SECTION LS 401

ASPHALT PAVEMENT REPAIR (GENERAL)

PART 1 – GENERAL

1.1 DESCRIPTION

A. These specifications include general requirements applicable to all types of asphalt concrete pavements irrespective of gradation of aggregate, kind and amount of asphalt binder, or pavement use. Deviations from these general requirements will be covered in the specific requirements for each type according to the appropriate contract item.

This work shall consist of one or more courses of asphalt concrete constructed on the prepared foundation in accordance with these specifications and the specific requirements of the type under contract, and in reasonably close conformity with the lines, grades, and typical cross sections shown on the plans or established by The City of Lakewood.

The asphalt concrete pavement thickness shown on the plans or stated in the proposal is for exclusive use in calculating the contract quantities.

1.2 COMPOSITION

A. The asphalt concrete mix shall be composed of a mixture of uniformly graded aggregate and specified type and grade of asphalt material.

The composition table for the type under contract specifies the limits within which the Job Mix Formula (JMF) will be set. Should the Contractor propose to change the source of the materials, a new JMF will be required.

B. The Suppliers' Engineer will establish a JMF using the Marshall Mix Design Method per the Asphalt Institute’s Manual MS-2. No change shall be made unless authorized by The City of Lakewood. These mixes shall be submitted for review by The City of Lakewood.

During production, variation from the JMF of plus or minus 3 percent passing the No. 4 (4.75 mm) sieve or plus or minus 0.3 percent bitumen shall be investigated and corrected by the Supplier.

A variation from the job-mix formula of plus or minus 5 percent passing the No. 4 (4.75 mm) sieve or plus or minus 0.5 percent bitumen shall be

sufficient cause for The City of Lakewood to order production discontinued until the cause of the variation is corrected.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Materials shall be:

Aggregates (intermediate and surface courses) ……	703.05
Aggregates (base courses) ……	703.04
Asphalt Binder (301, 302, LS 402, LS 404) ……..	702.01
Asphalt Material (LS 401.M, LS 401.R) ……..……	702.01, 702.02 or 702.04

B. Use of Reclaimed Materials

1. The Contractor may use a blend of new materials in combination with reclaimed materials. A maximum of 10 percent of reclaimed materials may be used for any asphalt pavements (301, 302, LS 402, LS 404). This percentage is based on the dry weight of all the materials used. The addition of the reclaimed materials can be made without adjusting the job-mix formula. The combined mixture shall fall within the limits of the item specified.

2. The Contractor shall identify the reclaimed material as to type, source, gradation and bitumen content. The stockpile shall be free of contamination and uniform in composition. Prior to stockpiling, the proposed sites for storing the reclaimed material shall be cleaned, graded and compacted for approval by The City of Lakewood prior to use. Additional reclaimed material shall not be added to an approved stockpile, except when the reclaimed material proposed for use is being reclaimed concurrently with the production of the recycled mixture.

3. The reclaimed material shall be of proper size to allow for complete breakdown of material in the plant. Incomplete mixing shall be reason to require a 2-inch screen to be placed on the cold feed. Further incomplete mixing shall be reason to require a smaller screen to be placed on the cold feed. Due to variations in the reclaimed material gradation, a maximum of 5 percent oversize material will be tolerated in the completed mix, provided it can be incorporated into the work with satisfactory results.

4. When reclaimed pavement is used in a surface course, the reclaimed material shall be processed to a maximum size of ¾ inch before incorporating the reclaimed pavement into the mix. Metal

separation shall be incorporated into the process to properly remove all metal materials and fragments from the reclaimed pavement. Material that does not pass the 3/4-inch maximum size must be reintroduced at the material entry point to be recycled through the crushing and separating stages until it meets the gradation requirements.

C. Mixing Plants

Plants shall provide verification to The City of Lakewood of ODOT approval during the current calendar year.

PART 3 – EXECUTION

3.1 WEATHER LIMITATIONS

A. Asphalt concrete shall only be placed when the surface is dry and when weather conditions are such that proper handling, finishing and compaction can be accomplished. In no case, however, shall asphalt concrete be placed when the air temperature is below the minimum established in the following table:

Course Thickness	**Minimum Air Temperature**
3 inches and over	35° F
1 to 3 inches	40° F
Surface - Less than 1 inch	50° F

B. Asphalt Binder Preparation

The asphalt binder shall be heated and delivered to the mixer within the temperature range specified in 702. Asphalt binder shall not be used while foaming.

C. Aggregate Preparation

Aggregates shall be fed to the cold elevator in their proper proportions and at a rate to permit correct and uniform control of heating and drying. All aggregates in the hot bins that will produce a mix outside the temperature limits or that contain sufficient moisture or expanding gases to cause foaming in the mixture shall be removed and returned to the proper stockpiles.

D. Mixing

1. When batch mixing is used, the order or sequence in which the aggregates are drawn or weighed shall be determined by the Supplier's Engineer. After all of the aggregate is in the mixer, the asphalt binder shall be added in an evenly spread sheet over the full length of the mixer. The mixing time shall be the interval between the start of application of the asphalt binder and the opening of the mixer gate. All asphalt binder required for one batch shall be discharged in not more than 30 seconds. The Supplier's Engineer will establish minimum mixing time of not less than 30 seconds.

2. When continuous mixing is used, the asphalt binder shall be added in an evenly spread sheet over the full width of the mixer at the charging end. The Supplier's Engineer shall establish mixing time of not less than 30 seconds. The mixing time is a ratio of pounds of dead-load of the mixer to the pounds per second delivered. The dead-load shall be determined by weighing a mixer full of material. The pounds per second delivered shall be determined by timing and weighing a load of mixed material.

3. Temperatures of the asphalt concrete mixtures at the plant shall be maintained within the ranges set by the Supplier's Engineer for the mix design. The temperature of the mixture on arrival at the project site shall be as determined by the Supplier's Engineer in keeping with the temperature range set in LS 401.O.

E. Hauling

1. Trucks used for hauling bituminous mixtures shall have tight, clean, smooth metal beds which have been thinly coated with a minimum amount of approved material to prevent the mixture from adhering to the beds. Each truck shall have a securely fastened, waterproof cover of suitable material to adequately protect the mixture from the weather. At the request of The City of Lakewood covers shall be removed prior to dumping into the paver.

2. When hot mixtures are being transported at prevailing air temperatures below 50° F or when the length of haul exceeds 20 miles, all truck beds shall be insulated to maintain workable temperature of the mixture, and all covers shall be fastened as to exclude all wind. The maximum distance mixtures may be transported from mixing plant to paving site shall not exceed 50 miles except by specific permission of The City of Lakewood.

F. Spreading equipment shall be self-contained and of sufficient size, power and stability to receive, distribute and strike-off the bituminous mixture at rates and widths commensurate with the typical sections and other details shown on the plans. The spreading equipment shall have automatic control systems that maintain the screed in a constant position relative to profile and cross-slope references. These references shall be such that control of the screed position is reasonably independent of irregularities in the underlying surface and of the spreader operation. Approval of spreading equipment by The City of Lakewood will be based on the demonstrated capability of the equipment to place the mixture to the required cross-section, profile and alignment in an acceptable, finished condition ready for compaction. Specialized equipment or hand methods approved by The City of Lakewood may be employed to spread the bituminous mixture where the use of standard full scale spreading equipment is impractical due to the size or irregularity of the area to be paved.

G. Rollers

1. Rollers shall be of the standard steel wheel and pneumatic tire types meeting the minimum requirements of the following tables. All ballasting shall conform to manufacturer's specifications.

STEEL WHEEL ROLLERS

Roller Type	Three Wheel	Tandem	Trench
Total weight, ton	10	8-12	
Compression rolls, pounds per inch width, min.	300	200	300
Capacity, S.Y. per hour of mixture placed, max.	700	700	15 per inch width

PNEUMATIC TIRE ROLLERS

Roller Designation	Type 1	Type 2
Tire size, minimum	9.00 x 20 in.	7.50 x 15 in.
Wheel load, minimum	5000 pounds	2000 pounds
Average tire contact pressure, minimum	85 lbs. per sq. inch	55 lbs. per sq. inch
Capacity, S.Y. per hour of		

mixture placed, maximum 1000 700

2. Pneumatic tire rollers shall be self-propelled, reversible units with vertical oscillation on all wheels on at least 1 axle. Tire inflation pressure shall be determined by the Contractor to meet the specified minimum contact area and contact pressure requirements. The Contractor shall furnish tire manufacturers' charts or tabulations for verification of the required inflation pressure by The City of Lakewood. Tire inflation pressure shall be checked by the Contractor as directed by The City of Lakewood and shall be maintained within 5 pounds per square inch of the required pressure.

3. Rolls and wheels shall be provided with the necessary accessories to prevent adhesion of the mixture and shall be kept properly moistened with water or water containing a detergent or other approved additive. The use of excess liquid will not be permitted.

H. Conditioning Existing Surface

1. Immediately prior to the arrival of pavement mixtures, the base, leveling course or old pavement shall have been thoroughly cleaned of all soil, grass, dirt or other foreign materials. All unstable, loosened, rutted or otherwise defective areas of the underlying sub-grade or pavement shall be removed and replaced, where necessary, with suitable material, before the placement of a subsequent pavement course.

2. When the surface of the existing pavement is irregular, it shall be brought to uniform grade and cross section as directed using the material specified. Contact surfaces of curbing, gutters, core holes, manholes, and other structures shall be painted with a thin, uniform coating of asphalt material prior to placing the asphalt concrete against them.

3. Where asphalt concrete is to be placed against the vertical face of rigid pavement, the vertical face shall be cleaned of foreign material and given an application of approved asphalt material in a manner that results in a coating of approximately 1/4 gallon per square yard.

4. Tack Coat materials shall be as specified in 407 and applied at a rate of 0.15 gallons per square yard for resurfacing on a planed surface and at a rate of 0.10 gallons per square yard for intermediate tack coats applied between all lifts and courses of asphalt, unless otherwise indicated on the plans or approved by The City of Lakewood. Application of all tack coats shall be

considered as incidental to the successful completion of the asphalt concrete pavement and no separate or additional payments will be made for this item.

I. Spreading and Finishing

1. The mixture shall be spread on an approved surface with bituminous pavers or spreaders in accordance with a weight to volume conversion at the rate of 4,000 pounds per cubic yard for stone or gravel aggregate. The weight required to be placed per unit of area shall be calculated from plan lines and dimensions. Variable depth courses shall be placed as required on the plan or as directed by The City of Lakewood.

2. Multiple courses of asphalt concrete shall not be placed upon each other during the same day of paving operations, unless specifically approved by The City of Lakewood.

3. Immediately after the mixture is spread, irregularities in grade and alignment shall be corrected by the addition or removal of mixture before compaction is started. Any areas showing an excess or deficiency of asphalt binder before or after compaction shall be removed and replaced.

4. On areas where irregularities or unavoidable obstacles make the use of mechanical spreading or finishing equipment impracticable, the mixture may be spread, raked, and luted by hand tools. For such areas the mixture shall be dumped, spread, and screened to give the required weight per unit of area.

J. Compaction

The asphalt concrete intermediate course and surface course shall have a minimum temperature of 290° F immediately before rolling. The asphalt concrete base course shall have a minimum temperature of 250° F when delivered to the paving machine. Immediately after the bituminous mixture has been spread, struck off and surface irregularities adjusted, it shall be thoroughly and uniformly compacted by rolling. Final rolling shall be completed before the pavement reaches a temperature of 180° F.

The number and type of rollers shall be sufficient to compact the asphalt concrete at the hourly rate of spreading without exceeding the capacity of the rollers in operation established in LS 401.L. Base courses shall be compacted with a combination of both steel and Type I pneumatic tire rollers, except in small areas which may be compacted by a method

approved by The City of Lakewood. Compact intermediate and surface courses using a 3-wheel roller for the initial rolling and a tandem roller for the final rolling. These rollers shall be supplemented by additional steel wheel rollers and/or by pneumatic tire rollers operating in the intermediate position. In small areas a single tandem roller may be used.

Unless otherwise directed, rolling shall begin at the sides and proceed longitudinally parallel to the centerline at a slow, uniform speed. After each coverage or complete round trip, the roller shall progress toward the crown of the road by overlapping the previous pass by at least one-half the width of the compression roll. On super-elevated curves, the rolling shall begin at the low side and progress toward the high side. In all cases where a longitudinal joint is being made, it shall be rolled first and then followed by the applicable rolling procedure.

Rolling shall be continued until full coverage of the course has been completed and all roller marks are eliminated. Care shall be taken to prevent displacement of the edge line and grade. Where displacement occurs, the area shall be corrected immediately in a manner satisfactory to The City of Lakewood.

Along curbs, headers, walls and in other areas not accessible to rollers, the asphalt shall be thoroughly compacted with hand tampers or with mechanical tampers. On depressed areas, trench rollers or rollers fitted with compression strips may be used.

Asphalt concrete that becomes loose, broken, contaminated or otherwise defective shall be replaced with fresh, hot mixture compacted to conform with the surrounding area.

K. In-Place Density Requirements

The in-place density of the compacted mixture shall be a minimum of 96 percent of the average of 3 Marshall specimens prepared at the plant. For each day of paving operations, the Contractor will collect and test three (3) field samples (6-inch cores) for each course paved that day, or as directed by the City. Locations of samples will be randomly selected by The City of Lakewood or Inspecting Authority. A minimum of one set of 3 Marshall specimens will be prepared for each day of production. Marshall Pills will not be prepared until all other control tests have been completed, and indicate that the mix conforms to the specification requirements.

At the option of the City, additional in-place core samples of the compacted mix may be randomly selected to verify the actual degree of compaction being obtained.

Core samples will be correlated to Marshall pill specimens prepared by the laboratory at the production facility. Should the density of the core samples fall below 96 percent of the Marshall specimens, the paving operations may be suspended until the mix and compaction procedures have been evaluated and corrective action has been taken to assure compliance with the 96 percent minimum requirement. The cores will be taken within 4 hours after commencement of daily placement operations.

All core holes shall be repaired using LS 404, compacted and finished to match the prevailing line and grade of the surrounding pavement.

L. Pavement Thickness

All City streets composed of full depth asphalt or asphalt compacted on aggregate base, shall be verified for thickness as per 451.17. The City reserves the right to pay a reduced price, according to 451.17, for any pavement found deficient in thickness.

M. Joints

Placing of the asphalt concrete pavement shall be as continuous as possible. Longitudinal and transverse joints shall be made in a careful manner. Joints shall be "set up" at the proper height above the adjacent construction to receive maximum compaction. A well bonded and sealed joint is required; if necessary to achieve this result, the joint shall be painted with the asphalt material used in the mixture as directed by The City of Lakewood.

N. Spreading and Surface Tolerances

When a uniform course is specified, the Contractor shall continuously maintain the weight-area placement within a tolerance of plus or minus 5 percent of the required calculated weight. The City of Lakewood will make periodic checks and may direct changes found to be necessary.

When variable depth courses are specified, the Contractor shall place the mixture at rates in accordance with the intent of the plans or as directed by The City of Lakewood.

The surface of each completed course shall not vary from the testing edge of a 10-foot straightedge by more than the tolerance specified for the type under contract. The Contractor shall furnish straightedges and straightedges equipped with levels or other devices satisfactory to The City of Lakewood and shall check the surface for conformance with requirements.

All gutters shall drain positively toward the catch basins. "Bird baths" will not be accepted and shall be corrected by the contractor at his expense in a manner satisfactory to The City of Lakewood.

Portions of the completed pavement that are defective in transverse slope, surface tolerances or composition shall be removed and replaced or otherwise corrected in a manner satisfactory to The City of Lakewood.

PART 4 – PAYMENT

4.1 BASIS OF PAYMENT

A. All work performed and measured as prescribed above will be paid for as provided in the respective items for each type. The City will pay for accepted quantities, complete in place, at the contract prices.

END OF SECTION LS 401