SECTION 02735

BITUMINOUS MIXTURE
THIN-WEARING SURFACE
(CARPET COAT)

PART 1 Description.

The work specified in this Section shall consist of placing a carpet coat over an existing asphaltic concrete pavement, in reasonably close conformity with the lines, grades, thickness, and typical cross-sections shown on the plans or established by the Engineer.

PART 2 Materials

2.01 Materials

A. Gradation of Aggregate

Sieve Size	% Passing By Weight
3/8" (9.5mm)	100
#4 (4.75mm)	62.5-70
#10(2mm)	32-50
#40 (425*u*m)	21-27
#50 (330*u*m)	16-22
#100 (150*u*m)	9-15
#200 (75*u*m)	5-8

B. Asphalt Content.

1. Asphaltic cement shall be PGM58.22. The grade of asphalt cement shall meet the requirements for grade and type as specified in AASHTO Standard Specifications for viscosity graded asphalt cement M226, Table I, current Edition. The type and grade of bituminous material may be changed one step by the Engineer during construction, at no change in unit price.

C. General Requirements.

1. Uniformity. The plant shall be so designed and operated as to produce a job mixture whose permissible variance from the mix design shall be as follows:

Amount passing on the No. 4 sieve and larger	+ 5%
Amount passing on the No. 8 to No. 110 sieves	+ 5%
Amount passing on the No. 40 sieve	+ 5%

Amount passing on the No. 200 sieve	+ 3%
Bitumen	±.5%

i. The mixture shall have a density, when thoroughly compressed, of not less than 97% of field sampled laboratory Marshall density.

2. Paving Plant Inspection. For verification of weights or proportions and character of materials, and determination of temperatures used in the preparation of mixture, the Engineer, or his authorized representatives, shall have access at any time to all parts of the paving plant.

D. Bituminous Mixture Design Criteria. The following Marshall Design Criteria shall be used to determine optimum asphalt content:

No. of Compaction Blows Each End of Specimen - 50.

Test Property	Min.	Max.
Stability, all mixtures (lbs.) (kg)	1200(550kg)	---
Flow, all mixtures (in.)(mm)	.08(2mm)	.16 (4.5mm)

PART 3 Execution.

A. General Conditions.

1. Weather Limitations. Bituminous plant mix shall not be placed on any wet surface or when the atmospheric temperatures are less than those specified in the following table; or when weather conditions otherwise prevent the proper handling or finishing of the bituminous mixtures:

Atmospheric Temperature Limitations

Compacted Thickness	Carpet Coat
Less than 1" (25mm)	70° F(21^0C)

B. Transportation of Mixture. The mixture shall be transported from the paving plant to the work in vehicles equipped with tight metal compartments previously cleaned of all foreign materials. When directed by the Engineer, the compartments shall be suitably insulated and each load shall be covered with canvas or other suitable materials of sufficient size to protect it from weather conditions. The inside surface must be lightly lubricated with a thin oil just before loading, but excessive lubricant will not be permitted. No loads shall be sent out so late in the day as to interfere with spreading and compacting the mixture during daylight.

C. Placing Asphalt Mixture. The mixture shall be delivered on the work site at a temperature

± 15° F. (-9°C) of the mixing temperature, but in no case shall the temperature be below 240° F. (115°C). Final rolling and density of the bituminous surface, subsurface, or leveling courses must be obtained prior to the mixture reaching a minimum temperature of 180° F. (82°C).

1. Unless otherwise permitted by the Engineer, the mixture shall be spread by means of a mechanical self-powered paver, capable of spreading the mixture true to the line, grade, and crown shown on plans. Hand-placing and spreading will be permitted in irregular areas where it is impractical to use a paving machine.

2. Pavers shall be equipped with hoppers and distributing screws of the reversing type to place the mixture evenly in front of adjustable screeds. The mixture shall be dumped in the center of the hoppers and care exercised to avoid overloading and spilling over the mixer upon the base. Pavers shall operate, when laying mixtures, at such speed between ten feet (10') (3m) and twenty feet (20') (6m) per minute as may be decided by the Engineer.

3. Pavers shall be equipped with a quick and efficient steering device and shall have forward and reverse traveling speeds of not less than one hundred feet (100') (30m) per minute and a tamping device capable of delivering at least 500 blows per minute.

4. Unless operating on fixed side forms, pavers shall employ mechanical devices such as equalizing runners, straight-edge runners, evener arms, or other compensating devices to adjust the grade and confine the edges of the mixtures to true lines without the use of stationary side forms. The pavers shall be capable of spreading the mixtures, without segregation, in thickness of from one-half inch (1/2") (12.5m) to three inches (3") (75mm) and in widths of eight feet (8') (2.5m) to fourteen feet (14') (4.5m) adjustable in steps of one foot (1') (.3m) or less. They shall be equipped with blending or joint leveling devices for smoothing and adjusting all longitudinal joints between adjacent strips of courses of the same thickness.

5. Pavers shall be equipped to automatically control the laying of the mixture to specified transverse slope and established longitudinal grade. The paver control system shall be automatically actuated from an independent line and grade control reference through a system of mechanical sensors and sensor-directed devices which shall maintain the paver screed at the proper transverse slope and height to establish the top surface of the compacted mixture at specified slope and grade.

6. The term "screed" includes a "strike-off" device operated by cutting, crawling, or other practical action which is effective on the mixture at a workable temperature without tearing, shoving, or gouging, and which produces a finished surface of the evenness and texture specified. The screed shall be adjustable as to level and shall have an indicating level attached.

7. Immediately after any course is screeded, and before roller compaction is started, the

surface shall be checked, any inequalities adjusted, and replaced with satisfactory material. Irregularities in alignment and grade along the outside edge shall also be corrected by the addition or removal of mixture before the edge is rolled.

8. The Contractor shall provide a competent worker who is capable of performing the work incidental to the correction of all pavement irregularities. Special attention shall be given by the worker to the straight-edging of each course immediately following the initial rolling.

9. In narrow, deep, or irregular sections, intersections, turnouts, or driveways where it is impractical to spread and finish the mixtures by machine methods, the Contractor may use approved spreading equipment or acceptable hand methods as directed by the Engineer.

10. When the mixture is to be spread by hand, upon arrival on the work it shall be dumped upon a steel dump board outside the area on which it is to be spread, or shoveled directly from the truck to the area on which it is to be spread. Immediately thereafter it shall be distributed into place by means of hot shovels and spread with hot rakes in a loose layer of uniform density and correct depth. Tines of the rakes shall be not less than one-half inch (1/2") (12.5mm) longer than the loose depth of mixture, and spaces between tines shall be not less than the maximum diameter of aggregate particle except that in no case should the spaces be less than one inch (1") (25mm). Loads shall not be dumped any faster than they can be properly handled by the shovelers. Lutes may be used with permission of the Engineer.

11. The shoveler shall not distribute the dumped load faster than it can be properly handled by the rakers.

12. The rakers will not be permitted to stand in the hot mixture while raking it, except where necessary to correct errors in the first raking. The raking must be carefully and skillfully done in such a manner that after the first passage of the roller over the raked mixture, a minimum amount of back patching will be required.

13. The placing of the mixture shall be as continuous as possible. The roller shall pass over the unprotected edge of the freshly laid mixture only when the laying of this course is to be discontinued for such intervals of time as to permit the mixture to become chilled.

D. Joints. Transverse construction joints shall be made in a careful manner. The edge of the previously laid course shall be cut back as far as is necessary to eliminate irregularities incidental to finishing and rolling. After laying the finished mixture adjacent to a transverse construction joint, a skilled laborer shall follow up each rolling with a straight-edge and corrective measures to insure a smooth riding surface. The laborer shall be equipped with hot smoothing irons, tampers, and other devices for use in truing up the pavement surface adjacent to the joint.

1. Longitudinal joints against both hot and cold material shall be made with equal care. Mixtures spread and compacted (or partially compacted) by the machine shall not be disturbed by a rake in dressing the joint, unless one side is too high, nor shall surplus mixture be spread or scattered back of the machine when not needed to build up low spots. When spreading next to a warm or cold edge of a previously laid section of surfacing, the machine shall be adjusted to leave a "bead" of material, roughly one inch (1") (25mm) by one inch (1") (25mm), which shall be rolled in to compensate for uneven density at the joint. If one side of the joint is cold, the "bead" shall be moved back of the rake to the warm side of the joint but otherwise the machine-laid mixture shall not be disturbed.

2. In making the joint along any adjoining edge such as curb, gutter, or an adjoining pavement, and after the hot mixture is placed by the finishing machine, just enough of the hot material shall be carried back to fill any space left open, and provide a small "bead" of extra material. This joint shall be properly "set-up" with the back of the rake at proper height and bevel to receive the maximum compression under rolling. The work of "setting-up" this joint shall always be performed by competent workers, who are capable of making a correct, clean, and neat joint.

E. Compaction of the Mixture. As soon as the mixture will carry the compaction equipment without undue shoving or displacement, it shall be compacted with self-propelled rollers meeting the following criteria:

1. Three-axle tandems, two-axle tandems, and three-wheeled rollers used for breakdown rolling shall be of such weight that the compression load on the drive wheels is at least three hundred twenty five pounds per inch (325lb/in) (58kg/cm) of tire width.

2. Vibratory rollers used for breakdown or intermediate rolling having a compactive effort of not less than a dynamic force of twenty one thousand pounds (21,000#) (9525kg) may be used only with the written consent of the City Engineer, and should not be used on lifts of two inches (2") (50mm) or less.

3. Two-axle tandem rollers used for intermediate and finish rolling shall weigh not less than seven tons (7t) (6.3 metric t).

4. Pneumatic-tired rollers used for intermediate rolling shall be the oscillating type having a width of not less than four feet (4') (1.2m) and equipped with pneumatic tires of equal size and diameter, having treads satisfactory to the Engineer. Wobble-wheel rollers will not be permitted. The tires shall be so spaced that the gap between adjacent tires will be covered by the tread of the following tire. The tires shall be inflated to ninety pounds per square inch (90psi) (621 kPa) or such lower pressure as designated by the Engineer, and maintained so that the air pressure will not vary more than five pounds per square inch (5psi) (35 kPa) from the designated pressure. Pneumatic-tired rollers shall be so constructed that the total weight of the roller can be varied to produce an operating weight per tire of not less than two thousand pounds (2,000#) (907kg). The total

operating weight of the roller shall be varied as directed by the Engineer.

i. Other rollers may be used subject to prior approval by the Engineer.

5. All rollers must be maintained in good mechanical condition, and those that cannot be driven along a straight path or operated without jerking, shall not be used. No leakage of petroleum products from any roller shall be allowed to come in contact with pavement being constructed, nor shall any roller be permitted to stand motionless on any portion of the work. The surfaces of all roller wheels shall be treated with sufficient water to prevent the pickup of bituminous materials, but under no circumstances shall the quantity of water used be detrimental to the surface of the pavement being rolled.

6. As soon as the layer of asphalt concrete has been placed, it shall be thoroughly compacted by rolling. Except when compacting lifts greater than four inches (4") (100mm) in compacted thickness, rolling shall be commenced along the lower edge of the area to be rolled and continued until the edge is thoroughly compacted, after which the roller shall be gradually advanced to the crown point, both sides being rolled in like manner. Rolling shall be continued until the pavement layer has become thoroughly compacted throughout and is true to grade and cross-section.

7. For lifts greater than four inches (4") (100mm) in compacted thickness, rolling shall be commenced in the middle of the mat, after which the roller shall be gradually advanced to both edges. The roller should be advanced to a supported edge first, if applicable. Rolling of an unsupported edge should be delayed as long as possible, provided the required densities are obtained after the completion of the finishing rolling.

8. The finish rolling of the surface course shall be done with a tandem steel-wheeled roller until all roller marks are eliminated.

9. Along curbs, headers, manholes, and similar structures, and at all places not accessible to the roller, thorough compaction must be secured by means of hot tampers and irons. At all contacts of this character, the joints between these structures and the surface mixture must be effectively sealed.

10. After final compression, the surface course shall conform with the following requirements:

    i. It shall be smooth and true to the established crown and grade. It shall have the average thickness specified and shall at no point vary more than one-fourth inch (1/4") (6.25mm) from the thickness shown on the typical cross-sections on the plans. Any low or defective places shall immediately be remedied by cutting out the course at such spots and replacing it with fresh, hot mixture which shall be immediately compacted to conform with the surrounding areas and shall be thoroughly bonded to it. The surface of the finished pavement shall be free from depressions exceeding one-fourth inch (1/4") (6.25mm) as measured with a ten foot

(10') (3m) straight edge in any direction.

PART 4 Quality Control.

A. All testing and sampling shall be done in accordance with the latest A.A.S.H.T.O. Methods unless otherwise specified. The following tests shall be required during construction.

1. Asphalt Content and Gradation. One asphalt content and gradation test shall be made per each four hundred tons (400t) (360 metric t) or portion thereof of asphaltic mixture placed per day. These tests shall be performed on samples taken prior to screeding. The percentage of asphalt content my be determined by extraction or ignition oven. (ASTM D 2172, D 6307, ASHTO T164).

2. Marshall Series. A complete Marshall test series shall be performed each week of paving operations.

3. Preconstruction Test and Sampling. All sampling and testing of materials shall be in accordance with the latest A.A.S.H.T.O. Methods unless otherwise specified. At least three (3) weeks in advance of the beginning of asphaltic paving work, the Contractor shall:

   i. Submit suitable samples of all materials including asphalt cement to an approved materials testing laboratory for mixture design, and to determine compliance of materials to these specifications;

   ii. Or shall submit certification that the materials to be used are in conformance with these specifications and that the mixture design for use with these materials is approved and on file with the City Engineer.

4. The Contractor shall be responsible for all preconstruction tests and sampling, Marshall series testing, and all asphalt content and gradation testing. The Contractor shall select and pay for a certified testing firm, acceptable to the Owner and Engineer.

5. Unless specified by the contract documents or Standard Specifications, the Owner/Engineer will be responsible for all density/moisture testing. If the initial test fails to meet minimum requirements, the Contractor shall pay for any and all additional tests until the minimum density/moisture standards are met.

4.01 Cleaning.

A. The Contractor will be required to perform all preparatory operations of cleaning the surface of the existing pavement that are necessary for the workmanlike construction of the asphaltic concrete resurfacing course. The pavement shall be cleaned of all dirt, "fat" spots of armor coat, loose armorcoat, and bituminous patches containing an excess of asphalt.

4.02 Reconstructed Areas

Wherever within the locations of this work any evidence of heaving or spalling shall occur so as to greatly effect the line and cross section of the completed resurfacing, such areas shall be removed and replaced upon written orders of the Engineer. Compensation for such work shall be paid for as outlined in the Special Provisions. Such bad spots shall not be construed to mean crack filling or general cleaning operations already covered by these specifications.

4.03 Patching.

Any area designated by the Engineer to be "patched" before the placing of a hot mix asphalt mat, shall be completed in the following manner: All asphalt and/or P.C.C. shall be removed, hauled away, cut, and chipped to true lines with vertical faces and completely cleaned of all debris. The Contractor shall provide and employ such equipment and methods of compaction as are necessary to obtain the specified density in narrow or irregular areas.

4.04 Adjustment.

A. Adjustment of Manholes and Water Valve Boxes. Manhole covers and water valve boxes shall be adjusted so that the tops are parallel to the street grade and cross-slope. The tops shall be set one-fourth inch (1/4")(6.25mm) below the finished pavement surface.

1. Adjustment of boxes and manholes shall take place prior to placement of carpet coat. Sanitary and storm sewer manhole frames and valve boxes may be adjusted by using manufactured adjusting rings, only if the top of the adjusting ring in place matches the final pavement surface as described above.

END OF SECTION