

**JOB ORDER CONTRACT BETWEEN
CITY OF BUCKEYE
AND
SUNLAND ASPHALT**

Contract Number: 2014-006

This JOB ORDER CONTRACT FOR STREET MAINTENANCE (the "Contract") is made and entered into by and between the City of Buckeye, an Arizona municipal corporation (the "City") and Sunland, Inc. – Asphalt & Sealcoating, DBA Sunland Asphalt, an Arizona Corporation (the Contractor). This Contract is for street maintenance as described in Exhibit A and issued as required by award of individual Delivery Orders (the "Project").

NOW, THEREFORE, in consideration of the mutual promises, covenants and agreements stated herein, and for other good and valuable consideration, the sufficiency of which is hereby acknowledged, the City of Buckeye and Job Order Contractor agree as follows:

**ARTICLE 1
CONTRACT TERM**

1. This Contract has a base period of one (1) year and four option periods of one (1) year each that may be exercised if it is in the best interest of City to do so. Any exercise of any option to renew this Contract beyond the base period will only be effective upon written notice from the City.
2. The Contract Time for each Delivery Order shall start with the Notice to Proceed (NTP) and end with Final Acceptance, as set forth below. The Notice to Proceed will not be issued until prior approval and acceptance by City of the Delivery Order.
3. The Contract Time is identified in the Delivery Order as the Contract Duration in terms of calendar days. Contractor agrees that it will commence performance of the Work after receiving an official NTP letter and complete the Project through both Substantial Completion (if applicable) and Final Completion within the Contract Time
4. Time is of the Essence of this Contract, and each Delivery Order issued hereunder, for each Project, and for each phase and/or designed Milestone thereof.
5. Failure on the part of Contractor to adhere to the approved Project Schedule will be deemed a material breach and sufficient grounds for termination of a specific Delivery Order and/or this Contract by City. The City will assess liquidated damages as described in each Delivery Order.

ARTICLE 2
OVERVIEW OF DELIVERY ORDER CONTRACTING UNDER THIS CONTRACT

1. This Contract establishes an indefinite delivery, indefinite quantity, Delivery Order Contract for such Construction services within the scope of this Contract as City may request from time to time by issuance of an individual Delivery Order for each Project. Unless otherwise specified in a specific Delivery Order, Delivery Orders generally will not include Design Services and that where Design Services are necessary, City will provide them under separate contract. There will be a separate Delivery Order for each Project that will describe the Work to be provided by Contractor for that Project. There may be multiple Projects and therefore multiple Delivery Orders under this Contract.

2. The amount to be paid by the City for the Project under each Delivery Order is the Contract Price for that Delivery Order. The Delivery Order price will include a total amount for each Delivery Order priced for the Work described for that Delivery Order. The Contract Price for any Delivery Order will be established as a Firm Fixed Price, subject to the following:

(a) The Contract Price for each Delivery Order shall not exceed \$1,000,000.00 [may be higher if approved via Council Action], including any Change Orders. Therefore, to allow for any potential Change Orders, the maximum initial amount of each Delivery Order will normally not exceed \$1,000,000.00. The expectation for this Contract is that the majority of Delivery Orders will be less than \$100,000.00.

(b) The cumulative sum of all Delivery Orders performed by the Contractor during any twelve (12) month term shall not exceed \$1,000,000.00 (unless otherwise approved by the City Council).

(c) There is no limit on the number of Delivery Orders that City may issue to the Contractor during any twelve (12) month term of this Contract or during the entire period this Contract is in effect.

(d) Contractor may not refuse any Delivery Order under this Contract properly issued by City, unless Contractor legitimately claims in writing that the scope of work is poorly defined or hazardous to health or safety.

3. City shall have the right to perform work of the types included in this Contract itself or to have other Contractors perform such work. In addition, as to any Delivery Order, City may elect to have Design Services provided by City's internal consultants or by independent Design Professionals. Such action by City shall not be a breach or otherwise violate the Contract Documents.

4. This Contract does not obligate or require City to offer any Delivery Order to Contractor, no Contract in relation to any specific Work being entered into until a Delivery Order therefore has been fully executed by City and Contractor.

5. This Contract is for a broad range of street maintenance, repair and minor construction work within the planning area of the City of Buckeye. The scope of this Contract will be to provide construction services, including the possibilities of design services, for a broad range of City Street maintenance and construction projects described in Exhibit A of this contract.

6. During the Term of this Contract, City will issue an individual Delivery Order request for proposal to Contractor for each Project. Each Delivery Order will have specific instruction concerning that Delivery Order. The Contractor will follow these specific instructions when preparing a response in the form of a Delivery Order Proposal.

7. The general steps for development of a Delivery Order are:

(a) When City identifies a need for performance of a Project under a Delivery Order; City will issue an RFP to Contractor and also advise Contractor of the nature of the Work to be done. At the same time, City will advise the Contractor if Design Services are required and how those services will be provided. Within two (2) working days of receipt of this notification, Contractor will:

- (i) Visit the proposed site of the Project with City designated representatives; and,
- (ii) Arrange with City to further define the scope of the needed Project.

Contractor shall thoroughly acquaint itself with all available information concerning the conditions of the Work under each Delivery Order and is responsible for correctly and fully estimating the difficulty of performing the Work, the actions required to perform the Work and the cost of successfully performing the Work under each Delivery Order.

(b) City may arrange for any needed Design Services to produce the Drawings and Specifications. Design Services will not begin until the scope of Design Services is approved by City. The Drawings and Specifications developed by the Design Services are subject to approval by City. If there are no Design Services, City will develop Drawings and Specifications consisting of a line drawing and a written description of the contemplated Work.

(c) Upon establishment of the scope of the needed Project, Contractor will prepare its proposal for accomplishment of the Project.

8. Upon award of a Delivery Order, a signed copy of the Delivery Order will be mailed or electronically forwarded to Contractor. Failure by Contractor to pick up or receive the mailed or electronic orders shall not relieve Contractor from the obligation to complete the Work under the Delivery Order in accordance with the terms of this contract or the terms of each Delivery Order.

9. City may provide a verbal Notice to Proceed (NTP) for the Work in advance of issuing the formal NTP letter (which will be followed up with a written NTP). Normally, NTP will be issued

under separate cover from the Delivery Order. The Contract duration starts with the date on the NTP letter.

ARTICLE 3 DEFINITIONS

“Addenda” written or graphic instruments issued prior to the submittal of the Proposal(s), which clarify, correct or change the Proposal(s) requirements.

“Agreement” means the executed agreement between City and Contractor.

“Change Order” means a written instrument issued after execution of a Delivery Order or this JOC Contract signed by City and the Contractor, stating their agreement upon all of the following: the scope of the change in the Work; the amount of the adjustment to the Contract Price; and the extent of the adjustment to the Contract Time(s).

“City” means the City of Buckeye, a municipal corporation, with whom Contractor has entered into this Contract and for whom the services is to be provided pursuant to said Contract.

“City’s Project Criteria” means information developed by or for the City to describe City’s program requirements and objectives for the Project, including use, space, price, time, site and expandability requirements, as well as submittal requirements and other requirements governing Contractor’s performance of the Work. City’s Project Criteria may include conceptual documents, design criteria, performance requirements and other Project-specific technical materials and requirements.

“City’s Representative” means the person designated within this contract.

“Commissioning” means the process for achieving, validating and documenting the performance of the Project including any works and its systems to meet the design needs and requirements of the City.

“Construction Documents” means the plans, specifications and drawings prepared by the Contractor or a Consultant.

“Construction Drawings” means the detailed drawings approved as part of the approved Construction Documents.

“Contract Documents” means the following items and documents in descending order of precedence: (i) all written modifications, amendments and Change Orders to this Contract; (ii) this Contract, including all exhibits and attachments, executed by City and Contractor to include each Delivery Order; (iii) written supplementary conditions; (iv) Construction Documents prepared and approved; (v) Contractor’s approved Variations of the City’s Project Criteria, as contained in Exhibit A.; (vi) City’s Project Criteria; (vii) Contractor’s Proposal(s),

except for accepted Variations of the City's Project Criteria, submitted in response to City's Project Criteria.

"Contract Price" means the amount or amounts set forth in each awarded Delivery Order subject to adjustment in accordance with this Contract.

"Contract Time" means the Days set forth in each awarded Delivery Order subject to adjustment in accordance with this Contract.

"Day(s)" means calendar days unless otherwise specifically noted in the Contract Documents.

"Deliverables" means the work products prepared by the Contractor in performing the scope of work described in each Delivery Order.

"Design Services" means all professional services to be performed or procured by the Contractor or by City to provide required Project design under this Contract and any subsequent amendments.

"Job Order Contractor" means the firm, corporation, or other approved legal entity with whom the City has entered into this Contract to provide services as detailed in this Contract. The term Contractor may be used to identify the Job Order Contractor.

"Differing Site Conditions" means concealed or latent physical conditions or subsurface conditions at the Site that, (i) materially differ from the conditions indicated in the Scope of Work issued with each Delivery Order or (ii) are of an unusual nature, differing materially from the conditions ordinarily encountered and generally recognized as inherent in the Work.

"Final Acceptance" means the completion of the Project as prescribed in Article 10.

"Float" means the number of Days by which an activity can be delayed without lengthening the Critical Path and extending the Substantial Completion date.

"Legal Requirements" means all applicable federal, state and local laws, codes, ordinances, rules, regulations, orders and decrees of any government or quasi-government entity having jurisdiction over the Project or Site, the practices involved in the Project or Site, or any Work.

"Notice to Proceed" or "NTP" means the directive issued by the City, authorizing the Contractor to start Work or a portion of the work.

"Payment Request" means the City form used by the Contractor to request payment for Work performed.

“Product Data” means illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

“Project” means the Work to be completed in the execution of any awarded Delivery Order and as amended and as prescribed as any Scope of Work in identified in each awarded Delivery Order. Project means the Work associated with each awarded Delivery Order issued under this JOC Contract.

“Project Schedule” means a schedule as prescribed in this Contract or subsequent Delivery Orders.

“Project Record Documents” means the documents created pursuant to Article 12.

“Samples” means physical examples which illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

“Schedule of Values (SOV)”, means the Document specified in the construction phase, which divides the Contract Price into pay items, such that the sum of all pay items equals the awarded Delivery Order Price for the Work, or for any portion of the Work having a separate specified Contract Price.

“Shop Drawings” mean drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

“Scheduled Substantial Completion Date” means the calendar date equal to the Notice to Proceed date established plus the number of Days established in each Delivery Order.

“Site” means the land or locations on which the Project is located, as more particularly described in the Delivery Order.

“Subcontractor” or “Subconsultant” means any person or entity retained by Contractor as an independent contractor to perform a portion of the Work and shall include material, men and suppliers.

“Substantial Completion” means the date on which the Work, or an agreed upon portion of the Work, is sufficiently complete so that City can occupy and use the Project or a portion thereof for its intended purposes.

“Technical Consultant” means an agent of the City who furnishes project management assistance (if applicable to a Delivery Order).

“Variations of the City’s Project Criteria” means agreed changes to the City’s Project Criteria by both Parties.

“Work” means any design and construction services, including procuring and furnishing materials, equipment, services, Commissioning and labor reasonably inferable from the Construction Documents.

ARTICLE 4 DESIGN PHASE AND DESIGN SERVICES

1. Costs for Preconstruction services will be included in Contractor’s firm fixed price cost proposal.
2. Contractor may also be required to provide incidental Design Services for all or a portion of the Work to be constructed under a specific Delivery Order. If consulting services for design and the preparation of Plans and Specifications are required; they will be paid for as a separate line item in the Contractor’s price proposal. Normally the City will obtain design services from a consultant or prepare design documents using City staff.

ARTICLE 5 CONSTRUCTION SERVICES

1. JOC Contractor shall perform all Work necessary to construct the Project in accordance with this Contract and the specifications outlined in each Delivery Order, and to render the Project and all its components operational and functionally and legally usable for their intended purpose.
2. The term "Work" shall mean whatever is done by or required of Contractor to perform and complete its duties relating to the construction of each Delivery Order under the Contract, including, without limitation, the following:
 - (a) Construction of the whole and all parts of the Project in full and strict conformity with each Delivery Order;
 - (b) The provision and furnishing, and prompt payment therefore, of all labor, supervision, services, materials, supplies, equipment, fixtures, appliances, facilities, tools, transportation, storage, power, fuel, heat, light, cooling, other utilities and things required for the construction of each Delivery Order;
 - (c) The procurement and furnishing of all necessary permits and other permits required for the construction of each Delivery Order;
 - (d) The creation and submission to City of detailed as-built drawings depicting all as-built construction;

(e) The furnishing of any required surety bonds and insurance as may be required by each Delivery Order;

(f) The furnishing of all equipment and product warranties, manuals, test results and user guides required by each Delivery Order or otherwise reasonably available to Contractor;

(g) The furnishing of all other services and things required or reasonably inferable from the Contract Documents, including the provisions of Article 6 below.

ARTICLE 6

TIME FOR CONSTRUCTION: THE CONTRACT TIME

1. After City has awarded each Delivery Order, City shall issue a notice to proceed (NTP) the Work directing Contractor to proceed with the Work on the date indicated in the notice (the "Commencement Date"). The notice to commence Work shall be issued at least ten (10) days prior to the Commencement Date.

2. Contractor shall commence the Work on the Commencement Date, and the Work shall be carried out regularly and without interruption. Contractor shall substantially complete the Work no later than the date established in each Delivery Order or such other date as may be issued by a Change Order (the "Scheduled Completion Date"). The number of calendar days between the effective date of the Contract and the Scheduled Completion Date is the "Contract Time". Contractor shall achieve Final Completion of the Work no later than thirty (30) calendar days after achieving Substantial Completion.

3. Contractor understands that if Substantial Completion for entire project is not attained by the Scheduled Substantial Completion date, City will suffer damages which are difficult to determine and accurately specify. Contractor agrees that if Substantial Completion is not attained by the Scheduled Substantial Completion Date, Contractor shall pay City the amount established in each Delivery Order as liquidated damages for each day that Substantial completion extends beyond the Scheduled Substantial Completion Date.

4. All limitations of time set forth in each Delivery Order are material and time is of the essence of each Delivery Order.

ARTICLE 7

ADDITIONAL DUTIES AND RESPONSIBILITIES OF CONTRACTOR

1. The intent of this Contract is to require complete, correct and timely execution of all Delivery Orders awarded for the Construction Work. Any and all Construction Work that may be required reasonably implied or reasonably inferred by each Delivery Order as necessary to

produce the intended result shall be provided by Contractor for the Construction Price as provided in each awarded Delivery Order.

2. All Construction Work performed by Contractor shall be in strict compliance with each Delivery Order. "Substantial Compliance" is not strict compliance. Any Construction Work not in strict compliance with each Delivery Order is defective.

3. The Construction Work shall be strictly supervised and directed using Contractors best and highest skill and effort. Contractor shall bear full responsibility for any and all acts or omissions of those engaged in the Construction Work on behalf of the Contractor.

4. Contractor warrants and guarantees to City that all labor furnished to perform the Construction Work under each Delivery Order will be competent to perform the tasks undertaken and is the best quality obtainable, that the product of such labor will yield only superior results in strict compliance with the requirements of each Delivery Order, that materials and equipment furnished will be of high quality and new unless otherwise permitted by the Delivery Order, and that the Construction Work will be of high quality, free from faults and defects and in strict conformance with the requirements found in each Delivery Order. Any and all Construction Work not strictly conforming to these requirements shall be considered defective and shall constitute a breach of Contractor's warranty.

5. Special or specific guarantees and warranties which are required by each Delivery Order to run for a fixed period of time shall commence running on the date of Substantial Completion of all Construction Work. In general, Contractor warrants all work, including labor and materials, for a period of two (2) years from the date of Substantial Completion, unless otherwise specified in the Delivery Order.

6. Contractor, within fifteen (15) days after the Commencement Date, shall submit to the Manager of Construction and Contracting for his information, and shall comply with, Contractor's Schedule of Construction for each Delivery Order awarded. The Schedule of Construction shall reflect the performance of all Construction Work on weekdays and non-holidays. The Schedule of Construction shall be a detailed critical path (CPM) schedule in a form acceptable to City. The Schedule of Construction shall be revised at least monthly and shall be revised to reflect conditions encountered from time to time and shall be related to the entire Project awarded as a Delivery Order. Each such revision shall be furnished to the City. Strict compliance with the requirements of this Paragraph shall be a condition precedent for payment to Contractor, and failure to strictly comply with this requirement shall constitute a material breach of the Contract. No claim for an increase in the Construction Price shall be allowed as a result of Contractor basing the Construction Price upon an early completion schedule, or as a result of delays and costs attributable to completion later than the planned early completion date.

7. Contractor shall continuously maintain at the site, for the benefit of City, an updated copy of the awarded Delivery Order, including one record copy of the Delivery Order Documents marked to record on a current basis changes, selections and modifications made during construction. Additionally, Contractor shall maintain at the site, for the benefit of City, a copy of all Shop Drawings, Product Data, Samples, and other Submittals, if specified in the awarded Delivery Order. Upon Final Completion of the Construction Work, or upon the City's request, all of the documents described in this Paragraph shall be finally updated and delivered to City and shall become the property of the City.

8. Contractor shall review, study, and approve, or take other necessary action upon all Shop Drawings, Product Data, Samples, and other Submittals to ensure that each Delivery Order will be constructed in a timely fashion in strict compliance with the requirements of the Contract and Delivery Order. No deviation from, substitution for, or other modification from the Documents shall be allowed by Contractor in a shop drawing or submittal without written approval, in the form of a Change Order, from City. Contractor shall engage in prompt and adequate review of Shop Drawing and other Submittals to maintain the Construction Schedule; Contractor also warrants it will use its best independent professional judgment in its review to determine compliance with the Contract Documents.

9. City shall also, in its discretion, have the right to review and approve Submittals, and if City so elects, Contractor shall not perform any portion of the Construction Work as to which the City has required submittal and review until such Submittal has been approved by the City. Approval by the City, however, shall not be evidence that Construction Work installed pursuant to the City's approval conforms with the requirements of the Contract nor shall such approvals relieve Contractor of any of its responsibilities or warranties under the Contract. If City elects to review Submittals, Contractor shall maintain a Submittal log which shall include, at a minimum, the date of each Submittal, the date of any resubmittal, the date of any approval or rejection, and the reason for any approval or rejection. Contractor shall have the duty to carefully review, inspect and examine any and all Submittals before submission of same to City. Shop Drawings and other Submittals from Contractor do not constitute a part of this Contract.

10. Contractor shall procure from all Subcontractors and Suppliers and shall transmit to the City, all warranties required by the Contract. Contractor shall review all such warranties and shall certify to City that the warranties are in strict compliance with the requirements of the Contract.

11. Contractor shall prepare or procure and shall transmit to the City all documentation required by this Contract regarding the operation and recommended maintenance programs relating to the various elements of the Construction Work.

12. If required in the Delivery Order, Contractor shall prepare and provide to the City a complete set of all as-built drawings which shall be complete and, except as specifically noted,

shall reflect performance of the Construction Work in strict compliance with the requirements of this Contract.

13. Contractor shall assume all labor responsibility for all personnel assigned to or contracted for the performance of the Construction Work and agrees to strictly comply with all its obligations as employer with respect to said personnel under all applicable labor laws.

14. Contractor shall be responsible for procuring all tests and inspections required by sound professional practices and by governmental authorities having jurisdiction over the Project. Contractor shall submit certified results of such tests to City. If the laws, ordinances, rules, regulations or orders of any public authority having jurisdiction require any Construction Work to be specifically inspected, tested, or approved, Contractor shall assume full responsibility therefore, pay all costs in connection therewith and furnish to City the required certificates of inspection, testing or approval.

15. Contractor shall, during the course of the Construction Work, comply with any regulations or guidelines prescribed by City. Contractor warrants that it will comply with all public laws, ordinances, rules and regulations applicable to the services to be performed under the Contract, including without limitation, those relating to the terms and conditions of the employment of any person by Contractor in connection with the Construction Work to be performed under the Contract.

16. Contractor shall perform the Construction Work in accordance with all construction codes, laws, ordinances or regulations applicable to the design and execution of the Construction Work. Any fine or penalty which may be imposed as consequence of any violation of this provision shall be paid by Contractor, and Contractor, to the fullest extent permitted by the law, shall fully defend, indemnify and hold City harmless for, from and against all loss, damage, and expense, including attorney's fees, resulting from any such violation or alleged violation of codes, laws, ordinances, or regulations, regardless of a concurrent contribution by City, through negligence or other wrongful act, to such loss, damage, or expense, except that such indemnity shall not apply if the violation is solely and directly caused by a negligent or willful act or omission of City, its officers, agents, or employees.

17. All construction and building permits, licenses and authorizations necessary for the construction of the Project shall be secured and paid for by Contractor. Contractor shall notify the City when it has received said permits, licenses, and authorizations, and upon receipt shall supply the City with copies of same. The originals of permits, licenses and authorizations shall be delivered to the City upon completion of the Construction Work, and receipt of these documents by City shall be a condition precedent to final payment. Contractor shall also give and maintain any and all notices required by applicable laws pertaining to the construction of the Construction Work.

18. While on City's property, all Contractor's employees and Subcontractors shall confine themselves to areas designated by the City and will be subject to City's badge and pass requirements, if any, in effect at the site of the Construction Work.

19. Contractor shall take all reasonable steps and legally required measures at the site to comply with applicable safety regulations and standards and to adequately protect the Construction Work, stored materials, and temporary structures located on the premises, and to prevent unauthorized persons from entering upon the site. Contractor shall at all times safeguard City's property and employees from injury or loss in connection with the performance of the Contract. Contractor shall at all times safeguard and protect its own partially or completely finished Construction Work and that of the adjacent property and all adjacent construction Work from damage. Contractor shall protect City's equipment, apparatus, machinery, and other property and all adjacent construction Work with boarding and other safeguards so as to keep the premises free from dampness, dirt, dust, or other damage and shall remove all such temporary protection upon completion of the Construction Work.

20. Unless otherwise instructed by City, Contractor shall repair and return to original condition all buildings, streets, curbs, sidewalks, utilities or other facilities affected by Contractor's performance of the Construction Work.

21. Contractor shall keep the site reasonably clean during performance of the Construction Work. Upon Final Completion of the Construction Work, Contractor shall thoroughly clean the site and the Project and remove all waste, debris, trash and excess materials or equipment, together with Contractor's property therefrom.

22. At all times relevant to the Contract, Contractor shall provide access to the Construction Work to City and its designees without formality or other procedure.

23. The City's decisions in matters relating to aesthetic standards and effect shall be final.

24. In performing both Design Services and Construction Work under this Contract, the relationship between City and Contractor is that of independent contractor, and the execution of this Contract does not change the independent status of Contractor. Contractor shall exercise independent judgment in performing its duties under this Contract and is solely responsible for setting working hours, scheduling or prioritizing the Contract work flow and determining how all Contract work is to be performed. No term or provision of this Contract or act of Contractor in the performance of this Contract shall be construed as making Contractor the agent, servant or employee of City, or making Contractor or any of its employees eligible for the fringe benefits, such as retirement, insurance and worker's compensation, which City provides its employees.

ARTICLE 8 CONTRACT PRICE

1. City shall pay, and Contractor shall accept, as full and complete payment for all work associated with each Delivery Order the amount approved and awarded to the Contractor as a Delivery Order. Each Delivery Order will be a separate contract under this blanket JOC Contract. The general terms and conditions will be established by this contract and special contract provisions will be established within each Delivery Order.

2. Delivery Order Construction Price, unless changed by Supplemental Agreement or Change Order, represents the absolute limit of obligation or liability that City may ever have insofar as the cost for full and final completion of the Construction Work, and the total of all payments to Contractor or its Subcontractors are concerned. Should additional amounts be required to be expended, over and above a Delivery Order Construction Price, to achieve completion of the Construction Work, including Project construction, and payment to Contractor, in accordance with this Contract and any Special Provisions included in each awarded Delivery Order, liability for and payment of such additional amounts shall be the sole responsibility of Contractor and its Contract Surety herein, and City shall never be liable for same.

3. In addition to the Construction Work Contractor will perform, it will also provide all the usual and necessary traditional construction management services incident to construction projects of the nature and scope of this Project, for which the Management Fee described in this Contract is paid. The services required are not intended in any manner to diminish the overall responsibility of Contractor for the full and final completion of the Construction Work within the time and cost constraints specified in this Contract.

4. City agrees to pay Contractor for the Cost of the Construction Work as defined in each Delivery Order, subject to submission by Contractor of all backup substantiation as may be reasonably required by the City. In no event shall the sum of payments for the Cost of the Construction Work and any other Contractor compensation exceed the Construction Price, as adjusted by Change Order. The term "Cost of the Construction Work" shall be defined in each Delivery Order and be established as a Firm-Fixed Price Contract.

ARTICLE 9 PAYMENT OF THE CONTRACT PRICE

1. Payments of the Contract Price will be made monthly as Work progresses. Payment Applications, covering labor, material, equipment, supplies, and other items completed, delivered or suitably stored on site during a period ending on the last calendar day of each month, shall be submitted to the City by the Contractor on the current edition of AIA Documents G702 and G703, within five (5) days after end of the period. Payment Applications shall be notarized shall be supported by such data substantiating the Contractor's right to

payment as the City may require, and reflect retainage, if any, as is provided. All payments shall be subject to any offset or retainage provisions of the Contract.

2. Each payment made to the Contractor shall be on account of the total amount payable to the Contractor, and title to all Work covered by a paid partial payment shall thereupon pass to the City. Nothing in this section shall be construed as relieving the Contractor from the sole responsibility for care and protection of materials and Work upon which payments have been made, for restoration of any damaged Work, or as a waiver of the right of the City to require fulfillment of all terms of Contract Documents.

3. The City, within seven (7) days after receipt of the Payment Application, will either issue a Certificate for Payment for such amount as is properly due or issue written notice of the reasons for withholding such a certificate.

4. The issuance of a Certificate for Payment will constitute a representation by the City, observations at the site and the data comprising the Application for Payment, that the Work is in accordance with the Contract Documents (subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to the results of any subsequent tests required by or performed under the Contract Documents, to minor deviations from the Contract Documents correctable prior to completion, and to any specific qualifications stated in his certificate); and that the Contractor is entitled to payment in the amount certified.

5. Payment may be withheld in whole or in part to protect the City on account of:

- (a) Unsatisfactory job progress as determined by the City.
- (b) Defective Work or materials not remedied.
- (c) Disputed Work or materials.
- (d) Claims or other encumbrances filed or reasonable evidence indicating probable filing of claims or other encumbrances by Subcontractors or Suppliers, or others.
- (e) Failure of the Contractor to make payment to Subcontractors or Suppliers within seven (7) days after receipt of each progress payment.
- (f) A reasonable doubt as determined by the City that the Work can be completed for the unpaid balance of the Contract Price or within the Contract Time.
- (g) The Contractor's failure to perform any of its contractual obligations under the Contractor Documents, or any other Contract with the City.
- (h) Deficiencies or claims asserted by City against Contractor arising from any other project. Within fourteen (14) days following the receipt of the Certificate of Payment, the City shall pay to the Contractor 90% of the value of the Work in place and materials suitably stored at the site. The remaining 10% shall be retained by the City until the Contract is 50% completed at which time the retainage shall be reduced to 5%; provided that: (a) the Contractor is making satisfactory progress on the Contract; and (b) in the City's sole judgment, there is no specific cause or claim requiring a greater amount than 5% to be retained. Thereafter, the City shall pay the Contractor 95% of the value of the Work, unless and until it determines satisfactory progress is not being made, at which time the 10% retainage may be reinstated. Such 10%

reinstatement would be 10% of the total contract value of Work in place and materials stored. The City's sole judgment concerning the satisfactory progress of the Work shall be final.

6. Within sixty (60) days after the issuance of the Certificate of Final Completion by the City and receipt of all other documents required by the Contract, all retained amounts shall be paid to Contractor as part of Final Payment:

(a) The Final Payment shall not become due until the Contractor delivers to the City full and final unconditional releases from Subcontractors and major Suppliers acknowledging payment in full. Any claim filed thereafter shall be the responsibility of the Contractor.

(b) If any claim remains unsatisfied after all payments are made, the Contractor shall immediately upon demand refund to the City all monies that the latter may be compelled to pay in discharging such claim including all costs, interest and attorneys' fees.

7. If any payment of the Contract Price is not made within thirty (30) days and without just cause, interest shall thereafter accrue on the unpaid principal balance at the minimum rate allowed by state law (A.R.S. § 44-1201) on the due date.

ARTICLE 10 SUBSTANTIAL AND FINAL COMPLETION

1. "Substantial Completion" means that stage in the progression of the Construction Work, as approved by City in writing, when the Project is sufficiently complete in accordance with the Contract that City can enjoy beneficial use or occupancy of the entire Project and can utilize it for all of its intended purposes. A condition precedent to Substantial Completion is the receipt by City of all necessary authorizations for the use of the Project required by any governmental or regulatory authority. City reserves the right to use any part, phase or system of the Project when such part, phase or system is substantially completed, but such partial use of the Project shall not result in the Project being deemed substantially complete, and such partial use shall not be evidence of Substantial Completion.

2. When Contractor believes that the Construction Work is substantially complete, Contractor shall notify the City in writing and shall submit to City a list of items remaining to be completed or corrected. The City, the City's designee, (or an independent consultant hired by City) will perform an inspection. If the Construction Work is substantially complete, in the sole opinion of City, City will prepare a Certificate of Substantial Completion which shall establish the date of Substantial Completion. The Certificate of Substantial Completion shall state the responsibilities of City and Contractor for Project security, maintenance, damage to the Construction Work, and insurance, and shall fix the date, not longer than 30 days after the established date of Substantial Completion, within which Contractor shall complete any items of incomplete or defective Construction Work. The Certificate of Substantial Completion shall be submitted to Contractor for its written acceptance of the responsibilities assigned to it in such certificate.

3. Upon Substantial Completion of the Construction Work, and upon execution by both City and Contractor of the Certificate of Substantial Completion, City shall pay Contractor, within thirty (30) days, all sums due Contractor, including such amount of retainage as the City in its sole discretion wishes to pay based upon the value of remaining performance, less the reasonable costs, as determined by City in City's sole discretion, for completing all incomplete Construction Work and/or any Design Services, correcting and bringing into strict conformance all defective and nonconforming Construction Work, and handling all outstanding or threatened claims.

4. "Final Completion" means the completion of all Work required by, and in strict compliance with, this Contract, the Delivery Order, including Contractor's provision to City of all documents and things required to be provided by the Contract.

5. When Contractor believes that all of the Construction Work is finally complete, and Contractor is ready for a final inspection, Contractor shall so notify the City in writing. The City (or an independent consultant hired by City) will then make final inspection of the Construction Work and, if the Construction Work is complete in strict accordance with the Contract, and the Contract has been fully performed, then City will issue a Certificate for Final Payment, providing for payment of the remainder of the Contract Price, less any amount withheld pursuant to the Contract.

6. City shall make final payment of all remaining sums due to Contractor within thirty (30) days after Final Completion as reflected by City's Certificate for Final Payment, provided that all documents and things required to be delivered to City under this Contract have been delivered as required, and provided that all other conditions precedent to payment have been satisfied.

7. Prior to being entitled to receive final payment, and as a condition precedent thereto, Contractor shall furnish City, in the form and manner required by the City, the following:

(a) an Affidavit of Final Payment and Release, in particular certifying that all Subcontractors and Suppliers have been paid all sums lawfully due to them, and releasing City from all claims that Contractor had or might have asserted during the performance of this Contract;

(b) if required by City, separate releases of lien or lien waivers from each Subcontractor, lower tier subcontractor, laborer, Supplier or other person or entity who has, or might assert a claim against City or City's property;

(c) consent of surety to final payment;

(d) a complete set of the as-built drawings to include AutoCAD disks and the record set of Contract Documents; and

(e) all product warranties, operating manuals, instruction manuals and other record documents, drawings and things customarily required of a Contractor, or expressly required herein, as a part of or prior to Project closeout.

8. Acceptance by Contractor of final payment shall constitute a waiver and release of all claims against City by Contractor except for those claims previously made in writing against City by Contractor, pending at the time of final payment and specifically identified on Contractor's pay request for final payment as unsettled at the time it submits its pay request.

ARTICLE 11

CITY'S DUTIES, OBLIGATIONS, AND RESPONSIBILITIES

In addition to payment, City shall undertake to perform the following:

1. City shall provide Contractor with information regarding City's requirements for the Project including any desired or required design or construction schedule.
2. City shall review any documents submitted by Contractor requiring City's decision, and shall render any required decisions pertaining thereto.
3. In the event City knows of any material fault or defect in the Construction Work, nonconformance with the Contract, or of any errors, omissions or inconsistencies in the Design Documents, then City shall give prompt notice thereof in writing to Contractor.
4. City shall provide Contractor access to the site and to the Construction Work, and shall provide Contractor with such information, existing and reasonably available, necessary to Contractor's performance of the Contract as Contractor may request.
5. City shall cooperate with Contractor in securing any necessary licenses, permits, approvals or other necessary authorizations for the design, construction and certification of the Project.
6. City shall perform the duties set forth in this Article 11 in a reasonably expeditious fashion so as to permit the orderly and timely progress of Contractor's Design Services and of the Construction Work.
7. City's review, inspection, or approval of any Construction Work, Design Documents, Submittals, or pay requests by Contractor shall be solely for the purpose of determining whether such Construction Work and such documents are generally consistent with City's construction program and requirements. No review, inspection, or approval by City of the Construction Work or documents shall relieve Contractor of its responsibility for the performance of its obligations under the Contract or the accuracy, adequacy, fitness, suitability, or coordination of its Design Services or the Construction Work. Approval by any governmental or other regulatory agency or other governing body of any Construction Work, Design Documents, or Contract Documents shall not relieve Contractor of responsibility for the strict performance of its obligations under the Contract. Payment by City pursuant to the Contract

shall not constitute a waiver of any of City's rights under the Contract or at law, and Contractor expressly accepts the risk that defects in its performance, if any, may not be discovered until after payment, including final payment, is made by City.

8. City's agreement not to exercise, or its delay or failure to exercise, any right under the Contract or to require strict compliance with any obligation of Contractor under the Contract shall not be a waiver of the right to exercise such right or to insist on such compliance at any other time or on any other occasion.

9. City shall furnish to Contractor, prior to the execution of each Delivery Order, any and all written and tangible material knowingly in its possession concerning conditions below ground at the site of the Project. Such written and tangible material is furnished to Contractor only in order to make complete disclosure of such material and for no other purpose. By furnishing such material, City does not represent, warrant, or guarantee its accuracy or completeness either in whole or in part, and shall have no liability therefore. If Contractor requests in writing, City shall also furnish surveys, legal limitations, and utility locations (if known), and a legal description of the Project site.

10. City shall obtain all easements required for construction, and shall pay for necessary assessments and charges required for use and occupancy of the Construction Work. Contractor shall render such assistance as City may request in obtaining such easements, certificates of occupancy, and the like.

11. In the event Contractor fails or refuses to perform the Construction Work in strict accordance with the Contract, or is otherwise in breach of this Contract in any way, City may, at its option, instruct Contractor to cease and desist from performing further Construction Work, or any part thereof. Upon receipt of such instruction from City in writing, Contractor shall immediately cease and desist as instructed by City and shall not proceed further until the cause for City's instructions has been corrected, no longer exists, or City instructs that the Construction Work may resume.

12. In the event City issues such instructions to stop Construction Work, and in the further event that Contractor fails and refuses within seven (7) days of receipt of same to provide adequate assurance to City that the cause of such instructions will be eliminated or corrected, then City shall have the right to carry out the Construction Work with its own forces, or with the forces of other contractors, and Contractor shall be fully responsible for the costs incurred in correcting any defective or deficient Construction Work. The rights set forth in Paragraph 14(K) and this Paragraph 14(L) are in addition to, and without prejudice to, any other rights or remedies City may have against Contractor, including the rights to terminate or withhold payment as provided herein.

ARTICLE 12
DELIVERY ORDER (PROJECT) DOCUMENTATION

1. Contractor shall maintain and protect all records relating in any manner whatsoever to the Project (the "Project Records") for no less than four (4) years after Final Completion of the Project, and for any longer period of time as may be required by law or good management practice.
2. All Project Records which are in the possession of Contractor or Contractors Subcontractors shall be made available to City for inspection and copying upon City's request at any time. Additionally, such records shall be made available upon request by City to any state, federal or other regulatory authorities, and any such authority may review, inspect and copy such records. The Project Records include, without limitation, all drawings, plans, specifications, Submittals, correspondence, logs, minutes, memoranda, photographs, tape or videotape recordings, or other writings or things which document the Project, its design, or its construction. Said records include those documents reflecting the cost of design and construction to Contractor.

ARTICLE 13
PERSONNEL, SUBCONTRACTORS AND SUPPLIERS

1. A "Subcontractor" means an entity which has a direct contract with Contractor to perform a portion of the Construction Work or the Design Services. For purposes of the Contract, Subcontractors shall also include those furnishing any equipment and materials for the Project.
2. A "Supplier" means an entity providing only equipment or materials for the performance of the Construction Work.
3. Upon execution of this Contract, and at such later times as may be applicable, Contractor shall furnish City, in writing, the names of persons or entities proposed by Contractor to act as Subcontractors on the Project. Contractor shall provide such information regarding such proposed Subcontractors as City deems necessary. City shall promptly reply to Contractor, in writing, stating any objections City may have to such proposed Subcontractors. Contractor shall not enter into a subcontract with an intended Subcontractor with reference to whom City objects. Any consent or failure to reject by City shall in no way relieve Contractor of any of its duties or warranties under the Contract.
4. All subcontracts and purchase orders with Subcontractors shall afford Contractor rights against the Subcontractor which correspond to those rights afforded to City against Contractor under this Contract, including those rights of Contract suspension, termination, and stop Construction Work orders as set forth in this Contract. It is expressly agreed that no relationship of agency, employment, contract, obligation or otherwise shall be created between City and

any Subcontractor of Contractor, and a provision to this effect shall be inserted into all agreements between Contractor and its Subcontractors.

5. Should Contractor subcontract all or any part of the Construction Work, such subcontracting of the Construction Work shall not relieve Contractor from any liability or obligation under the Contract or under any applicable policy, law or regulation, and Contractor shall be responsible for all and any acts, defaults, omissions or negligence of its Subcontractors, Suppliers, and consultants.

6. In accordance with Article 3 above, Contractor shall employ and assign only qualified and competent personnel to perform any service or task concerning the Project. Contractor shall designate one such person as the Project Contractor. Absent written instruction from Contractor to the contrary, the Project Contractor shall be deemed to be Contractor's authorized representative and shall be authorized to receive and accept any and all communications from City. Key design and supervisory personnel assigned by Contractor to each Delivery Order will be provided at the time the contractor submits the RFP pricing package. The contractor shall conform to all requirements established in each Delivery Order RFP issued by the City.

7. If, at any time during the course of the Project, City reasonably determines that the performance of any Subcontractor or any member of Contractor's staff construction Working on the Project is unsatisfactory, City's Representative may require Contractor to remove such Subcontractor or staff member from the Project immediately and replace the staff member at no cost or penalty to City for delays or inefficiencies the change may cause.

ARTICLE 14

CHANGES AND EXTENSIONS OF TIME

1. Changes in the Design Services (if required) or the Construction Work under this Contract, consisting of additions, deletions, revisions or any combination thereof, may be ordered unilaterally by City without invalidating the Contract. Such changes shall be communicated by Change Order, Field Order or supplemental agreement, as applicable. Contractor shall proceed diligently with any changes, and same shall be accomplished in strict accordance with the terms and conditions as set forth in this Contract/Delivery Order.

2. All change orders, changes requested by Contractor, or extensions of Contract Time occurring during construction of the Project related to actual Construction Work shall be governed by the applicable provisions of this Contract/Delivery Order. All requests for additional compensation due to a change in the scope, and all requests for an extension of time to the Schedule, shall include sufficient backup documentation to reasonably understand the request and the amount of time or compensation requested and determine the merits of the request.

3. Upon the occurrence of a change order for Construction Work which increases the Cost of the Construction Work, the Construction Price will thereafter include such Cost of the Construction Work and Services attributable to such change to the extent allowed.

4. In the event the parties are unable to agree on the terms of a Change Order or Supplemental Agreement, then Contractor shall continue to diligently perform the Work, including any change directed by City by Change Order or Supplemental Agreement, and shall keep thorough records of the cost of performance of such Change Order or Supplemental Agreement.

5. Contractor recognizes and accepts a fiduciary relationship of trust and confidence hereby established between Contractor and City and agrees that it shall at all times in good faith use its best efforts to advance City's interests and agrees to perform the Work in the highest professional manner.

ARTICLE 15

CLAIMS BY CONTRACTOR

1. Claims by Contractor against City are subject to the terms and conditions of this Article 15, and strict compliance herewith shall be a condition precedent to any liability of City therefore.

2. All claims for additional compensation or additional time, regardless of their nature, when they occur, or whether they occur during the design or construction phase, shall be governed by the City of Buckeye Procurement Code.

3. Contractor shall provide, and continue to provide, to City all such documentation, including cost and time records, as and when City may request so that City may evaluate Contractor's claim.

4. Contractor shall continue its performance under this Contract regardless of the existence of any claims submitted by Contractor against City.

5. In the event Contractor seeks to make a claim for an increase in the Construction Price, as a condition precedent to any liability of City for any claim, Contractor shall strictly comply with the requirements of Paragraph 2 above and such notice shall be given by Contractor before proceeding to execute any alleged additional or changed Construction Work. Failure of the condition precedent to occur shall constitute a waiver by Contractor of any claim.

6. In connection with any claim by Contractor against City for compensation in excess of the Construction Price, any liability of City shall be strictly limited to the Cost of the Construction Work and Design Services if required as defined and allowed in this Contract and subsequent Delivery Orders and shall in no event include, indirect, consequential, impact or

other costs, expenses or damages of Contractor or its Subcontractors. City shall not be liable to Contractor for claims of third parties, including Subcontractors, for acts, omissions, events, or conditions for which City would not be liable to Contractor under the terms of the Contract. As a condition precedent to City's liability to Contractor for any loss or damage resulting from claims of third parties, including Subcontractors, such third parties must have complied with all conditions contained in their agreements with Contractor and such claims must have been submitted to City by Contractor in strict compliance with all the requirements of this Article. City shall not be liable to Contractor for claims of third parties including Subcontractors, unless and until the liability of Contractor has been established in a court of competent jurisdiction.

7. The resolution of any claim under this Article shall be reflected by a Change Order or Supplemental Agreement executed by City and Contractor.

ARTICLE 16

UNCOVERING AND CORRECTING CONSTRUCTION WORK

1. If any of the Construction Work is covered, concealed or obscured contrary to the written request of City, or contrary to any provision of the Contract, said Construction Work shall, if required by City, be uncovered for inspection and shall be properly replaced at Contractor's expense without change in the Contract Time.

2. If any of the Construction Work is covered, concealed or obscured in a manner not inconsistent with Paragraph 1 above, it shall, if required by City, be uncovered for inspection. If such Construction Work conforms strictly with the Contract, the cost of uncovering and proper replacement shall be charged to City. If such Construction Work does not strictly conform to the Contract, Contractor shall pay the cost of uncovering and proper replacement.

3. Contractor shall immediately proceed to correct Construction Work rejected by City as defective or failing to conform to the Contract. Contractor shall pay all costs and expenses associated with correcting such rejected Construction Work, including any additional testing and inspections made necessary thereby.

4. In addition to its warranty obligations set forth elsewhere herein, Contractor shall be specifically obligated to correct at its cost and expense any and all defective or nonconforming Construction Work for a period of twelve (12) months following Final Completion upon written direction from City. This obligation shall survive final payment by City and termination of the Contract.

5. Nothing contained in Paragraph 4 shall establish any period of limitation with respect to other obligations which Contractor has under the Contract. Establishment of the one-year time period in Paragraph 4 above relates only to the duty to Contractor to specifically correct the Construction Work.

6. City may, but shall in no event be required to, choose to accept defective or nonconforming Construction Work. In such event, the Contract Price shall be reduced by the reasonable costs of removing and correcting the defective or nonconforming Construction Work. City shall be entitled to a reduction in the Construction Price regardless of whether City has, in fact, removed and corrected such defective Construction Work. If the unpaid balance of the Construction Price, if any, is insufficient to compensate City for the acceptance of defective or nonconforming Construction Work, Contractor shall, upon written demand from City, pay City such additional compensation for accepting defective or nonconforming Construction Work.

ARTICLE 17

SUSPENSION AND TERMINATION

1. City may for any reason whatsoever suspend performance under the Contract. City shall give written notice of such suspension to Contractor specifying when such suspension is to become effective.

2. From and upon the effective date of any Suspension ordered by City, Contractor shall incur no further expense or obligations in connection with this Contract, and Contractor shall cease its performance. Contractor shall also, at City's direction, either suspend or assign to City any of its open or outstanding subcontracts or purchase orders.

3. In the event City directs a suspension of performance under this Article 17, through no fault of Contractor, and provided Contractor submits a proper claim as provided in this Contract, City shall pay Contractor as full compensation for such suspension Contractor's reasonable costs, actually incurred and paid, of:

- (a) demobilization and remobilization, including such costs paid to Subcontractors;
- (b) preserving and protecting Construction Work in place;
- (c) storage of materials or equipment purchased for the Project, including insurance thereon; and
- (d) performing in a later, or during a longer, time frame than that contemplated by this Contract.

4. If City lifts the suspension it shall do so in writing, and Contractor shall promptly resume performance of the Contract unless, prior to receiving the notice to resume, Contractor has exercised its right of termination as provided herein.

5. City reserves the right, for any reason whatsoever (including, but not limited to, the City's failure to appropriate funding for this Contract), or without reason, terminate performance under the Contract by Contractor for convenience. City shall give thirty (30) calendar days advance written notice of termination for convenience to Contractor. Contractor shall incur no further obligations in connection with the Contract and Contractor shall stop Work when such termination becomes effective. Contractor shall also, at City's direction, either

terminate or assign to City outstanding orders and subcontracts. Contractor shall settle the liabilities and claims arising out of any terminated subcontracts and orders. City may direct Contractor to assign Contractor's right, title and interest under terminated orders or subcontracts to City or its designee. Contractor shall transfer title and deliver to City such completed or partially completed Design Documents (if any), Construction Work and materials, equipment, parts, fixtures, information and Contract rights as Contractor has.

6. When terminated for convenience, Contractor shall be compensated as follows:

(a) Contractor shall submit a termination claim to City specifying the amounts believed to be due because of the termination for convenience together with costs, pricing or other data required by City. If Contractor fails to file a termination claim within three (3) months from the effective date of termination, City shall pay Contractor an amount derived in accordance with Subparagraph (c) below;

(b) City and Contractor may agree to the compensation, if any, due to Contractor under this paragraph;

(c) Absent agreement to the amount due to Contractor, City shall pay Contractor, as full compensation for termination for convenience, the following amounts:

(i) the Cost of the Construction Work and Services, as defined and allowed by to the extent incurred or paid prior to receipt by Contractor of the notice of termination;

(ii) such portion of Work which is completed and unpaid as of the date of receipt by Contractor of the notice of termination; and

(iii) reasonable costs of settling and paying claims arising out of the termination of subcontracts or orders hereinabove. These costs shall not include amounts paid in accordance with other provisions of this Contract. In no event shall Contractor be entitled to recover lost profits or other incidental or consequential damages from City on account of a termination for convenience, or an erroneous termination for cause as described below.

7. If Contractor does not perform the Construction Work, or any part thereof, in a timely manner, supply adequate labor, supervisory personnel or proper equipment or materials, or if it fails to timely discharge its obligations for labor, equipment and materials, or proceeds to disobey applicable laws, ordinances, rules, regulations or orders of any public authority having jurisdiction, or otherwise commits a violation of a material provision of the Contract, then City may by written notice to Contractor, without prejudice to any other right or remedy against Contractor or others, terminate the performance of Contractor and take possession of the Project site and of all materials and equipment at the site and may finish the Construction Work by whatever methods it may deem expedient. In such cases, Contractor shall not be entitled to receive any further payment until the Construction Work is finished.

8. In the event the employment of Contractor is terminated by City for cause and it is subsequently determined by a court or other tribunal of competent jurisdiction that such termination was without cause, such termination shall thereupon be deemed a Termination for Convenience under this Paragraph and the provisions of this Paragraph regarding compensation shall apply.

ARTICLE 18 INDEMNITY

1. To the fullest extent permitted by law, Contractor agrees to defend, indemnify and hold City, its elected officials, officers, agents and employees, harmless for, from and against any and all claims, lawsuits, judgments, costs and expenses for personal injury (including death), property damage or other harm for which recovery of damages is sought, suffered by any person or persons, that may arise out of or be occasioned by Contractor's breach of any of the terms or provisions of this Contract, or by any negligent, grossly negligent or strictly liable act or omission of Contractor, its officers, agents, or employees, in the performance of this Contract; except that the indemnity provided for in this paragraph shall not apply to any liability resulting from the sole negligence or fault of City, its elected officials, officers, agents, employees or separate contractors. The provisions of this paragraph are solely for the benefit of the parties hereto and are not intended to create or grant any rights, contractual or otherwise, to any other person or entity.

ARTICLE 19 INSURANCE AND BONDS

1. Concurrently with the execution of the Contract, the Contractor shall furnish the City of Buckeye a certificate of insurance on a standard insurance industry ACORD form. The ACORD form shall be issued by an insurance company authorized to transact business in the State of Arizona.

2. Contractor, subcontractors and subconsultants shall procure and maintain until all of their obligations have been discharged, including any warranty periods under this Contract are satisfied, insurance against claims for injury to persons or damage to property, which may arise from or in connection with the performance of the work hereunder by the Contractor, his agents, representatives, employees, or subcontractors.

3. The insurance requirements herein are minimum requirements for this Contract and in no way limit the indemnity covenants contained in this Contract.

4. The City in no way warrants that the minimum limits contained herein are sufficient to protect the Contractor from liabilities that might arise out of the performance of the work under this Contract by the Contractor, his agents, representatives, employees, subcontractors or subconsultants and Contractor is free to purchase such additional insurance as may be determined necessary.

5. Minimum Scope And Limits Of Insurance. Contractor shall provide coverage at least as broad and with limits of liability not less than those stated below.

(a) Commercial General Liability-Occurrence Form Policy shall include bodily injury, property damage, broad form contractual liability and XCU coverage.

General Aggregate	\$2,000,000
Products-Completed Operations Aggregate	\$1,000,000
Personal & Advertising Injury	\$1,000,000
Each Occurrence	\$1,000,000

The policy shall be endorsed to include the following additional insured language: "The City of Buckeye shall be named as an additional insured with respect to liability arising out of the activities performed by, or on behalf of the Contractor."

(b) Automobile Liability- Bodily injury and property damage for any owned, hired, and non-owned vehicles used in the performance of this Contract

Combined Single Limit (CSL)	\$1,000,000
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The policy shall be endorsed to include the following additional insured language: "The City of Buckeye shall be named as an additional insured with respect to liability arising out of the activities performed by, or on behalf of the Contractor" including automobiles owned, leased, hired or borrowed by the Contractor."

(c) Workers Compensation and Employers Liability

<u>Workers Compensation</u>	<u>Statutory</u>
Employers' Liability	
Each Accident	\$ 100,000
Disease-Each Employee	\$ 100,000
Disease-Policy Limit	\$ 500,000

The policy shall contain a waiver of subrogation against the City of Buckeye.

(d) Professional Liability

Each Claim	\$1,000,000
Annual Aggregate	\$2,000,000

(i) The required professional liability coverage must cover work done or to be done or on the behalf of the Contractor.

(ii) In the event that professional liability insurance required by this Contract is written on a "claims made" basis, coverage shall be maintained for two years past completion and acceptance of the Work or services required by this Contract.

(iii) Should any Delivery Order include the services of design as an integral part of the work, any professional liability shall specifically delete any design-build or similar

exclusions that could compromise coverage's because of the design-build delivery of the Project.

(e) Umbrella/Excess Liability: Umbrella/Excess Liability insurance with a limit of not less than \$5,000,000 per occurrence combined limit Bodily Injury and Property Damage, that "follows form" and applies in excess of the Commercial General Liability, Automobile Liability, and Employer's Liability, as required above.

6. Additional Insurance Requirements. The policies shall include, or be endorsed to include, the following provisions:

(a) On insurance policies where the City of Buckeye is named as an additional insured, the City of Buckeye shall be an additional insured to the full limits of liability purchased by the Contractor even if those limits of liability are in excess of those required by this Contract.

(b) The Contractor's insurance coverage shall be primary insurance and non-contributory with respect to all other available sources.

(c) Coverage provided by the Contractor shall not be limited to the liability assumed under the indemnification provisions of this Contract.

7. Subconsultant's and Subcontractor's Insurance. Contractor's certificate(s) shall include all subcontractors as additional insureds under its policies or subcontractors shall maintain separate insurance as determined by the Contractor, however, subcontractor's limits of liability shall not be less than \$1,000,000 per occurrence / \$2,000,000 aggregate. All coverage's for subcontractors and subconsultants shall be appropriate to cover all of its work performed herein.

8. Notice Of Cancellation. Each insurance policy required by the insurance provisions of this Contract shall provide the required coverage and shall not be suspended, voided, canceled by either party, reduced in coverage or in limits except after thirty (30) days prior written notice has been given, by certified mail, return receipt requested to:

Christopher A. Williams
Manager, Construction and Contracting
City of Buckeye
530 East Monroe Avenue
Buckeye, Arizona 85326

9. Acceptability Of Insurers. Insurance is to be placed with insurers duly licensed or approved unlicensed companies in the State of Arizona and with an A. M. Best's rating of no less than A -. The City in no way warrants that the above required minimum insurer rating is sufficient to protect the Contractor from potential insurer insolvency.

10. Verification of Coverage:

(a) Contractor shall furnish the City Certificates of Insurance (ACORD form or equivalent approved by the City) and with original endorsements effecting coverage as required by this Contract. The certificates and endorsements for each insurance policy are to be signed by a person authorized by that insurer to bind coverage on its behalf. *Any policy endorsements that restrict or limit coverages shall be clearly noted on the certificate of insurance.*

(b) All certificates and endorsements are to be received and approved by the City before work commences. Each insurance policy required by this Contract must be in effect at or prior to the earlier of commencement of work under this Contract or the signing of this Contract and remain in effect for the duration of the Project. Failure to maintain the insurance policies as required by this Contract or to provide evidence of renewal is a material breach of contract.

(c) All certificates of insurance required by this Contract shall be sent directly to the City of Buckeye, Manager of Construction and Contracting. The contract number and project description shall be included on the Certificates of Insurance. The City reserves the right to require complete, certified copies of all insurance policies required by this Contract, at any time.

11. Approval. Any modification or variation from the insurance requirements in this Contract shall be approved by the City, whose decision shall be final. Such action will not require a formal contract amendment, but may be made by administrative action.

12. Bonds and Other Performance Security. Contractor shall provide the following performance bond and labor and material payment bond:

(a) Prior to execution of this Contract, the Contractor must provide a performance bond and a labor and materials bond, each in an amount equal to the amount of initial Contract Price designated for construction services set forth in each Delivery Order.

(b) Each such bond shall be executed by a surety company or companies holding a Certificate of Authority to transact surety business in the State of Arizona, issued by the City of the Arizona Department of Insurance. A copy of the Certificate of Authority shall accompany the bonds. The Certificate shall have been issued or updated within two years prior to the execution of the Contract.

(c) The bonds shall be made payable and acceptable to the City of Buckeye.

(d) The bonds shall be written or countersigned by an authorized representative of the surety who is either a resident of the state of Arizona or whose principal office is maintained in this state, as by law required, and the bonds shall have attached thereto a certified copy of Power of Attorney of the signing official. If one Power of Attorney is

submitted, it shall be for twice the total Contract amount. If two Powers of Attorney are submitted, each shall be for the total Contract amount. Personal or individual bonds are not acceptable.

(e) Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall permit a copy to be made.

(f) All bonds submitted for this project shall be provided by a company which has been rated "A- or better" by the A.M. Best Company.

13. Approval, disapproval or failure to act by City regarding any insurance supplied by Contractor or its Subcontractors shall not relieve Contractor of full responsibility or liability for damages, errors, omissions or accidents as set forth in this Contract. Neither the bankruptcy or insolvency of Contractor's insurer nor any denial of liability by Contractor's insurer shall exonerate Contractor from the liability or responsibility of Contractor set forth in this Contract.

ARTICLE 20

CANCELLATION UNDER A.R.S. § 38-511

1. This Contract may be cancelled pursuant to the terms of Arizona Revised Statutes Section 38-511, as amended.

ARTICLE 21

GIFT TO PUBLIC SERVANT

1. City may terminate this Contract immediately if Contractor has offered, conferred, or agreed to confer any benefit upon a City of Buckeye employee or official that the City of Buckeye employee or official is prohibited by law from accepting.

2. For purposes of this section, "benefit" means anything reasonably regarded as pecuniary gain or pecuniary advantage, including benefit to any other person in whose welfare the beneficiary has a direct or substantial interest, but does not include a contribution or expenditure made and reported in accordance with law.

3. Notwithstanding any other legal remedies, City may require Contractor to remove any employee of Contractor from the Project who has violated the restrictions of this section or any similar state or federal law, and obtain reimbursement for any expenditures made to Contractor as a result of the improper offer, agreement to confer, or conferring of a benefit to a City employee or official.

ARTICLE 22 NONDISCRIMINATION

1. As a condition of this Contract, Contractor covenants that Contractor will take all necessary actions to insure that, in connection with any work under this Contract, Contractor, his associates and subcontractors, will not discriminate in the treatment or employment of any individual or groups of individuals on the grounds of race, color, religion, national origin, age, sex, or handicap unrelated to job performance, either directly, indirectly or through contractual or other arrangements. Contractor shall also comply with all applicable requirements of the Americans with Disabilities Act, 42 U.S.C.A. §§12101-12213, as amended. In this regard, Contractor shall keep, retain and safeguard all records relating to this Contract or work performed hereunder for a minimum period of three (3) years from final Contract completion, with full access allowed to authorized representatives of City, upon request, for purposes of evaluating compliance with this and other provisions of the Contract.

2. Subject to existing law, and regulations, illegal or undocumented persons will not be employed by the Contractor for any work or services to be performed pursuant to this contract. The Contractor will ensure that this provision is expressly incorporated into any and all subcontracts or subordinate agreements issued in support of this contract. Contractor shall notify the City upon the selection and agreement with any sub-contractor, and shall notify the City prior to any subcontractor being on site doing work. Contractor agrees to comply with the provisions of section 274A(a)(1)(A) and 274A(a)(2) of the Immigration and Nationality Act (8 U.S.C.1324a(a)(1)(A), 1324a(a)(2)) (the "INA employment provisions"), and any amendments thereto, prohibiting the unlawful employment of illegal or undocumented persons. Under the terms of this agreement, the Contractor shall not knowingly hire or employ for any work performed pursuant to this contract any workers or employees not lawfully authorized to work in the United States under the provisions of the Immigration and Nationality Act or any other applicable federal or state laws. Violation of the provisions of this section shall be deemed a material breach of this Contract.

ARTICLE 23 MISCELLANEOUS PROVISIONS

1. This Contract shall be governed by the laws and court decisions of the State of Arizona. This Contract is performed in Maricopa County, Arizona, and exclusive venue for the enforcement of rights or legal obligations under this Contract shall be in Maricopa County, Arizona.

2. This Contract shall be binding upon and inure to the benefit of the parties to this Contract and their respective successors and, except as otherwise provided in this Contract, their assigns.

3. Contractor shall not assign this Contract, or any part of this Contract, without prior written consent of City.

4. All notices, communications, and reports required or permitted under this Contract shall be personally delivered or mailed to the respective parties by depositing same in the United States mail, postage prepaid, at the addresses shown below, unless and until either party is otherwise notified in writing by the other party, at the following addresses. Mailed notices shall be deemed communicated as of five days after mailing.

If intended for City, to:

Christopher A. Williams
Manager, Construction and Contracting
City of Buckeye
530 E. Monroe Ave.
Buckeye, Arizona 85326
Phone: (623) 349-6225

If intended for Contractor, to:

Sunland Asphalt
ATTN: ~~Craig A. Bennetts~~ **Ken Estrada**
775 W. Elwood Street
Phoenix, AZ 85041
Phone: (602) 689-3262

5. No information relative to the existence or the details of the Design Services or the Construction Work shall be released by Contractor, either before or after completion of the Project, for publication, advertising or any commercial purposes without City's prior written consent.

6. In the event that any portion or any portions of this Contract are held to be unenforceable by a court of competent jurisdiction, then the remainder of this Contract shall be enforced as though such portions had not been included, unless to do so would cause this Contract to fail of its essential purposes.

7. This Contract, with all Exhibits and incorporated or referenced attachments, and any Delivery Order, together with Contractor's and Surety's performance and payment bonds for the Project, constitute the entire and exclusive agreement between City and Contractor with reference to the Project. This Contract supersedes any and all prior documents, discussions, communications, representations, understandings, negotiations or agreements by and between the parties.

8. If the City Council does not appropriate funds to continue this Contract in to a subsequent fiscal year, and pay for charges hereunder or under any current Delivery Order for a Project that extends into a new fiscal year, the City may terminate this Contract at the end of the current fiscal period, or at the time that funds are no longer available to meet the City's payment obligations hereunder. The City agrees to give written notice of termination to the Contractor at least thirty (30) days prior to any termination for a lack of funds and will pay to

the Contractor all approved charges incurred prior to Contractor's receipt of such notice, subject to the availability of funds therefore.

ARTICLE 24

E-VERIFY

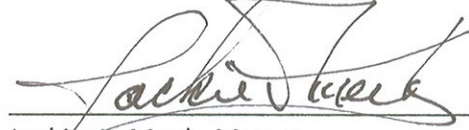
1. E-Verify Requirements. To the extent applicable under Arizona Revised Statute § 41-4401, the Contractor and its subcontractors warrant compliance with all federal immigration laws and regulations that relate to their employees and their compliance with the E-verify requirements under Arizona Revised Statute § 23-214(A). The Contractor or subcontractor's breach of the above-mentioned warranty shall be deemed a material breach of the Contract and may result in the termination of the Contract by the Town of Buckeye. The Town of Buckeye retains the legal right to randomly inspect the papers and records of the Contractor or subcontractor employee who work on the Contract to ensure that the Contractor and its subcontractors are complying with the above-mentioned warranty.

2. The Contractor and its subcontractors warrant to keep the papers and records open for random inspection during normal business hours by the Town. The Contractor and its subcontractors shall cooperate with Town's random inspections including granting the Town's entry rights onto its property to perform the random inspections and waiving their respective rights to keep such papers and records confidential.

[Signature Page to Follow]

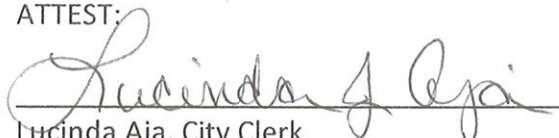
"City"

CITY OF BUCKEYE, ARIZONA,
an Arizona municipal corporation



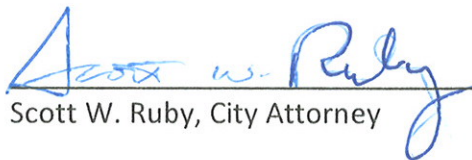
Jackie A. Meck, Mayor

ATTEST:



Lucinda Aja, City Clerk

APPROVED AS TO FORM:



Scott W. Ruby, City Attorney

RECOMMENDED:



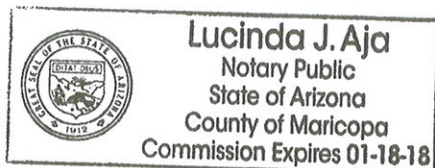
Christopher A. Williams, Manager
Construction & Contracting Division

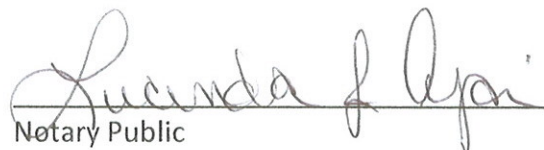
ACKNOWLEDGEMENT

STATE OF ARIZONA)
)
County of Maricopa)

On this 4th day of March, 2014, before me personally appeared **Jackie A. Meck**, the Mayor of the CITY OF BUCKEYE, an Arizona municipal corporation, whose identity was proven to me on the basis of satisfactory evidence to be the person who he claims to be, and acknowledged that he or she signed the above/attached document.

(Affix notary seal here)





Notary Public

ACKNOWLEDGEMENT

STATE OF ARIZONA)

County of Maricopa)

On this ____ day of _____, 2014, before me personally appeared **Jackie A. Meck**, the Mayor of the CITY OF BUCKEYE, an Arizona municipal corporation, whose identity was proven to me on the basis of satisfactory evidence to be the person who he claims to be, and acknowledged that he or she signed the above/attached document.

(Affix notary seal here)

Notary Public

"Contractor"

SUNLAND, INC. ASPHALT & SEALCOATING, DBA SUNLAND ASPHALT,
an Arizona corporation

By: Troy C. Rudolph
Name: Troy C. Rudolph
Title: VICE PRESIDENT

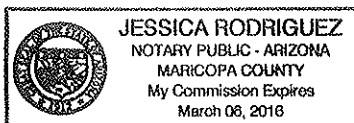
ACKNOWLEDGEMENT

STATE OF ARIZONA)

County of Maricopa)

On this 7th day of February, 2014, before me personally appeared Troy Rudolph, whose identity was proven to me on the basis of satisfactory evidence to be the person who he or she claims to be, and acknowledged that he or she signed the above/attached document.

(Affix notary seal here)



Jessica Rodriguez
Notary Public

EXHIBIT A
TECHNICAL SPECIFICATIONS



CITY OF BUCKEYE

ON CALL

STREET MAINTENANCE

TECHNICAL SPECIFICATIONS

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CITY OF BUCKEYE ON-CALL STREET MAINTENANCE

1.0 INTENT:

The intent of this Invitation for Bids is to source contractors to perform asphalt repairs, patching, crack filling, resurfacing, removal and replacement, seal coating, line striping, rpm placement for various roads owned by City of Buckeye.

This contract is to be utilized for public roadways, parking lots, intersections, turn lanes, road widening, extensions, and other work deemed necessary by the City.

All work shall be governed by the Uniform Standard Specifications for Public Works Construction prepared by the Maricopa Association of Governments (MAG Specs) and City of Buckeye standards. The Manual of Uniform Traffic Control Devices (MUTCD) will be a guide for Traffic Control setup.

The City reserves the right to award in whole or in part, by item or group of items, by section or geographic area, or make multiple awards, where such action serves the City's best interest.

The City reserves the right to add additional contractors, at the City's sole discretion, in cases where the currently listed contractors are of an insufficient number or skill-set to satisfy the City's needs or to ensure adequate competition on any project or task order work.

2.0 SCOPE OF SERVICES:

2.1 CONTRACTOR PERFORMANCE REQUIREMENTS:

Contractor to supply all labor, supervision, materials, supplies, equipment, transportation, and all effort necessary to perform the specifications herein.

2.2 CRACK SEALING:

Crack Sealing shall consist of furnishing crack seal material and applying this material to cracks in asphalt concrete pavement, in accordance with these specifications.

2.2.1 MATERIAL:

Material Specifications: The crack sealant material shall be a hot applied elastically polymer modified asphalt or single asphalt rubber component. The asphalt rubber sealant shall be a blend of asphalt cement, crumb rubber, virgin rubber, fillers, and plasticizers formulated for hot arid climates. The asphalt rubber modified compound shall:

- (A) Be formulated to cure as it cools;
- (B) Sufficiently cure after a twenty-minute set time to resist pick up and tracking by vehicular traffic; and
- (C) Not bleed or become tacky under traffic during summer temperatures.

The asphalt component shall be paving grade asphalt per MAG Specs Section 711.

The supplied sealant material shall be formulated for use during hot climatic conditions and meet the following specifications:

PROPERTY	TEST METHOD	REQUIREMENT
Ductility @ 77° F, cm	ASTM D113	15
Flash Point, Degrees F		450 Min.
Softening Point, Degrees F	ASTM D36	200 Min.
Cone Penetration @ 77° F, dmm	ASTM D5329	25-40
Resilience, %	ASTM D5329	30 Min.
Bitumen Content, %	ASTM D4	60 Min.
Brookfield Viscosity @ 375° F, Poise	ASTM D2196	40-90
Asphalt Compatibility	ASTM D5329	Pass
Material Unit Weight @ 60° F, lbs/gal		10
Pouring Consistency		Self-Leveling
Safe Heating Temperature, Degrees F		400
Recommended Pour Temperature, Degrees F		380

Additionally, the specific gravity of the crumb rubber shall be 1.15 +/- 0.02 and free from fabric, wire, and other contaminating materials. The material shall contain a minimum of 18 percent crumb rubber by weight of total asphaltic components. The material containing crumb rubber shall be reacted at the plant to provide a homogenous mix of components. A maximum of 4 percent calcium carbonate may be added to prevent particle clumping. The crumb rubber shall comply with the following table:

SIEVE (see Note)	PERCENT PASSING
#8	100
#20	98-
#40	0-10

Note: The sieves shall comply with the requirements of AASHTO M-92

The Contractor shall not change the crack sealant material or supplier unless authorized by the Engineer.

The Contractor shall submit copies of all invoices for crack sealant material to the Engineer within 24 hours of material receipt.

2.2.2 MATERIAL TESTING:

Crack sealant material will be sampled and tested for compliance at a frequency of not less than one per month. The complete lot will be rejected if the material fails to comply. No payment will be made for pavement area in which the rejected material was used.

2.2.3 CONSTRUCTION METHODS:

2.2.3.1 EQUIPMENT:

The Engineer must approve all equipment designated for use by the Contractor. The equipment shall comply with all applicable OSHA, industry and local government safety procedures, rules, and regulations. The Contractor must utilize safe and serviceable equipment capable of transporting required material and equipment to each job site.

2.2.3.2 MELTER APPLICATOR:

The melter applicator unit shall be capable of heating and applying without any further equipment modification, all grades of asphalt rubber sealant, specification joint sealant, and fiber modified sealant. The machine shall be capable of starting at ambient temperature and bringing the sealing material up to application temperature in one hour or less. All qualified bidders must have and maintain a complete inventory of repair parts as well as having experienced service personnel for this equipment. The tank shall be well insulated and equipped with suitable heating devices (burners and flues) to assure a uniform specified application viscosity and temperature. It shall have an internal mixing device to keep asphalt rubber from separating from the compound. It shall have a double boiler type jacket to create a reservoir, which shall hold a minimum capacity of 200 gallons at ambient temperature. The machine, heating chamber and wand shall be so designed and constructed that under day-to-day operation no clean-out procedure is required. Diesel fuel or any other cleaning materials detrimental to the crack sealant product shall not be used to clean melter applicator equipment.

2.2.3.3 WEATHER:

In no case shall sealant be placed during damp roadway conditions that exist such as wet roadway surfaces or damp material inside the cracks.

Operations stopped by the Engineer, due to weather, shall be at no additional cost to the City.

2.2.3.4 CLEANING CRACKS:

Immediately before applying the sealant, cracks shall be thoroughly cleaned of loose particles, grass, grass roots, weeds, dust, and other deleterious substances by means of high velocity compressed air or by other methods approved by the Engineer. Compressed air alone may not be sufficient to clean the cracks properly. Additional handwork may be required.

The compressor used shall be capable of a sustained pressure of 90 psi. The crack cleaning equipment shall be capable of cleaning cracks to a minimum depth of 1/2 inch. The equipment shall also be capable of dust containment by filtering particulate matter 10 micrometers or less in diameter with no dust clouds visible to the naked eye as determined by the Engineer (i.e. vacuum).

During the cleaning of cracks, the Contractor shall protect against damage to items such as, but not limited to, cars, people, driveways, walkways, landscape materials, etc. in the work area. During and after placement of the sealant, the Contractor shall protect against harm to persons or animals that may be exposed to the hot material.

2.2.3.5 APPLICATION:

The Contractor shall protect all utilities from damage. The Contractor shall immediately contact the appropriate utility company if damage should occur and shall be responsible for all claims for damage due to their operations.

All cracks, including the space between the asphalt concrete pavement and the curb and gutter, which have an average clear opening 1/8 inch or greater, shall be sealed for the entire length of the visible crack. Sealant is to include portions of the crack sections smaller than 1/8 inch. The maximum crack width to be sealed shall be 1-1/2 inches. All cracks that have an average clear opening greater than 1-1/2 inches shall not be sealed unless directed to do so by the Engineer.

The sealant shall be placed in a manner that will completely fill the crack and not form a lap of greater than 1 inch on each side after forcing material into the crack with a squeegee. Immediately after the application, a rubber squeegee, or other acceptable method, shall be used to force the material into the crack, level the sealant with roadway surface, and form the lap.

The sealant shall be heated to the written manufacturer specifications, or as directed by the Engineer, before starting any crack sealant application.

The sealant shall only be applied to clean dry cracks that have been approved by the Engineer.

2.2.3.6 INSPECTION:

Inspection will include, but not be limited to, the quality of workmanship, width of cracks filled, cleanliness of cracks, and lapping.

The Contractor, at no additional cost to the City, will correct unacceptable work. Unacceptable work shall include, but not be limited to, unsealed cracks, material wastage on the sides of the roadway, and such quantities of material on the roadway that driving is affected.

Correction of unacceptable workmanship shall be accomplished within five working days after notification from the Engineer of the unacceptable work. The Contractor shall not progress to a new area until the unacceptable work is corrected to the satisfaction of the Engineer.

The Contractor shall meet with the Engineer on a daily basis and supply a signed daily report indicating the amount of crack sealant material applied for the day in total pounds and total square yards. In addition, the Contractor shall supply the Engineer with the dates of completion for each segment of road.

2.2.4 MEASUREMENT:

Crack sealing shall be measured by the square yards of asphalt concrete pavement surface area sealed.

2.2.5 PAYMENT:

Payment shall be made at the contract price per square yard of road area sealed and accepted with crack sealant material. This price shall be full compensation for furnishing, preparation, and placing of this material, all labor, equipment, tools, and incidentals including taxes, necessary to complete the item. Also included as incidental items are cleaning of cracks, application of blotter material, and all costs associated with any construction water and clean up.

2.2.6 PREPARATION OF SURFACES:

This item shall consist of cleaning and patching existing transverse and longitudinal cracks wider than 1-1/2" to 6" in bituminous pavements in accordance with these specifications.

The quantity shown is for bidding purposes and has been approximated. Actual payment for the work will be determined by field measurements of the work completed. The Engineer will determine the cracks to be patched.

2.2.7 MATERIALS:

2.2.7.1 PATCHING MATERIAL:

Unique Paving Material or approved equivalent for patching shall conform to these requirements:

Limestone	91-97% by weight
Petroleum Asphalt Base	2-8% by weight
Petroleum Solvent	1-3% by weight
Additives	<1.0% by weight

2.2.7.2 MATERIAL ACCEPTANCE:

Prior to the use of the Patching material, the contractor shall submit to the Engineer, the appropriate material certification or laboratory test indicating that the material meets specification requirements. If the contractor applies the material prior to receipt of the test reports, payment for the material shall be withheld until they are received. If the material does not pass the specification it shall be replaced at the contractor's expense.

The Engineer may request samples for testing, prior to and during production, to verify the quality of the materials and to ensure conformance with the applicable specifications.

2.2.8 CONSTRUCTION METHODS:

2.2.8.1 WEATHER LIMITATIONS:

The material can be applied any time of the year due to different grades designed for optimum performance during various temperatures of application.

2.2.8.2 EQUIPMENT:

All machines, tools and equipment used in the performance of work required by these specifications will be subject to the approval of the Engineer and maintained in a satisfactory working condition at all times.

Hand tamper, vibratory plate compactor and rollers are acceptable for cracks as a final compaction. Depending on depth of crack a steel rod with a 1-1/2" diameter head shall be used to compact in lifts.

2.2.8.3 PREPARATION OF CRACKS:

No material shall be installed until all cracks have been cleaned free of all deleterious materials, including any dust, old sealant, incompressibles, and organic material.

When vegetation exists in the cracks and joints, it shall be removed and those cracks and joints shall be treated with a herbicide that sterilizes the soil subject to the approval of the Engineer. Cost for treatment is incidental.

2.2.8.4 APPLICATION OF PATCHING MATERIAL:

No patching material shall be installed until all cracks to be patched have been inspected and approved by the Engineer.

2.2.8.5 PAVEMENT CLEANING AND PROTECTION:

The pavement surface and all work areas shall be left in a clean condition.

2.2.9 METHOD OF MEASUREMENT:

Measurement for payment shall be by the pound of patching material used and accepted by the Engineer.

2.2.9.1 BASIS OF PAYMENT:

Payment shall be made at the contract unit price per pound of crack patching. This price shall be full compensation for furnishing all materials, for all preparation, and placing of the material, and for all labor, equipment, tools, and incidentals necessary to complete this item.

2.3 ASPHALT EMULSION SLURRY SEAL COAT.

2.3.1 DESCRIPTION:

The work covered by this specification consists of furnishing all labor, equipment, and materials necessary to perform all operations required for the application of an asphalt emulsion slurry surface.

2.3.2 MATERIALS:

The Engineer prior to their use must approve all material sources. Once approved, material sources shall not be changed without the approval of the Engineer. If requested by the Engineer, the Contractor shall submit material samples at least seven (7) days prior to start of construction. When requested, additional samples shall be furnished during the construction period at no cost to the City. Material sample submittal is a non-pay item.

The asphalt emulsion material, mineral aggregate and mineral filler shall be as specified in MAG Specs Section 715.

2.3.3 DETERMINATION OF JOB MIX:

The job mixture shall be designed to provide a suitable surface for traffic conditions, climate and curing. All materials shall be pre-tested in a qualified laboratory to determine their suitability for use in the slurry seal. The Wet Track Abrasion Test (W.T.A.T.) will be used for design purposes to establish the mix design to be used in the specified slurry seal.

The test will show a maximum wear loss of 50 grams per square foot. Samples of materials to be used on the job shall be used to run the W.T.A.T. The test will be performed in accordance with ASTM D-3910 Design Testing and Construction of Slurry Seal.

The Contractor shall submit a signed original mix design covering the specific materials to be used on the project, prior to commencement of the work. Any additives used shall be approved by the testing laboratory as part of the mix design. The Materials certification of crude source and asphalt type to be used on the project shall also be included in the submittal. The design shall be performed by an approved laboratory, experienced in slurry seal mix designs, with materials the Contractor will use on the project. After the mix design has been approved no substitution will be permitted, unless approved by the Engineer.

2.3.3.1 COMPOSITION OF SLURRY SEAL MIXTURES:

The job mixture shall conform to the requirements of the contract documents. The mixture shall attain an initial set in not less than 5 minutes nor more than one hour.

The mix design report shall show the test results performed on the materials and how the results of the materials tested compare to the required specifications. The mix design report shall include, as a minimum, the following information:

<u>SPECIFICATION</u>	<u>TEST METHOD</u>	<u>REQUIREMENT</u>
Slurry Seal Consistency	ISSA TB 106	2-3 cm.
W.T.A.T.	ASTM D-3910	50 grams/sf (max)
Compatibility	ISSA TB 115	Pass

The mixture shall be a Type II with the combined aggregates conforming to the gradation requirements of MAG Specs Table 715-1.

In cases where the surface is not critical to be open to traffic, a longer set time may be allowed, however not to exceed 12 hours. The setting time may

be adjusted by the addition or removal of approved mineral fillers or chemical agents. The mixture shall be one of three types whose combined aggregates conform to the gradation requirements of MAG Specs Table 715-1. The mixture shall be sufficiently free flowing to fill cracks in the pavement. The mixture shall not segregate during or after laydown. The mixture shall produce a skid-resistant surface.

2.3.3.2 TRAIL APPLICATIONS:

The Contractor shall place a test strip of 1000 square yards in the area designated by the Engineer. The test strip shall be placed the day prior to construction with the area residents notified 48 hours prior to any test strip placement. The test section shall be placed using the same equipment and methods as will be used on the job. The slurry mixture placed in a test strip shall conform to the design mix as determined by the W.T.A.T. with minor variations to obtain crack filling, set time, pavement bond and a skid resistant texture. If the materials do not meet the requirements for fluidity, non-segregation, or surface texture, a new job mix shall be formulated and tested. Work shall not proceed before approval of design mix and acceptance following the placing of a test strip.

2.3.4 EQUIPMENT:

2.3.4.1 GENERAL:

When requested by the Engineer, descriptive information on the slurry seal mixing and applications equipment to be used will be submitted for approval no less than 7 days before the starts.

2.3.4.2 SELF CONTAINED SLURRY MACHINE(S):

The mixing machine shall be a self-propelled or truck mounted, able to accurately deliver and proportion aggregate, mineral filler, water, additive(s) and polymers modified emulsion to a revolving multi-blade mixer capable of minimum speeds of 200 rpm and discharge the product on a continual flow basis. The machine shall have sufficient storage capacity for all materials to maintain an adequate supply to the proportioning controls.

The machine shall be equipped with mechanical and electronic counters to accurately measure and calibrate the revolutions of the conveyor delivering slurry aggregate to the pug mill. Each machine shall be equipped with a positive displacement pump and digital read-out counter to accurately measure and display in gallons, the quantity of emulsified asphalt delivered to the pug mill. Counters and meters shall be repaired or replaced immediately upon discovery of inaccuracy. The machine shall not be used until measuring devices are repaired.

The slurry machine shall have a clearly audible and functioning back-up horn.

A Certificate of Calibration, no more than three (3) months old, shall be submitted to the Engineer.

2.3.4.3 SLURRY SEAL SPREADING EQUIPMENT:

Attached to the mixer machine shall be a mechanical type squeegee spreader equipped with flexible material in contact with the surface to prevent loss of slurry from the distributor. It shall be maintained to prevent loss of slurry on varying grades and crown by adjustments to assure uniform spread. There shall be a steering device and a flexible strike-off. The spreader box shall have an adjustable width. The box shall be kept clean. Build-up of asphalt and aggregate on the box shall not be permitted. The use of burlap drags or other drags shall be approved by the Engineer.

The paving mixture shall be spread uniformly by means of mechanical type lay-down box attached to the mixer, equipped with agitation, to spread the materials throughout the box without dead zones. Equipment shall be designed and operated so that all the fresh mix will be agitated. Flexible seals, front and rear, shall be in contact with the road surface to prevent loss of mixture from the box. The spreader box shall be equipped with an adjustable strike-off for controlling the thickness of the spread mixture and hydraulic cylinders to adjust the width of the lay-down box.

The spreading equipment shall be maintained free from buildup of the mixture on the paddles or sidewalls. Any skips, lumps, or tears in the finished product will not be allowed.

2.3.4.4 ROLLERS:

Rollers shall be approved by the Engineer.

2.3.4.5 CLEANING EQUIPMENT:

Pick-up brooms, water flushing equipment, and hand brooms shall be suitable for cleaning the surface and cracks of the old surface.

2.3.4.6 AUXILIARY EQUIPMENT:

Hand squeegees, shovels, and other equipment shall be provided as necessary to perform the work.

2.3.5 PREPARATION OF THE SURFACE:

2.3.5.1 CLEANING:

Immediately before applying the slurry, the area to be surfaced shall be cleaned of oil, grease, gasoline, dirt, loose material, and other objectionable material. The slurry seal shall be applied the same day the pavement is cleaned. In urban areas, the surface shall be cleaned with a self-propelled pick-up sweeper. In rural areas, power brooms may be used. When necessary, cleaning shall be supplemented by hand brooms. When necessary, cleaning of the existing pavement surface shall be supplemented by hand brooms or other methods, approved by the Engineer, to assure a good bond between the asphalt emulsion slurry seal and the pavement surface. Power brooms or pick up brooms alone may not be adequate to thoroughly clean the surface. This also includes the removal of grass or weeds, which are growing in the joint between the street and the concrete gutter

The Contractor shall take all steps, procedures, and means to prevent dust pollution due to his construction practices in connection with this work. Dust prevention measures shall be maintained at all times during construction of the project to the satisfaction of the Engineer, in accordance with "Maricopa County Air Pollution Control Regulations".

Prior to the Pre-Construction meeting, the Contractor shall have a dust control plan, approved by the Maricopa County Division of Air Pollution Control. For information and requirements for the dust control plan, the Contractor shall contact:

Maricopa County Environmental Services Department
Division of Air Pollution Control
2406 South 24th Street, Suite E-214
Phoenix, AZ 85034 (602) 506-6727

The Contractor shall remove and dispose of raised pavement markers (if any) prior to the placement of the slurry seal. Removal shall be by chipping, grinding, or any other method approved by the Engineer. The cost of raised pavement marker removal is incidental to pavement preparation.

Prior to striping removal, the Contractor shall document and detail the existing pavement striping and delineation. The details shall include as a minimum the type, size, color, dimensions, and specific detailed location of the delineation, acceptable to the Engineer, so that contractor or City Forces can replace the delineation, as it existed prior to the removal. The details shall be submitted to the Engineer a minimum three (3) working days prior to covering the striping with slurry.

The slurry shall not be applied until an inspection of the surface has been made by the Engineer and he has determined that it is suitable.

2.3.5.2 WATER FOGGING:

When required by local conditions, the surface, directly ahead of the slurry box, shall be pre-wetted by fogging. The fogging shall be accomplished in such a manner that the entire surface is damp with no apparent flowing water or puddles.

Water Fogging is required and the rate of application of the fog spray shall be adjusted during the day to suit temperatures, surface texture, humidity, and dryness of the pavement. Water for construction is the responsibility of the Contractor. Any cost associated with water shall be incidental to the project. Sprayers shall be kept clean and operating at all times. The spray systems shall always be controlled by the slurry operator and not the driver of the vehicle. The system shall be a dual operated immediately in front of the truck and the spreader box. Slurry vehicles without the dual spray operator controlled system will not be permitted to work.

2.3.6 WEATHER LIMITATIONS:

The slurry seal shall not be applied during inclement weather, or weather determined unsuitable by the Engineer. The slurry seal shall not be applied if either the pavement or the air temperature is below 50 degrees F and falling, nor applied when the ambient temperature exceeds 105 degrees F, measured in the shade. No slurry seal shall be applied when the ambient temperature is expected to drop below 35 degrees F within 24 hours of application.

2.3.7 PROTECTION OF UNCURED SURFACE:

Adequate methods such as barricades, flagmen, pilot cars, etc. shall be used to protect the uncured slurry surface from all types of traffic.

The Contractor shall be responsible for the repair of all damage done within 24 hours of initial application.

2.3.8 MIXING AND APPLICATIONS:

The mixing time shall not exceed four minutes.

Excessive mixing will not be allowed. The resulting mixture shall have the desired consistency, when placed on the surface. If breaking, hardening, segregation, balling or lumping occurs during the mixing process, the batch will be discarded.

A sufficient amount of slurry shall be carried in all parts of the spreader at all times so that a complete coverage is obtained.

No streaks caused by oversized aggregate shall be left in the finished surface. Build-up on longitudinal and transverse joints will be kept to a minimum. Approved squeegees shall be used to spread slurry in areas non-accessible to the slurry mixer.

2.3.8.1 JOINTS:

No excess build up, uncovered areas, or unsightly appearance shall be permitted on longitudinal or transverse joints. When possible the longitudinal joints shall be placed on lane lines. Half passes and odd width passes will be used only when required. If half passes are used they shall not be the last passes of any paved area. A maximum of six inches (6") shall be allowed for overlap of longitudinal lane line joints.

2.3.8.2 LINES:

Care should be taken to insure straight lines along curbs and shoulders. No runoff shall be permitted at the above-mentioned area. Lines at intersections shall be kept straight to provide a neat appearance.

2.3.8.3 HAND WORK:

Areas that cannot be reached with the slurry seal machine shall be surfaced using hard squeegees to provide complete and uniform coverage. The area to be hand worked shall be lightly dampened prior to mix placement and the slurry placed in a time period so that the finish is the same as the finish achieved by use of the spreader box.

2.3.8.4 STOCKPILE AND CLEAN UP:

The Contractor shall locate and acquire areas to stockpile materials and equipment needed for construction. The cost of material stockpiling, equipment storage and clean up is incidental to the project.

Before final acceptance by the City, all private or public property and grounds occupied by the Contractor in connection with the work shall be cleaned of all rubbish, excess materials, temporary structures and equipment, and all parts of the work area shall be left in an acceptable condition. Clean-up shall also include the daily removal of slurry seal materials from manhole covers, valve covers, fire hydrant markers, gutters, curbs, sidewalks, survey monuments (brass caps), etc. in the project area.

2.3.8.5 MATERIAL TESTING:

The Contractor is responsible for the quality control of all materials used. Testing performed by the Engineer will assure that materials conform to the specifications and shall not be considered a quality control measure.

Asphalt Emulsion: Provisions for properly sampling emulsion from distributor trucks or on-site bulk storage units shall be made by the Contractor. Emulsion sampling shall be performed by the Contractor and witnessed by the Engineer in accordance with the latest edition of ASTM D-140, "Standard Methods of Sampling Bituminous Materials." Testing will be performed by the Engineer in accordance with the latest edition of ASTM D-244, "Testing Emulsified Asphalts".

The minimum amount of sampling and testing shall be once for every 500 tons of emulsion. Material found in non-compliance will be rejected and shall be removed from the job site. No payment will be made for rejected material. The project shall not resume until the new material is tested and found in compliance. No lost time will be considered as a result of material being found in non-compliance.

Fine Aggregate Material: Material will be sampled and tested by the Engineer in accordance with the latest edition of ASTM C-136, "Sieve Analysis of Fine and Coarse Aggregates." The Engineer will sample aggregate cover material for acceptance at the stockpile location.

The minimum amount of sampling fine aggregate material and testing shall be once per day. Material found in non-compliance will be rejected. No payment will be made for rejected material. The area represented by the test shall be that area covered the day the sample was taken. No lost time will be considered as a result of material being found in non-compliance.

The Contractor shall permit the City to take samples of the materials and slurry used in the project at the City's discretion.

If any two successive tests of the stockpile material fail, the job shall be stopped. The Contractor shall, at his own expense, provide proof to the City that the conditions have been corrected.

If any two successive tests of the mix from the same machine fail, the use of the machine shall be suspended. The Contractor shall, at his own expense, provide proof to the City that the problems have been corrected and that the machine is working properly.

The Contractor shall check stockpile moisture content and set the machine accordingly to account for aggregate bulking. The City will use the following minimum sampling and testing guide for the contract.

AGGREGATE: Gradation, ASTM C-136, during production

<u>SAMPLE POINT</u>	<u>FREQUENCY</u>	<u>SIZE</u>	<u>ACCEPTANCE</u>
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Stockpile or Unit on the job site	Once per day (average of 2*)	3/8"	100% passing
		#4	± 5% of design
		#8	± 5% of design
		#16	± 5% of design
		#30	± 5% of design
		#50	± 4% of design
		#100	± 3% of design
		#200	± 2% of design

Supplier Stockpile prior to start up

* The percentage of aggregate passing shall not go from the high end to the low end of specified range on any two successive sieves.

AGGREGATE: Sand Equivalent, ASTM D-2419, during production

<u>SAMPLE POINT</u>	<u>FREQUENCY</u>	<u>ACCEPTANCE</u>
Stockpile or Unit	Weekly	50 min (any sample)
Supplier Stockpile	1 prior to start up	

EMULSION: Percent Residue, ASTM D-244, during production

<u>SAMPLE POINT</u>	<u>FREQUENCY</u>	<u>ACCEPTANCE</u>
Storage Tank or Unit	Monthly & at start up	± 1% of design (60% min)

SLURRY MIX: Percent Emulsion Measured and Calculated, during production

<u>SAMPLE POINT</u>	<u>FREQUENCY</u>	<u>ACCEPTANCE</u>
NA	Daily	± 1% of design

SLURRY MIX: Application Rate Measured and Calculated, during production

<u>SAMPLE POINT</u>	<u>FREQUENCY</u>	<u>ACCEPTANCE</u>
NA	Daily	18-24 lbs/sy

2.3.9 ROLLING:

As soon as the asphalt slurry has been set sufficiently to prevent any material from being picked up, it shall be rolled until all ridges have been ironed out and a uniform surface is obtained.

2.3.10 MEASUREMENT:

Quantities and materials for this work will be paid for at the contract price per unit of measurement for each of the following pay items as indicated in the proposal.

2.3.10.1 Bituminous tack coat if specified Ton (Diluted)

2.3.10.2 Emulsified asphalt for slurry Ton (Undiluted)

2.3.10.3 Aggregate for slurry Ton (Surface Dry)

Payment for various bid items shall be compensation in full for furnishing all materials, labor, tools, equipment, and appurtenances necessary to complete the work in a satisfactory manner, as specified.

No additional payment will be made for work related to any item, unless specifically called for in the bid. No payment will be made for materials used to patch unacceptable work.

Price per ton of aggregate will include the price of the mineral filler. Total quantities indicated in the proposal are approximate and for bidding purposes only.

Only certified tickets of the bituminous tack coat, emulsion, and dry weight of aggregate delivered to a City representative will be accepted for payment. Overweight tickets shall not be accepted and material shall be partially unloaded, at no expense to the contracting agency, to a legal status for re-weighing. A new ticket will be required for the remaining load. No deliveries shall be accepted prior to 7:00 a.m., or after 4:30 p.m. Any deliveries before or after this time frame will not be compensated.

A daily tabulation of materials delivered, used, square yards covered, application rate, etc., shall be compared between the Contractor and the Engineer. Adjustments and agreements are final at the end of each stockpile. Materials placed without approval of the inspector, or materials rejected due to improper placing, improper proportions of materials, or materials found to be defective, will not be compensated.

2.3.11 SAND BLOTTER:

Sand Blotter shall be in accordance with MAG Specs Sections 333.3.2 and 333.7, except as modified below.

The Contractor shall apply sand blotter prior to opening the roadway to traffic where there is an excess of asphalt emulsion, if requested by the Engineer. The Contractor shall also be responsible for sweeping the sand within 24 hours of opening the roadway to traffic.

There will be no payment for materials not placed in accordance with this specification. The cost associated with sand blotter, the material supplies,

application, and clean-up shall be included in the unit price of related pay items. No direct payment or measurement for pay purposes will be made for sand blotter.

If the paved roadway must be sanded, the surface shall be sanded at approximately two pounds per square yard. No more sand shall be used than necessary, and the amount specified shall not be increased without prior approval of the Engineer.

After the treated area has been opened to traffic, the Contractor shall immediately cover any excess asphalt emulsion that comes to the surface with additional sand.

2.4 ASPHALT MILLING.

The work under this section shall consist of milling existing asphalt concrete pavement where shown on the Plans or requested by the Engineer.

2.4.1 CONSTRUCTION REQUIREMENTS:

Contractor is responsible for locating all milling hazards on and below the surface within the areas to be milled including areas requiring special milling. Special milling is not a separate pay item and shall be paid for as Asphalt Milling.

The milling cut depth shall be the depth indicated on the Plans plus or minus 1/8 inch. The milling machine shall have electronic grade controls. Contractor shall remove the milled material and sweep the roadway clean with a power pick-up broom to the satisfaction of the Engineer.

Asphalt pavement adjacent to manholes, valve boxes, small radius curbs and other fixed objects that produce confined area shall be removed with milling equipment specifically designed to operate in constricted areas. The equipment shall be capable of removing asphalt concrete of the specified thickness without damage to, or displacement of, the adjacent object(s).

The Contractor shall be responsible for continually checking the milling operation to determine that the proper depth of milling has been achieved, that the proper profile and cross slope are achieved, and that the surface texture is (a) free from longitudinal ridges, and (b) has a uniform pattern.

The Contractor shall immediately notify the Engineer when:

- The existing pavement thickness is found to be less than anticipated and breaking of the underlying material occurs.

- Delamination of underlying material occurs.

The work shall result in a clean milled surface to the specified depth for the area indicated by the construction documents including the areas immediately around and next to any individual hazard within the area to be milled. The edge of milled area shall form a straight clean cut line.

Road sections with curb and gutter shall be edge milled in accordance with Maricopa County Department of Transportation Standard Detail No.2013 "MILLING FOR OVERLAY", dated January 2, 2009, included in these special provisions or as directed by the Engineer.

Road sections without curb and gutter shall be milled at the road terminations.

Asphalt milling shall be performed for areas containing high points, rutting, shoving, seal coats, or other special circumstances as requested by the Engineer.

The Contractor shall not mill existing pavement until the Engineer approves the asphalt- rubber concrete mix design.

Pavement markings removed by the milling operation shall be replaced with temporary traffic control devices in order to provide continuous marking and control of the construction area, including delineation of traffic lanes.

Roadway without intersecting roads, curb and gutter, etc. will not require asphalt milling unless requested by the Engineer.

Any damage done to milled surfaces by traffic or other circumstances, prior to the placement of asphalt-rubber concrete, shall be repaired by Contractor as specified by the Engineer at no additional cost to the City.

2.4.2 MEASUREMENT AND PAYMENT:

Measurement for Asphalt Milling will be by the square yard and shall only include area milled to the required depth and cross section.

Payment for Asphalt Milling at the contract unit price shall be full compensation for the work, complete-in-place, including all asphalt milling, milling around structures, removal and disposal of milled materials, and sweeping.

2.5 ASPHALT CONCRETE PAVEMENT.

2.5.1 DESCRIPTION:

This section is to provide specifications for furnishing all materials, mixing at a plant, hauling and placing a mixture of aggregate materials, mineral admixture and asphalt binder to form a pavement course for placement upon a previously prepared base or sub base.

2.5.2 MATERIALS AND MANUFACTURE:

The materials shall conform to MAG Specs Section 710 for the type specified. The specific required mix type shall be called out in the contract documents or as directed by the Engineer.

2.5.3 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 degrees F. (50 degrees F for Asphalt Concrete lift less than 2 inch thick) or above. No asphalt concrete shall be placed when the weather is foggy or rainy, or when the base or sub base on which the material is to be placed is unstable. Asphalt concrete shall be placed only when the Engineer determines that weather conditions are suitable.

2.5.4 APPLICATION OF TACK COAT:

A tack coat shall be applied to all existing and to each new course of asphalt concrete prior to the placing of a succeeding lift of asphalt concrete. 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 MAG Specs Section 329. The grade of emulsified asphalt shall be SS-1 h or CSS-1 h as specified in MAG Specs 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. This shall be addressed in the project specifications prior to the bidding of the project.

2.5.5 MIX DESIGN:

The mix design shall be submitted to the Engineer at least five working days prior to the start of asphalt concrete production. The Engineer will review

and approve the mix design to assure it contains all of the required information as outlined in MAG Specs Section 710.3.1. The target values for gradations, binder contents, and air voids will be established as the accepted Job Mix Formula (JMF) based upon the mix design. Mix designs not containing all of the information will be returned within five working days of receipt of all mix design information, for action and resubmission by the contractor.

Once the mix design has been approved by the agency and the mixing plant selected, the Contractor and/or his supplier shall not change plants nor utilize additional mixing plants without prior approval of the Engineer.

If the contractor elects to change its source of material, the contractor shall furnish the Engineer with a new mix design, which meets the requirements of MAG Specs Section 710, as amended by the Project Specifications.

The contractor may make self-directed target changes to the approved mix design within the limits shown below. Requests for self-directed target changes shall be made in writing and acknowledged by the Engineer prior to the start of production of a lot and will remain in effect until such time as any additional changes are implemented.

The self-directed target changes must meet the contract requirements for mix design criteria and gradation limits.

ALLOWABLE SELF-DIRECTED TARGET CHANGES	
MEASURED CHARACTERISTICS	ALLOWABLE SELF-DIRECTED TARGET CHANGES
Gradation (Sieve Size)	
3/8 INCH	+ 2% from mix design target value
No 8	+ 2% from mix design target value
No 30	+ 1% from mix design target value
No 200	none
Binder Content	+ 0.2% from mix design target value
Effective Air Voids	None

The contractor may propose target changes, other than self-directed changes, to the approved mix design for the approval of the Engineer. The Engineer will determine if the proposed target change will result in mix production that meets the contract requirements for mix design criteria and

gradation limits. The target changes will not be retroactive for the purpose of acceptance.

2.5.6 MIX PRODUCTION:

All materials shall be proportioned by weight in a hot mix asphalt plant in the proportions required by the mix design to provide a homogeneous and workable mass. Each hot mix asphalt plant shall be inspected in accordance with the provisions contained in the 'Hot Mix Asphalt Production Facilities' by the Arizona Rock Products Association and shall have a current inspection certificate. All measuring devices shall be calibrated at least annually by a technician licensed by the Arizona Bureau of Weights & Measures. Mixing plants shall conform to the requirements of AASHTO M 156, except as modified herein.

In drum mix plants the mineral admixture shall be added and thoroughly mixed with the mineral aggregate by means of a mechanical mixing device prior to the mineral aggregate and mineral admixture entering the dryer. The moisture content of the combined mineral aggregate shall be a minimum of three percent by weight of the aggregate during the mixing process.

For drum-mix plants, the mineral admixture shall be weighed across a weight belt, or other 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 that is in good working condition. The rate of the aggregate feed shall not exceed the mixing device's capacity in ton per hour. The mixer shall be constructed to minimize the loss of mineral admixture and shall be located in the aggregate delivery system at a location where the mixed material can be readily inspected. The mixing device shall be capable of effective mixing in the full range of the asphalt concrete production rates.

The hot plant and equipment shall be constructed and operated to prevent loss of mineral admixture through the dust collection system of the plant.

A positive signal system shall be provided and utilized during production whereby the mixing shall automatically be stopped if the mineral admixture is not introduced into the mineral aggregate. The plant will not be permitted to operate unless the signal system is in good working condition.

The introduction of bituminous material shall be controlled by an automated system fully integrated with the controls of the mineral aggregate and mineral admixture. The production of the plant shall be controlled by the rate required to obtain a uniform mixture of all components. Drying and heating shall be accomplished in such a manner as to preclude the mineral

admixture from becoming coated with un-spent fuel. The completed asphalt concrete may be held in storage for up to 12 hours in insulated or heated silos, providing the minimum temperature noted herein for placement and compaction is met behind the placement device. If the Engineer determines that there is an excessive amount of heat, heat loss, drain down, segregation and/or oxidation of the mixture due to temporary storage, use of surge bins or storage bins will be discontinued.

The temperature of the asphalt concrete, with unmodified binders, upon discharge from the mixer shall not exceed 335 degrees F. The discharge temperature may be increased on the recommendation of the binder supplier, when approved by the Engineer. If the asphalt concrete is discharged from the mixer into a hopper, the hopper shall be constructed so that segregation of the asphalt concrete will be minimized.

2.5.7 PAVEMENT SMOOTHNESS (RIDEABILITY):

Pavement smoothness payment adjustments shall only apply to roadways with new asphalt pavement surfacing length greater than 0.25 miles, a functional classification of collector or higher, and a posted speed limit of 40 mph or greater. When the new asphalt pavement has a minimum of two courses of hot mix asphalt, each layer being 1.0 inch or greater; or the pavement has a new overlay of at least 1.5 inches the final pavement surface shall be evaluated for smoothness by the Engineer.

The Engineer shall determine if the rideability shall be applied to road segments, where a single lift overlay of 1.5" or greater is applied to existing pavement with a before overlay IRI of greater than 220 "International Roughness Index" (IRI). The "Before IRI Overlay" is defined as the average IRI of the existing pavement for a road section from starting to end termini. The before overlay IRI shall be provided by the Engineer. If the pavement structure is determined to be of sufficient thickness a bid item shall be included for mandatory profile milling as a pay item. All applicable road segments shall be identified in the pre-bid documents. For road segments with a before overlay IRI between 120 and 220 profile milling is optional and will not be a pay item. Road segments with a before overlay IRI of less than 120 shall follow the new construction portion of the smoothness specification.

Prior to the placement of the final course of pavement, the Engineer will furnish the Contractor with an International Roughness Index (IRI) value that results from the Engineer's evaluation of the material placed to date. The actual time of this "preliminary" evaluation will be coordinated between the Engineer, the Contractor, and the City. This evaluation will be limited to one (1) test run in a single lane in each direction of travel. The IRI value

will serve as a guide to the Contractor in evaluating his current level of conformance with the smoothness specification. Preliminary IRI evaluations shall **NOT** be performed on road segments with profile milling, due to the extreme rough texture created by the profiler. The IRI value for the final course of pavement will be the basis for determining payment adjustments for smoothness. The smoothness adjustment will be in accordance with the New Construction Rideability Adjustment Schedule (Table 1) or the Overlay Rideability Adjustment Schedule (Figure 1).

2.5.7.1 EVALUATION METHOD:

The City shall evaluate the final pavement surface for smoothness, using the City IRI vehicle equipped with an International Cybernetics Corp. Laser Road Profiler. The IRI value is the calculated measurement of the deviation of a pavement surface from a true planar surface. The IRI data is typically collected at the posted speed limit, however speeds may range from 20-60mph. A zero IRI value would indicate a perfectly smooth pavement surface, while increasing IRI values would correspond to an increasingly rough pavement surface. IRI values will be calculated in inches of vertical displacement for every 0.10 mile lane segment and normalized to inches/mile. [Example: a 0.10-mile section yielding an actual vertical displacement of ten (10) inches would be normalized to an IRI value of 100 inches/mile.]

The final pavement surface being evaluated will be divided into 0.10-mile road segments and individual lanes. The final road segment will include any remaining portion of a segment not equaling 0.10 miles. [Example: 1.52 miles of pavement divides into 15 segments with the last one measuring 0.12 miles.] The IRI is calculated for each 0.10-mile segment and shall be averaged (three runs per lane) to determine the IRI value for that segment. All values obtained from the RMS IRI vehicle shall be final.

The following shall be subject to smoothness testing:

1. Roadway lanes that are 0.25 miles or greater in length.
2. Smoothness data will not be computed for the following project sections;
 - Lanes less than 0.25 miles in length.
 - Shoulders.
 - Pavement on horizontal curves that require the test vehicle to travel at speeds less than 20 mph.
 - Test segments with an irregularity such as bridge joints, cattle guards, drainage swales, railroad tracks, valley gutters, or other irregularity item as identified by the Engineer shall have a reduction in length of the

test section by a minimum of 0.01 mile (53'), to exclude the irregularity from the data set.

3. Bridge decks shall be included only if paved as part of the project. If bridge decks are not included as part of the construction project, profile testing will be suspended before the first joint between the asphalt surfacing and the bridge/approach slab and restarted after the last joint between the bridge/approach slab and the asphalt surfacing.
4. Smoothness measurement testing will start and stop at the transverse joints of the project limits.

When requested by the Engineer, the Contractor shall provide traffic control for smoothness testing to allow the test vehicle to safely travel through signalized intersections and/or stop controls oriented in the test direction of travel.

The Contractor shall notify the Engineer within ten (10) working days after completion of all pavement repairs that the pavement is ready for smoothness testing. The Engineer will have the testing conducted within twenty (20) working days after notification by the Contractor. All Asphalt concrete pavements shall conform to MAG Specs Section 321 and 325 prior to smoothness testing.

When the smoothness measurements indicate corrective work is required, the Engineer shall notify the Contractor in writing within ten (10) working days after the completion of the smoothness testing. The Contractor shall have twenty (20) working days following such notification to make repairs to the pavement.

The Contractor shall notify the Engineer within ten (10) working days after completion of all pavement repairs that the pavement is ready for smoothness re-testing. The Engineer will conduct the testing within twenty (20) working days after notification by the Contractor.

No testing shall be conducted during rain or under other conditions deemed inclement by the Engineer. During testing the roadway must be free of moisture and other materials that might affect the evaluation. Any work associated with preparing the roadway for the evaluation, such as but not limited to sweeping, will not be measured for payment.

2.5.7.2 PAYMENT ADJUSTMENT FOR RIDEABILITY:

All Asphalt concrete shall conform to MAG Specs Section 321 and 325 prior to final payment adjustment for smoothness. Positive adjustments for rideability **shall not be made** for those areas subsequently reviewed and

determined by the Engineer to be otherwise defective. The Area shall be considered defective if it does not conform to MAG Specs Section 321 and 325 requirements for Air Voids, Binder Content, Gradation, Density, and/or Pavement Thickness.

Payment adjustments shall be made under the contract item Rideability. When a project is considered to be new construction or re-construction with grade control from the sub-grade material and up, the payment to the Contractor shall be based on the IRI value according to the New Construction Rideability Adjustment Schedule (Table 1). In the case of single lift 1.5" or greater overlays the payment to the contractor shall be based on the IRI value according to the Overlay Rideability Adjustment Schedule (Figure 1). The adjustment will be applied to each one tenth mile (0.10 mi.) segment of each lane subject to smoothness testing. The rideability payment will be the indicated percent adjustment multiplied times the adjusted contract price for the surface course quantities of the hot mixed asphalt, asphalt overlay, or rubber asphalt overlay incorporated into the final construction.

Payment for Rideability will be distributed based on segment areas; the area of each lane segment will be the segment length times the segment width. The segment width shall be the striped traffic lane width or modified lane width. The width for exterior lanes will be the striped traffic lane width modified to include the asphalt area of adjacent bicycle lanes, paved shoulders, and short auxiliary lanes. The width of the innermost traffic lanes will be the striped traffic lane width modified to include the asphalt area of adjacent asphalt paved medians and left turn bays.

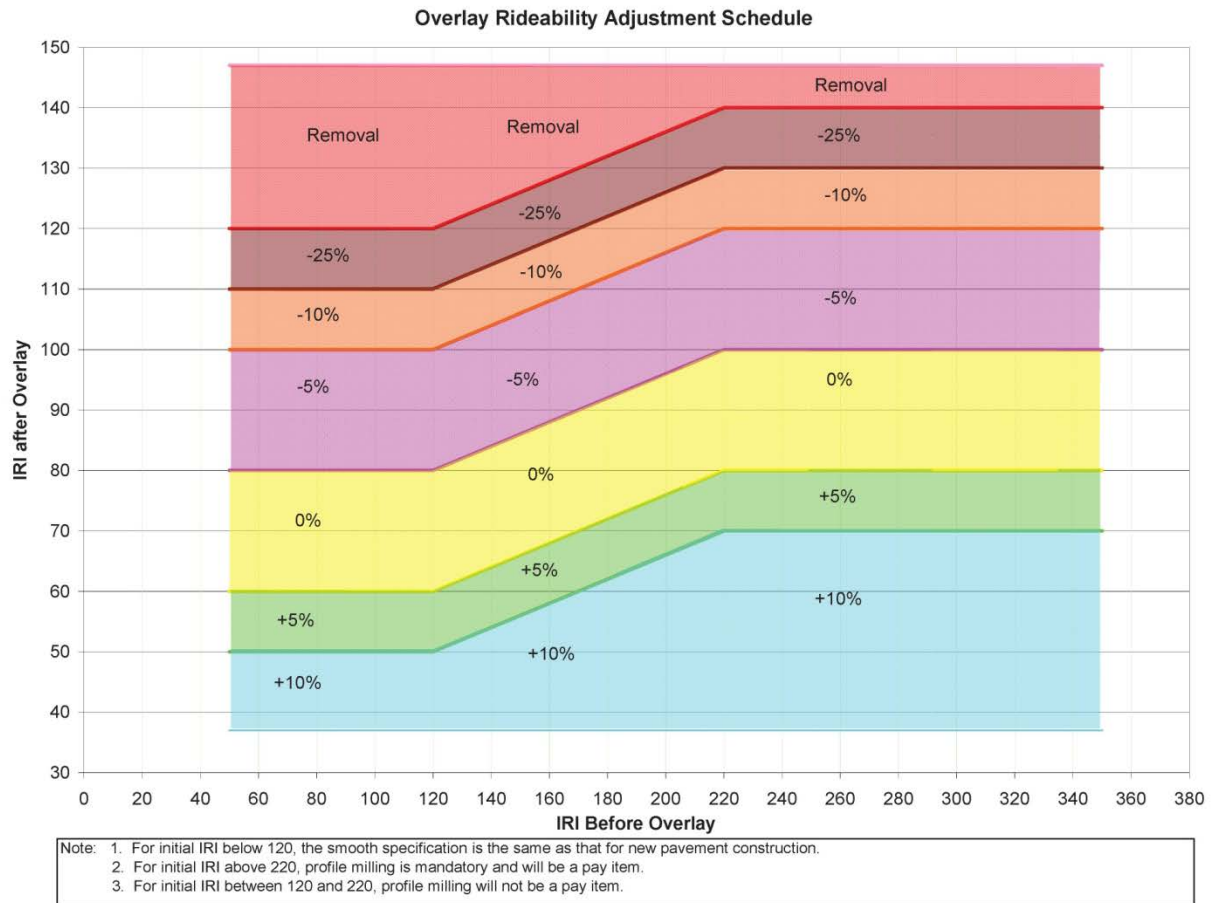
Table 1: New Construction Rideability Adjustment Schedule

IRI (inches per mile)	PERCENT ADJUSTMENT
≤ 50	+10
51 - 60	+05
61 - 80	0
81 - 100	-05
101 - 110	-10
111 - 120	-25
>120	RxR Required

NOTES:

All IRI values will be rounded to the nearest whole number. (Example: 75.5 shall be rounded to 76.) “RxR Required” is the Removal and Replacement of the defective area.

Figure1:



2.5.8 TRANSPORTATION:

Petroleum distillates or other substances that will have a detrimental effect on the asphalt concrete shall not be used as a release agent.

The beds of all transportation units shall be clean and smooth to allow the free flow of material into the paving machine’s hopper.

Tarpaulins shall be furnished on all trucks and used when weather condition warrant, or if directed by the Engineer.

2.5.9 PLACEMENT:

2.5.9.1 PLACING:

All courses of asphalt concrete shall be placed and finished by means of a self-propelled paving machine equipped with an automatically actuated control system, except under certain conditions or at locations where the Engineer deems the use of a self-propelled paving machine impracticable.

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 alternatively when directed, by controlling the elevation of each end independently.

The control system shall be capable of working with one of the following devices:

- (A) Ski or non-contact device of not less than 30 feet in length, supported throughout its entire length
- (B) Taut stringline or wire set to grade
- (C) Short ski or sonar sensing units from curb control
- (D) Joint matching shoe

Failure of the control system to function properly shall be cause for the suspension of asphalt concrete production. In order to achieve a continuous operation, the speed of the paving machine shall be coordinated with the hot mix plant and transport units.

If the asphalt concrete is dumped from the hauling vehicles directly into the paving machine, 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 truck.

If asphalt concrete is dumped upon the surface being paved and subsequently loaded in 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 asphalt concrete shall be picked up and loaded into the paving machine.

Self-propelled paving machines shall spread the mixture without segregation or tearing, true to line, grade and crown indicated on the Project plans. Pavers shall be equipped with hoppers and augers that will distribute the mixture uniformly in front of an adjustable floating screed. The raising of the hopper wings must be minimized and the paving machine will not be operated when in an empty condition.

Screeds shall include any strike-off 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. 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.

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

2.5.9.2 JOINTS:

Transverse joints: before a surface course is placed in contact with a cold transverse construction joint, the cold existing asphalt concrete shall be trimmed to a vertical face for its full depth and exposing a fresh face. After placement and finishing the new asphalt concrete, both sides of the joint shall be dense and the joint shall be smooth and tight. The surface in the area of the joint shall not deviate more than $\frac{1}{4}$ inch from a 12-foot straightedge, when tested with the straightedge placed across the joint, parallel to the centerline.

Longitudinal Joints of each course shall be staggered a minimum of 6 inches with relation to the longitudinal joint of the immediate underlying course cold transverse construction joint, the cold existing asphalt concrete shall be trimmed to a vertical face for its full depth and exposing a fresh face. The fresh face shall be tacked prior to placement of the adjacent course. After placement and finishing the new asphalt concrete, both sides of the joint shall be dense and the joint shall be smooth and tight. The surface in the area of the joint shall not deviate more than $\frac{1}{4}$ inch from a 12-foot straightedge, when tested with the straightedge placed across the joint, parallel to the centerline. The joint will be tack coated if required by the Engineer.

2.5.9.3 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. If a leveling course is being applied on an Asphalt surface, a tack coat shall be applied. The compaction requirements contained in MAG Specs Section 321.10 do not apply to leveling courses.

2.5.9.4 COMPACTION BASE AND SURFACE:

It is the contractor's responsibility to perform any desired Quality Control monitoring and/or testing during compaction operations to achieve the required compaction. Asphalt concrete immediately behind the laydown machine shall be referenced to MAG Specs Table 321.3. The probe type thermocouple thermometer shall have a current calibration sticker attached. When measuring the temperature of the mat, the probe shall be inserted at mid- depth and as horizontal as possible to the mat.

Asphalt compaction equipment shall be of sufficient size and weight to accomplish the required compaction. All compaction equipment shall be operated and maintained in accordance with the manufacturer's recommendations and the project requirements. During the rolling operation, the speed of the roller shall not exceed 3 miles per hour, unless otherwise approved by the Engineer.

Pneumatic tired compactors shall be equipped with skirt-type devices mounted around the tires so that the temperature of the tires will be maintained during the compaction process.

The Engineer will determine the acceptability of the pavement compaction in accordance with Section 2.5.11

2.5.9.5 SMOOTHNESS:

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 one-fourth ($\frac{1}{4}$) inch from the lower edge of a 12-foot straightedge when the straightedge is placed parallel to the centerline of the roadway.

2.5.9.6 ASPHALT CONCRETE OVERLAY:

Asphalt concrete overlay consists of the placing and compacting 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.

Asphalt concrete mix aggregate gradation and percentage of asphalt binder shall be in accordance with MAG Specs Section 710 using a 1/2-inch Marshall-Low Traffic asphalt concrete mix designation for overlay more than one and one-half inch in thickness and a 3/8-inch Marshall-Low Traffic

asphalt concrete mix designation for overlay one and one-half inch or less in thickness, unless otherwise shown or specified in the special provisions.

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

- (a) 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 either milled or cut out and patched. 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.
- (b) Before placing asphalt concrete overlay, milling shall be done as shown on the plans or specified in the special provisions and shall be in accordance with MAG Specs Section 317.
- (c) After surfaces have been prepared to the satisfaction of the Engineer, they shall receive a tack coat per MAG Specs Section 321.4. 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.

Asphalt concrete overlay shall be placed as specified in MAG Specs Section 321.8.1 and compacted as specified in MAG Specs Section 321.8.4. The surface smoothness shall meet the tolerances specified in MAG Specs Section 321.8.5.

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.

2.5.9.7 PAVEMENT FABRIC INTERLAYER:

Pavement fabric interlayer shall be used only when specified on the plans or in the specifications.

Pavement fabric interlayer shall be in accordance with MAG Specs Table 796-1 and be the class designated on the plans or in the specifications.

Asphalt binder coat used to bond the fabric to the pavement shall be paving asphalt PG 70-10 asphalt cement conforming to the requirements of MAG Specs Section 711. The application and distributing equipment for the asphalt binder shall conform to the requirements of MAG Specs Section 330. The asphalt binder coat shall be uniformly spray applied to the prepared pavement surface at the rate of 0.20 gallons per square yard for Class B fabric or at the rate of 0.25 gallons per square yard for Class A fabric. Some underlying surfaces may require a higher or lower application rate. A test strip may be necessary to determine the proper application rate. The width of liquid asphalt cement application shall be the fabric width, plus six inches.

Neither the asphalt binder coat or fabric interlayer shall be placed when weather conditions, in the opinion of the Engineer, are not suitable. The asphalt binder and fabric interlayer shall only be placed when the pavement is dry, the ambient air temperature is 50 degrees F and rising, and pavement temperature is 40 degrees F and rising.

Equipment for placing the fabric shall be mechanized and capable of handling full rolls of fabric. The equipment shall be able to lay the fabric smoothly to maximize pavement contact and remove air bubbles. Stiff bristle brooms shall be used to smooth the fabric. The equipment used to place the fabric shall be in good working order and is subject to approval by the Engineer.

Pavement fabric interlayer shall not be placed if the in-place binder is hotter than 325 degrees F or has cooled to 180 degrees F or below (as determined by non-contact thermometer).

Pavement fabric interlayer shall be placed onto the asphaltic binder with the heat bonded side up with a minimum amount of wrinkling or folding. Remaining wrinkles or folds 1-inch and larger shall be removed or slit and shingle-lapped in the direction of paving. Burning or torching of wrinkles is not allowed. Fabric shall overlap three to six inches to insure full closure of the joint. Transverse joints shall be shingle-lapped in the direction of paving to prevent edge pickup by the paver. A second application of hand-placed asphalt binder may be required at laps and repairs as determined by the Engineer to ensure proper binding of the narrow double fabric layer.

All areas where fabric has been placed shall be paved with asphaltic concrete during the same work shift. Placement of the asphaltic concrete shall closely follow fabric lay down. The temperature of the asphaltic

concrete immediately behind the laydown machine shall not exceed 325 degrees F. In the event that the asphalt binder coat bleeds through the fabric causing construction problems before the overlay is placed, the affected areas shall be sanded with a sand blotter in compliance with MAG Specs Section 333. Excess sand shall be removed before beginning the paving operation. In the event of rainfall prior to the placement of the asphaltic concrete, the fabric shall be allowed to dry before the asphalt concrete is placed.

Turning of the paving machine or of other vehicles on the fabric shall be gradual and kept to a minimum to avoid damage to the fabric. Should equipment tires stick to the fabric during pavement operations, small quantities of paving asphalt concrete shall be broadcast on the fabric to prevent pick-up. Decrease of binder rate in order to minimize pick-up on tires is not allowed.

TABLE 321.2						
MINIMUM ASPHALT CONCRETE PLACEMENT TEMPERATURE						
Base (1) Temp (/F)	Mat Thickness					
	½	¾	1	1 ½	2	3 and greater
40 – 50	--	--	310	300	285	275
50 – 60	--	310	300	295	280	270
60 – 70	310	300	290	285	275	265
70 – 80	300	290	285	280	270	265
80 – 90	290	280	270	270	265	260
+ 90	280	275	265	265	260	255

(1) Base on which mix is to be placed

2.5.10 QUALITY CONTROL:

It is the contractor's responsibility to perform Quality Control monitoring and/or testing during asphalt concrete production to achieve the required compaction and to perform Quality Control monitoring and/or testing during asphalt concrete production to achieve the required mix properties. The Engineer may obtain samples of any portion of any material at any point of the operations for his own use. Also, the Engineer may order the use of any drying, proportioning and mixing equipment or the handling of any material discontinued which, in his/her opinion, fails to produce a satisfactory mixture.

The asphalt concrete produced shall conform to the properties of the mix design. When the asphalt concrete does not conform to the approved mix design properties, it shall be reported to the Engineer, and corrective

quality control measures shall be implemented, or production shall cease immediately at no additional cost to the contracting Agency or Engineer.

2.5.11 ACCEPTANCE:

2.5.11.1 ACCEPTANCE CRITERIA:

Unless otherwise specified, asphalt concrete will be divided into lots for the purpose of acceptance. A lot shall be considered to be one day's production. When the quantity of asphalt concrete placed in a day exceeds 500 tons but is less than 2000 tons, the lot shall be divided into 500 ton sub-lots or fraction thereof. Where the quantity of asphalt concrete placed in a day exceeds 2000 tons, the day's production will be divided into four (4) approximately equal sub-lots. A minimum of one sample will be obtained from each lot. Tests used to determine acceptance will be performed by the Engineer or a laboratory employed by the Engineer. In either case the laboratory shall be accredited by the AASHTO Accreditation Program (AAP), for the tests being performed. The acceptance laboratory will take representative samples of the asphalt concrete from each sub-lot to allow for gradation, binder content, air voids, pavement thickness and compaction of base and surface course. Each sub-lot will be accepted based upon the test data from the sample(s) from that sub-lot. All acceptance samples shall be taken using random locations or times designated by the Engineer in accordance with ASTM D 3665.

2.5.11.2 GRADATION, BINDER CONTENT AND AIR VOIDS:

The acceptance laboratory will take a sample of the asphalt concrete in accordance with the requirements of Section 2 or 4 of Arizona Test Methods 104 or AASHTO T168 from each sub-lot. The minimum weight of the sample shall be 45 pounds. Asphalt binder content and gradation shall be determined in accordance with AASHTO T308 using the ignition furnace for each sub-lot. The acceptance laboratory is responsible for obtaining the necessary materials and performing an ignition furnace calibration as outlined in AASHTO T308 for each asphalt concrete mixture utilized on the project. The correction factor used for each test shall be clearly indicated on the report. The bulk density for Marshall Mix designs shall be tested in accordance with AASHTO T245. The bulk density for Gyratory mix designs shall be tested in accordance with AASHTO T312. The maximum theoretical density shall be tested in accordance with the requirements of AASHTO T209. Effective voids determined on the laboratory compacted specimens will be determined at a minimum of once per lot in accordance with the requirements of AASHTO T269. Should the testing for effective air voids not meet the "Full Payment" or "No Corrective Action" requirements of Table 321-5,

additional testing for laboratory air voids on the remaining sub-lots will be performed as necessary to determine the extent of the deficiency.

Acceptance testing results will be furnished to the contractor within five working days of receipt of samples by the acceptance laboratory.

The allowable deviations for acceptable production of each measured characteristic from the values established in the JMF for each sub-lot are as follows:

TABLE 321-3	
ACCEPTANCE LIMITS FOR ASPHALT CONCRETE	
Maximum Aggregate Size	100% passing
Nominal Maximum Aggregate	±7%
No. 8 Sieve to the Nominal Maximum	±6%
No. 100 and No. 30 Sieves	±4%
No. 200 Sieve	±2%

If the results from a single acceptance sample fall outside of the acceptance limits in Table 321-3 a second sample shall be taken and if the second acceptance sample is also outside of the acceptance limits in Table 321-3 the Contractor shall cease production of asphalt concrete. Production shall not begin again until calibration test results verify that adjustments made to materials or proportions yield a gradation that falls within acceptance limits in Table 321-3.

The asphalt binder content shall be considered acceptable if it is within $\pm 0.40\%$ of the mix design target value.

TABLE 321-4
ASPHALT BINDER CONTENT CORRECTIVE ACTION FOR DEVIATIONS

Deviation from that permitted	When the contracting agency is the owner: Payment Reduction (\$ per ton of asphalt concrete)	When the contracting agency is not the owner (i.e. permits): Corrective Action
0.0 to 0.1% points	\$2.00	EA (see 2.5.11.6)
Over 0.1 to 0.2%	\$6.00	EA (see 2.5.11.6)
Over 0.2% points	Removal*	Removal*

Note: Removal* refers to Section 2.5.11.6

TABLE 321-5		
LABORATORY VOIDS ACCEPTANCE AND PENALTIES		
Laboratory Air Voids (Measured at Ndes or 75 blows as applicable)	When the contracting agency is the owner: Payment Reduction (\$ per ton of asphalt concrete)	When the contracting agency is not the owner (i.e. permits): Corrective Action
Less than 1.5%	Removal*	Removal*
1.5-2.0%	\$2.50	EA (see 2.5.11.6)
2.1-2.7%	\$1.00	EA (see 2.5.11.6)
2.8-6.2%	Full Payment	No corrective
6.3-6.9%	\$1.00	EA (see 2.5.11.6)
7.0-8.0%	\$2.50	EA (see 2.5.11.6)
Greater than 8.0%	Removal*	Removal*

Note: Removal* refers to Section 2.5.11.6

If an agency or Engineer is purchasing asphalt concrete directly from a commercial material supplier, the agency or Engineer will use MAG Specs Section 321.10 and specifically Tables 321-3, 321-4 and 321-5 from MAG Specs Section 321.10 when determining the acceptance of the asphalt concrete with the material supplier.

2.5.11.3 SURFACE TESTING:

If directed by the Engineer surface drainage test shall be performed. 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 12-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.

2.5.11.4 ASPHALT PAVEMENT THICKNESS:

Asphalt Pavement thickness will be determined from cores secured from each sub-lot for this purpose. Such cores will be taken and measured by the Asphalt Concrete Coring Method. This method can be found at in MAG Specs Section 321.14. Each core location will be patched by the party responsible for the testing.

If the pavement thickness is deficient from the target thickness by 0.25 inches or less, it will be paid for at the contract unit price

If the thickness deficiency of the pavement exceeds 0.25 inch, the limits of the deficient area will be isolated by coring at maximum intervals of 100 feet from the deficient core. The thicknesses of the original deficient core will be averaged with the thicknesses of the cores taken from 100 feet on each side of it to determine compliance with the acceptance requirements.

- (1) If the pavement thickness from step one above deviates from the target thickness by more than 0.25 inch but not more than 0.50 inch, corrective action will be required. This corrective action will consist of application of a Type II slurry seal coat in accordance to MAG Specs Section 715. The Contractor may present an engineering analysis outlining other proposed remedial measures for the consideration of the Engineer. The Engineer will review the engineering analysis and decide within 30 working days whether to accept the proposed remedial measures.
- (2) If the pavement thickness from step one above deviates from the target thickness by more than 0.50 inch, corrective action will be required. The deficient area will be overlaid with no less than 1 inch thick lift, for the full width of the pavement to meet or exceed the designed thickness, with the appropriate end and edge milling, with a mixture approved by the Engineer. The Contractor may present an engineering analysis outlining other proposed remedial measures for

the Engineer's consideration. The Engineer will review the engineering analysis and decide within 10 working days whether to accept the proposed remedial measures. If the Engineer chooses to reject the engineering analysis, the indicated overlay will be constructed by the Contractor at no additional cost to the Owner.

If the pavement thickness deficiency is greater than 0.25 inches and the contracting agency is the owner, Table 321-6 will apply.

TABLE 321-6	
ASPHALT PAVEMENT THICKNESS PAYMENT REDUCTION For Thickness Deficiency of More Than 0.25 inches and less	
Specified Mat Thickness	Reduction in Payment or Corrective
Less than 1.5 inches	50%
1.50 inches to 1.99 inches	33%
2.00 inches to 2.49 inches	25%
2.50 inches to 2.99 inches	20%
3.00 inches and over	17%

2.5.11.5 DENSITY:

Achieving the required compaction is the responsibility of the contractor. The number and types of rollers is the contractor's responsibility and shall be sufficient to meet these requirements.

In-place air voids shall be determined in accordance with AASHTO T269 utilizing cores taken from the finished pavement. The maximum theoretical density used in the determination of in-place air voids will be the average value from the acceptance samples determined for the Lot as outlined in 2.5.11.1

The Engineer will designate two random test locations for each sub-lot and the acceptance laboratory will obtain two cores from each location. The two cores will be averaged for acceptance. The outside one foot of each pass of the pavement course or any unconfined edge will be excluded from testing. The Engineer may exclude areas from the compaction lot that are not accessible by normal compaction equipment.

The Contractor will provide the traffic control to facilitate any coring operations necessary for compaction acceptance.

Cores will be taken per the Asphalt Concrete Coring Method. This method can be found in MAG Specs Section 321.14. The acceptance laboratory will furnish test results within three working days of receipt of the cores.

If the pavement density has in-place voids of 8.0% or less, the asphalt concrete will be paid for at the contract unit price. If the pavement

density has in-place voids greater than 8.0%, the limits of the deficient area will be isolated within the sub-lot by coring at maximum intervals of 100 feet from the deficient core. The in-place voids of the original deficient core will be averaged with the in-place voids of the cores taken from 100 feet on each side of it to determine compliance with the acceptance requirements. If the average of the in-place voids is greater than 8.0% then Table 321-7 shall apply to the sub-lot.

TABLE 321-7		
PAVEMENT DENSITY PENALTIES		
Limits of In-place Air voids	When the contracting agency is the owner: Payment Reduction	When the contracting agency is not the owner (i.e. permits): Corrective Action
Less than 1.5 inches	(\$ per ton of asphalt concrete)	
8.1% to 9.0%	\$4.00	EA
9.1% to 10.0%	\$6.00	EA and Type II Surry Seal
10.1% to 11.0%	Removal*	Removal*
Greater than	Removal	Removal

Notes: Removal refers to Section 2.5.11.6. The Contractor shall remove and replace the entire sub-lot that is deficient. Removal for In-place Air Voids greater than 11.0% is not eligible for Section 2.5.11.6.

2.5.11.6 ENGINEERING ANALYSIS (EA):

Within 10 working days after receiving notice that a sub-lot of asphalt concrete is deficient for “Removal” by the Engineer, the contractor may submit a written proposal (Engineering Analysis) to accept the material in place at the applicable penalties listed in the “Removal” category.

The Engineering Analysis shall contain an analysis of the anticipated performance of the asphalt concrete if left in place. The Engineering Analysis shall also detail the effect of any proposed corrective action on the performance. The Engineering Analysis shall be performed by a professional engineer experienced in asphalt concrete testing and mix designs. If the sub-lot is submitted for referee testing by the contractor, the ten working days allowed to prepare an engineering analysis will begin upon notification of referee test results.

When an Engineering Analysis recommends that a specific lot or sub-lot not be removed, the Engineering Analysis will recommend that the following penalties (Table 321-8) be paid.

TABLE 321-8 ENGINEERING ANALYSIS PENALTIES for REMOVAL* LOTS/SUBLOTS LEFT IN-PLACE		
Acceptance Criteria	Acceptance Limits	Penalty When Contracting Agency is the Owner (\$/Ton)
Asphalt Binder Content	Over 0.2% points from that Permitted	\$9.00
Laboratory Air Voids (Measured at Ndes or 75 blows as applicable)	Less than 1.5% or Greater Than 8.0%	\$3.75
Limits of In-place Air Voids	10.1% to 11.0%	\$9.00

2.5.12 REFEREE:

In the event the contractor elects to question the acceptance test results for a sub-lot, the Contractor may make a written request for additional testing of that sub-lot. The Contractor will engage an independent laboratory (at the Contractors own expense) who is accredited by AAP in all of the acceptance tests. The independent laboratory shall be acceptable to the Engineer and shall perform a complete new set of acceptance tests (as required by Section 2.5.11 representing the area or set of tests in question).

These tests shall include asphalt binder content, aggregate gradation, Marshall or Gyratory unit weight, and maximum theoretical unit weight. Samples for referee testing shall come from representative samples obtained from the completed pavement, as directed by the Engineer.

The number of samples taken will be the same as specified in Section 2.5.11. 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 experienced in asphalt concrete testing and mix designs. 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, and the results will be binding between all parties.

2.5.13 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, asphalt binder, and mineral admixture. 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.

2.5.14 PAYMENT:

The asphalt concrete measured as provided above will be paid for at the contract price per ton or square yard, as adjusted per Section 2.5.11, 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.

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 the mix design unit weight. The calculations and payment for overrun will be by individual pay 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 price.

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.

2.5.15 ASPHALT CORE METHOD:

Core Drilling of Hot Mix Asphalt (HMA) for Specimens of 4" or 6" diameter

2.5.15.1 SCOPE:

This method is to establish a consistent method of the use of a diamond bit core to recover specimens of 4 or 6 inch diameter for laboratory analysis and testing. The method will require the use of: water, ice (bagged or other suitable type), dry ice, and a water-soap solution to be utilized when coring asphalt rubber concrete. Individuals doing the specimen recovery should be observing all safety regulations from the equipment manufacturer as well as the required job site safety requirements for actions, and required personal protective equipment.

2.5.15.2 CORE DRILLING DEVICE:

The core drilling device will be powered by an electrical motor, or by an acceptable gasoline engine. Either device used shall be capable of applying enough effective rotational velocity to secure a drilled specimen. The specimen shall be cored perpendicularly to the surface of pavement, and that the sides of the core are cut in a manner to minimize sample distortion or damage. The machinery utilized for the procedure shall be on a mounted base, have a geared column and carriage that will permit the application of variable pressure to the core head and carriage throughout the entire drilling operation. The carriage and column apparatus shall be securely attached to the base of the apparatus; and the base will be secured with a mechanical fastener or held in place by the body weight of the operator. The core drilling apparatus shall be equipped with a water spindle to allow water to be introduced inside of the drill stem while operating. The cutting edge of the core drill bit shall be of hardened steel or other suitable material with embedded diamond chips in the cutting surface. The core barrel shall be of sufficient diameter to secure a specimen that is a minimum of four or six inches or whichever is prescribed for necessary testing. The core barrel shall not be missing more than one of the teeth used for cutting; if so it shall be discarded and another barrel shall be used. The core barrel shall also be a minimum of two inches longer than the anticipated depth of pavement in accordance with project paving plans.

2.5.15.3 ACCESSORY EQUIPMENT:

A sufficient supply of ice and dry ice shall be provided to sufficiently cool the pavement prior to securing the samples from the designated areas in the pavement. The ice should also be used to adjust the temperature of the water used to cool the core bit. A water supply (usually a plastic 35 – 55 gal drum) with sufficient hose to introduce the water into and through the spindle of the coring device by gravity feed. The drum should be white or light in color to minimize excessive thermal heating of the water (*for coring of asphalt rubber cores see Note 1*). At no time shall the water utilized in the coring operation exceed 65° F during the coring operation. Ice shall be utilized to ensure the temperature control of the water being introduced during the cutting operation. An ice chest or other suitably insulated container that can maintain a temperature of less than 70° F shall be used to secure the specimens during transport. The container will be equipped with flat shelving that will support the drilled cores throughout the entire specimen dimension during transport back to the testing facility.

Miscellaneous hand tools to remove the drilled specimen from the drill hole or the core barrel taking great care in not disturbing the specimen more than necessary (refer to fig. 1 in ASTM D 5361-05).

2.5.15.4 PROCESS:

The pavement surface at the time of coring shall not exceed a temperature of 90° F, the pavement shall be conditioned with ice or dry ice to ensure that this requirement is met. Immediately after it has been ensured that the pavement has dropped to the required temperature, core drilling shall begin. The operator will then apply an even and continuous pressure (Note 2) to penetrate through the full depth of the pavement. The operator will concurrently ensure that enough water is moving over the core surface as to adequately remove any and all cuttings that could damage the drilled core. After the pavement thickness has been penetrated the core shall be carefully removed from either the drill hole or the core barrel and be immediately transferred to an ice chest or other suitable container. Each individual core shall be placed on a shelf in the cooler with the exposed side of the specimen facing down, or the “top side” down. If the specimen is a two lift core, the only acceptable means of separating lifts is with a power or other acceptable wet saw type of equipment (conforming to ASTM D 5361-05); however, at no time shall cores be split using a mallet and screwdriver or metal straight edge when being tested for bulk density. Perpendicularity of the specimen shall be checked in the field after the specimen has been extracted from the surface. The core operator shall hold the core up to eye level and place the core top side down in a “speed square” or small carpenters square. The specimen placed in the square shall not depart from perpendicular to the axis more than 0.5° (approximately equivalent to 1/16 of an inch in 6 inches). If the specimen is outside of this distance from square it shall be discarded in the field and another sample cored that falls within tolerance. The cores upon arriving at the laboratory for testing shall be carefully cleaned and measured for thickness in accordance with ASTM D 3549. A speed square shall be utilized to measure squareness as compared to a 90 degree angle and shall not depart from perpendicular to the axis more than 0.5° (approximately equivalent to 1/16 of an inch in 6 inches). All remaining testing shall be done within the parameters of the current project and / or agency required specification.

- **Note 1** – It should be noted that when the material to be cored is a rubberized asphalt mixture a wetting agent such as liquid dish soap shall be added to the water barrel to hinder the material from sticking or allowing the binder to spread during coring.

- **Note 2** – This refers to pressure exerted on the core barrel and machine during the coring process. Too much pressure can cause damage to the core barrel and the motor; and too little pressure can cause a glazing of the diamonds, reducing cutting efficiency and premature wear of the barrel.

2.6 ASPHALT-RUBBER CONCRETE, GAP GRADED.

2.6.1 DESCRIPTION:

Asphalt-rubber concrete consists of supplying, placing and compaction of plant mixed gap graded asphalt-rubber concrete over asphalt surfaces. The thickness of the finished asphalt-rubber concrete overlay shall be within the range of one to two inches as shown on the plans or as specified in the special provisions. The City will make any repairs needed to roadway prior to overlay.

2.6.2 MATERIALS:

Asphalt-rubber concrete shall consist of a mixture of aggregate and asphalt-rubber binder. Tack coat, asphalt-rubber concrete mix and transportation thereof shall be as specified in Sections 710 and 321, except as modified below:

2.6.2.1 AGGREGATE:

The aggregate shall meet the following gradation:

<u>Sieve Size</u>	<u>Percent Passing</u>
½ inch	100
3/8 inch	78-92
#4	28-42
#8	15-25
#30	5-15
#200	3-7
*Type II Portland Cement	1.5%
Or	
*Hydrated Lime	1.0%

***By total weight of the mineral aggregate.**

The aggregate shall conform to the requirements of Sections 701 and 710 for asphalt concrete, except as modified below:

Sand Equivalent	65% minimum
Crushed Aggregate retained on #8 sieve (at least one crushed face, produced by crushing)	85% minimum

2.6.2.2 ASPHALT-RUBBER BINDER:

The asphalt-rubber binder shall conform to M A G Specs Section 717.

2.6.2.3 MIX DESIGNS:

At the Pre-Construction Meeting, the Contractor shall submit the name of the asphalt-rubber concrete supplier, a description of the materials, and the job mix design(s). The design method used shall be in accordance with the Marshall Mix procedure, 75 blows, as described in "Design Methods for Hot- Mixed Asphalt-Rubber Concrete Paving Materials" by James G. Chehovits, October 1989. The job mix designs are subject to approval by the Engineer.

The asphalt-rubber concrete job mix design shall be for High Traffic conditions.

Asphalt Rubber Binder Content:

The percent of asphalt-rubber binder in the mix(es) shall be within the following range:

Traffic Condition	Asphalt Rubber Binder
Low	8.4% to 8.8%
High	8.0% to 8.4%

The amount of asphalt-rubber binder in each mix shall be provided in the design subject to approval by the Engineer. Low traffic areas include residential streets. High traffic areas include arterial streets.

Air Voids:

The percent of air voids in the mix(es) shall be within the following range:

Traffic Condition	Air Voids
Low	3.0% to
High	4.0% to

The amount of air voids in each mix shall be provided in the design subject to approval by the Engineer.

Mix designs shall include 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 (No extender oil allowed)

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), if required
Temperature when added to aggregate

- (3) Recommended asphalt - rubber binder content by both weight of total mix and by weight of dry aggregate.
- (4) Recommendations for maximum / minimum temperatures during material production and lay down; and the allowable ambient air and existing pavement surface temperatures during lay down.

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.

2.6.2.4 CALIBRATION FACTORS:

A minimum of one week prior to the production of asphalt rubber hot mix, the Contractor shall submit to the Engineer samples of all hot mix materials that will be used on the project. The materials shall be used to determine the calibration factors using the acceptance laboratory and the Contractor supplied ignition furnaces and related quality control test equipment. Calibration factors shall be recalculated whenever a change in the asphalt rubber hot mix materials occurs and when requested by the Engineer.

2.6.3 SURFACE PREPARATION:

Before placing asphalt-rubber concrete on existing pavements, severely raveled areas or cracked areas that are depressed more than 3/4" from the adjoining pavement shall be cut out and patched at least 48 hours prior to the resurfacing operation. Over-asphalted (bleeding or flushing) 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 surface cleaning requirements are included as part of the Asphalt- Rubber Concrete paving operations, and the cost thereof shall be included in the Asphalt- Rubber Concrete pay item.

Pavement repairs and crack sealing when required are to be compensated for by other appropriate contract pay items.

Prior to placing the asphalt-rubber concrete on milled surfaces, pot-holes left by the milling operation shall be repaired by the Contractor, as a related non-pay item and as required by the Engineer. The milled area shall be swept.

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

Surface preparation shall include removal by the Contractor existing raised pavement markers prior to sweeping and application of the tack coat.

2.6.4 CONSTRUCTION METHODS:

Asphalt-rubber concrete shall be placed only when the surface is dry, and when the atmospheric temperature in the shade is 55°F or above. No asphalt-rubber concrete shall be placed when the weather is foggy or rainy. Asphalt-rubber concrete shall be placed only when the Engineer determines that weather conditions are suitable.

Except as otherwise noted, placing and rolling of the asphalt-rubber concrete and the smoothness of the surface shall be as specified in MAG Specs Section 321 for asphalt concrete. The spreading equipment shall be equipped with a mat reference ski-type control device of not less than 30 feet in length, or other method of control approved by the Engineer.

The density of the compacted mixture shall not be less than 95% of the laboratory unit weight composed of the same mixture compacted by the 75 blow method of ASTM D-1559 at 290/ F $\pm$ 5° F, or at the job mix design specified compaction temperature. Pneumatic rollers shall not be used.

Placement and compaction temperature shall be specified with the submitted mix design data but in no case less than 275° F at the point of placement. The temperature of the material in the truck shall be measured by inserting a thermometer, or other approved measuring device, to a point at least 6" below the surface of material.

If asphalt-rubber concrete is placed in a windrow during paving, the windrow shall not exceed a distance greater than 150 feet in front of the paving machine.

Rideability shall be tested in accordance with the provisions of MAG Specs Section 321.6.7 Pavement Smoothness.

2.6.4.1 LIME WATER:

An application of lime water shall be applied by the Contractor to the compacted asphalt rubber concrete surface after final compaction, 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 rate of approximately ½ gallon/square yard. The lime shall be mixed using a minimum of (1) one 50-pound bag per 3,000 gallons of water.

2.6.4.2 QUALITY CONTROL AND ACCEPTANCE:

Production requirements for asphalt-rubber concrete shall be as specified in MAG Specs Section 321.9 Quality Control and MAG Specs Section 321.10 Acceptance. The production tolerances and corrective action will be enforced for asphalt-rubber concrete.

2.6.4.3 ADJUSTMENTS:

After installation of an overlay course all necessary frame and cover adjustments for manholes, valve boxes, survey monuments, sewer clean-outs, etc., shall be completed by the Contractor within the given segments being surfaced. On roads without curb and gutter, the existing shoulder elevation shall be adjusted by the Contractor to match the elevation at the edge of new overlay and slope away from the new pavement surface at a rate that the existing quantity of shoulder material will allow. Shoulder material includes the existing shoulder, millings, untreated base materials, or a granular material approved by the Engineer. Shoulder material shall be compacted to a minimum of 95% of maximum density, determined in accordance with MAG Specs Section 301.3.

2.6.5 MEASUREMENT:

Asphalt-Rubber Concrete shall be measured by the ton, for the mixture actually used, which shall include the required quantities of mineral aggregates, filler material, rubberized asphalt binder and anti-strip agent.

Application of Lime Water shall be measured by the square yard. The measured area shall be the area of asphalt-rubber pavement to which the lime water is applied. The measured area shall only be counted one time regardless of the number of applications applied to the asphalt-rubber pavement section.

Shoulder adjustment to match the new pavement surface elevation shall not be measured. The cost of this work shall be included in the price paid for Asphalt-Rubber Concrete or other related pay items.

2.7 TACK COAT.

2.7.1 DESCRIPTION:

Tack coat for bituminous paved surfaces shall consist of the application of emulsified asphalt as specified in MAG Specs Section 713. A tack coat shall be applied to all asphalt concrete surfaces prior to the application of the asphalt-rubber concrete.

2.7.2 PREPARATION OF SURFACE:

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

2.7.3 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.

2.7.4 EQUIPMENT:

Tack coat shall be applied by distributor trucks designed, equipped, maintained and operated in accordance with MAG Specs 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.

2.7.5 PROTECTION FOR ADJACENT PROPERTY:

According to MAG Specs Section 333.

2.7.6 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.

2.7.7 PAYMENT:

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

2.7.8 ADJUSTING FRAMES, COVERS:

Adjust manhole cover in accordance with MAG Uniform Standard Detail 422.

2.8. ASPHALT CHIP SEAL.

2.8.1 DESCRIPTION:

This work shall consist of the application of a bituminous material followed by the application of a cover material.

2.8.2 MATERIALS:

The Engineer must approve all material sources prior to their use. Once approved, material sources shall not be changed without the approval of the Engineer. If required by the Engineer, the Contractor shall submit material samples at least seven days prior to start of construction. When requested, additional samples shall be furnished during the construction period at no cost to the City. Material sample submittal is a non-pay item.

2.8.3 RUBBER ASPHALT BINDER (RAB):

The asphalt binder shall consist of asphalt cement, Granulated Reclaimed Tire Rubber (CRM), and SBS Polymer. This material is designated as Rubber Asphalt Binder (RAB). The RAB may be manufactured by terminal blending or field blending.

The ground tire rubber shall be any crumb rubber, derived from processing whole scrap tires or shredded tire materials taken from automobiles, trucks, or other equipment owned and operated in the United States. The processing shall not produce, as a waste, casings, or other ground material that can hold water when stored or disposed above ground. Rubber tire buffing produced by the re-treading process qualifies as a source of crumb rubber.

The Contractor shall determine RAB/stone chip compatibility. Proposed aggregate samples shall be submitted to the RAB supplier prior to the preparation of the mix design to test the aggregate for stripping characteristics. All test results shall be submitted to the Engineer.

2.8.3.1 RUBBER ASPHALT BINDER (RAB) - TERMINAL BLEND:

The terminal blended binder shall be smooth, homogeneous and comply with the following requirements:

TABLE		
RUBBER ASPHALT BINDER (RAB) - TERMINAL BLEND		
Property	Test Method	Requirement
Ground Tire Rubber Content, % of weight of total RAB	Certificate of	5 Min.
SBS Polymer, % of weight of total RAB	Certificate of	2-3
Penetration @ 77°F, 100g/5 sec.,	ASTM D-5	55-75

Kinematic Viscosity @ 275°F, -cSt	ASTM D-2170	2000 Max.
Softening Point, °F	ASTM D-36	140 Min.
Solubility, %	ASTM D-2042	97.5 Min.
Elastic Recovery @ 77°F, 5cm/min., % Recovery After 1 Hour	ASTM D-6084 Modified (Modify 10cm to 20cm)	55 Min.
Separation of Polymer, 325°F, %	TEX 540-C (see Note below)	Report
Retained Penetration Ratio <u>RTFO Pen. @ 77°F, 100g/5 sec.</u> Original Pen. @ 77°F	ASTM D-5	0.6-1.0

Note: A 350-gram sample of the RAB is poured into a friction-top pint can (approximately 3-1/2 inch diameter by 4 inch height) and stored for 48 hours at 325°F. Upon completion of storage time the sample is visually examined for separation of polymer from the asphalt (smoothness and homogeneity). If after visual evaluation a question still exists about the separation of polymer, samples will be taken from the top and bottom for softening point determination. A difference between the softening points of top and bottom samples of 4 percent or more, based on the average of the top and bottom softening points, constitutes separation (Tex 540-C).

Application and storage temperatures shall comply with the following requirements:

Type-Grade	Recommended Range, °F	Max. Allowable, °F	Max. Heating and
RAB	340-	375	375 (see Note)

Note: Maximum temperature for storage by the Asphalt Supplier or the Contractor shall be 360°F. For RAB designated for surface treatment work, the temperature of the modified asphalt binder may be increased to a maximum of 375°F by the supplier loading through an in-line heater, or by the Contractor just prior to application. In any case, the heating, storage, and application temperatures used shall be the lowest temperatures practical.

2.8.3.2 RUBBER ASPHALT BINDER (RAB) - FIELD BLEND:

The field blended binder shall be smooth, homogeneous and comply with the following requirements:

2.8.3.2.1 BASE ASPHALT:

The recommended type and grade of asphalt cement utilized to manufacture the RAB shall be PG 64-16. The actual grade used may be changed, as long as the end product complies with these specifications.

2.8.3.2.2 GRANULATED RECLAIMED TIRE RUBBER (CRM) AND SBS POLYMER:

The CRM used shall be produced primarily from the processing of automobile and truck tires. The rubber shall be produced by ambient temperature grinding processes only. The SBS Polymer shall be a pelletized or granulated thermoplastic elastomer type linear styrene-butadiene block copolymer. It shall have a high enough molecular weight to provide excellent mechanical and elastic properties to compound. The gradation of the SBS modifier shall meet the RAB provider's need to produce homogeneous concentrate and final RAB product. The gradation for CRM modifier when tested in accordance with ASTM C-136 (dry sieve only) and using a 50-gram sample, shall comply with the following requirements.

TABLE 330-2	
GRANULATED RECLAIMED TIRE RUBBER (CRM)	
Sieve	CRM, % Passing
No. 8	-----
No.	-----
No.	100
No.	98-100
No.	Open
No.	Open

The use of CRM from multiple sources is acceptable provided that the overall blend of rubber meets the gradation requirements. The CRM shall have a specific gravity of 1.15 +/- 0.05 and shall be free of loose fabric, wire and other contaminants except that up to 4 percent (by weight of rubber) calcium carbonate or talc may be added to prevent the rubber particles from sticking together. The rubber shall be sufficiently dry so as to be free flowing and not produce a foaming problem when blended with the hot asphalt cement. The CRM shall be accepted by certification from the rubber supplier.

2.8.3.2.3 RUBBER ASPHALT BINDER (RAB):

The final RAB product shall be a result of two homogenous blends of CRM concentrate and SBS Polymer concentrate and shall comply with the following requirements.

TABLE 330-3		
RUBBER ASPHALT BINDER (RAB) - FIELD BLEND		
Property	Test Method	Requirement
Ground Tire Rubber Content, % of weight of total RAB	Certificate of	5-10
SBS Polymer, % of weight of total RAB	Certificate of	1-4

Penetration @ 77°F, 100g/5 sec.,	ASTM D-5	30-65
Rotational Viscosity @ 400°F, Spindle 1 @ 12	ASTM D-2669	300-900
Softening Point, °F	ASTM D-36	140 Min.
Elastic Recovery @ 77°F, 5cm/min., % Recovery After 2 Hours	ASTM D-6084 Modified (Modify 10cm to 20cm)	50 Min.
Separation of Polymer,	TEX 540-C (see Note, top of page 5)	Report
Solubility, %	ASTM D-2042	92.5 Min.
Dynamic Shear, G*/sin□ @76°C	AASHTO T315	1.00 Min.
Resilience %	ASTM D-5329	20 Min.

The exact CRM and SBS Polymer content for final RAB shall be determined by the rubber asphalt binder design submitted by the RAB supplier. The viscosity shall be conducted by using a hand held RYAN VISCOMETER, Model VT-02 with rotor 1, or equivalent.

2.8.3.2.4 RUBBER ASPHALT BINDER (RAB) FORMULATION:

The RAB supplier shall furnish to the Engineer within 15 days of the notice to proceed the RAB formulation, which shall contain the following information:

- (A) Asphalt Cement
 - 1) Source of Asphalt Cement
 - 2) Grade of Asphalt Cement
 - 3) Percentage of Asphalt Cement by total weight of RAB mixture
- (B) Granulated Reclaimed Tire Rubber (CRM)
 - 1) Source of CRM
 - 2) Grade of CRM
 - 3) Percentage of CRM by total weight of the RAB mixture
- (C) SBS Polymer
 - 1) Source of SBS Polymer
 - 2) Grade of SBS Polymer
 - 3) Percentage of SBS Polymer by total weight of the RAB mixture
- (D) Test results of specified properties listed in Section 2.8.3.2.3

If CRM from more than one source is to be utilized, then the above information will be required for each type of CRM used.

2.8.3.2.5 RUBBER ASPHALT BINDER (RAB) MIXING AND REACTION:

The final RAB product shall be a result of two step blending. During the first step of blending, homogenous blends of CRM and SBS concentrates with elevated concentration, as determined by RAB design, are produced separately at different specified temperatures. During the second step, the two concentrates are blended to form a homogenous binder.

The temperature of the asphalt cement shall be between 375° F and 450° F at the addition of the CRM to produce CRM concentrate; and the temperature of the asphalt cement shall be between 350° F and 400° F at the addition of the SBS Polymer to produce SBS concentrate. The concentrates then shall be combined and mixed together, at the proper ratio as determined in the rubber asphalt binder design, in an agitated interaction tank and reacted for a minimum period of 60 minutes.

The temperature of the RAB mixture shall be at or above 375° F during the reaction period, but shall not exceed 400° F at any time. Completely mixed and reacted RAB shall be stored within a temperature range of 350° F and 400° F just prior to application. Exceeding the 400° F limit will be grounds for rejection of the affected rubber asphalt binder.

When a job delay occurs after full reaction and a batch of RAB is not used within six hours, the RAB may be allowed to cool. When the temperature of RAB cools below 350°F and is then reheated, the process is considered a reheating cycle. The total number of reheating cycle shall not exceed two. The RAB shall be re-heated slowly to a uniform temperature not less than 375°F, and agitated.

2.8.3.2.6 RUBBER ASPHALT BINDER (RAB) EQUIPMENT:

All equipment utilized in the production and application of RAB materials shall be described as follows:

- (A) An asphalt cement heating tank with a hot oil heat transfer system or a retort heating system capable of heating the asphalt cement to the proper temperature for blending with the CRM and SBS Polymer.
- (B) The mechanical blender shall have a two stage continuous mixing process capable of producing a homogenous blend of asphalt cement, CRM, and SBS Polymer at the mix design specified ratios, as directed by the Engineer. This unit shall be equipped with a two compartment granulated materials feed system capable of supplying the asphalt

cement feed system, as not to interrupt the continuity of the blending process.

The maximum capacity of the primary blending vessel shall be 500 gallons. Both the primary and secondary blenders shall be equipped with an agitation device orientated horizontally in the blending vessel. The blending unit shall be capable of fully blending the individual CRM and rubber particles with the asphalt cement. Separate asphalt cement feed pump and finished product pump are required. This unit shall have an asphalt cement/totalizing meter in gallons and a flow rate meter in gallons per minute.

An approved "Siefer style" mill, or equivalent shall be capable of producing a homogenous blend of SBS Polymer concentrate at the binder design specified ratio. The interaction storage tank shall be mechanically agitated.

- (C) A distributor truck equipped with a heating unit, and an internal mixing device capable of maintaining a uniform mixture of asphalt cement, CRM, and SBS Polymer. It shall be equipped with a full circulating spreader bar and pumping system capable of applying RAB material within +/- 0.05 gallons per square yard tolerance of the specified application rate, and must achieve a uniform covering of the surface to be treated. The distributor shall have a boot board on the rear of the vehicle and a bootman shall accompany the distributor. The bootman shall ride in a position so that all the spray bar tips are in full view and readily assessable for unplugging, if a plugged tip should occur. The distributor shall also include a tachometer, pressure gauge, a volume-measuring device, and thermometer and shall also have a computer rate control (CRC) installed.

2.8.4 MATERIAL TESTING:

The Contractor is responsible for the quality control of the materials used. Testing done by the Engineer will be for acceptance and assurance that materials used conform to the specifications and not considered quality control.

2.8.4.1 ASPHALT BINDER:

Provisions for properly sampling from distributor trucks or on- site bulk storage units shall be made by the Contractor. Sampling shall be done by the Contractor and witnessed by the Engineer in accordance with the latest edition of ASTM D-140, "Standard Methods of Sampling Bituminous Materials". The Engineer will test in accordance with the latest edition of ASTM or AASHTO.

The minimum amount of assurance sampling and testing shall be once per 500 tons of asphalt binder. Material found in non-compliance will be rejected and removed from the job site. No payment will be made for rejected material. The project shall not resume until the new material is tested by the Contractor's ASSHTO asphalt accredited, independent, materials laboratory, and found in compliance. The Contractor's test results shall be submitted to the Engineer for compliance verification. No lost time will be considered as a result of material being found in non-compliance.

2.8.4.2 STONE CHIPS:

The stone chips will be sampled and tested by the Engineer in accordance with the latest edition of ASTM C-136, "Sieve Analysis of Fine and Coarse Aggregates." The Engineer will sample and test the stone chips, for approval, from the completed stockpile.

2.8.5 TIME OF APPLICATION AND WEATHER CONDITIONS:

Chip seal shall not be applied for at least 7 days after completion of new bituminous paving.

The chip seal shall be placed only when the roadway surface is dry and there is no imminent threat of rain or if wind deflects the asphalt binder spray from vertical. The surface treatment shall not be applied unless the pavement temperature is at least 60 F and rising (measured in a shaded area).

Caution should be exercised in the placement of asphalt chip seal between the dates of Oct. 1 and April 1.

2.8.5.1 CONSTRUCTION METHODS:

2.8.5.1.1 PREPARATION OF SURFACES:

Immediately before applying the bituminous material, the area to be surfaced shall be cleaned of oil, grease, gasoline, dirt and other objectionable material. In urban areas, the surface shall be cleaned with a self-propelled pickup sweeper. In rural areas, power brooms may be used. When necessary, cleaning shall be supplemented by hand brooms.

The bituminous material shall not be applied until an inspection of the surface has been made by the Engineer and he has determined that it is suitable.

For chip seals using paving grade asphalt as the binder, a bituminous tack coat shall be applied prior to sealing. The tack coat shall comply

with MAG Specs Section 329. The exact rate shall be determined by the Engineer.

2.8.5.1.1.1 DOCUMENT PAVEMENT MARKINGS:

The Contractor shall document and detail the existing pavement markings, traffic signal detection loops, and fire hydrant locations as required in MAG Specs Section 401.2.4

Pavement Markings and place temporary chip seal pavement markers.

2.8.5.1.1.2 REMOVE PAVEMENT MARKINGS:

The Contractor shall remove and dispose of raised pavement markers (if any) and non-paint (thermoplastic) symbols/legends prior to the placement of the chip seal. Removal shall be by chipping, grinding, or any other method approved by the Engineer. The cost of raised pavement marker removal shall be considered as incidental to pavement preparation.

2.8.5.1.1.3 CHIP SEAL PAVEMENT MARKERS (TEMPORARY):

Prior to applying the surface treatment, the Contractor shall purchase and install chip seal pavement markers in accordance with Arizona Department of Transportation Standard Specifications, Section 701-2.05. The cost for this item is considered incidental to striping.

Markers shall be placed at all tangent points and installed every 100 feet, following the existing pavement centerline and lane line striping, except that edge line striping need not be marked. These markers shall be used as a guide for the Contractor's striping crews.

Temporary pavement markers shall be placed with the reflective side facing on-coming traffic. After the surface treatment is applied to the pavement, the Contractor shall remove the plastic cover to expose the reflective tape.

2.8.5.1.1.4 SURFACE CLEANING:

Immediately before applying the bituminous material, the area to be surfaced shall be cleaned of dirt and other objectionable material. The surface shall be cleaned with a self-propelled pickup sweeper. When necessary, cleaning of the existing pavement surface shall be supplemented by hand brooms or other methods, approved by the Engineer, to assure a good bond between the surface treatment and

the pavement surface. Pick up brooms alone may not be adequate to thoroughly clean the surface. If water is used, the pavement shall be dry before applying the asphalt binder. The Contractor shall conduct all sweeping operations in the same direction as traffic flow.

The Contractor shall take all steps, procedures, and means to prevent dust pollution due to his construction practices in connection with this work. Dust prevention measures shall be maintained at all times during construction of the project to the satisfaction of the Engineer, in accordance with Maricopa County Air Pollution Control Regulations

2.8.5.2 APPLICATION OF BITUMINOUS MATERIAL:

The bituminous material shall be applied the same day the surface is prepared. Asphalt binder containing particulate modifiers may be susceptible to separation of the modifier. Appropriate circulation or agitation in storage shall be provided if separation of the modifier is expected, suspected, or if the modified asphalt binder will be stored at elevated temperature for more than one day before use.

The quantity of liquid or emulsified asphalts will be between the range of 0.20 and 0.40 gals./sq. yd. The quantity of paving grade asphalt will be between the range of 0.17 and 0.31 gals./sq. yd. The exact rate of application will be determined by the Engineer.

The Engineer will determine the precise application rate of the asphalt binder. For bidding purposes the application rate shall be 0.50 gal/sy for low volume, and 0.60 gal/sy for high volume at 60 F. At application temperature, the rate could be .05 gal/sy higher. At all times, application rate shall be kept to a minimum.

The chips shall be spread before the bituminous material sets. The maximum distance that the bituminous material is applied in advance of the chips will be determined by the Engineer.

The asphalt binder shall be applied only to asphalt pavement surfaces. The spraying of asphalt binder on concrete curb and gutter, on concrete valley gutters, or on the concrete aprons around catch basins, shall be removed by the Contractor.

2.8.5.3 APPLICATION OF COVER MATERIAL:

At an appropriate time, as determined by the Contractor following the application of the bituminous material, the chips shall be spread with a self-propelled mechanical spreader. The spreader shall be a self-propelled

machine with an aggregate receiving hopper in the rear, belt conveyors to carry the aggregate to the front, and a spreading hopper equipped with a full width distribution auger and spread roll. The spreader shall be in good mechanical condition and be capable of applying the cover material uniformly across the spread at the specified rate. The minimum width of the spreader shall be twelve feet.

At the time of application, precoated aggregate shall be within the temperature range of 200 degrees F. and 300 degrees F. measured at a point 6 to 12 inches below the top of the load.

At the time of application, uncoated chips shall not contain moisture in excess of a saturated, surface dry condition when liquid or paving grade asphalt are used as the seal coat binder.

At the time of application, chips shall be surface wet but free from running water when emulsified asphalt is used as the seal coat binder.

The Engineer will determine the application rate of the cover material. For bidding purposes assume a maximum application rate of 20 lbs/sy for low volume, and 28 lbs /sy for high volume. At all times, application rate shall be kept to a minimum.

Trucks for hauling stone chips shall be tailgate discharge and shall be equipped with a device to lock onto the hitch at the rear of the stone chip spreader. Haul trucks shall also be compatible with the stone chip spreader so that the dump bed will not push down on the spreader when fully raised or have too short a bed, which results in stone chip spillage while dumping into the receiving hopper.

2.8.5.4 ROLLING:

Immediately following the application of the cover material, the surface shall be rolled with self-propelled pneumatic-tired rollers. Three coverages shall be made with a pneumatic roller. Each roller shall carry a minimum of 2,000 pounds on each wheel and a minimum of 60 psi in each tire. The roller shall not travel in excess of 12 miles per hour. A minimum of 3 self-propelled pneumatic rollers shall be required for projects over 10,000 sq. yds. On projects under 10,000 sq. yds., one roller may be used provided it performs the same number of coverages.

In residential areas, rollers shall be completely skirted.

Three operational pneumatic-tired rollers, with operators shall be provided to accomplish the required embedment of the stone chips. If the

Contractor is working at more than one location, there shall be a minimum of three rollers, with operators at each location.

Sufficient rollers shall be used for the initial rolling to cover the width of the stone chip spread with one pass. The first pass shall be made immediately behind the stone chip spreader. Three complete passes with pneumatic-tired rollers shall be made and one final pass with a 12 to 14 ton steel wheel roller. The inspector may require extra rolling on Cul-de-Sacs. All rolling completed within one hour after the application of the stone chips. If the spreading is stopped for an extended period, the stone chip spreader shall be moved ahead or off to the side so that all stone chips can be immediately rolled.

2.8.5.5 JOINTS:

All joints shall be constructed as approved by the Engineer such that there be a uniform application of cover material and bituminous material.

Paper, or other material approved by the Engineer, shall be used at the beginning and end of the surface treatment section to make a smooth, straight, clean transition. Paper shall also be used at concrete bridge decks. Overlap of asphalt binder at transverse stopping points, creating a bump, is not allowed.

2.8.5.6 SURPLUS AGGREGATE REMOVAL:

Surplus aggregate shall be removed from the surface using methods specified in MAG Specs Section 330.4.1 and stockpiled in the location indicated on the plans or as approved by the Engineer. In no event shall surplus aggregate be left on the pavement for more than 1 day (24 hours).

The Contractor shall keep all driveways and sidewalks clean of any loose stone chips on a daily basis during construction. Air powered blowers are not allowed. Cleanup shall also include the daily removal of surface treatment materials from manhole covers, valve covers, survey monuments, fire hydrant markers, gutters, curbs, sidewalks, etc. in the project area.

The Contractor shall conduct all sweeping operations in the same direction of traffic flow. Pick-up brooms shall be used on subdivision roads, and roads with curb and gutter.

2.8.5.7 DISTRIBUTING EQUIPMENT:

Distributor trucks shall be of the pressure type with insulated tanks. Gravity distributors will not be permitted.

Spray bars and extensions shall be of the full circulating type. The spray bar shall be adjustable to permit varying height above the surface to be treated.

The nozzle spacings, center to center, shall not exceed 6 inches. The valves shall be operated so that one or all valves may be quickly opened or closed in one operation. The valves which control the flow from the nozzles shall be of a positive acting design so as to provide a uniform, unbroken spread of bituminous material on the surface.

The distributor shall be equipped with devices and charts to provide for accurate, rapid determination and control of the amount of bituminous material being applied. The distributor shall be equipped with a tachometer of the auxiliary wheel type registering speed in feet per minute. The distributor shall also be equipped with pressure gauges and an accurate thermometer for determination of the temperature of bituminous material. The spreading equipment shall be designed so that uniform application of a bituminous material can be applied in controlled amounts ranging from 0.05 to 2.0 gallons per square yard. Transverse variation rate shall not exceed ten (10) percent of the specified application rate. The distributor shall be equipped with a hose and nozzle attachment to be used for spotting skipped areas and areas inaccessible to the distributor. Distributor and booster tanks shall be maintained as to prevent dripping of bituminous material from any part of the equipment.

Equipment that fails to perform satisfactorily shall be removed from the job.

Distributor trucks shall comply with the requirements of Section 404-3.02 (A) of the Arizona Department of Transportation Standard Specifications for Road and Bridge Constructions, 2008 edition. For each distributor truck proposed to be used on the project, an Arizona Test Method 411 Report shall be submitted to the Engineer. If the reports are over 12 months old, the Contractor's AASHTO Accredited Testing Laboratory will test the trucks, with the results submitted to the Engineer.

2.8.5.8 SAND BLOTTER:

Sand blotter shall be in accordance with MAG Specs Section 333.3.2.

The Contractor shall apply sand blotter, as many times as necessary, prior to opening the roadway to traffic where there is an excess of asphalt, or as requested by the Engineer. The Contractor shall be responsible for sweeping the sand within 24 hours of opening the roadway to traffic.

There will be no payment for materials not placed in accordance with this specification. The cost associated with sand blotter, the material supplies,

application, and clean-up shall be included in the unit price of related pay items. No direct payment or measurement for pay purposes will be made for sand blotter.

If the paved roadway is to be sanded, the surface shall be sanded at approximately two pounds per square yard. No more sand shall be used than necessary, and the amount specified shall not be increased without prior approval of the Engineer.

2.8.5.9 PERFORMANCE:

The completed surface treatment shall leave a homogeneous mat, adhere firmly to the prepared surface, and have a skid resistant surface texture.

2.8.5.10 CLEANUP:

Before final acceptance by the City, all private or public property and grounds occupied by the Contractor in connection with the work shall be cleaned of all rubbish, excess materials, temporary structures, and equipment. All parts of the work area shall be left in a condition equal to, or better than, it was prior to the start of the project.

Before final acceptance by the City, the Contractor shall sweep the completed project area and repeat the surface treatment where the old road surface is exposed, or where binder lies uncovered by stone chips

2.8.6 MEASUREMENT:

Certified weight slips of all material shall be delivered to the Engineer before the materials are applied. Certified weight slips of any material being weighed back in for credit shall be delivered to the Engineer the next day. Certified weight slips are required for all asphalt binder.

2.8.7 PAYMENT:

Quantities of materials for this work will be paid for at the contract unit price.

(A)	Binder Material:	Ton	
(B)	Asphalt Cement, Liquid Asphalt, Emulsion, Diluted Emulsion		Ton
(C)	Chips	Ton	

There will be no payment for materials not placed in accordance with this specification. The cost associated with sand blotter, the material supplies, application, and clean-up shall be included in the unit price of related pay items. No direct payment or measurement for pay purposes will be made for sand blotter.

2.9 FOG SEAL COAT:

2.9.1 DESCRIPTION:

The work covered by this specification consists of furnishing all labor, equipment, and materials necessary to perform all operations required for the application of fog seal to bituminous paved surfaces.

2.9.2 MATERIALS:

The Engineer must approve all material sources prior to their use. Once approved, material sources shall not be changed without the approval of the Engineer. If requested by the Engineer, the Contractor shall submit material samples at least seven (7) days prior to start of construction. When requested, additional samples shall be furnished during the construction period at no cost to the City. Material sample submittal is a non-pay item.

The emulsified asphalt shall be a grade SS-1h, CSS-1h, or CQSH, as specified in MAG Specs Section 713. The emulsified asphalt shall be diluted in proportions of 50% water and 50% emulsified asphalt.

If needed, the sand blotter shall be as specified in MAG Specs Section 701.3 and shall be graded in accordance with MAG Specs Table 333-1

2.9.3 APPLICATION:

Fog seal shall be applied by a distributor truck equipped with fog nozzles at the approximate rate of 0.10 gallon per square yard. The exact rate shall be as directed by the Engineer. The distributor truck shall be as specified in Section 2.9.4.

2.9.4 EQUIPMENT:

2.9.4.1 GENERAL:

When requested by the Engineer, descriptive information on the fog seal application equipment to be used will be submitted for approval no less than 7 days before the starts.

2.9.4.2 DISTRIBUTING EQUIPMENT:

Distributor trucks shall be of the pressure type with insulated tanks. Gravity distributors will not be permitted.

Spray bars and extensions shall be of the full circulating type. The spray bar shall be adjustable to permit varying height above the surface to be treated.

The nozzle spacings, center to center, shall not exceed 6 inches. The valves shall be operated so that one or all valves may be quickly opened or closed in one operation. The valves which control the flow from the nozzles shall be of a positive acting design so as to provide a uniform, unbroken spread of bituminous material on the surface.

The distributor shall be equipped with devices and charts to provide for accurate, rapid determination and control of the amount of bituminous material being applied. The distributor shall be equipped with a tachometer of the auxiliary wheel type registering speed in feet per minute. The distributor shall also be equipped with pressure gauges and an accurate thermometer for determination of the temperature of bituminous material. The spreading equipment shall be designed so that uniform application of a bituminous material can be applied in controlled amounts ranging from 0.05 to 2.0 gallons per square yard. Transverse variation rate shall not exceed ten (10) percent of the specified application rate. The distributor shall be equipped with a hose and nozzle attachment to be used for spotting skipped areas and areas inaccessible to the distributor. Distributor and booster tanks shall be maintained as to prevent dripping of bituminous material from any part of the equipment.

Equipment that fails to perform satisfactorily shall be removed from the job.

2.9.5 PREPARATION OF THE SURFACE:

Immediately before applying the fog seal, the area to be surfaced shall be cleaned of oil, grease, gasoline, dirt, loose material, and other objectionable material. The fog seal shall be applied the same day the pavement is cleaned. In urban areas, the surface shall be cleaned with a self-propelled pick-up sweeper. In rural areas, power brooms may be used. When necessary, cleaning shall be supplemented by hand brooms. When necessary, cleaning of the existing pavement surface shall be supplemented by hand brooms or other methods, approved by the Engineer, to assure a good bond between the fog seal and the pavement surface. Power brooms or pick up brooms alone may not be adequate to thoroughly clean the surface. This also includes the removal of grass or weeds, which are growing in the joint between the street and the concrete gutter

The Contractor shall take all steps, procedures, and means to prevent dust pollution due to his construction practices in connection with this work. Dust prevention measures shall be maintained at all times during

construction of the project to the satisfaction of the Engineer, in accordance with "Maricopa County Air Pollution Control Regulations".

Prior to the Pre-Construction meeting, the Contractor shall have a dust control plan, approved by the Maricopa County Division of Air Pollution Control. For information and requirements for the dust control plan, the Contractor shall contact:

Maricopa County Environmental Services Department
Division of Air Pollution Control
2406 South 24th Street, Suite E-214
Phoenix, AZ 85034 (602) 506-6727

The Contractor shall remove and dispose of raised pavement markers (if any) prior to the placement of the fog seal. Removal shall be by chipping, grinding, or any other method approved by the Engineer. The cost of raised pavement marker removal is incidental to pavement preparation.

Prior to striping removal, the Contractor shall document and detail the existing pavement striping and delineation. The details shall include as a minimum the type, size, color, dimensions, and specific detailed location of the delineation, acceptable to the Engineer, so that contractor or City Forces can replace the delineation, as it existed prior to the removal. The details shall be submitted to the Engineer a minimum three (3) working days prior to covering the striping with fog seal.

The fog seal shall not be applied until an inspection of the surface has been made by the Engineer and he has determined that it is suitable.

2.9.6 WEATHER LIMITATIONS:

The fog seal shall not be applied if the surface is wet, during inclement weather, or weather determined unsuitable by the Engineer. The ambient temperature shall be at least 50 degrees F. and rising and the application shall cease when the temperature is 55 degrees F and falling.

2.9.7 PROTECTION OF UNCURED SURFACE:

Adequate methods such as barricades, flagmen, pilot cars, etc. shall be used to protect the treated surface from all types of traffic until the asphalt emulsion will not be picked up by traffic.

The Contractor shall be responsible for the repair of all damage done within 24 hours of initial application.

2.9.8 PROTECTION FOR ADJACENT PROPERTY:

Care shall be taken to prevent the spraying of asphalt emulsion on adjacent pavements, including that portion of the pavement being used for traffic, on structures, curb, gutter, sidewalks, guard rails, guide posts, markers, trees, shrubs, and property of all kinds

2.9.9 MATERIALS TESTING:

The Contractor is responsible for the quality control of all materials used. Testing performed by the Engineer will assure that materials conform to the specifications and shall not be considered a quality control measure.

Provisions for properly sampling emulsion from distributor trucks or on-site bulk storage units shall be made by the Contractor. Emulsion sampling shall be performed by the Contractor and witnessed by the Engineer in accordance with the latest edition of ASTM D-140, "Standard Methods of Sampling Bituminous Materials." Testing will be performed by the Engineer in accordance with the latest edition of ASTM D-244, "Testing Emulsified Asphalts".

The minimum amount of sampling and testing shall be once for every 500 tons of emulsion. Material found in non-compliance will be rejected and shall be removed from the job site. No payment will be made for rejected material. The project shall not resume until the new material is tested and found in compliance. No lost time will be considered as a result of material being found in non-compliance.

2.9.10 MEASUREMENT:

Quantities and materials for this work will be paid for at the contract price per unit of measurement for each of the following pay items as indicated in the proposal.

Emulsified asphalt for fog seal - Ton (Undiluted)

Payment for various bid items shall be compensation in full for furnishing all materials, labor, tools, equipment, and appurtenances necessary to complete the work in a satisfactory manner, as specified.

There will be no payment for materials not placed in accordance with this specification. The cost associated with sand blotter, the material supplies, application, and clean-up shall be included in the unit price of related pay items. No direct payment or measurement for pay purposes will be made for sand blotter.

No additional payment will be made for work related to any item, unless specifically called for in the bid. No payment will be made for materials used to patch unacceptable work.

Only certified tickets of the emulsion delivered to a City representative will be accepted for payment. Overweight tickets shall not be accepted and material shall be partially unloaded, at no expense to the contracting agency, to a legal status for re-weighing. A new ticket will be required for the remaining load. No deliveries shall be accepted prior to 7:00 a.m., or after 4:30 p.m. Any deliveries before or after this time frame will not be compensated.

A daily tabulation of materials delivered, used, square yards covered, application rate, etc., shall be compared between the Contractor and the Engineer. Adjustments and agreements are final at the end of each stockpile. Materials placed without approval of the inspector, or materials rejected due to improper placing, improper proportions of materials, or materials found to be defective, will not be compensated.

2.9.11 SAND BLOTTER:

Sand Blotter shall be in accordance with MAG Specs Sections 333.3.2 and 333.7, except as modified below.

The Contractor shall apply sand blotter prior to opening the roadway to traffic where there is an excess of asphalt emulsion, if requested by the Engineer. The Contractor shall also be responsible for sweeping the sand within 24 hours of opening the roadway to traffic.

There will be no payment for materials not placed in accordance with this specification. The cost associated with sand blotter, the material supplies, application, and clean-up shall be included in the unit price of related pay items. No direct payment or measurement for pay purposes will be made for sand blotter.

If the paved roadway must be sanded, the surface shall be sanded at approximately two pounds per square yard. No more sand shall be used than necessary, and the amount specified shall not be increased without prior approval of the Engineer.

After the treated area has been opened to traffic, the Contractor shall immediately cover any excess asphalt emulsion that comes to the

2.10 HIGH DENSITY MINERAL BOND:

2.10.1 DESCRIPTION:

The work covered by this specification consists of furnishing all labor, equipment, and materials necessary to perform all operations required for the application of high density mineral bond slurry seal (HDMB) to bituminous paved surfaces.

2.10.2 MATERIALS:

The Engineer must approve all material sources prior to their use. Once approved, material sources shall not be changed without the approval of the Engineer. If requested by the Engineer, the Contractor shall submit material samples at least seven (7) days prior to start of construction. When requested, additional samples shall be furnished during the construction period at no cost to the City. Material sample submittal is a non-pay item.

The material, ready to place, shall be as specified in the American Public Works Association (APWA) standard specifications Section 32 01 13.68 with modification to Section 2.3 Table 4 as follows:

Table 4** – Selection Guide			
Criterion	ASTM	Target	Unit
Asphalt content by weight	D 2172	17 min.	percent
Residual asphalt by weight	D 2939	30	percent
Cone penetration viscosity	D 217	350-450	cST/sec
Weight per gallon	D 2939	11.2 minimum	pounds
VOC	D 3960	<10	gram/liter
Sand or other round aggregate	--	6 percent maximum	by weight
Maximum VOC:	--	<10 g/l	g/l
Pinholes on glass	--	No grazing on film	--
Resistance to re-emulsification	--	Very good	--
Wear resistance (70 mils wet)	D 2486 *Modified	<6.5 percent @ 12,000 cycles	by weight
* Wear resistance scrubs @ 48 Wet Mils ASTM D2486 Modified Brass Brush 1000 Grams Glass Substrate Panels air dried three days then soaked 24 hours prior to testing. Report in Percentage of Dry Film Loss at 12,000 Scrub Cycles			

**American Public Works Association (APWA) standard specifications
Section 32 01 13.68 modified Table 4 of Section 2.3.

2.10.3 APPLICATION:

The HDMB shall be applied by distributing equipment that meets the requirements of Section 2.10.4. Two separate applications coats are required. The first application must be thoroughly dry and free of any damp areas before the second application begins. Application rates: 0.20 gallons per square yard maximum and 0.16 gallons per square yard minimum. The material per square yard of surface delivery rate shall be kept constant, even if the forward speed of the machine varies. Application rates shall not be reduced along edges or around manhole covers. Both applications shall be applied right to the edge of the pavement. Do not back away from curbs, manhole covers, and edges on either application.

2.10.4 EQUIPMENT:

2.10.4.1 GENERAL:

When requested by the Engineer, descriptive information on the HDMB application equipment to be used will be submitted for approval no less than 7 days before the starts.

2.10.4.2 DISTRIBUTING EQUIPMENT:

A Continuous flow mixing unit paver shall be capable of applying at least 15,000 square yards of material per day. It shall be equipped with full sweep helical mixer to assure proper suspension of fine aggregates. The machine shall have two separate filters. The primary filter should be at least 200 square inches with a filter face of 3/8 inch. The secondary filter needs to be at least 1500 square inches with a filter face of 1/8 inch. It shall have a retractable spray bar with spacing of 16 inches between each discharge orifice. The bar should be positioned minimum of 20 inches from the surface, and no more than 23 inches from the surface.

2.10.5 PREPARATION OF THE SURFACE:

Immediately before applying the HDMB, the area to be surfaced shall be cleaned of oil, grease, gasoline, dirt, loose material, and other objectionable material. The HDMB shall be applied the same day the pavement is cleaned. In urban areas, the surface shall be cleaned with a

self-propelled pick-up sweeper. In rural areas, power brooms may be used. When necessary, cleaning shall be supplemented by hand brooms. When necessary, cleaning of the existing pavement surface shall be supplemented by hand brooms or other methods, approved by the Engineer, to assure a good bond between the HDMB and the pavement surface. Power brooms or pick up brooms alone may not be adequate to thoroughly clean the surface. This also includes the removal of grass or weeds, which are growing in the joint between the street and the concrete gutter

The Contractor shall take all steps, procedures, and means to prevent dust pollution due to his construction practices in connection with this work. Dust prevention measures shall be maintained at all times during construction of the project to the satisfaction of the Engineer, in accordance with "Maricopa County Air Pollution Control Regulations".

Prior to the Pre-Construction meeting, the Contractor shall have a dust control plan, approved by the Maricopa County Division of Air Pollution Control. For information and requirements for the dust control plan, the Contractor shall contact:

Maricopa County Environmental Services Department
Division of Air Pollution Control
2406 South 24th Street, Suite E-214
Phoenix, AZ 85034 (602) 506-6727

The Contractor shall remove and dispose of raised pavement markers (if any) prior to the placement of the HDMB. Removal shall be by chipping, grinding, or any other method approved by the Engineer. The cost of raised pavement marker removal is incidental to pavement preparation.

Prior to striping removal, the Contractor shall document and detail the existing pavement striping and delineation. The details shall include as a minimum the type, size, color, dimensions, and specific detailed location of the delineation, acceptable to the Engineer, so that contractor or City Forces can replace the delineation, as it existed prior to the removal. The details shall be submitted to the Engineer a minimum three (3) working days prior to covering the striping with HDMB.

The HDMB shall not be applied until an inspection of the surface has been made by the Engineer and he has determined that it is suitable.

A tack coat shall be applied to high absorbent, polished, oxidized, or raveled asphalt surfaces or to concrete or brick surfaces. The tack coat should consist

of one part emulsified asphalt, three parts water and should be SS or CSS grade.

2.10.6 WEATHER LIMITATIONS:

HDMB shall not be applied during inclement weather, or weather determined unsuitable by the Engineer. The air and roadbed temperatures in the shade shall be 55 deg F. and rising and the application shall cease when the temperature is below 60 deg F. and falling or if the finished product will freeze before 48 hours.

2.10.7 PROTECTION OF UNCURED SURFACE:

Adequate methods such as barricades, flagmen, pilot cars, etc. shall be used to protect the treated surface from all types of traffic until the asphalt emulsion will not be picked up by traffic.

The Contractor shall be responsible for the repair of all damage done within 24 hours of initial application.

2.10.8 PROTECTION FOR ADJACENT PROPERTY:

Care shall be taken to prevent the spraying of asphalt emulsion on adjacent pavements, including that portion of the pavement being used for traffic, on structures, guard rails, guide posts, markers, trees, shrubs, and property of all kinds.

The Contractor shall mask off end of streets and intersections to provide straight lines:

1. Make straight lines along lip of gutters and shoulders. Keep same thickness in these areas. No runoff on these areas will be permitted.
2. Vary edge lines no more than 1/2 inch per 100 feet.
3. Protect curb, gutter, and sidewalk from spatter, mar, or overcoat.

2.10.9 MATERIALS TESTING:

The Contractor is responsible for the quality control of all materials used. Testing performed by the Engineer will assure that materials conform to the specifications and shall not be considered a quality control measure.

Provisions for properly sampling the mixture, ready to install, from distributing equipment or on-site bulk storage units shall be made by the Contractor. Sampling shall be performed by the Contractor and witnessed by the Engineer in accordance with the latest edition of ASTM D-2939, "Standard Test Methods for Emulsified Bitumens Used as Protective Coatings."

The minimum amount of sampling and testing shall be once for every 500 tons of materials ready to use. Material found in non-compliance will be rejected and shall be removed from the job site. No payment will be made for rejected material. The project shall not resume until the new material is tested and found in compliance. No lost time will be considered as a result of material being found in non-compliance.

2.10.10 MEASUREMENT:

Quantities and materials for this work will be paid for at the contract price per unit of measurement for each of the following pay items as indicated in the proposal.

HDMB mixture, ready to install - Ton
Bituminous tack coat if specified – Ton (Diluted)

Payment for various bid items shall be compensation in full for furnishing all materials, labor, tools, equipment, and appurtenances necessary to complete the work in a satisfactory manner, as specified.

No additional payment will be made for work related to any item, unless specifically called for in the bid. No payment will be made for materials used to patch unacceptable work.

There will be no payment for materials not placed in accordance with this specification. The cost associated with sand blotter, the material supplies, application, and clean-up shall be included in the unit price of related pay items. No direct payment or measurement for pay purposes will be made for sand blotter.

Only certified tickets of the HDMB mixture, ready to install, delivered to a City representative will be accepted for payment. Overweight tickets shall not be accepted and material shall be partially unloaded, at no expense to the contracting agency, to a legal status for re-weighing. A new ticket will be required for the remaining load. No deliveries shall be accepted prior to 7:00 a.m., or after 4:30 p.m. Any deliveries before or after this time frame will not be compensated.

A daily tabulation of materials delivered, used, square yards covered, application rate, etc., shall be compared between the Contractor and the Engineer. Adjustments and agreements are final at the end of each stockpile. Materials placed without approval of the inspector, or materials rejected due to improper placing, improper proportions of materials, or materials found to be defective, will not be compensated.

2.10.11 SAND BLOTTER:

Sand Blotter shall be in accordance with MAG Specs Sections 333.3.2 and 333.7, except as modified below.

The Contractor shall apply sand blotter prior to opening the roadway to traffic where there is an excess of asphalt emulsion, if requested by the Engineer. The Contractor shall also be responsible for sweeping the sand within 24 hours of opening the roadway to traffic.

There will be no payment for materials not placed in accordance with this specification. The cost associated with sand blotter, the material supplies, application, and clean-up shall be included in the unit price of related pay items. No direct payment or measurement for pay purposes will be made for sand blotter.

If the paved roadway must be sanded, the surface shall be sanded at approximately two pounds per square yard. No more sand shall be used than necessary, and the amount specified shall not be increased without prior approval of the Engineer.

After the treated area has been opened to traffic, the Contractor shall immediately cover any excess asphalt emulsion that comes to the surface with additional sand.

2.11 MTR (TIRE RUBBER MODIFIED SEALCOAT):

2.11.1 DESCRIPTION:

The work covered by this specification consists of furnishing all labor, equipment, and materials necessary to perform all operations required for the application of MTR (tire rubber modified sealcoat) to bituminous paved surfaces.

2.11.2 MATERIALS:

The Engineer must approve all material sources prior to their use. Once approved, material sources shall not be changed without the approval of the Engineer. If requested by the Engineer, the Contractor shall submit material samples at least seven (7) days prior to start of construction. When requested, additional samples shall be furnished during the construction period at no cost to the City. Material sample submittal is a non-pay item.

The material, ready to place, shall be per the manufacturers recommendations. In areas where additional aggregate is required based on

job specific conditions, the additional aggregate shall be added in accordance with the manufacturer's recommendations.

2.11.3 APPLICATION:

The MTR shall be applied by distributing equipment that meets the requirements of Section 2.11.4. Two separate applications coats are required. The first application must be thoroughly dry and free of any damp areas before the second application begins. Application rates of properly mixed MTR shall be 50 to 60 square feet per gallon/per coat or .15 -.18 gallons per square yard. At the direction of the Engineer, a third coat of MTR might be required in heavy traffic areas.

Pavement surfaces should be misted with water during application in extremely hot temperatures (90 degrees and above).

2.11.4 EQUIPMENT:

2.11.4.1 GENERAL:

When requested by the Engineer, descriptive information on the MTR application equipment to be used will be submitted for approval no less than 7 days before the starts.

2.11.4.2 DISTRIBUTING EQUIPMENT:

Application equipment shall meet the requirements of the manufacturer. Per the manufacturer, MTR can be applied by hand spray/squeegee, mechanical spray tankers or squeegee machines. Application units shall be equipped with mechanical agitators to maintain consistency of the mixed material during application.

2.11.5 PREPARATION OF THE SURFACE:

Immediately before applying the MTR, the area to be surfaced shall be cleaned of oil, grease, gasoline, dirt, loose material, and other objectionable material. The MTR shall be applied the same day the pavement is cleaned. In urban areas, the surface shall be cleaned with a self-propelled pick-up sweeper. In rural areas, power brooms may be used. When necessary, cleaning shall be supplemented by hand brooms. When necessary, cleaning of the existing pavement surface shall be supplemented by hand brooms or other methods, approved by the Engineer, to assure a good bond between the MTR and the pavement surface. Power brooms or pick up brooms alone may not be adequate to thoroughly clean the surface. This

also includes the removal of grass or weeds, which are growing in the joint between the street and the concrete gutter

The Contractor shall take all steps, procedures, and means to prevent dust pollution due to his construction practices in connection with this work. Dust prevention measures shall be maintained at all times during construction of the project to the satisfaction of the Engineer, in accordance with "Maricopa County Air Pollution Control Regulations".

Prior to the Pre-Construction meeting, the Contractor shall have a dust control plan, approved by the Maricopa County Division of Air Pollution Control. For information and requirements for the dust control plan, the Contractor shall contact:

Maricopa County Environmental Services Department
Division of Air Pollution Control
2406 South 24th Street, Suite E-214
Phoenix, AZ 85034 (602) 506-6727

The Contractor shall remove and dispose of raised pavement markers (if any) prior to the placement of the MTR. Removal shall be by chipping, grinding, or any other method approved by the Engineer. The cost of raised pavement marker removal is incidental to pavement preparation.

Prior to striping removal, the Contractor shall document and detail the existing pavement striping and delineation. The details shall include as a minimum the type, size, color, dimensions, and specific detailed location of the delineation, acceptable to the Engineer, so that contractor or City Forces can replace the delineation, as it existed prior to the removal. The details shall be submitted to the Engineer a minimum three (3) working days prior to covering the striping with MTR.

The MTR shall not be applied until an inspection of the surface has been made by the Engineer and he has determined that it is suitable.

A tack coat shall be applied to high absorbent, polished, oxidized, or raveled asphalt surfaces. The tack coat should consist of one part emulsified asphalt, three parts water and should be SS-1h grade.

2.11.6 WEATHER LIMITATIONS:

MTR shall not be applied during inclement weather, or weather determined unsuitable by the Engineer. The air and roadbed temperatures in the shade shall be 55 deg F and rising. MTR should not be applied if raining or rain is forecasted within 24 hours of application.

2.11.7 PROTECTION OF UNCURED SURFACE:

Adequate methods such as barricades, flagmen, pilot cars, etc. shall be used to protect the treated surface from all types of traffic until the asphalt emulsion will not be picked up by traffic.

The Contractor shall be responsible for the repair of all damage done within 24 hours of initial application.

2.11.8 PROTECTION FOR ADJACENT PROPERTY:

Care shall be taken to prevent the spraying of asphalt emulsion on adjacent pavements, including that portion of the pavement being used for traffic, on structures, guard rails, guide posts, markers, trees, shrubs, and property of all kinds.

The Contractor shall mask off end of streets and intersections to provide straight lines:

4. Make straight lines along lip of gutters and shoulders. Keep same thickness in these areas. No runoff on these areas will be permitted.
5. Vary edge lines no more than 1/2 inch per 100 feet.
6. Protect curb, gutter, and sidewalk from spatter, mar, or overcoat.

2.11.9 MATERIALS TESTING:

The Contractor is responsible for the quality control of all materials used. Testing performed by the Engineer will assure that materials conform to the specifications and shall not be considered a quality control measure.

Provisions for properly sampling the mixture, ready to install, from distributing equipment or on-site bulk storage units shall be made by the Contractor. Sampling shall be performed by the Contractor and witnessed by the Engineer in accordance with the latest edition of ASTM D-2939, "Standard Test Methods for Emulsified Bitumens Used as Protective Coatings."

The minimum amount of sampling and testing shall be once for every 500 gallons of materials ready to use. Material found in non-compliance will be rejected and shall be removed from the job site. No payment will be made for rejected material. The project shall not resume until the new material is tested and found in compliance. No lost time will be considered as a result of material being found in non-compliance.

2.11.10 MEASUREMENT:

Quantities and materials for this work will be paid for at the contract price per unit of measurement for each of the following pay items as indicated in the proposal.

MTR mixture, ready to install - Gallon
Bituminous tack coat if specified – Ton (Diluted)

Payment for various bid items shall be compensation in full for furnishing all materials, labor, tools, equipment, and appurtenances necessary to complete the work in a satisfactory manner, as specified.

No additional payment will be made for work related to any item, unless specifically called for in the bid. No payment will be made for materials used to patch unacceptable work.

Only certified tickets of the MTR mixture, ready to install, delivered to a City representative will be accepted for payment. Overweight tickets shall not be accepted and material shall be partially unloaded, at no expense to the contracting agency, to a legal status for re-weighing. A new ticket will be required for the remaining load. No deliveries shall be accepted prior to 7:00 a.m., or after 4:30 p.m. Any deliveries before or after this time frame will not be compensated.

A daily tabulation of materials delivered, used, square yards covered, application rate, etc., shall be compared between the Contractor and the Engineer. Adjustments and agreements are final at the end of each stockpile. Materials placed without approval of the inspector, or materials rejected due to improper placing, improper proportions of materials, or materials found to be defective, will not be compensated.

2.12 PMM RTU (POLYMER-MODIFIED MASTERSEAL ASPHALT EMULSION SEALCOAT):

2.12.1 DESCRIPTION:

The work covered by this specification consists of furnishing all labor, equipment, and materials necessary to perform all operations required for the application of PMM RTU polymer-modified MasterSeal ready to use asphalt emulsion sealcoat (PMM RTU) to bituminous paved surfaces.

2.12.2 MATERIALS:

The Engineer must approve all material sources prior to their use. Once approved, material sources shall not be changed without the approval of the Engineer. If requested by the Engineer, the Contractor shall submit material samples at least seven (7) days prior to start of construction.

When requested, additional samples shall be furnished during the construction period at no cost to the City. Material sample submittal is a non-pay item.

The material, ready to place, shall be per the manufacturers recommendations. In areas where additional aggregate is required based on job specific conditions, the additional aggregate shall be added in accordance with the manufacturer's recommendations.

2.12.3 APPLICATION:

The PMM RTU shall be applied by distributing equipment that meets the requirements of Section 2.12.4. Two separate applications coats are required. The first application must be thoroughly dry and free of any damp areas before the second application begins. Application rates of properly mixed PMM RTU shall be 45 to 60 square feet per gallon/per coat or .15 -.20 gallons per square yard. At the direction of the Engineer, a third coat of PMM RTU might be required in heavy traffic areas or on severely distressed pavements.

Pavement surfaces should be misted with water during application in extremely hot temperatures (90 degrees and above).

2.12.4 EQUIPMENT:

2.12.4.1 GENERAL:

When requested by the Engineer, descriptive information on the PMM RTU application equipment to be used will be submitted for approval no less than 7 days before the starts.

2.12.4.2 DISTRIBUTING EQUIPMENT:

Application equipment shall meet the requirements of the manufacturer. Per the manufacturer, PMM RTU can be applied by hand spray/squeegee, mechanical spray units or squeegee machines. Application units shall be equipped with mechanical agitators to maintain consistency of the mixed material during application, or to mix additional aggregate if needed.

2.12.5 PREPARATION OF THE SURFACE:

Immediately before applying the PMM RTU, the area to be surfaced shall be cleaned of oil, grease, gasoline, dirt, loose material, and other objectionable material. The PMM RTU shall be applied the same day the pavement is cleaned. In urban areas, the surface shall be cleaned with a self-propelled pick-up sweeper. In rural areas, power brooms may be used. When necessary, cleaning shall be supplemented by hand brooms. When necessary, cleaning of the existing pavement surface shall be

supplemented by hand brooms or other methods, approved by the Engineer, to assure a good bond between the PMM RTU and the pavement surface. Power brooms or pick up brooms alone may not be adequate to thoroughly clean the surface. This also includes the removal of grass or weeds, which are growing in the joint between the street and the concrete gutter

The Contractor shall take all steps, procedures, and means to prevent dust pollution due to his construction practices in connection with this work. Dust prevention measures shall be maintained at all times during construction of the project to the satisfaction of the Engineer, in accordance with "Maricopa County Air Pollution Control Regulations".

Prior to the Pre-Construction meeting, the Contractor shall have a dust control plan, approved by the Maricopa County Division of Air Pollution Control. For information and requirements for the dust control plan, the Contractor shall contact:

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Division of Air Pollution Control
2406 South 24th Street, Suite E-214
Phoenix, AZ 85034 (602) 506-6727

The Contractor shall remove and dispose of raised pavement markers (if any) prior to the placement of the PMM RTU. Removal shall be by chipping, grinding, or any other method approved by the Engineer. The cost of raised pavement marker removal is incidental to pavement preparation.

Prior to striping removal, the Contractor shall document and detail the existing pavement striping and delineation. The details shall include as a minimum the type, size, color, dimensions, and specific detailed location of the delineation, acceptable to the Engineer, so that contractor or City Forces can replace the delineation, as it existed prior to the removal. The details shall be submitted to the Engineer a minimum three (3) working days prior to covering the striping with PMM RTU.

The PMM RTU shall not be applied until an inspection of the surface has been made by the Engineer and he has determined that it is suitable.

2.12.6 WEATHER LIMITATIONS:

PMM RTU shall not be applied during inclement weather, or weather determined unsuitable by the Engineer. The air and roadbed temperatures in the shade shall be 55 deg F and rising. PMM RTU should not be applied if raining or rain is forecasted within 24 hours of application.

2.12.7 PROTECTION OF UNCURED SURFACE:

Adequate methods such as barricades, flagmen, pilot cars, etc. shall be used to protect the treated surface from all types of traffic until the asphalt emulsion will not be picked up by traffic.

The Contractor shall be responsible for the repair of all damage done within 24 hours of initial application.

2.12.8 PROTECTION FOR ADJACENT PROPERTY:

Care shall be taken to prevent the spraying of asphalt emulsion on adjacent pavements, including that portion of the pavement being used for traffic, on structures, guard rails, guide posts, markers, trees, shrubs, and property of all kinds.

The Contractor shall mask off end of streets and intersections to provide straight lines:

1. Make straight lines along lip of gutters and shoulders. Keep same thickness in these areas. No runoff on these areas will be permitted.
2. Vary edge lines no more than 1/2 inch per 100 feet.
3. Protect curb, gutter, and sidewalk from spatter, mar, or overcoat.

2.12.9 MATERIALS TESTING:

The Contractor is responsible for the quality control of all materials used. Testing performed by the Engineer will assure that materials conform to the specifications and shall not be considered a quality control measure.

Provisions for properly sampling the mixture, ready to install, from distributing equipment or on-site bulk storage units shall be made by the Contractor. Sampling shall be performed by the Contractor and witnessed by the Engineer in accordance with the latest edition of ASTM D-2939, "Standard Test Methods for Emulsified Bitumens Used as Protective Coatings."

The minimum amount of sampling and testing shall be once for every 500 gallons of materials ready to use. Material found in non-compliance will be rejected and shall be removed from the job site. No payment will be made for rejected material. The project shall not resume until the new material is tested and found in compliance. No lost time will be considered as a result of material being found in non-compliance.

2.12.10 MEASUREMENT:

Quantities and materials for this work will be paid for at the contract price per unit of measurement for each of the following pay items as indicated in the proposal.

PMM RTU mixture, ready to install - Gallon

Payment for various bid items shall be compensation in full for furnishing all materials, labor, tools, equipment, and appurtenances necessary to complete the work in a satisfactory manner, as specified.

No additional payment will be made for work related to any item, unless specifically called for in the bid. No payment will be made for materials used to patch unacceptable work.

Only certified tickets of the PMM RTU mixture, ready to install, delivered to a City representative will be accepted for payment. Overweight tickets shall not be accepted and material shall be partially unloaded, at no expense to the contracting agency, to a legal status for re-weighing. A new ticket will be required for the remaining load. No deliveries shall be accepted prior to 7:00 a.m., or after 4:30 p.m. Any deliveries before or after this time frame will not be compensated.

A daily tabulation of materials delivered, used, square yards covered, application rate, etc., shall be compared between the Contractor and the Engineer. Adjustments and agreements are final at the end of each stockpile. Materials placed without approval of the inspector, or materials rejected due to improper placing, improper proportions of materials, or materials found to be defective, will not be compensated.

2.13 TRMSS (TIRE RUBBER MODIFIED SURFACE SEAL):

2.13.1 DESCRIPTION:

The work covered by this specification consists of furnishing all labor, equipment, and materials necessary to perform all operations required for the application of TRMSS tire modified surface seal (TRMSS) to bituminous paved surfaces.

2.13.2 MATERIALS:

The Engineer must approve all material sources prior to their use. Once approved, material sources shall not be changed without the approval of the Engineer. If requested by the Engineer, the Contractor shall submit material samples at least seven (7) days prior to start of construction. When requested, additional samples shall be furnished during the

construction period at no cost to the City. Material sample submittal is a non-pay item.

The material, ready to place, shall be per the manufacturers recommendations.

2.13.3 APPLICATION:

The TRMSS shall be applied by distributing equipment that meets the requirements of Section 2.13.4. Application rates of properly mixed TRMSS shall be per the manufacturer's recommendations.

2.13.4 EQUIPMENT:

2.13.4.1 GENERAL:

When requested by the Engineer, descriptive information on the TRMSS application equipment to be used will be submitted for approval no less than 7 days before the starts.

2.13.4.2 DISTRIBUTING EQUIPMENT:

Application equipment shall meet the requirements of the manufacturer. Per the manufacturer, TRMSS can be applied with computer rate controlled asphalt spreader or standard sealcoat spray distributor trucks. Hand spray wands and squeegees are to be used for small areas and trim.

2.13.5 PREPARATION OF THE SURFACE:

Immediately before applying the TRMSS, the area to be surfaced shall be cleaned of oil, grease, gasoline, dirt, loose material, and other objectionable material. The TRMSS shall be applied the same day the pavement is cleaned. In urban areas, the surface shall be cleaned with a self-propelled pick-up sweeper. In rural areas, power brooms may be used. When necessary, cleaning shall be supplemented by hand brooms. When necessary, cleaning of the existing pavement surface shall be supplemented by hand brooms or other methods, approved by the Engineer, to assure a good bond between the TRMSS and the pavement surface. Power brooms or pick up brooms alone may not be adequate to thoroughly clean the surface. This also includes the removal of grass or weeds, which are growing in the joint between the street and the concrete gutter

The Contractor shall take all steps, procedures, and means to prevent dust pollution due to his construction practices in connection with this work. Dust prevention measures shall be maintained at all times during construction of the project to the satisfaction of the Engineer, in accordance with "Maricopa County Air Pollution Control Regulations".

Prior to the Pre-Construction meeting, the Contractor shall have a dust control plan, approved by the Maricopa County Division of Air Pollution Control. For information and requirements for the dust control plan, the Contractor shall contact:

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The Contractor shall remove and dispose of raised pavement markers (if any) prior to the placement of the TRMSS. Removal shall be by chipping, grinding, or any other method approved by the Engineer. The cost of raised pavement marker removal is incidental to pavement preparation.

Prior to striping removal, the Contractor shall document and detail the existing pavement striping and delineation. The details shall include as a minimum the type, size, color, dimensions, and specific detailed location of the delineation, acceptable to the Engineer, so that contractor or City Forces can replace the delineation, as it existed prior to the removal. The details shall be submitted to the Engineer a minimum three (3) working days prior to covering the striping with TRMSS.

The TRMSS shall not be applied until an inspection of the surface has been made by the Engineer and he has determined that it is suitable.

2.13.6 WEATHER LIMITATIONS:

TRMSS shall not be applied during inclement weather, or weather determined unsuitable by the Engineer. The air and roadbed temperatures in the shade shall be 55 deg F and rising. TRMSS should not be applied if raining or rain is forecasted within 24 hours of application.

2.13.7 PROTECTION OF UNCURED SURFACE:

Adequate methods such as barricades, flagmen, pilot cars, etc. shall be used to protect the treated surface from all types of traffic until the asphalt emulsion will not be picked up by traffic.

The Contractor shall be responsible for the repair of all damage done within 24 hours of initial application.

2.13.8 PROTECTION FOR ADJACENT PROPERTY:

Care shall be taken to prevent the spraying of asphalt emulsion on adjacent pavements, including that portion of the pavement being used for traffic, on

structures, guard rails, guide posts, markers, trees, shrubs, and property of all kinds.

The Contractor shall mask off end of streets and intersections to provide straight lines:

1. Make straight lines along lip of gutters and shoulders. Keep same thickness in these areas. No runoff on these areas will be permitted.
2. Vary edge lines no more than 1/2 inch per 100 feet.
3. Protect curb, gutter, and sidewalk from spatter, mar, or overcoat.

2.13.9 MATERIALS TESTING:

The Contractor is responsible for the quality control of all materials used. Testing performed by the Engineer will assure that materials conform to the specifications and shall not be considered a quality control measure.

Provisions for properly sampling the mixture, ready to install, from distributing equipment or on-site bulk storage units shall be made by the Contractor. Sampling shall be performed by the Contractor and witnessed by the Engineer in accordance with the latest edition of ASTM D-2939, "Standard Test Methods for Emulsified Bitumens Used as Protective Coatings."

The minimum amount of sampling and testing shall be once for every 500 gallons of materials ready to use. Material found in non-compliance will be rejected and shall be removed from the job site. No payment will be made for rejected material. The project shall not resume until the new material is tested and found in compliance. No lost time will be considered as a result of material being found in non-compliance.

2.13.10 MEASUREMENT:

Quantities and materials for this work will be paid for at the contract price per unit of measurement for each of the following pay items as indicated in the proposal.

TRMSS mixture, ready to install - Ton

Payment for various bid items shall be compensation in full for furnishing all materials, labor, tools, equipment, and appurtenances necessary to complete the work in a satisfactory manner, as specified.

No additional payment will be made for work related to any item, unless specifically called for in the bid. No payment will be made for materials used to patch unacceptable work.

Only certified tickets of the TRMSS mixture, ready to install, delivered to a City representative will be accepted for payment. Overweight tickets shall not be accepted and material shall be partially unloaded, at no expense to the contracting agency, to a legal status for re-weighing. A new ticket will be required for the remaining load. No deliveries shall be accepted prior to 7:00 a.m., or after 4:30 p.m. Any deliveries before or after this time frame will not be compensated.

A daily tabulation of materials delivered, used, square yards covered, application rate, etc., shall be compared between the Contractor and the Engineer. Adjustments and agreements are final at the end of each stockpile. Materials placed without approval of the inspector, or materials rejected due to improper placing, improper proportions of materials, or materials found to be defective, will not be compensated.

2.14 PAINTED PAVEMENT MARKINGS:

2.14.1 DESCRIPTION:

The work covered by this specification consists of furnishing all labor, equipment, and materials necessary to perform all operations required for the construction of painted pavement markings

2.14.2 MATERIALS:

The Engineer must approve all material sources prior to their use. Once approved, material sources shall not be changed without the approval of the Engineer. If requested by the Engineer, the Contractor shall submit technical material/manufacturer data for all materials and appurtenances used on the project at least seven (7) days prior to start of construction.

2.14.2.1 STRIPING:

All striping shall conform to the latest edition of the MUTCD and any ADOT supplement.

2.14.2.2 PAINT:

Paint shall be ready mixed, conventional and fast drying waterborne traffic paints. It shall be lead-free, non-toxic, NASSHTO Test Deck, with a minimum retroreflectance of 100 mcDs, and a durability rating of 6 or more after being in place for 9 months. The paint material shall fall within following limits:

- a) Pigment, percent by weight: 60 (plus or minus 2);
- b) Vehicle, percent by weight: 40 (plus or minus 2);
- c) Non-Volatile, percent by weight of paint: 76.0;

- d) Weight per gallon: minimum 13.0 lbs;
- e) Viscosity: 80-95 Krebs Units at 77 degrees F;
- f) Grind (Hegeman Gauge) minimum Field Tested no tracking time under ambient conditions: 20-90 seconds;
- g) Dry Through Time, 15 mils wet at 90 percent relative humidity, 72 degrees F, ASTM D1640: 125 minutes maximum; and
- h) VOC (Volatile Organic Content): One lbs/gal maximum (Do not exceed State or Environmental Protection Agency maximum VOC on traffic paint).

Glass Beads shall be AASHTO M247, Type 1, coated to enhance embedment and adherence with paint.

2.14.3 APPLICATION:

Striping shall be applied by a continuous longitudinal line application machine. The application machine shall be as specified in Section 2.14.4.

Paint will be agitated for 1-15 minutes prior to application to ensure even distribution of paint pigment. The paint shall be dispensed at a maximum ambient temperature of 150 degrees F to wet film thickness of 15 mils except at edge markings where it will be dispensed to a wet film thickness of 12 mils. Glass beads shall be applied at a rate of 6 pounds per gallon of paint. Contractor will prevent the paint from splattering and over spray when applying markings.

Markings shall be applied to indicated dimensions at indicated locations.

Unless material is track free at the end of the paint application convoy, the Contractor shall use traffic cones to protect markings from traffic until track free. The Contractor shall eradicate affected marking and resultant tracking and apply new markings when vehicle crosses a marking and tracks it or when splattering or over spray occurs.

Contractor shall collect and legally dispose of all residues from painting operations.

2.14.3.1 APPLICATION TOLERANCES:

The Contractor shall observe the following tolerances:

- a) Maximum Variation from Wet Film Thickness: 1 mil.

- b) Maximum Variation from Wet Paint Line Width: Plus or minus 1/8 inch.
- c) Maintain cycle length for skip lines at tolerance of plus or minus 6 inches per 40 feet and line length of plus or minus 3 inches per 10 feet.
- d) Maximum Variation from Specified Application Temperature: Plus or minus 5 degrees F.

Pavement markings that do not conform to these tolerances shall be removed and reapplied. No payment shall be made for pavement markings that do not meet tolerances. No lost time will be considered as a result of pavement markings not meeting tolerances.

2.14.4 EQUIPMENT:

2.14.4.1 GENERAL:

When requested by the Engineer, descriptive information on the continuous longitudinal line application equipment to be used will be submitted for approval no less than 7 days before the starts.

2.14.4.2 STRIPING EQUIPMENT:

Continuous Longitudinal Line Application Machine must have the following capabilities.

- a) Dual nozzle paint gun to simultaneously apply parallel lines of indicated width in solid or broken patterns or various combinations of those patterns.
- b) Pressurized bead-gun to automatically dispense glass beads onto painted surface, at required application rate.
- c) Measuring device to automatically and continuously measure length of each line placed, to nearest foot.
- d) Device to heat paint to manufacturers recommendations for fast dry applications.

Machine Calibration:

- a) Paint Line Measuring Device: Calibrate automatic line length gauges to maintain tolerance of plus or minus 25 feet per mile.
- b) Cycle Length/Paint Line Length Timer: Calibrate cycle length to maintain tolerance of plus or minus 6 inches per 40feet; calibrate paint line length to maintain tolerance to plus or minus 3 inches per 10 feet.
- c) Paint Guns: Calibrate to simultaneously apply paint binder at uniform rates as specified with an allowable tolerance of plus or minus 1 mil.

- d) Bead Guns: Calibrate to dispense glass beads simultaneously at specified rate. Check guns by dispensing glass beads into gallon container for predetermined fixed period of time. Verify weight of glass beads.

2.14.4.3 OTHER EQUIPMENT:

For application of crosswalks, intersections, stop lines, legends and other miscellaneous items by walk behind stripers, hand spray or stencil trucks, apply with equipment meeting requirements of this section. Do not use hand brushes or rollers. Optionally apply glass beads by hand.

2.14.5 PREPARATION OF THE SURFACE:

Prior to painting the area shall be clean and dry. The surface shall be cleaned of dirt, loose material, oil, grease, gasoline, and other objectionable material. In urban areas, the surface shall be cleaned with a self-propelled pick-up sweeper. In rural areas, power brooms may be used. When necessary, cleaning shall be supplemented by hand brooms. When necessary, cleaning of the existing pavement surface shall be supplemented by hand brooms or other methods, approved by the Engineer. Power brooms or pick up brooms alone may not be adequate to thoroughly clean the surface.

The Contractor shall remove existing markings in an acceptable manner. Existing pavement markings shall not be removed by painting over with blank paint. Existing markings shall be removed only by water blasting. The Contractor shall satisfactorily repair any pavement or surface damage caused by the removal of the markings.

The Contractor shall take all steps, procedures, and means to prevent dust pollution due to his construction practices in connection with this work. Dust prevention measures shall be maintained at all times during construction of the project to the satisfaction of the Engineer, in accordance with "Maricopa County Air Pollution Control Regulations".

Prior to the Pre-Construction meeting, the Contractor shall have a dust control plan, approved by the Maricopa County Division of Air Pollution Control. For information and requirements for the dust control plan, the Contractor shall contact:

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Phoenix, AZ 85034 (602) 506-6727

Prior to applying the traffic lines the contractor shall spot locate the final pavement markings as specified and as indicated on the drawings by applying pavement spots 25 feet on center. The Contractor shall notify the Engineer after placing the pavement spots a minimum of 3 days prior to applying traffic lines.

2.14.6 WEATHER LIMITATIONS:

Do not apply materials when surface and ambient temperatures are outside temperature ranges required by paint product manufacturer.

Do not apply exterior coatings during rain or snow when relative humidity is outside humidity ranges, or moisture content of surfaces exceed those required by paint product manufacturer.

Do not apply paint when temperatures are expected to fall below 50 degrees F for 24 hours after application.

2.14.7 PROTECTION OF FINISHED WORK:

The Contractor shall protect painted pavement markings from vehicular and pedestrian traffic until paint is dry and track free. Follow manufacturer's recommendations or use minimum of 30 minutes. Consider barrier cones as satisfactory protection for materials requiring more than 2 minutes dry time

2.14.8 QUALITY CONTROL:

The Contractor is responsible for the quality control of all materials used. Testing performed by the Engineer will assure that materials conform to the specifications and shall not be considered a quality control measure.

Traffic Paints shall be tested and analyzed traffic paints in accordance with [ASTM D34] [ASTM D126] [ASTM D562] [ASTM D711] [ASTM D713] [ASTM D969] [ASTM D1301] [ASTM D1394] [ASTM D1475] [ASTM D2202] [ASTM D2371] [ASTM D2621] [ASTM D2743].

Paints and glass beads shall be made available for inspection at manufacturer's factory prior to packaging for shipment. The contractor shall notify the Engineer at least seven days prior to inspection.

The Contractor shall allow witnessing of factory inspections and test at manufacturer's test facility. Contractor shall notify the Engineer at least seven days before inspections and tests are scheduled.

2.14.9 FIELD QUALITY CONTROL:

After the installation of the pavement marking, the Engineer will inspect for incorrect location, insufficient thickness, line width, coverage, retention, uncured or discolored material, and insufficient bonding.

The Contractor shall repair all lines and markings, which after application and curing do not meet following criteria:

- a) Incorrect Location: Remove and replace incorrectly placed patterns.
- b) Insufficient Thickness, Line Width, Paint Coverage, Glass Bead Coverage or Retention: Prepare defective material by acceptably grinding or blast cleaning to remove substantial amount of beads and to roughen marking surface. Remove loose particles and debris. Apply new markings on cleaned surface in accordance with this Section.
- c) Uncured or Discolored Material, Insufficient Bonding: Remove defective markings in accordance with this Section and clean pavement surface one foot beyond affected area. Apply new markings on cleaned surface in accordance with this Section.

The contractor shall replace defective pavement markings as specified throughout the 2 year warranted period. The Contractor shall replace markings damaged by anti-skid materials, studded tires, tire chains, chemical deicers, snow plowing or other loss of marking material regardless of cause. Contractor shall be released from warranty requirements for damaged work when markings are damaged by pavement failure or by the City's painting, crack sealing, or pavement repair operations,.

A three member team will evaluate warranty provisions. The team will consist of one member from the City, one member from the Contractor, and third person who is mutually acceptable to the City and the Contractor. Any costs for a third person will be equally shared between the City and the Contractor. At least once each year, beginning with year after acceptance, the team shall:

- a) Observe the City taking readings by retroreflectometer, or review the City's records of such evaluation. The number of readings will be as large as necessary to ensure that minimum criteria are satisfied. Readings will be during period from March 15 through October, when pavement is clean and dry.
- b) Determine color fade, discoloration or pigment loss based on visual color comparison between original sample plates with glass beads and in-place pavement markings.
- c) Determine magnitude of material loss.

The Engineer shall prepare list of defective areas and areas requiring additional inspection and evaluation to decide where material may need

replaced. The Contractor shall provide traffic control as necessary if markings require more detailed evaluation.

The Contractor shall replace failed or defective markings in entire section of defective markings within 30 days after notification when any of the following exists during warranty period:

- a) Average retroreflectivity within any 528 foot section is less than 1225 mcd/m²/1x for white pavement markings and 100 mcd/m²/1x for yellow pavement markings.
- b) Marking is discolored or exhibits pigment loss, and is determined to be unacceptable by three member team based on visual comparison with beaded color plates.
- c) More than 15 percent of area of continuous line, or more than 15 percent of combined area of skip lines, within any 528 foot section of roadway is missing.

The Contractor shall replace pavement marking material under warranty using original or better type material. The warranty shall continue to the end of original 2 year period even when replacement materials have been installed as specified.

When eradication of existing paint lines is necessary, the Contractor shall eradicate it by shot blast or water blast method. The pavement shall not have a gouge or groove of more than 1/16 inch during removal. The area of removal shall be limited to area of marking plus 1 inch on all sides. Damage shall be prevented to transverse and longitudinal joint sealers.

The Contractor shall maintain a daily log showing work completed, results of the above inspections or tests, pavement and air temperatures, relative humidity, presence of any moisture on pavement, and any material or equipment problems. The log entries shall be legible, in ink, sign and submitted by the end of each work day. Environmental data shall be entered into the log prior to starting work each day and at two additional times during day.

2.14.10 PERFORMANCE REQUIREMENTS:

The Contractor is responsible for the quality control of all materials used. Testing performed by the Engineer will assure that materials conform to the specifications and shall not be considered a quality control measure.

Paint Adhesion: Adhere to road surface forming smooth continuous film one minute after application.

Paint Drying: Tack free by touch so as not to require coning or other traffic control devices to prevent transfer by vehicle tires within two minutes after application.

2.14.11 MEASUREMENT:

Quantities and materials for this work will be paid for at the contract price per unit of measurement for each of the following pay items as indicated in the proposal.

Painted pavement longitudinal and transverse markings, such as edge lines, lane lines, gore lines, cross-walks and stop bars, will be measured by the linear foot along the center line of the pavement marking line and will be based on a four-inch-wide line. Measurement for striping with a plan width greater or less than the basic four inches as shown on the plans or directed by the Engineer will be made by the same method and then adjusted by the following factor:

Plan Width of Striping (inches) x Linear Feet
4 (inches)

No measurement will be made of the number of linear feet of gaps in dashed lines.

Double marking lines, consisting of two four- inch-wide stripes, will be measured as two individual marking lines. Crosswalk lines, stop bars, stop lines, gore lines, cross hatch lines, chevron lines and rail road marking transverse lines will be measured for center line length and adjusted for widths other than four inches, as defined above.

Painted pavement marking symbols, such as diamonds; bike lane symbol, handicap symbol, or single, double, or triple arrows, will be measured by each unit applied. Each pavement symbol, as shown on the plans, will be considered a unit.

Painted pavement marking legends, defined as a complete letter grouping such as "SCHOOL," "XING," "STOP," "RR," or "ONLY." , will be measured by each unit applied. Each pavement legend, as shown on the plans, will be considered a unit.

No separate measurement or payment will be made for cleaning and preparing the pavement surface, including abrasive sweeping, high-pressure air spray, water blasting of existing markings, and for disposal of excess materials, cleaning fluids, and empty material containers, the cost being considered as included in contract items.

Removal of curing compound from new Portland cement concrete pavement and the application of primer-sealer, which is to be applied to both old and new Portland cement concrete pavement prior to application of thermoplastic marking, shall be measured by the linear foot for striping lines regardless of width, or unit each for symbols and legends, and in accordance with the items of work established in the bid schedule.

No separate measurement or payment will be made for cleaning and preparing the pavement surface, including abrasive sweeping, high-pressure air spray, water blasting of existing markings, and for disposal of excess materials, cleaning fluids, and empty material containers, the cost being considered as included in contract items.

No additional payment will be made for work related to any item, unless specifically called for in the bid. No payment will be made for materials used to patch unacceptable work.

2.15 THERMOPLASTIC PAVEMENT MARKINGS:

2.15.1 DESCRIPTION:

The work covered by this specification consists of furnishing all labor, equipment, and materials necessary to perform all operations required for the construction of thermoplastic pavement markings

2.15.2 MATERIALS:

The Engineer must approve all material sources prior to their use. Once approved, material sources shall not be changed without the approval of the Engineer. If requested by the Engineer, the Contractor shall submit technical material/manufacturer data for all materials and appurtenances used on the project at least seven (7) days prior to start of construction.

All permanent longitudinal pavement striping (centerlines, lane lines, bay lines) shall be 60 mil sprayed thermoplastic. Thermoplastic material shall be applied in accordance with section 704 of ADOT's standard Specifications for Road and Bridge Construction.

Reflective beads shall be applied in accordance with section 704 of ADOT's Standard Specifications for Road and Bridge Construction on all striping.

All stop bars, crosswalks, (lines and rails), holding bars, ladder lines, and channelization lines shall be 90 mil extruded thermoplastic. Reflective beads shall be applied as pursuant to ADOT's Standard Specifications for Road and Bridge Construction, Section 704

All letters, arrows and symbols and legends shall be in conformance with the “Standard Alphabets for Highway Signs and Pavement Markings” adopted by the Federal Highway Administration and shall be 3M Stamark L270ES Pavement Marking Tape.

All striping shall conform to the latest edition of the MUTCD and any ADOT supplement.

2.15.3 APPLICATION:

Application shall be in accordance with section 704 of ADOT’s Standard Specifications for Road and Bridge Construction.

2.15.4 PREPARATION OF THE SURFACE:

Preparation shall be in accordance with section 704 of ADOT’s Standard Specifications for Road and Bridge Construction. Prior to application the area shall be clean and dry. The surface shall be cleaned of dirt, loose material, oil, grease, gasoline, and other objectionable material. In urban areas, the surface shall be cleaned with a self-propelled pick-up sweeper. In rural areas, power brooms may be used. When necessary, cleaning shall be supplemented by hand brooms. When necessary, cleaning of the existing pavement surface shall be supplemented by hand brooms or other methods, approved by the Engineer. Power brooms or pick up brooms alone may not be adequate to thoroughly clean the surface.

The Contractor shall remove existing markings in an acceptable manner. Existing pavement markings shall not be removed by painting over with blank paint. Existing markings shall be removed only by water blasting. The Contractor shall satisfactorily repair any pavement or surface damage caused by the removal of the markings.

The Contractor shall take all steps, procedures, and means to prevent dust pollution due to his construction practices in connection with this work. Dust prevention measures shall be maintained at all times during construction of the project to the satisfaction of the Engineer, in accordance with “Maricopa County Air Pollution Control Regulations”.

Prior to the Pre-Construction meeting, the Contractor shall have a dust control plan, approved by the Maricopa County Division of Air Pollution Control. For information and requirements for the dust control plan, the Contractor shall contact:

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Phoenix, AZ 85034 (602) 506-6727

Prior to applying the traffic lines the contractor shall spot locate the final pavement markings as specified and as indicated on the drawings by applying pavement spots 25 feet on center. The Contractor shall notify the Engineer after placing the pavement spots a minimum of 3 days prior to applying traffic lines.

2.15.5 QUALITY CONTROL:

The Contractor is responsible for the quality control of all materials used. Testing performed by the Engineer will assure that materials conform to the specifications and shall not be considered a quality control measure. Quality Control shall be in accordance with section 704 of ADOT's Standard Specifications for Road and Bridge Construction.

2.15.6 MEASUREMENT:

Quantities and materials for this work will be paid for at the contract price per unit of measurement for each of the following pay items as indicated in the proposal.

Thermoplastic pavement longitudinal and transverse markings, such as edge lines, lane lines, gore lines, cross-walks and stop bars, will be measured by the linear foot along the center line of the pavement marking line and will be based on a four-inch-wide line. Measurement for striping with a plan width greater or less than the basic four inches as shown on the plans or directed by the Engineer will be made by the same method and then adjusted by the following factor:

Plan Width of Striping (inches) x Linear Feet
4 (inches)

No measurement will be made of the number of linear feet of gaps in dashed lines.

Double marking lines, consisting of two four- inch-wide stripes, will be measured as two individual marking lines. Crosswalk lines, stop bars, stop lines, gore lines, cross hatch lines, chevron lines and rail road marking transverse lines will be measured for center line length and adjusted for widths other than four inches, as defined above.

Thermoplastic pavement marking symbols, such as diamonds; bike lane symbol, handicap symbol, or single, double, or triple arrows, will be measured by each unit applied. Each pavement symbol, as shown on the plans, will be considered a unit.

Thermoplastic pavement marking legends, defined as a complete letter grouping such as "SCHOOL," "XING," "STOP," "RR," or "ONLY." , will be measured by each unit applied. Each pavement legend, as shown on the plans, will be considered a unit.

No separate measurement or payment will be made for cleaning and preparing the pavement surface, including abrasive sweeping, high-pressure air spray, water blasting of existing markings, and for disposal of excess materials, cleaning fluids, and empty material containers, the cost being considered as included in contract items.

Removal of curing compound from new Port land cement concrete pavement and the application of primer-sealer, which is to be applied to both old and new Port land cement concrete pavement prior to application of thermoplastic marking, shall be measured by the linear foot for striping lines regardless of width, or unit each for symbols and legends, and in accordance with the items of work established in the bid schedule.

No separate measurement or payment will be made for cleaning and preparing the pavement surface, including abrasive sweeping, high-pressure air spray, water blasting of existing markings, and for disposal of excess materials, cleaning fluids, and empty material containers, the cost being considered as included in contract items.

No additional payment will be made for work related to any item, unless specifically called for in the bid. No payment will be made for materials used to patch unacceptable work.

2.16 REFLECTIVE PAVEMENT MARKERS:

2.16.1 DESCRIPTION:

The work covered by this specification consists of furnishing all labor, equipment, and materials necessary to perform all operations required for the installation of reflective pavement markers.

2.16.2 MATERIALS:

The Engineer must approve all material sources prior to their use. Once approved, material sources shall not be changed without the approval of the Engineer. If requested by the Engineer, the Contractor shall submit technical material/manufacturer data for all materials and appurtenances used on the project at least seven (7) days prior to start of construction.

Reflective pavement markers shall be Type D (yellow, two-way) and Type G (clear, one-way). They shall meet the requirements of section 706 of ADOT's Standard Specifications for Road and Bridge Construction.

2.16.3 INSTALLATION:

Installation shall be in accordance with section 706 of ADOT's Standard Specifications for Road and Bridge Construction.

2.16.4 PREPARATION OF THE SURFACE:

Preparation shall be in accordance with section 706 of ADOT's Standard Specifications for Road and Bridge Construction. Prior to application the area shall be clean and dry. The surface shall be cleaned of dirt, loose material, oil, grease, gasoline, and other objectionable material. In urban areas, the surface shall be cleaned with a self-propelled pick-up sweeper. In rural areas, power brooms may be used. When necessary, cleaning shall be supplemented by hand brooms. When necessary, cleaning of the existing pavement surface shall be supplemented by hand brooms or other methods, approved by the Engineer. Power brooms or pick up brooms alone may not be adequate to thoroughly clean the surface.

The Contractor shall remove existing markings in an acceptable manner. Existing pavement markings shall not be removed by painting over with blank paint. Existing markings shall be removed only by water blasting. The Contractor shall satisfactorily repair any pavement or surface damage caused by the removal of the markings.

The Contractor shall take all steps, procedures, and means to prevent dust pollution due to his construction practices in connection with this work. Dust prevention measures shall be maintained at all times during construction of the project to the satisfaction of the Engineer, in accordance with "Maricopa County Air Pollution Control Regulations".

Prior to the Pre-Construction meeting, the Contractor shall have a dust control plan, approved by the Maricopa County Division of Air Pollution Control. For information and requirements for the dust control plan, the Contractor shall contact:

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The Contractor shall remove and dispose of raised pavement markers (if any) prior to the placement of the slurry seal. Removal shall be by chipping,

grinding, or any other method approved by the Engineer. The cost of raised pavement marker removal is incidental to pavement preparation.

2.16.5 LOCATION FOR PLACEMENT:

The Contractor shall follow all requirements for location, spacing, and number of raised pavement markers as found in the latest edition of the MCDOT Pavement Parking Manual.

2.16.6 QUALITY CONTROL:

The Contractor is responsible for the quality control of all materials used. Testing performed by the Engineer will assure that materials conform to the specifications and shall not be considered a quality control measure. Quality Control shall be in accordance with section 706 of ADOT's Standard Specifications for Road and Bridge Construction.

2.16.7 MEASUREMENT:

Quantities and materials for this work will be paid for at the contract price per unit of measurement for each of the following pay items as indicated in the proposal.

Pavement markers will be measured as a unit for each marker furnished and placed.

2.17 TRAFFIC CONTROL:

2.17.1 DESCRIPTION:

The work covered by this specification consists of furnishing all labor, equipment, and materials necessary to provide traffic control. All traffic control devices and their application shall conform to the more stringent of the Manual on Uniform Traffic Control Devices (MUTCD - United States Department of Transportation, Federal Highway Administration) as modified by the Arizona Department of Transportation's Supplement, the special provisions, and latest edition of the City of Phoenix "Traffic Barricade Manual".

All traffic control shall be in accordance with MAG Specs Section 401 Traffic Control and attached City of Buckeye Traffic Control Plan Guidelines.

2.17.2 MEASUREMENT:

Measurement for Traffic Control shall be made on a Lump Sum basis. This lump sum measurement shall include all materials, equipment and labor necessary to facilitate traffic control per the contract documents. Traffic Control includes but is not limited to the application and removal of temporary pavement markings including related modification of existing

pavement markings, pilot cars, flagmen, barricades, sign panels, sign stands, warning lights, and related temporary pavements.

No direct measurement of individual traffic control elements or devices will be made. All traffic control devices, unless otherwise noted, shall be considered as included in the lump sum measurement for the Traffic Control pay item. No direct measurement for temporary pavements will be made. All sawcutting, grading, aggregate base course materials, asphaltic concrete pavement, labor, and equipment shall be considered as included in the lump sum measurement for the Traffic Control pay item.

No direct measurement for removal of temporary pavements will be made. All sawcutting, and removal of aggregate base course materials and asphaltic concrete pavement shall be considered as included in the lump sum measurement for the Traffic Control pay item.