UNIFORM STANDARD SPECIFICATIONS for PUBLIC WORKS CONSTRUCTION

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MARICOPA ASSOCIATION of GOVERNMENTS

1998 ARIZONA (Includes revisions through 2007)
FOREWORD

Publication of these Uniform Standard Specifications and Details for Public Works Construction fulfills the goal of a group of agencies who joined forces in 1966 to produce such a set of documents. Subsequently, in the interest of promoting county-wide acceptance and use of these standards and details, the Maricopa Association of Governments accepted their sponsorship and the responsibility of keeping them current and viable.

These specifications and details, representing the best professional thinking of representatives of several Public Works Departments, reviewed and refined by members of the construction industry, were written to fulfill the need for uniform rules governing public works construction performed for Maricopa County and the various cities and public agencies in the county. It further fulfills the need for adequate standards by the smaller communities and agencies who could not afford to promulgate such standards for themselves.

A uniform set of specifications and details, updated and embracing the most modern materials and construction techniques will redound to the benefit of the public and the private contracting industry. Uniform specifications and details will eliminate conflicts and confusion, lower construction costs, and encourage more competitive bidding by private contractors.

The Uniform Standard Specifications and Details for Public Works Construction will be revised periodically and reprinted to reflect advanced thinking and the changing technology of the construction industry. To this end a Specifications and Details Committee has been established as a permanent organization to continually study and recommend changes to the Specifications and Details. Interested parties may address suggested changes and questions to:

Standard Specifications & Details Committee  
c/o Maricopa Association of Governments  
302 North First Avenue, Suite 300  
Phoenix, Arizona, 85003.

These suggestions will be reviewed by the committee and appropriate segments of the industry and cumulative annual revisions will be published the first of each year. A copy of this publication is available for review on the internet at the website listed below. Please follow the links to the publications page and look for Uniform Standard Specifications for Public Works Construction and/or Uniform Standard Details for Public Works Construction:

www.mag.maricopa.gov

While in the interest of uniformity, it is hoped that all using agencies will adopt these standards with as few changes as possible, it is recognized that because of charter requirements and for other reasons, some agencies will find it necessary to modify or supplement certain requirements.
SECTION 321

ASPHALT CONCRETE PAVEMENT

321.1 DESCRIPTION:
This section covers the placement of asphalt concrete either as a surface course, base course and/or curb upon a previously prepared base or subgrade in accordance with these specifications or as shown on the plans or ordered in writing by the Engineer.

321.2 MATERIALS AND MANUFACTURE:
Materials and manufacture shall conform with Section 710 for the type specified.

321.3 WEATHER AND MOISTURE CONDITIONS:
Asphalt concrete shall be placed only when the surface is dry, and when the atmospheric temperature in the shade is 40°F. or above. No asphalt concrete shall be placed when the weather is foggy or rainy, or when the base on which the material is to be placed contains moisture in excess of the optimum. Asphalt concrete shall be placed only when the Engineer determines that weather conditions are suitable.

321.4 APPLICATION OF TACK COAT:
A tack coat shall be applied to all existing and to each new course of bituminous surfaces prior to the placing of a succeeding layer of bituminous mixed material. The tack coat may be deleted when a succeeding layer of asphalt concrete is being applied over a freshly laid course that has been subjected to very little traffic when approved by the Engineer.

The application of the tack coat shall comply with Section 329. The grade of emulsified asphalt shall be SS-1 h as specified in Section 713.

The same material that is specified above for the tack coat shall be applied to the vertical surfaces of existing pavements, curbs, and gutters, against which asphalt concrete is to be placed.

The surface to be covered may require repair or patching as directed by the Engineer.

321.5 PLACING, SPREADING, AND FINISHING:
Asphalt concrete shall be delivered and placed at a temperature within the job mix formula limits specified in Section 710. Tarpaulins shall be furnished and used to cover all loads during transportation if the temperature of the mixture is below the job mix formula limits specified in Section 710. The temperature shall be taken at a point 6 inches below the exposed surface of the material, in the truck, on the job site, and just prior to placement. When releasing agents are placed in the truck beds, no free fluid shall be present in the truck bodies at the time of asphalt concrete loading. Diesel fuel shall not be used as a releasing agent.

The handling of the completed mixture shall at all times be such as to prevent segregation, and the material as spread shall be free from areas of excess coarse, or fine material. Float rock developed in the process of raking shall be placed on an underlying course or otherwise disposed of. In no case shall it be scattered over the surface of a final course.

Placement shall begin on pavement at points farthest from the source of supply, and progress continuously toward the source of supply, unless otherwise ordered by the Engineer, and no more than 1/2 day's delivery to the project shall be placed in any one lane in advance of the other lanes. The end of each lane shall be staggered in relation to the adjacent lane.

At locations where the mixture is to be placed over areas inaccessible to the required spreading or compacting equipment or over areas where the use of the required spreading and compacting equipment would not be practicable, the mixture may be spread or compacted by other methods as approved by the Engineer.
SECTION 321

321.5.1 Base Preparation: The base prepared by the Contractor, on which the asphalt concrete is to be placed, shall be smooth, firm, and true to grade and cross-section as shown on the plans, and shall be so maintained throughout the period of placing asphalt concrete. If necessary, in order to obtain the above specified base condition, and if ordered by the Engineer, a leveling course of asphalt concrete compacted in layers not exceeding 2 inches in thickness or aggregate base shall be spread to level irregularities such as dips, depressions, and sags. All irregularities such as humps or high spots shall be removed in order to provide a smooth base of uniform grade and cross-section, so that subsequent surfacing will be of uniform thickness.

No additional compensation will be allowed for furnishing and placing these materials, and full compensation for all materials and for all work incidental to the correcting of irregularities will be considered as included in the contract price for asphalt concrete.

Pavement termination per Detail 201, Type A or B, shall be installed on all street edges where no other curb or retainment has been installed. This will include but not be limited to the center line of half streets, diagonal or perpendicular end terminations, street edges without curb and gutter or single curb.

321.5.2 (A) Spreading and Finishing Equipment: Self-propelled mechanical spreading and finishing equipment shall be provided with a vibrating screed or strike off assembly capable of distributing not less than the full width of a traffic lane. The term screed includes any strike off device that operates by cutting, crowding, or other practical action which is effective on mixtures at workable temperatures without tearing, shoving, or gouging, and which will produce a finished surface of the smoothness and texture required. The screed shall be adjustable to the required template and elevation. The forward speed of operation of self-propelled mechanical spreading and finishing equipment shall be so regulated that no irregularities will result in the surface texture or smoothness of the mat due to excessive forward speed of the spreading machine. The forward speed of operation shall not exceed 55 feet per minute unless the contractor can demonstrate to the satisfaction of the Engineer that higher speeds will not affect the smoothness of the mat.

All material within the self-propelled mechanical spreading and finishing equipment shall be handled to prevent segregation of the aggregate. This includes but is not limited to devices such as augers, screws or slat conveyors. These devices shall extend to the final or termination point where the material is being transported within the equipment. If any of the devices fail to function, the paving operation shall be terminated immediately until repairs are completed. In the case of the screed, auger extensions and vibrators shall be installed wherever the screed is extended more than one (1) foot beyond the end of the base auger or auger extension. However, when placing material against an extremely uneven curb or edge over a short distance, the Engineer may waive the auger extensions and vibrators.

Self-propelled mechanical spreading and finishing equipment shall be equipped with a control system capable of automatically maintaining the screed elevation as specified herein.

The control system shall be automatically actuated from either a reference line or surface through a system of mechanical sensors or sensor directed mechanisms or devices which will maintain the paver screed at a predetermined transverse slope and at the proper elevation to obtain the required surface. When directed, the transverse slope control system shall be made inoperative and the screed shall be controlled by sensor directed automatic mechanisms which will independently control the elevation of each end of the screed from reference lines or surfaces.

The controls shall be capable of working in conjunction with any of the following attachments:

(A) Ski-type device of not less than 30 feet in length.
(B) Taut stringline or wire set to grade.
(C) Short ski or shoe.

The Contractor shall furnish all necessary equipment to perform the paving operation including a long ski or shoe and all required stakes and wire. Should the automatic control system become inoperative during the day’s work, the Contractor may be permitted to place the remaining material on site using manual controls; however, no further material shall be delivered to the project site, and work shall not be resumed thereafter until the automatic control system has been made operative.

In conditions where the curb and/or gutter is not even and true to grade, the Engineer may require the Contractor to use a ski-type device or stringline as described in A or B above to establish the grade of the asphalt concrete surface adjacent to the curb or gutter.
SECTION 321

When trucks are backed into the self-propelled mechanical spreading and finishing equipment, it shall be in such a manner that the equipment will not be jarred excessively or moved out of line. Once in position, the truck shall be securely attached to the equipment during spreading and finishing.

When the Engineer deems that the automatic screed control operation is not practical under a particular set of conditions, he/she may order the use of manual control in lieu thereof. However, the machine shall be equipped with the automatic device.

Use of the spreader boxes will be permitted by the Engineer only in writing, under certain conditions, such as in alleys and on narrow paving projects where it is not practical to use self-propelled equipment. The spreader box will be equipped with a readily adjustable strike off blade. In order to obtain a smooth surface manipulation of the controls of the spreader box shall be held to a minimum. Trucks shall be backed into the spreader box in such a manner that the box will not be jarred excessively or moved out of line and the trucks shall be securely attached to the spreading and finishing.

If approved in writing by the Engineer, asphalt base course material may be placed with a self propelled pneumatic tired blade grader equipped with an automatic leveling device capable of accurately maintaining transverse slope of the blade at a preset angle. The grader shall have a blade not less than 12 feet long. Motor graders shall be free from appreciable lost motion in the blade control.

321.5.2 (B) Compaction Equipment: All rollers used in compaction of asphalt concrete shall be self-propelled and reversible, with a minimum weight of 8 tons. All rollers shall be maintained to insure smooth operation in respect to steering, the ability to stop, start and reverse. All rollers shall be equipped with an automatic device or devices capable of properly dispensing an approved releasing agent on the wheels to prevent the wheels from picking up the asphalt concrete. Diesel fuel shall not be used as a releasing agent. All rollers shall be equipped with scrapers to keep the wheels clean from asphalt and other debris.

Pneumatic-tired rollers shall be of the 2 axle tandem type, having a rolling width of not less than 5 feet. All tires shall not be less than 20 inches in diameter, shall be of the same size and shall have treads satisfactory to the Engineer. The roller shall be so constructed that the operating weight per tire shall not be less than 2000 pounds and the tires shall be spaced so that the entire gap between adjacent tires will be covered by the tread of the following tire. Except as otherwise specified, each tire shall be inflated to 90 psi and at all times the air pressure in each tire shall not vary more than 5 psi from the specified pressure. Pneumatic-tired rollers shall be equipped with skirt-type devices mounted around the tires so that the temperature of the tires will be maintained during the rolling process.

Steel-wheeled tandem rollers or vibratory rollers may be used where applicable. In all cases, the larger of the two roller wheels will be operated in the forward position. The steel wheels shall be straight, free from grooves and/or pits. Vibratory rollers shall be operated in accordance with standard practices and manufacturer recommendations.

321.5.3 Leveling Course: A leveling course shall be used when specified, or as directed in writing by the Engineer, to bring existing pavement to a uniform grade prior to placing an overlay or other course.

After the prime coat or tack coat has been applied, the leveling course mixture shall be spread to the proper width and to such depth as will compact to the required thickness. Actual quantities of the mixture required will be determined by the Engineer.

The distance to which a leveling course may be spread in advance of covering it with the following course shall be as ordered by the Engineer.

The leveling course material shall be placed in layers, 2 inches maximum compacted thickness, prior to finishing by means of self-propelled spreading equipment, spreader box or motor graders as discussed above. Other means may be permitted for placing the leveling course provided the method, at the discretion of the Engineer, can provide a finish surface that does not vary from the design surface by more than the amount specified below. In order to obtain a smooth surface, manipulation of controls of the paver shall be at a minimum. Unless otherwise permitted by the Engineer, adjustments shall not be made on less than 50 feet intervals and any adjustment shall not result in a change in thickness of the pavement in excess of 1/8 inch. Except where the machine is equipped with electronic grade controls.

The placing of the leveling course shall be not less than one lane width and for the longest practical length for any one lay, preferably not less than 1200 feet. The exact width and length will be approved by the Engineer.
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Compaction shall be accomplished by use of pneumatic-tire or steel-wheel rollers. Rolling shall proceed concurrently with the laydown of the leveling course. During the rolling operation, the speed of the roller shall not exceed 3 miles per hour. Additional rollers may be required depending on the placement rate of the asphalt concrete. If ample number of rollers are not present, the contractor shall adjust the placement rate to accommodate the roller speed.

The leveling course shall be thoroughly compacted, smooth and true to grade and cross-section and free from ruts, humps, depressions or irregularities. An acceptable surface shall not vary more than 1/2 inch from the lower edge of a 25 foot straightedge when the straightedge is placed parallel the centerline of the roadway. The straightedge shall be furnished by the Contractor and shall be constructed of such lightweight materials that it can be handled by the inspector without assistance.

When deviations in excess of the above tolerance are found, such places as humps; or depressions shall be corrected to meet the specified tolerance. All labor and equipment necessary to correct such deviations shall be at no additional cost to the Contracting Agency. Adjustment in the cost for the material may be requested by either the Contracting Agency or Contractor depending on the type of deviation.

321.5.4 Asphalt Base and Surface Course: Asphalt base and surface courses shall be spread and finished by means of self-propelled mechanical spreading and finishing equipment as described and specified above, except as otherwise provided in the plans and specifications, or if approved in writing by the Engineer.

When more than one course is placed, longitudinal joints of each course shall be staggered not less than 6 inches with relation to the longitudinal joints of the underlying course.

Before a surface course is placed adjacent to cold transverse construction joints, the joints shall be trimmed to a vertical face by cutting (e.g., sawcut) the material back to its full depth to expose a fresh surface. The joint shall be cut on a 10 to 15 degree skew from a line perpendicular to the center line of the street or roadway. The joint formed when the fresh mixture is placed shall be dense and well sealed. The transverse surface joints shall be tested with a 25 foot straightedge and shall conform to the requirements herein for surface smoothness. For short overnight intermissions in paving, a full depth bulkhead (e.g., wooden member) can be placed near the end of the day’s pavement. The bulkheads and excess material will be removed just prior to the placement of the following day’s pavement.

An approved joint heater shall be used on cold transverse or longitudinal joints where conditions are such that it is deemed necessary by the Engineer. The joint heater shall be capable of heating the joint to a minimum temperature of 200 °F. for a minimum depth of 1/4 inch at a speed commensurate with that of the laydown machine.

If it is deemed necessary by the Engineer to seal the joint, a light coat of asphalt emulsion shall be applied to the exposed edge before the joint is made.

Sufficient rolling equipment shall be furnished to satisfactorily compact and finish the amount of mixture being placed. However, there shall be a minimum of two rollers with two (2) operators on the project at all times. Upon direction of the Engineer, one of the rollers may be a pneumatic-tire roller. During rolling operations, the speed of the roller(s) shall not exceed 3 miles per hour. If ample number of rollers are not present, the contractor shall adjust the asphalt placement rate to accommodate the roller(s) speed. The type and required number of rollers shall be on the project and in acceptable operating condition, prior to the placement of any asphalt material. All rollers shall be operated continuously from the breakdown through finish rolling. The contractor may use vibratory rollers in lieu of the steel-wheeled roller, however when the thickness of the asphalt is one(1) inch or less, all rolling will be done in the static mode.

When more than one width of asphalt concrete material will be placed, a 6 inches strip adjacent to the area on which future material is to be laid shall not be rolled until such material has been placed but shall not be left unrolled more than 2 hours after being placed, unless the 6 inches unrolled strip is first heated with a joint heater. After the first strip or width has been compacted, the second width shall be placed, finished and compacted as provided for the first width, except that rolling shall be extended to include the 6 inches of the first width not previously completed.

At any place not accessible to the roller, the mixture shall be thoroughly compacted with tampers and finished, where necessary, with a hot smoothing iron to provide a uniform and smooth layer over the entire area compacted in this manner.

Breakdown rolling shall begin as soon as the mixture will bear the roller without undue displacement. Rolling shall be longitudinal, overlapping on successive trips by at least 1/2 but not more than 3/4 the width of the rear wheels. Alternate trips of the roller shall be of slightly different lengths. The motion of the roller shall at all time be slow enough to avoid displacement of the mixture.
SECTION 321

Break down and compaction rolling shall be done by either steel-wheel or pneumatic-tire rollers. The Engineer may require a pneumatic-tire roller for one of the rolling operations. Rolling shall continue until the specific gravity of the compacted mixture is not less than 95 percent of the specific gravity of specimens composed of the same materials in similar proportions or composed of the same mixture compacted in the laboratory by the 75 blow method of AASHTO T-245 if the mix was designed by the Marshall method. If the mix was designed by The Asphalt Institute’s SP-2 Gyratory method, rolling shall continue until the specific gravity of the compacted mixture is not less than 93 percent of the maximum theoretical specific gravity (ASTM D-2041) of specimens composed of the same materials in similar proportions or composed of the same mixture compacted in the laboratory.

Finish rolling shall be done by means of steel-wheeled roller or a vibratory steel-wheel roller operated in the static mode.

The completed surfacing shall be thoroughly compacted, smooth and true to grade and cross-section and free from ruts, humps, depressions or irregularities. An acceptable surface shall not vary more than 1/4 inch from the lower edge of a 25-foot straightedge when the straightedge is placed parallel to the centerline of the roadway. The straightedge shall be furnished by the contractor and shall be acceptable to the Engineer.

All streets shall be water tested for drainage in the presence of the Engineer or designated representative before final acceptance. Any areas not draining properly shall be corrected to the Engineer’s satisfaction at the Contractor’s expense. Water for this testing shall be provided and paid for by the Contractor.

When deviations in excess of the above tolerance are found, humps or depressions shall be corrected to meet the specified tolerance, or shall be cut out along neat straight lines and replaced with fresh hot mixture and thoroughly compacted to conform with and bond to the surrounding area. Materials and work necessary to correct such deviations shall be at no additional cost to the Contracting Agency.

321.5.5 Preservative Seal: An asphalt concrete preservative seal shall be used on all new asphalt concrete pavement and shall comply with Section 334. The Engineer will make a field determination and provide the actual application rate or delete the requirement. This seal is not required for pavement matching and surface replacement over pipe trenches, etc., unless specified in the special provisions.

321.6 CORRECTIVE REQUIREMENTS FOR DEFICIENCIES:

321.6.1 Thickness: The engineer or the permittee will test the density and thickness of the asphalt concrete after pavement construction is complete, using cores. The cores will be taken by the Engineer at random locations, at a minimum sampling rate of one core per 1,000 feet of lineal distance per paver pass width. For residential streets, a paver pass width will be considered to be a minimum of 12 feet. For residential streets, a minimum of one core will be taken between intersecting streets or portions thereof. When a deficiency of more than 1/4 inch is found, two additional cores will be taken not closer than 100 feet apart nor closer than 100 feet to the original core, and the average of these three cores will be used to determine the amount of the deficiency. Further cores may be taken by the Contractor if he so chooses, to determine the limits of the deficiency, and shall be at no additional cost to the Contracting Agency but shall not be used in determining the average thickness of the pavement. Thickness of the cores shall be determined by average caliper measurement. Where pavement thickness is deficient by 1/4 inch or less, it will be paid for at the contract price. The contractor shall repair all of the core holes using hot asphalt concrete from the project or a high quality asphalt based patching compound.

Where the pavement is deficient in thickness by more than 1/4 inch but not more than 1/2 inch, payment will be reduced per Table 321-1.
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TABLE 321-1

PAVEMENT THICKNESS PAYMENT REDUCTION (AC)
For Thickness Deficiency of More Than 1/4 inch and less than 1/2 inch

<table>
<thead>
<tr>
<th>Specified Mat Thickness</th>
<th>Reduction in Payment or Corrective Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: When the agency is the contracting party:</td>
<td></td>
</tr>
<tr>
<td>Less than 1.5 inches</td>
<td>50%</td>
</tr>
<tr>
<td>1.50 inches to 1.99 inches</td>
<td>33%</td>
</tr>
<tr>
<td>2.00 inches to 2.49 inches</td>
<td>25%</td>
</tr>
<tr>
<td>2.50 inches to 2.99 inches</td>
<td>20%</td>
</tr>
<tr>
<td>3.00 inches and over</td>
<td>17%</td>
</tr>
<tr>
<td>B: When the agency is not the contracting party (work under permit, e.g. subdivision, utilities, etc.)</td>
<td></td>
</tr>
<tr>
<td>For all thicknesses</td>
<td>Corrective action shall be the same as that for pavement thickness deficiencies exceeding 1/2 inch as described below.</td>
</tr>
</tbody>
</table>

When the deficiency of the pavement thickness exceeds 1/2 inch, the pavement shall be overlaid on the area affected, but in no case less than one City block or 660 feet, whichever is less in length, for the full width of pavement, with a new mat of material specified by the Engineer, equal in thickness to the deficiency but not less than 1/2 inch in any instance. This is to be done at no additional cost to the Contracting Agency. At locations where specific grades must be maintained, such as adjacent to curb and gutter or to accommodate drainage, the asphalt concrete surface may require milling prior to placement of the overlay.

When the pavement is deficient in thickness by more than 1/4 inch, all coring done to establish this premise shall be done by a laboratory that is independent of the contractor, and who is working under the direction of the Engineer. The cost of this work shall be born by the contractor by reduction of payments due under the contract.

321.6.2 Density: The Engineer or the permittee will test the density and thickness of the asphalt concrete after pavement construction is complete using cores. The cores will be taken in the same pattern as defined in Section 321.6.1, except that additional cores shall be taken if the density is less than the specified density. When the density represented by the average of three cores is deficient and the Contractor is unable to correct the deficiency, corrective action will be taken as prescribe in Table 321-2. For the purposes of this specification, the material represented by the set of three cores shall include all of the material placed in that paver pass for a length extending from half the distance to the previous core to half the distance to the next core.

At the discretion of the Engineer, for density deviations equal to or less than one percent, the average density of all of the cores taken from a given day’s production may be used to represent all of the material placed that day.

The Agency’s approval of the mix design does not guarantee the mix can be compacted to the specified limits. The Contractor shall work closely with the mix designer, compaction equipment manufacturers and the material supplier to assure the mix approved for use on the project can be compacted to the limits specified.
SECTION 321

### TABLE 321-2

**PAVEMENT DENSITY CORRECTION (ASPHALT CONCRETE)**

<table>
<thead>
<tr>
<th>Deviation Below Specification</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. When the Agency is the Contracting Party:</td>
<td></td>
</tr>
<tr>
<td>Equal to or less than 1.0%</td>
<td>$1.00/ton of Asphalt Concrete penalty</td>
</tr>
<tr>
<td>Greater than 1.0% and equal to or less than 2.0%</td>
<td>$2.00/ton of Asphalt Concrete penalty</td>
</tr>
<tr>
<td>Greater than 2.0% and equal to or less than 3.0%</td>
<td>$3.00/ton of Asphalt Concrete penalty</td>
</tr>
<tr>
<td>Greater than 3.0%</td>
<td>See Note Below</td>
</tr>
<tr>
<td>B. When the Agency is not the contracting party (work under permit, e.g.: subdivisions, utilities etc.)</td>
<td></td>
</tr>
<tr>
<td>Equal to or less than 2.0%</td>
<td>See Agencies’ policies, amendments, etc. pertaining to the action</td>
</tr>
<tr>
<td>Greater than 2.0% and equal to or less than 3.0%</td>
<td>Mill and inlay at a minimum depth of three times the nominal aggregate size using the same mix as specified for the project</td>
</tr>
<tr>
<td>Greater than 3.0%</td>
<td>See Note Below</td>
</tr>
</tbody>
</table>

**Note:** The Contractor shall remove and replace the entire asphalt layer that is deficient. The dimensions of the repairs shall be the width of the paver or 12 feet, whichever is greater, and the length of one City block or 660 feet, whichever is less.

### 321.6.3 Mineral Aggregate:

When the mineral aggregate gradation deviates from the requirements of this specification in an amount which, in the opinion of the Engineer, will affect the stability or durability of the mix, the Contractor shall, as directed by the Engineer, either: remove the asphalt concrete and replace it with material which meets the requirements of this specification, or place an additional mat of such thickness and gradation as required by the Engineer which will, in the opinion of the Engineer, correct the deficiency.

The above corrective work, due to deviations from the requirements for mineral aggregate, shall be done at no additional cost to the Contracting Agency.

### 321.6.4 Acceptance Testing Requirements:

Tests used to determined acceptance under Section 321.6 will be performed by the Engineer or a laboratory employed by the Engineer. In either case, the laboratory shall be accredited by the AASHTO Materials Reference Laboratory (AMRL) or an equivalent certification Agency for AASHTO Method T 166.

If the Contractor has reason to question the validity of any of the acceptance test results, he may request that the Engineer consider verification tests for final acceptance. Any request for verification testing must describe the Contractor’s reasons for questioning the validity of the original acceptance results and must clearly describe which set of acceptance tests are in question. The Engineer may either accept or reject the request for verification testing.

If the Engineer accepts the request for verification testing, he will engage an independent laboratory who is accredited by AMRL or equivalent. The independent laboratory shall be paid by the Engineer and shall perform a completely new set of acceptance tests (as required by 321.6) representing the area or set of tests in question. These tests shall include unit weight and thickness of cores, as well as Marshall or Maximum theoretical unit weight of the material obtained from the cores.

The verification tests shall be made on 6-inch diameter core specimens taken as near as it is practical to the acceptance test locations. For each sample, a minimum of three core specimens shall be taken, and the average values for unit weight and/or thickness shall be used.
SECTION 321

An adequate number of cores will be taken so their combined weight will be sufficient for a laboratory unit weight test in accordance with ASTM D2041 or AASHTO T 166, as appropriate for the specified mix design. The appropriate laboratory unit weight test shall be performed on the verification sample after re-heating and re-mixing the core specimens. The cores shall be prepared for testing by cleaning with a steel brush and by removing any extraneous lifts of differing materials. After removing extraneous materials, the entire core specimen will be used in the laboratory unit weight determination without removing aggregate particles that were cut by coring or trimming.

The number of samples taken will be in accordance with the Engineer’s acceptance test frequency. The independent laboratory shall compile the test results and transmit them to both the Engineer and the Contractor. The independent laboratory shall include a letter signed by an Engineer registered in the State of Arizona, who is a specialist in asphalt concrete. The signed letter shall give an opinion that the material evaluated either does or does not comply with project specifications, and shall clearly describe any deficiencies.

If the difference in test results of the independent laboratory versus the original acceptance laboratory falls outside the multi-laboratory precision statements for the test methods being used, the contracting Agency will bear the cost of the verification testing. If the difference in tests results fall within the multi-laboratory precision statement, the cost for verification testing will be deducted from payments that were to be made to the Contractor. For test methods that do not have multi-laboratory precision statements, the cost for verification testing will be deducted from payments that were to be made to the contractor.

321.6.5 Asphalt Cement Content: Corrective requirements and penalties for deficient asphalt cement as determined by tests conducted on the asphalt material used for paving shall be as indicated in Section 710.4.2 Asphalt Cement Content and Table 710-10 Asphalt Cement Content Corrective Action for Deviations.

321.6.6 Air Voids: Corrective requirements and penalties for deficient air voids as determined by tests conducted on the asphalt material used for paving shall be as indicated in Section 710.4.4 Volumetrics and Table 710-11 Laboratory Voids Acceptance and Penalties.

321.7 CURBS:

The curb shall be placed by an approved extrusion type machine. In the event the Contractor wishes to utilize a template which varies from the cross-section shown on the plans, such change must meet the approval of the Engineer. The asphalt mix used shall be a 9.5 mm mix. One percent by weight of the total mixture shall consist of a granulated synthetic resin stiffener, Lexite or equal, complying with the following characteristics:

<table>
<thead>
<tr>
<th>Property</th>
<th>Test</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Softening Point (Ring &amp; Ball)</td>
<td>ASTM D36</td>
<td>210°F. minimum</td>
</tr>
<tr>
<td>Acid Number</td>
<td>ASTM D465</td>
<td>Less than 1.00</td>
</tr>
<tr>
<td>Saponifiable matter</td>
<td>ASTM D464</td>
<td>Less than 1%</td>
</tr>
<tr>
<td>Iodine Number</td>
<td>ASTM D29</td>
<td>175—185</td>
</tr>
</tbody>
</table>

321.8 MEASUREMENT:

Asphalt concrete pavement will be measured by the ton, or by the square yard, for the mixture actually used as allowed above, which shall include the required quantities of mineral aggregates, filler material, asphalt cement, and sand. Measurement shall include any tonnage used to construct intersections, roadways, streets, or other miscellaneous surfaces indicated on the plans or as directed by the Engineer.

Weighmastr's Certificates, in accordance with Section 109, will be provided regardless of method of measurement.

The bid price per ton or square yard for asphalt concrete shall include the cost of the asphalt cement in the percentages as specified in Section 710.
SECTION 321

Asphalt concrete curbs will be measured by the linear foot, parallel to the base or foundation, unless otherwise specified.

Preservative seal for asphalt concrete pavement will be measured by the gallon diluted, unless otherwise indicated in the special provisions.

321.9 PAYMENT:

The asphalt concrete measured as provided above, will be paid for at the contract price per ton or square yard, which price shall be full compensation for the item complete, as herein described and specified.

Payment for tack coat will be by the ton diluted, based on the rate of application; as directed by the Engineer.

The quantities of preservative seal, measured as provided above will be paid for at the contract bid price per gallon diluted or as specified, which price shall be full compensation for the item complete as herein described or as specified.

No payment will be made for any overrun in quantity of asphalt concrete in excess of 10 percent based on actual field measurement of area covered, design thickness, and a unit weight of 145 pounds per cubic foot. The calculations and payment for overrun will be by individual bid item. To compensate or adjust for a thickness deficiency in an underlying asphalt concrete course, the Engineer may authorize a quantity increase in excess of 10 percent for a subsequent asphalt concrete course. In such cases, the quantity in excess of 10 percent will be paid for at the lowest unit bid price.

Payment for the curbs will be at the contract unit price bid per linear foot, which price shall be full compensation for the curb complete in place, including all necessary labor, equipment and material.

Except as otherwise specified in the special provisions, no separate payment will be made for work necessary to construct miscellaneous items or surfaces of asphalt concrete.
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
SECTION 329

TACK COAT

329.1 DESCRIPTION:

Tack coat for bituminous paved surfaces shall consist of the application of emulsified asphalt as specified in Section 713.

329.2 PREPARATION OF SURFACE:

Surfaces to be treated shall be cleaned of all loose material as specified in Section 330.

329.3 APPLICATION:

Tack coat shall be diluted in the proportion of 50 percent water and 50 percent emulsion and applied at the rate of 0.05 to 0.10 gallons per square yard. Application shall be made in advance of subsequent construction as ordered by the Engineer.

329.4 EQUIPMENT:

Tack coat shall be applied by distributor trucks designed, equipped, maintained and operated in accordance with Section 330. Hand spray by means of hose or bar through a gear pump or air tank shall be acceptable for resurface work, corners or tacking of vertical edges. Care shall be taken to provide uniform coverage. Equipment that performs unsatisfactory shall be removed from the job.

329.5 PROTECTION FOR ADJACENT PROPERTY:

According to Section 333.

329.6 MEASUREMENT:

Bituminous emulsion that is diluted prior to application will be measured by the ton of diluted material. Any conversion from volumetric quantities shall be in accordance with Section 713.

329.7 PAYMENT:

Payment for the emulsified bituminous tack coat will be by the ton, diluted.

End of Section
SECTION 717

ASPHALT-RUBBER

717.1 GENERAL:

Asphalt rubber shall consist of a properly proportioned mixture of hot paving grade asphalt, ground vulcanized rubber and a hydrocarbon diluent combined by heating into a visco-elastic composition.

There are two approved production processes, Method A and Method B. Prior to any placement, the Contractor will provide a certification from the supplier that the asphalt-rubber components conform to the material requirements for either Method A or B.

717.2 MATERIAL - METHOD A:

717.2.1 Paving Grade Asphalt: The paving grade asphalt used shall meet the requirement of Section 711.

717.2.2 Extender Oil: The extender oil shall be a resinous, high flash point, aromatic hydrocarbon conforming to the following test requirements:

- Viscosity, 55 U, at 100 degree F. (ASTM D-88) 2500 min.
- Flash point, COC, degrees F. (ASTM D-92) 390 min.
- Molecular Analysis (ASTM D-2007):
  - Asphaltines, percent by weight 0.0 max.
  - Aromatics, percent by weight 55.0 min.

717.2.3 Ground Vulcanized Rubber: The rubber shall be vulcanized rubber scrap specially selected so that the natural rubber content is at least 25 percent by total weight. It shall be free from fabric, wire or other contaminating material. After grinding, it must be a dry, free-flowing material. Not more than 4 percent by weight of a mineral powder (such as calcium carbonate) may be included to prevent sticking or caking of the particle. The dry, free-flowing ground rubber shall meet the following test requirements of Table 717-1.

<table>
<thead>
<tr>
<th>TABLE 717-1</th>
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<tbody>
<tr>
<td>GROUND VULCANIZED RUBBER GRADATION (ASTM) C-136</td>
</tr>
<tr>
<td>Chemical Analysis (ASTM D-297)</td>
</tr>
<tr>
<td>Natural Rubber Content, percent by weight 25 min.</td>
</tr>
<tr>
<td>Sieve No.</td>
</tr>
<tr>
<td>8</td>
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<tr>
<td>30</td>
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<tr>
<td>50</td>
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<td>100</td>
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717.3 MATERIAL - METHOD B:

717.3.1 Paving Grade Asphalt: The paving grade asphalt used shall meet the requirement of Section 711.

717.3.2 Kerosene**: The kerosene used shall be compatible with the other materials and shall meet the following requirements:

- Flash Point - Degrees F. (ASTM D-92) 80 min.
- Initial Boiling Point - Degrees F. (ASTM D-850) 350 min.
- Dry Point - Degrees F. (ASTM D-850) 450 max.

**WARNING: Kerosene shall not be used in mix design for asphalt rubber hot mix.
717.3.3 Ground Tire Rubber: The rubber shall be 100 percent vulcanized, ground tire rubber. It shall be free from fabric, wire or other contaminating material. After grinding, it must be a dry, free-flowing material with a specific gravity of 1.15 + 0.05. Not more than 4 percent by weight of a mineral powder (such as calcium carbonate) may be included to prevent sticking or caking of the particles. The gradation shall be in accordance with Table 717-2.

<table>
<thead>
<tr>
<th>Sieve No.</th>
<th>Percent Passing</th>
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<tr>
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<tr>
<td>10</td>
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<td>0-10</td>
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End of Section