LOCATION OF THE WORK:

The project is located in Maricopa County, Arizona within Operations Division Maintenance Districts 2 and 4. Specific road segments are described in the attached SURFACE TREATMENT SCHEDULE and map section included in these Special Provisions.

PROPOSED WORK:

The work consists of cold planing (edge milling) the existing asphalt concrete pavement at the concrete gutter, structures, road termini, intersecting, and abutting roads, and overlaying with a minimum of three-quarter (3/4) inch of asphalt-rubber overlay, friction course (ARFC). Traffic control, pavement delineation, special milling, and other miscellaneous items of work are required for the completion of the project.

Total length of the project is approximately 64.95 miles (139.83 lane miles, 1,148,388 square yards).

Permanent pavement delineation will be replaced by the County. CONTRACTOR shall provide and accurately install appropriate temporary traffic control devices approved by the ENGINEER to satisfy the interim time frame until COUNTY replaces permanent pavement delineation.

CONTRACT TIME:

CONTRACTOR shall complete all work on the project within sixty (60) calendar days after the date of Notice to Proceed. CONTRACTOR shall work during daylight hours, Monday through Friday, excluding Holidays, unless otherwise approved by the ENGINEER.

SECTION 108.4 – CONTRACTOR’S CONSTRUCTION SCHEDULE:

Section 108.4.2 of the MDOT Supplement shall apply except as modified below:
A critical path schedule is not required, however, a bar graph construction schedule showing all activities involved, as well as the sequencing of roads shall be submitted to the ENGINEER for review and approval, as required.

SECTION 105.6– COOPERATION WITH UTILITIES:

Cooperation with utilities shall be in accordance with Section 105.6, except as modified below:

CONTRACTOR shall inspect and locate all manholes, handholes, valve boxes, survey monuments, traffic loops and/or other such items (conflicts), prior to commencement of the project, which would interfere with milling operations. Milling shall continue up to a point reasonably close to conflicts and then stopped or guided around them. Damage to any of the above stated items shall be avoided. CONTRACTOR shall repair or replace damaged conflicts related items caused by CONTRACTOR construction operations within twenty-four (24) hours of damage, or by the time frame requested by the owner of the damaged item, whichever is less.

Prior to performing work on any roads with railroad crossings, CONTRACTOR shall contact the railroad having jurisdiction, in order to assure compliance with all mandated permit, insurance, inspection, or any other requirements of the railroad.

Special milling shall be accomplished by hand operated machines next to conflicts, including but not limited to, items such as manholes, handholes, valve boxes, survey monuments, etc.

*Insert names of utility contacts here. Get them from Wayne Butch.*

SECTION 211 FILL CONSTRUCTION:

Fill Construction shall be done in accordance with MAG Standard Specification Section 211, except as modified below:

On roads without curb and gutter, the existing shoulder elevation shall be adjusted by CONTRACTOR to match the elevation at the edge of new overlay and slope away from new pavement surface at a rate that the existing quantity of shoulder material will allow. Shoulder material to include existing shoulder, millings, or import shall be compacted to a minimum of 90% of maximum density, determined in accordance with MAG section 301.3. Grading, shaping and compaction is considered incidental.

If the existing quantity of shoulder material is not sufficient to match the elevation at the edge of new overlay, CONTRACTOR shall use any millings collected from milling operations on the same road to meet this requirement. In the case that
there are no millings on the same road or if CONTRACTOR uses all the milling material and there is still a deficiency, CONTRACTOR shall use imported fill, which shall be select, aggregate base course, or a granular material approved by the ENGINEER. CONTRACTOR be compensated for imported fill, measured by certified weigh tickets, at the contract unit price bid per ton, COMPLETE-IN-PLACE, bid item 301-3, Imported Fill.

**SECTION 317 - ASPHALT CONCRETE MILLING:**

Asphalt Concrete Milling shall be in accordance with MCDOT Supplement, Section 317, except as modified below:

CONTRACTOR shall not mill existing pavement until ENGINEER approves the asphalt rubber concrete mix design.

Prior to milling CONTRACTOR shall mill, or remove by other means, existing raised and flexible pavement markers. Pavement striping that has been removed by the milling operation shall be replaced with centerline vertical panels before sunset, as required, in order to provide proper delineation of traffic lanes and golf cart crossings.

All debris and waste material shall be removed daily from the project and properly disposed.

For this project, the overlay thickness is ¾" minimum. Milling depth at the gutter lip shall be ½". Termini and intersecting road milling depth shall be ¾". Refer to MILLING FOR OVERLAY detail included in these Specifications.

Milling of pavement at structure approaches such as cattle guards, bridge abutments, etc. shall be accomplished in the same manner. The result shall be a smooth and seamless transition from overlay to existing pavement at all termini and/or structure approaches.

Any existing asphalt material build up over the concrete gutter, adjacent to existing pavement, shall be removed as part of this bid item.

CONTRACTOR shall remove and dispose of the milled material at a location, approved by the ENGINEER.

**Milling Transport Location:**

In the Sun City area, CONTRACTOR shall transport and offload the millings at the County’s NW maintenance yard, located at 12975 W. Bell Road, Surprise, AZ 85375 and in Dreamland Via, on selected roads near 96th Street and Baywood. The County will spread the offloaded material.
CONTRACTOR may mill and place asphalt concrete rubber pavement in separate operations. Any damage done to the milled surface, by traffic or other circumstances, prior to the placement of asphalt rubber concrete pavement, shall be repaired by CONTRACTOR as specified by the ENGINEER at no additional cost to the County.

Payment for this work will be made at the contract unit price bid per square yard for ITEM 317. The price shall be for full compensation of the work, COMPLETE IN PLACE, including all milling, special milling around structures, disposal of millings, sweeping and removal of existing raised delineators.

SECTION 322 - ASPHALTIC CONCRETE FRICTION COURSE (ASPHALT-RUBBER):

Replace all of Section 322 of the Standard Specifications with the following:

322.1 Description:

Asphaltic Concrete Friction Course (Asphalt-Rubber), hereinafter, asphaltic concrete, shall consist of furnishing all materials, mixing at a plant, hauling, and placing a mixture of aggregate materials, mineral admixture if required, and bituminous material (asphalt-rubber) to form a pavement course or to be used for other specified purposes, in accordance with the details shown on the project plans and the requirements of these specifications, and as directed by the ENGINEER.

The CONTRACTOR shall be responsible for all adjustments to its equipment necessary to properly accommodate the use of asphalt-rubber as a bituminous material.

322.2 Asphaltic Concrete Mix Design Criteria:

Mix designs will be performed in accordance with Arizona Test Method 814a, modified as necessary for Asphaltic Concrete Friction Course (Asphalt-Rubber), included in these specifications. The allowable range of percent absorbed asphalt-rubber shall be 0 - 1.0, when tested in accordance with the applicable section of Arizona Test Method 815.

322.3 Materials:

For comparative purposes, quantities shown in the bidding schedule have been calculated based on the following data:

- Spread Rate, kg/m2 (lbs/sy) 40.05 / 73.83
  (125 lbs/cf @ ¾” + 5% for leveling)
- Bituminous Material, % 9.2
Mineral Admixture, %  1.0

The asphalt-rubber shall be Type 2 in accordance with Subsection 322.3.4.

The spread rate specified includes 5 percent for leveling to provide a minimum ¾” compacted thickness. The exact spread rate will be determined by the ENGINEER.

322.3.1 Mineral Aggregate Source:

There is no Department-furnished source of mineral aggregate. The CONTRACTOR shall use a commercial source.

When the CONTRACTOR selects a source or sources, it shall notify the ENGINEER. The CONTRACTOR shall be solely responsible for assuring that the mineral aggregate meets all requirements and, when processed, is fully capable of providing asphaltic concrete which meets all the requirements of these specifications.

322.3.2 Mineral Aggregate:

Coarse mineral aggregate shall consist of crushed gravel, crushed rock, or other approved inert materials with similar characteristics, or a combination thereof, conforming to the requirements of these specifications.

Fine mineral aggregate or blend material shall consist of natural sand, sand prepared from rock, or other approved inert materials, or a combination thereof, conforming to the requirements of these specifications.

Material aggregate furnished for mix designs shall be representative of the source(s) and sampled from the materials stockpiles to be utilized in asphalt concrete production. Mix designs shall be performed utilizing mineral aggregate which conforms to the grading limits in Table 322-1.

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Percent Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.5 mm (3/8”)</td>
<td>100</td>
</tr>
<tr>
<td>4.75 mm (#4)</td>
<td>30 - 45</td>
</tr>
<tr>
<td>2.36 mm (#8)</td>
<td>4 - 8</td>
</tr>
<tr>
<td>75 μm (#200)</td>
<td>0 – 2.5</td>
</tr>
</tbody>
</table>
Mineral aggregate shall conform to the requirements in Table 414-2 when tested in accordance with the applicable test methods.

<table>
<thead>
<tr>
<th>Table 322-2</th>
<th>Mineral Aggregate Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Characteristic</td>
<td>Test Method</td>
</tr>
<tr>
<td>Combined Bulk Specific Gravity</td>
<td>Arizona Test Method 814</td>
</tr>
<tr>
<td>Combined Water Absorption</td>
<td>Arizona Test Method 814</td>
</tr>
<tr>
<td>Sand Equivalent</td>
<td>Arizona Test Method 242</td>
</tr>
<tr>
<td>Fractured Coarse Aggregate Particles</td>
<td>Arizona Test Method 212</td>
</tr>
<tr>
<td>Flakiness Index</td>
<td>Arizona Test Method 233</td>
</tr>
<tr>
<td>Percent Carbonates In Aggregate</td>
<td>Arizona Test Method 238</td>
</tr>
<tr>
<td>Abrasion</td>
<td>AASHTO T 96</td>
</tr>
</tbody>
</table>

Tests on aggregates outlined in Table 322-2, other than abrasion, shall be performed on materials furnished for mix design purposes and composited to the mix design gradation. Abrasion shall be performed separately on samples from each source of mineral aggregate. All sources shall meet the requirements for abrasion.

322.3.3 Mineral Admixture:

An approved mineral admixture will be required. The amount shall be 1.0 percent, by weight of the mineral aggregate and shall be either Portland cement type II or hydrated lime, conforming to the requirements of Table 322-3.

<table>
<thead>
<tr>
<th>TABLE 322-3</th>
<th>MINERAL ADMIXTURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material</td>
<td>Requirement</td>
</tr>
<tr>
<td>Portland Cement, Type II</td>
<td>ASTM C 150</td>
</tr>
<tr>
<td>Hydrated Lime</td>
<td>ASTM C 1097</td>
</tr>
</tbody>
</table>

322.3.4 Bituminous Material:

Bituminous material shall be asphalt-rubber conforming to the requirements of Section 717 of these specifications. The crumb rubber gradation shall be Type B conforming to the requirements of Section 717.
In no case shall the asphalt-rubber be diluted with extender oil, kerosene, or other solvents. Any asphalt-rubber so contaminated shall be rejected.

Any kerosene or other solvents used in the cleaning of equipment shall be purged from the system prior, to any subsequent use of that equipment.

322.4 Mix Design:

At the Pre-Construction Meeting, CONTRACTOR shall submit the name of the asphalt-rubber concrete supplier, a description of the materials, and the mix design(s). The mix design(s) submitted will be reviewed and considered in determining the final mix design.

The percent of asphalt-rubber binder in the mix shall be a minimum of 9.5% by total weight of the mix. Exact amount of asphalt-rubber binder shall be provided in a mix design for approval by the ENGINEER, but shall not be less than 9.5%.

Mix designs shall contain the following information, as a minimum:

1. Aggregate
   - source and identification (for each material used)
   - gradation (for each material used)
   - blend percentage
   - mixture gradation

2. Asphalt - Rubber Binder
   - source and PG grade of asphalt cement
   - %, source and identification of ground rubber
   - ground rubber gradation
   - ground rubber percentage of the asphalt - rubber binder
   - type and amount of additive(s)
   - temperature when added to aggregate

3. Recommended asphalt - rubber binder content by both weight of total mix (9.5% minimum).

The mix design shall include sufficient test results and documentation to assure that all requirements for rubber, aggregate and the asphalt-rubber binder are fulfilled.

322.5 Acceptance of Materials:

322.5.1 General:
If the production of asphaltic concrete is stopped either for failure to meet the
requirements specified hereinafter under Subsection 322.5.3, or because
changes are made in the mix design, samples will be taken for calculating new
consecutive averages either after production resumes or after the changes in the
mix design have been made. The acceptance of the mineral aggregate gradation
and the bituminous material content will be determined on the basis of the tests
as hereinafter specified under Subsection 322.5.3. The ENGINEER reserves the
right to increase the frequency of sampling and testing upon the resumption of
asphaltic concrete production.

322.5.2 Mineral Aggregate:

Aggregate shall be free of deleterious materials, clay balls, and adhering films or
other material that prevent thorough coating of the aggregate with the bituminous
material.

At the direction of, and witnessed by the ENGINEER, the CONTRACTOR shall
secure one representative sample of each day's production from each stockpile.
These samples will be tested for conformance with the mineral aggregate
gradation in accordance with the requirements of Arizona Test Method 201.
These samples will also be composited to the specified stockpile percentages by
the ENGINEER and tested for sand equivalent in accordance with Arizona Test
Method 242, the percent of fractured coarse aggregate particles in accordance
with the requirements of Arizona Test Method 212, and flakiness index in
accordance with the requirements of Arizona Test Method 233.

Should testing indicate results not meeting the requirements of Table 322-2 for
sand equivalent, fractured coarse aggregate particles, and flakiness index,
material represented by failing test results will be rejected.

322.5.3 Asphaltic Concrete:

(A) Mineral Aggregate

For each approximate 450 metric tons (495 Tons) of asphaltic concrete, at least
one sample of mineral aggregate will be taken. Samples will be taken in
accordance with the requirements of Arizona Test Method 105 on a random
basis, by means of a sampling device which is capable of producing samples
which are representative of the mineral aggregate. The device, which shall be
approved by the ENGINEER, shall be furnished by the CONTRACTOR. In any
shift that the production of asphaltic concrete is less than 450 metric tons (495
Tons), at least one sample will be taken.

Samples will be tested for conformance with the mix design gradation in
accordance with the requirements of Arizona Test Method 201. If the sample
does not include mineral admixture, the gradation results will be adjusted to reflect the addition of mineral admixture.

The gradation of the mineral aggregate, including mineral admixture, will be considered to be acceptable, unless the average of any three consecutive tests or the result of any single test varies from the mix design gradation percentages as follows:

<table>
<thead>
<tr>
<th>Passing Sieve</th>
<th>Number of Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Three Consecutive</td>
</tr>
<tr>
<td>4.75 mm(#4)</td>
<td>± 4</td>
</tr>
<tr>
<td>2.36 mm (#8)</td>
<td>± 3</td>
</tr>
<tr>
<td>75 μm(#200)</td>
<td>± 1</td>
</tr>
</tbody>
</table>

One hundred percent of the material shall pass the largest sieve size shown in Table 322-1.

At any time that test results indicate that the gradation of the mineral aggregate, including mineral admixture, does not fall within all of the limits indicated, the production of asphaltic concrete shall cease immediately and shall not begin again until a calibration test indicates that the gradation is within the three consecutive test limits indicated.

(B) Asphalt-Rubber Content:

During production of asphaltic concrete, the CONTRACTOR shall maintain at the plant site a nuclear asphalt content gauge calibrated and operated in accordance with Arizona Test Method 421. Under the observation of the ENGINEER, asphalt-rubber content shall be measured by the CONTRACTOR by means of the nuclear asphalt content gauge a minimum of four times per full shift. Production of asphaltic concrete shall cease immediately and the plant shall be re-calibrated if the ENGINEER determines the percent of asphalt-rubber has varied by an amount greater than ± 0.4 percent from the amount directed by the ENGINEER.

322.6 Construction Requirements:

322.6.1 Quality Control:
Quality control shall be the responsibility of the CONTRACTOR. The ENGINEER reserves the right to obtain samples of any portion of any material at any point of the operations for the ENGINEER's own use.

322.6.2 Stockpiling:

The CONTRACTOR will not be allowed to feed the hot plant from stockpiles containing less than two full days of production unless only two days production remain to be done or special conditions exist where the ENGINEER deems this requirement waived.

Mineral aggregate shall be separated and stockpiled so that segregation is minimized. An approved divider of sufficient size to prevent intermingling of stockpiles shall be provided.

322.6.3 Proportioning:

The CONTRACTOR shall provide documentation by calibration charts or other approved means that the mineral aggregate, asphalt-rubber, and mineral admixture are being proportioned in accordance with the approved mix design.

Changes in stockpile use in excess of five percent from the approved mix design will not be permitted without the approval of the ENGINEER.

Mineral admixture shall be mechanically mixed with the mineral aggregate prior to combining the mineral aggregate and asphalt-rubber. The ENGINEER may direct a spray of water be applied either to control the loss of the mineral admixture or to comply with any mix design requirements for wet mixing of the aggregate and admixture.

If a drum mix plant is used, the mineral admixture shall be added and thoroughly mixed by means of a mechanical mixing device prior to the mixture entering the drum drier. The mineral admixture shall be weighed across a weigh belt or an approved alternative weighing system, with a weight totalizer, prior to entry into the mechanical mixing device. The mechanical mixing device shall be a pugmill type mixer consisting of at least two motorized shafts with mixing paddles. The mixing device shall be designed such that the mixture of aggregate and admixture is moved in a near horizontal direction by the mixing paddles without the aid of conveyor belts for a distance of at least one meter. Mixing devices which permit the mixture of aggregate and admixture to fall through mixing blades onto a belt or chute are not acceptable. The mixing device's rated capacity in metric tons per hour shall not be exceeded by the rate of material feed to the mixer. The mixer shall be constructed to prevent the leakage of the contents. The mixer shall be located in the system at a location where the mixed material can be readily inspected on a belt prior to entry into the drum.
mixing device shall be capable of effective mixing in the full range of asphaltic concrete production rates.

A positive signal system and a limit switch device shall be installed in the plant at the point of introduction of the admixture. The positive signal system shall be placed between the metering device and the drum drier, and utilized during production whereby the mixing shall automatically be stopped if the admixture is not being introduced into the mixture. If a batch plant is used, the mineral admixture shall be added and thoroughly mixed in the pugmill prior to adding asphalt-rubber.

The CONTRACTOR shall furnish daily documentation to the ENGINEER that the required amount of mineral admixture has been incorporated into the asphaltic concrete.

No fine material which has been collected in the dust collection system shall be returned to the mixture unless the ENGINEER, on the basis of tests, determines that all or a portion of the collected fines can be utilized. If the ENGINEER so determines, the ENGINEER will authorize in writing the utilization, of specific proportion of the fines; however, authorization will not be granted unless the collected fines are uniformly metered into the mixture.

Mineral aggregate, mineral admixture, and asphalt-rubber shall be proportioned by volume, by weight, or by a combination of volume and weight.

When mineral aggregate, mineral admixture, and asphalt-rubber are proportioned by weight, all boxes, hoppers, buckets, or similar receptacles used for weighing materials, together with scales of any kind used in batching materials, shall be insulated against the vibration or movement of the rest of the plant due to the operation of any equipment so that the error in weighing with the entire plant operating shall not exceed 2 percent for any setting nor 1-1/2 percent for any batch. Bituminous material shall be weighed in a heated, insulated bucket suspended from a springless dial scale system.

When mineral aggregate, mineral admixture, and asphalt-rubber are proportioned by volume, the correct portion of each mineral aggregate size introduced into the mixture shall be drawn from the storage bins by an approved type of continuous feeder which will supply the correct amount of mineral aggregate in proportion to the bituminous material and so arranged that the proportion of each mineral aggregate size can be separately adjusted. The continuous feeder for the mineral aggregate shall be mechanically or electrically actuated.

The introduction of asphalt-rubber shall be controlled by an automated system fully integrated with the controls for mineral aggregate and mineral admixture.
322.6.4  **Drying and Heating:**

A recording pyrometer or other approved recording thermometric instrument sensitive to a rate of temperature change not less than 5°C (41°F) per minute shall be so placed at the discharge chute of the drier in order to record automatically the temperature of the asphaltic concrete or mineral aggregate. A copy of the recording shall be given to the ENGINEER at the end of each shift.

The moisture content of the asphaltic concrete shall not exceed 0.5 percent. The moisture content will be determined in accordance with Arizona Test Method 406. Drying and heating shall be accomplished in such a manner as to preclude the mineral aggregate from becoming coated with fuel oil or carbon.

322.6.5  **Mixing:**

The production of the plant shall be governed by the rate required to obtain a thorough and uniform mixture of the materials.

A positive signal system shall be provided to indicate the low level of mineral aggregate in the bins. The plant will not be permitted to operate unless this signal system is in good working condition. Each bin shall have an overflow chute or a divider to prevent material from spilling into adjacent bins.

The temperature of asphaltic concrete upon discharge from the mixer shall not exceed 175°C (345°F). If the asphaltic concrete is discharged from the mixer into a hopper, the hopper shall be constructed so that segregation of the asphaltic concrete will be minimized.

322.6.6  **Placing and Finishing**

(A) **General Requirements:**

The handling of asphaltic concrete shall at all times be such as to minimize segregation. Any asphaltic concrete which displays segregation shall be removed and replaced.

**COUNTY** will make preliminary preparation to roadway, such as crack sealing and patching.

Prior to placing the asphalt-rubber concrete, pot-holes left by the milling operation shall be repaired by the CONTRACTOR, as an incidental non-pay item and as required by the ENGINEER.

**CONTRACTOR** shall have a power pick-up broom (vacuum type only) available on the job site at all times during the overlay operation to assure clean joints and to maintain a clean street prior to overlay operations, or other work. Regular
power brooms (non pick-up) may be used in non-residential areas, outside the defined PM-10 area, if approved by the ENGINEER.

The milled area shall be swept and the entire width of the pavement tacked prior to placement of the asphalt-rubber concrete.

Unless otherwise specified on the project plans, asphaltic concrete shall not be placed on the 600 millimeter(2 ft) widened section where guard rail is to be installed.

(1) Dates and Surface Temperature:

Asphaltic concrete shall be placed between the dates of March 1- May 31 or September 1 – November 15 and only when the temperature of the surface on which the asphaltic concrete is to be placed is at least 29°C(84°F). This project shall be completed between March 1 – May 31, 2000, unless otherwise approved by the ENGINEER.

Despite a surface temperature of 29°C(84°F), the ENGINEER, at any time, may require that the work cease or that the work day be reduced in the event of weather conditions either existing or expected which would have an adverse affect upon the asphaltic concrete.

(2) Delivery To Screed Unit:

Asphaltic concrete delivered to the screed unit shall be a free flowing, homogeneous mass in which there is no segregation, crusts, lumps, or migration of the asphalt-rubber.

Should any one or more of such conditions be evident in the material delivered to the screed unit, and which cannot be eliminated by one or more of the following methods, the ENGINEER will order the work to be stopped until conditions are conducive to the delivery of the material in the condition as herein before required:

1) Covering hauling units with tarpaulins.
2) Dumping material directly into the paver.
3) Moving the hot plant nearer to the point of delivery.

Other measures proposed by the CONTRACTOR which will deliver asphaltic concrete meeting the above requirements will be considered by the ENGINEER.

(B) Loading Asphaltic Concrete Into the Paving Machine:
If the asphaltic concrete is dumped directly into the paving machine from the hauling trucks, care shall be taken to avoid jarring the machine or moving it out of alignment. No vertical load shall be exerted on the paving machine by the trucks. Trucks, while dumping, shall be securely attached to the paving machine.

If the asphaltic concrete is dumped upon the surface being paved and subsequently loaded into the paving machine, it shall not be dumped at a distance greater than 45 meters (148 ft) in front of the paving machine. The loading equipment shall be self-supporting and shall not exert any vertical load on the paving machine. Substantially all of the asphaltic concrete shall be picked up and loaded into the paving machine.

(C) Placing and Finishing Asphaltic Concrete By Means of Self-Propelled Paving Machines:

All courses of asphaltic concrete shall be placed and finished by means of self-propelled paving machines except under certain conditions or at certain locations where the ENGINEER deems the use of self-propelled paving machines impractical.

In order to achieve, as far as practical, a continuous operation, the speed of the paving machine shall be coordinated with the production of the plant. If the paving machine is stopped for more than three minutes, or there is a three minute or longer interval between the completion of delivery by one truck and the beginning of delivery by the next truck, the paving machine shall be pulled away from the mat in order for the rollers to compact this area in accordance with the temperature limitations given hereinafter under Subsection 322.6.8(C). A transverse construction joint shall be made by a method approved by the ENGINEER.

Self-propelled paving machines shall spread the mixture without segregation or tearing within the specified tolerances, true to the line, grade, and crown indicated on the project plans. Pavers shall be equipped with hoppers and augers which will distribute the mixture uniformly in front of adjustable screeds.

Screeds shall include any strikeoff device operated by tamping or vibrating action which is effective without tearing, shoving or gouging the mixture and which produces a course with a uniform texture and density for the full width being paved. Screeds shall be adjustable as to height and crown and, shall be equipped with a controlled heating device for use when required.

Tapered sections not exceeding 2.4 meters (8 ft) in width, or widened sections not exceeding 1.2 meters (4 ft) in width may be placed and finished by other means approved by the ENGINEER.

(D) Automatically Actuated Control System:
Except under certain conditions or at certain locations where the ENGINEER deems the use of automatic controls impractical, all courses of asphaltic concrete shall be placed and finished by means of self-propelled paving machines equipped with an automatically actuated control system.

The control system shall control the elevation of the screed at each end by controlling the elevation of one end directly and the other end indirectly either through controlling the transverse slope or alternately when directed, by controlling the elevation of each end independently.

The control system shall be capable of working with the following devices which shall be furnished with the machine:

- Ski-type device at least, 9 meters (30 feet) in length, supported throughout its entire length.

Failure of the control system to function properly shall be cause for the suspension of the asphaltic concrete operations.

322.6.7 Joints

If the lift thickness is equal to or greater than 2.5 millimeters (.098 in), the CONTRACTOR shall schedule its paving operations to minimize exposed longitudinal edges. Unless otherwise approved by the ENGINEER, the CONTRACTOR shall limit the placement of asphaltic concrete courses, in advance of adjacent courses, to one shift of asphaltic concrete production. The CONTRACTOR shall schedule its paving operations in such a manner to eliminate exposed longitudinal edges over weekends or holidays.

Longitudinal joints shall be located within 300 millimeters (12 in) of the centerline between two adjacent lanes.

Before a surface course is placed in contact with a cold transverse construction joint, the cold existing asphaltic concrete shall be trimmed to a vertical face by cutting the existing asphaltic concrete back for its full depth and exposing a fresh face. After placement and finishing of the new asphaltic concrete, both sides of the joint shall be dense and the joint shall be well sealed. The surface in the area of the joint shall conform to the requirements hereinafter specified for surface tolerances when tested with the straightedge placed across the joint.

322.6.8 Compaction:

(A) General Requirements:
The temperature of asphaltic concrete just prior to compaction shall be at least 135°C (275°F).

The wheels of compactors shall be wetted with water or, if necessary, soapy water to prevent mix pick-up during rolling. The ENGINEER may change the rolling procedure if in the ENGINEER'S judgment the change is necessary to prevent picking up of the asphaltic concrete.

(B) Equipment:

A minimum of three static steel wheel compactors shall be provided. The drums shall be of sufficient width that when staggered, two compactors can cover the entire width of the ribbon with one pass.

The compactors shall weigh not less than 7.25 metric tons (7.98 Tons).

The compactors shall be self-propelled and shall be operated with the drive wheel in the forward position. Vibratory rollers may be used in the static mode only. All rollers shall be equipped with pads and a watering system to prevent sticking of the asphaltic concrete mix to the steel wheels.

(C) Rolling Procedure:

Two compactors shall be used for initial breakdown and be maintained no more than 90 meters (295ft) behind the paving machine. The remaining compactor shall follow as closely behind the initial breakdown as possible. As many passes as is possible shall be made with the compactors before the temperature of the asphaltic concrete falls below 105°C (220°F).

(D) Lime Water Treatment:

An application of lime water shall be applied by the CONTRACTOR to the compacted asphalt rubber concrete surface prior to opening the roadway to traffic, or when requested by the ENGINEER to cool the pavement to prevent tracking and pick-up. The lime water solution shall be applied at the approximate rate of 1/2 gallon per square yard. The lime shall be mixed using a minimum of (1) one, (50) fifty pound bag per 3,000 gallons of water. The Cost associated with lime water application is incidental to the project.

322.6.9 Surface Requirements and Tolerances:

Asphaltic concrete shall be compacted as required, smooth and reasonably true to the required lines, grades, and dimensions.
Asphaltic concrete shall not vary more than three millimeters (.1 in) from the lower edge of a three meter (9.8 ft) straightedge when the straightedge is placed parallel to the center line of the roadway.

322.6.10 Acceptance:

Asphaltic concrete will be accepted complete in place, if, in the judgment of the ENGINEER, the asphaltic concrete reasonably conforms to the requirements specified herein. Asphaltic concrete that is not acceptable and is rejected shall be replaced to the satisfaction of the ENGINEER and at no expense to the Department.

(A) CORRECTIVE REQUIREMENTS FOR DEFICIENCIES:

(1) Thickness:

Where the pavement thickness is less than three-quarter(3/4)-inch, payment will be reduced as follows:

<table>
<thead>
<tr>
<th>Mat Thickness</th>
<th>Reduction in Payment</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; ¾&quot; but &gt; ½&quot;</td>
<td>50%</td>
</tr>
<tr>
<td>≤ 1/2 &quot;</td>
<td>No Payment, Overlay ¾&quot;</td>
</tr>
</tbody>
</table>

When the deficiency of the pavement thickness exceeds 1/4 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 width of a paving pass, with a new mat of material specified by the ENGINEER, thickness to be three-quarter(3/4)-inch. Any additional milling to blend in the new mat will be at the CONTRACTOR'S expense.

(2) Asphalt Rubber Binder:

When the binder content exceeds the limits established in these special provisions, additional nuclear or core tests, as determined by the ENGINEER, will be made for each deficient test taken, and the average of all tests taken shall be used to determine the binder content.

When the average binder content is in excess of that permitted for that day's lot, the CONTRACTOR shall remove any areas of bleeding, as directed by the
ENGINEER, and replace the affected material with new material meeting the specification requirements for the mix type involved. This shall be done any time within a period of 1 year, until the bleeding has been corrected, at no additional cost to the Contracting Agency. Should the stability of the mix be effected by the excess asphalt cement to such an extent that the pavement is displaced under normal traffic loads, within a period of 1 year, the areas affected shall be removed and replaced with new material, at no additional cost to the Contracting Agency.

When the average asphalt binder content is from 0.0 to 1.0 percent, for that day’s lot, by weight of the total mixed material, less than the minimum permitted in these specifications, payment to the CONTRACTOR for asphalt concrete pavement will be reduced as follows:

<table>
<thead>
<tr>
<th>Deviation from that Permitted</th>
<th>Payment Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 to 0.2% points</td>
<td>2%</td>
</tr>
<tr>
<td>Over 0.2% to 0.5% points</td>
<td>5%</td>
</tr>
<tr>
<td>Over 0.5% to 1.0% points</td>
<td>10%</td>
</tr>
</tbody>
</table>

When the deviation is more than 1.0 percent the CONTRACTOR shall place a micro seal over the area involved, but not for less than one City block, or 660 feet, whichever is less, at no additional cost to the Contracting Agency.

(3) Mineral Aggregate:

When the mineral aggregate gradation, or plastic index of the aggregate, 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 provide the ENGINEER with an Engineering Analysis that addresses the deficiency. The Engineering Analysis shall be prepared by a Registrant of the State of Arizona and shall discuss the potential performance of the mixture that has been placed and recommend any remedial action, if required.

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

322.7 Method of Measurement:
Asphaltic concrete will be measured by the metric ton (Ton) for the mixture actually used, which will include the weight of mineral aggregate, mineral admixture and asphalt-rubber. Measurement will include any weight used in construction of intersections, turnouts, or other miscellaneous items or surfaces.

322.8 Basis of Payment

The accepted quantities of asphaltic concrete, measured as provided above, will be paid for at the contract unit price per metric ton (Ton), which price shall be full compensation for the work, complete in place, as specified herein.

SECTION 329 - BITUMINOUS TACK COAT:
Bituminous Tack Coat shall be in accordance with Section 329, except as modified below:

Tack coat shall be grade SS-1h (diluted per Section 329.3). Tack coat application rate shall be held to a minimum to prevent it bleeding through the new overlay. Tack coat shall be applied at the rate of 0.05 to 0.10 gallons per square yard as determined by the CONTRACTOR or as requested by the ENGINEER.

Payment for this work will be made at the contract unit price bid per ton (diluted), COMPLETE-IN-PLACE, bid item 329, Tack Coat.

SECTION 345 - ADJUSTING FRAMES, COVERS, VALVE BOXES, AND WATER METER BOXES:

After installation of the overlay, all necessary adjustments shall be completed by the CONTRACTOR within the given segments being surfaced, in accordance with section 345, except as modified below:

CONTRACTOR shall be responsible for the tie-out of all water valves, manholes, etc., for locations and adjustments after the overlay. The method used shall be approved by the ENGINEER prior to starting work.

Prior to paving, CONTRACTOR shall provide to the ENGINEER, a map clearly locating manholes, valves, etc. requiring adjustment after paving. The map shall include offset and location.

CONTRACTOR shall adjust all existing frames and covers to the new pavement elevation with the possible exception of utility company manholes.

CONTRACTOR shall keep rings and covers matched and shall return them to their original locations.

CONTRACTOR shall remove all asphalt material and aggregate from all metal covers encountered within the limits of this project, resulting from this or prior
work. The method for removal of this material must be approved by the ENGINEER prior to its use. This work shall be completed prior to adjusting the frame.

**ADJUSTMENT:** Brass caps for section corners shall be adjusted at various locations according to MAG Standard Detail 120-2-E. Brass caps for subdivision corner PCs and PTs according to MAG 120-2D. Frames and covers shall be adjusted according to Standard Detail 422 or 270 and these Construction Special Provisions, except that the concrete collar shall extend up to the finished grade. Prior to pouring the concrete and setting manhole frames the excavation shall be rolled level. A 10-foot straight edge provided by the CONTRACTOR shall be used to ensure a level final placement. The frame and finished surface shall not vary more than $\pm \frac{1}{4}$ - inch from the (10') ten foot straight edge laid across the center axis of the frame and finished cover. The concrete used shall be Class AA, or equivalent, with high early strength to attain 2500 psi compressive strength in 24 hours. Mix design shall be submitted to the ENGINEER for review at the pre-construction conference.

**CONTRACTOR** shall coordinate with the ENGINEER and with representatives of the various utilities regarding the adjustment and inspection of their manholes, handholes, etc. Utility company specifications shall be adhered to for all adjustments. The CONTRACTOR shall be responsible for obtaining any additional specification requirements from utility companies.

Individual utility companies have the right to accept or reject CONTRACTOR's bid for their portion of the frame and cover adjustment. If CONTRACTOR's bid for the frame and cover adjustment is rejected, the utility company will perform their own adjustment and the bid item quantity will be adjusted accordingly. Any utility inspection costs associated with utility work will be the responsibility of the CONTRACTOR.

Southwest Gas may utilize the CONTRACTOR to adjust their manholes and valves. **CONTRACTOR** shall adhere to Southwest Gas standards and requirements and shall provide an approved schedule to Southwest Gas and notify them one (1) week prior to work required.

Salt River Project (water) structures shall be adjusted by the CONTRACTOR who shall utilize construction details provided by Salt River Project and contact their utility representative two (2) weeks prior to work being required. A company representative must be present at all times when adjusting Salt River Project (water) manholes.

Salt River Project (power) will adjust their own manholes. **CONTRACTOR** shall provide an approved schedule to Salt River Project (power) and notify them two (2) weeks prior to work being required.
Arizona Public Service Company may utilize the CONTRACTOR to adjust manholes. CONTRACTOR shall adhere to A.P.S. standards and shall provide an approved schedule to their representative one (1) week prior to work required. Manholes shall be grouted on the inside and the outside for a waterproof seal. A company representative must be present at all times when adjusting Arizona Public Service Company manholes.

U.S. West may utilize the CONTRACTOR to adjust their manholes. CONTRACTOR shall provide an approved schedule to U.S. West and contact their representative two (2) weeks prior to work being required.

CONTRACTOR shall maintain accurate records of utility adjustments in order to allow the County to recover the adjustment costs from the appropriate utility.

SECTION 401.1 TRAFFIC CONTROL:

Traffic control shall be done by CONTRACTOR, in accordance with Section 401, these Special Provisions and Maricopa County Department of Transportation’s Supplement to MAG Uniform Standard Specifications for Public Works Construction, March 1999 Edition, except as modified herein.

CONTRACTOR shall place temporary pavement markers on the newly overlaid roadway for the purpose of temporary delineation. COUNTY will use temporary pavement markers as a guide to re-stripe the road. The temporary pavement markers shall be placed daily, on the former alignment of previously existing centerline striping, on the area paved. CONTRACTOR shall be responsible to ensure accurate placement of the temporary pavement markers. All temporary pavement markers shall conform to the latest edition of the ADOT Standard Specification for Road and Bridge Construction Section 701-2.08. CONTRACTOR shall ensure that the markers are uniform in color to the existing striping color they are replacing. On roads with existing striping CONTRACTOR shall place the temporary pavement markers at the following locations at the specified spacing:

- (40’) forty foot maximum spacing on all locations in Sun City
- (30’) thirty foot maximum spacing on all other roads.

401.7 - PAYMENT:

Payment for ITEM 401-1 Traffic Control, will be made at the lump sum bid price for the item.

Payment for ITEM 401-2 Uniformed Off-Duty Law Enforcement Officer, will be based on approved time sheets or invoices in an amount not-to-exceed $__________, as shown on the Bidding Schedule, for all actual hours provided an Uniformed Off-Duty Law Enforcement Officer for
traffic control purposes at the request and with the approval of the County. Expenses, eligible for reimbursement, are labor costs, supported by approved time sheets or invoices and documented expenses such as taxes or bond costs charged to CONTRACTOR in connection with the Uniformed Off-Duty Law Enforcement Officer assignment. No additional mark-up for profit and/or fee for CONTRACTOR will be eligible for reimbursement.

SECTION 405- MONUMENTS:

New construction of survey monuments shall be in accordance with section 405, except as modified below:

ENGINEER will tie-out and reference corners and mark monuments after construction. Brass caps for section corners shall be new construction at various locations according to MAG Standard Detail 120-2-E. Brass caps for subdivision corner PCs and PTs according to MAG 120-2D. Payment for new survey monument construction will be made at the unit price for ITEM 405, NEW SURVEY MONUMENTS, which price shall be full compensation for the work, including labor, materials, traffic control devices, and miscellaneous incidentals, necessary to complete the work.

Brass caps for section corners shall be adjusted at various locations according to MAG Standard Detail 120-2-E. Brass caps for subdivision corner PCs and PTs according to MAG 120-2D. Frames and covers shall be adjusted according to Standard Detail 422 or 270 and these Construction Special Provisions, except that the concrete collar shall extend up to the finished grade. Prior to pouring the concrete and setting manhole frames the excavation shall be rolled level. A 10-foot straight edge provided by the CONTRACTOR shall be used to ensure a level final placement. The frame and finished surface shall not vary more than ± 1/4 - inch from the (10') ten foot straight edge laid across the center axis of the frame and finished cover. The concrete used shall be Class AA, or equivalent, with high early strength to attain 2500 psi compressive strength in 24 hours. Mix design shall be submitted to the ENGINEER for review at the pre-construction conference.

SECTION 717 ASPHALT-RUBBER:

Replace all of Section 717 of the Standard Specifications with the following:

717.1 Description:

The work under this section shall consist of furnishing, proportioning and mixing all the ingredients necessary to produce an asphalt-rubber material.

717.2 Materials:

717.2.1 Asphalt-Rubber:
(A) Asphalt Cement:

Asphalt cement shall conform to the requirements of Section 1005.

(B) Rubber:

Rubber shall meet the following gradation requirements when tested in accordance with Arizona Test Method 714.

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Type A Passing</th>
<th>Type B Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.36 mm (#8)</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>2.00 mm (#10)</td>
<td>95-100</td>
<td>100</td>
</tr>
<tr>
<td>1.18 mm (#16)</td>
<td>0-10</td>
<td>65-100</td>
</tr>
<tr>
<td>600 m (#30)</td>
<td>20-100</td>
<td></td>
</tr>
<tr>
<td>300 m (#50)</td>
<td>0-45</td>
<td></td>
</tr>
<tr>
<td>75 m (#200)</td>
<td>0-5</td>
<td></td>
</tr>
</tbody>
</table>

The rubber shall have a specific gravity of 1.15 ± 0.05 and shall be free of wire or other contaminating materials, except that Type A rubber shall contain not more than 0.1 percent fabric and Type B shall contain not more than 0.5 percent fabric. Calcium carbonate, up to four percent by weight of the granulated rubber, may be added to prevent the particles from sticking together.

Certificates of Compliance conforming to Subsection 106.05 shall be submitted. In addition, the Certificates shall confirm that the rubber is a crumb rubber, derived from processing whole scrap tires or shredded tire materials; and the tires from which the crumb rubber is produced is taken from automobiles, trucks, or other equipment owned and operated in the United States. The Certificates shall also verify that the processing does not produce, as a waste product, casings or other round tire material that can hold water when stored or disposed of above the ground.

717.2.2 Asphalt-Rubber Proportions:

The asphalt-rubber shall contain a minimum of 20 percent ground rubber by the weight of the asphalt cement.

717.2.3 Asphalt-Rubber Properties:

Asphalt-rubber shall conform to the following:

<table>
<thead>
<tr>
<th>Property</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Type 1</td>
</tr>
</tbody>
</table>

Work Order No. 11920-21
<table>
<thead>
<tr>
<th>Grade of base asphalt cement</th>
<th>PG 64-16</th>
<th>PG 58-22</th>
<th>PG 52-28</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rotational Viscosity*; 177°C (351°F); Pascal seconds (cps)</td>
<td>1.5-4.0 (1500-4000)</td>
<td>1.5-4.0 (1500-4000)</td>
<td>1.5-4.0 (1500-4000)</td>
</tr>
<tr>
<td>Penetration; 4°C (39°F), 200g, 60 sec. (ASTM D 5); dmm (in), min</td>
<td>10 (0.04)</td>
<td>15 (0.06)</td>
<td>25 (0.10)</td>
</tr>
<tr>
<td>Softening Point; (ASTM D 36); °C (°F), min.</td>
<td>57 (135)</td>
<td>54 (129)</td>
<td>52 (126)</td>
</tr>
<tr>
<td>Resilience; 25°C (77°F) (ASTM D 3407); %, min</td>
<td>30</td>
<td>25</td>
<td>15</td>
</tr>
</tbody>
</table>

* The Viscometer used must be a Haake Viscometer, Model VT – 04, Rotor No. 1

**717.2.4 Asphalt-Rubber Design:**
At least two weeks prior to the use of asphalt-rubber, the CONTRACTOR shall submit an asphalt-rubber design prepared by an approved laboratory. Such design shall meet the requirements specified herein. The design shall show the values obtained from the required tests, along with the following information: percent, grade and source of the asphalt cement used; and percent, gradation and source(s) of rubber used.

**717.3 Construction Requirements:**

**717.3.1 Mixing of Asphalt-Rubber:**

The temperature of the asphalt-cement shall be between 177°C (351°F) and 204°C (399°F) at the time of addition of the ground rubber. No agglomerations of rubber particles in excess of 50 millimeters in the least dimension shall be allowed in the mixing chamber. The ground rubber and asphalt-cement shall be accurately proportioned in accordance with the design and thoroughly mixed prior to the beginning of the one-hour reaction period. The CONTRACTOR shall document that the proportions are accurate and that the rubber has been uniformly incorporated into the mixture. Additionally, the CONTRACTOR shall demonstrate that the rubber particles have been thoroughly mixed such that they have been “wetted.” The occurrence of rubber floating on the surface of agglomerations of rubber particles shall be evidence of insufficient mixing. The temperature of the asphalt-rubber immediately after mixing shall be between 163°C (325°F) and 191°C (376°F). The asphalt-rubber shall be maintained at such temperature for one hour before being used.

Prior to use, the viscosity of the asphalt-rubber shall be tested by the use of a rotational viscometer, which is to be furnished by the CONTRACTOR or supplier.

**717.3.2 Handling of Asphalt-Rubber:**
Once the asphalt-rubber has been mixed, it shall be kept thoroughly agitated during periods of use to prevent settling of the rubber particles. During the production of asphaltic concrete, the temperature of the asphalt-rubber shall be maintained between 163°C (325°F) and 191°C (376°F). However, in no case shall the asphalt-rubber held for more than 10 hours be allowed to cool and gradually reheated to a temperature between 163°C (325°F) and 191°C (376°F) before use. The cooling and reheating shall not be allowed more than once. Asphalt-rubber shall not be held at temperatures above 121°C (250°F) for more than four days.

For each load or batch of asphalt-rubber, the CONTRACTOR shall provide the ENGINEER with the following documentation:

(A) The source, grade, amount and temperature of the asphalt cement prior to the addition of rubber.

(B) The source and amount of rubber and the rubber content expressed as percent by the weight of the asphalt cement.

(C) Times and dates of the rubber additions and resultant viscosity test.

(D) A record of the temperature, with time and date reference for each load or batch. The record shall begin at the time of the addition of rubber and continue until the load or batch is completely used. Readings and recordings shall be made at every temperature change in excess of 11°C (52°F), and as needed to document other events which are significant to batch use and quality.

717.4 Method of Measurement:

Asphalt-rubber material will be included in the cost of SECTION 322 - ASPHALTIC CONCRETE FRICTION COURSE (ASPHALT-RUBBER):

(END OF CONSTRUCTION SPECIFICATIONS)