SECTION 310

UNTREATED BASE

310.1 DESCRIPTION:

Untreated base, i.e., select or aggregate base course, shall comply with Subsection unless the use of a different type of material is specifically authorized in the special provisions.

310.2 PLACING:

Untreated base 6 inches or less in compacted thickness may be placed in a single layer and those more than 6 inches in thickness shall be built up in successive layers of approximately equal compacted thickness not to exceed a maximum thickness of 6 inches. The requirements which follow are applicable to all types of material.

After distributing, the base material shall first be watered and then immediately bladed to a uniform layer that will net, after rolling, the required thickness. If the materials deposited are not uniformly blended together, the blading operation shall be continued to such extent as may be necessary to eliminate segregation. The quantity of water applied shall be that amount which will assure proper compaction resulting in a relative density of not less than 100 percent as determined under Section 301. Care shall be exercised in connection with watering operations to avoid wetting the subgrade or any lower base course to detrimental extent.

Upon completion, the base surface shall be true, even and uniform conforming to the grade and cross-section specified.

Untreated base may vary not more than 1/2 inch above or below required grade and cross-section.

310.3 DEFICIENCY:

When in the opinion of the Engineer there is reason to believe that a deficiency in thickness, or an excess of plasticity exists, measurements or samples will be taken in the same pattern as that defined in Section 321. If the base has been covered or it is otherwise impractical to correct the deficiency, the corrective measures in Table 310-1 shall be taken by the Contractor at no additional cost to the Contracting Agency.

TABLE 310-1

THICKNESS AND PLASTICITY DEFICIENCY

Type	Deficiency	Corrective Measure
I	1/2 inch or more but less than 1inch thickness	Place asphalt chip seal using precoated chips in accordance with Section 330 for the full roadway width over the area involved but for not less than 660 feet or one City block in length.
II	1 inch or more in thickness	Place an additional asphalt concrete overlay, a 9.5 mm mix, of 1/2 the thickness of the deficiency in thickness for the full roadway width over the area involved, not less than 660 feet or one City block in length.
III	A plasticity index of 6 to 7 inclusive*	Place an asphalt concrete overlay 1/2 inch in thickness over the same total area as required for Type I and II.
IV	A plasticity index of over 7*	Remove deficient material from affected area and replace with material complying with the specifications.

* The plasticity index shall be in accordance with AASHTO T-146 Method A (wet preparation), T-89 and T-90.

310.4 PAYMENT:

Payment for untreated base will be made on the basis of the price bid per ton unless an alternate basis of payment is provided in the proposal.

End of Section

311.4.3 Mixing: Mixing with addition of water as required shall be continued until the product is uniform in color and at optimum moisture content. Any mixture of soil and cement which has not been compacted and finished shall not remain undisturbed for more than 30 minutes but shall be agitated by remixing.

311.4.4 Optimum Moisture: Optimum moisture requirements and field tests of moisture density shall be determined in accordance with AASHTO T-134, T-191, T-217, or ASTM D-558, D-2922, D-3017 on representative samples of soil cement mixture obtained from the area being processed. At time of laydown, the moisture content shall not be below optimum moisture, and shall be less than that quantity which will cause the base course to become unstable during the compaction and finishing process. Any area which becomes so unstable shall be removed and replaced with new cement stabilized material.

311.4.5 Compaction: After mixing is complete, the mixture shall be carefully placed in a uniform loose depth which will provide a surface true to grade and section when compacted. Unless otherwise directed by the Engineer, initial compaction shall be by means of a tamping, grid, or pneumatic roller. After the tamping roller has partially walked out, pneumatic rollers shall be used. Density of final product shall be not less than 95 percent as determined by AASHTO or ASTM as specified above.

311.4.6 Finishing: As compaction nears completion, the surface of the base course shall be shaped to required lines, grades and cross-section. When required, the surface shall be lightly scarified with spike tooth harrows or other approved equipment to remove imprints left by equipment or to prevent slippage planes. During the finishing process the surface shall be kept moist by means of fog-type sprays. Surface finish and final compaction shall be completed in not more than 2 hours from time of laydown. The completed base course shall be true to line, grade, cross-section and shall not vary more than 1/2 inch in thickness and not more than 1 inch in surface tolerance when tested with a 10 foot straight edge. It shall be free of surface cleavage planes, cracks, or loose material. As a final operation, the surface shall be very lightly scalped with a motor grader, wet with a fog spray and rolled with a pneumatic roller as directed by the Engineer.

311.4.7 Deficiency: When in the opinion of the Engineer there is reason to believe that a deficiency in thickness exists, cores will be taken in the same pattern as that defined in Section 321. If the base has been covered or it is otherwise impractical to correct the deficiency, the corrective measures, listed in Table 310-1 for Type I or II deficiencies, shall be taken by the Contractor at no additional cost to the Contracting Agency.

311.4.8 Curing: After completion of the final finishing process, the soil-cement shall be cured with a bituminous curing seal applied at the end of each construction day. This seal may be either an emulsion or cut-back asphalt applied at a minimum rate of 0.20 gal./sq. yd. The finished soil-cement shall be kept continuously moist until the bituminous cure seal is applied, using fog or gravity bar spray. The spray equipment shall be approved by the Engineer before construction is begun.

311.4.9 Construction Joints: At the end of each day's work, a construction joint shall be made transverse to the centerline of the road by cutting back into the work to provide a full depth vertical joint. Except where specifically authorized by the Engineer, no other construction joints will be permitted. Where authorized, such joints shall be full depth vertical joints.

311.4.10 Maintenance: The Contractor shall maintain the surface until it has been covered with the designated bituminous wearing course. In case it is necessary to replace any soil cement, it shall be for the full depth. No skin patches or soil cement will be permitted. Minor surface pits may be filled with compacted bituminous surfacing, if authorized by the Engineer. Immediately prior to the placing of the bituminous wearing course, the surface shall be broomed to removed all loosened material from the surface.

311.5 MEASUREMENT:

Measurement of soil cement will be the number of square yards constructed to the required depth, completed and accepted.

Measurement of portland cement will be the number of tons of cement mixed with local soil.

SECTION 322

ASPHALT CONCRETE OVERLAY

322.1 DESCRIPTION:

Asphalt concrete overlay consists of the placing and compaction of plant mix asphalt concrete over existing asphalt concrete paving. The thickness of the overlay shall be as shown on the plans or as specified in the special provisions. Preliminary preparation of existing surfaces will be required except when accomplished by the Contracting Agency, and it is so stipulated in the special provisions. With the exception of those which have been preheated and remixed only, existing surfaces shall receive a tack coat.

322.2 MATERIALS:

The tack coat, asphalt concrete mix and transportation of the mix shall be as specified in Sections 710 and 321, except for the maximum size of aggregate and percentage of binder which shall be as specified in the following paragraph.

322.3 ASPHALT CONCRETE:

The aggregate gradation and percentage of asphalt binder shall be in accordance with Section 710 using a 12.5 mm mix for overlay more than one inch in thickness and a 9.5 mm mix for overlay one inch or less in thickness, unless otherwise shown or specified in the special provisions.

322.4 PREPARATION OF SURFACES:

Except when they have been preheated and remixed, surfaces shall be prepared as follows:

Before placing asphalt concrete overlay, severely raveled areas or cracked areas that are depressed more than 3/4 inch from the adjoining pavement shall be cut out and patched at least 48 hours prior to the resurfacing operation. Over-asphalted areas or rough high spots shall be removed by burning or blading. Large shrinkage cracks shall be filled with asphalt sealing compound acceptable to the Engineer. The entire surface shall be cleaned with a power broom. Raveled areas that do not require removing shall be cleaned by hand brooming. The above are incidental, and the cost thereof shall be included in the bid items.

After surfaces have been prepared to the satisfaction of the Engineer, they shall receive a tack coat as specified in Section 321. Traffic will not be permitted over surfaces which have received a tack coat. When the overlay is to extend onto the concrete gutter, the gutter shall be thoroughly cleaned of loose dust and cement particles and shall be tack coated.

322.5 CONSTRUCTION METHODS:

Placing and rolling on the asphalt concrete and the smoothness of the surface shall be as specified in Section 321.

322.6 MANHOLES:

Manholes shall be built up and the frames set flush with the finished surface of the new paving, and tops of valve boxes, clean-outs and other existing structures shall be adjusted to finish grade. In the event the base course and original paving have been removed or disturbed in order to build up the manhole, they shall be replaced with approved materials which shall be thoroughly compacted. The asphalt concrete around the manhole frame shall be completed and made flush with the adjacent overlay.

322.7 PAYMENT:

Payment for tack coat and asphalt concrete will be as specified in Section 321 except as noted above.

End of Section

The Contractor shall furnish the Engineer with the brand name and name of the manufacturer of the Type I asphalt rejuvenating agent he proposes to use and the material shall be approved by the Engineer before it is used. The Contractor shall also furnish the Engineer with a manufacturer's certificate of compliance indicating quality and specification control.

(B) Type II asphalt emulsion shall be SS-1 or SS-1h emulsified asphalt as specified in Section 713 and shall be applied at the rate of 0.10 to 0.20 gallons per square yard undiluted. However, the exact quantity shall be as directed by the Engineer.

323.8 ASPHALT CONCRETE OVERLAY:

Asphalt concrete overlay shall be in accordance with applicable requirements specified in Section 322.

The asphalt concrete overlay shall be placed within 48 hours after the heating and remixing operation, unless otherwise specified in the special provisions.

The overlay shall also cover existing pavement over areas not accessible to the heater remixer. Such areas including edges of adjoining concrete, shall receive a tack coat and joints shall be finished as specified in Section 321.

323.9 PAYMENT:

Payment for heater remix surfacing will be made on the basis shown below:

(A) Heater Remix Only	Square Yard
(B) Type I Asphalt Rejuvenating Agent	Ton (Undiluted)
(C) Type II Asphalt Emulsion	Ton (Undiluted)
(D) Asphalt Concrete Overlay	Ton or Square Yard
(E) Tack Coat	Ton (Diluted)

End of Section

SECTION 327

HOT IN-PLACE RECYCLING

327.1 DESCRIPTION

This work shall consist of rehabilitating the surface layer of existing asphalt concrete pavement. Rehabilitation shall be accomplished with specially designed equipment in a simultaneous multistep process of heating, scarifying, applying an asphalt recycling agent and thoroughly remixing and reshaping the old asphalt concrete surface, and then placing an overlay of new hot mix asphalt concrete in compliance with the lines, grades, thickness and typical cross sections shown on the plans. NOTE: This work shall be performed with a single machine that heats, scarifies, recycles and spreads new asphalt concrete hot mix, all in one continuous pass. Additional preheaters may be utilized to achieve specified depth and temperature.

327.2 MATERIALS:

Asphalt Recycling Agent used to restore the existing pavement shall be approved by the Engineer prior to use. A manufacturer's certification shall be submitted for each load of recycling agent delivered to the project.

Hot Mix Asphalt Concrete (HMAC) shall meet the requirements of section 710.

327.3 EQUIPMENT

The Contractor shall specify, in the bid proposal, the type of equipment intended for use. The equipment shall be on the project in operating condition a minimum of 2 days before beginning operations to allow evaluation by the Engineer. The Engineer reserves the right to reject equipment deemed not suitable for the intended purpose, at no additional cost to the Agency.

The recycling equipment shall meet the following minimum requirements:

Repaver: The equipment for this work shall be a self-contained, self-propelled, automated unit capable of heating, scarifying (or milling), mixing, redistributing and leveling the existing asphalt concrete pavement to the specified depth, all in a single pass.

It shall have a means of automatically applying an asphalt recycling agent at a uniform rate as shown on the plans, special provisions, or as requested by the Engineer. It shall be capable of applying a new HMAC layer over the hot, partially compacted recycled mixture.

Heating Unit: This unit shall be hooded to prevent damage to adjacent property, including trees and shrubs. It shall be capable of heating the pavement surface to a temperature high enough (375˚ - 400˚ F.) to allow scarification to the required depth without breaking aggregate particles or charring the pavement surface.

Scarifying or Milling Units: The sacrificers or rotary millers shall be able to penetrate the pavement surface to a depth shown, up to a maximum of one inch in one pass. Sacrificers or millers shall be equipped with separate, automatic height adjustments which allow clearance over manholes and other obstructions.

Recycling Agent Applicator: This system shall automatically add recycling agent to the scarified material at a uniform rate as shown on the plans, special provisions or as requested by the Engineer. The application rate shall be synchronized with the machine's forward speed to maintain a tolerance, within 5% of the specified rate.

Conveying System: Shall consist of a receiving hopper and conveying system to collect and transport new hot mix asphalt concrete material to the finishing unit.

Recycling Unit: A system that mixes, distributes and levels the scarified material over the width processed to produce a uniform cross-section of recycled material.

Finishing Unit: This unit shall have automatic screed controls to produce a surface conforming to that shown on the plans. The unit shall be capable of producing a uniform slope, grade and texture.

SECTION 336

PAVEMENT MATCHING AND SURFACING REPLACEMENT

336.1 DESCRIPTION:

Street and alley pavement and surfacing within the Contracting Agency's rights-of-way, removed by construction activities or to be widened or matched in connection with the improvement of Public Works, shall be placed as shown on the plans and applicable standard details, in accordance with this specification and/or the special provisions.

Asphalt concrete pavement replacement shall be constructed in accordance with Type A, B, D or E of standard details, as indicated on the plans, and as required by Sections 321 and 710.

Portland cement concrete pavement replacement shall be in accordance with Type C of the Standard Details, and as required by Sections 505 and 725.

ABC or decomposed granite surface replacement shall be constructed in accordance with Type F of standard details as indicated on the plans and in Section 702.

Temporary pavement replacement shall be constructed as required below.

Pavements to be matched by construction of new pavements adjacent to or at the ends of a project shall be saw cut in accordance with these specifications and where shown on the plans.

Pavement and surfacing replacement within ADOT rights-of-way shall be constructed in accordance with their permits and/or specification requirements.

336.2 MATERIALS AND CONSTRUCTION METHODS:

Materials and construction methods used in the replacement of pavement and surfacing shall conform to the requirements of all applicable standard details and specifications, latest revisions.

336.2.1 Pavement Widening or Extensions: Existing pavements which are to be matched by pavement widening or pavement extension shall be trimmed to a neat true line with straight vertical edges free from irregularities with a saw specifically designed for this purpose. The minimum depth of cut shall be 1 1/2 inches or D/4, whichever is greater.

The existing pavement shall be cut and trimmed after placement of required ABC and just prior to placement of asphalt concrete for pavement widening or extension, and the trimmed edges shall be painted with a light coating of asphalt cement or emulsified asphalt immediately prior to constructing the new abutting asphalt concrete pavements. No extra payment shall be provided for these items and all costs incurred in performing this work shall be incidental to the widening or pavement extension.

The exact point of matching, termination, and overlay may be adjusted in the field, if necessary, by the Engineer or designated representative.

336.2.2 Pavement to be Removed: Existing asphalt pavement to be removed for trenches or for other underground construction or repairs shall be cut by a device capable of making a neat, straight and smooth cut without damaging adjacent pavement that is not to be removed. The Engineer's decision as to the acceptability of the cutting device and manner of operation shall be final. If saw cutting, only, is to be utilized, it will be so specified in the plans or special provisions.

In lieu of cutting trenches across driveways, curbs and gutters, sidewalks, alley entrances, and other types of pavements, the Contractor may, when approved by the Engineer, elect to tunnel or bore under such structures and pavements.

When installations are within the street pavement and essentially parallel to the center line of the street, the Contractor, with approval of the Engineer, may elect to bore or tunnel all or a portion of the installation. In such installations, the seal coat requirements, as discussed in Section 336.2.4, will be modified as follows:

(A) If the pavement cuts (bore pits, recovery pits, etc.) are 300 feet or more apart, the bore or tunneled distance will not be considered as part of the open trench and the seal coat may not be required.

(B) If the pavement cuts (bore pits, recovery pits, etc.) are less than 300 feet apart, the distance between the cuts will be considered the same as a trench cut and the distance will be added to any trench cut distances.

336.2.3 Temporary Pavement Replacement: Temporary pavement replacement, as required in Section 601, may be with cold-mix asphalt concrete, with a minimum thickness of 2 inches, using aggregate grading in accordance with Section 710.

Temporary pavement replacement shall be used in lieu of immedi acement of single course permanent replacement or the first course of two course pavement replacement only on transverse lines such as spur connections to inlets, driveways, road crossings, etc., when required by the Engineer, by utilities or others who subcontract their permanent pavement replacement, under special prior arrangement; or for emergency conditions where it may be required by the Engineer. Temporary pavement replacement shall be placed during the same shift in which the backfill to be covered is completed.

Rolling of the temporary pavement replacement shall conform to the following:

(A) Initial or breakdown rolling shall be followed by rolling with a pneumatic-tired roller. Final compaction and finish rolling shall be done by means of a tandem power roller.

(B) On small areas or where equipment specified above is not available or is impractical, the Engineer will approve the use of small vibrating rollers or vibrating plate type compactors provided comparable compaction is obtained.

The surface of the temporary pavement shall be finished off flush with the adjacent pavement.

336.2.4 Permanent Pavement Replacement and Adjustments:

336.2.4.1 Permanent Pavement Replacement: Pavement replacement for cuts essentially parallel to the street centerline and greater than 50 feet in length shall be two course pavement replacement as hereinafter specified. For cuts greater than 600 feet in length the entire area shall then be seal coated in accordance with Section 330 (coated chips) or as otherwise specified. This seal coat shall extend from the edge of pavement or lip of gutter to the street centerline except that on residential streets less than 36 feet face to face of curb or where the pavement patch straddles the centerline, the entire width of street shall be seal coated.

In lieu of placing the seal coat as required previously, and with approval of the Contracting Agency, the Contractor may deposit with the Contracting Agency for credit to the Street Maintenance Department, a negotiated agreed upon amount. The Street Maintenance Department will incorporate this work into their street maintenance program.

Pavement replacement for cuts parallel to the street centerline less than 50 feet in length, transverse cuts, bell holes and similar small areas shall match gradation and thickness of the existing pavement. These one course pavement patches shall be compacted with a vibratory roller to the same density specified for asphalt concrete pavements.

Laying of single course or the base course of the asphalt concrete pavement replacement where a two course replacement is applicable shall never be more than 600 feet behind the ABC placed for the pavement replacement.

The trench must be compacted to its required density, and required ABC must be in place prior to the placement of the asphalt concrete.

Single course replacement shall consist of a 12.5 mm or 19 mm mix placed and fini as directed by the Engineer.

The base course of two course pavement replacement shall consist of a 19 mm mix in accordance with Section 710.

Where the base course is to be placed with non-compactive equipment, it shall be not less than 2 inches in thickness and the aterial shall be immediately rolled with a pneumatic-tired roller. The surface course shall be of sufficient depth to provide th total required compacted thickness of the two courses, but not more than 1 inch.

Where the trench is 6 feet or more in width, all courses, single or both courses of the two course pavement replacement, shall be laid with a self-propelled compacting, spreading equipment. When the trench is from 6 to 8 feet in width, the self-propelled compacting, spreading equipment shall not be wider than 8 feet. All courses, except the surface course, shall be of a compacted thickness of not less than 1 1/2 inches.

The surface course shall consist of a 9.5 mm mix in accordance with Section 710 as specified by the Engineer to match the existing surface. The surface course shall not be placed sooner than 2 weeks after the base course, except where the trench crosses a signalized intersection. In this case the surface course shall be placed within 48 hours, e crossing pavement replacement shall be single course as specified above.

Placement of the surface course is to be by means which will result in a surface texture satisfactory to the Engineer, and flush with the existing pavement.

Where deep lift asphalt concrete (asphalt concrete base and asphalt concrete wearing course) exists, the base course replacement shall be made in lifts not exceeding 6 inches in compacted thickness to within 1/2 inch of the finish grade.

336.2.4.2 Adjustments: When new or existing manholes, values, survey monuments, clean outs, etc. fall within the limits of the permanent pavement replacement as discussed in this Section, the Contractor shall be responsible for adjusting the various items to the new pavement surface or as directed by the Engineer. This will include but not be limited to slurry and chip seals.

The Contractor will coordinate with the Engineer and with representatives of the various utilities regarding the adjustment and inspection of the work. The Contractor shall be responsible for obtaining and complying with all specifications, special requirements, details, etc. of the Utility Company regarding the adjustments. When adjusting the Agency's utilities, survey monuments, etc., the adjustment will comply with these Specifications and Details.

The work will be done in compliance with OSHA standards and regulations regarding confined space entry.

The Contractor shall remove all material attached to the lids and/or covers including that of prior work. The method of removal shall be approved by the Engineer and/or the Utility Representative.

336.3 TYPES AND LOCATIONS OF PAVEMENT AND SURFACING REPLACEMENT:

Normally, the type of pavement replacement and backfill required will be noted on the plans or specified in other portions of the contract documents and construction will be in accordance with Detail 200. This detail requires that a 12 inches "T" Top be utilized when normal traffic flow is perpendicular to any one of the four sides of the trench excavation. Therefore, Type A pavement replacement will require a "T" Top whenever the trench crosses a street or goes through an intersection and at the end(s) if they terminate in the street. Type B pavement replacement will require the "T" Top on the sides that are perpendicular to normal traffic flow.

If a type is not noted on the plans or specified in the special provisions, the following criteria will govern:

Type A pavement replacement, including the "T" Top, will be utilized on all streets where the excavation is parallel to the centerline of the street.

Type B pavement replacement, including the "T" Top, will be utilized on all streets where the excavation is transverse to the centerline of the street.

Type C pavement replacement will be used to match existing portland cement concrete pavement.

Type D pavement replacement may be used when the condition of the existing pavement does not justify construction of Type A or B. Prior written approval of the Engineer is required.

SECTION 709

RECLAIMED ASPHALT PAVEMENT

709.1 DESCRIPTION:

Reclaimed Asphalt Pavement (RAP) is pavement containing RAP asphalt and RAP aggregates, which has been processed to 1 1/2 inches maximum size and is free of detrimental quantities of organic, non-granular soils and deleterious materials. The stored RAP shall be uniform in appearance and well graded from fine to coarse.

709.2 STORAGE:

RAP shall be stored in such a manner to permit ready inspection and shall be protected from contamination. Any portion of the stockpile that has been consolidated so that the uniformity is affected, will require reprocessing prior to use.

709.3 TEST REQUIREMENTS:

Prior to the use of RAP in a recycled asphalt concrete mix, the reclaimed asphalt concrete supplier shall furnish the Engineer with the following test reports from the stockpiles that are to be used for recycling.

(A) Sand equivalent test of the unextracted RAP: Minimum of 80 when tested in accordance with ASTM D-2419 or AASHTO T-176.

(B) RAP asphalt content ASTM D-2172 and D-1856.

(C) Gradation test of the sample aggregate, after removal of the RAC per Section 710.4.2, using sieve sizes per Section 710.4.1, for the appropriate mix.

End of Section

SECTION 719

RECYCLED ASPHALT CONCRETE
HOT MIXED

719.1 GENERAL:

Recycled asphalt concrete (RAC) shall consist of reclaimed asphalt pavement, new aggregate and paving asphalt and/or recycling agent. This mixture shall be combined at a central mixing plant to provide a homogenous, workable product. This product shall meet the requirement of Section 710, based on the type specified, for aggregate gradation, asphalt grade and asphalt content.

Prior to the use of RAC on any project, the Contractor shall notify the Engineer of his intentions and shall make available the test reports required in Section 709 and a mix design as required by this section. Unless written authorization is given by the Engineer, RAC will not be used in the surface course or single course pavement. If the Contractor fails to comply with the above procedures or with the intent of Section 709 and this section, the RAC will be removed and replaced with asphalt concrete at no cost to the Contracting Agency.

When the amount of RAP is 15 percent or less of the total mix, the supplier shall maintain a job mix formula at the plant. The formula shall be based on current test data and approved by the Engineer.

When the amount of RAP to be added is over 15 percent of the total mix, a job mix formula and supporting test data shall be submitted to the Engineer for approval at least 8 working days prior to use. The supporting test data for the RAC shall include the results of tests for stability, swell, and moisture vapor susceptibility. These tests are in addition to the tests for the RAP stockpile specified in Section 709.

After the job mix formula has been approved, the mixing plant designated and the RAP stockpile(s) approved, the Contractor and/or his Supplier shall not change any of the above or utilize additional mixing plants or stockpiles without prior approval of the Engineer.

719.2 MATERIALS:

719.2.1 Aggregate: New aggregate shall conform to Section 710.

719.2.2 Reclaimed Asphalt Pavement: Shall conform to section 709.

719.2.3 Asphalt: New asphalt shall conform to Section 711.

719.2.4 Mineral Filler: Shall be dry hydrated lime or portland cement.

719.2.5 Recycling Agent (RA): Shall comply with Table 719-1.

TABLE 719-1

RECYCLING AGENTS

TEST	ASTM Test Methods	RA 5 Min	RA 5 Max	RA 25 Min	RA 25 Max	RA 75 Min	RA 75 Max	RA 250 Min	RA 250 Max	RA 500 Min	RA 500 Max
Viscosity at 140°F. (60°C). CST	D2170 or 2171	200	800	1000	4000	5000	10000	15000	35000	40000	60000
Flash Point, COC. F. (°C) Min	D92	400 (204)		425 (218)		450 (232)		450 (232)		450 (232)	
Saturates Wt. % Max	D2007		30		30		30		30		30
Residue from RTFO Oven Test at 325°F. (163°C)	D2872										
Viscosity Ratio[2] Max	_		3		3		3		3		3
RTFO Oven Weight Change ±, %	D2872	4		3		2		2		2	
Specific Gravity	D 70 or D1298	Report		Report		Report		Report		Report	

(1) The acceptance of any recycling agent is subject to its ability to develop a RAC binder which will comply with the asphalt grade specified.

(2) Viscosity Ratio = $\frac{\text{RTFO Viscosity at 140° F, cSt}}{\text{Original Viscosity at 140° F, cSt}}$

719.3 DEFINITIONS:

(A) RAP Asphalt is the asphalt content as determined by tests prescribed in Section 709.

(B) New Binder is the new asphalt and/or recycling agent added to produce RAC.

(C) RAC Binder is the total asphalt content present in RAC, consisting of RAP asphalt and new binder.

719.4 TEST REQUIREMENTS:

(A) Combined aggregate and RAP, after all processing except the adding of new binder and mineral filler, shall have an unextracted minimum sand equivalent of 50 when tested in accordance with ASTM D-2419 or AASHTO T-176.

(B) The RAC binder shall meet the RTFO residue requirements in Section 711 for the PG grade specified. The viscosity of the RAC binder shall be determined by test performed on the asphalt residue obtained by the Abson-Recovery Method ASTM D-1856 or ADOT Method 511.

(C) The combined grading and RAC binder content shall conform to Section 710. All percentages are based on the weight of dry aggregate only.

719.5 RAC BATCH PLANT METHOD:

A conventional batch plant shall be modified to introduce the RAP at locations other than the dryer by:

(A) Providing a separate RAP storage facility, with direct access to the weight hopper or

(B) Providing for RAP introduction to the hot aggregate elevator; or

(C) Other method approved by the Engineer.

New aggregate shall be dried and heated for a sufficient time in the dryer so that the moisture content will not be greater than 1 percent.

The dryer shall be provided with an approved temperature-indicating device to determine the temperature of the aggregate leaving the dryer. The device shall be mounted independently of other plant components, shall be accurate to the nearest 10 degrees F., and shall be installed in such a manner that a temperature fluctuation of 10 degrees F. in the aggregate will be indicated within 1 minute.

After drying, the aggregates shall be evenly fed to the screens in such quantities as to maintain, in the separate bins, a uniform grading of the materials and a proper balance in the amount of material. The operation of the screens shall be controlled so as to secure a thorough separation of the aggregate sizes.

Each bin shall be provided with an opening to prevent overflow into adjacent bins.

If any time there is a substantial change made in the cold feed to accommodate the demands of a different type of mixture, the hot storage bins shall be emptied and recharged with the correct materials. Discharged materials may be returned to a storage area that contains aggregates of the approximate grading of the discharged material, except when the hot storage bins contain RAP. Discharged material containing RAP shall be returned to a separate stockpile.

The RAP and the combined new aggregate shall be weighed on separate belt scales. They shall be of such accuracy that, when the plant is operating between 30 percent and 100 percent of belt capacity, the average difference between the indicated weight of the material delivered and the actual weight delivered will not exceed 1 percent of the actual weight for three 2-minute runs. For any of the three individual 2-minute runs, the indicated weight of material delivered shall not vary from the actual weight delivered by more than 2 percent of the actual weight. The actual weight of material delivered shall be determined by a vehicle platform scale or other certified weighing device approved by the Engineer.

The individual belt scales for the RAP and the combined new aggregate, the proportioning meters for the new asphalt and RA, and the other proportioning devices, shall be interlocked so that the rates of feed of the RAP, new aggregate, new asphalt, and RA will be adjusted automatically to maintain the proper proportions. The plant shall not be operated unless this automatic system is operating and in good working condition.

Belt scales and proportioning meters shall be equipped with resettable totalizers, so that the actual weight of asphalt, RA, RAP, and combined aggregates can be determined. The bins containing the mineral filler, if used, shall be equipped with a vibrating unit or other equipment which will prevent any hang-up of material while the plant is operating. Before the quantity of material in any one bin reaches the strike-off capacity of the feed gate, a device shall automatically close down the plant.

When mineral filler is used, a safe and suitable sampling device shall be installed in each feed line or surge tank preceding the proportioning device.

719.7.3 RAC Miscellaneous Requirements: New aggregate consisting of sand, rock dust, and various sizes of aggregates shall be stored separately at the plant and evenly fed to the dryer to ensure a uniform flow of properly combined aggregates. In placing materials in storage or in moving them from storage to the feeder, no method shall be used which may cause segregation, degradation, or the intermingling of different size aggregates. Materials not meeting the gradation requirements shall be discarded or reprocessed to comply with the requirements of Section 710.

End of Section