REWORKED ASPHALT CONCRETE PAVEMENT.
(REV -10-26-12)

The following new Section is inserted after Section 320.

SECTION 324
REWORKED ASPHALT CONCRETE PAVEMENT

324-1 Description.

Construct a reworked asphalt concrete pavement layer using milling and plant-produced hot-mix asphalt or the hot-in-place recycling process, as specified in this Section. The applicable requirements of Sections 300, 320, 327, 330, 334 and 337 apply to the reworked asphalt layer, as noted herein.

324-2 Hot Mix Asphalt Materials.

324-2.1 General Requirements: The following materials requirements apply only to plant-produced hot-mix asphalt for the reworked asphalt pavement layer.

324-2.2 Asphalt Binder or Recycling Agents: Meet the requirements of Section 916. If the reworked layer is the final surface, use a PG 67-22 binder meeting the requirements of Section 916 or an asphalt rubber binder meeting the requirements of Section 336.

324-2.3 Aggregate: Meet the requirements of Section 901 for coarse aggregate and Section 902 for fine aggregate.

324-2.4 Reclaimed Asphalt Pavement (RAP) Material: RAP may be used as a component of the asphalt mixture with no limit subject to the following requirements:

1. Assume full responsibility for the design, production and construction of asphalt mixes which incorporate RAP as a component material.

2. Provide stockpiled RAP material that is reasonably consistent in characteristics and contains no aggregate particles which are soft or conglomerates of fines.

324-2.5 Mix Design Requirements: If the reworked layer is the final surface, RAP from this project may be used in the mix design with no limit provided any virgin aggregate that is used in the mix design is either granite or Oolitic limestone.

324-3 General Composition of Mixture.

Obtain an adequate number of cores to characterize the in-place mixture types. Provide separate mix designs when the in-place mixture varies significantly enough to change the reworked asphalt mixture properties outside of the allowable mixture tolerances provided in 324-5. Compact the mixture in the laboratory using a Superpave gyratory compactor in accordance with AASHTO T 312-11. Utilize a design number of gyrations of either 50 or 75. The design air void content shall be within the range of 3.0 to 4.5%. The minimum voids in the mineral aggregate (VMA) shall be 12.0%. The minimum effective binder content shall be 4.5%. Utilize FM 1-T 209 for determination of the mixture's maximum specific gravity for air void determination. Ensure that the recovered binder from the compacted mix will have a penetration value within the range of 40 - 80 dmm when tested in accordance with AASHTO T 49 or have a recovered viscosity within the range of 5,000 – 15,000 Poises when tested in accordance with AASHTO T 202. Furnish a copy of the mix design(s) to the Engineer prior to any paving work.

During production, the Contractor may revise the mix design(s) provided the previous design requirements are met. Submit mix design changes to the Engineer.

324-4 Construction.

324-4.1 General Requirements: Prior to commencing construction operations, repair all defective portions of the existing pavement as indicated in the Plans. The minimum ambient temperature required for operations is 45ºF. Clean the pavement such that it is reasonably free from loose materials, sand, dirt, caked clay and other deleterious substances. Remove and dispose of all reflective pavement markers. Remove thermoplastic striping prior to hot-in-place recycling operations.

324-4.2 Milling: Use the cold milling process per Section 327 to remove the upper layer(s) of asphalt above the reworked layer, if shown in the Plans. Use cold milling, hot milling or hot scarifying to remove or rework the underlying pavement layer.

324-4.3 Bonding of Pavement Layers: Construct a pavement in such a manner to ensure that the layers are adequately bonded. When using plant-produced hot-mix asphalt for the reworked asphalt pavement layer, utilize a tack coat meeting the requirements of Section 300.

324-4.4 Compaction: Select the compaction equipment and rolling sequences necessary to meet the density requirements as set forth below. Complete all compaction operations before the pavement surface temperature drops to 150ºF. Utilize a process control system, such as a density gauge, to monitor in-place compaction operations during construction.

324-4.5 Additional Requirements: When construction includes the paving of adjacent shoulders (equal to or less than 5 feet wide), the top pavement layer and shoulder must be paved in a single pass, unless called for differently in the Contract Documents.

Adjust the reworking depth as necessary to mitigate the reworking of base material into the reworked asphalt material. Remove any contaminated material from the reworked material prior to paving.

324-5 Contractor's Process Control.

324-5.1 General: Utilize a Process Control System that will provide assurance that all materials and products furnished to the Department conform to the Contract requirements, and will meet the performance requirements, as outlined below. Document all Process Control procedures, inspections, and tests and make that information available for review by the Department throughout the life of the Contract. Transfer ownership of these documents to the Department at the end of the project.

Utilize a process control plan that contains the following as a minimum:

a. Determination of maximum specific gravity, air void content, and asphalt binder viscosity or penetration – minimum frequency of once per day.

b. Depth determination (uncompacted mix) - once per 100 feet.

c. Density determination (roadway cores) – per 324-5.5.

d. Determination of pavement thickness (roadway cores) - per 324-5.6.

e. Determination of cross-slope - per 324-5.7.

f. Determination of pavement smoothness - per 324.5.8.

g. Determination of the rejuvenator quantity.

324-5.2 Corrective Actions: Take prompt action to correct any errors, equipment malfunctions, process changes, or other assignable causes which have resulted or could result in the submission of materials, products, and completed construction which do not conform to the requirements of the specifications.

324-5.3 Recovered Binder: Monitor the penetration or viscosity of the recovered asphalt binder during production. Recover the binder from the asphalt mixture in accordance with FM 5-524 and FM 3-D 5404. Maintain the penetration of the recovered asphalt material in the asphalt mixture (determined in accordance with AASHTO T 49), within the range of 40 – 80 dmm or maintain the viscosity of the recovered asphalt material in the asphalt mixture (determined in accordance with AASHTO T 202), within the range of 5,000 to 15,000 poises. If two or more consecutive tests exceed this tolerance, stop all recycling operations until the problem is adequately corrected.

324-5.4 Air Voids: Air voids shall be based on specimens compacted in accordance with AASHTO T 312-11 and a maximum specific gravity as determined in accordance with FM 1-T 209. When two consecutive air void tests are less than 2.0% or greater than 6.0%, stop all recycling operations until the problem is adequately corrected. If any single air void test is less than 1.8% or greater than 6.2%, address the defective material in accordance with 324-7. Make adjustments to the blend of materials to modify the air void content to an acceptable level.

324-5.5 Density: The in-place density of the reworked asphalt layer will be evaluated by the use of 6-inch diameter roadway cores. The in-place density will be based on the daily maximum specific gravity (Gmm) of the as-produced mix. Obtain the roadway cores at random locations approved by the Engineer at the end of each day's production prior to opening the roadway to traffic, at a minimum frequency of one core per 1,000 feet or portion thereof for distances less than 1,000 feet. Assume responsibility for maintenance of traffic, coring, patching the core holes, and trimming the cores to the proper thickness prior to density testing.

Determine the density of the cores in accordance with FM 1-T 166 and calculate an average for each LOT, which for purposes of mixture process control, is defined as 5,000 feet. The average density of a LOT shall be a minimum of 92.0% of Gmm. Take corrective actions for those LOTs that have an average density less than 92.0% of Gmm. If two consecutive LOTs are less than 92.0% of Gmm, stop construction until appropriate adjustments are made to ensure the minimum density requirement is met. Address areas with an average density less than 90.0% of Gmm in accordance with 324-7.

Once the average density of a LOT has been determined, do not provide additional compaction to raise the average.

324-5.6 Pavement Thickness: The thickness specified in the Plans shall be the compacted in-place thickness. The thickness shall be determined on a daily basis by averaging the thickness measurements from roadway cores. Determine the pavement thickness utilizing the cores cut for the evaluation of density as specified in 324-5.5. Maintain the average thickness of the reworked asphalt layer within 1/4 inch of that specified in the Plans. If the average thickness is deficient by more than 1/4 inch but no more than 1/2 inch, take appropriate corrective actions. If the average thickness is deficient by more than 1/2 inch or any single core is deficient by more than 3/4 inch, take additional cores to determine the area of deficient thickness to be corrected. Correct any area deficient in thickness by using plant-produced hot-mix asphalt at no cost to the Department or by using another approach approved by the Engineer. If the average thickness is deficient for two consecutive days by more than 1/4 inch of that specified in the Plans, stop construction activities until adjustments are made to the operation that will allow placement at the specified depth. Continued operations when the thickness is deficient by more than 1/4 inch of the thickness specified in the Plans will not be allowed.

324-5.7 Cross Slope: Construct a pavement surface with cross slope meeting the requirements of 330-9.3.

324-5.8 Pavement Smoothness: Construct a smooth pavement meeting the requirements of 330-9.4.

324-6 Testing by the Engineer.

The Department reserves the right to run any test at any time for informational purposes. Make all Process Control sampling and testing data accessible for review by the Engineer. Obtain additional roadway cores as directed by the Engineer.

324-7 Defective Material.

Assume responsibility for reworking or removing and replacing all defective material placed on the project, at no cost to the Department.

As an option, the Contractor may perform delineation tests on roadway cores to determine the limits of the defective material that may require removal and replacement. Prior to any delineation testing, all sampling locations shall be approved by the Engineer. All delineation sampling and testing may be monitored and verified by the Engineer.

When evaluating defective material by delineation testing, at a minimum, evaluate all material located between passing test results. Exceptions to this requirement shall be approved by the Engineer.

The minimum limit of removal of defective material is fifty-feet on both sides of the failed sample. If approved by the Engineer, leave defective material in place at reduced or no pay.

The pavement may be reworked a maximum of two times; once for the original rework and once for any defective material repair. The second rework must meet the requirements of this specification. After the second rework, any further repairs must be accomplished utilizing hot mix asphalt meeting the requirements of this specification.

324-8 Method of Measurement.

The quantity of reworked asphalt layer to be paid for will be the area in square yards, determined by plan quantity, completed and accepted. There will be no pay adjustments for the bituminous material and spread rate for this item.

When required, friction course will be measured and paid in accordance with Section 337.

324-9 Basis of Payment.

Price and payment will be full compensation for all work specified in this Section.

Payment will be made under:

Item No. 905-324-1 Reworked Asphalt Concrete, per square yard.