

1 GENERAL

1.01 RELATED REQUIREMENTS

- .1 Section 32 12 16 - Hot Mix Asphalt.

1.02 REFERENCES

- .1 ASTM International
 - .1 ASTM C 117-04, Standard Test Methods for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C 131-06, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
 - .3 ASTM C 136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .4 ASTM D 422-63(2007), Standard Test Method for Particle-Size Analysis of Soils.
 - .5 ASTM D 698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft²) (600kN-m/m²).
 - .6 ASTM D 1557-09, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft²) (2,700kN-m/m²).
 - .7 ASTM D 1883-07e2, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
 - .8 ASTM D 4318-10, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
- .2 Canada Green Building Council (CaGBC)
 - .1 LEED Canada-NC Version 1.0-2004, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations (including Addendum 2007).
- .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
 - .2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.
- .4 U.S. Environmental Protection Agency (EPA) / Office of Water
 - .1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.03 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

1.04 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

2 PRODUCTS

2.01 MATERIALS

- .1 Granular sub-base material: in accordance with Section 31 05 16 - Aggregate Materials and following requirements:

- .1 Crushed, pit run or screened stone, gravel or sand.
- .2 Gradations to be within limits specified when tested to ASTM C 136 and ASTM C 117. Sieve sizes to CAN/CGSB-8.1.
- .3 Table

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

- .4 Other properties as follows:
 - .1 Liquid Limit: to ASTM D 4318, Maximum 25.
 - .2 Plasticity Index: to ASTM D 4318, Maximum 6.
 - .3 Los Angeles degradation: to ASTM C 131.
 - .1 Maximum loss by mass: 40 to 50 %.
 - .4 Particles smaller than 0.02 mm: to ASTM D 422, Maximum 3%.
 - .5 Soaked CBR: to ASTM D 1883, Minimum 40 when compacted to 100% of ASTM D 1557.

3 EXECUTION

3.01 EXAMINATION

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

3.02 PLACING

- .1 Place granular sub-base after subgrade is inspected and approved by Departmental Representative.

- .2 Construct granular sub-base to depth and grade in areas indicated.
- .3 Ensure no frozen material is placed.
- .4 Place material only on clean unfrozen surface, free from snow or ice.
- .5 Begin spreading sub-base material on crown line or high side of one-way slope.
- .6 Place granular sub-base materials using methods which do not lead to segregation or degradation.
- .7 Place material to full width in uniform layers not exceeding 150 mm compacted thickness.
 - .1 Departmental Representative may authorize thicker lifts if specified compaction can be achieved.
- .8 Shape each layer to smooth contour and compact to specify density before succeeding layer is placed.
- .10 Remove and replace portion of layer in which material has become segregated during spreading.

3.03 COMPACTION

- .1 Compaction equipment to be capable of obtaining required material densities.
- .2 Compact to density of not less than 98% maximum dry density in accordance with ASTM D 698, ASTM D 1557.
- .3 Shape and roll alternately to obtain smooth, even and uniformly compacted sub-base.
- .4 Apply water as necessary during compaction to obtain specified density.
- .5 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Departmental Representative.
- .6 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.04 CLEANING

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

3.05 SITE TOLERANCES

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

uniformly high or low.

3.06 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

1 GENERAL

1.01 RELATED REQUIREMENTS

- .1 Section 32 12 16 - Hot Mix Asphalt.

1.02 MEASUREMENT AND PAYMENT

- .1 Measure the Supply, hauling, and compaction of granular base will not be measured for payment, but will be considered incidental to section 32 12 16 - Hot Mix Asphalt.

1.03 REFERENCES

- .1 ASTM International
 - .1 ASTM C 117-04, Standard Test Methods for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C 131-06, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
 - .3 ASTM C 136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .4 ASTM D 698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ftü) (600kN-m/mü).
 - .5 ASTM D 1557-09, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ftü) (2,700kN-m/mü).
 - .6 ASTM D 1883-07e2, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
 - .7 ASTM D 4318-10, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
 - .2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.
- .3 U.S. Environmental Protection Agency (EPA) / Office of Water
 - .1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.05 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

1.06 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00.

2 PRODUCTS

2.01 MATERIALS

- .1 Granular base: material in accordance with Section 31 05 16 - Aggregate Materials and following requirements:

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

- .1 Gradation Method #1 to:

Sieve Designation	% Passing	(1)	(2)	(3)
100 mm	—	—	—	—
75 mm	—	—	—	—
50 mm	100	—	—	—
37.5 mm	70-100	—	—	—
25 mm	—	100	—	—
19 mm	50-75	—	—	100
12.5 mm	—	65-100	70-100	—
9.5 mm	40-65	—	—	—
4.75 mm	30-50	35-60	40-70	—
2.00 mm	—	22-45	23-50	—
0.425 mm	10-30	10-25	7-25	—
0.180 mm	—	—	—	—
0.075 mm	3-8	3-8	3-8	—

- .2 Gradation Method #2 to: insert name of agency and material type except that percentage finer than 0.075 mm not to exceed 8%.
.3 Material to level surface depressions to meet gradation (2) limits in accordance with Method #1.
.4 Liquid limit: to ASTM D 4318, maximum 25
.5 Plasticity index: to ASTM D 4318, maximum 6.
.6 Los Angeles degradation: to ASTM C 131. Max. % loss by weight: 45
.7 Crushed particles: at least 60% of particles by mass within each of following sieve designation ranges to have at least 1 freshly fractured face. Material to be divided into ranges using methods of [ASTM C 136].

Passing	to	Retained on
50 mm	to	25 mm
25 mm	to	19.0 mm
19.0 mm	to	4.75 mm

- .8 Soaked CBR: to ASTM D 1883, minimum 80, when compacted to 100% of ASTM D 1557.

3 EXECUTION

3.01 PLACEMENT AND INSTALLATION

- .1 Place granular base after sub-base surface is inspected and approved in writing by Departmental Representative.
.2 Placing:

- .1 Construct granular base to depth and grade in areas indicated.
- .2 Ensure no frozen material is placed.
- .3 Place material only on clean unfrozen surface, free from snow and ice.
- .4 Begin spreading base material on crown line or on high side of one-way slope.
- .5 Place material using methods which do not lead to segregation or degradation of aggregate.
- .6 For spreading and shaping material, use spreader boxes having adjustable templates or screeds which will place material in uniform layers of required thickness.
- .7 Place material to full width in uniform layers not exceeding 150 mm compacted thickness.
 - .1 Departmental Representative may authorize thicker lifts if specified compaction can be achieved.
- .8 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
- .9 Remove and replace that portion of layer in which material becomes segregated during spreading.
- .3 Compaction Equipment:
 - .1 Ensure compaction equipment is capable of obtaining required material densities.
 - .3 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.
 - .4 Equipped with device that records hours of actual work, not motor running hours.
- .4 Compacting:
 - .1 Compact to density not less than 100% maximum dry density to ASTM D 698, ASTM D 1557.
 - .2 Shape and roll alternately to obtain smooth, even and uniformly compacted base.
 - .3 Apply water as necessary during compacting to obtain specified density.
 - .4 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved in writing by Departmental Representative.
 - .5 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.02 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.

3.03 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials in accordance with Section 01 74 21

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AGGREGATE BASE COURSES

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- Construction/Demolition Waste Management and Disposal.
- .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.
- .2 Divert unused granular material from landfill to local quarry unless specified otherwise by Departmental Representative.

3.04 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 SECTION INCLUDES

- .1 Materials and installation for asphalt concrete paving for roads and parking lots.

1.2 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 02 41 23 - Selective Site Demolition
- .3 Section 31 05 17 - Aggregate Materials

1.4 REFERENCES

- .1 American Association of State Highway and Transportation Officials (AASHTO)
 - .1 AASHTO M320-02, Standard Specification for Performance Graded Asphalt Binder.
 - .2 AASHTO R29-02, Standard Specification for Grading or Verifying the Performance Graded of an Asphalt Binder.
 - .3 AASHTO T245-97(2001), Resistance to Plastic Flow of Bituminous Mixtures using Marshall Apparatus.
- .2 Asphalt Institute (AI)
 - .1 AI MS2-1994 Sixth Edition, Mix Design Methods for Asphalt Concrete and other Hot-Mix Types.
- .3 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM C 88-99a, Standard Test Method for Soundness of Aggregates by Use of Sodium Sulphate.
 - .2 ASTM C 117-95, Standard Test Method for Material Finer than 0.075mm (No. 200) Sieve in Mineral Aggregates by Washing.
 - .3 ASTM C 123-98, Standard Test Method for Lightweight Particles in Aggregate.
 - .4 ASTM C 127-01, Standard Test Method for Specific Gravity and Absorption of Coarse Aggregate.
 - .5 ASTM C 128-01, Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate.
 - .6 ASTM C 131-01, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
 - .7 ASTM C 136-01, Standard Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .8 ASTM D 995-95b (2002), Standard Specification for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.
 - .9 ASTM D 2419-02, Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
 - .10 ASTM D 3203-94(2000), Standard Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures.
 - .11 ASTM D 4791-99, Standard Test Method for Flat and Elongated Particles or Flat And Elongated Particles in Coarse Aggregate.

- .4 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-8.2-M88, Sieves Testing, Woven Wire, Metric.
 - .2 CAN/CGSB-16.3-M90, Asphalt Cements for Road Purposes.
- .5 New Brunswick Department of Transportation (NBDOT) Standard Specifications, January 2011 Edition including current revisions, Item 260, Asphalt Concrete and as noted.

1.5 PRODUCT DATA

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

1.6 SAMPLES

- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Inform Departmental Representative of proposed source of aggregates and provide Access for sampling at least 4 weeks prior to beginning of Work.
- .3 Submit samples of following materials proposed for use at least 4 weeks prior To beginning of Work.
 - .1 One 5 L container of asphalt cement.
- .4 Provide one asphalt cement sample per 3000 tonnes of asphalt mix production Taken in accordance with ASTM D140.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Deliver and stockpile aggregates in accordance with Section 31 05 17- Aggregate Materials. Stockpile minimum 50% of total amount of aggregate required Before beginning asphalt mixing operation.
- .2 When necessary to blend aggregates from one or more sources to produce Required gradation, do not blend in stockpiles.
- .3 Stockpile fine aggregate separately from coarse aggregate, although separate Stockpiles for more than two mix components are permitted.

- .4 Provide approved storage, heating tanks and pumping facilities for asphalt cement.

1.8 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 Construction/Demolition Waste Management and Disposal.
- .2 Remove from site and dispose of all packaging materials at appropriate Recycling facilities.
- .3 Collect and Separate for disposal paper plastic polystyrene corrugated cardboard Packaging material in appropriate on-site bins for recycling in accordance With Waste Management Plan.
- .4 Divert unused aggregate materials from landfill to facility for reuse as Approved by Departmental Representative.
- .5 Divert unused asphalt from landfill to facility capable of recycling materials.
- .6 Fold up metal banding, flatten and place in designated area for recycling.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Asphalt cement: to NBDOT 260.2.1, Grade: 200. For asphalt D, use PG 58-28.
- .2 Aggregates: in accordance with Section 31 05 17 - Aggregate Materials and Following requirements:
- .1 Crushed Stone or Gravel.
- .2 Gradations: within limits specified when tested to ASTM C 136 and ASTM C 117. Sieve sizes to CAN/CGSB-8.2.
- .3 Gradations:
- .1 Coarse Aggregate to NBDOT 260.2.1.2 and Table 260-1.
- .2 Fine Aggregate: to NBDOT 260.2.1.3 and Table 260-2.
- .3 Blending Sand: to NBDOT 260.2.1.5 and Table 260-3.
- .4 Coarse Aggregate: aggregate retained on 4.75mm sieve and fine aggregate Is aggregate passing 4.75mm sieve when tested to ASTM C 136.
- .5 When dryer drum plant or plant without hot screening is used, process Fine aggregate through 4.75mm sieve and stockpile separately from Coarse aggregate.

2.2 EQUIPMENT

- .1 In general, provide equipment acceptable to the. Departmental Representative and in conformance with NBDOT 260.4.2 and as specified in this section.
- .2 Mixing plant and components: to NBDOT 240.4.2.
- .3 Placing Equipment: mechanical grade controlled Equipment capable of spreading mix within specified Tolerances, true to line, grade, and crown as indicated. Conform to NBDOT 240.2.12.
- .4 Compaction Equipment: sufficient number of type And weight to obtain specified

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- density of compacted mix. Conform to NBDOT 260.4.2.13.
- .5 Vibratory Rollers:
 - .1 Minimum drum diameter: 1200mm.
 - .2 Maximum amplitude of vibration (machine Setting): 0.5mm for lifts less than 40mm thick.
 - .6 Haul Trucks: sufficient number and of adequate size, Speed and condition to ensure orderly and continuous Operation and as follows:
 - .1 Boxes with tight metal bottoms.
 - .2 Covers of sufficient size and weight to completely Cover and protect asphalt mix when truck is Fully loaded.
 - .3 In cool weather or for long hauls, insulate entire Contact area of each truck box.
 - .4 Use only trucks which can be weighed in single Operation on scales supplied.
 - .7 Hand Tools:
 - .1 Lutes or rakes with covered teeth for spreading And finishing operations.
 - .2 Tamping irons having mass not less than 12kg And bearing area not exceeding 310cm² for Compacting along structures inaccessible to Roller. Mechanical compaction equipment, when Approved by Departmental Representative, may be Used instead of tamping irons.
 - .3 Straight edges, 4.5m in length, to test finished Surface.
 - .8 Plant testing facility: provide laboratory space At plant site for exclusive use of Departmental Representative, for performing tests, keeping Records and making reports.

2.3 MIX DESIGN

- .1 Mix design to be approved by Contractor and certified By a Professional Departmental Engineer certified in the Province of New Brunswick. Job mix formula to be approved by Departmental Representative.
- .2 Mix design to be developed by testing laboratory approved by Departmental Representative.
- .3 Design of mix: by Superpave Method to NBDOT 260.3.2 and Requirements below:
 - .1 Mix physical requirements to NBDOT 260.2.3 and Table 260-7.
 - .2 Do not change job-mix without prior approval Of Departmental Representative. When change in Material source proposed, new job-mix formula To be approved by Departmental Representative.

PART 3 - EXECUTION

3.1 PLANT AND MIXING REQUIREMENTS

- .1 Batch and continuous mixing plants:
 - .1 Equipment to ASTM D995 and NBDOT 260.4.2.
 - .2 Production to NBDOT 260.4.3.
 - .3 Feed aggregates from individual stockpiles through separate bins to cold elevator feeders. Do not load frozen materials into bins.

- .4 Feed cold aggregates to plant in proportions to ensure continuous operations.
- .5 Calibrate bin gate openings and conveyor speeds to ensure mix proportions are achieved.
- .6 Before mixing, dry aggregates to moisture content not greater than 0.5% by mass or to lesser moisture content if required to meet mix design requirements.
- .7 Immediately after drying, screen aggregates into hot storage bins in sizes to permit recombining into gradation meeting job-mix requirements.
- .8 Store hot screened aggregates in manner to minimize segregation and temperature loss.
- .9 Heat asphalt cement and aggregates to mixing Temperature directed by Departmental Representative. Do not heat asphalt cement above 160 degrees Celsius.
- .10 Make available current asphalt cement viscosity data at plant. With information relative to viscosity of asphalt being used, Departmental Representative to review temperature of completed Mix at plant and at paver after considering Hauling and placing conditions.
- .11 Maintain temperature of materials within 5 Degrees Celsius of specified mix temperature during mixing.
- .12 Mixing Time:
 - .1 In batch plants, batch dry and wet mixing Times as directed by Departmental Representative. Continue wet mixing as long as necessary to obtain thoroughly blended mix but not less than 35s or more than 75s.
 - .2 In continuous mixing plants, mixing time As directed by Departmental Representative but not less than 35s.
 - .3 Do not alter mixing time unless directed By Departmental Representative.
- .2 Dryer Drum Mixing Plant:
 - .1 Equipment to ASTM D 995 and NBDOT 260.4.2.
 - .2 Production to NBDOT 240.4.3.
 - .3 Load aggregates from individual stockpiles to Separate cold feed bins. Do not load frozen materials into bins.
 - .4 Feed aggregates to burner end of dryer drum by Means of multi-bin cold feed unit and blend to Meet job-mix requirements by adjustments of Variable speed feed belts and gates on each Bin.
 - .5 Calibrate bin gate openings and conveyor speeds To ensure mix proportions are achieved. Calibrate Weigh bridge on charging conveyor by weighing Amount of aggregate passing over weigh bridge in set amount of time. Difference between this value and amount shown by plant computer system to differ by not more than $\pm 2\%$.
 - .6 Make provision for conveniently sampling full flow of materials from cold feed.
 - .7 Provide screens or other suitable devices to Reject oversize particles or lumps of aggregates from cold feed prior to entering drum.
 - .8 Provide system interlock stop on feed components If either asphalt or aggregate from bin stops flowing.
 - .9 Accomplish heating and mixing of asphalt mix in approved parallel flow dryer-mix in which aggregate enters drum at burner end and travels parallel to flame and exhaust gas stream. Control heating to prevent fracture of aggregate or excessive oxidation of asphalt. Equip system with automatic burner controls and provide for continuous temperature sensing of asphalt mixture at discharge, with printing recorder that can be monitored by plant operator. Submit printed record of mix temperatures at end of each day.
 - .10 Mixing period and temperature to produce uniform Mixture in which particles are thoroughly coated, and Moisture content of material as it leaves mixer to be less than 0.15%.
- .3 Temporary Storage of hot mix:
 - .1 Provide heated mix storage of sufficient capacity to permit continuous operation

- and designed to prevent Segregation and localized overheating.
- .2 Do not store asphalt mix in storage bins in excess of 3 hours. Overnight storage is not permitted.
- .4 While producing asphalt mix for this Project, do not Produce mix for other users unless separate storage and Pumping facilities are provided for materials supplied To this project.
- .5 Mixing Tolerances:
 - .1 Permissible variation in physical requirements From job mix (percent of total mass) shall conform To NBDOT 260.4.3.2.
 - .2 Permissible variation of mix temperature at Discharge from plant: 5°C.
 - .1 Minimum mixing temperature: 115°C.
 - .2 Maximum mixing temperature: 165°C.

3.2 PREPARATION

- .1 When paving over existing asphalt surface, clean Pavement surface to satisfaction of Departmental Representative. When leveling course is not required, Patch and correct depressions and other irregularities To approval of Departmental Representative before Beginning paving operations.
- .2 Prior to laying mix, clean surfaces of loose and foreign material.
- .3 Fine grade granular surfaces to Departmental Representative's approval.
- .4 Contact faces of structures shall receive an application of tack coat before placing asphalt.

3.3 TRANSPORTATION OF MIX

- .1 Transport mix to job site in vehicles cleaned of Foreign material. Conform to NBDOT 260.4.3.6.
- .2 Paint or spray truck beds with limewater, soap or detergent solution, or non petroleum based commercial product, at least daily or as required. Elevate truck bed and thoroughly drain. No excess solution to remain in truck bed.
- .3 Schedule delivery of material for placing in daylight, unless Departmental Representative approves artificial light.
- .4 Deposit mix from surge or storage silo to trucks in multiple drops to reduce segregation. Do not dribble mix into trucks.
- .5 Deliver material to paver at uniform rate and in an amount within capacity of paving and compacting equipment.
- .6 Deliver loads continuously in covered vehicles and immediately spread and compact. Deliver and place mixes at temperature within range as directed by Departmental Representative, but not less than 135°C.

3.4 PLACING

- .1 Obtain Departmental Representative's approval of existing surface prior to placing asphalt.
- .2 Place asphalt concrete to thickness, grades and lines as indicated and directed by Departmental Representative. Conform to NBDOT 260.4.3.8.
- .3 Placing Conditions:
 - .1 Place asphalt mixtures only when surface temperature of material to be overlaid is above 5°C.
 - .2 When temperature of surface on which material is to be placed, falls below 10 °C, provide extra rollers as necessary to obtain required compaction before cooling.

- .3 Do not place hot-mix asphalt when pools of standing water exist on surface to be paved, during rain, or when surface is damp.
- .4 Place asphalt concrete in compacted lifts of thickness as follows:
 - .1 In layers of maximum 50mm each.
- .5 Where possible do tapering and leveling where required in lower lifts. Overlap joints by not less than 300mm.
- .6 Place individual strips no longer than 500m.
- .7 Spread and strike off mixture with self propelled mechanical finisher.
 - .1 Construct longitudinal joints and edges true to line markings. Contractor to establish lines for paver to follow parallel to centerline of proposed pavement. Position and operate paver to follow established line closely.
 - .2 When using pavers in echelon, have first paver follow marks or lines, and second paver follow edge of material placed by first paver. Work pavers as close together as possible and in no case permit them to be more than 30 m apart.
 - .3 Maintain constant head of mix in auger chamber of paver during placing.
 - .4 If segregation occurs, immediately suspend spreading operation until cause is determined and corrected.
 - .5 Correct irregularities in alignment left by paver by trimming directly behind machine.
 - .6 Correct irregularities in surface of pavement course directly behind paver. Remove shovel or lute excess material forming high spots. Fill and smooth indented areas with hot mix. Do no broadcast material over such areas.
- .7 Do not throw surplus material on freshly screened surfaces.
- .8 When hand spreading is used:
 - .1 Use approved wood or steel forms, rigidly supported to assure correct grade and cross section. Use measuring blocks and intermediate strips to aid in obtaining required cross-section.
 - .2 Distribute material uniformly. Do not broadcast material.
 - .3 During spreading operation, thoroughly loosen and uniformly distribute material by lutes or covered rakes. Reject material that has formed into lumps and does not break down readily.
 - .4 After placing and before rolling, check surface with templates and straightedges and correct irregularities.
 - .5 Provide heating equipment to keep hand tools free from asphalt. Control temperature to avoid burning material. Do not use tools at higher temperature than temperature of mix being placed.

3.5 COMPACTING

- .1 Do not change rolling pattern unless mix changes or lift thickness changes. Change rolling pattern only as directed by Departmental Representative.
- .2 Roll asphalt continuously to density not less than 92.5% of theoretical maximum relative density as determined in accordance with NBDOT 260.4.5.
- .3 General:
 - .1 Provide at least two rollers and as many additional rollers as necessary to achieve specified pavement density. When more than two rollers are required, one roller must be pneumatic tired type.
 - .2 Start rolling operations as soon as placed mix can bear weight of roller without excess displacement of material or cracking of surface.
 - .3 Operate roller slowly initially to avoid displacement of material. Do not exceed 5km/h for breakdown and intermediate rolling for static steel-wheeled and pneumatic tire rollers. Do not exceed 9km/h for finish rolling.
 - .4 Use static compaction for leveling coarse less than 25mm thick.

- .5 For lifts 50mm thick and greater, adjust speed and vibration frequently of vibratory rollers to produce minimum of 25 impacts per metre of travel. For lifts less than 50mm thick, impact spacing not to exceed compacted lift thickness.
- .6 Overlap successive passes of roller by minimum of 200mm and vary pass lengths.
- .7 Keep wheels of roller slightly moistened with water to prevent pick-up of material but do not over-water.
- .8 Do not stop vibratory rollers on pavement that is being compacted with vibratory mechanism operating.
- .9 Do not permit heavy equipment or rollers to stand on finished surface before it has been compacted and has thoroughly cooled.
- .10 After traverse and longitudinal joints and outside edge have been compacted, start rolling longitudinally at low side and progress to high side. Ensure that all points across width of pavement receive essentially equal numbers of passes of compactors.
- .11 When paving in echelon, leave unrolled 50 to 75mm of edge which second paver is following and roll when joint between lanes is rolled.
- .12 Where rolling causes displacement of material, loosed affected areas at once with lutes or shovels and restore to original grade of loose material before re-rolling.
- .4 Breakdown Rolling:
 - .1 Begin breakdown rolling immediately following rolling of transverse and longitudinal joint and edges.
 - .2 Operate rollers as close to paver as necessary to obtain adequate density without causing undue displacement.
 - .3 Operate breakdown roller with drive roll or wheel nearest finishing machine. When working on steep slopes or super-elevated sections use operation approved by Departmental Representative.
 - .4 Use only experienced roller operators.
- .5 Intermediate Rolling:
 - .1 Use pneumatic-tired, steel wheel or vibratory rollers and follow breakdown rolling as closely as possible and while paving mix temperature allows maximum density from this operation.
 - .2 Rolling to be continuous after initial rolling until mix placed has been thoroughly compacted.
- .6 Finish Rolling:
 - .1 Accomplish finish rolling with two-axle or three axle tandem steel wheeled rollers while material is still warm enough for removal of roller marks. If necessary to obtain desired surface finish, use pneumatic-tired rollers as directed by Departmental Representative.
 - .2 Conduct rolling operations in close sequence.

3.6 JOINTS

- .1 General:
 - .1 Remove surplus material from surface of previously laid strip. Do Not deposit on surface of freshly laid strip.
 - .2 Construct joints between asphalt between asphalt concrete pavement And Portland Cement Concrete Pavement as indicated.
 - .3 Paint contact surfaces of existing structures such as manholes, curbs Or gutters with bituminous material prior to placing adjacent pavement.

- .2 Transverse Joints:
 - .1 Offset transverse joint in succeeding lifts by at least 2000mm.
 - .2 Cut back to full depth vertical face and tack face with thin coat of hot asphalt prior to continuing paving.
 - .3 Compact transverse joints to provide smooth riding surface. Use methods to prevent rounding of compacted surface at joints.
- .3 Longitudinal Joints:
 - .1 Offset longitudinal joints in succeeding lifts by at least 150mm.
 - .2 Overlap previously laid strip with spreader by 25 to 50mm.
 - .3 Before rolling, carefully remove and discard coarse aggregate in material overlapping joint with lute or rake.
 - .4 Roll longitudinal joints directly behind paving operation.
 - .5 When rolling with static or vibratory rollers, have most of drum width ride on newly placed lane with remaining 150mm extending onto previously placed and compacted lane.
- .4 Construct feather joints so that thinner portion of joints contains fine graded material obtained by changed mix design or by racking out coarse aggregate in mix. Place and compact joint so that joint is smooth and without visible breaks in grade.

3.7 FINISH TOLERANCES

- .1 Finished asphalt surface to conform with the requirements of NBDOT Item 260.4.5.2 and Bump/Dip Profile Requirements of NBDOT 260.4.5.2.3.
- .2 Finished asphalt surface shall have a uniform texture and be free of visible signs of poor workmanship.

3.8 DEFECTIVE WORK

- .1 Correct irregularities which develop before completion of rolling by loosening surface mix and removing or adding material as required. If irregularities or defects remain after final compaction, remove surface course promptly and lay new material to form true and even surface and compact immediately to specified density.
- .2 Determine surface defects in accordance with NBDOT Item 260.4.5.3.
- .3 Repair areas showing checking, rippling, segregation, insufficient binder, roller marks, cracking, tearing, improper joints, tire marks, improper patches, improper repair of sampling locations, contaminants, flushed areas, or other deficiencies to the satisfaction of the Departmental Representative.
- .4 Adjust roller operation and screed settings on paver to prevent further defects such as rippling and checking of pavement.

3.9 HOURS OF WORK

- .1 Further to Section 01 11 00, unless specifically authorized by the Departmental Representative, all spreading of asphalt mix shall stop at least ½ hour before sunset and the paver shall be off the road by sunset.

3.10 POLLUTION CONTROL/SITE CLEAN-UP

- .1 Control emissions from equipment and plant to Provincial emission requirements.

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- .2 Copies of the Contractor's current Provincial Asphalt Plant Approval Permit must be provided to PSPC and the Environmental Protection Officer.