

**PART C ASPHALT CONSTRUCTION**

**ASPHALT CONCRETE, GENERAL**

**320**

**320.1 DESCRIPTION**

These requirements are applicable to all types of hot mixed asphalt pavements irrespective of class, type, asphalt material, or pavement use. Exceptions to the general requirements are in the specified requirements for each class.

The work consists of one or more courses of asphalt concrete mixture constructed on a prepared foundation.

**320.2 MATERIALS**

**A. Composition of Mixtures:** The asphalt concrete shall be composed of a mixture of aggregate, asphalt binder, additives, and approved modifiers. No reclaimed asphalt pavements (RAP) are allowed in the asphalt concrete unless specified in the plans. Aggregate fractions shall be combined in such proportions that the resulting mixture meets the specified requirements.

The operation of the plant shall not commence until the Bituminous Engineer has established, in writing, a job mix formula, meeting the aggregate and mix design specifications for the class of asphalt concrete specified. The job mix formula established by the Bituminous Engineer shall fix a single percentage of aggregate passing each required sieve size, a single percentage of asphalt binder to be added to the aggregate, a single asphalt binder application temperature at the mixer, a single temperature at which the mixture is to be discharged from the mixer, and a single temperature at which the mixture is to be delivered to the road. The following table sets forth the tolerances for the job mix formula:

3/8 inch (9.5 mm) & larger .....	±7%
No. 4 thru No. 40 (4.75 mm thru 425 m) .....	±5%
No. 200 (75 m) .....	±2.0%
Asphalt Binder Content .....	±0.3%
Temp. of Mixture when emptied from mixer .....	±20 F (±11 C)
Temp. of Mixture on delivery to the road .....	-20 F & +30 F (-11 C & +17 C)
Asphalt Binder Application Temperature .....	±20 F (±11 C)

The mixture shall conform within the range of tolerances established by the job mix formula for that class of asphalt concrete. Should a change in sources of materials be proposed or when unsatisfactory results are obtained a new job mix formula shall be established.

<u>MIX DESIGN SPECIFICATIONS</u>			
<u>MIX DESIGN PARAMETERS</u>	<u>Class D</u>	<u>Class E</u>	<u>Class G</u>
% Air Voids	3.0 Min.	3.5 Min.	4.0 Min.
% VMA* 3/4" (19 mm) nominal maximum size	13.0 Min.	13.5 Min.	14.0 Min.
1/2" (12.5 mm) nominal maximum size	14.0 Min.	14.5 Min.	15.0 Min.
Marshall Blows	50	50	50
Marshall Stability	1000 Min.	1500 Min.	1800 Min.
Marshall Flow	8-18	8-16	8-16
Dust/Binder Ratio (based on effective binder)	0.6-1.4	0.6-1.4	0.6-1.4
Moisture Sensitivity**	NA	NA	70 Min.

\* Evaluated for compliance during the mix design . If the percent passing the 1/2-inch (12.5 mm) sieve is greater than or equal to 90 percent the mix shall be considered 1/2-inch (12.5 mm) nominal maximum size. If the percent passing the 1/2-inch (12.5 mm) sieve is less than 90 percent the mix shall be considered 3/4-inch (19 mm) nominal maximum size. Mixes containing 80% or more crushed limestone ledge rock shall meet the VMA requirements of 13.0 % Min. for a 3/4" (19mm) nominal maximum size and 14.0 % Min. for 1/2" (12.5 mm) nominal maximum size.

\*\* Moisture sensitivity will be tested according to SD 309. Hydrated lime shall be used to meet the moisture sensitivity requirement of the mix. Hydrated lime will not be required if the moisture sensitivity requirements are met without the addition of hydrated lime. Hydrated lime will not be included in the Dust (-#200) /binder ratio.

**B. Aggregates:** Aggregates shall conform to Section 880.

**C. Asphalt Binder:** Asphalt binder shall conform to Section 890.

**D. Shoulder Joint Sealant:** Joint sealant shall conform to Section 870.

**E. Additives:** An additive is any material added to a bituminous mixture or material, such as mineral filler, asphalt additives, and similar products, that does not have a specific pay item. Additives shall not be incorporated into the mixture without approval of the Bituminous Engineer.

**F. Hydrated Lime:** Hydrated lime shall conform to Section 760.

### 320.3 CONSTRUCTION REQUIREMENTS

**A. Weather and Seasonal Limitations:** Asphalt concrete shall not be placed when the underlying surface is wet or frozen. Asphalt concrete shall not be placed when weather conditions prevent proper handling, compaction, or finishing. The temperature and seasonal limitations are as follows:

#### Minimum Air Temperatures & Seasonal Limitations

Compacted Thickness	Surface Course		Subsurface Course & Shoulder Courses	
	Min. Temp	Seasonal Limits	Min. Temp	Seasonal
1 (25 mm) or less	45°F (7°C)	May 1 to Oct 15 (incl.)	45°F (7°C)	None
over 1" (25 mm)	40°F (4°C)	May 1 to Oct 15 (incl.)	40°F (4°C)	None

For Class S asphalt concrete the following seasonal restrictions shall apply:

Construction will be permitted only between June 1 and September 15, inclusive, and when the air and surface temperatures are 60 F (16 C) or greater in the shade.

## **B. Equipment:**

- 1. Requirements for All Plants:** The central plant for mixing the mineral aggregate and asphalt binder may be a batch or drum mix type mixing plant.

When mineral filler hydrated lime, or other additives are required, a separate feed system shall be provided to store and accurately and uniformly proportion the required quantity into the mixture. All cold feed bins shall be equipped with dividers to prevent overflow of aggregate to adjacent bins.

The plant shall be equipped with emission control equipment including a dust collector capable of eliminating or conserving the dust necessary to meet gradation limits and environmental standards.

Burner fuel used for production of asphalt concrete shall be propane, butane, natural gas, Grade 1 fuel oil, Grade 2 fuel oil, Grade 4 fuel oil, Grade 4 (light) fuel oil, or Grade 5 (light or heavy) fuel oil. Fuel heavier than Grade 2 shall meet the requirements of ASTM D396. Recycled fuel oils, RFO4, RFO5L, and RFO5H may also be used provided they meet the requirements of ASTM D6448. The Contractor shall certify that each load of fuel meets the applicable ASTM specification. Recycled fuel oils and fuel oils heavier than Grade 2 shall be properly preheated and efficiently burned. Production of mix shall be stopped if flameouts or signs of incomplete combustion occur.

A pyrometer or other thermometric instrument shall be installed in the supply line between the storage tank and the discharge point in the plant to accurately measure the temperature of the asphalt binder.

The plant shall be equipped with accurate weighing or volumetric measurement devices.

Asphalt binder storage tanks shall be kept level. Accurate calibration charts which show the quantity of material contained in a tank at each 1/4 inch (5 mm) increments of depth and a suitable device to measure the depth of the material, shall be provided. Storage tanks shall uniformly heat the material, under effective and positive control, to the required temperature. Heating shall be accomplished by steam coils, electricity, or burners, provided the flame does not come in direct contact with the heating tank. The asphalt circulating system shall be of adequate size to insure proper and continuous circulation during the entire operating period.

If hydrated lime is used, the Contractor's hydrated lime system shall be equipped with scales to accurately determine the amount of hydrated lime used at any time. Alternate methods to accurately determine the amount of lime used must be approved by the Engineer. Hydrated lime shall be added at the specified rate with a tolerance of  $\pm 0.10$  percent by weight of mix.

- 2. Batch Type Mixing Plants:** Batch type plants shall have at least two storage bins with sufficient capacity to furnish the quantity of mineral aggregate materials necessary to operate at the calibrated capacity of the plant. Each compartment shall have partitions that prevent diversion of materials into other compartments. Vibrators shall be provided to prevent bridging or arching of the bin contents.

Batch plants shall be fully automatic, to the extent that the only manual operation required would be for the proportioning of one batch utilizing a single actuation switch or starter.

The automatic unit shall include a timer to automatically control the measuring, mixing and dumping processes through a central control. The automatic unit shall include a time lock device, which is capable of controlling the operations of a complete mixing cycle.

A recording pyrometer shall be mounted in the discharge chute of the dryer. Daily charts of continuous aggregate temperature readings shall be submitted to the Engineer.

- 3. Drum Mix Plants:** The dryer drum shall uniformly heat, coat and mix the materials without overheating the materials and adversely affecting the mixture.

**a.** Materials and additives shall be fed simultaneously into the dryer. Recycled asphalt (RAP) when specified to be used shall be fed at the midpoint of the drum unless the drum mix plant has a manufacturer's design technology made specifically for RAP entry at a different location.

**b.** The aggregate feed system shall provide positive control of the aggregate feed that can be easily and accurately calibrated. The rate of feed shall be continuously monitored, by belt scale, or other device that is interlocked with the asphalt metering mechanism.

**c.** The asphalt metering device shall positively control the rate asphalt is introduced into the mixture and shall respond instantaneously to variation in the aggregate feed rate.

**d.** Production shall be limited to the rate required to obtain uniform aggregate coating and a uniform mixture meeting job mix temperature requirements. The rate must be within manufacturers rated plant capacity.

**e.** A recording pyrometer shall be mounted in the discharge end of the mixer for determining the temperature of the mix. Daily charts of continuous mix temperature readings shall be submitted to the Engineer.

- 4. Pavers:** Self-propelled pavers shall be equipped with a hopper having a bottom conveyor, a full width vibrating screed with heaters and capable of spreading and finishing the mix to the specified widths, typical section and thickness. Hydraulic extendable screeds may be used for variable width pavements. The paver shall have an auger that extends to within one foot from either edge of the vibrating screed. The paver shall provide an accurate, smooth, uniform textured spread, and provide preliminary compaction.

An attachment shall be provided on the paver that will place a beveled edge on the mat as specified.

Pavers shall be equipped so that the height and transverse slope of the screed is automatically controlled using a fixed or traveling stringline on either or both sides of the paver. The traveling stringline shall utilize either mechanical skis or non-contacting grade averaging sensors. The traveling stringline shall have a minimum effective length of 28 feet (8.5 meters). The traveling stringline shall be attached and positioned on the paver to reference off the adjacent lane, with the sensor of the control system resting midway between the ends.

- 5. Rollers:** Rollers for compacting the asphalt concrete shall be of the self-propelled type, capable of producing a smooth surface finish. The number and weight of rollers furnished shall be sufficient to compact the mix to the required density. The rollers shall be capable of being reversed smoothly.

Rollers shall be equipped to prevent "pickup" on the tires or drums. Moistening the drums or tires with water, a water detergent solution, or enclosing the roller to prevent heat loss from the tires may be required. The use of fuel oil or other petroleum solvents to prevent "pickup" will not be permitted. Measures shall be taken to prevent oil, grease, or fuels from being dropped on the mat by rollers or any other type of equipment.

### C. Preparation of the Mineral Aggregate:

- 1. Stockpiling Aggregate:** The following requirements apply unless the bid item for asphalt concrete composite is provided.

Stockpiles of mineral aggregate for Asphalt Concrete shall be built in layers, completing each layer over the full area of the pile before the next layer is started. The height of each layer shall be controlled to minimize segregation. The maximum drop of the materials from the conveyor shall not exceed 10 feet (three meters). Coning shall not exceed 10 feet (three meters). The stockpile shall be leveled with rubber tired equipment between layers to maintain a level platform for the next layer. Dumping, casting, or pushing over the sides of the previous layers will not be permitted. Segregated piles will be rejected until corrected. The equipment operating on the pile shall be free of dirt, grease, oil, and other contaminants. The size of the equipment shall be limited to that which can be operated on the stockpile without degradation of the material. The leveling requirement will be waived for the fines stockpile when split on a 1/4 inch (6.3 mm) or smaller screen unless there is indication of segregation. Aggregate stockpiles shall be kept separate and adequate measures to prevent contamination must be used at stockpile sites.

- 2. Stockpile Tests:** The following requirements apply unless the bid item for asphalt concrete composite is provided.

The Contractor shall run process control tests on the mineral aggregate when producing material. A gradation, PI, crushed and lightweight particles test shall be run for every 1500 tons (1500 metric tons) produced per pile. The Contractor shall also test the quality (abrasion and soundness) of the mineral aggregate. The quality shall be tested once per source. All

sampling and testing shall be accomplished in accordance with the South Dakota Department of Transportation Materials Manual. The Engineer may reduce the frequency of the stockpile tests on ledge rock sources depending on the quality and uniformity of the materials. Test results shall be recorded on forms furnished by the Department, and shall be immediately submitted to the Engineer.

- 3. Mix Design Submittal:** The asphalt concrete mix designs shall be performed by the Department in the central office bituminous lab. 50 percent of the plan quantity, or 15,000 tons (15,000 metric tons), which ever is less, of the mineral aggregate shall be produced prior to submission for the mix design. The materials for the mix design shall be submitted a minimum of 15 working days prior to hot mix production. Mix designs will not be performed on samples that are not submitted through the Area Engineer and accompanied by the following:
- a. A properly filled out data sheet (DOT 1), including the legal description of all mineral aggregate sources.
  - b. The mineral aggregate samples submitted shall be representative of the materials produced for the project.
  - c. The average stockpile test results of each mineral aggregate stockpile produced along with the recommended bin splits of each material produced.
  - d. A minimum of two 1 quart (two 1 Liter) samples of asphalt binder intended for use on the project.
  - e. A temperature viscosity curve (chart) or required mixing temperature for the asphalt binder intended for use and the specific gravity of the asphalt binder. The asphalt binder supplier shall provide the recommended lab mixing and compacting temperatures and the recommended field mixing and compaction temperatures for modified asphalt binders.

Two mix designs per type will be made by the Department without charge. Should the Contractor desire an additional mix design, or if additional mix designs are required due to the materials not meeting specifications, the costs involved shall be at the Contractor's expense.

- 4. Proportioning of Aggregates:** If blending of aggregates is required, separate bins or stockpiles shall be provided. Materials shall be kept separated until they are delivered in their proper proportions onto the feeder leading to the dryer. Spreading or dumping filler, sand, or crushed rock over the tops of gravel pits, stockpiles or in hoppers at the crushing plants will not be permitted. Charging bins directly from pits, crusher, or screening plants will not be permitted.

The mineral aggregate exclusive of other additives shall be separated into at least two fractions dividing on the No. 4 sieve (4.75 mm), or other size agreed upon, and placed into separate compartments ready for proportioning and mixing.

- D. Preparation of the Mixture:** The mineral aggregate shall be satisfactorily mixed with the proper quantity of asphalt binder at the central mixing plant.

The mixing plant shall be operated using automatic controls. Manual operation will be permitted for the remainder of the day when automatic controls fail, provided specified results are obtained. The Contractor shall restore automatic operation prior to the next day's production.

The asphalt binder shall be added to the mix in the proportionate quantity and at the temperature established by the job mix formula.

After introducing the required aggregate and asphalt binder into the mixer, the materials shall be continuously mixed until the aggregate is completely and uniformly coated and a thorough distribution of the asphalt throughout the aggregate is obtained.

Hydrated lime, when added, shall be added at the pugmill to moistened aggregate containing a minimum moisture content of 1.0 percent above the saturated surface dry condition of the aggregate. The mixing of the aggregate, hydrated lime, and water shall be accomplished by using an enclosed twin-shaft pugmill with a minimum effective length of 4.5 ft (1.4 m). A water spray must be used at the pugmill to prevent fugitive lime dust from being released into the air.

When hot mix storage bins are used, storage of the mix shall be limited to a maximum of 15 hours.

- E. Transportation and Delivery of the Mixture:** The mixture shall be transported from the plant to the point of use in pneumatic tired vehicles. The vehicle boxes shall be tight, clean, and smooth. Boxes shall be cleaned only with lime water, soap, a detergent solution, or an approved commercial product. Oil, diesel fuel, or other petroleum solvents shall not be used. Excess solution in the box shall be disposed of before the vehicle is loaded.

Night operations in urban areas may be permitted, night operations in rural areas will not be permitted.

Loads shall be tarped in inclement weather conditions and when directed to do so by the Engineer.

- F. Tacking, Spreading, and Compacting:** The surface, including all vertical contact faces, on which the asphalt concrete is to be placed, shall be tacked in accordance with Section 330. The tack coat shall be allowed a cure period, as determined by the Engineer, prior to asphalt concrete placement.

Asphalt concrete shall be placed by self-propelled pavers. Handwork is permissible in inaccessible or odd shaped areas.

Paver laid mix shall be spread using automatic transverse and longitudinal grade controls. If the automatic controls fail or malfunction, the Engineer may permit manual operation for the remainder of the day, provided the finished product meets the specifications. Frequent breakdowns shall constitute cause for suspension of the work until repair or replacement is made.

Following placement of the first pass using the traveling stringline for control, adjacent passes and succeeding lifts shall be placed using the traveling stringline riding on the previously laid material. A shoe attachment may be used to match the longitudinal joint(s) on the final paver pass(es) of the top lift unless otherwise directed by the Engineer.

A shoe attachment on the paver shall be used to automatically match the elevation of asphalt concrete shoulders with concrete pavements.

Automatic slope controls will be required on paving equipment for placing asphalt concrete on shoulders [8 feet (2.4 meters) or more in finished width] next to asphalt or concrete pavement.

Asphalt concrete shall be placed directly on the roadbed in a uniform windrow and then fed into the paver by a paver feeder. The use of a paver feeder is not required on shoulders, turning lanes less than 500 feet (150 m), roadway paving less than 500 feet (150 m), and transitions into bridge decks less than 500 feet (150 m). The paver feeder shall pick up substantially all of the mix and feed it into the paver without segregation. A Material Transfer Vehicle (MTV) which takes material directly from the trucks, stores and mixes it, and then dumps into the paver hopper may be used if approved by the Engineer.

The size of the windrow shall be regulated so the paver is fed a continuous and adequate supply of mix.

The "temperature of mixture on delivery to the road" shall be defined as the temperature of the mix just prior to placement or just prior to spreading by blade.

Spot leveling and repair of the existing surface with asphalt concrete shall be required prior to the paver laid courses at locations designated. Potholes and areas of localized disintegration shall be cleaned of loose material, squared, tacked, leveled with asphalt concrete, and satisfactorily compacted. Spot leveling may be blade laid in lifts not exceeding 3 inches (75 mm) of uncompacted depth. Compaction shall be by the specified roller coverage method, except a steel face roller will not be required.

On the final surfacing lift, laydown operations shall commence at the farthest point and progress continuously toward the plant.

On rural projects, a partial width pass may be extended beyond the adjacent pass by as much as one day's run. The paver shall be moved back the following working day to place the adjoining pass. Where a difference in elevation exists between two lanes carrying traffic in the same direction on rural multilane asphalt concrete construction, one of the effected lanes shall remain closed to traffic.

The plant production and availability of hauling vehicles shall be sufficient to provide a uniform and consistent quantity of asphalt concrete to the paver so laydown operations are continuous. Stops and starts shall be restricted to a minimum. Stopping normal laydown operations to surface an approach, thereby creating an unnecessary joint will not be permitted.

Laydown operations shall proceed from the center to the shoulders of the roadbed surface. When turning lanes are present, the Contractor may alter the laydown operation. The Contractor shall submit his proposed laydown operation to the Engineer for prior approval. The center joints of succeeding lifts shall be offset approximately 6 inches (150 mm). The center joint of the top lift shall be located on centerline. Longitudinal joints below the top lift shall be offset from the previously constructed joints by approximately 6 in. (150 mm), and be located within 12 in. (300 mm.) of the lane line. In curb and gutter sections, laydown may proceed from the gutter line to the centerline.

Transverse joints of the final lift shall be formed by sawing back the previous run to expose the full depth of the course. The finished transverse joint of all lifts shall have a uniform texture and comply with the straightedge requirement. Waste material resulting from forming joints and temporary ramps shall be removed and disposed of.

Segregation or excessive pulling of the mix shall warrant suspension of operations.

Immediately after the mix has been placed and surface irregularities adjusted, it shall be thoroughly and uniformly compacted by rolling.

Vibratory rollers shall have an automatic shutoff to deactivate the vibrators when the roller speed is less than 0.5 mph. They shall operate according to the manufacturer's recommendations for speed, impacts per foot, and amplitude of vibration for the thickness of mix being compacted. Rollers shall be operated with the drive wheel nearest the paver.

Rolling shall be longitudinal, commencing at the outer edges of the mat and progressing toward the center in straight, parallel strips, overlapping at least 6 inches (150 mm). On superelevated curves, rolling shall progress from the lower to the upper edge. The Contractor shall vary the points of reversal to prevent a transverse crease. The rollers shall not stand idle on any part of the mat, which has not been completed and cooled sufficiently to resist deformation.

The beveled edge shall be satisfactorily compacted.

Longitudinal joints shall be compacted in accordance with the following:

- a.** For confined edges, on the first pass adjacent to the confined edge, the compaction equipment shall be entirely on the hot mat 6 in. (150 mm) from the longitudinal joint.
- b.** For unconfined edges, the compaction equipment shall extend 6 in. (150 mm) beyond the edge of the mat.

The surface of each lift shall be free of waves and other irregularities. The final lift surface shall be checked with a 10-foot (three-meter) straightedge. The variation of the surface from the straightedge between any two contact points shall not exceed 0.02 foot (6 mm). The crown, on all lifts, as indicated by checking with a 10-foot (three-meter) straightedge, shall be within 0.04-foot (13 mm) of specified crown in any 10 foot (three meter) length.

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Irregularities shall be corrected while the material is in a workable condition. Under no circumstances shall operations continue when it becomes evident final rolling is not producing a smooth, uniform, compacted surface free from roller marks and other irregularities.

The mix shall be compacted on the road by one of the following methods. Unless otherwise specified, the Specified Density Method shall be used.

1. **Specified Density Method:** The mix shall be compacted to the density specified for the class of asphalt concrete designated. The percent of density shall be based on the maximum specific gravity of the test specimens prepared in the field in accordance with SD 312. The compacted density of asphalt concrete shall be determined according to SD 311.

Compaction rolling shall be completed before the temperature of the mix drops below 175° F (80° C). Vibratory rollers may be used in the static mode for finish rolling.

Compaction of mix placed on entrances to farms, residences, or businesses and intersecting road approaches shall be compacted by the specified roller coverage method.

2. **Specified Roller Coverages:** The mix shall be compacted by at least four complete coverages with pneumatic tired rollers and at least one complete coverage with steel faced rollers, or as approved by the Engineer.

Breakdown rolling may be accomplished by steel-faced rollers, only when approved by the Engineer.

Self-propelled pneumatic tired rollers shall cover an overall surface width of at least 60 inches (1500 mm) and furnish a minimum rolling weight (mass) of 250 pounds per inch (4.5 kilograms per millimeter) of roller width.

Self-propelled tandem smooth steel rollers (two steel drums operating in the same track) shall furnish a minimum rolling weight (mass) of 275 pounds per inch (4.9 kilograms per millimeter) of roller width.

Rolling shall proceed on the mat as soon as lay down is completed. Completion of rolling on any segment shall not lag behind the laydown more than 1000 feet (300 meters). During periods of cool weather this maximum distance between laydown and final rolling shall be reduced as directed.

Compaction to a specified density will not be required. However, additional roller coverage may be required in order to obtain a smooth surface finish.

When directed by the Engineer, the Contractor shall cool, saw and remove an undamaged, 6 inch (150 mm) square sample, or a 6 inch (150 mm) diameter round sample from a designated area and repair the hole to the satisfaction of the Engineer.

- G. **Maintenance:** The Contractor shall maintain the work during construction and until final acceptance. Maintenance shall include protection and repair of the prepared base course, tack

coat, wearing surface mat, shoulders, and seal course. Rich or bleeding areas, breaks, raveled spots, or other nonconforming areas in the wearing surface or base shall be corrected.

- H. Traffic Control:** Hauling or allowing traffic on the roadway will not be permitted until the surface has been compacted and cooled sufficiently to resist marking or distortion.

Where traffic is to be maintained by means of part width construction, the Contractor shall control all traffic by identified pilot cars and flaggers. The Contractor shall schedule work so traffic will not be greatly inconvenienced with long one-way lanes.

- I. Shoulder Joints:** When specified a continuous groove shall be constructed by forming, sawing, or routing the joint between the Portland cement concrete pavement and the asphalt concrete shoulder.

Sawing may be done with either diamond or water-cooled abrasive blades.

If a router is used it must be capable of cutting a groove to the required dimensions. Equipment designed to plow the groove to dimension will not be permitted. The walls of the finished groove shall be vertical and the groove bottom shall be flat.

The groove shall be thoroughly cleaned immediately after forming, sawing, or routing. Dry sawed joints shall be cleaned with high-pressure air. Wet sawed joints shall be cleaned with high-pressure water followed by high-pressure air. The air compressor shall produce a minimum of 125 CFM (0.06 cubic meters per second) output and shall be equipped with a maximum 3/4 inch (20 mm) nozzle. The groove (including the sides) shall be free of dirt, dust, water, oil, grease, and loose material immediately prior to sealing. The Portland cement concrete surface shall be free of asphalt and any curing compound that would prevent bonding. The groove shall be completely dry and filled level with joint sealer by a sealing device, which will not entrap air in the sealed joint.

Joint sealer application will not be permitted when the air temperature near the joint is less than 40° F (5°C) or is 40° F (5°C) and falling.

#### 320.4 METHOD OF MEASUREMENT

- A. Asphalt Binder:** Asphalt binder will be measured to the nearest 0.1 ton (0.1 metric ton).
- B. Asphalt Concrete:** Asphalt concrete will be measured to the nearest 0.1 ton (0.1 metric ton) for the class specified. The mixture of mineral aggregate and asphalt binder will be weighed after mixing. No deduction will be made for the weight of the asphalt binder included in the mixture.

Deduction will not be made for material removed from temporary approaches authorized by the Engineer.

- C. Compaction Samples:** Samples will be measured by actual count of samples ordered and accepted by the Engineer.

- D. Sawing and Sealing Shoulder Joints:** Field measurement for this work will not be required. Plan quantity will be the basis of payment. If changes are ordered by the Engineer, the length will be measured and the quantity adjusted.
- E. Hydrated Lime:** Hydrated lime, when provided as an additive to the asphalt concrete mixture, will be measured to the nearest 0.1 ton (0.1 metric ton).
- F. Stockpile Tests:** Stockpile tests will not be measured for payment.

### 320.5 BASIS OF PAYMENT

- A. Asphalt Binder:** The accepted quantities of asphalt binder will be paid for at the contract unit price per ton (metric ton). The amount bid for this item shall be at least the cost of the asphalt binder furnished and delivered to the project site.
- B. Asphalt Concrete:** The accepted quantities of asphalt concrete will be paid for at the contract unit price per ton (metric ton) complete in place.
- C. Compaction Samples:** Compaction samples will be paid for at the contract unit price per each.
- D. Sawing and Sealing Shoulder Joints:** Sawing and sealing shoulder joints will be paid for at the contract unit price per foot (meter).
- E. Hydrated Lime:** Hydrated lime will be paid for at the contract unit price per ton (metric ton) complete in place.
- F. Stockpile Tests:** There will be no direct payment for the stockpile testing and related requirements. All costs related to the testing for labor, test equipment, laboratory, tools and all incidentals required to satisfactorily perform the required work shall be incidental to the asphalt concrete pavement items.