STANDARD CONSTRUCTION SPECIFICATIONS
FOR ASPHALT SURFACING
DIVISION 40
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STANDARD CONSTRUCTION SPECIFICATIONS
FOR ASPHALT SURFACING
DIVISION 40

SECTION 40.01 GENERAL

Article 1.1 Scope of Work

The Work covered by these Specifications consists of providing all plant, labor, equipment supplies, material, transportation, handling, and storage, and performing all operations necessary to complete the construction of hot mix asphalt concrete pavement consisting of one or more courses on a previously prepared base, seal coat of asphalt cement and cover aggregate, and bituminous surface treatment in single or multiple courses.

Article 1.2 Applicable Standards

The latest revision of the following standards: American Society for Testing and Materials (ASTM), American Association of State Highway and Transportation Officials (AASHTO), and State of Alaska Department of Transportation and Public Facilities, Alaska Test Methods and Standard Practices (ATM) are hereby made a part of these Specifications. Additionally, the Western Alliance for Quality Transportation Construction (WAQTC) Test Methods and Procedures are hereby incorporated into these Specifications. The test designations listed below are those that are currently specified for use in this Division.

ADOT&PF Alaska Test Method 312	Nordic Abrasion
ASTM C-29	Test for Unit Weight of Aggregate
ASTM C-88	Test for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C-117	Test for Materials Finer than No. 200 Sieve in Mineral Aggregates
ASTM C-127	Test for Specific Gravity and Absorption of Coarse Aggregate
ASTM C-128	Test for Specific Gravity and Absorption of Fine Aggregate
ASTM C-131	Test for Resistance to Abrasion of Small Size Coarse Aggregate by Use of Los Angeles Abrasion Machine Test for Sieve or Screen Analysis of Fine and Coarse Aggregate
ASTM C-183	Sampling Hydraulic Cement
ASTM D-75	Sampling Stone, Slag, Gravel, Sand and Stone Block for Use as Highway Materials
ASTM D-140	Sampling Bituminous Materials
ASTM D-242	Specification for Mineral Filler for Bituminous Paving Mixtures
ASTM D-4125	Standard Test Method for Asphalt Content of Bituminous Mixtures by

	Nuclear Method
ASTM D-4791	Flat and Elongated Particles
ASTM D-5821	Percent Fracture
AASHTO M-29	Fine Aggregate for Bituminous Paving Mix
AASHTO M-43	Standard Size of Coarse Aggregate for Highway Construction
AASHTO M-156	Requirements for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.
AASHTO M-208	Specification for Cationic Emulsified Asphalt
AASHTO M-226	Viscosity Graded Asphalt Cement - Table Three (3)
AASHTO M-320	Standard Specifications for Performance-Graded Asphalt Binder
AASHTO T-30	Test for Mechanical Analysis of Extracted Aggregate
AASHTO T-43	Test for Specific Gravity of Bituminous Materials
AASHTO T-85	Specific Gravity and Absorption of Coarse Aggregate
AASHTO T-180-D	Test for Moisture-Density Relations of Soils
AASHTO T-102	Spot Test of Asphaltic Materials
AASHTO T-164	Test for Quantitative Extraction of Bitumen*
AASHTO T-195	Test for Coated Particles for Bituminous Mixtures
AASHTO T-168	Sampling Bituminous Paving Mixtures
AASHTO T-304	Uncompacted Void Content of Fine Aggregate (Fine Aggregate Angularity)
AASHTO T-308	Determining the Asphalt Content of Hot Mix Asphalt (HMA) by Ignition Method
AASHTO T-209	Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
AASHTO T-166	Bulk Specific Gravity of Compacted Bituminous Mixtures Using Saturated Surface Dry Specimens
AASHTO T-275	Bulk Specific Gravity of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens

* In lieu of the specified methods, the Engineer may permit the use of a nuclear asphalt gauge.

The following standards of The Asphalt Institute are also a part of these Specifications:

Construction Specifications for Asphalt Concrete, by The Asphalt Institute.

Mix Design Methods for Asphalt Concrete, by The Asphalt Institute.

The number of blows of the Compaction hammer used in the Marshall Mix Design will be fifty (50) blows per side of specimen.

Article 1.3 Subsurface Investigation

Information pertaining to subsurface exploration, boring, test pit locations, and other preliminary investigation may appear in the Contract Documents, or be available at selected locations for review by the Bidder. While such data will have been collected with reasonable care, there is not expressed or implied guarantee that conditions so indicated are exact or entirely representative of those actually existing. The Bidder shall make his or her own interpretation of results of such investigations and satisfy himself as to the conditions to be encountered.

Article 1.4 Materials and Inspection

Representative samples of all materials proposed for use under these Specifications shall be submitted to the Engineer for testing. The Contractor shall submit these materials at his own expense. Material shall not be used until it has been approved by the Engineer.

For verification of weights and measures, character of materials, and determination of temperatures used in the preparation of the paving mixes, the Engineer or his authorized representative shall at all times have access to all portions of the paving plant, aggregate plant, storage yards, and other facilities for producing and processing the material construction.

Article 1.5 Stripping Test for Aggregates

The use and proportions of antistrip agents shall be determined by ATM T-14 and be included in job mix design. At least seventy percent (70%) of the aggregate shall remain coated when tested in accordance with ATM T-14.

Article 1.6 Payment - General

Payment for all Work included in this Division shall be paid for in accordance with Division 10, Section 10.07 - Measurement and Payment, and shall include full payment for all Work described.

SECTION 40.02 SEAL COAT

Article 2.1 Description

The Work under this Section consists of the performance of all Work required for the construction of a seal coat of asphalt cement and cover aggregate on RAP, strip-paved, and gravel surfaces.

Article 2.2 Asphalt

The Contractor shall submit a certified analysis of the proposed asphalt from the refinery laboratory to the Engineer for review and approval. A copy of the certified analysis shall accompany each shipment of asphalt to the Project. The Engineer shall reserve the right to make check tests of the asphalt received on the Project site, and if the asphalt is not in accordance with the certified analysis, he may reject the material.

The asphalt required by these Specifications shall conform to the requirements of The Asphalt Institute for the type and grade shown below:

Asphalt for Seal Coating	CRS-2 or CRS-2P

Article 2.3 Cover Aggregate

A. General

Cover aggregate shall consist of crushed gravel and shall be sound, durable, free of adherent coatings of clay, dirt or any other objectionable matter, and shall have a percentage of wear not to exceed forty (40) after five hundred (500) revolutions, as determined by ASTM C-131. Fractured Face Count shall conform to Section 40.06, Article 6.2 - Material and Testing. The cover aggregate shall have the following gradation:

Sieve Size	Percentage Passing Sieve
1/2"	100
3/8”	90-100
#4	10-30
#8	0-8
#200	0-1

B. Stripping Test for Aggregates

Cover aggregate shall show no detrimental amount of stripping when tested as described in Section 40.01, Article 1.5 - Stripping Tests for Aggregates.

Regardless of the test results, a "non-stripping" additive shall be added to the asphalt in the amount of one-half percent (0.5%) by weight of the asphalt. Such additive material shall be of quality and grade acceptable to the Engineer.

Article 2.4 Equipment

A. General

All equipment used on this Work shall be of sufficient size and in such mechanical condition as to meet the requirements and to produce the Work to the specified quality.

B. Pressure Distributor

The bitumen distributor shall be pneumatic-tired, self-propelled, and shall have a capacity of not less than eight hundred (800) gallons. It shall be equipped with an independently-operated bitumen pump, tachometer, pressure gauges, volume metering devices, a thermometer for reading the tank temperature, and a hose attachment suitable for applying the bituminous material to spots unavoidably missed by the distributor. The independently-operated bitumen pump shall be equipped with a tachometer calibrated in revolutions per minute. The distributor shall also be equipped to agitate and circulate the bituminous material during the heating process. Spray bars shall be the circulating type with extensions, available for distributing width from eight to twenty-one feet (8’ to 21’) by one foot (1’) increments.

The nozzle shall give uniform distribution and the shutoff shall be quick and positive to prevent dripping. The distributor shall be designed and equipped to distribute the bituminous material uniformly at consistent surface speeds, at uniform temperatures with various surface widths, at known and maintained rates of five hundredth (0.05) to two (2.0) gallons per square yard within a tolerance of five (5) percent, and through pressure ranges from twenty-five (25) to seventy-five (75) pounds per square inch. Air pressure type equipment may be used only upon written approval from the Engineer.

C. Cover Aggregate Spreader

The spreader shall be self-propelled and capable of spreading the cover material uniformly for widths of eight to sixteen feet (8’ to 16’) in one foot (1’) increments, and adjustable to spread uniform layers of ten (10) to thirty (30) pounds per square yard. Revolving plate type chip spreaders will not be approved.

D. Rollers

Rollers shall be self-propelled, pneumatic-tired, weighing not less than five (5) tons and not more than eight (8) tons. Rolling shall follow closely on spreading of aggregate.

E. Hauling Equipment

The cover aggregate shall be transported from the plant to the site in trucks having tight, clean and smooth beds.

F. Miscellaneous Equipment

A power broom and all necessary hand tools thermometers, etc. shall be provided by the Contractor.

Article 2.5 Construction

A. Surface Preparation

The existing surface shall be swept clean of all dust, dirt, and other loose material with hand brooms or through the use of approved mechanical sweepers. Where existing dust and dirt cannot be satisfactorily removed by brooming, it may be necessary to flush the asphalt surface with water. If flushing is necessary, the Contractor shall furnish the necessary equipment for flushing.

B. Weather Limitations

Bituminous material shall not be placed during rainy or threatening weather, or when the moisture on the surface to be treated would prevent satisfactory bond, or when the air temperature is less than fifty degrees (50º) Fahrenheit, except by approval of the Engineer.

C. Heating and Application of Bituminous Material

The bituminous material shall be heated in such a manner as to insure even heating of the entire mass with an efficient and positive control at all times. It shall be applied at a temperature between one hundred thirty (130) and one hundred eighty degrees (180º) Fahrenheit. Necessary thermometers shall be supplied so that the temperature may be observed at all times.

The bituminous material for the surface coat shall be uniformly applied by means of a pressure distributor at the ratio of four-tenths (0.40) to fifty-five hundredths (0.55) gallons per square yard with forty-five hundredths (0.45) gallons per square yard desired. The quantity of material as measured by the volume measuring device of the distributor shall not vary from the true quantity, as herein specified, by more than five percent (5%). A strip of building paper or other suitable covering shall be used at the beginning and/or end of the spread to provide a positive cutoff at the desired limits.

Existing improvements such as curb and gutter, steps and buildings shall be protected to prevent contact with bituminous material.

D. Preparation and Application of Cover Aggregate

Cover material shall be sufficiently dried when it comes in contact with bituminous material that a satisfactory bond or coating is obtained. The moisture content shall not exceed two percent (2%) by weight.

Immediately following the application of the bituminous material, the aggregate cover material shall be uniformly spread over the surface with an approved mechanical spreader at a rate of twenty-two (22) to thirty (30) pounds per square yard. The cover material shall be applied continuously and without delay until the asphalt application is covered.

Whenever possible, successive strips shall be applied before the previous strip has cooled. Cover material shall not be spread on the six inches (6”) adjacent to an unprotected edge until the next strip of bituminous material has been applied. Rolling shall immediately follow the application of the cover material. The roller shall be pneumatic-tired and of such a weight that it does not crush the cover material.

Rolling shall continue only long enough to "set" the cover material in the bituminous material. Under no circumstances will the rolling continue until the cover material is crushed or pulverized. If the cover material is distributed or thrown off the surface by traffic, it shall be broomed back into place. Areas with a deficiency or excess of cover material shall be corrected.

E. Maintenance of Surface

After application of the cover material, the surface shall be maintained by the Contractor for two to five (2-5) days, depending on the weather. During this period the Contractor shall, at least once daily, redistribute the cover material that has become displaced by traffic, by means of brooms, a drag or other method satisfactory to the Engineer. When all possible material has been imbedded in the bituminous material to the satisfaction of the Engineer, the Contractor shall sweep the pavement surface of all excess material and remove it to the storage yard as designated, unless otherwise directed by the Engineer.

Article 2.6 Measurement

Bituminous material and cover aggregate shall be measured by weight in tons (2,000 lbs).

Legible weight tickets shall be submitted to the Engineer for all bituminous material and cover aggregate delivered to the Project site for use in the Work. All weight tickets shall contain, at a minimum, the following information:

1. Weight ticket serial number;
2. Vehicle identification number;
3. The date and time the load was weighed;

4. The tare weight of the vehicle;
5. The gross weight of the loaded vehicle, as registered on the scale; and
6. The legal gross weight of the vehicle, as permitted by Anchorage Municipal Code Sections 9.46.090 or 9.46.100.

The Owner shall not pay for that portion of any load in excess of the legal gross weight for the vehicle.

Article 2.7 Basis of Payment

Payment for this Work shall be in accordance with Division 10, Section 10.07 - Measurement and Payment, and shall include full payment for all Work described in this Section.

Payment shall be made under the following units:

ITEM	UNIT
Asphalt for Seal Coat	Ton
Cover Aggregate	Ton

SECTION 40.03 PRIME COAT

Article 3.1 Description

This Work under this Section consists of the performance of all Work required for preparing and treating the base course with bituminous material, and blotter material, in conformity with the required lines.

Article 3.2 Materials

The prime coat shall be MC-30 or approved equal. The aggregate for blotter material shall conform to the gradation requirements of AASHTO M-43, Size No. 10. The aggregate shall be free from organic or other deleterious material.

Article 3.3 Construction

Weather Limitations: Bituminous material shall not be applied on a wet or frozen surface, or when the air temperature is below forty-five degrees (45º) Fahrenheit, or when weather conditions would prevent the proper construction of the prime coat.

Article 3.4 Application of Bituminous Material

The distributor shall be so designed, equipped, maintained and operated that bituminous material at even heat may be applied uniformly on variable widths of surface up to fifteen feet (15') at readily determined and controlled rates from five hundredths (0.05) to two (2.0) gallons per square yard, with uniform pressure and with an allowable variation from any specified rate not to exceed two hundredths (0.02) gallon per square yard. Distributor equipment shall include a tachometer, pressure gauges, accurate volume measuring devices or a calibrated tank, and a thermometer for measuring temperatures of tank contents. Distributors shall be equipped with a power unit for the pump, and full circulation spray bars adjustable laterally and vertically.

Traveling or stationary mixing plants, or other equipment of proven performance, may be used by the Contractor in lieu of the specified equipment if approved.

Bituminous material shall be applied to the width of the section to be primed by means of a pressure distributor in a uniform, continuous spread. When traffic is maintained, not more than half (1/2) of the width of the section shall be treated in one application. Care shall be taken that the application of bituminous material deficiencies shall be corrected. Building paper shall be placed over the end of the previous applications and the joining application shall start on the building paper. Building paper used shall be removed and satisfactorily disposed of.

When traffic is maintained, one-way traffic shall be permitted on the untreated portion of the roadbed. As soon as the bituminous material has been absorbed by the surface and will not pick up, traffic shall be transferred to the treated portion and the remaining width of the section shall be primed.

The quantities, rate of application, temperatures and areas to be treated shall be approved before application of the prime coat.

Article 3.5 Application of Blotter Material

If, after the application of the prime coat, the bituminous material fails to penetrate within the time specified and the roadway must be used by traffic, blotter material shall be spread in the amounts required to absorb any excess bituminous material. Blotter material will be used only at the direction of the Engineer.

Article 3.6 Measurement

Bituminous material will be measured by the ton and blotter material will be considered incidental to the asphalt used as prime coat.

Article 3.7 Basis of Payment

Payment for this Work shall be in accordance with Division 10, Section 10.07 - Measurement and Payment, and shall include full payment for all Work described in this Section.

Payment shall be made under the following units:

ITEM	UNIT
Asphalt Prime Coat	Ton

SECTION 40.04 TACK COAT

Article 4.1 Description

The Work under this Section shall consist of performing all Work required for the application of bituminous material to an existing asphalt base or bituminous binder to provide bond for a superimposed asphalt wearing surface.

Article 4.2 Material

The Contractor shall submit a certified analysis from the refinery laboratory to the Engineer for review and approval. A copy of the certified analysis shall accompany each shipment of the asphalt received on the Project site, and if the asphalt is not in accordance with the certified analysis, he may reject the material. The asphalt required by these Specifications shall conform to the latest Asphalt Institute Specifications for the type and grade shown below:

Asphalt for Tack Coat	STE-1 {Snap-Tack} or equal

Article 4.3 Equipment

A. General

All equipment used on this Work shall be of sufficient size and in such mechanical condition as to meet the requirements and to produce the Work to the specified quality.

B. Pressure Distributor

The bitumen distributor shall have pneumatic tires of such width and number that the load produced on the binder course shall not exceed six hundred fifty (650) pounds per inch of tire width, and shall be so designed, equipped, maintained and operated that bituminous material at even heat may be applied uniformly on variable widths of surface at readily determined and controlled rates per square yards, with a pressure range of from twenty-five (25) to seventy- five (75) pounds per square inch, and with an allowable variation from the specified rate not to exceed five percent (5%). Distributor equipment shall include a tachometer, pressure gauges, volume measuring devices, and a thermometer for reading temperatures of tank contents.

Contractor shall be required to lay a test strip of not less than fifteen feet (15') in length to demonstrate that the equipment is working. Location of the test strip will be on-site, as approved by the Engineer. Street closures required for testing of equipment will be the responsibility of the Contractor prior to testing.

Notification of testing will be made to the Engineer not less than 24 hours prior to making the test strip to allow the inspector and materials analysis personnel to be

present. Engineer may require reasonable adjustments to the distribution rate to meet the required or desired cured thickness.

All equipment shall meet federal and State of Alaska safety standards. The Engineer and Contractor will inspect equipment jointly. Contractor shall immediately repair or replace defective or non-working pumps, gauges, or spray bar parts.

Contractor shall re-test test strips that fail due to equipment failure or inexperienced personnel operating the equipment will be re-tested. Engineer may require additional tests that he feels is needed to verify that the equipment meets the requirements of these specifications and the Contractor has qualified personnel and supervision to complete this Work.

Supplying the application of tack coat test strips is incidental to the bid item “Tack Coat” and no separate payment shall be made.

C. Miscellaneous Equipment

A power broom equipped with blower and all necessary hand tools, thermometers, etc., shall be provided by the Contractor.

Article 4.4 Construction

A. Surface Preparations

Immediately before applying the tack coat, if the surface is sufficiently bonded, the full width of surface to be treated shall be swept with a power broom equipped with a blower, supplemented by hand brooms, washed down with water, or otherwise cleaned to remove all loose dirt, clay, or other loose and objectionable material.

After the operation of removing dust has been completed and prior to the application of the tack coat, the Engineer shall make an inspection of the existing pavement to determine its fitness to receive the bituminous material.

B. Weather Limitations

Tack coat shall not be applied during cold weather, after sunset, or to a wet surface. The tack coat shall be applied only when the temperature of the atmosphere is above sixty degrees (60º) Fahrenheit.

C. Heating and Application of Bituminous Material

The application of the bituminous tack material shall be made by means of a pressure distributor of approved type, and shall be in the following amounts. Contractor shall distribute undiluted amounts of bituminous material (STE-1 {Snap-Tack} or equal) so that the mixture will cure back to 0.05 to 0.10 gallons per square yard. The quality of material as measured by the volume measuring device of the distributor shall not vary from the true quantity, as herein specified, by more than

five percent (5%). The bituminous material shall be applied at a temperature between seventy-five and one hundred thirty degrees (75º and 130º) Fahrenheit. Necessary thermometers shall be supplied so that the temperature may be observed at all times.

Existing improvements such as keyboxes, manholes, cleanouts, monuments, curb and gutter, steps, and buildings shall be protected to prevent contact with bituminous material to the satisfaction of the Engineer. The surface shall be allowed to dry until it is a proper condition of tackiness to receive the AC surface course placement as is necessary to obtain this proper condition of tackiness. Until the wearing surface course is placed, the Contractor shall protect the tack coat from damage.

Article 4.5 Measurement

Bituminous material will be measured by weight in tons (2000 lbs).

Article 4.6 Basis of Payment

Payment for this Work shall be in accordance with Division 10, Section 10.07 - Measurement and Payment, and shall include full payment for all Work described in this Section.

Payment shall be made under the following units:

ITEM	UNIT
Asphalt Tack Coat	Ton

SECTION 40.05 CRACK AND JOINT SEALANT

Article 5.1 General

The Work under this Section shall consist of the performance of all plant, labor and supervision, equipment, and material for performing all operations required for the preparation and application of a hot bituminous emulsion and three-eighths inch (3/8") chip applied as a crack and joint sealant. The Work under this Section shall be performed after the asphalt pavement has been rotomilled or as directed by the Engineer.

Article 5.2 Materials

Asphalt materials shall be approved by the Engineer prior to use (a certified analysis by the refinery laboratory with each shipment of asphalt to the project may be acceptable). The Engineer shall reserve the right to make check tests of the asphalt received on the job and if the certified analysis proves to be unsatisfactory individual check tests will be required.

The asphalt required by these specifications shall conform to the requirements of the Asphalt Institute for the type and grade shown below:

Asphalt for Bituminous Emulsion Crack Sealant	STE-1{Snap-Tack} or approved equal

The aggregate shall consist of crushed gravel (three-eighths inch (3/8") minus and sand) evenly mixed and shall be sound, durable, and free of adherent coatings of clay, dirt, or any other objectionable matter. Not less than sixty percent (60%) by weight of crushed gravel shall consist of pieces having two or more faces being freshly fractured.

The aggregate shall have the following gradation:

Sieve Designation	Percentage By Weight Passing
3/8"	100
#4	85-100
#8	0-25
#200	0-2

All aggregate equipment shall meet federal and State of Alaska safety standards and shall be sufficient in size and mechanical condition to meet the requirements and to produce the Work. The equipment will be inspected jointly by the Municipality and the Contractor and shall be approved by the Engineer before any Work is started. Any units found defective shall be immediately repaired or replaced before starting Work on this project. The Contractor shall notify the Engineer twenty-four (24) hours in advance for equipment inspection.

The bitumen distributor shall have pneumatic-tires and be self-propelled and shall have a capacity of not less than 400 gallons. It shall be equipped to agitate and circulate the bituminous material during heating, with an independently-operated bitumen pump, tachometer, pressure gauges, volume metering devices, tank thermometer, and a hand held pressurized spray bar with a single nozzle equipped with a quick and positive shut-off to prevent dripping or over-spraying.

Rollers shall be self-propelled, have pneumatic-tires, and weigh not less than five tons or more than eight tons.

The Contractor shall provide a power broom and all necessary hand tools, thermometers, etc., at no additional cost to the Municipality.

Article 5.3 Construction

Crack and joint sealant shall be applied to cracks or joints that have dimensions between three-eighths inch (3/8") and three-quarter inch (3/4") in width as directed by the Engineer. The sealant shall be applied in conformance with the manufacturer's instructions and to full depth of the crack. Cracks less than three-eighths inch (3/8") in width will be filled with sealant (STE-1).

The cracks shall be cleaned and all loose material shall be blown out to the full depth of the crack. The interior of the crack shall be completely dried and existing asphalt surfaces shall be exposed to enable bonding of the sealant.

All cracks shall have a minimum depth of one inch (1"). If the crack does not have a minimum depth of one inch (1"), the crack shall be deepened to a minimum of one inch (1") through the use of a router or similar device approved by the Engineer. The area covered with the emulsion/aggregate treatment shall be a minimum of six inches (6") on either side of the crack.

Crack and joint sealant shall be prepared and applied in conformance with the manufacturer's instructions. All extruded sealant shall be removed and feathered to transition to the existing pavement surface.

Crack sealant shall <u>not</u> be applied during cold weather, after sunset, or when the surface and crack are wet. The crack sealant shall be applied only when the temperature of the atmosphere is above sixty degrees (60º) Fahrenheit.

The application of the bituminous material shall be made by means of a pressure distributor of approved type. Undiluted amounts of bituminous material (STE-1) shall be distributed at the rate two-tenths to thirty-five hundredths (0.20 to 0.35) gallons per square yard. The quality of material as measured by the volume-measuring device shall not vary from the true quantity, as herein specified, by more than five percent (5%). The bituminous material shall be applied at a temperature between one hundred and twenty-five and one hundred and eighty-five degrees (125º and 185º) Fahrenheit.

The hot bituminous emulsion shall be applied with a hand held spray bar, with a nozzle pressure range from twenty (20) pounds per square inch (psi) to forty-five (45) pounds per square inch (psi), to distribute the bituminous material uniformly to the full depth of the crack without filling it.

Aggregate distribution shall follow the emulsion applications closely as possible. It shall be placed prior to the emulsion breaking to ensure the greatest adherence.

The loose aggregate shall be removed and all crack repairs shall be broomed and cleaned before the asphalt overlay is installed.

For wide cracks or other openings in the existing asphalt surface, which in the opinion of the Engineer are too large for crack sealing, the Engineer shall direct the Contractor to remove and replace pavement in accordance with Section 40.11 - Remove and Replace Existing Asphalt Surfacing or place an A.C. wedge course in accordance with Section 40.06 - Asphalt Concrete Pavement.

The crack and joint sealant must be in place a minimum of twenty-four (24) hours and approved by the Engineer prior to an application of the tack coat or overlay will be allowed.

Article 5.4 Measurement

The application of crack and joint sealant shall be measured per linear foot of sealant applied as directed. Application of aggregate shall be incidental to bid item “Crack and Joint Sealant” and no separate payment shall be made.

Article 5.5 Basis of Payment

Payment for this Work shall be in accordance with Division 10, Section 10.07 - Measurement and Payment, and shall include full payment for all Work described in this Section.

Payment shall be made under the following unit:

ITEM	UNIT
Crack and Joint Sealant	Linear Foot

SECTION 40.06 ASPHALT CONCRETE PAVEMENT

Article 6.1 Description

The Work under this Section consists of the performance of all Work required for the construction of asphalt concrete pavement on a prepared base.

Article 6.2 Material and Testing

A. Asphalt:

The Contractor shall submit a certified analysis of the asphalt from the refinery laboratory to the Engineer for review and approval. A copy of the certified analysis shall accompany each shipment of asphalt to the asphalt mixing plant. The Engineer may make check acceptance tests of the asphalt binder, and, if the asphalt binder is not in accordance with the certified analysis, it shall be rejected.

1) For Class A asphalt concrete, the asphalt cement or binder required by this specification shall conform to the following AASHTO designations.

Meets AASHTO M-320 and the following:

Performance Grade of Asphalt binder	PG 64-28
Softening Point, minimum (AASHTO T-53)	125˚ F
Toughness, minimum (ASTM D-5801)	110 in-lbs
Tenacity, minimum (ASTM D-5801)	75 in-lbs

2) For other classes of asphalt concrete, the asphalt cement or binder required by these Specifications shall conform to the requirements of AASHTO M-320 and Certified Performance Grade Asphalt Binder PG 52-28.

B. Aggregates

1) Class A asphalt concrete

Coarse aggregate is all mineral retained on the No. 4 sieve.

The aggregate retained on the No. 4 sieve shall contain at least ninety percent (90%) by weight of particles having a minimum of two mechanically fractured surfaces.

Coarse Aggregate: Particles retained on the No. 4 sieve. Remove all natural fines passing the No. 4 sieve before crushing coarse aggregates for the asphalt concrete grading. The grain-size distribution for the asphalt concrete shall consist entirely of aggregate produced from an aggregate crushing process. Crush only aggregate that is free from clay conglomerates, vegetative matter or other deleterious material. Crush only

aggregate which consists of sound, tough, durable rock of uniform quality and is not coated with silt or clay. Aggregates shall meet the following requirements;

Property	Test Method	Requirement
Percent Sodium Sulfate Loss	ASTM C-88	9% maximum
(5 cycles)		
Percent Fracture	ASTM D-5821	90% minimum
(Two Surfaces)		
Flat & Elongated Particles	ASTM D-4791	
3 to 1	-----	15% max.
5 to 1	-----	5% max.
Nordic Abrasion	ADOT&PF Alaska Test Method 312	12% maximum
Absorption	AASHTO T-85	2% maximum

Fine Aggregate: Particles passing the No. 4 sieve. Remove all natural fines retained on the No. 4 sieve before crushing fine aggregate for the asphalt concrete grading. Crush only aggregate that is free from clay conglomerates, vegetative matter or other deleterious material and that consists of sound, tough, durable rock of uniform quality not coated with silt or clay.

The grain-size distribution for the asphalt concrete shall consist entirely of aggregate produced from an aggregate crushing process and be non-plastic as determined in accordance with AASHTO T-90 (Determining the Plastic Limit and Plasticity Index of Soils). Meet the quality requirements of AASHTO M-29, including S1.1, Sulfate Soundness and the following:

Property	Test Method	Requirement
Uncompacted Void Content of Fine Aggregate (Fine Aggregate Angularity)	AASHTO T-304	45% minimum

2) Class D and E asphalt concrete

Coarse aggregate for Class D and E asphalt concrete is all mineral retained on the No. 4 sieve. The aggregate retained on a No. 4 sieve shall contain at least eighty percent (80%) by weight of crushed pieces having two or more mechanically fractured surfaces.

All coarse aggregate shall be free from coatings of clay, silt, or other objectionable matter and shall not contain clay balls or other aggregation of fine material. Coarse aggregate shall be tested for soundness in accordance with the requirements of ASTM C-88, or will have proven sound through adequate record of service.

When aggregate grading is such that the material will tend to segregate in stockpile or handling, it shall be supplied in 2 or more sizes. Each size of aggregate required to produce the combined graduation specified shall be placed in individual stockpile at the plant site and separated by bulkheads or other means. When it is necessary to blend 2 or more aggregate sizes, the blending shall be done through separate bins at the cold elevator feeders, and not in the stockpile.

Fine aggregate is composed of all mineral matter passing the No. 4 sieve. It shall consist of natural and/or manufactured material derived by crushing gravel.

The aggregate particles shall be clean, tough, durable, moderately sharp, and free from coating of clay, silt, or other objectionable matter and shall not contain clay balls or other aggregations of fine material. Fine aggregate shall be tested for soundness in accordance with the requirements of ASTM C-88, or shall have a satisfactory soundness record. When tested for soundness, the number of cycles shall be five (5), the solution shall be sodium sulphate; the maximum loss shall be nine percent (9%) by weight. Fine aggregates shall be maintained in individual stockpiles, suitably separated to prevent intermingling.

C. Mineral Filler

Mineral Filler shall conform to the requirements of ASTM D-242.

Article 6.3 Composition of Mixes

A. General Requirements

Paving mixtures prepared under these Specifications shall be composed of aggregate and paving asphalt within the limits set forth in the following table:

Asphalt paving mixtures prepared under these Specifications shall be composed of aggregate and asphalt cement within the limits set forth in the following table:

Percentages by Weight Passing Sieves
Wearing Course

Sieve Size	Class A	Class D	Class E
1”	-----	-----	-----
3/4"	100	-----	100
1/2"	68 – 82	100	78 – 96
3/8”	52 – 64	75 – 92	66 – 86
#4	36 – 46	50 – 68	46 – 66
#8	26 – 36	32 – 50	34 –52
#16	16 – 28	20 – 38	24 – 42
#30	10 – 20	14 – 30	16 – 32
#50	6 – 16	10 – 24	10 – 24
#100	4 – 12	7 – 16	7 – 16
#200	3 – 8	3 – 9	3 – 9
Asphalt Cement *	5.0 – 7.0	5.0 – 7.0	5.0 – 7.0

*By weight of total mix

Target values for the gradation of the Job Mix Design shall be within the Broad Band Limits depicted in the table above.

B. Additive Materials

A "non-stripping" additive shall be added to the asphalt in the amount determined by ATM T-14 or one-fourth percent (0.25%) by weight of the asphalt, if approved by the Engineer. Such additive material shall be of quality and grade acceptable to the Engineer.

C. Job Mix

The Contractor, at his expense, shall submit to the Engineer for approval, a job mix formula within the limits specified above, for each class of mix designated by the Contract. Within each mix design the Contractor shall provide correction factor ignition points generated in accordance with AASHTO T-308. The aggregate gradation of the job-mix formula, when plotted upon an aggregate grading chart, shall closely approximate the shape of average gradations for the limits specified. For that portion of the aggregate passing No. 4 sieve, gradings which range from at or near the maximum of one (1) sieve to at or near the minimum of the next sieve will not be permitted. The Engineer may require increased asphalt content up to

one-half percent (0.5%) above that indicated by Marshall Design Criteria. Upon requiring increased asphalt content, the lower limit of percent voids and the upper limit of percent voids filled shall be waived.

D. Maximum Permissible Variations

Tolerances to the approved Job Mix Formula shall not exceed the permissible variations presented in the following table. The Job Mix Formula band shall mean the approved Job Mix Formula plus-or-minus (±) the numeric values for the maximum permissible variations.

Maximum Permissible Variation

(Percent by Weight of Total Aggregate)

Sieve Size	Class A Asphalt	Class D & E Asphalt
3/8" and Larger	± 6.0	± 5.0
#4	± 5.0	± 5.0
#8	± 5.0	± 4.0
#s 16, 30 & 50	± 4.0	± 4.0
#100	± 3.0	± 3.0
#200	± 2.0	± 2.0
Asphalt	± 0.4	± 0.4

When these permissible variations are applied to the "Class A Asphalt Concrete" Job Mix formula, the broad band limits in Subsection A, above, may be exceeded only as follows:

1. The three-quarter inch (3/4") and No. 200 sieves shall not exceed the broad band limits in SubArticle 6.3.A - General Requirements;

2. All other sieves may exceed the broad band limits in SubArticle 6.3.A - General Requirements for the respective sieve sizes in the above table provided that the Job Mix Formula band is not exceeded.

When these permissible variations are applied to the "Class D or Class E Asphalt Concrete" Job Mix formulas, the individual sieve shall not exceed the Broad Band limits in SubArticle 6.3.A – General Requirements, above.

Maximum temperature shall not vary more than twenty-five degrees (25º) Fahrenheit from the approved Job Mix Formula design.

E. Test Methods

The job-mix shall be determined according to the Marshall Method, as set forth in The Asphalt Institute Manual.

Upon compaction and testing of the job-mix specimens, the mixture shall conform to the aforementioned specifications within the following limits:

	Class A Asphalt	Class D & E Asphalt
Stability (Marshall) Pounds Minimum	1200	1200
Flow (Marshall) Maximum	8 to 16	8 to 16
Percent Voids	2.5 to 4.5	3 to 5
Percent Voids Filled with Asphalt	70 to 80	75 to 85

Article 6.4 Equipment

A. General

All equipment furnished by the Contractor shall be maintained in a sound mechanical condition. Equipment shall be serviced and lubricated away from the paving site; units that drip fuel, oil and/or grease shall be removed from the Project until such leakage is corrected to the satisfaction of the Engineer.

B. Asphalt Mixing Plant

All plants, used by the Contractor, shall be designed, coordinated and operated to produce a mix uniformly within the job- mix tolerances as listed herein and in accordance with AASHTO M-156. The plant may be either a weightbatch type or a volumetric proportioning, continuous/drum mixing type, provided the equipment has demonstrated that it is suitable for producing finished mixtures complying with the job-mix formula specified herein.

The plant shall be equipped with the necessary equipment for storing, handling, drying, heating and mixing the aggregate and asphalt. Satisfactory means shall be provided for aggregate and asphalt control as to quantity and temperature. Adequate safety measures shall be provided on stairs, gears, pulley, chains, sprockets, and all other dangerous moving parts.

Contractor shall calibrate the asphalt plant not more than thirty (30) days in advance of production and furnish copies of the data to the Engineer at least one day prior to asphalt concrete production. Aggregate and asphalt cement sampling locations meetings OSHA safety requirements shall be provided. Proportioning (batch) scales shall not be used for weighing material for payment. Weight scales used in conjunction with a storage silo may be used to weight the final product for payment, provided the scales are certified by the State of Alaska. The asphalt plant shall maintain a current Air Quality Permit issued by the State of Alaska.

C. Pavers

Asphalt pavers shall be self-propelled units provided with a heated vibratory screed. Grade and cross slope shall be controlled through the use of automatic grade and slope control devices. The paver screed control system shall be automatically actuated by the use of an erected string-line or a mobile string-line (ski) at least thirty feet (30') in length on the high side of the paver. Grade control shall be used on either (a) both the high and low sides, or (b) grade control on the high side and slope control on the low side.

The Contractor may request a waiver for the screed control system (string-line or ski) if he or she believes the paving grade poses an unreasonable obstacle in the form of extreme horizontal or vertical curves or unusual cul-de-sac and/or street configuration.

For trails, pavers shall be capable of placing the required thickness in one lift with a minimum paving width of five feet (5'), truck-towed spreader-type equipment will be permitted, providing the width and depth requirement can be met.

The paver shall be equipped with a receiving hopper having sufficient capacity for a uniform spreading operation. The hopper shall be equipped with a distribution system to place the asphalt concrete mixture uniformly in front of the screed without segregation and/or tearing.

The term "screed" includes any strike-off device operated by cutting, crowding, or other action which is effective on mixes at workable temperatures, without tearing, shoving, or gouging, and which produces a finished surface of an even and uniform texture. The screed shall be adjustable as to level and section and shall have provisions for vibration and heat.

The screed assembly shall produce a finished surface of the required smoothness, thickness, and texture without tearing, shoving, displacing or segregating the asphalt concrete mixture. Screed extensions used for paving a constant width shall be heated and vibrated. Auger extensions shall be within one and one-half feet (1.5') of the screed extension on both sides.

The paver shall be capable of placing courses in thicknesses of from one-half inch (1/2") to at least three inches (3"), and, in width, be adjustable in increments of six inches (6") and one foot (1').

The use of a pick-up machine to transfer the asphalt concrete mixture from a windrow to the paver hopper will be permitted, provided the pick-up machine is capable of collection of the windrowed material without damage to the underlying course. The Engineer will not allow the continued use of the pick-up machine if segregation, excessive temperature loss, or any detrimental effects are observed.

Paver shall be equipped with a means of preventing the segregation of the coarse aggregate particles from the remainder of the bituminous concrete mixture while

being carried from the paver hopper over the slat-conveyor to the auger chamber. The mechanism to accomplish this must be approved in writing by the paver manufacturer and may consist of chain curtains, deflector plates, or other devices and may be any combination of these.

The following specific requirements apply to the following identified bituminous pavers:

1. Blaw-Knox bituminous paver shall be equipped with the Blaw-Knox Materials Management Kit (MMK).

2. Cedarapids bituminous paver must have been manufactured in 1989 or later.

3. Caterpillar bituminous pavers shall be equipped with the following deflector plate models: 6630, 6631, or 6640.

Contractor shall provide a Certificate of Compliance that verifies the required mechanism has been installed to prevent bituminous paver segregation.

The Engineer shall approve all mechanisms proposed by Contractor for preventing paver segregation of coarse aggregate prior to the bituminous paver's use on the project.

D. Rollers

Rollers shall be self-propelled, reversible, and equipped to maintain clean and straight contact surfaces. Heat shall be maintained on pneumatic tires by skirting or other approved devices.

The number, weight, and type of rollers furnished shall be sufficient to obtain the required density and surface requirements while the mix is in a workable condition. One pneumatic and a minimum of one vibratory roller shall be furnished and operated in a workmanlike manner by the Contractor. There shall be at least one operator for each roller.

Pneumatic Tired Rollers:

Pneumatic tired roller shall ride on not less than seven uniformly sized and uniformly inflated smooth tires mounted on wheel rims of twenty inch (20") minimum diameter. The rear group of tires shall align behind and cover the spaces between the forward group of tires. Tires shall be inflated, and the roller ballasted, to provide a uniform (plus or minus five [5] pounds per square inch) minimum ground contact weight of seventy (70) pounds per square inch, unless a lower weight is requested in writing by the Engineer. If a pneumatic roller experiences a pick-up problem, the Contractor shall be required to add an effect release agent to the tire watering tank.

Steel-Drum Rollers: Steel-wheel roller may be of two (2) types:

Two-axle static drum rollers, 8 to 22 tons in weight.

Two-axle vibratory drum rollers, 8 to 22 tons in weight.

All rollers shall be equipped with power units of not less than four (4) cylinders and under working conditions shall develop a compression in the rear wheels of two hundred fifty (250) to three hundred fifty (350) pounds per inch of roller width. Rollers shall be in good working condition and be free from backlash, faulty steering mechanism, or worn parts. Rollers shall be equipped with adjustable scrapers to keep the drums clean and with efficient means of keeping the drums/wheels wet to prevent mixes from sticking to the drums. Rollers/Drums shall be free of flat areas, openings or projections which will mar the surface of the pavement.

E. Haul Trucks

Vehicles used for the transportation of hot-mix asphalt from the plant to the Project shall have tight metal bottoms and shall be free from dust, screenings, petroleum oils, volatiles, and other mineral spirits which may effect the mix being hauled. The truck beds shall be cleaned as often as required, but at least once a day. After this operation the truck bed shall be elevated and thoroughly drained; no excess solution shall be permitted.

When requested by the Engineer, trucks shall be equipped with covers of canvas, insulated boxes, or other suitable material, and be of sufficient size and weight to protect the load from adverse weather conditions and to maintain the required mix temperatures.

F. Truck Scales

Hot mix asphalt shall be weighed on platform scales furnished by the Contractor or on public scales at the Contractor's expense. The scales shall be satisfactory to the Engineer and shall comply with all State Laws governing the use of scales. The scales shall be tested and sealed by an authorized public official, at the expense of the Contractor, as often as the Engineer may deem necessary to ensure their accuracy. Batch plant proportioning scales may be used in lieu of truck scales only with the written approval of the Engineer.

G. Hand Tools

Only lutes or asphalt rakes shall be used during the spreading operation and when finishing by hand.

Tamping irons shall weigh not less than twenty-five (25) pounds and shall have a bearing area not exceeding forty-eight (48) square inches. Mechanical compaction equipment, satisfactory to the Engineer, may be used instead of tamping irons.

H. Straightedges

Straightedges ten (10') and sixteen feet (16') in length, to test the finished surface, shall be provided by the Contractor. The sixteen foot (16') straightedge shall be used on straight sections and the ten foot (10') straightedge on vertical curves or crown.

Article 6.5 Construction

A. Weather Limitations

Asphalt concrete mixture shall not be placed when it is raining or when rain is imminent, on a saturated surface, on an unstable/yielding roadbed, when the base material is frozen, or when weather conditions prevent proper handling or finishing of the mixture. Asphalt concrete mixture shall not be placed unless the surface temperature is forty-five degrees (45º) Fahrenheit or warmer and the ambient air is at least thirty-two degrees (32º) Fahrenheit and not descending. Air temperature shall be measured in the shade away from heat sources at the paving site.

B. Preparation of Area to be Paved

The area to be paved shall be true to line and grade, having a smooth dry, compacted surface prior to the start of paving operations. The area to be paved shall be free from all loose asphalt and foreign material.

Contractor shall notify the Engineer, a minimum of twenty-four (24) hours prior to paving, that the newly constructed, rotomill planed, or existing surface, has been prepared in conformance with the Drawings and Specifications and are ready to be paved. Engineer or his representative shall inspect the grade through the use of string line, straightedge, levels, or any other means necessary. Upon determining the grade that has been proposed for paving is in conformance with the Drawings and Specifications, Engineer will provide written authorization for the Contractor to proceed with the paving. The Contractor shall not initiate paving prior to receiving written authorization to proceed.

The surface of the Leveling Course, when finished, shall not demonstrate any deviation in excess of three-eighths inch in ten feet (3/8" in 10') parallel with, and at right angles to, the centerline, or more than five-eighths inch (5/8") total from centerline to face of curb of the area to be paved. Any deviation in excess of this amount shall be corrected by loosening, adding, or removing material and reshaping and compacting to satisfy the above requirement.

Existing paved surfaces shall be cleaned of loose material by sweeping with a power broom, supplemented by hand sweeping, if determined necessary by the Engineer.

After rotomilling of a section of the roadway has been completed, that section shall be inspected by the Engineer for areas of distress or failure. Areas requiring repair

shall have the remaining pavement removed, and the distressed area shall be excavated to the depth and limits directed by the Engineer. The excavated area shall be backfilled, as directed by the Engineer, with crushed aggregate Leveling Course material and/or Asphalt Concrete leveling course in conformance with the Drawings and Specifications. Pavement surface irregularities, remaining from the rotomilling effort, that extend more than three-quarters inch (3/4") below the milling indentations shall be pre-leveled and brought into conformance with the tolerances established in Article 6.6 - Density and Surface Requirements. Pre-leveling shall be completed with an approved Class D asphalt concrete in accordance with this Section and include the furnishing, hauling, placing, and compaction of the asphalt concrete.

Contact surfaces of curbing, gutters, manholes, and other structures shall be painted with a thin, uniform coating of asphaltic cement or approved equal material prior to the mixture being placed against them. Butt joints on previously placed cooled pavement shall be saw cut and tack coated prior to continuing the paving operation.

Contractor shall not pave against newly placed concrete curbing until said curbing has cured for a minimum five (5) days. For the purpose of paving operations only, curb curing time may be reduced to seventy-two (72) hours only upon receipt of Contractor's written certification that Type III Portland High-Early-Strength cement concrete was used in, properly placed, and appropriate curing compounds were applied to the adjacent curb and gutter.

C. Preparation of Paving Asphalt

The asphalt shall be heated at the paving plant to a temperature at which it can be properly handled through the pumping system, but at no time shall the temperature of the asphalts exceed that recommended by the asphalt supplier or manufacturer, or be greater than three hundred twenty-five degrees (325º) Fahrenheit or less than two hundred fifty degrees (250º) Fahrenheit.

D. Preparation and Handling of Aggregates

The aggregate for the asphalt concrete mixture shall be heated and dried to a temperature compatible with the mix requirements specified. The burner on the dryer shall be properly adjusted to avoid damage to the aggregate and to avoid the presence of unburned fuel on the aggregate. Any asphalt concrete mixture in which soot or fuel is present shall be wasted and no payment made.

Drying operations shall reduce the aggregate moisture content so that the moisture content of the asphalt concrete mixture, sampled at the point of acceptance for asphalt cement content, shall be no more than one-half percent (0.5%) (by total weight of mix), as determined by ATM T-25. Adequate dry storage shall be provided for the mineral filler.

Aggregates shall be stored at the plant in such a manner that the separate sizes will not become intermixed. Cold aggregate shall be carefully fed to the plant in such proportions that surplus and shortages in the hot bins will not cause breaks in the continuous operations.

Stockpiles and bins shall be sampled for gradation analysis, dust coating, and for other purposes, at the option of the Engineer.

When requested by the Engineer, the Contractor shall provide representative samples from each of the hot bins. Samples shall be used to determine compliance with these Specifications.

1. Drying:

   The aggregate shall be thoroughly dried and heated to provide a paving mix within a tolerance specified herein. The moisture content of the heated and dried aggregate shall not exceed one-half percent (0.5%).

   Dust collected during the drying operation may be fed uniformly back into the hot aggregate prior to screening, provided a position mechanical feed is used which will control the feed back to the quantity specified by the Engineer.

2. Screening:

   Aggregates shall be screened into sizes that may be recombined into a gradation meeting the requirements of the job-mix formula. Screens shall have normal capacities slightly in excess of the production capacity of the mixer and rated capacity of the dryer.

3. Hot Aggregate Storage:

   Hot screened aggregate shall be stored in such a manner as to minimize segregation and loss of temperature.

E. Mixing Plants and Controls

All plants shall be equipped with a positive means to govern the time of mixing. Mixing time shall not be altered unless requested by the Engineer.

Frequent gradation analysis of the hot aggregates of the completed mix shall be made to be certain that the materials being used and produced are within the tolerances of the job-mix formula and the specifications of the mix being used. If the mix is found to be outside the hot-mix formula tolerances or outside the specification limits, corrections shall be made in quantities measured from the hot bins and suitable changes made at the cold bin feeders. It shall be the responsibility of the Contractor to furnish a finished product in accordance with the Contract Documents. Tests conducted by the Engineer are for quality acceptance purposes only and are not authorized for use in plant calibration. Plant metering

systems and scales shall be calibrated to the accuracy specified in AASHTO M-156.

Batch Type Plant: When the mix is produced in a batch type plant, the aggregate shall be accurately weighed in the proper proportions to provide the batch weight.

The asphalt shall be heated to provide a material sufficiently fluid to produce a uniform coating on every particle of aggregate within the specified mixing time. The temperature of the aggregates and asphalt immediately prior to mixing shall be approximately that of the completed batch. In no case shall the temperature of the asphalt and aggregate vary more than twenty-five degrees (25º) Fahrenheit when placed in the mixing chamber.

A dry mixing period of not less than ten (10) seconds shall precede the addition of the asphalt to the mix. Excess wet mixing shall be avoided. Wet mixing shall continue as long as is necessary to obtain a thoroughly blended mix. The minimum percent of coated particles used to establish the mixing time interval shall be ninety-five percent (95%) as determined by AASHTO T-195.

Continuous Type Plant: Continuous mix and drum plants shall in general be controlled in the same manner as batch plants.

The determination of mixing time shall be by weight method under the following formula unless otherwise approved:

$$\text{Mixing time in seconds} = \frac{\text{Pugmill Dead Capacity in Pounds}}{\text{Pugmill Output in Pounds Per Second}}$$

The weights used for computing mixing time shall be determined for the job, from tests made by the Contractor and shall conform to the recommendations of the manufacturer. Mixing temperature shall not exceed that recommended by the asphalt cement manufacturer without the written approval of the Engineer. To aid in determining the proper temperature of the completed batch, current viscosity data shall be available at the plant at all times.

F. Transportation of Mix

The dispatching of the hauling vehicles shall be so scheduled that all material delivered may be placed and rolled in daylight. When variations in size of loads, speed of trucks, length of haul, and conditions of trucks interfere with orderly continuous operations, the Engineer may order suitable corrections to be made.

G. Mechanical Spreading

Contractor shall submit a Paving Plan for the Engineer's review a minimum of five (5) working days prior to initiating paving operations. The plan shall consist of at least the following items:

1. Paving schedule to include sequence of operations.

2. Operational details to include:

   a. Plant operating capacity and target production rate. Process control testing frequency for gradation, moisture, asphalt cement content, and compaction.

   b. Number and capacity of trucks, cycle time, and delivery rate.

   c. The manufacturer and model of the paver and pick-up machine to include information on grade followers, sensors, operating speed, and production rate of the pavers.

   d. Number, type, weight, and operating speed of rollers, including replacement roller.

   e. Location and method of constructing longitudinal and transverse joints.

   f. Construction plan for paving intersections and driveways.

3. The asphalt concrete shall be placed on the road surface at a temperature not less than two hundred fifty degrees (250º) Fahrenheit or greater than three hundred degrees (300º) Fahrenheit. Additionally, the maximum temperature to which the asphalt concrete is heated shall not exceed the supplier's recommendation. The asphalt concrete temperature shall be measured directly behind the paver screed at the time of placement.

   The asphalt concrete mixture shall be laid upon a surface approved in writing by the Engineer, spread and struck-off and compacted to the thickness specified in the Drawings and specifications. Asphalt pavers shall be used to distribute the asphalt concrete mixture in lanes of such widths as to hold to a practical minimum the number of longitudinal joints required.

Longitudinal joints and edges shall be constructed to true line markings. Lines shall be established parallel to the center line for the paver to follow in placing individual lanes. The paver shall be operated and positioned to closely follow the established line. When backing trucks to the finisher, care shall be taken not to jar the paver.

The texture of the unrolled surface shall be checked to determine its uniformity. The adjustment of the screed, tamping, feed screws, hopper feed, etc., shall be checked frequently to assure uniform spreading of the mix. Segregation of the material shall not be permitted. If segregation occurs, the spreading operation shall be immediately suspended until the cause is determined and corrected.

Any irregularities left by the paver shall be corrected by trimming directly behind the machine by use of lutes or covered rakes. Immediately after trimming, the edges of the course shall be thoroughly compacted by tamping. Distortion of the pavement during this operation shall be avoided.

Edges against which additional pavement is to be placed shall be vertically formed to true line. A lute or covered rake shall be used immediately behind the finisher, when required to obtain a true line and vertical edge. Any irregularities in the surface of the pavement course shall be corrected directly behind the paver. Excess material forming high spots shall be removed by a shovel or lute. Indented areas shall be filled with hot-mix and smoothed with the back of a shovel pulled over the surface. Fanning of material over such areas shall not be permitted.

On longitudinal joints, the paver shall be positioned so that in spreading, the material overlaps the edge of the lane previously placed by one or two inches (1" or 2") and is sufficiently high to allow for compaction. The coarse aggregate in the material overlapping the joint shall all be raked out into the cold lane as soon as possible behind the paver and broomed up and wasted. In no case shall scattered rocks be rolled into the surface of either lane.

Asphalt concrete mixture which is contaminated or segregated will be rejected.

When multiple lifts are specified in the Contract, the final lift shall not be placed until all lower lifts throughout that section, as defined by the Paving Plan, have been placed and accepted. Paving shall not begin until all adjacent curb has been poured for at least seven (7) days when Type I/II cement is used or three (3) days when Type III cement is used.

H. Hand Spreading

On areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impracticable, the asphalt concrete mixture shall be spread, raked, and luted by hand tools. For such areas, the asphalt concrete mixture shall be placed to the required compacted thickness and density.

I. Compaction

Immediately after the asphalt mixture has been spread, struck off and surface irregularities adjusted, it shall be thoroughly and uniformly compacted by rolling.

The surface shall be rolled when the mixture is in the proper condition and when the rolling does not cause undue displacement, cracking, or shoving.

Initial rolling shall be done with a steel-drum roller with the drive roll operating toward the paver, and/or a suitable pneumatic tired roller. Initial rolling shall be completed while the bituminous mat temperature is above two hundred twenty-five degrees (225º) Fahrenheit.

Following the initial rolling at least three coverages of the pavement shall be completed with a pneumatic tired roller, while the mat temperature is above one hundred seventy-five degrees (175º) Fahrenheit.

Final rolling shall be completed with a steel–drum roller and shall continue until roller marks and further compression are not evident in the pavement and specified density has been achieved.

Unless otherwise directed, rolling shall begin at the sides and proceed longitudinally parallel to the road center line, each trip overlapping one-half the roller width, gradually progressing to the crown of the road. When paving in echelon or abutting a previously placed lane, the longitudinal joint should be rolled first followed by the regular rolling procedure. On superelevated curves the rolling shall begin at the low side and progress to the high side by overlapping of longitudinal trips parallel to the centerline.

Any displacement occurring as result of the reversing of the direction of a roller, or from other causes, shall be corrected at once by the use of rakes and addition of fresh mixture when required. Care shall be exercised in rolling not to displace the line and grade of the edges of the asphalt mixture.

To prevent adhesion of the mixture to the rollers, the wheels shall be kept properly moistened with water or water mixed with very small quantities of detergent or other approved material. Excess liquid will not be permitted.

Along forms, curbs, headers, walls, and other places not accessible to the rollers, the mixture shall be thoroughly compacted with hot hand tampers, smoothing irons, or with mechanical tampers. On depressed areas, a trench roller may be used or cleated compression strips may be used under the roller to transmit compression to the depressed area.

Rollers or other vehicles shall not be parked or left standing on pavement that has not cooled sufficiently to prevent indentation by wheels.

J. Joints

The Contractor shall not construct longitudinal joints in the driving wheel paths. The Contractor shall align the joints of the top layer of pavement to either the centerline of the road or to lane lines. The Contractor shall offset the longitudinal joint in the top layer of pavement not more than six inches (6”) from centerline of edge of stripe. Joints shall be constructed to ensure a continuous bond between old and new sections of the course. All joints shall present the same texture and smoothness as other sections of the course. The Contractor shall offset the longitudinal joints in the top layer from the joint in the layer immediately below by at least four inches (4”).

When joining existing pavement and new pavement, the old pavement shall be cut in a neat line with a power driven saw.

Improperly formed joints resulting in surface irregularities shall be removed full depth, replaced with fresh asphalt concrete mixture, and thoroughly compacted. Rolling of joints after the material has cooled below one hundred seventy degrees

(170º) Fahrenheit shall not be allowed. All pavement removal shall be precut to a neat line with a power-driven saw.

A tack coat of asphalt cement or asphalt emulsion shall be applied on all cold joints and allowed to break prior to placing fresh asphalt concrete mixture against the joint. This Work shall be completed by Contractor just prior to paving.

Transverse joints shall be formed by saw cutting back on the previous run to expose the full depth of the course or by using a removable bulkhead. Transverse joints shall not be perpendicular to centerline, but shall be skewed between fifteen and twenty-five degrees (15º and 25º).

K. Repair and Replacement

Asphalt concrete mixture that becomes contaminated with foreign material or is in any way defective as determined by the Engineer shall be removed. Skin patching will not be permitted. Defective materials shall be removed for the full thickness of the course. The pavement shall be cut so that all edges are vertical, the sides are parallel to the direction of traffic, and the ends are skewed between fifteen and twenty-five degrees (15º and 25º). Edges shall be coated with a thin tack coat of material. Fresh asphalt concrete mixture shall be placed in sufficient quantity so that the finished surface will conform to grade and smoothness requirements. The asphalt concrete mixture shall be compacted to the density specified. Any area determined to have an excess or deficiency of asphalt concrete shall be corrected by full depth removal and replacement. No payment shall be made for material replacing defective material. All costs associated with the patching of defective areas shall be borne by Contractor.

L. Vehicular Traffic

Contractor shall not allow vehicular traffic on the asphalt mat surface until the mat surface has cooled to below one hundred twenty degrees (120º) Fahrenheit. Any portion of the asphalt concrete mixture that becomes loose and broken, rutted, or damaged in any way due to vehicular traffic on the asphalt mat surface prior to it cooling to below one hundred twenty degrees (120º) Fahrenheit, shall be removed and replaced with fresh hot asphalt concrete, which shall be compacted to conform with the surrounding area at the specified density.

Article 6.6 Density and Surface Requirements

The complete pavement shall have a density equal to or greater than ninety-six (96) percent of Maximum Density (Marshall Method), except for trail pavement which shall have a density equal to or greater than ninety percent (90%). Maximum Density shall be determined in accordance with the test procedures specified in Section 40.01, Article 1.2 - Applicable Standards. The compacted specimens on which the Maximum Density is determined, shall be produced from a laboratory specimen made from the same days mix, and as close to the lay down temperature as practicable.

When requested by the Engineer, the Contractor shall, without charge, provide the Engineer with test samples of asphalt concrete cored from the completed pavement. All cores shall be at least four inches (4") in diameter and the core holes will be patched by the Contractor within seventy-two (72) hours.

The final surface shall be of a uniform texture conforming to true grade, and cross sections in accordance with the Contract Documents. The thickness of the course shall be in accordance with the Drawings and Specifications. Where curb and gutter is present the compacted pavement surface shall be one-eighth inch plus or minus one-eighth inch (1/8"±1/8") above the top front edge of curb.

Prior to the delivery of the first load of asphalt to the Project, the Contractor shall furnish straightedges to the Inspector for checking surface uniformity. Irregularities in the finished pavement surface shall not exceed three-sixteenths of an inch (3/16") within ten feet (10'), or five-sixteenths of an inch (5/16") within sixteen feet (16'). Non-conforming surfaces shall be subject to rejection by the Engineer. Irregularities which develop before the completion of rolling shall be remedied by loosening the surface mix, removing or adding material as may be required, and rerolling.

For trails, a ten foot (10') straightedge, supplied by the Contractor, shall be used to check the paving surface. Surface irregularities shall not exceed one inch in ten feet (1" in 10'). Non-conforming surfaces shall be subject to rejection by the Engineer. Irregularities which develop before completion of rolling shall be remedied by loosening the surface mix, removing or adding material as may be required, and rerolling.

Article 6.7 Measurement

Asphaltic concrete will be paid for by one of the methods as defined in the paragraph below and as designated in the Bid Schedule.

A. Measurement by the Ton

Measurement of hot-mix asphaltic paving materials, unless otherwise provided, shall be weighed on truck scales in accordance with Article 6.4, SubArticle F – Truck Scales. Asphalt concrete pavement shall be measured per ton (2,000 lbs) based on the amount of hot mix asphaltic material actually used in the completed and accepted work modified as follows: the quantity paid for shall not exceed one hundred and five percent (105%) of tonnage determined on the basis of the average core density, the specified neat line thickness, and the completed area of asphaltic concrete pavement. In addition, the Owner will not pay for that portion of any load in excess of the legal gross weight for the vehicle delivering the load.

B. Measurement by the Square Yard

Measurement of hot-mix asphaltic paving materials, unless otherwise provided, shall be measured by the completed and accepted work. The area measured will be that which is shown on the Drawings plus any additional areas as authorized by the Engineer in writing.

The tolerance for thickness of asphaltic concrete under square yard measurement shall be plus or minus one-fourth inch (1/4") from design mat thickness, as shown on the typical section. This one-fourth inch (1/4") variance shall be the exception only with the average variance for the job being plus or minus one-eighth inch (±1/8") from the design mat thickness. All asphaltic concrete placed outside the variables allowed will be corrected by the Contractor at his expense.

C. Measurement by the Linear Foot

Measurement of hot-mix asphaltic paving materials for bike trails, unless otherwise provided, shall be per linear foot along the centerline of the constructed trail. The thickness of asphalt shall not be less than the thickness shown in the typical section as noted on the Drawings.

Article 6.8 Basis of Payment

Payment for this Work shall be in accordance with Division 10, Section 10.07 - Measurement and Payment, and shall include full payment for all Work described in this Section.

Payment shall be made under the following units:

ITEM	UNIT
A.C. Pavement (Class)	Ton
A.C. Pavement (Class, Thickness)	Square Yard
A.C. Pavement (Class, Thickness)	Linear Foot

SECTION 40.07 STONE MASTIC ASPHALT CONCRETE PAVEMENT

Article 7.1 General

The Work under this Section consists of performing all operations pertaining to furnishing and mixing of aggregate, asphalt cement, and additives at a mixing plant; and the hauling, spreading, and compaction of the Stone Mastic Asphalt (S.M.A.) Concrete mixture on a previously prepared surface as specified in the Contract and in conformance with the lines, grades, and thicknesses shown on the Drawings.

Article 7.2 Material and Testing

A. Asphalt

Contractor shall submit a certified analysis of the asphalt from the refinery laboratory to the Engineer for review and approval. A copy of the certified analysis shall accompany each shipment of asphalt to the asphalt mixing plant. The Engineer reserves the right to make check tests of the asphalt received on the Project site; and if the asphalt is not in accordance with the certified analysis, he may reject the materials.

The asphalt required by these specifications shall conform to the requirements of The Asphalt Institute for the type and grade. For SMA Class of asphalt concrete, the asphalt cement or binding shall conform to the requirements of AASHTO M-320 and be certified Performance Grade Asphalt Binder PS 64-28.

B. Aggregate for Stone Mastic Asphalt Pavement

1. Coarse Aggregate

Coarse aggregate (that material retained on the No. 4 Sieve) shall be crushed stone or crushed gravel and shall consist of sound, tough, durable rock of uniform quality. All material shall be free from clay balls, vegetative matter, or other deleterious matters. Coarse aggregate shall not be coated with dirt or other finely divided mineral matter. In addition, coarse aggregate shall meet the following requirements:

Property	Test Method	Requirement
Percent of Wear	AASHTO T-96	45 max
Degradation Value	ATM T-13	30 min
Percent Sodium Sulfate Loss	ASTM C-88	9 max (5 cycles)
Percent Fracture Double Face	ASTM D-5821	90 min
Flat and Elongated Particles	ASTM D-4791	
3 to 1		15% max
5 to 1		5% max
Absorption	AASHTO T-85	2% max
Nordic Abrasion	ADOT&PF Alaska Test Method 312	12% max

2. Fine Aggregate

Fine aggregate (passing the No. 4 Sieve) shall meet the quality requirements of AASHTO M-29, and shall consist of one hundred percent (100%) crushed aggregate and shall be nonplastic (AASHTO T-90). Additionally, the uncompacted Voids shall be a minimum of forty-five percent (45%) when tested by AASHTO T-304 method A.

3. Mineral Filler

Mineral filler shall conform to the requirements of AASHTO M-17. The mineral filler shall be free of organic impurities and have a plastic index not greater than four. The mineral filler shall be sufficiently dry to flow freely and be free from agglomerations. The mineral filler shall not have less than forty percent (40%) by weight smaller in size than 0.02 mm.

Article 7.3 Composition of Mixes

A. General Requirements

1. Blended Aggregate

The several aggregate fractions for the mixture shall be sized, graded, and combined in such proportions that the resulting composite blend conforms to the following grading requirements:

STONE MASTIC ASPHALT CONCRETE
AGGREGATE BROAD BAND
Percent Passing by Weight

Sieve Designation	Requirement
3/4”	100
1/2"	82-88
3/8”	60-70
# 4	25-29
# 8	18-24
# 16	15-20
# 30	12-18
# 50	11-15
# 100	10-14
# 200	7-10
* Asphalt Cement	6.4-7.5

* By Weight of Total Mix

B. Additive Materials

1. Anti-strip Additives

Anti-strip agents shall be used in the proportions determined by the (ATM) T-14 and shall be included in the approved Job-Mix Design. At least seventy percent (70%) of the aggregate shall remain coated when tested in accordance with ATM T-14.

2. Stabilizing Additives

Cellulose stabilizing additive shall be used. The dosage rate for the cellulose is three-tenths percent (0.3%) by weight of the total mix. The allowable tolerance per ton shall not exceed plus or minus ten percent (±10%) of the required weight of the stabilizing additive.

The cellulose-stabilizing additive shall conform to the following properties:

CELLULOSE STABILIZING ADDITIVE

Property	Requirement
Sieve Analysis:	
Method A - Alpine Sieve Analysis [1]	
Fiber Length	0.25" (max.)
Percent Passing # 100 Sieve	60-80
Method B - Mesh Screen Analysis [2]	
Fiber Length	0.035"-0.06"(avg.)
Percent Passing # 20 Sieve	75-95
Percent Passing # 40 Sieve	55-75
Percent Passing # 140 Sieve	10-30
Ash Content [3]	20 percent non-volatiles (max.)
pH [4]	7.5±1.0
Oil Absorption [5]	5.0±1.0 times fiber weight
Moisture Content [6]	<5 percent
Bulk Density [7]	1.25-2.50 lbs/ft^3

Notes:

1. Method A - Alpine Sieve Analysis. This test is performed using an Alpine Air Jet Sieve (Type 200 LS). A representative five-gram sample of fiber is sieved for fourteen (14) minutes at a controlled vacuum of twenty-two inches plus or minus three inches (22" ±3") of water. The portion remaining on the screen is weighed.

2. Method B - Mesh Screen Analysis. This test is performed using standard No. 20, 40, 60, 80, 100, and 140 sieves, nylon brushes, and a shaker. A representative ten (10) gram sample of fiber is sieved using a shaker and two nylon brushes on each screen. The amount retained on each sieve is weighed and the percentage passing calculated.

3. Ash Content. A representative two to three (2 to 3) gram sample of fiber is placed in a tared crucible and heated between eleven hundred and twelve hundred degrees (1100º and 1200º) Fahrenheit for not less than two hours. The crucible and ash are cooled in a desiccator and reweighed.

4. pH Test. Five grams of fiber is added to one hundred (100) ml of distilled water, stirred, and let sit for thirty (30) minutes. The pH is determined with a probe calibrated with pH 7.0 buffer.

5. Oil Absorption Test. Five grams of fiber is accurately weighed and suspended in an excess of mineral spirits for not less than five minutes to ensure total saturation. It is then placed in a screen mesh strainer (approximately one-half (0.5) square millimeter hole size) and shaken on a wrist action shaker for ten (10) minutes (approximately one and one-quarter inch [1 1/4"] motion at two hundred and forty [240] shakes/minute). The shaken mass is then transferred, without touching, to a tared container and weighed. Results are reported as the amount (number of times its own weight) the fibers are able to absorb.

6. Moisture Content. Ten grams of fiber is weighed and placed in a two hundred and fifty degree (250º) Fahrenheit forced-air oven for two hours. The sample is then reweighed immediately upon removal from the oven.

7. Bulk Density. Fluff fiber with air or mixer, weigh out twenty-five (25) grams of fiber, place in 100-ml cylinder, tap cylinder, and measure volume.

C. Job-Mix

Contractor, at his expense, shall submit to the Engineer for approval a job-mix formula within the limits specified in this Article. The aggregate gradation of the job-mix formula, when plotted upon an aggregate grading chart, shall closely approximate the shape of average gradations for the limits specified. For that portion of the aggregate passing # 4 Sieve, gradings which range from at or near the maximum of one sieve to at or near the minimum of the next sieve will not be permitted. The Engineer may require increased asphalt content up to one-half percent (0.5%) above that indicated by the Marshall Design Criteria. Upon requiring increased asphalt content, the lower limit of percent voids and the upper limit of percent voids filled shall be waived.

D. Maximum Permissible Variations

Measured Characteristics	Permissible Variation Percent by Weight of Total Mix
3/4”	+/-6.0
1/2”	+/-6.0
3/8”	+/-6.0
# 4	+/-6.0
# 8	+/-6.0
# 16	+/-5.0
# 30	+/-4.0
# 50	+/-4.0
# 100	+/-3.0
# 200	+/-2.0
Asphalt Cement	+/-0.4
Density	93 Min. - 98 Max. of MSG

E. Test Methods

The job-mix shall be determined according to the Marshall Method, as set forth in State of Alaska, Department of Transportation and Public Facilities, Alaska Test Methods (ATM) T-17, except that the optimum voids total mix shall be adjusted from four percent (4.0%) voids to three percent (3.0%) voids when determining optimum asphalt content.

Upon compaction and testing of the job-mix specimens, the mixture shall conform to the aforementioned specifications within the following limits:

STONE MASTIC ASPHALT CONCRETE

MIX DESIGN REQUIREMENTS

Design Parameters	Requirements
Stability, lbs., min.	1,000
Flow, 0.01 inch (0.25)	8-16
Voids in Total Mix, Percent	2-4
Compaction, Number of Blows Each Side of Test Specimen	50
Dust-Asphalt Ratio (The Percent of Material Passing the No. 200 Sieve Divided by the Percent of Asphalt, by Weight of Mix)	0.6-1.4
Voids in the Mineral Aggregate (VMA), min.	15.0
Voids in Coarse Aggregate (VCA) of Asphalt Concrete	Less than VCA of the Coarse Aggr. as determined by AASHTO T-19
Asphalt Cement Content, %	6.2 to 7.4

Approved Job-Mix Designs and aggregates will have the full tolerances, as listed above, applied and will not be limited to the broad band as referenced in SubArticle 7.3.A.1 – Blended Aggregate. Tolerances will not be applied to the largest sieve specified.

Contractor shall provide a Stone Mastic Asphalt Concrete mixture that meets the Stone Mastic Asphalt Concrete Job-Mix formula submitted for approval.

At least fifteen (15) calendar days prior to the production of Stone Mastic Asphalt Concrete mixture, Contractor shall submit the following to the Engineer:

1. A letter stating the location, size, and type of mixing plant, the proposed gradation for the Job-Mix Design, gradations for individual stockpiles with supporting process control information, and the blend ratio of each aggregate stockpile. The proposed gradation must meet the requirements of the table for, SubArticle 7.3.A.1 – Blended Aggregate Stone Mastic Asphalt Concrete Aggregate Broad Band. Stone Mastic Asphalt Concrete mixtures produced from different plants shall not be mixed.
2. Representative samples of each of the aggregates to be blended. Sample sizes: one hundred (100) pounds of each intermediate and/or coarse aggregate, two hundred (200) pounds of fine aggregate, twenty-five (25) pounds of blend sand and/or mineral filler.
3. A minimum of three one (1) gallon samples of the asphalt cement proposed for use in the mixture, including name of product, manufacturer, test results,

manufacturer's certificate of compliance, and a temperature/viscosity curve for the asphalt cement.

4. A one-half (1/2) pint sample of the anti-strip additive proposed, including name of product, manufacturer, manufacturer's data sheet, and current Materials Safety Data Sheet (MSDS).

5. A minimum five-pound sample of the cellulose-stabilizing additive proposed for use in the mixture, including name of product, manufacturer, test results, and manufacturer's certificate of compliance.

Article 7.4 Equipment

A. General

All equipment shall be in good working order and free of asphalt concrete mix buildup. All equipment shall be available for inspection and demonstration of operation twenty-four (24) hours prior to placement of Stone Mastic Asphalt Concrete mix.

B. Bituminous Mixing Plants

Contractor shall use an asphalt plant designed to dry aggregates, maintain accurate temperature control, and accurately proportion asphalt cement and aggregates. Contractor shall calibrate the asphalt plant not more than thirty (30) days in advance of production and furnish copies of the data to the Engineer at least one day prior to Stone Mastic Asphalt Concrete production.

The asphalt plant shall have a scalping screen to prevent oversize material or debris from being incorporated into the Stone Mastic Asphalt Concrete mixture. Aggregate and asphalt cement sampling locations meeting OSHA safety requirements shall be provided.

Proportioning (batch) scales shall not be used for weighing material for payment. Weight scales used in conjunction with a storage silo may be used to weigh the final product for payment, provided the scales are certified. The asphalt plant shall maintain a current Air Quality Permit issued by the State of Alaska.

C. Hauling Equipment

Trucks used for hauling asphalt mixtures shall have tight, clean, smooth metal beds which have been thinly coated with a minimum amount of paraffin oil, lime water solution, or other manufactured asphalt release agent. Diesel fuel or fuel oil shall not be used as an asphalt release agent.

Each truck shall have a watertight canvas cover of such size as to extend at least one foot (1') over the sides and end of the truck bed and be adequately secured to protect the Stone Mastic Asphalt Concrete mixture. The use of the canvas cover shall be at the Engineer's direction.

D. Asphalt Pavers

Asphalt pavers shall be self-propelled units provided with a heated vibratory screed. Grade and cross slope shall be controlled through the use of automatic grade and slope control devices. The paver screed control system shall be automatically actuated by the use of an erected string line or a mobile string-line (ski) at least thirty feet (30') in length on the high side of the paver. Grade control shall be used on either a) both the high and low sides or b) grade control on the high side and slope control on the low side.

The paver shall be equipped with a receiving hopper having sufficient capacity for a uniform spreading operation. The hopper shall be equipped with a distribution system to place the Stone Mastic Asphalt Concrete mixture uniformly in front of the screed.

The screed assembly shall produce a finished surface of the required smoothness, thickness, and texture without tearing, shoving, or displacing the Stone Mastic Asphalt Concrete mixture. Screed extensions used for paving a constant width shall be heated and vibrated. Auger extensions shall be within one and one-half feet (1.5') of the screed extension on both sides.

The use of a pick-up machine to transfer the Stone Mastic Asphalt Concrete mixture from a windrow to the paver hopper will be permitted, provided the pick-up machine is capable of collection of the windrowed material without damage to the underlying course. The Engineer will not allow the continued use of the pick-up machine if segregation, excessive temperature loss, or any detrimental effects are observed.

E. Rollers

Contractor shall supply a minimum of three rollers weighing a minimum of twelve (12) tons each to compact the mixture to the required density while maintaining the pace of the paving operations. Rollers shall be of the static steel wheel or vibratory steel wheel type. The roller drums shall be a minimum of seven feet (7') wide. The rollers shall be self-propelled and capable of reversing without backlash. They shall be specifically designed to compact hot asphalt concrete mixtures. The use of equipment which results in crushing of the aggregate, or pick-up of the Stone Mastic Asphalt Concrete mixture will not be permitted.

F. Truck Scales

Hot mix asphalt shall be weighed on platform scales furnished by Contractor or on public scales at Contractor's expense. The scales shall be satisfactory to the Engineer and shall comply with all state laws governing the use of scales. The scales shall be tested and sealed by an authorized public official, at the expense of Contractor, as often as the Engineer may deem necessary to ensure their accuracy.

Article 7.5 Construction

A. Weather Limitation

Stone Mastic Asphalt Concrete mixture shall not be placed when it is raining or when rain is imminent, on a wet surface, on an unstable/yielding roadbed, when the base material is frozen, or when weather conditions prevent proper handling or finishing of the mixture. No Stone Mastic Asphalt Concrete mixture shall be placed unless the surface temperature is forty-five degree (45º) Fahrenheit or warmer and the ambient air is at least thirty-five degrees (35º) Fahrenheit and not descending.

B. Preparation of Area to be Paved

Existing surfaces shall be prepared in conformance with the Drawings and Specifications. Existing paved surfaces shall be cleaned of loose material by sweeping with a power broom, supplemented by hand sweeping, if necessary.

After planing of a section of the roadway has been completed, that section shall be inspected by the Engineer for areas of distress or failure. Areas requiring repair shall have the remaining pavement removed, and the distressed area shall be excavated to the depth and limits directed by the Engineer. The excavated area shall be backfilled, as directed by the Engineer, with crushed aggregate leveling course material in conformance with the Drawings and Specifications, asphalt concrete leveling course, or with Stone Mastic Asphalt Concrete. Pavement surface irregularities remaining from the planing effort that extend more than three-quarter inch (3/4") below milling indentation shall be pre-leveled and brought into conformance with the tolerances established in Article 7.6 Density and Surface Requirements. Pre-leveling shall be completed with an approved Class B Asphalt Concrete in accordance with Section 40.06 - Asphalt Concrete Pavement and include the furnishing, hauling, placing, and compaction of the asphalt concrete.

Contact surfaces of curbing, gutters, manholes, and other structures shall be painted with a thin, uniform coating of asphaltic cement or approved equal material prior to the mixture being placed against them. Butt joints on previously placed cooled pavement shall be tack-coated prior to continuing the paving operation.

C. Preparation of Paving Asphalt

The asphalt shall be heated at the paving plant to a temperature at which it can be properly handled through the pumping system, but at no time shall the temperature of the asphalt exceed that recommended by the asphalt supplier or manufacturer, or be greater than three hundred and twenty-five degrees (325º) Fahrenheit or less than two hundred and fifty degrees (250º) Fahrenheit.

D. Preparation and Handling of Aggregates

The aggregate for the Stone Mastic Asphalt Concrete mixture shall be heated and dried to a temperature compatible with the mix requirements specified. The burner

on the dryer shall be properly adjusted to avoid damage to the aggregate and to avoid the presence of unburned fuel on the aggregate. Any Stone Mastic Asphalt Concrete mixture in which soot or fuel is present shall be wasted and no payment made.

Drying operations shall reduce the aggregate moisture content so that the moisture content of the Stone Mastic Asphalt Concrete mixture, sampled at the point of acceptance for asphalt cement content, shall be no more than one-half percent (0.5%) (by total weight of mix), as determined by WAQTC TM 6. Adequate dry storage shall be provided for the mineral filler and the stabilizing additive.

E. Mixing Plants and Controls

The aggregate, asphalt cement, additives, and stabilizing additives shall be combined uniformly in the amounts required by the Job-Mix Design. The materials shall be mixed such that a complete and uniform coating of the aggregate is obtained.

1. Batch Plants

Stabilizing additive shall be added through a separate inlet directly into the weigh hopper above the pugmill. The addition of the stabilizing additive shall be timed to occur during the hot aggregate charging of the hopper. Adequate dry mixing time is required to ensure proper blending of the aggregate and fiber stabilizer.

2. Drum Mix Plants

Cellulose stabilizing additive shall be introduced into the drum mixer at the same point the asphalt cement is added. Operation of the drum mixer will be such to ensure complete blending of the stabilizing additive into the mix.

The dry mixing and wet mixing times for Stone Mastic Asphalt Concrete with cellulose stabilizing additive shall be a minimum of fifteen (15) seconds and forty (40) seconds, respectively. For batch plants, dry aggregate shall be placed in motion immediately prior to the addition of asphalt cement. Wet mixing time shall be adequate to obtain ninety-eight percent (98%) coated particles when tested in accordance with AASHTO T-195.

The temperature of the Stone Mastic Asphalt Concrete mixture at the time of the mixing shall be as determined by the Job-Mix Design.

Provisions shall be made for proportioning the mineral filler into the mixture uniformly and in the desired quantities. Special attention shall be directed to providing appropriate equipment for accurately proportioning the relative large amounts of mineral filler required for a Stone Mastic Asphalt Concrete mixture.

F. Temporary Storage of Asphalt Concrete Mixture

Temporary storage or holding of Stone Mastic Asphalt Concrete mixture in silo type storage bins will be permitted.

All of the Stone Mastic Asphalt Concrete mixture drawn from the silo type storage bins shall conform to all of the requirements for Stone Mastic Asphalt Concrete mixtures as if loaded directly into hauling equipment from the mixing plant. Signs of visible segregation, heat loss, changes from the Job-Mix Design, changes in the characteristics of asphalt cement, lumpiness, or stiffness of the mixture will be cause for rejection.

Rejected Stone Mastic Asphalt Concrete mixture shall be disposed of by Contractor at no cost to the Owner.

G. Mechanical Spreading

Contractor shall submit a Paving Plan for the Engineer's review a minimum of five (5) working days prior to initiating paving operations. The plan shall consist of at least the following items:

1. Paving schedule to include sequence of operations.

2. Operational details to include:

    a. Plant operating capacity and target production rate. Process control testing frequency for gradation, moisture, asphalt cement content, and compaction.

    b. Number and capacity of trucks, cycle time, and delivery rate.

    c. The manufacturer and model of the paver and pick-up machine, to include information on grade followers, sensors, operating speed, and production rate of the pavers.

    d. Number, type, weight, and operating speed of rollers, including replacement roller.

    e. Location and method of constructing longitudinal and transverse joints.

    f. Construction plan for paving intersections and driveways.

3. The Stone Mastic Asphalt Concrete shall be placed on the road surface at a temperature not less than two hundred and sixty degrees (260º) Fahrenheit or greater than three hundred degrees (300º) Fahrenheit. Additionally, the maximum temperature to which the Stone Mastic Asphalt Concrete is heated shall not exceed the supplier's recommendation. The Stone Mastic

Asphalt Concrete temperature shall be measured directly behind the paver screed at the time of placement.

The Stone Mastic Asphalt Concrete mixture shall be laid upon a surface approved by the Engineer, spread and struck-off and compacted to the required compacted thickness. The mixture shall be spread and compacted in one layer with a total thickness of two inches (2”). Asphalt pavers shall be used to distribute the Stone Mastic Asphalt Concrete mixture in lanes of such widths as to hold to a practical minimum the number of longitudinal joints required.

On areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impracticable, the Stone Mastic Asphalt Concrete mixture shall be spread, raked, and luted by hand tools. For such areas the Stone Mastic Asphalt Concrete mixture shall be placed to the required compacted thickness.

Any Stone Mastic Asphalt Concrete mixture which is contaminated or segregated will be rejected.

When multiple lifts are specified in the Contract, the final lift shall not be placed until all lower lifts throughout that section, as defined by the Paving Plan, have been placed and accepted. Paving shall not begin until all adjacent curb has been poured and cured for at least seventy-two (72) hours.

H. Compaction

Immediately after the Stone Mastic Asphalt Concrete mixture has been spread, struck-off, and surface irregularities adjusted, it shall be thoroughly and uniformly compacted by rolling.

Due to the nature of Stone Mastic Asphalt Concrete mixtures, the surface shall be rolled immediately. Rolling shall be accomplished with a minimum of three steel wheel rollers of a minimum weight of twelve (12) tons each. Rolling procedures shall be adjusted to provide the specified pavement density. Rollers shall move at a uniform speed to obtain no less than ten to twelve (10-12) impacts per foot with the drive roller nearest the paver. The rollers vibratory eccentric’s shall be set for high frequency and low amplitude. Rolling shall continue until all roller marks are eliminated and the minimum density has been obtained.

To prevent adhesion of the mixture to the rollers, it shall be necessary to keep the wheels properly moistened with water mixed with detergent or other approved material. Rollers showing evidence of excessive pick-up will be replaced.

Once sufficient in-place density has been achieved, rolling operations shall cease. If migration of asphalt cement and filler to the compacted pavement surface has

occurred, Contractor shall remove the defective area and replace it with fresh Stone Mastic Asphalt Concrete mixture at his expense.

The surface will be tested after final rolling at selected locations using a ten foot (10') straightedge. The variation of the surface from the testing edge of the straightedge between any two contacts with the surface shall not exceed three-sixteenth inch (3/16"). The Stone Mastic Asphalt Concrete mixture in all defective areas shall be removed and replaced. All costs associated with removal and replacement of Stone Mastic Asphalt Concrete mixture in the defective areas shall be borne by Contractor.

Areas not accessible to the rollers shall be graded with rakes and lutes and compacted with mechanical tampers. For depressed areas a trench roller may be used to achieve the required compaction.

Stone Mastic Asphalt Concrete mixture that becomes loose and broken, segregated, mixed with dirt, or is any other way defective shall be removed and replaced with fresh Stone Mastic Asphalt Concrete mixture, which shall be compacted to conform with the surrounding area. Areas where asphalt cement, stabilizing additive and/or filler has migrated to the compacted pavement surface and produced "flushing" or segregated coarse aggregate has formed "rock pockets" shall be removed and replaced with fresh Stone Mastic Asphalt, by the contractor without compensation.

The Stone Mastic Asphalt Pavement shall be compacted to a minimum of ninety-three (93%) and maximum of ninety-eight percent (98%) of maximum specific density (MSD) as determined in accordance with AASHTO T-209. The compacted specimens, on which the maximum density is determined, shall be calculated from a laboratory specimen produced from a field sample of the same days mix. Acceptance testing for field density shall be determined in accordance with AASHTO T-166/T-275.

Rollers or other vehicles shall not be parked or left standing on pavement that has not cooled sufficiently to prevent indentation by wheels.

I. Joints

Joints shall be constructed to ensure a continuous bond between old and new sections of the course. All joints shall present the same texture and smoothness as other sections of the course.

When joining existing pavement and new pavement, the old pavement shall be cut in a neat line with a power driven saw.

Improperly formed joints resulting in surface irregularities shall be removed full depth, replaced with fresh Stone Mastic Asphalt Concrete mixture, and thoroughly compacted. Rolling of joints after the material has cooled below one hundred and

seventy degrees (170º) Fahrenheit shall not be allowed. All pavement removal shall be precut to a neat line with a power driven saw.

A tack coat of asphalt cement or asphalt emulsion shall be applied on all cold joints and allowed to break prior to placing fresh Stone Mastic Asphalt Concrete mixture against the joint. Contractor shall complete this Work immediately prior to paving.

Transverse joints shall be formed by saw cutting back on the previous run to expose the full depth of the course or by using a removable bulkhead. Transverse joints shall not be perpendicular to centerline, but shall be skewed between fifteen and twenty-five degrees (15º and 25º).

The longitudinal joints in one layer shall offset those in the layer immediately below by at least six inches (6”). Longitudinal joints shall be at lane lines. Where preformed marking tape striping is required, the longitudinal joint in the top layer shall be offset not more than six inches (6”) from the edge of the stripe.

J. Repair and Replacement

Stone Mastic Asphalt Concrete mixture that becomes contaminated with foreign material or is in any way defective as determined by the Engineer shall be removed. Skin patching is not permitted. Defective materials shall be removed for the full thickness of the course. The pavement shall be cut so that all edges are vertical, the sides are parallel to the direction of traffic, and the ends are skewed between fifteen and twenty-five degrees (15º and 25º). Edges shall be coated with a thin tack coat of material. Fresh Stone Mastic Asphalt Concrete mixture shall be placed in sufficient quantity so that the finished surface will conform to grade and smoothness requirements. The Stone Mastic Asphalt Concrete mixture shall be compacted to the density specified. No payment shall be made for material replacing defective material. All costs associated with the patching of defective areas shall be borne by Contractor.

K. Vehicular Traffic

Contractor shall not allow vehicular traffic on the asphaltic mat surface until the mat surface has cooled to below one hundred and twenty degrees (120º) Fahrenheit. Any portion of the Stone Mastic Asphalt Concrete mixture that becomes loose and broken, rutted, or damaged in any way due to vehicular traffic on the asphaltic mat surface prior to it cooling to below one hundred and twenty degrees (120º) Fahrenheit, shall be removed and replaced with fresh hot Stone Mastic Asphalt Concrete, which shall be compacted to conform with the surrounding area at the specified density.

L. Test Section

A minimum five (5) days prior to proceeding with Stone Mastic Asphalt Concrete paving, Contractor shall place a minimum of three hundred (300) tons of Stone Mastic Asphalt Concrete mixture in a test section at a location approved by the

Engineer. The test section will be used to adjust the Job-Mix Design asphalt cement content and to also familiarize Contractor's personnel with the laydown and compaction of Stone Mastic Asphalt Concrete mixture.

Stone Mastic Asphalt Concrete mixture placed in the test strip that meets specifications will be measured and paid for at Contract prices. No payment will be made for mixture that does not meet specifications. If the test strip is placed within the project limits and does not meet specifications it shall be removed at Contractor's expense.

Article 7.6 Density and Surface Requirements

Stone Mastic Asphalt Concrete placed on this project shall have a density equal to or greater than ninety-three percent (93%) but shall not exceed ninety-eight percent (98%) of the maximum specific gravity (MSG) as determined in accordance with AASHTO T-209. For the first day's production of Stone Mastic Asphalt Concrete, the MSG will be determined by the Job-Mix Design. For each subsequent day's production, the MSG will be determined by a sample of Stone Mastic Asphalt Concrete from the respective day's production. Acceptance testing for field density will be determined in accordance with ATM T-18, except that a minimum six inch (6") diameter core is required.

When requested by the Engineer, Contractor shall, without charge, provide the Engineer with test samples of Stone Mastic Asphalt Concrete cored from the completed pavement. All cores shall be at least six inches (6") in diameter and the Contractor shall patch core holes within seventy-two (72) hours.

The final surface shall be of a uniform texture conforming to true grade and cross sections in accordance with the Contract Documents. The Engineer shall determine the thickness of the course.

Prior to the delivery of the first load of asphalt to the project, Contractor shall furnish straightedges to the Inspector for checking pavement surface uniformity. Surface irregularities of the newly placed Stone Mastic Asphalt Concrete Pavement shall not exceed three-sixteenth inch (3/16") within ten feet (10'), or five-sixteenth inch (5/16") within sixteen feet (16'). Stone Mastic Concrete Pavement with non-conforming surfaces shall be subject to rejection by the Engineer. Irregularities which develop before the completion of rolling shall be remedied by loosening the surface mix, removing or adding material as may be required, and rerolling.

Article 7.7 Measurement

Stone Mastic Asphalt Concrete will be paid for as defined in the following paragraphs and as designated in the bid schedule.

A. Measurement by the Ton

Measurement of Stone Mastic Asphalt Concrete, unless otherwise provided, shall be weighed on truck scales in accordance with Article 7.4, SubArticle F – Truck

Scales. Stone Mastic Asphalt Concrete pavement shall be measured per ton of two thousand (2,000) pounds based on the amount of hot mix Stone Mastic Asphaltic material actually used in the completed and accepted Work modified as follows: the quantity paid for shall not exceed one hundred and five percent (105%) of tonnage determined on the basis of the average core density, the specified neat line thickness, and the completed area of Stone Mastic Asphaltic Concrete pavement. In addition, the Owner shall not pay for that portion of any load in excess of the legal gross weight for the vehicle delivering the load.

B. Sampling and Testing

Samples taken for the determination of acceptance will be taken from behind the screed prior to initial compaction. Samples may be taken from the windrow, if belly-dumps are used, with the prior approval of the Engineer. Asphalt cement content will be determined by ATM T-23, AASHTO T164-94, or AASHTO T-308, with the exception that the moisture content will be determined by ATM T-25.

For Stone Mastic Asphalt Concrete mixture samples, the gradation will be determined in accordance with AASHTO T-30 from the aggregate remaining after the ignition oven (AASHTO T-308) has burned off the asphalt cement, or from aggregate extracted in accordance with AASHTO T164-94. If the asphalt cement content is determined by AASHTO T-308, the percent of asphalt shall be reduced by three-tenths percent (0.3%), by weight of total mix, for Stone Mastic Asphalt containing cellulose.

Article 7.8 Basis of Payment

Payment for this Work shall be in accordance with Division 10, Section 10.07 - Measurement and Payment, and shall include full payment for all Work described in this Section.

Payment shall be made under the following unit:

ITEM	UNIT
S.M.A. Concrete Pavement	Ton

SECTION 40.08 RECYCLED ASPHALT PAVING (RAP)

Article 8.1 General

The work under this Section consists of furnishing all materials and performing all operations necessary to complete placement and construction of a recycled asphalt paving (RAP) surface on an existing prepared subbase.

Article 8.2 Material

The RAP shall consist of crushed gravel, rock, sand, or other approved material. The aggregate shall be derived from recovered AC pavement and be free from lumps, balls of clay, or other objectionable matter, and shall be durable and sound. The portion of the material retained on a No. 4 sieve shall be known as coarse aggregate. Maximum RAP conglomerate (prior to extraction) shall pass the one inch (1”) sieve.

RAP is to be delivered to the jobsite in an unheated condition. Delivery of heated material to the jobsite will be rejected unless previously approved by the Engineer.

A. Coarse Aggregate

The coarse aggregate material conforming to the requirement specified above shall have a percentage of wear not to exceed fifty (50) after five hundred (500) revolutions, as determined by the current requirements of ASTM C-131. It shall consist of angular fragments, reasonably uniform in density and quality, and reasonably free from thin elongated pieces, dirt, and other objectionable material. At least fifty percent (50%) of the coarse aggregate particles shall have at least two (2) mechanically fractured faces. Asphalt extraction and sieve analysis shall be performed in accordance with ASTM D-2172-A or B, AASHTO T-164-A or B, and AASHTO T-30.

B. Fine Aggregate

The fine aggregate shall consist of material free of organic or other objectionable matter. The fine aggregate, either naturally combined with the coarse aggregate or separately obtained and mixed therewith, shall be of such character that the composite material will conform to the gradation and other requirement specified.

C. Gradation

The composite mixture of coarse aggregate and fine aggregate, processed as hereinafter specified, shall conform to the following gradation limits:

Sieve Size	Percentage Passing By Weight
1"	100
3/4”	70-100
3/8”	50-85
# 4	35-65
# 10	25-50
# 40	10-30
# 80	5-20
# 200	2-10

Asphalt Content: 2.7% - 4.7%

Moisture Content: 3.5% Max

The asphalt content of RAP delivered to the project shall be determined on the individual extraction test results and not an average of extractions conducted.

Article 8.3 Construction

The RAP shall be placed to the lines, grades, and thicknesses shown on the Drawings and shall consist of the materials specified. The RAP shall provide a smooth stabilized paved surface on which vehicular traffic can drive.

A. Preparation of Subbase

Subbase preparation shall be completed by others in accordance with Division 20, Section 20.11 - Grading Existing Surfaces with the compaction density modified to ninety-five percent (95%).

B. Placing

The approved RAP material shall be deposited and spread uniformly on the prepared subbase in one uniform layer to the required contour and grades and to such loose depth that when compacted to the density required will achieve the specified thickness. Portions of the layer which become segregated in spreading shall be remixed to the required gradation.

C. Compacting

The RAP shall be compacted to at least ninety-five percent (95%) of maximum density as per AASHTO T-180D. In all places not accessible to the rolling equipment, the mixture shall be compacted with tamping equipment capable of attaining the specified density. Blading, rolling and tamping shall continue until the surface is smooth and free from waves and inequalities. If at any time the mixture is determined to be above or below optimum moisture, it shall be aerated by means of blade graders, harrows or other approved equipment or moisture added until the moisture content is such that the surface can be recompacted and finished as above. In place compaction shall be accomplished with a double-drum vibratory asphalt compactor with a minimum of fifteen thousand (15,000) pounds of dynamic force per drum. All requests for equipment substitution shall require a current certification test, identifying the capability of the equipment to meet the required specifications.

D. Smoothness Test

The surface of the RAP, when finished, shall not show any deviation in excess of three-eighths inch (3/8") when tested with a ten foot (10') straightedge applied parallel with and at right angles to the centerline of the area to be paved. Any deviation in excess of this amount shall be corrected by loosening, adding, or removing material and reshaping and compacting to satisfy the above requirement.

The Contractor shall furnish a ten foot (10') long straightedge and shall, in the presence of the Engineer, straightedge test the entire surface.

E. Seal Coat

The surface of the RAP shall be seal coated in accordance with the provisions in Section 40.02 – Seal Coat. The sealant shall be considered incidental to the cost of RAP construction.

Article 8.4 Measurement

The RAP shall be measured in tons of materials delivered and placed in accordance with these Specifications and adjusted for excess moisture as provided. Said measurement may include moisture up to a maximum of three and one-half percent (3.5%) of dry weight of the material.

When tests by the Engineer indicate that moisture contents in excess of three and one-half percent (3.5%) may be occurring consistently, the frequency of testing will be increased as necessary and the results averaged over a period of one week. When this average is greater than three and one-half percent (3.5%), the tonnage as measured over the above period shall be reduced by the difference. No credit will be due the Contractor when moisture content is less than three and one-half percent (3.5%). Testing will be done in accordance with AASHTO T-255.

Article 8.5 Basis of Payment

Payment for this work shall be in accordance with Division 10, Section 10.07 - Measurement and Payment, and shall include full payment for all Work described in this Section.

Payment shall be made under the following unit:

ITEM	UNIT
Furnish & Install RAP	Ton

SECTION 40.09 BITUMINOUS SURFACE TREATMENT

Article 9.1 Description

The Work under this Section consists of the performance of Work required for the construction of a seal coat of asphalt cement and cover aggregate on an asphalt street surface.

Article 9.2 Asphalt

The Contractor shall submit a certified analysis from the refinery laboratory to the Engineer for review and approval. A copy of the certified analysis shall accompany each shipment of asphalt to the Project. The Engineer shall reserve the right to make check tests of the asphalt received on the Project site, and if the asphalt is not in accordance with the certified analysis, he may reject the material.

The asphalt required by these Specifications shall conform to the requirements of The Asphalt Institute for the type and grade shown below:

Asphalt for Bituminous Surface Treatment	CRS-2

Article 9.3 Aggregates

Aggregate shall consist of crushed gravel and shall be sound, durable, free of adherent coatings of clay, dirt, dust or any other objectionable matter, and shall have a percentage of wear not to exceed forty (40) after five hundred (500) revolutions, as determined by the ASTM C-131. Not less than sixty percent (60%) by weight of crushed gravel shall consist of crushed pieces having two (2) or more faces having freshly fractured face.

Aggregate material shall have the following gradation:

A. Cover - 1st Course

Sieve Designation	Percentage By Weight Passing
3/4"	100
1/2”	90-100
3/8”	40-75
# 4	0-15
# 8	0-5
# 200	0-1

B. Cover Aggregate - 2nd Course

Sieve Designation	Percentage By Weight Passing
3/8”	100
# 4	85-100
# 8	0-25
# 200	0-2

Article 9.4 Equipment

A. General

All equipment used on this Work shall be of sufficient size and in such mechanical condition as to meet the requirements and to produce the Work to the specified quality.

B. Pressure Distributor

The bitumen distributor shall be pneumatic-tired self-propelled, and shall have a capacity of not less than eight hundred (800) gallons. It shall be equipped with an independently-operated bitumen pump, tachometer, pressure gauges, volume metering devices, a thermometer for reading the tank temperature and a hose attachment suitable for applying the bituminous material to spots unavoidably missed by the distributor. The independently-operated bitumen pump shall be equipped with a tachometer calibrated in revolutions per minute. The distributor shall also be equipped to agitate and circulate the bituminous material during the heating process.

Spray bars shall be the circulating type with extensions, available for distributing width from eight to twenty-one feet (8’ to 21’) by one foot (1’) increments. The nozzles shall give uniform distribution and shutoff shall be quick and positive so as to prevent dripping. The distributor shall be designed and equipped to distribute the bituminous material uniformly at consistent surface speeds, at uniform temperatures with various surface widths, at known and maintained rates of five-hundredths (0.05) to two (2.0) gallons per square yard within a tolerance of five percent (5%), and through a pressure range from twenty-five (25) to seventy- five (75) pounds per square inch. Air pressure type equipment may be used only upon written approval from the Engineer.

C. Cover Aggregate Spreader

The spreader shall be self-propelled and capable of spreading the cover material uniformly for widths of eight to sixteen feet (8’ to 16’) in one foot (1’) increments, and adjustable to spread uniform layers of ten (10) to fifty (50) pounds per square yard. Revolving plate type chip spreaders will not be approved.

D. Rollers

Rollers shall be self-propelled, pneumatic-tire, weighing not less than five (5) tons or more than eight (8) tons. Rolling shall follow closely on spreading of aggregate.

E. Hauling Equipment

The cover aggregate shall be transported from the plant to the site in trucks having tight, clean smooth beds.

F. Miscellaneous Equipment

A power broom and all necessary hand tools, thermometers, etc., shall be provided by the Contractor.

Article 9.5 Construction

A. Surface Preparation

The existing road surface shall be graded smooth to the satisfaction of the Engineer. There shall be no visible ruts, holes, or large rocks protruding from the surface to be treated. Existing soft spots in the road base shall be compacted or excavated and backfilled with a suitable base course material. The area to be treated in any one operation shall be as indicated on the Drawings.

B. Weather Limitations

Bituminous material shall not be placed during rainy or threatening weather, or when the moisture on the surface to be treated would prevent satisfactory bond. The surface coats shall not be applied when the air temperature is below fifty degrees (50º) Fahrenheit, unless otherwise approved by the Engineer.

C. Heating and Application of Bituminous Material

Bituminous material shall be heated in such a manner as to insure heating of the entire mass with an efficient and positive control at all times. A curing period of twenty-four (24) hours may be required between the application of the prime coat and the next application of bituminous material, during which time the surface shall be kept in repair. The asphalt for the surface treatment shall be applied at a temperature between one hundred thirty and one hundred eighty degrees (130º and 180º) Fahrenheit and at a rate of 0.30 to 0.45 gallons per square yard for the first coat and 0.25 to 0.40 gallons per square yard for the second coat. Thermometers shall be provided by the Contractor so that temperatures can be observed at all times.

Bituminous material shall be uniformly applied by means of a pressure distributor in the amount per square yard specified. The quantity of material as measured by the volume measuring device of the distributor shall not vary from the true quantity as herein specified by more than five percent (5%). Bituminous material shall not be

applied until sufficient cover aggregate is on hand to cover the area to be applied at a particular application. If the aggregate spreader is delayed by breakdown or operational difficulties, application of bituminous material shall cease until the Engineer is satisfied that delays will not recur.

D. Preparation and Application of Cover Aggregate

Cover material shall be sufficiently dried when it comes in contact with bituminous material so that a satisfactory bond or coating is obtained.

When the prime coat has sufficiently cured, the asphalt for the surface coat shall be applied to the surface. Immediately following this application of bituminous material, the first coat of cover aggregate shall be uniformly spread over the surface with an approved mechanical spreader at a rate of thirty (30) to forty (40) pounds per square yard. A minimum curing period of twelve (12) hours will be required before the second coat of asphalt and cover aggregate is applied. The rate of application of the second coat of cover aggregate shall be twenty (20) to thirty (30) pounds per square yard. Cover material shall be applied continuously and without delay until the particular application is covered. Whenever possible successive strips shall be applied before the previous strip has cooled. Cover material shall not be spread on the six inches (6”) adjacent to an unprotected edge until the next strip of bituminous material has been applied. Rolling shall immediately follow the application of each coat of cover aggregate and shall continue until the surface is accepted as determined by the Engineer.

E. Maintenance of Surface

After application of the second coat of cover material, the surface shall be maintained by the Contractor, at his expense, for a period of three (3) days. During this period the Contractor shall, at least once daily, redistribute the cover material that has become displaced by traffic, by means of brooms, a drag or other method satisfactory to the Engineer.

When all possible aggregate has been imbedded in the bituminous material on each course to the satisfaction of the Engineer, the Contractor shall sweep each course surface of all excess material and remove it to a designated area, unless otherwise directed by the Engineer.

Article 9.6 Measurement

Bituminous material and cover aggregate course will be measured by weight in tons (2,000 lbs).

Legible weight tickets shall be submitted to the Engineer for all bituminous material and cover aggregate delivered to the Project site for use in the Work. All weight tickets shall contain, at a minimum, the following information:

1. Weight ticket serial number;

2. Vehicle identification number;
3. The date and time the load was weighed;
4. The tare weight of the vehicle;
5. The gross weight of the loaded vehicle, as registered on the scale; and
6. The legal gross weight of the vehicle, as permitted by Anchorage Municipal Code Sections 9.46.090 or 9.46.100.

The Owner shall not pay for that portion of any load in excess of the legal gross weight for the vehicle.

Article 9.7 Basis of Payment

Payment for this Work shall be in accordance with Division 10, Section 10.07 - Measurement and Payment, and shall include full payment for all Work described in this Section.

Payment shall be made under the following units:

ITEM	UNIT
B.S.T. Asphalt for Prime Coat (Type & Grade)	Ton
B.S.T. Asphalt (Type & Grade)	Ton
B.S.T. Cover Aggregate (1st Coat)	Ton
B.S.T. Cover Aggregate (2nd Coat)	Ton

SECTION 40.10 PAVEMENT ROTOMILLING

Article 10.1 General

The Work under this Section consists of furnishing all plant, labor, supervision, equipment, and material for performing all operations necessary for the removal and disposal of pavement to a depth designated on the Drawings with a power-operated profile machine designed for this specific purpose.

Article 10.2 Construction

Pavement shall be removed by rotomilling, planning, or grinding to a final surface smooth enough for temporary traffic and repaving with no additional preparation other than sweeping and application of a tack coat. Additional rotomilling, grinding, or milling by the power-operated profile machine may be necessary around manhole covers, valve boxes, survey monument cases, etc. The depth of asphalt removal under this Section may vary.

The Contractor shall dispose of the removed pavement tailings at a location designated by the Municipal Street Maintenance Department. The Contractor shall coordinate the exact location with the Street Maintenance Control Center. If the removed pavement material under this Section contains objectionable material within it, as identified by the Engineer, then Contractor shall dispose of this material in accordance with Division 10, Section 10.04, Article 4.9 - Disposal Sites.

Article 10.3 Measurement

Pavement removed by rotomilling, planning or grinding shall be measured by the square yard of pavement designated for and actually removed. No additional payment will be made regardless of depth or additional rotomilling around utility appurtenances.

Article 10.4 Basis of Payment

Payment for this Work shall be in accordance with Division 10, Section 10.07 - Measurement and Payment, and shall include full payment for all Work described in this Section.

Payment shall be made under the following unit:

ITEM	UNIT
Pavement Rotomilling	Square Yard

SECTION 40.11 REMOVE AND REPLACE ASPHALT SURFACING

Article 11.1 Description

The Work under this Section consists of the performance of all Work required for removing, disposing of, and replacing existing asphaltic surfacing or cold mix asphalt, including leveling course and existing traffic markings, as indicated on the Drawings.

Article 11.2 Materials

All materials used shall conform to the requirements of these Specifications and other agencies (if any) having jurisdiction over the pavement being replaced.

Cold mix asphalt material shall be that located at the Kloep Maintenance Station.

Article 11.3 Construction

All construction practices, tests and other controls shall conform to the Division 20 - Earthwork, and this Division.

Contractor shall remove existing asphalt surfacing and leveling course, regardless of thickness. Replacement asphalt surfacing and leveling course thickness shall be shown on the Drawings.

Contractor shall neatly and cleanly saw cut existing asphalt surfacing to be removed prior to removal. Saw cuts shall be a minimum of two inches (2”) deep and shall be straight and parallel. If any portion of the remaining asphalt surfacing is undercut by trenching operations, the Contractor shall saw cut, remove, and replace the affected area at his own expense.

Contractor shall apply tack coat to all contact surfaces including curbing, gutters, manholes, and other structures with a thin, uniform coating prior to placing asphalt. Butt joints on previously placed cooled pavement shall be tack coated prior to continuing the paving operation.

Asphaltic concrete paving replacement will be performed by utilizing a mechanical spreader and will be compacted by a mechanical roller weighing not less than ten (10) tons, except that where the area of the asphalt replacement patch is less than one hundred (100) square feet, a mechanical spreader need not be employed.

Small areas inaccessible to roller shall be tamped to produce a compression and surface texture equivalent to that produced by the specified rolling. Hand tampers shall have a maximum tamping face of fifty (50) square inches and a minimum weight of twenty-five (25) pounds.

The Contractor shall replace traffic markings, in kind, in accordance with Division 70, Section 70.10 – Traffic Markings.

Prior to winter shutdown, Contractor shall haul, place, and compact cold mix asphalt on areas where asphalt has been removed. Rejuvenated hot mix asphalt will be supplied by the Municipality of Anchorage at a rate of approximately two (2) tons per hour. The rejuvenated hot mix will be located at the Kloep Maintenance Station, 5701 Northwood Drive. Contractor shall coordinate with Maintenance & Operations Department, Street Maintenance Division, at 343-8277, when the patch can be obtained. Contractor shall haul from the Kloep Maintenance Station to the project site.

Contractor shall keep all asphalt surfacing designated for removal free from objectionable material (concrete, steel, etc.). Contractor shall dispose all removed asphalt surfacing at the Kloep Maintenance Station, 5701 Northwood Street. Contractor shall coordinate exact location and time of delivery with the Maintenance & Operations Department, Street Maintenance Division, at 343-8102. If the removed asphalt surfacing, under this Section, contains objectionable material, as identified by the Engineer, Contractor shall dispose of this asphalt surfacing in accordance with Division 10, Section 10.04, Article 4.9 – Disposal Sites.

Article 11.4 Measurement

Removing, disposing of, and replacing existing asphalt surfacing and cold mix asphalt, including leveling course, is measured per square yard, complete in place.

Article 11.5 Basis of Payment

Payment for this Work shall be in accordance with Division 10, Section 10.07 - Measurement and Payment, and shall include full payment for all Work described in this Section.

Payment shall be made under the following units:

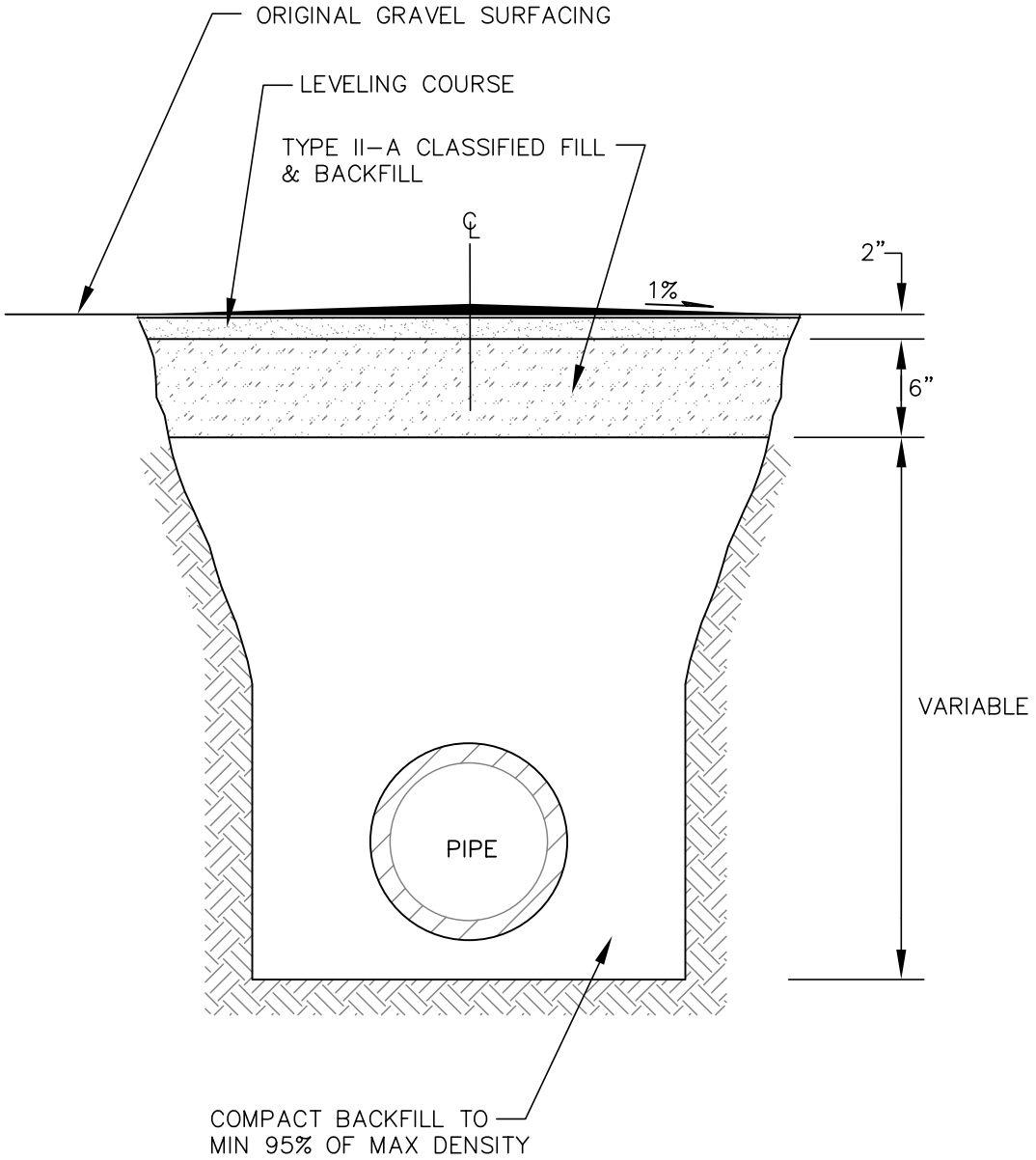
ITEM	UNIT
Remove Asphalt , Replace with Municipal-Supplied Hot Mix Asphalt	Square Yard
Remove Asphalt , Replace with Asphalt Surfacing (Class)	Square Yard

MUNICIPALITY OF ANCHORAGE
STANDARD SPECIFICATIONS

DIVISION 40
ASPHALT SURFACING
STANDARD DETAILS

STANDARD CONSTRUCTION SPECIFICATIONS
MISCELLANEOUS
DIVISION 40
INDEX OF STANDARD DETAILS

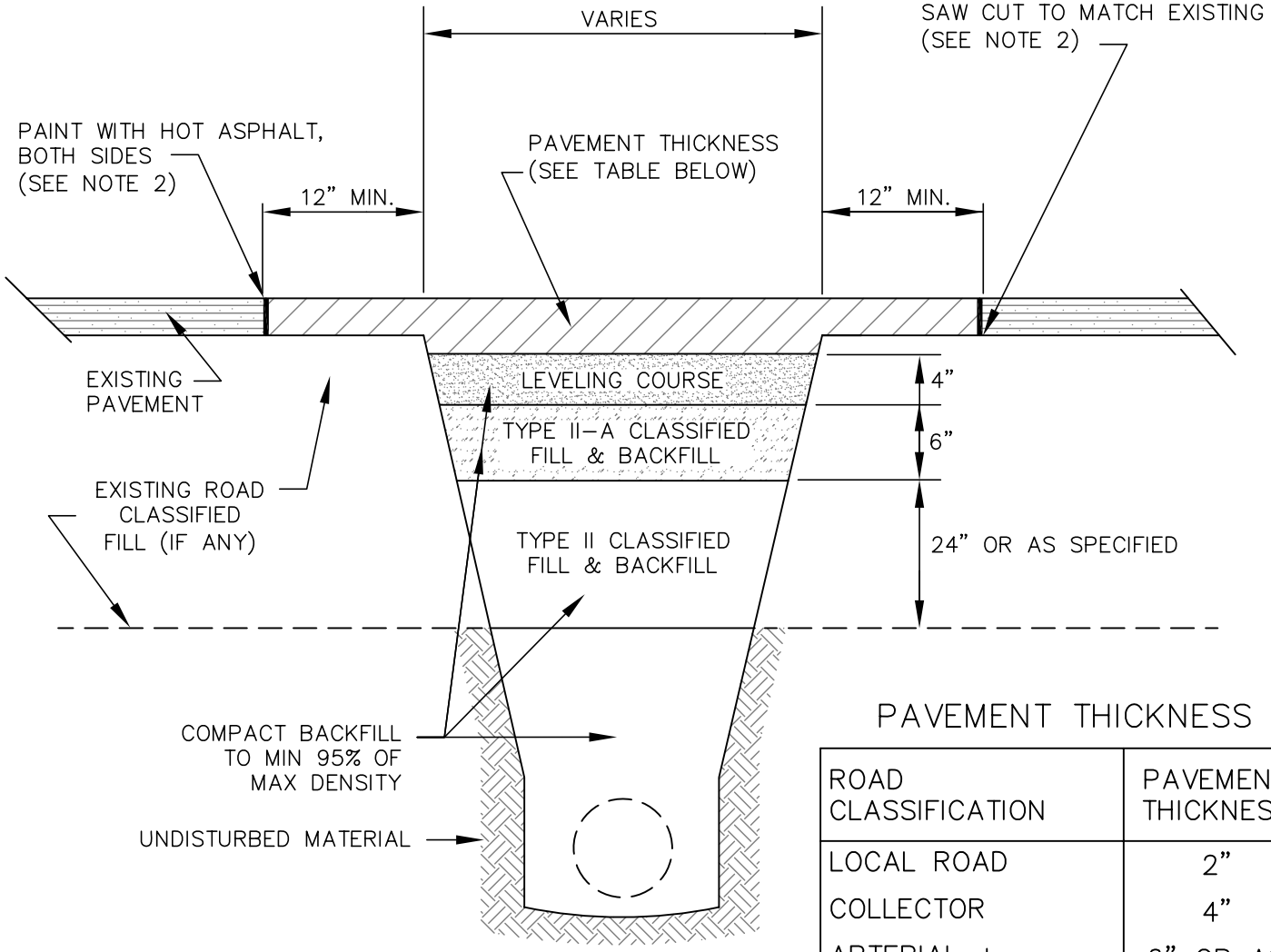
40-1 Typical Resurfacing Detail - Gravel
40-2 Typical Resurfacing Detail - Non-Gravel Surfaces



NOTE:

1. CONTRACTOR SHALL CONSTRUCT A 1% CROWN WITH THE PEAK CENTERED OVER THE CENTERLINE OF THE EXCAVATION.

MUNICIPALITY OF ANCHORAGE	SCALE: NTS APPROVED: REVISED: 10/07	**TYPICAL RESURFACING DETAIL GRAVEL**	SECTION # 40.11 DETAIL # 40–1



PAVEMENT THICKNESS

ROAD CLASSIFICATION	PAVEMENT THICKNESS
LOCAL ROAD	2"
COLLECTOR	4"
ARTERIAL +	6" OR AS SPECIFIED

NOTES:

1. ENGINEER OR PERMITTING AGENCY MAY DIRECT ADDITIONAL AMOUNTS OF SURFACE REPLACEMENT MATERIALS AND/OR TYPE II CLASSIFIED FILL & BACKFILL, BASED UPON FIELD CONDITIONS.
2. AFTER TRENCH BACKFILL HAS BEEN COMPACTED, CONTRACTOR SHALL SAW CUT (REF. SECTION 40.02.5.J) AND REMOVE AN ADDITIONAL 12" FROM EACH EDGE OF THE ORIGINAL CUT. ENGINEER MAY REQUIRE ADDITIONAL REMOVAL, IF THE EXISTING SURFACING HAS BEEN LIFTED IN THE REMOVAL PROCESS OR IF THE JOINT DOES NOT OCCUR ON UNDISTURBED MATERIAL. TRIM AND SQUARE THE EDGES OF EXISTING SURFACING, AND REMOVE LOOSE MATERIALS BEFORE PLACING PAVEMENT. CONTRACTOR SHALL PAINT SURFACES AND EDGES OF EXISTING PAVEMENT WITH HOT ASPHALT CEMENT AS SPECIFIED IN THE CONTRACT DOCUMENTS OR AS APPROVED BY THE ENGINEER.
3. MAXIMUM LIFT THICKNESS IS 2' UNLESS OTHERWISE SPECIFIED IN THE DRAWINGS OR APPROVED BY THE ENGINEER.
4. THIS DETAIL APPLIES TO ALL NON-GRAVEL SURFACES INCLUDING, BUT NOT LIMITED TO, PAVEMENT, RECYCLED ASPHALT PAVEMENT (RAP), AND BITUMINOUS SURFACE TREATMENT, ALSO KNOWN AS CHIP SEAL.

MUNICIPALITY OF ANCHORAGE	SCALE: NTS APPROVED: REVISED: 10/07	TYPICAL RESURFACING DETAIL NON-GRAVEL SURFACES	SECTION # 40.11 DETAIL # 40-2