

PART 1 - GENERAL

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| <u>1.1 DESCRIPTION</u> | .1 | This section covers the full depth pavement removal of existing asphalt within the project limits. |
| <u>1.2 Related Sections</u> | .1 | Hot Mix Asphalt Concrete - Section 32 12 16 |

PART 2 - PRODUCTS

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| <u>2.1 Not Applicable</u> | .1 | Not Applicable |
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PART 3 - EXECUTION

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|------------------------|----|---|
| <u>3.1 PREPARATION</u> | .1 | Prior to commencing removal operation, inspect and verify with Department Representative areas, depths and lines of asphalt concrete pavement to be removed. |
| <u>3.2 EQUIPMENT</u> | .1 | Use milling equipment and other equipment capable of removing all of asphalt concrete pavement surface to depths or grades indicated. |
| <u>3.3 REMOVAL</u> | .1 | Remove the full width of existing asphalt by milling full depth. |
| | .2 | In areas with an amended granular base, a maximum of 60 mm of the milled material is to be mixed/blended thoroughly with 90 mm of virgin Class A gravel to form a gravel/milled asphalt mixture (40% millings and 60% Class A). |
| | .3 | The new blended material is to be spread to a uniform thickness of 150 mm over the required width. |
| | .4 | Additional Class A may be required to make up a shortfall in existing millings. |
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3.3 REMOVAL
(Cont'd)

- .5 Dispose of surplus millings off site.
- .6 Use equipment and methods of removal and hauling which do not tear, gouge, break or otherwise damage or disturb underlying pavement.
- .7 Prevent contamination of removed asphalt concrete pavement by topsoil, underlying gravel or other materials.
- .8 Provide for suppression of dust generated by removal process.
- .9 Compact underlying material.
- .10 In areas where localized pavement removal is carried out within the traffic lane ensure traffic is restricted from area until the surface is restored.

3.4 TOLERANCE

- .1 Compacted surface shall be within plus or minus 5 mm of elevations established by the Departmental Representative, but not uniformly high or uniformly low.

3.5 TRAFFIC CONTROL

- .1 Maintain one lane of traffic at times.

PART 1 - GENERAL

1.1 RELATED WORK .1 Rough Grading - Section 31 23 13

- 1.2 REFERENCES .1 ASTM C117-13, Test Method for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.
- .2 ASTM C131-14, Test Method for Resistance to Degradation of Small Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
- .3 ASTM C136-14, Method for Sieve Analysis of Fine and Coarse Aggregates.
- .4 ASTM D698-12e1, Test Methods for Moisture Density Relations of Soils and Soil Aggregate Mixtures Using 2.49 kg Rammer and 304.8 mm Drop.
- .5 ASTM D4318-10e1, Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
- .6 CAN/CGSB-8.2-M88 (R10/3), Sieves Testing, Woven Wire, Metric.
- .7 ASTM D1557-12, Test Methods for Moisture Density Relations of Soils and Soil Aggregate Mixtures Using 4.54 kg Rammer and 457 mm Drop.
- .8 ASTM D1883-14, Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
- .9 ASTM D2922-05, Standard Test Method for Density of Soil and Soil Aggregate in Place by Nuclear Methods.
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PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Gravel: to meet PEI DOTIE Class A and Class B and the following requirements:

Sieve Size	Granular Class A	Granular Class B
50.0mm	-	-
45.0mm	-	-
38.0mm	-	-
31.5mm	100	100
25.0mm	95-100	95-100
19.0mm	-	-
12.5mm	50-83	50-83
9.5mm	-	-
4.75mm	30-60	30-60
1.18mm	15-40	15-43
600µm	10-32	10-35
300µm	5-22	5-26
75µm	3-9	3-7

- .2 Granular Base: Class A material.
- .3 Shoulder Material: Class B material.
- .4 Amended Base: Homogenous blend of asphalt millings (maximum 40% of thickness) and 60% Class A gravel. Maximum particle size in milled asphalt to be 38 mm.

PART 3 - EXECUTION

3.1 INSPECTION OF UNDERLYING SUB-BASE

- .1 Place granular base after surface is inspected and approved by Department Representative.
- .2 Underlying material to be compacted to 100% of Standard Proctor Density to ASTM D698

3.2 PLACING

- .1 Class B gravel will be used in shouldering as directed by Departmental Representative.
- .2 In areas using an amended granular base, overtop 60 mm asphalt millings with of Class A gravel. Blend in place to achieve a homogenously blended material. If there is a shortfall of

3.2 PLACING
(Cont'd)

- .2 (Cont'd)
existing millings, additional Class A material
to blend to achieve 150 mm compacted thickness.
- .3 In areas using virgin granular base, place
granular material to compact thickness as
indicated.
- .4 Ensure no frozen material is used in placing.
- .5 Place material only on clean unfrozen surface,
properly shaped and compacted and free from snow
and ice.
- .6 Shape each layer to smooth contour and compact
to specified density before succeeding layer is
placed.
- .7 Remove and replace that portion of layer in
which material becomes segregated during
spreading.
- .8 Place and compact shouldering to specified
cross slope in reconstruction areas. In overlay
sections, feather new shoulder material from top
of new asphalt to existing hinge point of
shoulder slope.
- .9 Compacted shouldering to be flushed with
asphalt concrete surface.
- .10 Hand work will be required to form base for
asphalt concrete gutters/offtakes.
- .11 Place, hand rake and compact new shoulder
material under and behind guiderail.

3.3 COMPACTION
EQUIPMENT

- .1 Vibratory compaction equipment must be used and
capable of obtaining required densities on
aggregates on project.

3.4 COMPACTING

- .1 Compact granular base and amended granular base
to density not less than 100% corrected maximum
dry density.
- .2 Shape and roll alternately to obtain smooth,
even and uniformly compacted base.
- .3 Apply water as necessary during compacting to
obtain specified density. If aggregate is

3.4 COMPACTING
(Cont'd)

- .3 (Cont'd)
excessively moist, aerate by scarifying with
suitable equipment until moisture content is
corrected.
- .4 In areas not accessible to rolling equipment,
compact to specified density with vibratory
mechanical tampers approved by Department
Representative.
- .5 Density will be determined according to ASTM
D2922.

3.5 FINISH

- .1 Finished base surface to be within plus or
minus 10 mm of established grade and cross
section but not uniformly high or low.
- .2 Correct surface irregularities by loosening and
adding or removing material until surface is
within specified tolerance.
- .3 Shouldering cross slope shall be according to
drawings.

3.6 MAINTENANCE

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

PART 1 - GENERAL

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| <u>1.1 Description</u> | .1 | This section covers asphalt tack coat between layers/lifts of asphalt. (Include tack coat in tendered price. Offer credit if not used.) |
| <u>1.2 Related Sections</u> | .1 | Hot Mix Asphalt Concrete - Section 32 12 16 |
| <u>1.3 References</u> | .1 | CAN/CGSB-16.2-M89, Emulsified Asphalts, Anionic Type, for Road Purposes. |
| | .2 | ASTM D140-88, Practice for Sampling Bituminous Materials. |
| <u>1.4 Samples</u> | .1 | Submit samples in accordance with Section 01 33 00 - Submissions / Shop Drawings, Product Data, Samples and Mock-ups. |
| | .2 | Submit, in plastic containers to Department Representative, two - 4 L samples of asphalt tack coat material proposed for use at least 2 weeks prior to commencing work |
| | .3 | Provide access on tank truck for Department Representative to sample asphalt material to be incorporated into work, in accordance with ASTM D140. |
| <u>1.5 Asphalt Material Certification</u> | .1 | Upon request by Department Representative, submit manufacturer's test data and certification that asphalt tack coat material meets requirements of this section. |
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PART 2 - PRODUCTS

- 2.1 Materials .1 Anionic emulsified asphalt: to CAN/CGSB-16.2, grade SS-1.

PART 3 - EXECUTION

- 3.1 Equipment .1 Pressure distributor to be:
- .1 Designed, equipped, maintained and operated so that asphalt material:
 - .2 Is maintained at even temperature. May be applied uniformly on variable widths of surface up to 5 m.
 - .3 May be applied at readily determined and controlled rate of 0.14 L/m² with uniform pressure, and with an allowable variation from any specified rate not exceeding 0.04 L/m²
- .2 Capable of distributing asphalt material in uniform spray without atomization at temperature required.
- .3 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.
- .4 .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.
- .5 Equipped with an easily read, accurate and sensitive device which registers temperature of liquid in reservoir.
- .6 Equipped with accurate volume measuring device or calibrated tank.
- .7 Equipped with nozzles of same make and dimensions, adjustable for fan width and orientation.

3.2 Application

- .1 Apply tack coat only on clean and dry surface. Obtain Department Representative's approval of surface before applying asphalt tack coat.
- .2 Dilute asphalt emulsion with water at 1:1 ratio for application. Mix thoroughly by pumping or other method approved by Department Representative.
- .3 Apply tack coat evenly to pavement surface at rate as directed by Department Representative but do not exceed 0.7 L/m².
- .4 Paint contact surfaces of curbs, gutters, headers, manholes and like structures with thin, uniform coat of asphalt tack coat material.
- .5 Do not apply asphalt tack coat when air temperature is less than 5°C or when rain is forecast within 2 hours of application.
- .6 Apply tack coat only to base coarse surfaces that are expected to be overlaid on same day.
- .7 Evenly distribute localized excessive deposits of tack coat by brooming as directed by Department Representative.
- .8 Where traffic is to be maintained, treat no more than one half of width of surface in one application..
- .9 Keep traffic off tacked areas until tack coat has set as directed by Department Representative.
- .10 Re-tack contaminated or disturbed areas as directed by Department Representative.
- .11 Permit tack coat to set before placing asphalt paving.

PART 1 - GENERAL

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|-----------------------------|----|--|
| <u>1.1 Description</u> | .1 | This section covers asphalt concrete on reconstructed roads and parking lots. |
| <u>1.2 Related Sections</u> | .1 | Removal of Existing Asphalt - Section 32 01 16 |
| | .2 | Asphalt Tack Coat - Section 32 12 15 |
| <u>1.3 References</u> | .1 | <p>In accordance with the following standards or most recent revisions:</p> <p>.1 ASTM C88-90, Test Method for Soundness of Aggregates by Use of Sodium Sulphate or Magnesium Sulphate.</p> <p>.2 ASTM C117-90, Test Method for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.</p> <p>.3 ASTM C123-92, Test Method for Lightweight Pieces in Aggregate.</p> <p>.4 ASTM C127-88, Test Method for Specific Gravity and Absorption of Coarse Aggregate.</p> <p>.5 ASTM C128-15, Test Method for Specific Gravity and Absorption of Fine Aggregate.</p> <p>.6 ASTM C131-14, Test Method for Resistance to Degradation of Small Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.</p> <p>.7 ASTM C136-14, Method for Sieve Analysis of Fine and Coarse Aggregates.</p> <p>.8 ASTM D995-88, Specification for Requirements for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.</p> <p>.9 ASTM D1559-89, Test Method for Resistance to Plastic flow of Bituminous Mixtures Using Marshall Apparatus.</p> <p>.10 ASTM D2419-14, Test Method for Sand Equivalent Value of Soils and Fine Aggregate.</p> <p>.11 ASTM D2041-11, Standard Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures</p> <p>.12 ASTM D2950-14, Standard Test Method for Density of Bituminous Concrete in Place by Nuclear Methods.</p> <p>.13 ASTM D3203-11, Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures.</p> <p>.14 ASTM D3515-89, Standard Specifications for Hot Mixed, Hot Laid Bituminous Paving Mixtures.</p> |

<u>1.3 References</u> (Cont'd)	.1	(Cont'd) .15 ASTM D4460-97(2015), Standard Method for Calculating Percent Asphalt Absorption by the Aggregate in an Asphalt Pavement Mixture. .16 CAN/CGSB-8.2-M88 (R10/3 Series), Sieves Testing, Woven Wire, Metric. .17 CAN/CGSB-16.3-M90, Asphalt Cements for Road Purposes. .18 AASHTO T-283 with Lottman Conditioning. .19 Current PEI DOTIE Standard Specifications, Division 600.
<u>1.4 Samples</u>	.1	Submit samples in accordance with Section 01 33 00 - Submissions/Shop Drawings.
	.2	At least 4 weeks prior to commencing work submit samples of following materials proposed for use: .1 One 4 L container of asphalt cement.
<u>1.5 Material Certification</u>	.1	At least 4 weeks prior to commencing work submit viscosity-temperature chart for asphalt cement to be supplied showing kinematic viscosity in mm ² /s versus temperature range from 105° to 175°.
	.2	At least 4 weeks before commencing work, submit refinery's test data and certification that asphalt cement meets requirements of this section which also includes the specific gravity of the asphalt cement.
<u>1.6 Submission of Mix Design</u>	.1	Samples of aggregate for mix design shall be derived from stockpiles not less than 1000 tonnes of each of fine and course aggregate.
	.2	The Contractor will submit, in writing, asphalt concrete mix design and trial mix test results to Department Representative for review at least 4 weeks prior to commencing work. The mix design shall contain the job mix formula which shall include the following: " asphalt cement content " specific gravity and absorption of each aggregate " Percentage of each aggregate " Gradation of Job Mix Formula " Marshall Stability and flow, kN " Bulk Specific Gravity, kg/m ³

1.6 Submission of .2 (Cont'd)
Mix Design
(Cont'd)

- “ Maximum theoretical density, kg/m3
- “ percentage voids in mineral aggregate
- “ percentage air voids
- “ percentage voids filled
- “ percentage of absorbed asphalt cement
- “ long term TSR (AASHTO T283)

1.7 Delivery .1 In accordance with PEI DOTIE Standard
and Storage Specifications Division 600.

1.8 Measurement .1 See Section 01 29 00 Project Particulars and
for Payment Measurement.

PART 2 - PRODUCTS

- 2.1 Materials .1 Asphalt cement: to AASHTO M320 Table 1.
- .2 Aggregates:
- .1 Coarse aggregate to be supplied for the manufacture of asphaltic concrete shall consist of crushed stone, composed of clean, sound, hard and durable particles free from a coating of silt, and/or clay and shall not contain other deleterious materials. Coarse aggregate shall conform to the physical requirements for coarse aggregate shown in Table 2.1-1 and 2.1-2.
- .2 Irrespective of compliance with the physical requirements of Table 2.1-1 and 2.1-2, a coarse aggregate may be rejected on the basis of past field performance.
- .3 Fine aggregate to be supplied for the manufacture of asphaltic concrete shall consist of manufactured material processed by crushing quarried rock or natural sand and gravel, the particles of which shall be clean, hard, durable and free from coatings of silt, clay or other deleterious material. Fine aggregate shall conform to the physical and gradation requirements shown in Table 2.1-3 and the fraction between any two of the following consecutive sieves (4.75 mm, 2.36 mm, 1.18 mm, 600 µm, 150 µm) shall be a minimum of 7%. A minimum of 25% fine aggregate, processed by

2.1 Materials
(Cont'd)

- .2 Aggregates:(Cont'd)
 - .3 (Cont'd)
crushing quarried rock, shall be incorporated into all asphaltic mixes.
- .3 Blending Sand:
 - .1 Blending sand supplied for the manufacture of asphaltic concrete shall consist of clean, tough, durable particles, free from silt clay and other deleterious material.
 - .2 The gradation of the blending sand shall be such that when incorporated into the asphaltic concrete mix, the resultant mix shall meet the requirements of Tables 2.2-4, 2.2-5 and 2.2-6.
 - .3 The blending sand shall have 100% passing the 9.5 Sieve and a maximum of 50% passing the 300 µm Sieve.
 - .4 The physical requirements of the blending sand shall be as specified in Table 2.1-3 with the exception of the limitation on the maximum percent passing the 75 µm Sieve.
 - .5 The maximum mass of blending sand to be used in the total mix shall not exceed 12%. f

2.2 Mix Design and
Job Mix Formula

- .1 Contractor Mix Design: The contractor shall use professional engineering services and a qualified testing laboratory to assess the performance grade asphalt cement and aggregate materials proposed for use and to carry out the design of the asphalt mix.
- .2 Requirement for Asphalt Mix Design: the asphalt mix design shall follow the Marshall method of mix design based on 75 blows and be in accordance with the latest edition of the Asphalt Institute Publication, Mix Design Methods for Asphalt Concrete manual Series No. 2(MS-2).
 - .1 The asphalt cement grades shall be PG 58-28, unless otherwise specified. The optimum percent of asphalt cement shall be that percent which yields design air voids of 4% +/- ½%.
 - .2 The approved asphalt mix design specifying the aggregate blend proportions and the design asphalt cement content shall be considered as the job mix formula.
 - .3 Contracts with SADT (Summer Average Daily Traffic) less than 10,000 shall have a job mix formula asphalt content yielding air voids of 3.5% +/- ½%.

2.2 Mix Design and .2
Job Mix Formula
(Cont'd)

Requirement for Asphalt Mix Design:(Cont'd)

.4 The percent passing the 4.75 mm Sieve size +/- 2% for the blended aggregate gradations for given mix types shall be as follows:

<u>Mix Type</u>	<u>% Passing 4.75 mm Sieve Size</u>
A	50%
B	67%

.5 The asphalt mix design data and the proposed job mix formula is to be submitted by the Contractor for review and shall include for each blend the following:

.1 The name of the testing firm responsible for the mix design.

.2 The specific location(s) of the source(s) of mineral aggregate.

.3 The source and type of mineral admixture and the percentage to be used.

.4 The percentage of aggregate passing each of the specified sieves for each aggregate to be incorporated into the mixture.

.5 The proportion of each material (in percent of aggregate), including hydrated lime, if required, as an anti-stripping agent.

.6 The composite gradation based on (4) and (5) above.

.7 The composite gradation plotted on a 0.45 power graph paper.

.8 The results of all aggregate testing, determinations, etc., as defined in Tables 2.1-1, 2.1-2 and 2.1-3, including bulk specific gravity and apparent specific gravity. In addition, aggregates shall be tested to determine if they are prone to stripping (tensile strength ratio <0.8) as well as no visual evidence of stripping. If an anti-stripping additive is required, hydrated lime or an effective liquid anti-stripping agent shall be used.

.9 The mix design with a minimum of four (4) different asphalt contents (minimum 0.5 % between each point) with at least one point above and one point below the optimum asphalt percentage that reports the following:

.1 The percentage (in units of one tenth of 1%) of asphalt cement to beaded, based on the total weight of the mixture.

2.2 Mix Design and .2
Job Mix Formula .5
(Cont'd)

Requirement for Asphalt Mix Design:(Cont'd)
.5 (Cont'd)

.9 (Cont'd)

- .2 The Marshall test results for the individual and average bulk specific gravity, stability and flow of at least three specimens at each asphalt content.
- .3 The maximum theoretical specific gravity at each asphalt content.
- .4 The percent of air voids in the mixture for each asphalt content.
- .5 The percent voids in mineral aggregate (VMA) at each asphalt content.
- .6 The percent voids filled with asphalt (VFA) at each asphalt content.
- .7 The design asphalt content as a percent of total mix.
- .10 All Marshal mix design characteristics, including graphs used in arriving at the final mix design, the bulk relative density of the combined aggregates and the asphalt absorption of the combined aggregates. The Contractor shall submit the following with the asphalt mix design for verification purposes:
 - .1 One - 20 kg sample of each representative virgin aggregate.
 - .2 Thirty-two 1.2 kg samples of representative virgin aggregate blended to the design mix gradation of the asphalt mix aggregate.
 - .3 Four Litres of the type of performance grade asphalt cement to be used.

2.2 Mix Design and	.2	Requirement for Asphalt Mix Design:(Cont'd)
Job Mix Formula	.5	(Cont'd)
(Cont'd)	.10	(Cont'd)

Table 2.2-4 Blended Aggregate Gradation and Asphalt Content for Asphaltic Concrete Mixes

Passing %		
Sieve Size	A Base	B Seal
25.0 mm	100	-
19.0 mm	90-100	-
12.5 mm	71-86	100
9.5 mm	60-78	90-100
4.75 mm	39-61	55-75
2.36 mm	23-49	32-60
1.18 mm	16-34	19-45
600 µm	11-24	13-35
300 µm	7-16	8-22
150 µm	5-10	5-12
75 µm	3.3-6	4.5-6.5
Asphalt Cement % by Mass of Total Mixture	4.7-6.0	5.5-7.0

Table 2.2.5 Physical Requirements for Dense Graded Asphaltic Concrete

D Sand Test	A Base	B Seal
Stability at 60°C(N)	5800	5800
Flow (0.25 mm)	8-16	8-16
Air Voids (%)	2.5-4.5	2.5-4.5
Minimum VMA (%)	13	15.5
VFA (%)	68-78	70-80

2.2 Mix Design and Job Mix Formula (Cont'd)	.2 Requirement for Asphalt Mix Design:(Cont'd) .5 (Cont'd) .10 (Cont'd)
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Table 2.2-6 Mix Control Tolerance from Job Mix Formula

Sieve Size	Allowable Variation of % Passing (\pm)
25.0 mm	5
19.0 mm	5
16.0 mm	5
12.5 mm	5
9.5 mm	5
4.75 mm	5
2.36 mm	4
1.18 mm	4
600 μ m	3
300 μ m	3
150 μ m	2
75 μ m	1
Asphalt Cement	0.3

- .3 Physical Requirements of the Mixture:
- .1 The mixture shall be uniform and shall consist of a mixture of coarse and/or fine aggregate together with any required blend sand, mineral filler or lime, and mixed with asphalt cement.
- .2 The mineral constituents shall be combined in such proportions as to produce a mixture conforming to the gradation requirements of Table 2.2-4. The grading shall not show marked fluctuations from opposite extremes of the limiting sizes.
- .3 Mixtures shall meet the physical requirements of the properties specified in Table 2.2-5. Current Department test procedures will be used to determine these properties.
- .4 Mix Control Tolerances:
- .1 Once the job mix formula has been designated by the Department Representative, the Contractor shall be required to produce an asphaltic concrete mixture conforming to the mix control tolerance as specified in Table 2.2-6
- .5 Stockpile Requirements:
- .1 Stockpiling sites shall be level, well drained, free of all foreign materials and of adequate bearing capacity to support the mass of the stockpiled materials. Stockpiles shall be

2.2 Mix Design and .5
Job Mix Formula
(Cont'd)

Stockpile Requirements:(Cont'd)

.1 (Cont'd)

either far enough apart or separated by substantial dividers to prevent intermingling.

.2 For all aggregates except where stockpiled on Portland cement concrete, asphaltic concrete or on otherwise acceptably stabilized areas, the bottom 150 mm of the stockpile is not to be incorporated into the Department's work.

.3 Stockpiles shall be built up in layers not exceeding 1 m in depth. Each layer shall be completed over the entire area of the stockpile before beginning the next layer. Coning of the piles or spilling of material over the edges of the pile will not be permitted. Traffic over the stockpile surface shall be limited to that required for adequate levelling or removal.

.4 The minimum size of each coarse and fine aggregate stockpile shall be 1000 tonnes. The minimum size of the stockpile(s) of blending sand shall be 150 tonnes.

.5 Before any production of asphaltic concrete mixture has commenced, aggregate stockpiles of the required size and gradation shall be provided at the asphalt plant site. Minimum stockpile requirements shall be maintained throughout the project. Aggregates brought to the site after production has commenced shall be stored in separate stockpiles.

.6 A minimum of 2 working days between the arrival of asphalt aggregate and its incorporation into the asphaltic concrete mixture will be required to facilitate complete analysis of the aggregate prior to its use.

.6 Handling, Feeding and Drying of Aggregate:

.1 Aggregate shall be loaded into the cold feed bins so as to prevent the mixing of separated sizes of aggregate. Mixing of materials on site or loading of more than one material into a single bin shall not be permitted.

.2 Where the Contractor chooses to use a batch or continuous mix operation, the aggregate shall be dried and heated in the drier and separated by screening into hot storage bins. When the aggregate is delivered to the mixer, it shall be at a temperature consistent with proper mixing and laying and shall in no case exceed 165°C. Surfaces of dried aggregate shall be free of carbon or unburnt fuel oil.

.3 The aggregate shall be sufficiently dried as evidenced by the lack of noticeable steaming,

2.2 Mix Design and .6
Job Mix Formula
(Cont'd)

(Cont'd)

.3 (Cont'd)

bubbling, or foaming of the asphalt mixture and the absence of visible free water on the tailgate of the truck box.

.4 If insufficient drying is evident, the Contractor shall take steps as deemed necessary to provide properly dried aggregates.

PART 3 - EXECUTION

3.1 Plant and Mixing.1
Requirements

Feeder lines for loading asphalt cement to the asphalt tanks shall be elevated and drained and the use of diesel fuel to clean asphalt cement pump feeder lines is not permitted. When necessary to use diesel to flush lines and pump, all flushed material shall be collected and not permitted to enter asphalt cement tanks or dumped on the ground.

.2 Batch and continuous mixing plants:

.1 To ASTM D995.

.2 Heat asphalt cement and aggregate to mixing temperature directed by Department Representative. Do not heat asphalt cement above 165°. 3. Before mixing, dry aggregates to a moisture content not greater than 0.5% by mass or to a lesser moisture content if required to meet mix design requirements.

.3 Make available current asphalt cement viscosity and specific gravity data at plant. With information relative to viscosity of asphalt cement being used, Department Representative will direct temperature of completed asphalt concrete at plant and at paver after considering hauling and placing conditions.

.4 Feed aggregates from individual stockpiles through separate bins to cold elevator feeders. Aggregate will not be fed directly to the plant from the crusher.

.5 Feed cold aggregates to plant in proportions that will ensure continuous operations.

.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 a manner to minimize segregation and temperature loss.

3.1 Plant and Mixing.2
Requirements
(Cont'd)

Batch and continuous mixing plants:(Cont'd)

.8 Maintain temperature of materials within plus or minus 5°C of specified mix temperature during mixing.

.9 Mixing time:

.1 In batch plants, both dry and wet mixing times as directed by Department Representative. Continue wet mixing as long as necessary to obtain a thoroughly blended asphalt concrete but not less than 30 s or more than 75 s.

.2 In continuous mixing plants, mixing time as directed by Department Representative but not less than 45 s.

.3 Do not alter mixing time unless directed by Department Representative.

.3 Dryer drum mixing plant:

.1 Feed aggregates to burner end of dryer drum by means of a multi-bin cold feed unit and blend to meet job-mix requirements by adjustments of variable speed feed belts and gates on each bin.

.2 Meter total flow of aggregate by an electronic weigh belt system with an indicator that can be monitored by plant operator and which is interlocked with asphalt pump so that proportions of aggregate and asphalt cement entering mixer remain constant.

.3 Provide for easy calibration of weighing systems for aggregates without having material enter drum.

.4 Make provision for conveniently sampling the full flow of aggregate from the cold feed.

.5 Provide screens or other suitable devices to reject oversize particles or lumps of aggregate from cold feed prior to entering drum.

.6 Provide a system interlock which will stop all feed components if either asphalt or aggregate from any bin stops flowing.

.7 Accomplish heating and mixing of asphalt concrete in an approved parallel flow dryer-mixer in which aggregate and asphalt cement enter drum at burner end and travel parallel to flame and exhaust gas stream.

Control heating to prevent fracture of aggregate or excessive oxidation of asphalt cement. Equip system with automatic burner controls and provide for continuous temperature sensing of asphalt concrete at discharge, with a printing recorder that can be monitored by plant operator. Submit printed record of mix temperatures at end of each week.

3.1 Plant and Mixing.
Requirements
(Cont'd)

Dryer drum mixing plant:(Cont'd)

.8 Mixing period and temperature to produce a uniform mixture in which particles are thoroughly coated, and moisture content of material as it leaves plant to be less than 0.5 %.

.4 Temporary storage of hot asphalt concrete:

.1 Provide storage of sufficient capacity to permit continuous operation and designed to prevent segregation.

.2 Do not store in storage bins in excess of 3 h.

.5 While producing asphalt concrete for this project, do not produce it for other users unless separate storage and pumping facilities are provided for materials supplied to this project.

.6 Mixing tolerances:

.1 Permissible variation in aggregate gradation from job mix (percent of total mass):

Sieve, μm	Allowable Variation, %
> 5000	5.0
5000	5.0
2500	4.0
315	3.0
160	2.0
80	2.0

.2 Permissible variation of asphalt cement from job mix, 0.25%.

.3 Permissible variation of asphalt concrete temperature at discharge from plant, 5°.

3.2 Equipment

.1 General: All equipment used on this project shall be in top operating condition because the project is located on a roadway with very steep grades and sharp curves.

.2 Pavers: Mechanical grade controlled self powered pavers capable of spreading asphalt concrete within specified tolerances, true to line, grade and crown indicated.

.1 Pavers to be equipped with automatic screed controls, as recommended by manufacturer for control of longitudinal grade and transverse slope.

.2 Pavers to be equipped with joint matching shoe to operate with longitudinal grade control.

3.2 Equipment
(Cont'd)

- .2 Pavers:(Cont'd)
 - .3 Transverse slope control shall be capable of operating from either side of paver.
 - .4 Pavers to be equipped with an approved 12 m ski. Where such ski is a flexible unit, it shall be equipped with a spring tensioned wire extending between brackets fitted on and slightly above each end of ski. Sensing grid shall ride on wire and not on ski.
- .3 Rollers: sufficient number of rollers of type and mass to obtain specified density of compacted mix.
- .4 Vibratory rollers:
 - .1 Minimum drum diameter: 1200 mm.
 - .2 Maximum amplitude of vibration (machine setting): 500 µm for lifts less than 40 mm thick.
- .5 Haul trucks: of adequate size, speed and condition to ensure orderly and continuous operation and as follows:
 - .1 Boxes with tight metal bottoms.
 - .2 Covers (tarps) of sufficient size and weight to completely cover and protect asphalt concrete when truck fully loaded.
 - .3 In cool weather or for long hauls, insulate entire contact area of each truck box.
 - .4 Trucks which cannot be weighed in a single operation on scales supplied will not be accepted.
 - .5 Truck tailgate assemblies must be such that they do not strike paver hopper when emptying into the hopper.
- .6 Hand tools:
 - .1 Lutes or rakes with covered teeth for spreading and finishing operations.
 - .2 Tamping irons having mass not less than 12 kg and a bearing area not exceeding 310 cm² for compacting material along curbs, gutters and other structures inaccessible to roller. Mechanical compaction equipment, when approved by Department Representative, may be used instead of tamping irons.
 - .3 Straight edges, 3 m in length, to test finished surface.
- .7 Material Transfer Vehicle: Transfer asphalt concrete from haul units to spreader with an approved Material Transfer Vehicle i.e. Roadtec SB 2500 C or approved equal.

-
- 3.3 Preparation
- .1 Pavement sites indicated by the Department Representative for pulverizing will be prepared in accordance with Section 32 01 16 - Removal of Existing Asphalt.
 - .2 Apply tack coat in accordance with Section 32 12 15 - Asphalt Tack Coat prior to paving.
 - .3 Pavement sites indicated by the Department Representative for overlay and skin patching shall be free of loose and foreign material and tack coat shall be applied in accordance with Section 32 12 15 - Tack Coat.
- 3.4 Transportation of Asphalt Concrete
- .1 Transport asphalt concrete to job site in vehicles cleaned of foreign material.
 - .2 Paint or spray truck beds with limewater, soap or detergent solution, at least once a day or as required. Elevate truck bed and thoroughly drain. No excess solution will be permitted. Diesel fuel is not permitted.
 - .3 Schedule delivery of asphalt concrete for placing in daylight, unless Department Representative approves artificial light.
 - .4 Deliver asphalt concrete to paver at a uniform rate and in an amount within capacity of paving and compacting equipment.
 - .5 Deliver loads continuously in covered vehicles and immediately spread and compact. Deliver and place asphalt concrete at temperature within range as directed by Department Representative, but not less than 135°.
 - .6 Tarpaulins or other coverings for trucks must be of sufficient mass to prevent rapid cooling of asphalt concrete surface.
- 3.5 Placing
- .1 Obtain Department Representative's approval of base and existing surface and tack coat and prime coat prior to placing asphalt.
 - .2 Place asphalt concrete to thicknesses, grades and lines as indicated or as directed by Department Representative.
-

3.5 Placing
(Cont'd)

- .3 Placing conditions:
 - .1 Place asphalt concrete only when air temperature is above 5°.
 - .2 When temperature of surface on which asphalt concrete is to be placed falls below 10°C, provide extra rollers as necessary to obtain required compaction before cooling.
 - .3 Do not place asphalt concrete when pools of standing water exist on surface to be paved, or during rain, or when surface is damp, or if ambient temperature is below 5°C .
- .4 Place asphalt concrete in compacted lifts of thickness as follows:
 - .1 On overlay section in two compacted lifts each with a spread rate of 120 kg/m² or as directed by the Department Representative.
 - .2 In lift of 70 mm to construct drainage gutters to the plans and specifications as directed by the Department Representative.
- .5 Spread and strike off asphalt concrete overlay with self propelled mechanical finisher.
 - .1 Place individual strips no longer than 500 m.
 - .2 Construct longitudinal joints and edges true to line markings. Lines for paver to follow will be established by Department Representative parallel to centreline of proposed pavement. Position and operate paver to follow established line closely.
 - .3 If segregation occurs, immediately suspend spreading operation until cause is determined and corrected.
 - .4 Correct irregularities in alignment left by paver by trimming directly behind machine.
 - .5 Correct irregularities in surface of pavement course directly behind paver. Remove by shovel or lute access asphalt concrete forming high posts. Fill and smooth dips with asphalt concrete.
 - .6 Do not broadcast asphalt concrete over surface.
 - .7 The forward speed of the paver shall be regulated by capacity of the plant and the rollers but shall not exceed a forward speed of 10 m/min.
- .6 When hand spreading is used:
 - .1 Approved wood or steel forms, rigidly supported to assure correct grade and cross section, may be used. Use measuring blocks and intermediate strips to aid in obtaining required cross-section.

3.5 Placing
(Cont'd)

- .6 When hand spreading is used:(Cont'd)
 - .2 Distribute material uniformly. Do not broadcast material.
 - .3 During spreading operation, thoroughly loosen and uniformly distribute asphalt concrete by lutes or covered rakes. Reject asphalt concrete 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. Avoid high temperatures which may burn asphalt concrete. Do not use tools at a higher temperature than temperature of asphalt concrete being placed.
- .7 To ensure continuous operation, pavers shall operate at uniform speeds to match the output of the plant provided that a consistent and satisfactory mat is being laid. However, in no case shall the speed of the paver exceed 10 m/min.

3.6 Compacting

- .1 Compact asphalt concrete continuously using established rolling pattern.
- .2 Do not change rolling pattern unless asphalt concrete changes or lift thickness changes. Change rolling pattern only as directed by Department Representative.
- .3 General:
 - .1 Provide at least three rollers or as many additional rollers as necessary to achieve specified pavement density.
 - .2 Start rolling operations as soon as asphalt concrete can bear mass of roller without undue displacement of asphalt concrete or cracking of surface.
 - .3 Operate roller slowly initially to avoid displacement of asphalt concrete. For subsequent rolling do not exceed 5 km/h for static steel-wheeled rollers and 8 km/h for pneumatic-tired rollers.
 - .4 For lifts 50 mm thick and greater, adjust speed and vibration frequency of vibratory rollers to produce minimum of 20 impacts per metre of travel.
 - .5 Overlap successive passes of roller by at least one half width of roller and vary pass lengths.

3.6 Compacting
(Cont'd)

- .3 General:(Cont'd)
 - .6 Keep wheels of roller slightly moistened with water to prevent pick-up of asphalt concrete but do not over-water and do not use diesel fuel.
 - .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.
 - .10 Where rolling causes displacement of asphalt concrete, loosen affected areas at once with lutes or shovels and restore to original grade of loose asphalt concrete before re-rolling.
 - .11 Do not refuel rollers on fresh asphalt concrete.
- .4 Breakdown rolling:
 - .1 Commence breakdown rolling with static steel wheeled roller vibratory roller immediately following rolling of transverse and longitudinal joint and edges.
 - .2 Operate rollers as close to paver as necessary to obtain the specified density without causing undue displacement.
 - .3 Operate breakdown roller with drive roll or wheel nearest finishing machine. Exceptions may be made when working on steep slopes or super-elevated sections.
 - .4 Use only experienced roller operators for this work.
- .5 Second rolling:
 - .1 Use pneumatic-tired, steel wheel or vibratory rollers and follow breakdown rolling as closely as possible and while paving asphalt concrete temperature allows maximum density from this operation.
 - .2 Rolling shall be continuous after initial rolling until asphalt concrete placed has been thoroughly compacted.
- .6 Dusting: If required by Department Representative, dust entire area of sheet asphalt concrete with hydrated lime immediately after rolling to eliminate tendency to pick-up under traffic.

3.6 Compacting
(Cont'd)

- .7 All asphalt concrete shall be compacted to 93% of Theoretical Maximum Relative Density (TMRD) in accordance with ASTM D3203.
- .8 The Contractor will supply additional compaction equipment if required density is not achieved.
- .9 Gutters will be compacted with vibratory compactors which operate perpendicular to the direction of the gutter.

3.7 Joints

- .1 General:
 - .1 Trim vertical face to provide true surface and cross section against which new pavement may be laid. Remove loose particles.
 - .2 Paint joint face with coat of tack coat emulsified asphalt cement or preheat joint face with approved heater, prior to placing of fresh asphalt concrete.
 - .3 Overlap previously laid strip with spreader by 100 mm.
 - .4 Rake fresh asphalt concrete against joint and thoroughly tamp and roll.
 - .5 Remove surplus material from surface of previously laid strip. Dispose of surplus material as directed by Department Representative.
 - .6 Do not throw surplus material on freshly screened mat surface.
- .2 Transverse Joints:
 - .1 Carefully construct and thoroughly compact transverse joints to provide a smooth riding surface.
 - .2 Hold transverse joints to a minimum. When paving single width and maintaining traffic, construct one lane no farther than one-half total paving day.
 - .3 Stagger joint locations 1.5 to 3.0 meters. Schedule each day's paving operation to terminate adjacent lanes in any one area to within above specified joint location.
 - .4 Offset transverse joint in succeeding course by at least 600 mm.
- .3 Longitudinal Joints:
 - .1 Before rolling, carefully remove with a lute or rake and discard coarse aggregate in asphalt concrete overlapping joint.
 - .2 Roll longitudinal joints directly behind paving operation.

3.7 Joints
(Cont'd)

- .3 Longitudinal Joints:(Cont'd)
- .3 When rolling with static roller, shift roller over onto previously placed lane in order that no more than 150 mm of roll rides on edge of newly laid lane, then operate roller to pinch and press fines gradually across joint. Continue rolling until a thoroughly compacted neat joint is obtained.
- .4 When rolling with vibratory roller, have most of drum width ride on newly placed lane with remaining 100 to 150 mm extending onto previously placed and compacted lane.
- .5 When abutting lane is not placed in same day, or when joint is distorted during day's work by traffic or other means, carefully trim edge of lane to line and paint with a thin coating of asphalt before abutting lane is placed.
- .6 Ensure joints are offset at least 150 to 200 mm from those in lower layers.

3.8 Finish
Tolerances

- .1 Finished asphalt concrete to be within 6 mm of design elevation but not uniformly high or low.
- .2 Finished asphalt concrete not to have irregularities exceeding 6 mm when checked with a 3 m straight edge placed in any direction.
- .3 Each course shall be within 0.5% of the specified cross slope.
- .4 Minimum lift thickness is 50 mm for A mix and 35 mm for B mix.
- .5 Thickness of combined courses shall be within 5 mm of the specified design thickness.

3.9 Temporary
Markings

- .1 The Contractor will place temporary pavement markings before sunset following each day's work. Marking material will be approved by the Department Representative.

3.10 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

- 3.10 Defective Work
(Cont'd)
- .1 (Cont'd)
lay new material to form a true and even surface
and compact immediately to specified density.
 - .2 Repair areas showing checking or rippling.
 - .3 Adjust roller operation and screed settings on
paver to prevent further defects such as
rippling and checking of pavement.

PART 1 - GENERAL

- | | | |
|---|----|---|
| <u>1.1 References</u> | .1 | CGSB 15-GP-1M-80, Calcium Chloride. |
| <u>1.2 Measurement
for Payment</u> | .1 | Supply and application of water for dust control is incidental to the work, to be included in overall tendered price. |
| <u>1.3 Delivery,
Storage and
Handling</u> | .1 | Supply water in quantities and at times as directed by Department Representative. |

PART 2 - PRODUCTS

- | | | |
|----------------------|----|---|
| <u>2.1 Materials</u> | .1 | Water: potable to Department Representative's approval. |
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PART 3 - EXECUTION

- | | | |
|------------------------|----|--|
| <u>3.1 Application</u> | .1 | Apply water with equipment approved by Department Representative at rate of 0.5 to 5.0 l/m ² as appropriate when directed by Department Representative. |
| | .2 | Apply water with distributors equipped with spray system to ensure uniform application and with means of shut-off. |

PART 1 - GENERAL

- | | | |
|--|----|---|
| <u>1.1 Work Included</u> | .1 | This section specifies topsoil, topsoil amendments, the stripping of topsoil, the preparation of existing grades, the placement of topsoil, and finish grading. |
| <u>1.2 Related Sections</u> | .1 | Environmental Protection - Section 01 35 44 |
| | .2 | Rough Grading - Section 31 23 13 |
| | .3 | Hydraulic Seeding - Section 32 92 22 |
| <u>1.3 Quality Assurance</u> | .1 | Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties. |
| | .2 | Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements. |
| | .3 | Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements. |
| <u>1.4 Testing</u> | .1 | All soil and sand used in this project shall be tested for compliance with texture specification by a laboratory designated by the Departmental Representative. Soil sampling, testing and analysis to be in accordance with Provincial regulations and standards. Contractor will arrange and pay for cost of tests. |
| <u>1.5 Waste Management And Disposal</u> | .1 | Separate and recycle waste materials. |
| | .2 | Divert unused soil amendments from landfill to official hazardous material collections site approved by Municipality. |
| | .3 | Do not dispose of unused soil amendments into sewer systems, into lakes, streams, onto ground |
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1.5 Waste Management.3
And Disposal

(Cont'd)

PART 2 - PRODUCTS

(Cont'd)

or in locations where it will pose health or environmental hazard.

2.1 Topsoil

- .1 Topsoil for this project to consist of topsoil stripped from site and imported topsoil to be supplied by the Contractor.
- .2 Topsoil: mixture of mineral particulates, micro organisms and organic matter which provides suitable medium for supporting intended plant growth, free of debris, weeds, foreign objects, toxic materials and stones and roots greater than 20 mm length.
- .3 Soil texture: sandy loam, based on The Canadian System of Soil Classification, to the following particle distribution and gradation:

Particle Type	Distribution by volume	Acceptable Range
very coarse sand	10%	10% or less
coarse & medium sand	45%	42-47%
fine sand	15%	13-17%
very fine sand	10%	8-12%
clay	20%	18-23%

Particle Type	Gradation
very coarse sand	2.0-1.0 mm
coarse sand	1.0-0.5 mm
medium sand	0.5-0.25 mm
fine sand	0.25-0.15 mm
very fine sand	0.15-0.106 mm
clay	less than 0.06 mm

- .4 Organic matter: 4-20% by dry weight volume, well decomposed and stable. Organic material measuring 20 mm will not exceed 2% by volume.
- .5 pH range: 6.0-7.0
- .6 Consistency: friable when moist.
- .7 Fertility: major soil nutrients present in following ratios:
- .1 Nitrogen (N): 20 to 40 micrograms of available N per gram of topsoil
- .2 Phosphorus (P): 10 to 20 micrograms of phosphate per gram of topsoil.

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|---------------------------------------|----|--|
| <u>2.1 Topsoil
(Cont'd)</u> | .7 | Fertility:(Cont'd)
.3 Potassium (K): 80 to 120 micrograms of
potash per gram of topsoil.
.4 Calcium, magnesium, sulphur and/or
establishment of intended vegetation. |
| <u>2.2 Source Quality
Control</u> | .1 | Notify Departmental Representative of topsoil
source at start of project. Departmental
Representative will visit source to check for
alien species. Do not import topsoil before
source is accepted. Do not switch source after
acceptance. |
| | .2 | Contractor is responsible for amendments to
supply topsoil as specified. |

PART 3 - EXECUTION

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| <u>3.1 Stripping of
Topsoil</u> | .1 | Commence topsoil stripping of areas after all
wood, brush and grasses have been removed from
site. |
| | .2 | Strip and pulverize topsoil to depths as
indicated. Avoid mixing topsoil with subsoil
where textural quality will be moved outside
acceptable range of intended application. |
| | .3 | Stockpile in locations as directed by
Department Representative. Stockpile height not
to exceed 2 m. |
| | .4 | Unused topsoil is to remain on site. |
| | .5 | Protect stockpiles from contamination and
compaction. |
| <u>3.2 Preparation of
Existing Grade</u> | .1 | Verify that grades are correct. If
discrepancies occur, notify Department
Representative and do not commence work until
instructed by Department Representative. |
| | .2 | Grade soil, eliminating uneven areas and low
spots, ensuring positive drainage. |
| | .3 | Remove debris, roots, branches, stones in
excess of 25 mm diameter and other deleterious
materials. Remove soil contaminated with calcium |

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- 3.2 Preparation of Existing Grade (Cont'd)
- .3 (Cont'd)
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 Department Representative has accepted subgrade.
- .2 Spread topsoil in uniform layers not exceeding 150 mm.
- .3 Spread topsoil/planting soil to following minimum depths after settlement.
.1 150 mm for seeded areas.
.2 500 mm for shrub beds.
- .4 Manually spread topsoil/planting soil around trees, shrubs and obstacles.
- 3.4 Soil Amendments
- .1 For planting beds and turf areas: apply and thoroughly mix soil amendments into full specified depth of topsoil at following rates recommended by soil analyses.
- 3.5 Finish Grading
- .1 Grade to eliminate rough spots and low areas and 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 Department Representative. Leave surfaces smooth, uniform and firm against deep footprinting.
- 3.6 Acceptance
- .1 Department Representative will inspect and test topsoil in place and determine acceptance of material, depth of topsoil and finish grading.
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3.6 Acceptance .2 Department Representative will inspect all rock
(Cont'd) walls and boulder placements to ensure secure
installation and neat finished appearance.

3.7 Surplus Material.1 Dispose of surplus materials off site.

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

.2 Clean all exposed rock and boulder surfaces to
approval of Department Representative.

PART 1 - GENERAL

- 1.1 Work Included .1 This Section specifies seed, mulch, slurry preparation and application, and maintenance for hydraulic seeding.
- 1.2 Related Sections .1 Section 01 35 44 - Environmental Protection
.2 Section 31 23 13 - Rough Grading.
.3 Section 32 91 21 - Topsoil and Finish Grading.
- 1.3 Submittals .1 Provide product data for:
.1 Seed.
.2 Mulch.
.3 Tackifier.
.4 Fertilizer.
.2 Submit in writing to Departmental representative 7 days prior to commencing work:
.1 Volume capacity of hydraulic seeder in litres.
.2 Amount of material to be used per tank based on volume.
.3 Number of tank loads required per hectare to apply specified slurry mixture per hectare.
- 1.4 Quality Assurance .1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
.2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
.3 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements.
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- 1.5 Scheduling .1 Schedule hydraulic seeding to coincide with preparation of soil surface.
- .2 Schedule hydraulic seeding to be completed not later than September 30 without written approved from Departmental representative.
- 1.6 Waste Management and Disposal .1 Separate and recycle waste materials.
- .2 Divert unused fertilizer from landfill to official hazardous material collections site approved by Municipality.
- .3 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.

PART 2 - PRODUCTS

- 2.1 Seed .1 "Canada pedigreed grade" in accordance with Government of Canada Seeds Act and Regulations.
- .2 Mixture composition:
- .1 60% Creeping Red Fescue
 - .2 20% Hard Fescue
 - .3 10% Perennial Rye
 - .4 10% Alsike Clover
- 2.2 Mulch .1 Specially manufactured for use in hydraulic seeding equipment, non-toxic, water activated, green colouring, free of germination and growth inhibiting factors with following properties:
- .1 Made from wood cellulose fibre.
 - .2 Organic matter content: 95% plus or minus 0.5%.
 - .3 Value of pH: 6.0.
 - .4 Potential water absorption: 900%.
- 2.3 Tackifier .1 Water soluble vegetable carbohydrate powder.

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|-----------------------|----|---|
| <u>2.4 Water</u> | .1 | Free of impurities that would inhibit germination and growth. |
| <u>2.5 Fertilizer</u> | .1 | To Canada "Fertilizers Act" and "Fertilizers Regulations". Complete synthetic, slow release with 35% of nitrogen content in water-insoluble form. |
| <u>2.6 Inoculants</u> | .1 | Inoculant containers to be tagged with expiry date. |

PART 3 - EXECUTION

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|------------------------------------|----|--|
| <u>3.1 Workmanship</u> | .1 | Do not spray onto structures, signs, guide rails, fences, plant material, utilities and other than surfaces intended. |
| | .2 | Clean-up immediately, any material sprayed where not intended, to satisfaction of Departmental representative. |
| | .3 | Do not perform work under adverse field conditions such as wind speeds over 10 km/h, frozen ground or ground covered with snow, ice or standing water. |
| | .4 | Protect seeded areas from trespass until plants are established. |
| <u>3.2 Preparation of Surfaces</u> | .1 | .1 Fine grade areas to be seeded free of humps and hollows. Ensure areas are free of deleterious and refuse materials. |
| | .2 | Cultivated areas identified as requiring cultivation to depth of 25 mm. |
| | .3 | Ensure areas to be seeded are moist to depth of 150 mm before seeding. |
| | .4 | Obtain Departmental representative's approval of grade and topsoil depth before starting to seed. |

3.3 Fertilizing
Program

- .1 Fertilize prior to fine grading incorporating fertilizer equally distributed in accordance with the following program.
- .2 Following germination, all seeded areas to receive an application of fertilizer at rate specified by fertilizer manufacturer after one cut.
- .3 Apply additional soil supplements as determined necessary by soils analysis conducted during establishment period.

3.4 Preparation
of Slurry

- .1 Measure quantities of materials by weight or weight-calibrated volume measurement satisfactory to Departmental representative. Supply equipment required for this work.
- .2 Charge required water into seeder. Add material into hydraulic seeder under agitation. Pulverize mulch and charge slowly into seeder.
- .3 After all materials are in the seeder and well mixed, charge tackifier into seeder and mix thoroughly to complete slurry

3.5 Slurry
Application

- .1 Hydraulic seeding equipment:
 - .1 Slurry tank.
 - .2 Agitation system for slurry to be capable of operating during charging of tank and during seeding, consisting of recirculation of slurry and/or mechanical agitation method.
 - .3 Capable of seeding by 50 m hand operated hoses and appropriate nozzles.
 - .4 Slurry mixture applied per 100 square metres.
 - .1 Seed: Grass mixture 2.0 kg.
 - .2 Mulch: 10 kg.
 - .3 Tackifier: as recommended by manufacturer.
 - .4 Water: Minimum 100 litres.
 - .5 Fertilizer: not less than 1,650 kg of phosphorous
- .2 Apply slurry uniformly, at optimum angle of application for adherence to surfaces and germination of seed.
- .3 Using correct nozzle for application.

3.5 Slurry
Application
(Cont'd)

- .4 Using hoses for surfaces difficult to reach and to control application. 5 .Blend application 300 mm into adjacent grass areas or sodded areas to form uniform surfaces.
- .5 Re-apply where application is not uniform.
- .6 Remove slurry from items and areas not designated to be sprayed.
- .7 Protect seeded areas from trespass satisfactory to Departmental representative.
- .8 Remove protection devices as directed by Departmental representative.

3.6 Maintenance
During Establishment
Period

- .1 Perform following operations from time of seed application until acceptance by Departmental representative.
- .2 Repair and reseed dead or bare spots to allow establishment of seed prior to acceptance.
- .3 Mow grass once whenever it reaches height of 90 mm. Remove clippings which will smother grass.
- .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; water in well.
- .5 Control weeds by mechanical or chemical means utilizing integrated pest management practices approved by the Departmental Representative.
- .6 Water seeded area to maintain optimum soil moisture level for germination and continued growth of grass. Control watering to prevent washouts.

3.7 Acceptance

- .1 Seeded areas will be accepted by Departmental representative provided that:
 - .1 Plants are uniformly established. Seeded areas are free of rutted, eroded, bare or dead spots.
 - .2 Areas have been mown at least twice.
 - .3 Areas have been fertilized.

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|---|----|---|
| <u>3.7 Acceptance
(Cont'd)</u> | .2 | Areas seeded in fall will achieve final acceptance in following spring, one month after start of growing season provided acceptance conditions are fulfilled. |
| <u>3.8 Maintenance
During
Warranty Period</u> | .1 | Perform following operations from time of acceptance until end of warranty period. |
| | .2 | Repair and reseed dead or bare spots to satisfaction of Departmental representative. |
| | .3 | Fertilize seeded areas in accordance with fertilizing program. Spread half of required amount of fertilizer in one direction and remainder at right angles and water in well. |
| <u>3.9 Cleaning</u> | .1 | Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers. |