

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS	.1	Section 31 05 16 - Aggregate Materials.
1.2 REFERENCES	.1	ASTM International .1 ASTM D2041-11, Standard Test Method for Threshold Maximum Specific Gravity and Density of Bituminous Paving Mixtures. .2 ASTM D2726-14, Standard Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures.
	.2	Canada Green Building Council (CaGBC) .1 LEED Canada-NC-2009, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations.
	.3	Washington State Department of Ecology. .1 Stormwater Management Manual for Western Washington, Volume II, Construction Pollution Prevention (2015 edition).
	.4	Government of Newfoundland and Labrador, Department of Transportation and Works. .1 Department of Transportation and Works Specifications, latest revision.
1.3 ACTION AND INFORMATIONAL SUBMITTALS	.1	Submit in accordance with Section 01 33 00 - Submittal Procedures.
	.2	Product Data: .1 Submit manufacturer's instructions, printed product literature and data sheets for asphalt mixes and aggregate and include product characteristics, performance criteria, physical size, finish and limitations. .2 Submit viscosity-temperature chart for asphalt cement to be supplied showing either Saybolt Furol viscosity in seconds or Kinematic Viscosity in centistokes, temperature range 105 to 175 degrees C 4 weeks prior to beginning Work.

1.3 ACTION AND  
INFORMATIONAL  
SUBMITTALS  
(Cont'd)

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- .3 Samples:
    - .1 Inform Departmental Representative of proposed source of aggregates and provide access for sampling 4 weeks prior to beginning Work.
    - .2 Submit samples of following materials proposed for use 4 weeks prior to beginning Work.
      - .1 One 5 L container of asphalt cement.
      - .2 1 kg of hydrated lime.
  - .4 Test and Evaluation Reports:
    - .1 Submit manufacturer's test data and certification that asphalt cement meets specification requirements.
    - .2 Submit manufacturer's test data and certification that hydrated lime meets specified requirements.
    - .3 Submit asphalt concrete mix design and trial mix test results to Departmental Representative for approval at least 4 weeks prior to beginning Work.
    - .4 Submit printed record of mix temperatures at end of each day.
  - .5 Sustainable Design Submittals:
    - .1 LEED Canada submittals: in accordance with Section 01 35 21 - LEED Requirements.
    - .2 Erosion and Sedimentation Control: submit copy of erosion and sedimentation control plan in accordance with EPA 832/R-92-2005 and authorities having jurisdiction and Section 01 35 21 - LEED Requirements.
    - .3 Construction Waste Management:
      - .1 Submit project Waste Management Plan highlighting recycling and salvage requirements.
      - .2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 75% of construction wastes were recycled or salvaged.
    - .4 Recycled Content:
      - .1 Submit listing of recycled content products used, including details of required percentages or recycled content materials and products, showing their costs and percentages of post-consumer
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1.3 ACTION AND  
INFORMATIONAL  
SUBMITTALS  
(Cont'd)

- .5 Sustainable Design Submittals: (Cont'd)
  - .4 Recycled Content: (Cont'd)
    - .1 (Cont'd)  
and post-industrial content, and total cost of materials for project.
    - .2 Submit evidence, when Supplementary Cementing Materials (SCMs) are used, to certify reduction in cement from Base Mix to Actual SCMs Mix, as percentage.
  - .5 Regional Materials: submit evidence that project incorporates required percentage 20% of regional materials and products, showing their cost, distance from project to furthest site of extraction or manufacture, and total cost of materials for project.

1.4 DELIVERY,  
STORAGE AND  
HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Deliver and stockpile aggregates in accordance with Section 31 05 16 - Aggregate Materials and erosion and sedimentation control plan. Stockpile minimum 50 % of total amount of aggregate required before beginning asphalt mixing operation.
- .3 When necessary to blend aggregates from one or more sources to produce required gradation, do not blend in stockpiles.
- .4 Stockpile fine aggregate separately from coarse aggregate, although separate stockpiles for more than two mix components are permitted.
- .5 Provide approved storage, heating tanks and pumping facilities for asphalt cement.
- .6 Develop Construction Waste Management Plan related to Work of this Section and in accordance with Section 01 35 21 - LEED Requirements.
- .7 Packaging Waste Management: remove for reuse or return of pallets, crates, padding, banding, and packaging materials as specified

<u>1.4 DELIVERY, STORAGE AND HANDLING (Cont'd)</u>	.7	Packaging Waste Management: (Cont'd) in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal and Section 01 35 21 - LEED Requirements.
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PART 2 - PRODUCTS

<u>2.1 MATERIALS</u>	.1	Asphalt materials: asphalt cement and aggregates to the requirements of the Department of Transportation and Works Specifications, Section 330 - Hot Mix Asphalt Concrete.
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	.2	Asphalt Tack Coat: to the requirements of the Department of Transportation and Works Specifications, Section 0320 - Tack Coat.
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<u>2.2 EQUIPMENT</u>	.1	Pavers: mechanical grade controlled self-powered pavers capable of spreading mix within specified tolerances, true to line, grade and crown indicated.
	.2	Rollers: sufficient number of type and weight to obtain specified density of compacted mix.
	.3	Vibratory rollers: .1 Drum diameter: 1200 mm minimum. .2 Amplitude of vibration (machine setting): 0.5 mm maximum for lifts less than 40 mm thick.
	.4	Haul trucks: sufficient number and of adequate size, speed and condition to ensure orderly and continuous operation and as follows: .1 Boxes with tight metal bottoms. .2 Covers of sufficient size and weight to completely cover and protect asphalt mix when truck fully loaded. .3 In cool weather or for long hauls, insulate entire contact area of each truck box.

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- 2.2 EQUIPMENT  
(Cont'd)
- .5 Hand tools:
    - .1 Lutes or rakes with covered teeth for spreading and finishing operations.
    - .2 Tamping irons having mass 12 kg minimum and bearing area not exceeding 310 cm<sup>2</sup> for compacting material along curbs, gutters and other structures inaccessible to roller. Mechanical compaction equipment, when approved by Departmental Representative, may be used instead of tamping irons.
    - .3 Straight edges, 4.5 m in length, to test finished surface.

- 2.3 MIX DESIGN
- .1 Mix design to be approved in writing by Departmental Representative.
  - .2 Mix design to be developed by testing laboratory approved in writing by Departmental Representative.
  - .3 Asphalt Mix Design: to the requirements of the Transportation and Works Specifications, Section 330 - Hot Mix Asphalt Concrete.
    - .1 Base course.
  - .4 Do not change job-mix without prior approval of Departmental Representative. When change in material source proposed, new job-mix formula to be approved by Departmental Representative.

PART 3 - EXECUTION

- 3.1 EXAMINATION
- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for asphalt paving 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
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| 3.1 EXAMINATION<br>(Cont'd)          | .1 | (Cont'd)<br>.3 (Cont'd)<br>after receipt of written approval to proceed<br>from Departmental Representative.                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 3.2 PLANT AND<br>MIXING REQUIREMENTS | .1 | Batch and continuous mixing plants: to the<br>requirements of the Transportation and Works<br>Specifications, Section 330 - Hot Mix Asphalt<br>Concrete.                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 3.3 PREPARATION                      | .1 | Temporary Erosion and Sedimentation Control:<br>.1 Provide temporary erosion and<br>sedimentation control measures to prevent soil<br>erosion and discharge of soil-bearing water<br>runoff or airborne dust to adjacent properties<br>and walkways, according to sediment and<br>erosion control drawings.<br>.2 Inspect, repair, and maintain erosion<br>and sedimentation control measures during<br>construction until permanent vegetation has<br>been established.<br>.3 Remove erosion and sedimentation<br>controls and restore and stabilize areas<br>disturbed during removal. |
|                                      | .2 | Prior to laying mix, clean surfaces of loose<br>and foreign material.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 3.4 TRANSPORTATION<br>OF MIX         | .1 | Transport mix to job site in vehicles cleaned<br>of foreign material.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|                                      | .2 | Paint or spray truck beds with limewater,<br>soap or detergent solution, or non petroleum<br>based commercial product, at least daily or as<br>required.<br>.1 Raise truck bed and thoroughly drain,<br>and ensure no excess solution remains in truck<br>bed.                                                                                                                                                                                                                                                                                                                           |
|                                      | .3 | Schedule delivery of material for placing in<br>daylight, unless Departmental Representative<br>approves artificial light for night placing.                                                                                                                                                                                                                                                                                                                                                                                                                                             |

- 3.4 TRANSPORTATION OF MIX  
(Cont'd)
- .4 Deposit mix from surge or storage silo to trucks in multiple drops to reduce segregation.
    - .1 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.
    - .1 Deliver and place mixes at temperature within range as directed by Departmental Representative, but not less than 135 degrees C.
- 3.5 PLACING
- .1 Obtain Departmental Representative's approval of base prior to placing asphalt.
  - .2 Place asphalt concrete to thicknesses, grades and lines as indicated.
  - .3 Placing conditions:
    - .1 Place asphalt mixtures only when air temperature is 5 degrees C minimum.
    - .2 When temperature of surface on which material is to be placed falls below 10 degrees 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 indicated.
    - .1 Base course to thicknesses required but not exceeding 50 mm.
    - .2 Surface course to thickness required but not exceeding 50 mm each.
  - .5 Where possible do tapering and levelling where required in lower lifts. Overlap joints by not less than 300 mm.
  - .6 Place individual strips no longer than 500 m.
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3.5 PLACING  
(Cont'd)

- .7 Spread and strike off mixture with self propelled mechanical finisher.
  - .1 Construct longitudinal joints and edges true to line markings.
  - .2 When using pavers in echelon, have first paver follow marks or lines, and second paver follow edge of material placed by first paver.
    - .1 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.
    - .1 Remove excess material forming high spots using shovel or lute.
      - .1 Fill and smooth indented areas with hot mix.
      - .2 Do not broadcast material over such areas.
  - .7 Do not throw surplus material on freshly screeded surfaces.
- .8 When hand spreading is used:
  - .1 Use approved wood or steel forms, rigidly supported to assure correct grade and cross section.
    - .1 Use measuring blocks and intermediate strips to aid in obtaining required cross-section.
  - .2 Distribute material uniformly without broad casting material.
  - .3 During spreading operation, thoroughly loosen and uniformly distribute material by lutes or covered rakes.
    - .1 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.
    - .1 Control temperature to avoid burning material.



3.5 PLACING  
(Cont'd)

- .8 When hand spreading is used: (Cont'd)
  - .5 (Cont'd)
    - .2 Do not use tools at higher temperature than temperature of mix being placed.

3.6 COMPACTING

- .1 Roll asphalt continuously of not less than 97.5% of average theoretical maximum density of the loose mix samples for the lot, in accordance with ASTM D2041 compared to core bulk densities, in accordance with ASTM D2726.
- .2 Do not change rolling pattern unless mix changes or lift thickness changes.
  - .1 Change rolling pattern only as directed by Departmental Representative.
- .3 General:
  - .1 Provide at least 2 rollers and as many additional rollers as necessary to achieve specified pavement density. When more than 2 rollers are required, 1 roller must be pneumatic tired type.
  - .2 Start rolling operations as soon as placed mix can bear weight of roller without excess displacement of material or cracking of surface.
  - .3 Operate roller slowly initially to avoid displacement of material. Do not exceed 5 km/h for breakdown and intermediate rolling for static steel-wheeled and pneumatic tired rollers. Do not exceed 9 km/h for finish rolling.
  - .4 Use static compaction for levelling coarse less than 25 mm thick.
  - .5 For lifts 50 mm thick and greater, adjust speed and vibration frequency of vibratory rollers to produce minimum of 25 impacts per metre of travel. For lifts less than 50 mm thick, impact spacing not to exceed compacted lift thickness.
  - .6 Overlap successive passes of roller by minimum of 200 mm and vary pass lengths.
  - .7 Keep wheels of roller slightly moistened with water to prevent pick-up of material but do not over-water.

3.6 COMPACTING  
(Cont'd)

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- .3 General: (Cont'd)
    - .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.
      - .1 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 75 mm of edge which second paver is following and roll when joint between lanes is rolled.
    - .12 Where rolling causes displacement of material, loosen affected areas at once with lutes or shovels and restore to original grade of loose material before re-rolling.
  - .4 Breakdown rolling:
    - .1 Begin breakdown rolling with static steel wheeled roller immediately following rolling of transverse and longitudinal joint and edges.
    - .2 Operate rollers as close to paver as necessary to obtain adequate density without causing undue displacement.
    - .3 Operate breakdown roller with drive roll or wheel nearest finishing machine. When working on steep slopes or super-elevated sections use operation approved by Departmental Representative.
    - .4 Use only experienced roller operators.
  - .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.
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3.6 COMPACTING  
(Cont'd)

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- .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.
    - .1 If necessary to obtain desired surface finish, use pneumatic-tired rollers as directed by Departmental Representative.
  - .2 Conduct rolling operations in close sequence.

3.7 JOINTS

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- .1 General:
    - .1 Remove surplus material from surface of previously laid strip.
      - .1 Do not deposit on surface of freshly laid strip.
    - .2 Construct joints between asphalt concrete pavement and Portland cement concrete pavement as indicated.
    - .3 Paint contact surfaces of existing structures such as manholes, curbs or gutters with bituminous material prior to placing adjacent pavement.
  - .2 Transverse joints:
    - .1 Offset transverse joint in succeeding lifts by at least 600 mm.
    - .2 Cut back to full depth vertical face and tack face with thin coat of hot asphalt prior to continuing paving.
    - .3 Compact transverse joints to provide smooth riding surface. Use methods to prevent rounding of compacted surface at joints.
  - .3 Longitudinal joints:
    - .1 Offset longitudinal joints in succeeding lifts by at least 150 mm.
    - .2 Cold joint is defined as joint where asphalt mix is placed, compacted and left to cool below 100 degrees C prior to paving of adjacent lane.
      - .1 For airfield runway paving, avoid cold joint construction in mid 30 m of runway.
      - .2 If cold joint can not be avoided, cut back by saw cutting previously laid lane, by at least 150 mm, to full depth
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- 3.7 JOINTS  
(Cont'd)
- .3 Longitudinal joints: (Cont'd)
- .2 (Cont'd)
- vertical face, and tack face with thin coat of hot asphalt of adjacent lane.
- .3 Overlap previously laid strip with spreader by 25 to 50 mm.
- .4 Before rolling, carefully remove and discard coarse aggregate in material overlapping joint with lute or rake.
- .5 Roll longitudinal joints directly behind paving operation.
- .6 When rolling with static or vibratory rollers, have most of drum width ride on newly placed lane with remaining 150 mm extending onto previously placed and compacted lane.
- .4 Construct feather joints so that thinner portion of joint contains fine graded material obtained by changed mix design or by raking out coarse aggregate in mix.
- .1 Place and compact joint to ensure joint is smooth and without visible breaks in grade.
- .2 Locate feather joints as indicated.
- .5 Construct butt joints as indicated.
- 3.8 FINISH  
TOLERANCES
- .1 Finished asphalt surface to be within 5 mm of design elevation but not uniformly high or low.
- .2 Finished asphalt surface not to have irregularities exceeding 5 mm when checked with 4.5 m straight edge placed in any direction.
- 3.9 DEFECTIVE WORK .1 Correct irregularities which develop before completion of rolling by loosening surface mix and removing or adding material as required.
- .1 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.
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- 3.9 DEFECTIVE WORK .2 Repair areas showing checking, rippling, or  
(Cont'd)
- .3 Adjust roller operation and screed settings  
on paver to prevent further defects such as  
rippling and checking of pavement.
- 3.10 TESTING .1 Inspection and testing of asphalt will be  
carried out by independent inspection and  
testing agency designated by Departmental  
Representative. Costs of these tests will be  
paid by Contractor in accordance with Section  
01 29 83 - Payment Procedures for Testing  
Laboratory Services and Section 01 45 00 -  
Quality Control.
- 3.11 CLEANING .1 Progress Cleaning: clean in accordance with  
Section 01 74 11 - Cleaning.  
.1 Leave Work area clean at end of each  
day.
- .2 Final Cleaning: upon completion remove  
surplus materials, rubbish, tools and  
equipment in accordance with Section 01 74 11  
- Cleaning.
- .3 Waste Management: separate waste materials  
for reuse and recycling in accordance with  
Section 01 74 21 - Construction/Demolition  
Waste Management and Disposal and Section  
01 35 21 - LEED Requirements.  
.1 Remove recycling containers and bins  
from site and dispose of materials at  
appropriate facility.