

Part 1 General

1.1 REFERENCES

- .1 City of Winnipeg
 - .1 City of Winnipeg Standard Construction Specification CW3110-Sub-grade, Sub-base and Base course construction. [December 2015] in Appendix B.
 - .2 For this specific project the word Contract Administrator in the City of Winnipeg Construction Specifications shall refer to Departmental Representative.

Part 2 Products

2.1 MATERIALS

- .1 The following size of granular materials shall be used for sub-base material in the site roadway construction:
 - .1 Sub-Base material shall be crushed limestone and have a maximum aggregate size of 50 millimeters. Refer to Section CW3110 Sub-grade, Sub-base and Base course construction.

2.2 TESTING

- .1 A minimum of one sample shall be tested for gradation (sieve analysis) and Maximum Dry Density for sub-base course material prior to starting construction. The material shall be sampled from stockpiles designated to be used for the contract and shall be tested in accordance with this Specification.
- .2 If one test fails to meet the requirements of this Specification, the material shall be re-tested. If the material fails a second test, the Departmental Representative shall designate a new source for supply of the material.
- .3 All testing required meeting specifications to be conducted by a certified material and testing agencies to be engaged and paid by contractor.
- .4 Departmental Representative may engage an independent testing laboratory to conduct random Quality assurance testing.

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 as shown on Drawing C02.
- .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 For spreading and shaping material, use spreader boxes having adjustable templates or screeds which will place material in uniform layers of required thickness.
- .8 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.
- .9 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
- .10 Remove and replace portion of layer in which material has become segregated during spreading.

3.2 COMPACTION

- .1 Place and compact sub-base materials in layers to a depth of 3 times the maximum aggregate size or as directed by the Departmental Representative. Compact to a minimum of 100% Standard Proctor Density, for the full width of the excavation, and each layer must be leveled before the succeeding layer may be placed. 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.

3.3 PROOF ROLLING

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

- .2 Backfill excavated subgrade with common material and compact in accordance with this section.
- .3 Replace sub-base material and compact.
- .6 Where proof rolling reveals areas of defective sub-base, remove and replace in accordance with this section at no extra cost.

3.4 QUALITY CONTROL

- .1 Determine the Standard Proctor Density for the base course materials at the optimum moisture content in accordance with ASTM Standard D698. The field density of each sub-base layer will be a percentage of the applicable Standard Proctor Density, in Section 3.2 of this specification.
- .2 Utilize quality control tests to determine the acceptability of the base course layer, as placed and compacted before the succeeding layer may be applied.
- .3 Verify the field density of the compacted layers by Field Density Tests in accordance with ASTM Standard D1556, Test for Density of Soil in Place by the Sand-Cone Method, or ASTM Standard D2922, Test of Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- .4 Fill promptly, holes made by the removal of samples from the layers with appropriate material and thoroughly compact so as to conform in every way with the adjoining material.
- .5 The frequency and number of tests will be 1 test for compaction density.

3.5 SITE TOLERANCES

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

3.6 PROTECTION

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

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 City of Winnipeg
 - .1 City of Winnipeg Standard Construction Specification CW3110-Sub-grade, Sub-base and Base course construction. [December 2015] in Appendix B.
 - .2 For this specific project the word Contract Administrator in the City of Winnipeg Construction Specifications shall refer to Departmental Representative.

Part 2 Products

2.1 MATERIALS

- .1 Base Course shall be crushed limestone in accordance with Clause 2.2 of CW 3110, latest edition.

2.2 TESTING

- .1 A minimum of one sample shall be tested for gradation (sieve analysis) and Maximum Dry Density for base course material prior to starting construction. The material shall be sampled from stockpiles designated to be used for the contract and shall be tested in accordance with this Specification.
- .2 If one test fails to meet the requirements of this Specification, the material shall be re-tested. If the material fails a second test, the Departmental Representative shall designate a new source for supply of the material.
- .3 All testing required to meet specifications to be conducted by a certified material and testing agencies to be engaged and paid by contractor.
- .4 Departmental Representative may engage an independent testing laboratory to conduct random Quality assurance testing and will pay for that.

Part 3 Execution

3.1 PLACEMENT

- .1 Place and compact base course material to a minimum 75 millimetres thickness for pavement and approaches to a minimum of 100% Standard Proctor Density for the full width of the excavation unless otherwise shown on the Drawings or as directed by the Departmental Representative.
- .2 Level the compacted base course to the finished base course elevation.
- .3 Maintain the finished base course until the pavement is placed.

- .4 Spread base course material uniformly to avoid segregation, free of pockets of fine and coarse material.
- .5 Place and compact leveling course to a maximum thickness of 50 millimetres for sidewalks, renewal of existing curbs and miscellaneous concrete slabs, to 95% Standard Proctor Density.

3.2 QUALITY CONTROL

- .1 Determine the Standard Proctor Density for the base course materials at the optimum moisture content in accordance with ASTM Standard D698. The field density of each sub-grade, sub-base and base course layers will be a percentage of the applicable Standard Proctor Density, in Section 3.1 of this specification.
- .2 Utilize quality control tests to determine the acceptability of the base course layer, as placed and compacted before the succeeding layer may be applied.
- .3 Verify the field density of the compacted layers by Field Density Tests in accordance with ASTM Standard D1556, Test for Density of Soil in Place by the Sand-Cone Method, or ASTM Standard D2922, Test of Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- .4 Fill promptly, holes made by the removal of samples from the layers with appropriate material and thoroughly compact so as to conform in every way with the adjoining material.
- .5 The frequency and number of tests will be 1 test for compaction density.

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 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 City of Winnipeg
 - .1 City of Winnipeg Standard Construction Specification CW3410 – Asphaltic Concrete Pavement Works [December 2015] in Appendix B.
 - .2 For this specific project the word Contract Administrator in the City of Winnipeg Construction Specifications shall refer to Departmental Representative.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for asphalt mixes and aggregate and include product characteristics, performance criteria, physical size, finish and limitations.

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.

Part 2 Products

2.1 MATERIALS

- .1 Aggregates
 - .1 Fine Aggregate
 - .1 Fine aggregate shall consist of sand having clean, hard, strong, durable, uncoated grains free from injurious amounts of dust, soft or flaking particles, shale, alkali, organic matter, loam or other deleterious substances
 - .2 Course Aggregate
 - .1 Coarse aggregate shall consist of natural gravel, crushed stone or other approved materials of similar characteristics having clean, hard, strong, durable, uncoated particles free from injurious amounts of soft, friable, thin, elongated or laminated pieces, alkali, organic or other deleterious matter

- .2 Crushed stone shall consist of angular, cubical fragments of aggregate of uniform quality throughout. It shall be produced from rock formations or from boulders and stones and shall be from sources of approved nature and origin. Coarse aggregate will not be accepted from rock formations or from boulders and stones containing intrusions or stratifications of an undesirable nature or from source showing signs of disintegration from the elements or other causes.
- .3 Coarse aggregate shall conform to the following additional requirements:
 - .1 Soundness - Coarse aggregate when subjected to five cycles of the soundness test shall have a weighted loss of not more than twelve (12%) percent when sodium sulphate is used or not more than eighteen (18%) percent when magnesium sulphate is used, or have in the opinion of the Departmental Representative a satisfactory soundness record. The method of testing shall be in accordance with ASTM Standard C88, Test for Soundness of Aggregates by Use of Sodium Sulphate or Magnesium Sulphate
 - .2 Abrasion - Coarse aggregate when subjected to the abrasion test shall have a loss of not more than thirty-five (35%) percent by weight, of any hand picked portion of a sample containing a minimum of one and a half (1.5%) percent by weight of the original sample. The method of testing shall be in accordance with ASTM Standard C131, Test for Resistance to Abrasion of Small Size Coarse Aggregate by Use of the Los Angeles Machine.
 - .3 Crushed Aggregate - Aggregate retained on a No. 5 000 sieve shall contain not less than the percent of crushed aggregate as determined by actual particle count and as shown in the Table 1.
- .2 Asphalt Cement
 - .1 The asphalt cement shall be prepared by the refining of petroleum, it shall be uniform in character and shall not foam when heated to 175°C.
 - .2 150 - 200(A) Grade asphalt cement shall conform to the requirements specified the following table:

Test Characteristics	ASTM Test	150-200 (A)		
Kinematic Viscosity (135°C, mm ² /s)	D2171	The viscosity and penetration values must fall within the area bounded by A to B to C to D to A, plotted as straight lines on a full logarithmic plot (log-log) as shown on Figure 1, with the co-ordinates of the points as follows:		
Penetration (25°C, 100 g, 5 s in dmm)	D5	Point	Abs. Visc	Pen.
		A	360	150
		B	255	150
		C	205	200
		D	285	200
Flash Point, Cleveland Open Cup (minimum °C)	D92	205		
Solubility in Trichloroethylene (minimum %)	D2042	99.5		
Tests on Residue from Thin-Film Oven Test: Ratio of Absolute Viscosity of Residue from Thin-Film Oven Test to Original Absolute Viscosity (max)	D1754	4.0		
Ductility, 25°C, 5 cm/min., min., cm	D2171	100		
15.56°C, 5 cm/min., min., cm	D113	--		

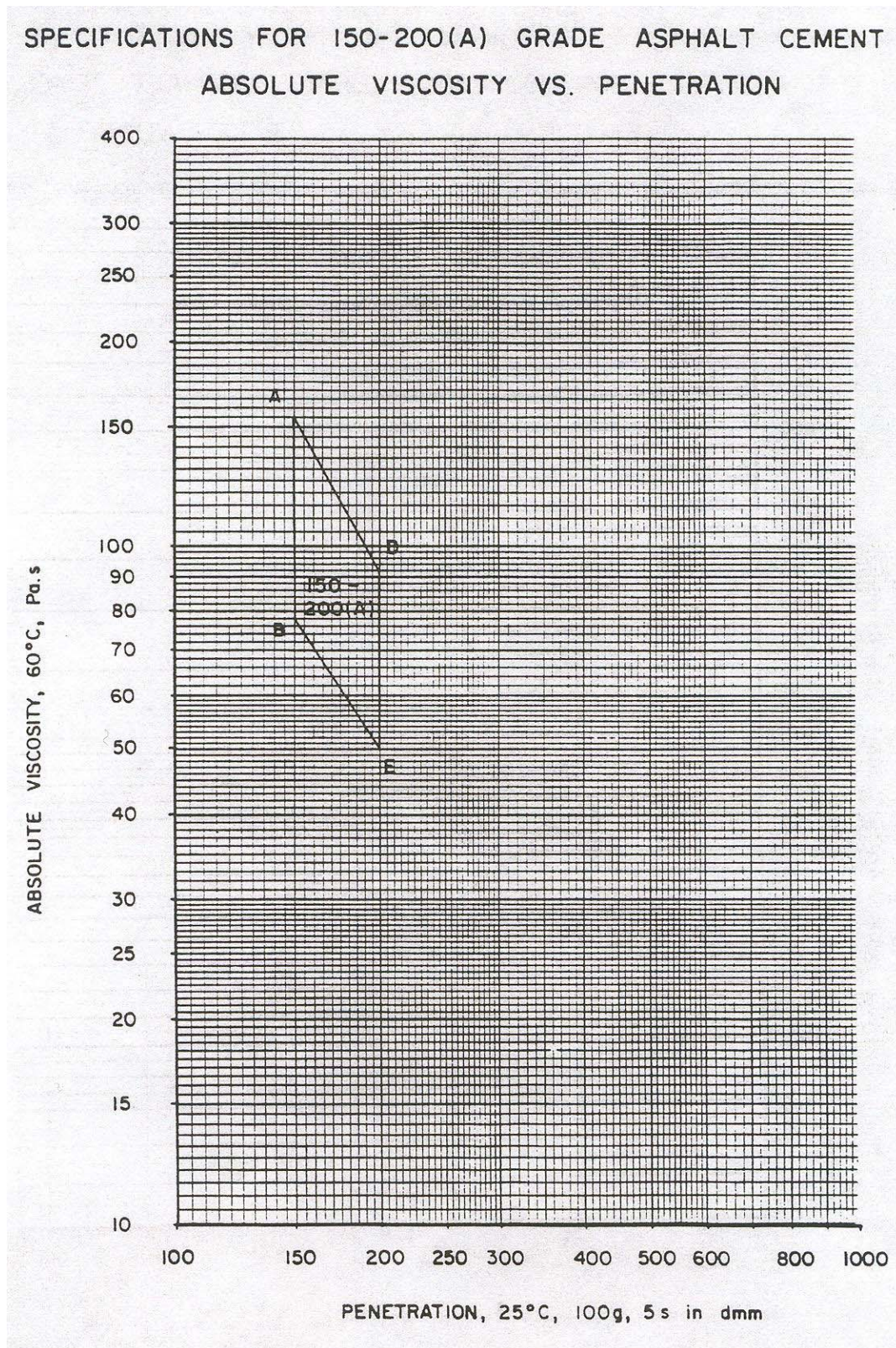


FIGURE 1

SPECIFICATIONS FOR 150-200(A) GRADE ASPHALT CEMENT
KINEMATIC VISCOSITY VS. PENETRATION

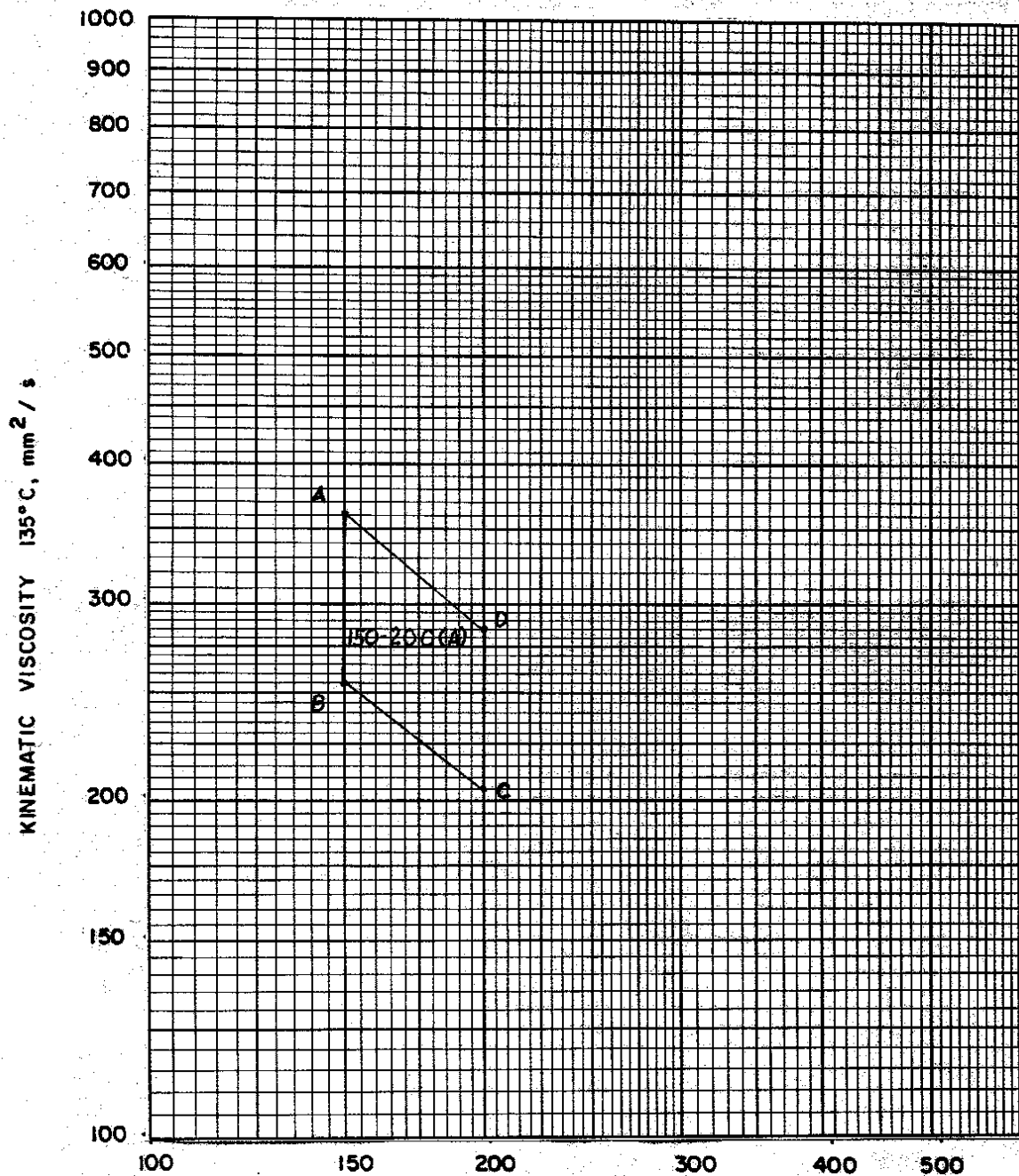


FIGURE 2

.3 Mineral Filler

- .1 Mineral filler, when required, shall consist of finely divided mineral matter such as rock dust, slag dust, hydrated lime, hydraulic cement, fly ash, loess or other suitable mineral matter, and shall conform to the requirements of ASTM Standard D242, Standard Specification for Mineral Filler for Bituminous Paving Mixtures.

2.2 EQUIPMENT

.1 Inspection of Plant and Equipment

- .1 Equipment required for this work shall be in satisfactory working condition and so maintained for the duration of the work.
- .2 Equipment shall be on the site and available for inspection, testing and approval before paving operations commence.
- .3 The Departmental Representative shall have access to all parts of the plant and equipment for purposes pertaining to the work.

.2 Mixing Plants

- .1 The plant shall be one of the following types: Drum Mix Plant, Continuous Mix Plant or Batch Mix Plant.
- .2 The output of the plant shall be as approved by the Departmental Representative, and within the manufacturer's specifications, with regard to plant size, discharge, temperature and the amount of moisture that must be removed from the aggregate.
- .3 Drum Mix Plants to ASTM 995
- .1 Cold Aggregate Feed
- .1 The cold aggregate feed unit shall contain separate bins for each aggregate, supplementary material and V.M.A. additive. Combining of these materials to meet the mix design shall be accomplished by means of adjustable gates and variable speed feed belts on each bin. The Contractor shall provide vibrators or other devices as may be required to ensure a uniform flow of material from each bin.
- .2 The Contractor shall provide a vibrating screener on the main feed belt. The maximum size of the screen opening shall be: Virgin mixes 37.5mm. Field conditions may necessitate a smaller screen.
- .3 The total flow of aggregate shall be metered by an electronic weigh belt system which has an indicator that can be monitored by the plant operator, and which is interlocked with a variable speed asphalt cement pump so that the proportions of aggregate and asphalt cement entering the drier-mixer remain constant.
- .2 Plant Operation and Controls

- .1 The weighing systems for aggregates and asphalt cement shall have provision to enable convenient calibration without having the material enter the drier-mixer.
- .2 The heating, coating and mixing of the bituminous material shall be accomplished in a parallel flow drier-mixer. Heating shall be controlled to prevent fracture of the aggregate or excessive oxydization of the asphalt cement. The system shall be equipped with automatic burner controls and shall provide for continuous temperature sensing of the bituminous material at discharge, with a printing recorder that can be monitored by the plant operator. The printed record of mix temperatures shall, if requested, be delivered to the Departmental Representative at the end of each week.
- .3 The mixing period and temperature shall be such as to produce a uniform mixture in which all the particles are thoroughly coated with asphalt cement. The asphalt cement metering system shall be capable of controlling the asphalt cement content of the mix to within plus or minus 0.2%.
- .4 The control panel for a drum mix plant shall have the following indicators, recorders and controls:
 - .1 Individual variable quantity feed controls which govern the output from each feed bin and a master variable quantity feed control which governs the combined output from the bin feeders.
 - .2 A belt scale totalizer showing accumulated weight of aggregate delivered to the drier-mixer.
 - .3 Provision for compensating for the moisture content of the material in each or all of the feed bins.
 - .4 An indicator showing the computed total weight per hour of aggregate (corrected for moisture content) delivered to the drier-mixer.
 - .5 A control for setting the required percentage of asphalt cement based on the weight of dry aggregate and a control to allow for a change in the specific gravity of asphalt cement.
 - .6 A counter from which the accumulated volume of asphalt cement delivered to the drier-mixer can be determined, but excluding asphalt cement being circulated in the storage tanks.
 - .7 A continuously recording instrument to indicate mix temperature at discharge from the drier-mixer.
 - .8 A master switch to start the asphalt cement and aggregate feeds simultaneously and a master switch to stop the asphalt cement and aggregate feeds simultaneously.
- .3 Storage for Bituminous Material

- .1 A metal storage bin covered with either a metal top, insulated tarpulin or other approved covering which:
 - .1 has a capacity equal to at least 20% of the Manufacturer's maximum rated production per hour of the drier-mixer; and
 - .2 has material introduced to it through an automatically controlled batching device; and
 - .3 is equipped with strain gauges or high and low level lights; and
 - .4 is elevated and discharges bituminous material through the base of the silo directly into hauling vehicles.
- .4 Continuous Mix and Batch Mix Plant to ASTM 995
 - .1 Cold Aggregate Feed
 - .1 Separate aggregate feeds capable of delivering a uniform flow of material to the drier shall be provided for each separate stockpile of aggregate, supplementary material and V.M.A. additive being used to produce the final mix.
 - .2 Where blending of materials from one or more sources is required to meet the Specifications, materials shall be placed in separate stockpiles.
 - .2 Plant Operation and Controls
 - .1 The plant shall be equipped with interlocking automatic controls to ensure that;
 - .1 The operation of the plant is independent of any operator; and
 - .2 The correct proportioning of the aggregates and the asphalt cement is achieved.
 - .2 Continuous mix plants shall contain an asphalt cement metering system to accurately indicate the accumulated quantity of asphalt delivered to the pugmill and a pressure gauge located between the meter and the pugmill spray bar.
 - .3 Batch plants shall be equipped with a batch counter.
 - .4 The aggregate shall be fed through the drier where it shall be heated without burning. The plant shall provide for continuous temperature sensing of the dried aggregate at discharge.
 - .5 The drier shall be equipped with a dust collector arranged so that any part or all of the dust may be returned to the hot stone elevator.
 - .6 After drying, the aggregate shall be passed over vibrating screens to separate the aggregate by size into two or more hot bins. The screens shall be kept clean and in good repair at all times. The amount of undersize material in the coarse bin and the amount of oversize material in the fine bin shall remain reasonably constant and shall not be more than ten percent by weight of the total aggregate in any sample taken from any bin.

- .7 Aggregate shall be mixed dry in the pugmill for not less than 10 seconds. The asphalt cement shall then be added and mixing continued until all aggregate particles are uniformly coated and the asphalt cement is uniformly distributed throughout the mixed material. The wet mix time shall be not less than 30 seconds.
- .8 The temperatures of the asphalt cement and aggregate entering the pugmill at anytime shall not differ from each other by more than 15°C.
- .9 The automatic controls shall be such that the mixing operation is automatically shut down when;
 - .1 in the case of batch mix plants, there is insufficient material in any one hot bin to make up the batch.
 - .2 in the case of continuous mix plants, the level of the aggregate in any one hot bin drops below one-third full.

2.3 DESIGN REQUIREMENTS

- .1 Mix Design Statement
 - .1 For each type of asphaltic paving mix to be used, the Contractor shall provide the Departmental Representative with a Mix Design Statement certifying the constituent materials and mix proportions that will be used in the asphaltic concrete paving mix. The Contractor shall also supply reasonable evidence to the Departmental Representative that the mix proportions selected will produce asphaltic concrete conforming to the requirements specified in Sections 2.3.2 and 2.3.3 of this Specification.
 - .2 One (1) week prior to the start of paving the Contractor shall provide the Departmental Representative with the results of one (1) Marshall Test to show that the requirements of the mix design statement have been met. Where a correction of the mix design statement is necessary to reflect actual production, the Contractor will submit to the Departmental Representative an additional one (1) Marshall test result for approval of the corrected mix design statement. This mix design statement, or revised mix design statement, as necessary, will be called the Job Mix Formula.
 - .3 Should a change occur in the Job Mix Formula during the course of the work, the Contractor shall re-submit to the Departmental Representative a minimum one (1) Marshall Test results to support approval of the revision.
 - .4 No changes in the Job Mix Formula will be permitted without following the above procedure.
- .2 Aggregate Gradation Requirements
 - .1 For each type of paving mixture, the mineral constituents shall be combined in such proportions so as to fall within the Gradation Limits shown in Table 1 - CW 3410-R5.1, unless the Contractor can conclusively show to the Departmental Representative that he can meet the physical requirements specified in Section 2.3.4 only by deviating from these gradation limits
- .3 Allowable Deviation from Job Mix Formula

.1 Aggregate Gradation

- .1 The aggregate gradation of the asphaltic concrete supplied by the Contractor shall not deviate from that of the Job Mix Formula by more than the Allowable Deviations shown hereafter and shall fall within the gradation limits shown:

Maximum Allowable Deviation from Job Mix Formula	
Canadian Metric Sieve Size	Percent of Total Dry Weight Passing Each Sieve
10 000	± 5%
5 000	± 5%
2 500	± 4%
1 250	± 4%
630	± 4%
315	± 4%
160	± 2%
80	± 2%

.2 Asphalt Cement Content

- .1 The asphalt cement content of the asphaltic concrete supplied by the Contractor shall not deviate from that of the Job Mix Formula by more than + 0.4%, provided that the asphalt cement content requirements are maintained in accordance with Table 2.

.4 Physical Requirements

- .1 For each type of paving mixture, the asphaltic concrete paving mix shall conform to the physical requirements shown in Table 2.

.5 Method of Testing

- .1 Quality control tests will be used to determine the acceptability of the asphaltic concrete paving mixture supplied by the Contractor.
- .2 The Departmental Representative shall obtain samples of asphaltic concrete paving mixture and of the constituent materials required for quality control tests.
- .3 An outline of some of the quality control tests that will be used to check the physical properties of the mixture, and to check the properties, gradations and proportions of the constituent materials is as follows:
- .4 Samples of mineral aggregates shall be taken in accordance with ASTM Standard D75, Standard Methods of Sampling Aggregates.
- .5 Samples of asphaltic concrete paving mixtures shall be taken in accordance with ASTM Standard D979, Standard Methods of Sampling Bituminous Paving Mixtures.
- .6 The determination of the particle size distribution of aggregates shall be made in accordance with ASTM Standard C136, Standard Method of Test for Sieve or Screen Analysis of Fine and Coarse Aggregates.

- .7 The specific gravity of aggregates shall be determined in accordance with ASTM Standard C127, Standard Method of Test for Specific Gravity and Absorption of Coarse Aggregate, and ASTM Standard C128, Standard Method of Test for Specific Gravity and Absorption of Fine Aggregate.
 - .8 The determination of the percent of asphalt cement in asphaltic concrete paving mixtures and pavement specimens shall be made in accordance with ASTM D2172, Standard Methods of Test of Quantitative Extraction of Bitumen from Bituminous Paving Mixtures.
 - .9 The percent air voids, the percent voids in the mineral aggregate, the Marshall density, Marshall stability and flow index shall be determined in accordance with the Standard Marshall Procedure (75 Blows) and in accordance with ASTM Standard D1559, Standard Method of Test for Resistance to Plastic Flow of Bituminous Mixtures using Marshall Apparatus.
- .6 Reclaimed Asphalt Pavement Content
- .1 Reclaimed asphalt pavement (RAP) material may be incorporated to a maximum of 10% by mass of total mix into the Class B mix design for asphalt pavements and overlays.
 - .2 Blending of the reclaimed asphalt pavement material shall be during production and the mix produced shall consist of a uniform blend of all materials.
 - .3 A mix design statement in accordance with Section 2.3.1 shall be submitted to the Departmental Representative for approval.
 - .4 All physical requirements and combined aggregate gradation limits shall met the requirements of Table 1 and Table 2.

Combined Aggregate Gradation Limits				
Percent of Total Dry Weight Passing Each Sieve				
Canadian Metric Sieve Size	Class IA (Surface Course) %	Type I (Surface Course) %	Type II (Surface Course) %	Type III (Base Course) %
40 000				100
25 000				90-100
16 000	99-100	100		60-90
12 500	--	--		26-80
10 000	70-88	70-85	100	--
5 000	55-70	45-70	90-95	29-59
2 500	40-60	25-55	74-80	20-50
1 250	25-50	20-40	55-64	--
630	15-40	15-30	35-46	15-30
315	5-28	5-20	22-30	5-17
160	4-11	11	--	11
80	3-7	3-6	8-11	1-7
Crush Count	60% min	50% min	--	60% min
	(2 fractured faces)	(1 fractured face)		(2 fractured faces)

TABLE 1

Physical Requirements				
	Class IA (Surface Course) %	Type I (Surface Course) %	Type II (Surface Course) %	Type III (Base Course) %
Asphalt Cement, % total sample weight	5-6	5-6	5-7	4-5.5
Voids in Mineral Aggregate, VMA	14 min	14.5 min	16.0 min	12.0 min
Air Voids	3-5	2.5-5.0	2.5-5.0	2.5-5.0
Marshall Stability, kN at 60C	7 min	5 min	4 min	5 min
Flow Index	6.0-16.0	6.0-16.0	6.0-16.0	6.0-16.0

TABLE 2

Part 3 Execution

3.1 PLACEMENT

- .1 The placing of the asphaltic concrete paving mixture shall not commence until the construction of the sub-grade, sub-base and base course has been completed .
- .2 The Departmental Representative shall approve the surface upon which new asphaltic concrete paving mix is to be placed before the paving operations for that course may begin.
- .3 The first course shall be laid upon a surface which is dry, clean and free from standing water, and only when weather conditions are suitable. The cleaning operation shall be done with a mechanical street sweeper.
- .4 In the case of placing new asphaltic concrete pavement, the base course shall have been previously prepared with one uniform application of Prime Coat prior to the delivery of the asphaltic concrete paving mixture.
- .5 In the case of asphaltic concrete overlay, the existing pavement surface shall have been previously prepared with one uniform application of Tack Coat prior to the delivery of the asphaltic concrete paving mixture. The Tack Coat shall be applied in small quantities only sufficient to wet the pavement surface on which the overlay is to be placed.
- .6 The type and amount of Prime Coat/Tack Coat applied, and the method of application, shall be as recommended by the manufacturer and shall be subject to the approval of the Departmental Representative.
- .7 No paving course shall be started until any frost or moisture from previous inclement weather has evaporated to leave a dry surface. The surface course shall be laid only under such conditions that the Departmental Representative determines to be conducive to obtaining the specified results.
- .8 The mixture shall be delivered to the job and placed at a temperature optimum for proper compaction, taking into consideration the weather conditions, the temperature of the surface on which the mixture is to be placed, and the thickness of the lift. In no case shall the mixture be placed at a temperature of less than 125°C nor greater than 155°C.

- .9 Unless otherwise permitted by the Departmental Representative, the mixture shall be spread by means of a mechanical self-powered paver capable of spreading the mixture true to the line, grade and crown required.
- .10 Pavers shall be equipped with hoppers and distributing screws of the reversing type to place the mixture evenly in front of adjustable screeds. The mixture shall be dumped in the centre of the hoppers and care exercised to avoid overloading and slopping over of the mixture upon the base. When laying the mixture, pavers shall operate so as to provide as continuous an operation as possible at a speed of between three metres and six metres per minute as may be decided by the Departmental Representative. They shall be equipped with a quick and efficient steering device and shall have forward and reverse travelling speeds of not less than 30 metres per minute.
- .11 Pavers shall be capable of spreading the mixture, without segregation, in thicknesses of not less than 25 mm and not more than 75 mm. Placement widths shall vary from a minimum of 1.5 metres to a maximum of 4.5 metres unless approved by the Departmental Representative. They shall be equipped with blending or joint leveling devices for smoothing and adjusting all longitudinal joints between strips or courses of the same thickness. Pavers shall be equipped with screeds.
- .12 The term screed includes any strike-off device operated by cutting, crowding or other practical action which is effective on the mixtures at workable temperature without tearing, shoving or gouging the finished surface.
- .13 Where the thickness of the mixture exceeds 75 mm, the mixture shall be placed in two layers. The leveling course, shall be placed such that the final layer or surface course is of uniform thickness and of minimum thickness of 40 mm.

3.2 COMPACTING BITUMINOUS MATERIAL

- .1 The Contractor shall supply rollers in sufficient quantities, to produce a uniform, tight knit pavement surface having a minimum of 97% Marshall Density. The Contractor's compaction equipment shall include at least one self-propelled rubber tired roller, or a combination roller having a vibratory steel drum on one end and at least four pneumatic tires on the other end.

3.3 TESTING

- .1 The frequency of testing is according to the City of Winnipeg Testing Guidelines as follows:
Asphalt Content - one test (sample)
Gradation - one test (sample)
Compaction - one core sample for thickness and density.
- .2 All testing required meeting specifications to be conducted by a certified material and testing agencies to be engaged and paid by the Contractor.

Departmental Representative may engage an independent testing laboratory to conduct random Quality assurance testing and will pay for that.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES

- .1 City of Winnipeg
 - .1 City of Winnipeg Standard Construction Specification CW 3170- Earthwork and Grading [December 2015] in Appendix B.
 - .2 For this specific project the word Contract Administrator in the City of Winnipeg Construction Specifications shall refer to Departmental Representative.

PART 2 PRODUCTS

2.1 TOPSOIL

- .1 All topsoil required shall consist of a screened clay-textured or loam-textured dark topsoil, a fertile, friable material neither of heavy clay nor of very light sandy nature containing by volume, a minimum of four (4%) percent for clay loams and two (2%) percent for sandy loams to a maximum twenty-five (25%) percent organic matter (peat, rotted manure or composted material) and capable of sustaining vigorous plant growth. Topsoil shall be free of subsoil contamination, roots, stones over 25mm in diameter, baler twine or subsoil clay lumps over 25mm in diameter and other extraneous matter. Topsoil shall not contain quack grass rhizomes, Canada thistle roots or other noxious weeds. Upon delivery or thirty (30) days following delivery, salinity rating shall be less than 4.0mm hos/cm on a saturated paste basis. The pH range shall be between 6.0 - 8.0.
- .2 Topsoil may be either on-site topsoil or imported topsoil.
- .3 On-site topsoil which has been stockpiled, can be reused providing that it is shredded or screened prior to being re-spread and that it meets the requirements specified above for topsoil.
- .4 Topsoil shall not be blow-in dirt taken from wind erosion sites and topsoil shall not be taken from fields abandoned to corn production where such soil may contain soil incorporated herbicides, such as eradican and atrazine with lasting residual effects.

2.2 SOIL AMENDMENTS

- .1 Fertilizer:
 - .1 Chemical fertilizer with an N-P-K analysis of 1-2-1 ratio at a rate to provide 48 kg actual Nitrogen, 96 kg actual Phosphate and 48 kg actual Potassium per hectare.
 - .2 Fertilizer shall be standard commercial brands meeting the requirements of the Canada Fertilizer Act and the Canadian Fertilizer Quality Assurance Program.
 - .3 All fertilizers shall be granular, pelletized or pill form, and shall be dry and free flowing.

2.3 SOURCE QUALITY CONTROL

- .1 Advise Departmental Representative of sources of topsoil to be utilized with sufficient lead time for testing.
- .2 Contractor is responsible for amendments to supply topsoil as specified.
- .3 Soil testing by recognized testing facility for PH, P and K, and organic matter.
- .4 Testing of topsoil will be carried out by testing laboratory designated by Departmental Representative.
 - .1 Soil sampling, testing and analysis to be in accordance with Provincial standards.

PART 3 EXECUTION

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 PREPARATION OF EXISTING GRADE

- .1 Subsoil shall be graded in accordance with Section 31 22 13 - Rough Grading to eliminate uneven areas and low spots, ensuring positive drainage. Any soil contaminated by toxic materials shall be removed and disposed off site.
- .2 All surface debris, roots, vegetation, branches and stones in excess of 25mm shall be removed.

- .3 Grades on the area to receive topsoil that have been previously established in conformance with the Construction Drawings and/or other applicable specifications shall be maintained in a true and even grade.

3.3 PLACING AND SPREADING OF TOPSOIL/PLANTING SOIL

- .1 Place topsoil after Departmental Representative has accepted subgrade.
- .2 The Contractor shall provide the Contract Administrator with a minimum of two working days notice for inspection of required grading.
- .3 The topsoil mix shall be applied to a minimum of 75 mm compacted depth for areas requiring sod and a 100 mm compacted depth for seeding areas. All areas shall be rolled with a mechanical roller of a minimum weight of 220kg and minimum width of 760mm.
- .4 For sodded areas keep topsoil 15mm below finished grade.
- .5 Manually spread topsoil/planting soil around trees, shrubs and obstacles.
- .6 The Contractor shall ensure that topsoil does not come in contact with new asphaltic concrete pavement that is less than 2 weeks old.

3.4 SOIL AMENDMENTS

- .1 The Contractor shall provide the Departmental Representative with a report for each work site indicating the fertilizer formulation used, the rate of application and the date of application.
- .2 Fertilizer shall be spread uniformly over the entire area of topsoil at a rate to provide 48 kg actual Nitrogen, 96 kg actual Phosphate and 48 kg actual Potassium per hectare.

3.5 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 Topsoil shall be rolled with a mechanical roller of a minimum weight of 220kg, minimum width of 760mm roller, to consolidate it in areas to be seeded or sodded, leaving the surface smooth, uniform, firm against deep foot printing and to the satisfaction of the Departmental Representative.

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 REFERENCES

- .1 City of Winnipeg
 - .1 City of Winnipeg Standard Construction Specification CW 3170- Earthwork and Grading [December 2015] in Appendix B.
 - .2 For this specific project the word Contract Administrator in the City of Winnipeg Construction Specifications shall refer to Departmental Representative.

1.2 DELIVERY, STORAGE AND HANDLING

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

1.3 WARRANTY

- .1 For seeding, 12 months warranty period is extended to 1 full growing season.
- .2 Contractor hereby warrants that seeding will remain free of defects in accordance with General Conditions CCDC GC 12.3, but for 1 full growing season.
- .3 End-of-warranty inspection will be conducted by Departmental Representative.

PART 2 PRODUCTS

2.1 GRASS SEED

- .1 All seed supplied by the Contractor shall be Canada Certified No. 1 or Canada Certified No. 2 and come complete with a Certificate of Analysis verifying that quality standards for Canada Certified No. 1 or Canada Certified No. 2 seed are met. The Contractor shall submit the Certificates of Analysis to the Contract Administrator.
- .2 The seed supplied shall be free of disease and mixed by percentage (%) of weight to meet the following blends or mixtures:

Sixty (60%) percent Kentucky Bluegrass (100% Class 1 or Class 2 cultivars, 3 cultivars in equal proportion), thirty (30%) percent Creeping Red Fescue and ten percent (10%) Perennial Ryegrass.

Refer to clauses 5.3.3 and 5.3.4 of CW 3520 for more details specifying Kentucky Bluegrass and Perennial Ryegrass.

- .3 Any variations to the above referenced seed blends or mixtures shall be approved by the Contract Administrator prior to sowing.

2.2 HERBICIDES

- .1 Herbicides shall be standard commercial products registered for sale and use in Canada under the Pest Control Products Act.

2.3 INSECTICIDES

- .1 Insecticides shall be standard commercial products registered for sale and use in Canada under the Pest Control Products Act.

PART 3 EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrate previously installed under other Sections or Contracts are acceptable for mechanical seeding installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 SEED BED PREPARATION

- .1 Do not perform work under adverse field conditions as determined by Departmental Representative.
- .2 Remove and dispose of weeds; debris; stones 50 mm in diameter and larger; soil contaminated by oil, gasoline and other deleterious materials; off site in location as in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .3 Verify that grades are correct. If discrepancies occur, notify Departmental Representative and commence work when instructed by Departmental Representative.
- .4 Fine grade surface free of humps and hollows to smooth, even grade to tolerance of plus or minus 15 mm, surface draining naturally.
- .5 Cultivate fine graded surface approved by Departmental Representative to 25 mm depth immediately prior to seeding.

3.3 SEED PLACEMENT

- .1 Ensure seed is placed under supervision of certified Landscape Planting Supervisor.
- .2 For mechanical seeding:

- .1 Mechanical landscape drill seeder ("Brillion" type or equivalent) 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 manually operated drop seeder ("Cyclone" type or equivalent).
 - .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 1.0 kg / 100 m²
- .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 All seeded areas shall be rolled with a mechanical roller of a minimum weight of 220kg and minimum width of 760mm to form a uniform even surface, level with adjoining curbs, sidewalks or sod.
- .9 Water shall be applied in sufficient quantities and frequencies to obtain seed germination and growth. Watering shall be controlled to prevent seed washout. All costs to provide water for seeded areas shall be borne by the Contractor.
- .10 Seeding operations shall be completed within two working days after the commencement of sowing operation. This shall include the application of seed, rolling and watering.
- .11 No seeding shall be done on frozen soil, or when any other conditions unfavourable to successful seed germination exist.

3.4 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 reuse/ 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.
 - .2 Divert unused fertilizer from landfill to official hazardous material collections site approved by Departmental Representative.

3.5 PROTECTION

- .1 Erect plastic snow fence around newly seeded areas sufficient to protect against deterioration due to pedestrian or other traffic.

3.6 MAINTENANCE DURING ESTABLISHMENT PERIOD

- .1 Ensure maintenance is carried out under supervision of certified Landscape Maintenance Supervisor.
- .2 Perform following operations from time of seed application until acceptance by Departmental Representative:
 - .1 Water seeded area to maintain optimum soil moisture level for germination and continued growth of grass. Control watering to prevent washouts.
 - .2 Repair and reseed dead or bare spots to allow establishment of seed prior to acceptance.
 - .3 Cut grass to 50 mm whenever it reaches height of 70 mm. Remove clippings which will smother.
 - .4 Fertilize seeded areas after first cutting 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 Control weeds by mechanical or chemical means utilizing acceptable integrated pest management practices.
 - .6 Adjust protection barrier as necessary to protect against deterioration due to pedestrian or other traffic as needed.

3.7 FINAL ACCEPTANCE

- .1 Seeded areas will be accepted by Departmental Representative provided that:
 - .1 Areas are uniformly established free of rutted, eroded, bare or dead spots and extent of weeds apparent in grass is acceptable.
 - .2 Areas have been cut at least twice.
 - .3 Areas have been fertilized.
 - .4 The seeded area is free of any visual obstructions such as leaves.
 - .5 The seeded area has been rolled and has a firm, uniform even surface.
 - .6 The seeded area has established into a healthy, vigorously growing condition.
 - .7 The seeded area is free of bare and dead spots and without more than ten (10) broadleaf weeds per fifty (50) square metres.
 - .8 The seeded area has sufficient shoot growth density that no surface soil is visible when the grass has been cut to a height of 50 - 60 mm.
 - .9 Seeded area is cut to a height of 50 - 60 mm within one working day before the final inspection.
 - .10 Edges of established seeded areas adjacent to shrub and flower beds are well defined.
 - .11 Seeded area is free of any turf damaging insects.
- .2 Areas seeded in fall will be accepted in following spring, one month after start of growing season provided acceptance conditions are fulfilled.

END OF SECTION