope.
 - .5 Place material using methods which do not lead to segregation or degradation of aggregate.
 - .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
 - .1 Compaction equipment to be capable of obtaining required material densities.
 - .2 Compact to density not less than 100% 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.

3.2 SITE TOLERANCES

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

3.3 PROTECTION

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

3.4 TESTING

- .1 Testing of base will be carried out by an independent laboratory as appointed by the Departmental Representative in accordance with Section 01 29 83 Testing Laboratory Services.
- .2 Any material not meeting the specifications shall be rejected.
- .3 Field densities will be taken on base constructed.
- .4 The minimum number of tests required are as follows:
 - .1 For base course, one field density for every 50 lineal metres of roadway or one of every five bore pits excavated in roadways.
- .5 Densities shall not be taken at locations within 1.0 m of a supported edge (urban x-section) and 1.0 m of an unsupported edge (rural x-section).

END OF SECTION

Part 1 General

1.1 PRODUCT DATA

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit viscosity-temperature chart for asphalt cement to be supplied showing either Saybolt Furol viscosity in seconds or Kinematic Viscosity in centistokes, temperature range 105 to 175 degrees C at least 4 weeks prior to beginning Work
- .3 Submit manufacturer's test data and certification that asphalt cement meets requirements of this Section.
- .4 Submit manufacturer's test data and certification that hydrated lime meets requirements of this Section.
- .5 Submit asphalt concrete mix design and trial mix test results to Departmental Representative for approval at least 2 weeks prior to beginning Work.

1.2 SAMPLES

- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Inform Departmental Representative of proposed source of aggregates and at least 4 weeks prior to beginning Work.

1.3 DELIVERY, STORAGE AND HANDLING

- .1 When necessary to blend aggregates from one or more sources to produce required gradation, do not blend in stockpiles.
- .2 Stockpile fine aggregate separately from coarse aggregate, although separate stockpiles for more than two mix components are permitted.
- .3 Provide approved storage, heating tanks and pumping facilities for asphalt cement.

1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 19 – Construction/Demolition Waste Management and Disposal.
- .2 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material for recycling in accordance with Waste Management Plan.
- .3 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .4 Divert unused aggregate materials from site to facility for reuse as approved by Departmental Representative.

Part 2 Products

2.1 MATERIALS

.1 Asphalt cement: to CAN/CGSB-16.3, grade: 150-200, group: A according to chart of Absolute viscosity versus penetration

.1 The asphalt cement shall comply with the following:

ASTM CHARACTERISTICS	Test Method	Specifications
		150-200(A)
		LIMITS
Penetration, 25°C, 100 g, 5 sec, 0.1 mm	ASTM D5	(see table below)
Absolute Viscosity @ 60°C, Pa.S	ASTM D2171	(see table below)
Flash point (Cleveland Open Cup), °C minimum %	ASTM D92	205
Thin film Oven Test Weight Loss, max %	ASTM D1754	1.0
Penetration @ 25°C of residue, % of orig.	D5	50
Ductility - @ 25°C, cm, maximum	ASTM D113	100
Solubility in Trichloroethylene, min %	ASTM D2042	99.5

The limits of the viscosity and penetration shall be as follows:

	LIMITS			
150-200(A)				
Viscosity	155	78	50	92
Penetration	150	150	200	200

.2 Aggregates: to Section 31 05 17 – Aggregates: material to the following requirements

.1 Crushed stone or gravel.

.2 Gradation with limits specified when test to ASTM C 136 and ASTM C 117. Sieve sizes to CAN/CGSB-8.2.

Mix Design Type	12 mm Max. Aggregate
Sieve Designation	% Passing
12.5 mm	100
9.0 mm	76 - 92
5.0 mm	56 - 75
2.0 mm	36 - 54
900 µm	22 - 39
400 µm	14 – 30
160 µm	8 – 20
71 µm	4 – 10

- .3 Coarse aggregate: aggregate retained on 5 mm sieve and fine aggregate is aggregate passing 5 mm sieve when tested to ASTM C136.
- .4 Fine aggregate shall have a minimum of 60% of manufactured particles and not more than 85% manufactured particles. All material passing a 400 µm sieve shall have a plasticity index (PI) or zero (0)
- .5 When dryer drum plant or plant without hot screening is used, process fine aggregate through 5 mm sieve and stockpile separately from coarse aggregate.
- .6 Do not use aggregates having known polishing characteristics in mixes for surface courses.
- .7 Sand equivalent: ASTM D2419. Min: 45.
- .8 Flat and elongated particles: to ASTM D 4791, (with length to thickness ratio greater than 5): Max% by mass:
 - .1 Coarse aggregate, surface course: 15.
 - .2 Coarse aggregate, lower course: 15.
- .9 Crushed fragments: at least 70% 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 C 136.

Passing		Retained on
25 mm	to	12.5 mm
12.5 mm	to	5.0 mm

- .10 Regardless of compliance with specified physical requirements, fine aggregates may be accepted or rejected on basis of past field performance.

- .3 Mineral filler:
 - .1 Finely ground particles of limestone, hydrated lime, Portland cement, or other approved non-plastic mineral matter, thoroughly dry and free from lumps.
 - .2 Add mineral filler when necessary to meet job mix aggregate gradation or as directed to improve mix properties.
 - .3 Mineral filler to be dry and free flowing when added to aggregate.
- .4 Anti-stripping agent: hydrated lime to ASTM C207 type N. Add lime at rate of approximately 2-3% of dry weight of aggregate.
- .5 Water: to approval of Departmental Representative.

2.2 MIX DESIGN

- .1 Mix design to be approved by Departmental Representative.
- .2 Mix design to be developed by testing laboratory approved by Departmental Representative.
- .3 Design of mix: by Marshall method to requirements below.
 - .1 Compaction blows on each face of test specimens: 50.
 - .2 Mix physical requirements:

Marshall Stability at 60c kN min	10.0
Flow Value, mm	2.0 – 3.5
Air Voids, %	2.0 - 4.0
Voids in Mineral Aggregate, %Min	13.5
Minimum Film Thickness, μ m	7.0
Index of Retained Stability, %Min	70.0
Voids Filled, %	65.0 – 75.0

- .3 Measure physical requirements as follows:
 - .1 Marshall load and flow value: to ASTM D1559.
 - .2 Compute void properties on basis of bulk specific gravity of aggregate to ASTM C127 and ASTM C128. Make allowance for volume of asphalt absorbed into pores of aggregate.
 - .3 Air voids: to ASTM D3203.
 - .4 Voids in mineral aggregates: to AI MS2, chapter 4.
- .4 Do not change job-mix without prior approval of Departmental Representative. When change in material source proposed, new job-mix formula to be approved by Departmental Representative.

Part 3 Execution

3.1 PLANT AND MIXING REQUIREMENTS

- .1 Batch and continuous mixing plants:
 - .1 To ASTM D995.
 - .2 Feed aggregates from individual stockpiles through separate bins to cold elevator feeders. Do not load frozen materials into bins.
 - .3 Feed cold aggregates to plant in proportions to ensure continuous operations.
 - .4 Calibrate bin gate openings and conveyor speeds to ensure mix proportions are achieved.
 - .5 Before mixing, dry aggregates to moisture content not greater than 1% by mass or to lesser moisture content if required to meet mix design requirements.
 - .6 Immediately after drying, screen aggregates into hot storage bins in sizes to permit recombining into gradation meeting job-mix requirements.
 - .7 Store hot screened aggregates in manner to minimize segregation and temperature loss.
 - .8 Heat asphalt cement and aggregate to mixing temperature. Do not heat asphalt cement above 160 degrees C.
 - .9 Make available current asphalt cement viscosity data at plant. With information relative to viscosity of asphalt being used, Departmental Representative to review temperature of completed mix at plant and at paver after considering hauling and placing conditions.
 - .10 Maintain temperature of materials within 5 degrees C of specified mix temperature during mixing.
- .2 Dryer drum mixing plant:
 - .1 To ASTM D995.
 - .2 Load aggregates from individual stockpiles to separate cold feed bins. Do not load frozen materials into bins.
 - .3 Feed aggregates to burner end of dryer drum by means of multi-bin cold feed unit and blend to meet job-mix requirements by adjustments of variable speed feed belts and gates on each bin.
 - .4 Meter total flow of aggregate by an electronic weigh belt system with indicator that can be monitored by plant operator and which is interlocked with asphalt pump so that proportions of aggregate, RAP and asphalt entering mixer remain constant.
 - .5 Provide for easy calibration of weighing systems for aggregates without having material enter mixer.
 - .6 Calibrate bin gate openings and conveyor speeds to ensure mix proportions are achieved. Calibrate weigh bridge on charging conveyor by weighing amount of aggregate passing over weigh bridge in set amount of time. Difference between this value and amount shown by plant computer system to differ by not more than plus or minus 2 %.
 - .7 Make provision for conveniently sampling full flow of materials from cold feed.
 - .8 Provide screens or other suitable devices to reject oversize particles or lumps of aggregate and RAP from cold feed prior to entering drum.

- .9 Provide system interlock stop on feed components if either asphalt or aggregate from bin stops flowing.
- .10 Accomplish heating and mixing of asphalt mix in approved parallel flow dryer-mixer in which aggregate enters drum at burner end and travels parallel to flame and exhaust gas stream. Control heating to prevent fracture of aggregate or excessive oxidation of asphalt. Equip system with automatic burner controls and provide for continuous temperature sensing of asphalt mixture at discharge, with printing recorder that can be monitored by plant operator. Submit printed record of mix temperatures at end of each weekday.
- .11 Mixing period and temperature to produce uniform mixture in which particles are thoroughly coated, and moisture content of material as it leaves mixer to be less than 2%.
- .3 Temporary storage of hot mix:
 - .1 Provide mix storage of sufficient capacity to permit continuous operation and designed to prevent segregation.
 - .2 Do not store asphalt mix in storage bins in excess of 3 hr.
- .4 While producing asphalt mix for this project, do not produce mix for other users unless separate storage and pumping facilities are provided for materials supplied to this project.
- .5 Mixing tolerances:
 - .1 Permissible variation in aggregate gradation from job mix (percent of total mass).

5 mm sieve and larger	
2 mm sieve	
0.425 mm sieve	
0.180 mm sieve	
0.075 mm sieve	±2.0

- .2 Permissible variation of asphalt cement from job mix: 0.25%.
- .3 Permissible variation of mix temperature from plant: 5 C
- .6 Addition of anti-stripping agent:
 - .1 Plant to be equipped with pug mill to thoroughly mix aggregates and lime prior to entering the plant.
 - .2 Plant to be equipped with suitable conveyor systems capable of supplying aggregates and lime at constant rate.
 - .3 Plant and equipment used for addition of lime to be equipped with covers to control loss of lime.
 - .4 Plant to be equipped to control rate of lime incorporation to within 0.25%.
 - .5 Add water to aggregate prior to entering pug mill.

- .6 Add water to lime sufficiently in advance to permit time to slake prior to entering pug mill.

3.2 EQUIPMENT

- .1 Pavers: mechanical self-powered pavers capable of spreading mix within specified tolerances, true to line, grade and crown indicated.
- .2 Rollers: sufficient number of type and weight to obtain specified density of compacted mix.
- .3 Vibratory rollers:
 - .1 Minimum drum diameter: 1200 mm.
 - .2 Maximum amplitude of vibration (machine setting): 0.5 mm for lifts less than 40 mm thick.
- .4 Haul trucks: sufficient number and of adequate size, speed and condition to ensure orderly and continuous operation and as follows:
 - .1 Boxes with tight metal bottoms.
 - .2 Covers of sufficient size and weight to completely cover and protect asphalt mix when truck fully loaded.
 - .3 In cool weather or for long hauls, insulate entire contact area of each truck box.
 - .4 Use only trucks which can be weighed in single operation on scales supplied.
- .5 Hand tools:
 - .1 Lutes or rakes with covered teeth for spreading and finishing operations.
 - .2 Straight edges, 4.5 m in length, to test finished surface.

3.3 PREPARATION

- .1 When paving over existing asphalt surface, clean pavement surface with power broom or street sweeper. When levelling course is not required, patch and correct depressions and other irregularities to approval of Departmental Representative before beginning paving operations
- .2 Apply prime coat in accordance with Section 32 12 14 - Asphalt Prime.
- .3 Prior to laying mix, clean surfaces of loose and foreign material.

3.4 TRANSPORTATION OF MIX

- .1 Transport mix to job site in vehicles cleaned of foreign material.
- .2 Paint or spray truck beds with limewater, soap or detergent solution, or non petroleum based commercial product, at least daily or as required. Elevate truck bed and thoroughly drain. No excess solution to remain in truck bed.
- .3 Schedule delivery of material for placing in daylight, unless Departmental Representative approves artificial light.

- .4 Deposit mix from surge or storage silo to trucks in multiple drops to reduce segregation. Do not dribble mix into trucks.
- .5 Deliver material to paver at uniform rate and in an amount within capacity of paving and compacting equipment.
- .6 Deliver loads continuously in covered vehicles and immediately spread and compact. Deliver and place mixes at temperature within range as directed by Departmental Representative, but not less than 135 degrees C.

3.5 PLACING

- .1 Obtain Departmental Representative's approval of base and existing surface and prime coat prior to placing asphalt.
- .2 Place asphalt concrete to thickness, grades and lines as indicated or as directed by Departmental Representative.
- .3 Placing conditions:
 - .1 Place asphalt mixtures only when air temperature is above 5 degrees C.
 - .2 Do not place asphalt when temperature of surface on which material is to be placed falls below 10 degrees C.
 - .3 Do not place hot-mix asphalt when pools of standing water exist on surface to be paved, during rain, or when surface is damp.
- .4 Place asphalt concrete in compacted lifts of maximum thickness of 50 mm.
- .5 Where possible do tapering and levelling where required in lower lifts. Overlap joints by not less than 300 mm.
- .6 Spread and strike off mixture with self propelled mechanical finisher.
 - .1 Construct longitudinal joints and edges true to line markings. Departmental Representative to establish lines for paver to follow parallel to centerline of proposed pavement. Position and operate paver to follow established line closely.
 - .2 When using pavers in echelon, have first paver follow marks or lines, and second paver follow edge of material placed by first paver. Work pavers as close together as possible and in no case permit them to be more than 30 m apart.
 - .3 Maintain constant head of mix in auger chamber of paver during placing.
 - .4 If segregation occurs, immediately suspend spreading operation until cause is determined and corrected.
 - .5 Correct irregularities in alignment left by paver by trimming directly behind machine.
 - .6 Correct irregularities in surface of pavement course directly behind paver. Remove by shovel or lute excess material forming high spots. Fill and smooth indented areas with hot mix. Do not broadcast material over such areas.
 - .7 Do not throw surplus material on freshly screeded surfaces.
- .7 When hand spreading is used:

- .1 Use approved wood or steel forms, rigidly supported to assure correct grade and cross section. Use measuring blocks and intermediate strips to aid in obtaining required cross-section.
- .2 Distribute material uniformly. Do not broadcast material.
- .3 During spreading operation, thoroughly loosen and uniformly distribute material by lutes or covered rakes. Reject material that has formed into lumps and does not break down readily.
- .4 After placing and before rolling, check surface with templates and straightedges and correct irregularities.
- .5 Provide heating equipment to keep hand tools free from asphalt. Control temperature to avoid burning material. Do not use tools at higher temperature than temperature of mix being placed.

3.6 COMPACTING

- .1 Roll asphalt continuously to density not less than 97% of 50 blow Marshall density to ASTM D1559.
- .2 General:
 - .1 Provide at least two rollers and as many additional rollers as necessary to achieve specified pavement density. When more than two rollers are required, one roller must be pneumatic tired type.
 - .2 Start rolling operations as soon as placed mix can bear weight of roller without excess displacement of material or cracking of surface.
 - .3 Operate roller slowly initially to avoid displacement of material. Do not exceed 5 km/h for breakdown and intermediate rolling for static steel-wheeled and pneumatic tired rollers. Do not exceed 9 km/h for finish rolling.
 - .4 Use static compaction for levelling coarse less than 25 mm thick.
 - .5 Overlap successive passes of roller by minimum of 200 mm and vary pass lengths.
 - .6 Keep wheels of roller slightly moistened with water to prevent pick-up of material but do not over-water.
 - .7 Do not stop vibratory rollers on pavement that is being compacted with vibratory mechanism operating.
 - .8 Do not permit heavy equipment or rollers to stand on finished surface before it has been compacted and has thoroughly cooled.
 - .9 After traverse and longitudinal joints and outside edge have been compacted, start rolling longitudinally at low side and progress to high side. Ensure that all points across width of pavement receive essentially equal numbers of passes of compactors.
 - .10 When paving in echelon, leave unrolled 50 to 75 mm of edge which second paver is following and roll when joint between lanes is rolled.
 - .11 Where rolling causes displacement of material, loosen affected areas at once with lutes or shovels and restore to original grade of loose material before re-rolling.

- .3 Breakdown rolling:
 - .1 Begin breakdown rolling with vibratory roller immediately following rolling of transverse and longitudinal joint and edges.
 - .2 Operate rollers as close to paver as necessary to obtain adequate density without causing undue displacement.
 - .3 Operate breakdown roller with drive roll or wheel nearest finishing machine. When working on steep slopes or super-elevated sections use operation approved by Departmental Representative.
 - .4 Use only experienced roller operators.
- .4 Intermediate rolling:
 - .1 Use pneumatic-tired, steel wheel or vibratory rollers and follow breakdown rolling as closely as possible and while paving mix temperature allows maximum density from this operation.
 - .2 Rolling to be continuous after initial rolling until mix placed has been thoroughly compacted.
- .5 Finish rolling:
 - .1 Accomplish finish rolling with two-axle or three-axle tandem steel wheeled rollers while material is still warm enough for removal of roller marks. If necessary to obtain desired surface finish, use pneumatic-tired rollers as directed by Departmental Representative.
 - .2 Conduct rolling operations in close sequence.

3.7 JOINTS

- .1 General:
 - .1 Remove surplus material from surface of previously laid strip. Do not deposit on surface of freshly laid strip.
 - .2 Construct joints between asphalt concrete pavement and Portland cement concrete pavement as indicated.
 - .3 Paint contact surfaces of existing structures such as manholes, curbs or gutters with bituminous material prior to placing adjacent pavement.
- .2 Transverse joints:
 - .1 Offset transverse joint in succeeding lifts by at least 600 mm.
 - .2 Cut back to full depth vertical face and tack face with thin coat of hot asphalt prior to continuing paving.
 - .3 Compact transverse joints to provide smooth riding surface. Use methods to prevent rounding of compacted surface at joints.
- .3 Longitudinal joints:
 - .1 Offset longitudinal joints in succeeding lifts by at least 150 mm.
 - .2 Cold joint is defined as joint where asphalt mix is placed, compacted and left to cool below 100 degrees C prior to paving of adjacent lane.
 - .1 If cold joint can not be avoided, cut back by saw cutting previously laid lane, by at least 150 mm, to full depth vertical face, and tack face with thin coat of hot asphalt of adjacent lane.
 - .3 Overlap previously laid strip with spreader by 25 to 50 mm.

- .4 Before rolling, carefully remove and discard coarse aggregate in material overlapping joint with lute or rake.
- .5 Roll longitudinal joints directly behind paving operation.
- .6 When rolling with vibratory rollers, have most of drum width ride on newly placed lane with remaining 150 mm extending onto previously placed and compacted lane.

3.8 FINISH TOLERANCES

- .1 Finished asphalt surface to be within 5 mm of design elevation but not uniformly high or low and matching existing surfaces.
- .2 Finished asphalt surface not to have irregularities exceeding 5 mm when checked with 3.0 m straight edge placed in any direction.

3.9 DEFECTIVE WORK

- .1 Correct irregularities which develop before completion of rolling by loosening surface mix and removing or adding material as required. If irregularities or defects remain after final compaction, remove surface course promptly and lay new material to form true and even surface and compact immediately to specified density.
- .2 Repair areas showing checking, rippling, or segregation.
- .3 Adjust roller operation and screed settings on paver to prevent further defects such as rippling and checking of pavement.

3.10 PROTECTION

- .1 Keep vehicular traffic off newly paved areas until paving surface temperature has cooled below 38°C. Do not permit stationary loads on pavement until 24 hours after placement.
- .2 Provide access to buildings as required. Arrange paving schedule so as not to interfere with normal use of premises.

END OF SECTION

Part 1 General

Part 2 Products

2.1 CONCRETE

- .1 Concrete shall conform to Section 03 30 00.01 - Cast-in-Place Concrete – Short Form.

2.2 REINFORCING

- .1 Reinforcing shall conform to Section 03 30 00.01 - Cast-in-Place Concrete – Short Form.

2.3 GRANULAR MATERIAL

- .1 Granular Material shall conform to:

Sieve Designation	Percent Passing by Weight
20 mm	100
12.5 mm	75-100
5 mm	50-100
400 µm	10-45
80 µm	0-10
Plasticity Index	0-6

2.4 CURING COMPOUND

- .1 The Compound shall equal or exceed the ASTM “Specification for Liquid Membrane –Forming Compounds for Curing Concrete,” Designation C-309. The water retention efficiency tests shall be carried out in accordance with ASTM Designation C-156.
- .2 The Compound shall adhere to damp concrete having a horizontal or vertical surface and form a continuous film when applied according to the manufacturer’s instructions. When dried, the Compound shall not be tacky and must adhere to the concrete surface even under normal pedestrian traffic conditions. The film shall not render the concrete surface slippery. The Compound shall be clear or translucent, resinous base, non-bituminous. It shall contain a fugitive dye, readily distinguishable upon the concrete for at least four hours after application. The colour shall become inconspicuous within seven (7) days of application.

Part 3 Execution

3.1 GENERAL

- .1 Sidewalks, Crossings, Curbs and Gutters that are demolished during installation of watermain and services shall be replaced to the existing dimensions, grade and elevation.

3.2 EXCAVATION AND BASE

- .1 A 150 mm layer of clean gravel or sand bedding shall be used as a leveling material under concrete sidewalks, curb and gutters unless the curb is to be constructed on granular base course. If necessary, granular base course or native earth material (in accordance with their respective specifications) shall be used to raise the subgrade to allow for the 150 mm layer of leveling material may be waived if automatic fine-grading equipment is approved in writing by the Departmental Representative or if the leveling course is greater than 150 mm then a granular base course can be used. Automatic grade and line control will be required for the fine-grading equipment.
- .2 The base on which the concrete will rest shall be tamped and thoroughly wetted immediately prior to placing the concrete and must not be frozen.

3.3 FORMS

- .1 Forms shall be of steel or wood of sufficient strength to resist the pressure of wet concrete, and the supply shall be sufficient to permit their remaining in place not less than twelve (12) hours after concrete has been placed, or longer if the Departmental Representative considers it necessary, unless the surface of the concrete is to be finished. The use of bent, twisted, battered or worn-out forms will not be permitted. Forms may be checked for alignment and elevation by the Departmental Representative before concrete is poured, and shall be cleaned and oiled before each use. Where required, reinforcement shall be secured in the location shown on the drawings and shall be free from scale, grease and rust immediately prior to placing concrete. Forms shall be held securely by approved methods to prevent movement and bulging when the concrete is being placed. Forms must be approved by the Departmental Representative before concrete is poured. Flexible forms will be required for all curves with a radius of less than 50 m.

3.4 PLACING OF CONCRETE

- .1 All concrete placing methods shall be subject to the approval of the Departmental Representative. Concrete placing shall not be started until the Departmental Representative has inspected and approved all preparations including forms, bedding, reinforcing steel, construction joints, and all mixing conveying, spreading, compacting, finishing, curing and protection equipment. Concrete shall be conveyed from the mixer to the point of deposit as practicable, using means and equipment which will prevent separation or loss of materials.
- .2 Concrete shall be deposited in the forms as close as practicable to its final position, and in no case more than 1 m from the point of final deposit in the horizontal or vertical direction.

- .3 Special care shall be taken to place the concrete against the forms, particularly in corners, in order to prevent voids, pockets, rough areas and honeycombing. The concrete shall be tamped in such a manner as to work the coarse aggregate away from the forms and exposed surfaces. Vibrators or vibrator speeds used in placing concrete shall be a minimum of 5,000 cycles per minute. Concrete shall be placed continuously until a complete section between expansion joints has been poured.
- .4 The concrete shall be thoroughly consolidated against and along the faces of the forms. Hand spreading shall be done with shovels, not with rakes, in order that the concrete will not be separated. Precautions should be taken to prevent overworking of the concrete.

3.5 FINISHING

- .1 The surface shall be leveled with a vibrator mounted leveling beam. Special care shall be taken not to over-vibrate the concrete and in no case shall an excess of water be brought to the surface/or added to the surface. The surface shall then be marked in the specified manner and left until the concrete has set sufficiently to permit the finishing operations without causing bleeding. At this time the surface shall be brought to a true surface with a wood-float and a uniform broomed finish shall be applied. Final marking of the blocks shall then be carried out leaving blocks with edges rounded or leveled to a radius of not less than 10 mm. The edges of the walk and the lines dividing the walk into sections shall be rigidly straight; joints with ragged edges will not be permitted.

3.6 JOINTS

- .1 Contraction Joints
 - .1 Contraction joints shall be at every 1.5 m by means of a marking tool or other approved method, whose depth shall not be less than 40 mm and width shall not be less than 3 mm. The edge of the joint shall be rounded off with an edger having an arc of a circle having 10 mm as a radius. These joints shall be perpendicular to the longitudinal axis of the sidewalk, curb and gutter and shall extend through the full width of the sidewalk, curb and gutter.
 - .2 Locate asphalt impregnated fibreboard joint filler at 4.5 meter centres and where walks abut walls and other vertical surfaces. Joint filler to be full area of concrete section.
- .2 Surface Joints
 - .1 After toweling, a joint not less than 10 mm deep shall be marked in the surface of the walk. The edge of the joint shall be rounded off with an edger having an arc of a circle of a 20 mm radius.
- .3 Sawed Joints
 - .1 If required, saw joints shall be made with a special concrete saw capable of producing a true straight joint of a constant depth.
- .4 Cold Joints
 - .1 Cold joints are required at the end of each day's placement of concrete at a concentration joint location. This joint shall be perpendicular to the surface and curb line. Dowels are to be inserted, in order to provide a tie to the next pour of concrete.

3.7 REINFORCING

- .1 All curb radii shall be reinforced with two, 10 M reinforcing rods with at least 600 mm of the rod extending, beyond the cold joint, into existing or new curb (to follow). In residential areas, reinforcing in the curb radius may be omitted if the walk, curb and gutter are cast and placed in a monolithic operation. Use reinforcing rod, to bond new to older work at cold joints.
- .2 All separate rolled curb and gutter constructed adjacent to Commercial or Industrial Zoned Areas shall be reinforced with two 10 M reinforcing rods.
- .3 All walk poured as a separate operation behind curb/gutter shall be held in place by 600 mm 10 M bars inserted into the curb and gutter, at 1.5 m on centre (centre line of walk panels).

3.8 CURING AND PROTECTION

- .1 After the concrete has been finished to cross-section and as soon as the concrete has set sufficiently, the entire surface shall be sprayed with a concrete curing compound in a manner and in such quantity as will be directed by the Departmental Representative. All concrete surfaces that are left exposed to the air after removal of forms shall be cured in the same manner as described in the immediately above after removal of forms.
- .2 No vehicular traffic shall be allowed to cross the crossings for a period of seven days after construction and substantial barricades shall be erected and maintained for this purpose. All freshly laid concrete shall be barricaded with suitable barricades for a period of one day and any damage to the finish of the walks or crossings shall be corrected.
- .3 No heavy construction equipment shall be allowed to operate adjacent to the freshly laid concrete for a period of seven (7) days for normal concrete and three (3) days for high early concrete or as approved by the Departmental Representative.
- .4 If these corrections are not carried out before the concrete is hardened, repairs shall be made by the Contractor by replacing all damaged walk to curb and gutter. Patching will not be permitted. The forms shall be removed with care, as not to damage the walk or curb. In the event of any defect in construction or finish, the entire sections must be removed on the order of the Departmental Representative.
- .5 The Contractor shall maintain on the job sufficient canvas or other suitable covering to protect all freshly laid concrete from the action of the elements.

3.9 COLD WEATHER REQUIREMENTS

- .1 When the atmosphere has a temperature lower than 5°C, all reinforcing materials, forms, and ground with which the concrete is to come in contact shall be defrosted and in no case shall concrete be deposited on or against any surface which is at a temperature of less than 2°C.
- .2 No concrete shall be placed on frozen subgrade (native or granular). If the subgrade is frozen it shall be thawed prior to concrete placement.

- .3 Concrete placement and protection shall be limited by the following table.
Concrete temperature shall not drop below 10°C during the curing period. Rapid cooling of the concrete at the end of the heating period is to be avoided.

OUTSIDE MINIMUM AMBIENT AIR TEMPERATURE	PROTECTIVE MEASURES
5°C TO 25°C	Normal curing – no temperature protection required.
Below 5°C	Adequate insulation for 7 days to achieve strength specified in CAN/CSA3-A23.1M90 with suitable enclosure or supplementary heat.

- .4 The Contractor may request the use of high early strength concrete at his own expense.
- .5 All concrete showing evidence of freezing shall be removed from the job and replaced at the Contractor's expense.

3.10 HOT WEATHER REQUIREMENTS

- .1 Hot weather is defined for the purpose of this specification as a combination of low relative humidity, windy conditions and high temperatures. The Contractor is advised that the placing of concrete when the evaporation rate exceeds 0.5 kg / m² / hr typically results in a substandard product that shall not be accepted. The removal and replacement of such if required would be at the Contractor's expense.
- .2 The Contractor shall limit the amount of concrete poured during hot weather to enable the work to be finished to the satisfaction of the Departmental Representative. Surface wetting to facilitate finishing is not permitted. Protective measures to prevent fast setting of the concrete are to be implemented.

3.11 INSPECTION

- .1 The finished surfaces of all concrete work shall be true to the required cross-section with a tolerance of ± 10 mm from the required elevation and dimensions or to match existing adjacent concrete. Surfaces of curbs, gutters or sidewalks shall not show any depressions or bumps exceeding 5 mm under a straight edge 3 m long, placed parallel to the curb or sidewalk. Concrete not meeting the requirements specified shall be removed to the nearest joint and replaced at the Contractor's expense.

END OF SECTION

Part 1 General

1.1 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 19 – Construction/Demolition Waste Management and Disposal.
- .2 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material for recycling in accordance with Waste Management Plan.
- .3 Divert any unused granular material from the site to local facility as approved by Departmental Representative.

Part 2 Products

2.1 MATERIALS

- .1 Reuse existing granular materials excavated from roadway first.
- .2 Granular sub-base material: in accordance with Section 31 05 17 – Aggregates shall conform to the following requirements:
 - .1 Crushed, pit run or screened stone, gravel or sand.
 - .2 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1 CAN/CGSB-8.2.
 - .3 Gradation to City of Regina Standard Construction Specifications.

Sieve Designation	% Passing
56 mm	100
80 µm	5-15

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

Part 3 Execution

3.1 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 Begin spreading sub-base material on crown line or high side of one-way slope.
- .6 Place granular sub-base materials using methods which do not lead to segregation or degradation.
- .7 Place material to full width in uniform layers not exceeding 150 mm compacted thickness.
- .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.

3.2 COMPACTION

- .1 Compaction equipment to be capable of obtaining required material densities.
- .2 Efficiency of equipment not specified to be proved at least as efficient as specified equipment at no extra cost and written approval must be received from Departmental Representative before use.
- .3 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.
- .7 Compact until no further rutting or settlement is noticeable.

3.3 SITE TOLERANCES

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

3.4 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 QUALITY ASSURANCE

- .1 Upon request from Departmental Representative, submit manufacturer's test data and certification that asphalt prime material meets requirements of this Section.

1.2 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 – Basic Product Requirements.
- .2 Provide, maintain and restore asphalt storage area.

1.3 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 19 – Construction/Demolition Waste Management and Disposal.
- .2 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material for recycling in accordance with Waste Management Plan.
- .3 Divert unused asphalt materials from site to local facility approved by Departmental Representative.

Part 2 Products

2.1 MATERIAL

- .1 Asphalt prime or tack coat: to CAN/CGSB-16.1, grade MC-70
- .2 Sand blotter: clean granular material passing 4.75 mm sieve and free from organic matter or other deleterious materials.
- .3 Water: clean, potable, free from foreign matter.

Part 3 Execution

3.1 EQUIPMENT

- .1 Pressure distributor to be:
 - .1 Designed, equipped, maintained and operated so that asphalt material can be:
 - .1 Maintained at even temperature.
 - .2 Applied uniformly on variable widths of surface up to 5 m.
 - .3 Applied at controlled rates from 0.2 to 5.4 L/m² with uniform pressure, and allowable variation from any specified rate not exceeding 0.1 L/m².

- .4 Distributed in uniform spray without atomization at temperature required.
- .2 Equipped with meter registering metres of travel per minute, visibly located to enable truck driver to maintain constant speed required for application at specified rate.
- .3 Equipped with pump having flow meter graduated in units of 5 L or less per minute passing through nozzles and readily visible to operator. Pump power unit to be independent of truck power unit.
- .4 Equipped with easily read, accurate and sensitive device which registers temperature of liquid in reservoir.
- .5 Equipped with accurate volume measuring device or calibrated tank.
- .6 Equipped with nozzles of same make and dimensions, adjustable for fan width and orientation.
- .7 Equipped with nozzle spray bar, with operational height adjustment.
- .8 Cleaned if previously used with incompatible asphalt material.

3.2 APPLICATION

- .1 Obtain Departmental Representative's approval of granular base surface before applying asphalt prime.
- .2 Cutback asphalt
 - .1 Heat asphalt prime to between 60 and 80 degrees C for pumping and spraying.
 - .2 Apply asphalt prime to granular base at rate at a rate of 1.5 L/m².
 - .3 Apply on dry surface unless otherwise directed by Departmental Representative.
- .3 Apply Asphalt prime only on unfrozen surface.
- .4 Do not apply prime when the surface temperature is less than 10 degrees C or when rain is forecast within 2 hours.
- .5 Paint contact surfaces of curbs, gutters, headers, manholes and like structures with thin, uniform coat of asphalt prime material.
- .6 Where traffic is to be maintained, treat no more than one-half width of surface in one application.
- .7 Prevent overlap at junction of applications.
- .8 Do not prime surfaces that will be visible when paving is complete.
- .9 Apply additional material to areas not sufficiently covered as directed by Departmental Representative.
- .10 Keep traffic off primed areas until asphalt prime has cured or set.
- .11 Permit prime to cure or set before placing asphalt paving.

3.3 USE OF SAND BLOTTER

- .1 If asphalt prime fails to penetrate within 24 hours, spread sand blotter material in amounts required to absorb excess material.
- .2 Allow sufficient time for excess prime to be absorbed as directed by Departmental Representative.
- .3 Apply second application of sand blotter as required.
- .4 Sweep and remove excess blotter material.

END OF SECTION

Part 1 General

1.1 WASTE MANAGEMENT AND DISPOSAL

- .1 Divert unused soil amendments from site to official hazardous material collections site approved by Departmental Representative.
- .2 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 Reuse stripped topsoil if possible.
- .2 Imported topsoil for seeded areas: 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.

2.2 SOIL AMENDMENTS

- .1 Fertilizer:
 - .1 Fertility: major soil nutrients present in following amounts:
 - .2 Nitrogen (N): 20 to 40 micrograms of available N per gram of topsoil.
 - .3 Phosphorus (P): 40 to 50 micrograms of phosphate per gram of topsoil.
 - .4 Potassium (K): 75 to 110 micrograms of potassium per gram of topsoil.
 - .5 Calcium, magnesium, sulfur and micro-nutrients present in balanced ratios to support germination and/or establishment of intended vegetation.
 - .6 Ph value: 6.5 to 8.0.
- .2 Peatmoss:
 - .1 Derived from partially decomposed species of Sphagnum Mosses.
 - .2 Elastic and homogeneous, brown in colour.
 - .3 Free of wood and deleterious material which could prohibit growth.
 - .4 Shredded particle minimum size: 5 mm.

- .3 Sand: washed coarse silica sand, medium to coarse textured.
- .4 Organic matter: compost Category A, B, unprocessed organic matter, such as rotted manure, hay, straw, bark residue or sawdust, meeting the organic matter, stability and contaminant requirements.
- .5 Use composts meeting Category B requirements for land fill reclamation and large scale industrial applications.
- .6 Fertilizer: industry accepted standard medium containing nitrogen, phosphorous, potassium and other micro-nutrients suitable to specific plant species or application or defined by soil test.

Part 3 Execution

3.1 STRIPPING OF TOPSOIL

- .1 Commence topsoil stripping after area has been cleared of brush weeds and grasses and removed from site.
- .2 Strip topsoil to depths as indicated or as directed by Departmental Representative. Avoid mixing topsoil with subsoil where textural quality will be moved outside acceptable range of intended application.
- .3 Stockpile in locations as directed by Departmental Representative or as indicated. Stockpile height not to exceed 2 m.
- .4 Disposal of unused topsoil is to be in an environmentally responsible manner but not used as landfill as directed by Departmental Representative.
- .5 Protect stockpiles from contamination and compaction.

3.2 PREPARATION OF EXISTING GRADE

- .1 Verify that grades are correct. 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. Remove soil contaminated with calcium chloride, toxic materials and petroleum products. Remove debris which protrudes more than 75 mm above surface. Dispose of removed material off site.
- .4 Cultivate entire area which is to receive topsoil to minimum depth of 100 mm. Cross cultivate those areas where equipment used for hauling and spreading has compacted soil.

3.3 PLACING AND SPREADING OF TOPSOIL/PLANTING SOIL

- .1 Place topsoil after Departmental Representative has accepted subgrade.

- .2 Spread topsoil as indicated or to following minimum depths after settlement.
 - .1 75 mm for seeded areas.
 - .2 125 mm for sodded areas.
- .3 Manually spread topsoil/planting soil around trees, shrubs and obstacles.

3.4 FINISH GRADING

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

3.5 ACCEPTANCE

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

3.6 SURPLUS MATERIAL

- .1 Dispose of materials except topsoil not required where directed by Departmental Representative off site.

3.7 CLEANING

- .1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

Part 1 General

1.1 SUBMITTALS

- .1 Product Data:
 - .1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures
 - .2 Provide product data for:
 - .1 Seed and Sod
 - .2 Fertilizer

1.2 WASTE MANAGEMENT AND DISPOSAL

- .1 Do not dispose of unused fertilizer into sewer systems, into lakes, streams, onto ground or in locations where it will pose health or environmental hazard.

1.3 SEEDING AND SODDING LOCATIONS

- .1 Restore grassed areas disturbed during construction as follows:
 - .1 Restore areas shown on Drawing C-103, C-104 and C-105 by seeding.
 - .2 Restore areas shown on Drawing C-106, C-107 and C-108 by seeding.
 - .3 Restore parking and laydown area by seeding.

Part 2 Products

2.1 GRASS SEED

- .1 Certified No. 1 Grade to Government of Canada, Seeds Regulations and having minimum germination of 85% for irrigated grass seed, 75% for un-irrigated grass seed and minimum purity of 97% for both.
- .2 Mixtures shall be supplied by a recognized seed house.
- .3 Seed shall be packed in bags or containers showing:
 - .1 Suppliers name and address
 - .2 Seed lot number and date of production
 - .3 Net weight
 - .4 Names and percentages of individual seed species
- .4 Grass Seed Mixtures:
 - .1 Irrigated Grass Seed:
 - .1 Use a grass seed mixture equivalent to the one growing on site or a mixture of the following. (Acceptable cultivars include, but are not limited to, those listed in parentheses. Substitutions for any of the above must be approved by the Departmental Representative.)

- .1 50% Canada Certified No. 1 Kentucky Bluegrass ('Touchdown', 'Fylking', 'Banff', 'Nugget', 'Crest', 'Able')
 - .2 20% Canada Certified No. 1 Creeping Red Fescue ('Boreal', 'Jasper')
 - .3 15% Canada Certified No. 1 Chewings Fescue ('Jamestown', 'Victory', 'Columbra')
 - .4 10% Canada Certified No. 1 Hard Fescue ('Aurora', 'Spartan', 'Serra')
 - .5 5% Canada Certified No. 1 Perennial Rye Grass.
- .2 Un-irrigated Grass Seed
- .1 Use a grass seed mixture equivalent to the one growing on site or a mixture of the following. (Acceptable cultivars include, but are not limited to, those listed in parentheses. Substitutions for any of the above must be approved by the Departmental Representative.)
 - .1 40% Canada Certified No. 1 Canada Bluegrass ('Reubens')
 - .2 20% Canada Certified No. 1 Hard Fescue ('Aurora', 'Serra', 'Spartan')
 - .3 15% Canada Certified No. 1 Chewings Fescue ('Jamestown', 'Victory', 'Columbra')
 - .4 15% Canada Certified No. 1 Creeping Red Fescue ('Boreal', 'Jasper')
 - .5 10% Canada Certified No. 1 Perennial Rye Grass.

2.2 SOD

- .1 Sod shall be #1 Nursery sod taken from good loamy soil.
- .2 Sod shall be permeated with roots, uniform in texture and shall be minimum 80% Kentucky blue grass and 15 – 20% creeping red fescue.
- .3 Sod shall be free from weeds and foreign materials, in healthy condition with no sign of decay and shall contain sufficient moisture to maintain vitality.
- .4 Sod shall be approximately 20 mm thick.

2.3 WATER

- .1 Free of impurities that would inhibit germination and growth.
- .2 Supplied by Departmental Representative at designated source on site.

2.4 FERTILIZER

- .1 To Canada "Fertilizers Act" and "Fertilizers Regulations".
- .2 Fertilizer shall be 16-32-6 controlled release, sulphur coated urea (SCU) or ammonia sulphate fertilizer.

Part 3 Execution

3.1 PREPARATION

- .1 Verify that grades are correct and match existing grades and drainage contours.
- .2 Areas to be seeded and sodded are limited to the areas damaged during construction.
- .3 The work shall be done in calm weather, during normal growing season between May 15 and before September 15. Work done after August 15 will not be accepted before June 15 of the following year.
- .4 Notify the Departmental representative prior to the start of seeding or sodding operations.

3.2 BED PREPARATION

- .1 Fine grade surface free of humps and hollows to smooth, even grade, to contours and elevations indicated to tolerance of plus or minus 15 mm, surface draining naturally.
- .2 Cultivate fine grade approved by Departmental Representative to 25 mm depth immediately prior to seeding or sodding.

3.3 SEED PLACEMENT

- .1 Sow seed during calm weather (winds less than 10 km per hour).
- .2 For mechanical seeding:
 - .1 Use "Brillion" type mechanical landscape seeder which accurately places seed at specified depth and rate and rolls in single operation.
 - .2 Use equipment and method acceptable to Departmental Representative.
- .3 For manual seeding:
 - .1 Use "Cyclone" type manually operated seeder.
 - .2 Use manually operated, water ballast, landscaping type, smooth steel drum roller. Ballast as directed by Departmental Representative.
 - .3 Use equipment and method acceptable to Departmental Representative.
- .4 On cultivated surfaces, sow seed uniformly at rate of:
 - .1 2.0 kg/ 100 m² or at a rate specified for the seed type.
- .5 Blend applications 150 mm into adjacent grass areas to form uniform surfaces.
- .6 Sow half of required amount of seed in one direction and remainder at right angles as applicable.
- .7 Incorporate seed by light raking in cross directions.
- .8 Consolidate mechanically seeded areas by rolling area if soil conditions warrant or if directed by Departmental Representative with equipment approved by Departmental Representative immediately after seeding.

3.4 LAYING SOD

- .1 Lay sod during the growing season.
- .2 Lay sod in row perpendicular to slope, with staggered joints, and smooth and even surface.
- .3 On steep slopes anchor sod with wood stakes.
- .4 Roll lightly and water immediately after laying

3.5 FERTILIZING PROGRAM

- .1 Fertilizer shall be spread at a rate of 2.5 kg per 100 square metres and prior to light raking.

3.6 PROTECTION

- .1 Provide and maintain barricades and warning signs for all seeded areas until acceptance
- .2 Cover seeded slopes of 3:1 or steeper using blanket cover approved by the Departmental Representative.

3.7 FINAL ACCEPTANCE

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

3.8 GUARANTEE

- .1 Guarantee for seeded and sodded areas is one (1) year from the date of acceptance.
- .2 Areas showing deterioration, bare spots, thin areas or other defects shall be re-seeded or re-sodded at the Contractor's expense

3.9 INSPECTION

- .1 Final inspection of seeded and sodded areas will be made at the end of the guarantee period.
- .2 At the time of inspection all the areas shall be alive and in a healthy satisfactory growing condition. Unhealthy areas must be re-established at the Contractor's expense

3.10 MAINTENANCE

- .1 The maintenance of seeded and sodded areas shall commence immediately after work has been completed and shall continue until after the second cutting of grass. The Contractor shall be responsible for watering and fertilizing costs up to and including the time of the second cut.
- .2 Maintenance includes the following:
 - .1 Mowing at regular intervals as required to maintain grass at a minimum height of 50 mm. No more than 1/3 of blade of blade may be cut at one time.
 - .2 Watering when required with sufficient amounts to ensure germination and prevent grass and underlying soil from drying.
 - .3 Fertilizing, including all required supplementary fertilizer applications as necessary to establish a vigorous growing.
 - .4 Weed control shall be carried out when required to keep seeded areas reasonably free of weeds. When herbicides are used, they shall be applied in accordance with manufacturer's recommendations. Any damage resulting from Contractor's use of herbicides shall be remedied at the Contractor's expense.
 - .5 Erosion resulting from Contractor's faulty workmanship and / or materials shall be repaired and re-seeded or sodded at the Contractor's expense.

END OF SECTION