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**Recommended Modifications to the Seal Coat Specifications from
Statewide Seal Coat Constructability Review**

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Recommended Modifications to the Seal Coat Specifications from Statewide Seal Coat Constructability Review

PROJECT ABSTRACT

The focus of this project is to conduct a formal constructability review of the construction and maintenance practices with respect to seal coat projects. The project's objective is to improve state-wide seal coat quality by identifying best practices. The researchers surveyed all 25 TxDOT districts to identify those practices that consistently produce successful seal coat projects throughout the State. Preparation and implementation of a comprehensive training plan on seal coat construction practices for use throughout the State was also done. Deliverables include a draft seal coat construction and maintenance specification, a final report, and district evaluations with individualized training to permit full implementation. This report identifies the changes recommended to the existing seal coat specifications based on the findings of this study.

INTRODUCTION

The seal coat specification adopted by TxDOT Districts is *ITEM 316: Surface Treatments* in the *Standard Specifications for Construction of Highways, Streets and Bridges*. In addition to this specification, plan notes are specified for individual contracts. This report is divided into three parts: procedural changes, general notes and specifications. Under procedural changes, recommendations are made to the existing seal coat practices in the areas of contract management, design practice and equipment management. General notes were extracted from each district, and a recommended set of general notes is included to be considered by all districts in general. Related standard specifications along with the suggested changes are also included. The major findings from the Statewide Constructability Review were categorized in four groups:

- Planning and Design
- Materials and Specifications
- Contract Administration
- Equipment and Construction

RECOMMENDED PROCEDURAL CHANGES

Planning And Design

1. Project Prioritization for Seal Coat Construction

It is the recommendation of this research team that a broad-based comprehensive approach be adopted in the project selection process for seal coat construction. Such a selection process may include the following components.

- Elimination of projects that are better candidates for major maintenance/rehabilitation work such as base repair, rutting and extensive cracking: This may be achieved by using factors such as the PMIS score (overall or individual distress-based).
- Establishing a prioritization (ranking) scheme that incorporates the specific needs of the area offices as well as facilitating centralized decision-making that is related to the district seal coat task group.
- Establishing a suitable weighting formula to incorporate several factors such as the magnitude of key distresses, traffic level, age since last surfacing and the area office ranking of the project.

2. Design Method

Seal coat design involves the selection of binder and the design of material application rates by incorporating the required mat depth and embedment depth. Districts perform this task in two ways. They are the Modified Kearby Method and the experience-based method. In addition, some districts use variable binder rates across the lanes and the others use a constant rate. With regard to the above design methods and the binder application methods, this constructability review did not reveal conclusively that one method provides superior performance compared to the other. This conclusion is based on the observations of the research team of district seal coat work and on the interviews with TxDOT personnel.

Districts rely on the experience of seal coat personnel for design and construction supervision due to the critical decisions to be made on adjustments to binder rates in the field at the time of construction. It is often said that seal coat work is an art. However, during the interview process, many Districts indicated that losing experienced field inspection personnel is a major problem. This has necessitated the use of inexperienced personnel and in many cases temporary

summer hands for inspection work. A formal design method such as the Modified Kearby Method can effectively serve to guide inexperienced personnel through the “art” of seal coat design and to train personnel including inspectors, designers and laboratory personnel. Correction factors for binder application rates for varying conditions including traffic, surface condition and aggregate, which are developed for conditions unique to the districts such as the aggregate and binder availability, will ensure a much faster learning curve for inexperienced personnel. Appendix A shows a series of Tables developed for adjustment factors. These tables were developed several years ago at the Brownwood and Abilene Districts for emulsified asphalts.

Modified Kearby Method

The design methodology requires the knowledge of some physical characteristics of the aggregate, such as unit weight, bulk specific gravity and the quantity of aggregate needed to cover one square yard of roadway. The unit weight test, bulk specific gravity test is done for calculating unit weight and bulk specific gravity. The Modified Kearby Method recommends the laboratory Board Test method in order to find the quantity of aggregate needed to cover one square yard of roadway. The Board test is performed by placing an adequate number of rocks on an area of one half square yard. The weight of aggregates that cover this area is determined and converted into a unit of pounds per square yard. The quantity of aggregate needed to cover one square yard of roadway can also be determined in terms of volume as shown in Eq. 1.

$$S = 27 W / Q \tag{1}$$

Where: S is the quantity of aggregate required in yd²/yd³

W is the dry loose unit weight in lb/ft³

Q is the aggregate quantity determined from board test in lb/yd².

The quantity of asphalt can be obtained from Eq. 2 once the aggregate properties and existing roadway conditions are known.

$$A = 5.61E \left(1 - \frac{W}{62.4G} \right) + T + V \tag{2}$$

Where: A is the binder rate in gallons/yd² at 60⁰F

E is the embedment depth calculated using Eq. 3.

$$E = e * d \quad (3)$$

Where: e is the percent embedment
d is the average mat depth in inches, as calculated from Eq. 4.

$$d = \frac{1.33Q}{W} \quad (4)$$

Where: G is the dry bulk specific gravity of aggregate,
T is the Traffic correction factor (from Table 1 in Appendix A)
V is the correction factor for existing surface condition.

The asphalt application rates obtained by the Modified Kearby method can be taken as the basis of estimate of the real asphalt rates, and the field inspector can modify these rates on the day of construction. The actual real asphalt application rates used in the field and the related field conditions shall be noted in a construction record to be used in the planning of next year's seal coat program.

Past Experience Method

Some districts use their wealth of experience to determine the basic binder and aggregate application rates to be used in the plans, and these rates may be changed in the field based on the conditions on the day of construction.

Calculation of Traffic for Seal Coat Design

When traffic is used as a seal coat design criterion, the percentage of heavy vehicles should be considered. This may be done either by having ADT and percent trucks taken separately, or by calculating the number of equivalent passenger vehicle using a conversion factor for trucks.

MATERIALS AND SPECIFICATIONS

Aggregate Decantation Test

The purpose of conducting the aggregate decantation test in seal coats is to assess the amount of dust present on aggregate surfaces. Dust on aggregate surface is one of the major causes of

aggregate retention problems. TxDOT Standard Test Method *Tex-217-F: Decantation Test for Asphalt Aggregates* is designed primarily for hot mix asphalt by attempting to mimic the hot mix asphalt production process at the plant by shaking the aggregate while sieving. However, this procedure has no relationship to the process of using aggregate in seal coat work where no sieve shaking takes place after the aggregate is handled at the crusher or the pit. Therefore, it is recommended that for seal coats and surface treatments, Test Method *Tex-406-A: Decantation Test for Concrete Aggregates*, be used. This test method does not screen off the fines prior to test.

Stockpile Testing

All tests that are covered in this report require the materials to be taken from the aggregate source, but this will mean neglecting the changes that occur to the aggregates during transportation and handling before they are placed to the road. So the samples of aggregates should also be taken randomly from the stockpiles in the field or directly from the aggregate spreader. Stockpile testing shall include gradation, decantation and precoating effectiveness measurements, and the frequency of testing shall be determined by the districts based on the type of aggregate and the climate. In addition, care should also be taken to ensure that precoated aggregate stockpiles are kept in a manner that does not affect the quality of the final seal coat quality.

Number of Aggregate-Binder Combinations per Contract

From a constructability standpoint, it is important to minimize the binder-aggregate combination for each contract and stay with it. Having too many binder aggregate combinations may cause cross contamination of the seal coat binders and will also increase the total number of test shots per project. Minimizing the number of combinations will help field inspection personnel to have better control over the project quality, resulting in better performing seals.

Aggregate-Binder Compatibility

It is extremely important to ensure that the aggregate and binder have ionic compatibility. In the case of precoated aggregates, the precoating material shall be compatible with the binder used in the seal. Aggregate loss from the seal is usually a good indication of this phenomenon. It is

recommended that each district construct an aggregate-binder compatibility matrix that is made available to the contractor through plan notes.

Measurement of Asphaltic Material at Site

It is recommended that asphaltic material shall be measured by weight except when small quantities (less than 6000 gal.) are involved.

CONTRACT ADMINISTRATION

Contract Size

The seal coat contracts that were larger than \$2 million were observed to produce better quality seals since the contractors seemed to give more attention to larger contracts. The problem of getting the contractor's B-Team may be eliminated by this method since the contractor would supply its best team for a large project. Such a strategy will also help districts to keep an experienced inspection team because most districts indicated that it is harder to retain experienced inspectors.

Permanent Seal Coat Team

Some districts assigned seal coat projects to different area offices each year. It was observed that the districts having a permanent seal coat team had better quality in their work. This is to be expected since the benefits of constructability can be better attained with a permanent seal coat team that does the work year after year.

Post-Contract Evaluation

A post-contract evaluation is strongly recommended. It is also recommended that the districts constitute a seal coat task group that meets several times a year to plan, evaluate and execute seal coat contracts. Such a team should include personnel from district administration, area administration, laboratory, area maintenance and inspectors. In order for this seal coat committee to be effective in evaluating the performance of district seals, information on actual seal coat rates and the construction conditions should be captured. A simple revision of the current daily report can provide all the information that is required. The design rates can be

checked against the actual values and design tables can be updated based on actual performance of the seal coat.

Technical Seal Coat Vocabulary

The seal coat technical vocabulary is not exactly the same in each district. For example some districts called the loss of aggregate *shelling* while others called it *raveling*. Another example is the use of words *flushing* and *bleeding*; it appears that these terms are used to mean the same thing or different things in certain instances. This may cause confusion between districts and in some cases between areas of the same district during communication. It is recommended that seal coat vocabulary be standardized.

Seal Coat Field Guide

A number of changes including rapid changes in equipment, materials and contractor capability are taking place in the seal coat industry. On the other hand, the turnover of experienced seal coat personnel results in more inexperienced personnel manning the seal coat teams across the State. Therefore, it is recommended that a seal coat field guide be developed for the benefit of field personnel such that useful information such as simple calculation procedures, test procedures and terminology are recorded for easy access.

Inspection Team

A seal coat project should have a minimum of 3 people in an inspection team to get a satisfying result from inspection. The duties of inspection team members will be as follows.

- Inspector 1 (Chief Inspector): Ranges along the whole length of the job and adjusts the asphalt and aggregate rates.
- Inspector 2: Follows the asphalt distributor, controls the distribution rates based on the instructions from chief inspector.
- Inspector 3: Follows the aggregate spreader and controls the distribution of spread rate of aggregates. She/He monitors the performance of the roller team.

Crack Sealing

It is recommended that the pavement length measure (lane miles of roadway) shall be used for crack sealing pay quantity.

EQUIPMENT AND CONSTRUCTION

The seal coat distributor has gone through some significant changes over the years. The use of computerized distributors and distributors with either variable flow nozzles or dual spray bars is becoming increasingly common. At the same time, the size and production rates of distributors have also been on the increase. This creates a situation where other equipment in the seal coat production train, particularly the rollers, has to keep up with the increased distributor production. The number and the size of rollers used in each project are different. Districts specify their rolling requirements in a variety of ways. Most districts specify either the roller type(s) only, number of rollers only, roller type and number of rollers, or the number of passes of a specified roller type.

There are a few districts that specify a minimum rolling time for a specified area. Such a specification would ensure that the shot gets adequate rolling time provided the rolling pattern covers the entire shot. The research team, during its visits to construction sites, did come across situations where two lightweight rollers were used and the rolling pattern did not cover the full shot width. The minimum rolling times used by Districts varied from 2000 to 6000 and with the information gathered by this research team, it is not possible to recommend a single value. Such a specification may be ill advised because the rolling requirement would depend on a number of factors including aggregate and binder type, climatic conditions and the type of roller(s). Therefore, it is recommended that individual Districts be given the flexibility to specify their own rolling rate in general notes, if they so desire.

The medium pneumatic roller is recommended, particularly for hot asphalt, because its higher tire contact pressure provides more efficient rolling and its larger width is often capable of providing a more desirable rolling coverage across the lane, particularly in the area between wheel paths where more rolling is needed. However, it should be emphasized that rolling

coverage across the lane also depends on the shot width. Lightweight pneumatic rollers may also be desirable where aggregate that has the potential to get crushed during rolling. However, it is recommended to check the roller coverage across the lane for the number of rollers being used. In this research, an analytical procedure based on construction equipment management principles was developed to calculate the number of rollers and roller passes for a given minimum rolling requirement and distributor production rate. This calculation procedure is illustrated in Appendix B of this report.

ANALYSIS OF GENERAL NOTES

The general notes for seal coat projects from 23 districts out of 25 were analyzed, and the items that were applicable for the seal coat constructability review were listed both according to Districts (Appendix D) and according to Item number (Appendix E). The following general note categories in Tables 1 to 11 are recommended for inclusion in the plans. Where available, general notes currently used by various districts are tabulated under each category.

Table 1. Material Application Rates

Spec Item	Parameter	No. of Districts	General Notes
316	Application rates of asphalt and aggregate	14	The application rates for asphalt and aggregate shown on the plans are based on the usual or average values and they may be varied.

There are a few districts that use modified Kearby method of seal coat design and set material application rates prior to construction. For example, in Brownwood district, the inspector, district lab and the area/maintenance office jointly establish material rates. In several districts, TxDOT inspector and contractor's superintendent jointly travel the road section prior to the date of construction to establish material application rate changes. However, no general notes are available in this regard. Appendix C of this report contains example tables to determine seal coat binder rates when modified Keraby method is used in design

Table 2. Aggregate Properties

Spec Item	Parameter	No. of Districts	General Notes
302	Polish value of aggregates	6	The minimum polish value for each project is shown on project data sheets
302	Soundness Test for aggregates	6	Representative samples from stockpiles shall not have more loss than that specified by the district after five cycles of soundness test in accordance with test method TEX-411-A. Almost every district has different limits for loss.
302	Flakiness index of aggregate	5	The flakiness index of aggregate shall not be greater than 15 to 20 according to each district by using the test method Tex-224-F.
302	Dust content of aggregate	2	The aggregate, which are found to contain excessive amount of dust after delivered to the construction site, may be rejected.
302	Type PL GR4 aggregate	1	Type PL GR 4 aggregate shall be used within the city limits.
316	Aggregates with striping characteristics	2	If the aggregate to be precoated are found to have stripping characteristics, the engineer may require the addition of a lime slurry. Lime meeting the requirements of item 264 shall be added to the aggregate at the rate of 1% hydrated lime by the mass of aggregate. The lime shall be added to the aggregate in slurry form at the cold feed. If approved by the engineer the lime slurry may be added at the stockpile but not more than 24 hours in advance of use.
316	Color of aggregate	1	If an uncoated aggregate is used, all aggregate furnished for any one index shall have the same color.

Table 3. Binder Properties

Spec Item	Parameter	No. of Districts	General Notes
316	Modification of asphalt cement	1	The asphalt cement used for this item shall be modified with either latex or SBS (Styrene-Butadiene Styrene) additives. If a latex modified asphalt is selected it shall consist of AC-5 or AC10 asphalt cement to which has been added a minimum of 2% by weight styrene-butadiene rubber latex. If an SBS modified asphalt is selected it shall consist of an asphalt cement to which has been added a minimum of 3% by weight of the SBS additive, to achieve the properties meeting the requirements for AC-15P.

Table 4. Precoated Aggregate

Spec Item	Parameter	No. of Districts	General Notes
302	Type PE aggregate	5	The type PE aggregate shall consist of crushed gravel, crushed stone or natural limestone rock asphalt.
302	Ionic compatibility for precoated aggregate	3	Asphalt used for precoating aggregate shall be ionically compatible to asphalt used in surface treatment.
302	Precoated aggregate	3	The precoating asphaltic material shall be AC-20.
302	Type LRA aggregate	1	The type LRA aggregate shall be precoated with a material having a minimum of 25 percent asphalt.
302	Type AC-15-5TR binder	1	The aggregate for use with AC-15-5TR shall be precoated by AC-3.
302	Type CRS-2P binder	1	The aggregate shall not be precoated if type CRS-2P binder will be used.
316	Type of asphalt to be used in precoating	2	The type and grade as well as the amount of asphalt to be used in precoating aggregate shall be approved by the engineer.
316	Precoating aggregates with emulsions	2	When emulsions are used as the precoat material, the precoated aggregate shall be adequately dried to the satisfaction of the engineer.

Table 5. Aggregate Stockpiles

Spec Item	Parameter	No. of Districts	General Notes
302	Moisture content of aggregate	2	The moisture content of the aggregate should not exceed 5 percent, and it shall be surface dry.
316	Location of aggregate stockpiles	3	Cover stone aggregate shall be stockpiled at sites agreed upon by the contractor and area engineer. The aggregate shall be free of excess surface moisture.
316	Sprinkling of stockpiled aggregate	3	To alleviate dust, surfacing aggregate shall be thoroughly sprinkled with water conforming to item 204, "sprinkling," as directed while in stockpiles prior to application on the road.
316	Stockpiles showing excessive heat	2	Stockpiles of aggregate precoated with AC may generate excessive heat built-up resulting in damage to the asphalt and/or aggregates if adequate cooling has not been initially provided. Stockpiles showing evidence of excessive heat built-up can be rejected.
316	Stockpile testing	*	

* Recommended as general note

Table 6. Aggregate Application

Spec Item	Parameter	No. of Districts	General Notes
316	Uniformity of aggregate applied	2	Sufficient truck loads of aggregate shall be ready to deliver aggregate behind the distributor for a length of an asphalt shot before the distributor can apply asphalt to the roadway. Aggregate shall be uniformly applied. Lack of uniformity, such as spots where coverage is not complete, shall be corrected by hand spotting or some other equally satisfactory method.
316	Vehicles used to transport aggregate	1	All vehicles used to transport aggregate to the chip spreader shall be of the same capacity when water level full.
316	Aggregate spreader box	1	A patch truck and crew will be required behind the aggregate spreader box.
316	Dump truck size	*	

* Recommended as general note to limit to 7 cubic yards to minimize damage to seal.

Table 7. Binder Application

Spec Item	Parameter	No. of Districts	General Notes
316	Asphalt distributor spray bar nozzles	12	The asphalt distributor spraybar shall be equipped so that the nozzles that are not on the wheel paths of the through lanes will have the capability of an increase up to 30%.
316	Asphalt application	1	The asphalt application will begin with a running start thereby allowing the asphalt distributor to reach the proper application speed upon crossing the paper joint.

Table 8. Rolling

Spec Item	Parameter	No. of Districts	General Notes
210	Flat wheel roller	2	The aggregate shall be rolled with single pass of a flat wheel roller that will follow behind pneumatic roller(s) as a final roller. It may be either tandem or three-wheel, having a resulting pressure between 6 and 7 kg/mm of roller width.
213	Type of pneumatic roller	7	The contractor shall provide an average of four medium, Type B pneumatic tired rollers having an average approximate rate of 1hr/2800m ² .
213	Type of pneumatic roller	4	The contractor shall provide an average of five light pneumatic tire rollers having an average approximate rate of 1hr/1700m ² .

Table 9. Construction Sequence and Related Activities

Spec Item	Parameter	No. of Districts	General Notes
316	Schedule and control work	1	The contractor shall schedule and control his work so that no more than 10 minutes lapses between the application of asphalt and the mineral aggregate.
316	One course surface treatment	1	The one course surface treatment shall be applied within two weeks after the final base course has been placed.
316	Two course surface treatment	1	Both the first and second course of the two course surface treatment shall be placed the same day and rolling completed before opening to traffic.
316	Surfacing	1	Surfacing shall be done on paved intersections prior to surfacing of the roadway.
316	Brooming operation	7	To minimize windshield damage, sealed sections of roadways and all paved surfaces adjacent to sealed sections shall be broomed and cleaned of surplus aggregate before opening to traffic. Brooming operation will require the use of up to three flashing arrow boards. A lead vehicle will be required and shall be equipped with one forward and one rear facing flashing arrow board, on a four lane undivided highway. A trailing vehicle will be required and shall be equipped with the third flashing arrow board, on two lane and four lane undivided highways.
316	To form straight and uniform alignment	3	Seal coat shall be applied in such a manner that the edge of finished work will be true and straight to the satisfaction of the engineer. The engineer may require the contractor to use a stringline as a guide.
316	Sealing of curves and intersections	6	On curves where widened sections exist, the seal coat shall conform to the edge of the existing paved surface. Asphalt shall be applied on intersections with the asphalt distributor bar to the maximum extend possible.
316	Sealing of mailbox turnouts and city streets	3	Intersections, mailbox turnouts and city streets shall be sealed prior to sealing the mainlanes and/or shoulders.
316	Cure time after completion of work	1	The contractor will schedule their operation to allow a minimum of 3 hours cure time before opening the roadway to traffic.
316	Pilot cars	*	

* Recommended as general note to use pilot cars on two-lane roads with shoulders less than 10 ft. wide and to reduce vehicle speed immediately after the seal for a duration that is suitable for the binder being used.

Table 10. General Notes on Climatic Conditions During Seal Coat Construction

Spec Item	Parameter	No. of Districts	General Notes
316	Latest application of asphalt during a day	4	No asphalt shall be applied later than 1 and 2 hours before sunset.
316	Rain chance	1	Asphalt shall not be applied when there is a chance of 40% or greater.
316	Air temperature for AC-5 and AC-10	1	AC-5 and AC-10 type asphaltic material shall not be applied when the air temperature is at least 20 degrees Celsius or rising.
316	Asphalt cements and emulsions	3	The asphalt cements will be used during warm weather or during the open season. The emulsions will be used during cool weather or during the closed season.
316	Wind	2	When wind velocities are sufficient to produce noticeable distortion of the spray from the distribution bar, asphaltic material shall not be placed.

Table 11. Post-Completion Activities

Spec Item	Parameter	No. of Districts	General Notes
316	Flying aggregate	1	In case where flying aggregate becomes a hazard to the public the contractor shall furnish additional flags on each end of the project to slow traffic.
316	Maintenance of surface	1	The maintenance of the surface treatment shall be the contractor's entire responsibility until the work is approved by the engineer in accordance with article 7.12 the contractor must provide, when needed, material to be used for controlling of bleeding surface.

RESULTS AND CONCLUSION

The Statewide Constructability Review Projects findings were examined to develop the recommendations to update seal coat specifications. These recommendations were presented as additions or updates for specifications, general notes and standard procedures.

APPENDIX A

UPDATED SEAL COAT SPECIFICATIONS

The following specifications related to seal coat construction were updated as a result of this constructability review. The added clauses are underlined and deleted sections are indicated with a strikethrough.

ITEM 316

SURFACE TREATMENTS

316.1. Description. This Item shall govern for the construction of a surface treatment composed of a single, double or triple application of asphaltic material, each covered with aggregate, constructed on existing pavements or on the prepared base course or surface in accordance with these specifications. This Item shall also govern for the furnishing of Aggregates (Stockpiled). Quantities for the different types of surfaces and materials will be as shown on the Basis of Estimate in the plans.

316.2. Materials. All materials shall be of the type(s) and grade(s) shown on the plans and shall conform to the pertinent material requirements of the following Items:

Item 300. Asphalts, Oils and Emulsions.

Item 302. Aggregate for Surface Treatments

Item 303. Aggregate for Surface Treatments (Lightweight).

316.3. Equipment.

(1) **Distributor.** The distributor shall be a self-propelled pressure type, equipped with an asphaltic material heater and a distributing pump capable of pumping the material at the specified rate through the distributor spray bar. The distributor spray bar shall be capable of fully circulating the asphaltic material. The distributor spray bar shall contain nipples and valves so constructed that the nipples will not become partially plugged with congealing asphaltic material, in order to prevent streaking or irregular distribution of asphaltic material. Distributor equipment shall include a tachometer, pressure gauges, volume measuring devices, and a thermometer for reading the temperature of tank contents.

The distributor tank shall have been calibrated to the satisfaction of the Engineer. The tank calibration procedure shall be in accordance with Test Method Tex-922-K, Part I, and shall be signed and sealed by a registered professional engineer. Unless otherwise shown on the plans, the Contractor shall provide the tank calibration and shall furnish the Engineer an accurate and satisfactory calibration record prior to beginning the work. The Engineer may at any time verify

calibration accuracy in accordance with Test Method Tex-922-K, Part II, and may perform the required recalibration if the calibration is found to be in error.

When computerized distributors are used in situations where asphaltic material is paid for by weight, the computer display may be used to verify asphaltic material applications rates instead of strapping the distributor. However, the accuracy of the computer display of spray rates shall be verified at a frequency that is acceptable to the Engineer. Results from such verification tests shall be documented for future reference.

(2) Aggregate Spreader. A self-propelled continuous-feed aggregate spreader shall be used which will uniformly spread aggregate at the rate specified by the Engineer.

(3) Rollers. Rolling equipment shall meet the governing specifications for Item 210, Rolling (Flat Wheel), and Item 213, Rolling (Pneumatic Tire).

The contractor shall ensure that between three and seven rollers, in good working condition to cover the entire width of shot in one pass, are available at site. The Engineer may ask the contractor to stop the seal coating operation until the contractor provides the adequate number of rollers in working condition at site.

(4) Broom. The broom shall be a rotary, self-propelled power broom for cleaning existing surfaces.

(5) Asphalt Storing and Handling Equipment. All equipment used in storing or handling asphaltic material shall be kept clean and in good operating condition at all times and shall be operated in such a manner that there will be no contamination of the asphaltic material. The Contractor shall provide and maintain a recording thermometer to continuously indicate the temperature of the asphaltic material at the storage heating unit when storing of asphalt is permitted.

(6) Vehicles used for hauling aggregate shall be of uniform capacity unless otherwise authorized by the Engineer.

316.4. Construction Methods.

(1) General. Temporary stockpiling of aggregates on the right of way will be permitted, provided that the stockpiles are so placed as to allow for the safety of the traveling public and not obstruct traffic or sight distance, and do not interfere with access from abutting property, nor with roadway drainage.

The aggregate placement sites will be subject to the approval of the Engineer.

Location of stockpiles shall be either a minimum of 30 feet from the edge of the travel lanes or shall be signed and barricaded as shown on the plans.

Prior to final acceptance of the project, aggregate stockpiles deemed undesirable by the Engineer, shall be removed by the Contractor. The temporary stockpile areas shall be left in a neat condition satisfactory to the Engineer. Aggregate stockpiles remaining on the State's right of way 30 days after the final acceptance of the project will become the property of the Texas Department of Transportation.

When shown on the plans, the Department will furnish aggregate to the Contractor without cost for designated sections of the project. The aggregate will be in stockpiles at locations or within limits shown on the plans. The Contractor shall load, haul, distribute and apply the stockpiled aggregate in accordance with specification requirements governing for this Item. The stockpile areas and remaining stockpiles shall be left in a neat condition satisfactory to the Engineer.

Surface treatments shall not be applied when the air temperature is below 60 °F and is falling, but may be applied when the air temperature is above 50 °F and is rising, the air temperature being taken in the shade and away from artificial heat. Surface treatments shall not be applied when the temperature of the surface on which the surface treatment is to be applied is below 60 °F. When latex modified asphalt cement is specified, surface treatments shall not be applied when the air temperature is below 80 °F and is falling, but may be applied when the air temperature is above 70 °F and is rising and shall not be applied when the temperature of the surface on which the surface treatment is to be applied is below 70 °F. When cutback asphalt or asphaltic materials designed for cool weather placement are used, application may occur whenever the air and surface temperatures are acceptable to the Engineer. Asphaltic material shall not be placed when general weather conditions, in the opinion of the Engineer, are not suitable.

The area to be treated shall be cleaned of dirt, dust or other deleterious matter by sweeping or other approved methods. If it is found necessary by the Engineer, the surface shall be lightly sprinkled with water just prior to the first application of asphaltic material.

The rates shown on the plans for asphalt and aggregate are for estimating purposes only. The rates may be varied as directed by the Engineer.

The Engineer will select the temperature of application within the limits recommended in Item 300, "Asphalts, Oils and Emulsions". The Contractor shall apply the asphalt at a temperature within 15 °F of the temperature selected.

The contractor shall, at all times, ensure that the distributor applies a uniform coating of asphalt on the pavement surface as specified in plans.

The width of each application of asphaltic material shall be such to allow uniform application and immediate covering with aggregate. The Contractor shall be responsible for uniform application of asphaltic material at the junction of distributor loads. Paper or other suitable material shall be used to prevent overlapping of transverse joints. Longitudinal joints shall match lane lines unless otherwise authorized by the Engineer. Application of asphaltic material will be measured as necessary to determine the rate of application.

After applying the aggregate, the entire surface shall then be broomed, bladed or raked as required by the Engineer and shall be thoroughly rolled with the type or types of rollers specified herein or as shown on the plans.

The finished surface shall be cleared of any surplus aggregate by the Contractor by sweeping or other approved methods after all rolling is completed.

The Contractor shall be responsible for the maintenance of the surface treatment until the work is accepted by the Engineer. All holes or failures in the surface shall be repaired by use of additional asphalt and aggregate. All fat or bleeding surfaces shall be covered with approved cover material in such a manner that the asphaltic material will not adhere to or be picked up by the wheels of vehicles.

The inspection shall be done as stated in Item 5 "Control of Work", and the inspector team shall include 3 inspectors.

(2) One Course Surface Treatments or First Course of a Multiple Surface Treatment. The Contractor shall protect the existing raised pavement markers by any means acceptable to the Engineer for one course surface treatments, unless otherwise shown on the plans.

(3) Two Course or Three Course Surface Treatments. The asphaltic material for each course of the surface treatment shall be applied and covered with aggregate in the same manner specified for the first application. Each surface shall then be broomed, bladed or raked as required by the Engineer and thoroughly rolled as specified for the first course. Asphaltic material and aggregate for each course shall be applied at the rates directed by the Engineer.

316.5. Measurement.

(1) Asphaltic Material. Asphaltic material will be measured as follows and as specified on the plans. Asphaltic material shall be measured by weight except when small quantities (less than 6000 gallons) are involved.

(a) Volume. Asphaltic material will be measured at the applied temperature by strapping the tank before and after application on the road and determining the net volume in gallons from the distributor's calibrated strap stick constructed in accordance with Tex-922-K. The quantity to be measured for payment shall be the number of gallons used, as directed, in the accepted surface treatment.

(b) Weight. Asphaltic material will be measured in tons at the point of origin. Weighing will be done by a certified public weigher and the transporting vehicle shall have a seal attached to the draining device and other openings. At the Contractor's expense, the Engineer may require random checking by reweighing on public scales to verify weight accuracy. An asphalt storage tank shall not be permitted unless approved by the Engineer. If an asphalt storage tank is used, the Contractor shall provide an acceptable means of measuring the amount of asphaltic material received to assure that all material measured at the point of origin is received and used on the project. Upon completion or temporary suspension of the prescribed work, any remaining

asphaltic material will be weighed by a certified public weigher or shall be measured by volume in a calibrated distributor or calibrated tank and the quantity converted to tons with respect to the measured temperature. The quantity to be measured for payment shall be the number of tons received minus the number of tons remaining after all directed work is complete and minus the amount used for other items.

(2) Aggregates. Aggregate will be measured by the cubic yard in vehicles as applied on the road.

When "Loading, Hauling and Distributing Aggregate" is a bid Item, it will be measured by the cubic yard in vehicles as applied on the road.

316.6. Payment. The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit prices bid for "Asphalt," "Aggregate" and "Aggregate (Stockpiled)," if required, of the type and grade specified. These prices shall each be full compensation for cleaning and sprinkling the existing surface; for furnishing, preparing, hauling, and placing all materials; for protecting existing pavement markers; for rolling, removing excess aggregate, and cleaning up stockpiles; for all freight and heating involved; and for all manipulations, labor, tools, equipment and incidentals necessary to complete the work.

When Loading, Hauling and Distributing Aggregate is a bid Item, the work performed and measured as provided for herein will be paid for at the unit price bid for "Loading, Hauling, and Distributing Aggregate." This price shall be full compensation for loading, hauling, applying and distributing aggregate; for protecting existing pavement markers; for rolling, removing excess aggregate, and cleaning up stockpiles; and for all manipulation, labor, tools, equipment and incidentals necessary to complete the work.

When Driveways and Turnouts are included in the contract as a bid Item, the work performed and materials furnished for driveways and turnouts will be paid for in accordance with Item 530, Driveways and Turnouts.



ITEM 302

AGGREGATES FOR SURFACE TREATMENTS

302.1. Description. This Item shall govern for aggregates and precoated aggregates used in the construction of surface treatments.

302.2. Materials.

(1) Aggregates. Aggregates shall be composed of gravel, crushed gravel, crushed stone, crushed slag or natural limestone rock asphalt. When specified on the plans, other aggregate types may be permitted or required. Aggregate from each source shall meet the requirements specified herein. Source is defined as a geographical location of naturally occurring material that can be mined or quarried from the original in-situ deposit.

At the Engineer's discretion, aggregate for quality testing may be sampled either at the source, job site or both. Additional samples for testing may be taken when deemed necessary by the Engineer.

Coarse aggregate to be used in surface courses shall have a minimum surface aggregate classification as shown on the plans. The surface aggregate classifications for sources on the Aggregate Quality Monitoring Program (AQMP) are listed in the Rated Source Quality Catalog (RSQC) along with the criteria used to determine surface aggregate classifications. When aggregates are supplied from a source, which is not on the AQMP program, the aggregate will be sampled and tested prior to use. The procedures will be in accordance with the AQMP program.

Blending of aggregates will not be allowed.

Aggregate with a minimum classification of "B" will be used unless otherwise shown on plans.

TABLE 1
SUMMARY OF SPECIFICATION REQUIREMENTS FOR AGGREGATES

Test	Test Method	Specification Requirement
Determination of Deleterious Material for Coarse Aggregates	Tex-217-F: Part I	Maximum 2.0 percent by weight of soft particles and other deleterious materials
Decantation Test for Coarse Aggregates	Tex-406-F: Part II	Maximum 1.0 percent loss from fine dust, clay-like particles and/or silt
Determination of Flakiness Index	Tex-224-F	Maximum 17.0 unless otherwise shown in plans
Abrasion of Coarse Aggregate Using the Los Angeles Machine	Tex-410-A	Maximum 35 percent loss due to abrasion unless otherwise shown in plans.
Determination of Crushed Face Particle Count	Tex-460-A: Part I	Minimum 85 percent of the particles retained on No. 4 sieve should have two (2) or more mechanically induced crushed faces
Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate	Tex-411-A	Maximum 25 percent aggregate loss from 5-cycles of magnesium soundness test, unless otherwise shown on the plans.

(2) Natural Limestone Rock Asphalt. In addition to the above requirements, natural limestone rock asphalt aggregate shall have an average bitumen content of up to 7.0 percent, by weight, of naturally impregnated asphalt, as determined by Test Method Tex-215-P. Except for Grade 5 aggregate, the portion of the material retained on the No. 4 sieve shall contain a minimum of 20 percent by weight of material with a naturally impregnated asphalt content of less than 1.0 percent. The percentage of material with less than 1.0 percent naturally impregnated asphalt shall be determined according to Test Method Tex-220-F, and the asphalt content of this separated material shall be determined according to Test Method Tex215-F.

Natural limestone rock asphalt aggregate shall contain not more than 2.0 percent by weight of any one of or any combination of, iron pyrites, or other objectionable matter, as determined by Test Method Tex-217-P, Part I.

The percent wear on natural limestone rock asphalt aggregate, as determined by Test Method Tex-410-A, shall be made on that portion of the material retained on the No. 4 sieve, having a naturally impregnated asphalt content of less than 1.0 percent.

(3) Precoated Aggregate. The grade of aggregate specified shall meet all requirements of Articles 302.2 and 302.4 prior to the application of the precoat or fluxing material.

Materials that are not uniformly and/or properly coated, in the opinion of the Engineer, will not be accepted for use. Precoated aggregates that cannot be spread by approved mechanical spreading devices will not be acceptable.

When limestone rock asphalt is used, it shall be fluxed with 0.5 to 1.5 percent by weight of fluxing material.

(4) Asphaltic Material. The precoating or fluxing material shall meet the requirements of Item 300 "Asphalts, Oils and Emulsions". Unless otherwise shown on the plans, any of the types and grades shown in Item 300, "Asphalt, Oils and Emulsions" may be used.

The asphaltic material selected shall be compatible with the aggregate used in the surface treatment.

(5) Water. Water in the amount not to exceed 3 percent by weight of the mixture may be used in precoating aggregate or fluxing limestone rock asphalt aggregate.

302.3. Types. Various aggregate types are identified as follows:

(1) Uncoated Aggregate Types.

Aggregate Type Designation	Description of Acceptable Aggregate Types
A	gravel, crushed slag, crushed stone or natural limestone rock asphalt
B	crushed gravel, crushed slag, crushed stone or natural limestone rock asphalt
C	gravel, crushed slag or crushed stone
D	crushed gravel, crushed slag or crushed stone
E	as shown on the plans

(2) Precoated Aggregate Types.

Aggregate Type Designation	Description of Acceptable Precoated Aggregate Types
PA	gravel, crushed slag, crushed stone or natural limestone rock asphalt
PB	crushed gravel, crushed slag, crushed stone or natural limestone rock asphalt
PC	gravel, crushed slag or crushed stone
PD	crushed gravel, crushed slag or crushed stone
PE	as shown on the plans

302.4. Grades. When tested by Test Method Tex-200-F, Part I, the gradation requirements shall be as follows:

	Percent By Weight
Grade 1:	
Retained on 1" Sieve.....	0
Retained on 7/8" Sieve.....	0-2
Retained on 3/4" Sieve.....	20-35
Retained on 5/8" Sieve.....	85-100
Retained on 3/8" Sieve.....	95-100
Retained on No. 10 Sieve.....	99-100
Grade 2:	
Retained on 7/8" Sieve.....	0
Retained on 3/4" Sieve.....	0-2
Retained on 5/8" Sieve.....	20-40
Retained on 1/2" Sieve.....	80-100
Retained on 3/8" Sieve.....	95-100
Retained on No. 10 Sieve.....	99-100
Grade 3:	
Retained on 3/4" Sieve.....	0
Retained on 5/8" Sieve.....	0-2
Retained on 1/2" Sieve.....	20-40
Retained on 3/8" Sieve.....	80-100
Retained on 1/4" Sieve.....	95-100
Retained on No. 10 sieve.....	99-100
Grade 4:	
Retained on 5/8" Sieve.....	0
Retained on 1/2" Sieve.....	0-2
Retained on 3/8" Sieve.....	20-35
Retained on No. 4 Sieve.....	95-100
Retained on No. 10 sieve.....	99-100
Grade 5:	
Retained on 1/2" Sieve.....	0
Retained on 3/8" sieve.....	0-5
Retained on No. 4 sieve.....	40-85
Retained on No. 10 sieve.....	98-100
Retained on No. 20 sieve.....	99-100

When shown on the plans, the aggregate of the specified grade(s) shall have from 99.5 to 100 percent by weight retained on the No. 200 sieve.

302.5. Equipment. It is recommended that whole of section 302.5 be deleted and replaced with "Mixing plants will meet the requirements of 340.4."

(1) Mixing Plants. Mixing plants that will not continuously meet all the requirements of this specification shall be condemned.

Mixing plants may be either the weigh-batch type, the continuous mixing type or the drum mix type. All plants shall be equipped with satisfactory conveyors, power units, aggregate handling equipment, and bins.

If the Engineer approves the use of emulsion as a precoat material, he may also waive the requirement for a dryer, as specified below, if it is demonstrated that a satisfactory coating can be obtained without drying or heating the aggregate.

When using a low grade fuel oil or waste oil the plant shall meet the requirements of Subarticle 340.4.(2).

(a) Weigh-Batch Type.

Cold Aggregate Bin and Proportioning Device. The cold aggregate bins or aggregate stockpiles shall be of sufficient number and size to supply the amount of aggregate required to keep the plant in continuous operation. The proportioning device shall be such as will provide a uniform and continuous flow of aggregate in the desired proportion to the plant.

Dryer. The dryer shall continually agitate the aggregate during heating. The temperature shall be controlled so that the aggregate will not be damaged in the drying and heating operations.

The burner, or combination of burners, and type of fuel used shall be such that in the process of heating the aggregate to the desired or specified temperatures, no residue from the fuel shall adhere to the heated aggregate. A recording thermometer shall be provided which will record the temperature of the aggregate when it leaves the dryer. The dryer shall be of sufficient size to keep the plant in continuous operation. The dryer will not be required for precasting natural limestone rock asphalt.

Screening and Proportioning. The screening capacity and size of the bins shall be sufficient to screen and store the amount of aggregate required to properly operate the plant and keep the plant in continuous operation at full capacity. Proper provisions shall be made to enable inspection forces to have easy and safe access to the proper location on the mixing plant where accurate representative samples of aggregate may be taken from the bins for testing.

Weighing and Measuring Equipment. The weighing and measuring equipment shall be of sufficient capacity and of adequate design for proper batching. The following equipment, conforming to the requirements of Item 520, Weighing and Measuring Equipment., shall be furnished:

1. Aggregate weigh box and batching scales.
2. Bucket and scales for precoat material or fluxing material

A pressure type flow meter may be used to measure the precoat material or fluxing material for each batch.

If a pressure type flow meter is used to measure the asphaltic material, the requirements of Item 520 "Weighing and Measuring Equipment" shall apply.

Provisions of a permanent nature shall be made for checking the accuracy of the asphaltic material measuring device. The line to the measuring device shall be protected with a jacket of hot oil or other approved means to maintain the temperature of the line near the temperature specified for the precoating material.

Mixer. The mixer shall be of the pug mill type, and shall have a capacity of not less than 3000 pounds in a single batch. Any mixer that has a tendency to segregate the aggregate or fails to secure a thorough and uniform mixing with the precoat material or fluxing material shall not be used. All mixers shall be provided with an automatic time lock that will lock the discharge doors of the mixer for the required mixing period. The dump door or doors and the shaft seals of the mixer shall be tight enough to prevent the spilling of aggregate or mixture from the pug mill.

(b) Modified Weigh-Batch Type.

General. This plant is similar to the weigh-batch type plant. The hot bin screens shall be removed and the aggregate control is placed at the cold feeds. The cold feed bins will be the same as those required for the drummix type plant.

Cold-Aggregate Bin Unit and Feed System. The number of bins in the cold-aggregate bin unit shall be equal to or greater than the number of stockpiles of individual materials to be used. The bins shall be of sufficient size to store the amount of aggregate required to keep the plant in continuous operation.

When blending materials, the bin unit shall be of proper design to prevent overflow of material from one bin to another. There shall be vertical partitions meeting the requirements of Subarticle 340.4.(2). The feed system shall provided a uniform and continuous flow of aggregate in the desired proportion to the dryer. The Contractor shall furnish a chart indicating the calibration of each cold bin in accordance with Construction Bulletin C-14, or other methods of cold bin calibration acceptable to the Engineer.

Scalping Screen. A scalping screen shall be required after the cold feeds and ahead of the hot aggregate surge bins.

Dryer. The dryer shall continually agitate the aggregate during heating. The temperature shall be controlled so that the aggregate will not be damaged in the drying and heating operations. The dryer shall be of sufficient size to keep the plant in continuous operation.

Screenings and Proportioning. The hot aggregate shall not be separated into sizes after being dried. There shall be one or more surge bins provided between the dryer and the weigh hopper. Surge bins shall be of sufficient size to hold enough combined aggregate for one complete batch of mixture.

Aggregate Weigh Box and Batching Scale. The aggregate weigh box and batching scales shall be of sufficient capacity to hold and weigh a complete batch of aggregate. The weigh box and scales shall conform to the requirements of Item 520, Weighing and Measuring Equipment..

Asphaltic Material Measuring System. If an asphaltic material bucket and scales are used, they shall be of sufficient capacity to hold and weigh the necessary asphaltic material for one batch. The bucket and scales shall conform to the requirements of Item 520, Weighing and Measuring Equipment..

If a pressure type flow meter is used to measure the asphaltic material, the requirements of Item 520, Weighing and Measuring Equipment., shall apply. This system shall include as automatic temperature compensation device to insure a constant percent by weight of asphaltic material in the mixture.

Provisions of a permanent nature shall be made for checking the accuracy of the asphaltic material measuring device. The asphalt line to the measuring device shall be protected with a jacket of hot oil or other approved means to maintain the temperature of the line near the temperature specified for the asphaltic material.

Mixer. The mixer shall be of the pugmill type and shall have a capacity of not less than 3,000 pounds (of natural-aggregate mixture) in a single batch, unless otherwise shown on the plans. Any mixer that has a tendency to segregate the aggregate or fails to secure a thorough and uniform mixing with the precast material or fluxing material shall not be used. All mixers shall be provided with an automatic timer that will lock the discharge doors of the mixer for the required mixing period. The dump door or doors and the shaft seals of the mixer shall be tight enough to prevent spilling of aggregate or mixture from the pugmill.

(c) Continuous Mixing Type.

Cold Aggregate Bin and Proportioning Device. Same as for weigh-batch type of plant.

Dryer. Same as for weigh-batch type of plant.

Screening and Proportioning. Same as for weigh-batch type of plant. These requirements shall also apply to materials that are stockpiled and that are proposed for direct use by a continuous mixing plant without the use of plant bins.

Aggregate Proportioning Device. The aggregate proportioning device shall be so designed that when properly operated a uniform and continuous flow of aggregate into the mixer will be maintained.

Spray Bar for Precoat Material and Fluxing Material. The spray bar for the precoat material or fluxing material shall be so designed that the material will spray uniformly and continuously into the mixer.

Meter for Precoat Material or Fluxing Material. An accurate recording meter for precoat material or fluxing material shall be placed in the line leading to the spray bar so that the

accumulative amount of precoat material or fluxing material being used can be accurately determined. Provisions of a permanent nature shall be made for checking the accuracy of the meter output.

Mixer. The mixer shall be of the continuous type and shall have a capacity of not less than 40 tons of mixture per hour. Any mixer that has a tendency to segregate the aggregate or fails to secure a thorough and uniform mixing of the aggregate with the precoat material or fluxing material shall not be used.

(d) Drum Mix Plant.

General. The plant shall be, adequately designed and constructed for the process of mixing aggregates and precoat material. The plant shall be equipped with satisfactory conveyors, power units, aggregate-handling equipment and feed controls.

Cold Aggregate Bin and Feed System. The number of bins in the cold aggregate bin unit shall be equal to or greater than the number of stockpiles of individual materials to be used. The bin unit shall be of sufficient size to store the amount of aggregate required to keep the plant in continuous operation.

When blending materials, the bin unit shall be of proper design to prevent overflow of material from one bin to another. There shall be vertical partitions meeting the requirements of Subarticle 340.4.(2). The feed system shall provide a uniform and continuous flow of aggregate in the desired proportion to the dryer. The Contractor shall furnish a chart indicating the calibration of each cold bin in accordance with Construction Bulletin C-14 or other methods acceptable to the Engineer.

The system shall provide positive weight measurement of the combined cold aggregate feed by use of belt scales. Provisions of a permanent nature shall be made for checking the accuracy of the measuring device as required by Item 520, Weighing and Measuring Equipments. When a belt scale is used, mixture production shall be maintained so that the scale normally operates between 50 percent and 100 percent of its rated capacity. Belt scale operation below 50 percent of the rated capacity may be allowed by the Engineer if accuracy checks show the scale to meet the requirements of Item 520, Weighing and Measuring Equipments, at the selected rate and it can be satisfactorily demonstrated to the Engineer that mixture uniformity and quality have not been adversely affected.

Scalping Screen. A scalping screen shall be required, after the cold feeds and ahead of the combined aggregate belt scale.

Precoat Material Measuring System. An asphaltic material measuring device meeting the requirements of Item 520, Weighing and Measuring Equipment., shall be placed in the line leading to the mixer so that the cumulative amount of precoat material wed can be accurately determined. Provisions of a permanent nature shall be made for checking the accuracy of the measuring device output. The line to the measuring device shall be protected with a jacket of hot oil or other approved means to maintain the temperature of the line near the temperature specified for the precoat material. The measuring system shall include an automatic temperature

compensation device to maintain a constant percent by weight of precasting material in the mixture.

Synchronization Equipment for Feed-Control Systems. The precoat material feed-control shall be coupled with the total aggregate weight measuring device to automatically vary the precast material feed rate to maintain the required proportion.

Mix System. The mix system shall control the temperature so that aggregate and asphalt will not be damaged in the drying, heating and mixing operations. A continuously-recording thermometer shall be provided which will indicate the temperature of the mixture as it leaves the mixer.

Surge-Storage System. A surge-storage system shall be required to minimize the production interruptions during the normal day's operations. A device such as a gob hopper or other similar devices approved by the Engineer to prevent segregation in the surge-storage bin shall be required.

(2) Heating Equipment for Precoat Material and Fluxing Material. Heating equipment for precoat material and fluxing material shall be adequate to heat the required amount of material to the desired temperature. The material may be heated by steam coils, which shall be absolutely tight. Direct fire heating will be permitted, provided the heating system used is manufactured by a reputable concern and there is positive circulation of the liquid throughout the heater. Agitation with steam or air will not be permitted. The heating apparatus shall be equipped with a recording thermometer with a 24-hour chart that will record the temperature of the precast material or fluxing material where it is at the point of highest temperature.

302.6. Storage, Proportions and Mixing.

(1) Aggregate Storage. If the aggregates are stored or stockpiled, they shall be handled in such a manner as to prevent segregation, the mixing of the various materials or sizes, and the contamination with foreign materials. The grading of aggregates proposed for use and as supplied to the mixing plant shall be uniform. When required by the Engineer, additional material shall not be added to stockpiles that have been sampled for approval.

When asphalt cement is the precoating material, stockpile height shall be limited to approximately three (3) feet immediately after production to limit the build up of heat. These stockpiles may be consolidated after cooling adequately, in the opinion of the Engineer.

The use of limestone rock asphalt aggregate containing moisture in excess of the saturated surface-dry condition will not be permitted. Excess moisture will be evidenced by the visual surface moisture on the aggregate or any unusual quantities of fines clinging to the aggregate.

(2) Storage and Heating of Precoating Material or Fluxing Material. The precoating or fluxing material storage shall be ample to meet the requirements of the plant. The precoating material shall not be heated in storage above the maximum temperature set forth in Item 300, "Asphalts, Oils and Emulsions". All equipment used in the storage and handling of precoat

material or fluxing material shall be kept in a clean condition at all times and shall be operated in such manner that there will be no contamination with foreign matter.

(3) Feeding and Drying of Aggregate. The feeding of various sizes of aggregate, other than natural limestone rock asphalt, to the dryer or drum mixer shall be done through the cold aggregate bin and proportioning device in such a manner that a uniform and constant flow of material in the required proportions will be maintained. The aggregate shall be heated to the temperature necessary to produce a mixture meeting the requirements of Subarticle 302.2.(3).

(4) Proportioning. The proportioning of the various materials entering into the mixture shall be as directed by the Engineer and in accordance with these specifications. Aggregate shall be proportioned by weight using the weigh box and batching scales herein specified when the weigh-batch type of plant is used and by volume using the aggregate proportioning device when the modified weigh-batch type, the continuous mixer type or drum mix plant is used. The precoat material or fluxing material shall be proportioned by weight or by volume based on weight using the specified equipment.

(5) Mixing.

(a) Weigh-Batch Type and Modified Weigh-Batch Type Mixer. In the charging of the weigh box and in the charging of the mixer from the weigh box, such methods or devices shall be used as are necessary to secure a uniform mixture. In introducing the batch into the mixer, the aggregate shall be introduced first; shall be mixed thoroughly, as directed, to uniformly distribute the various sizes throughout the batch before the precoat material or fluxing material is added; the precast material or fluxing material shall then be added and the mixing continued until such time that the aggregate is properly coated. This mixing period may be varied, if, in the opinion of the Engineer, the mixture is not uniform.

(b) Continuous or Drum Mix Type Mixer. The amount of aggregate and precoat material or fluxing material entering the mixer and the rate of travel through the mixer shall be so coordinated that a uniform mixture of the specified grading and percent by weight of precast material or fluxing material will be produced.

302.7. Measurement and Payment. Aggregate will be delivered at the locations indicated on the plans or purchase contract. Unless otherwise noted, measurement and payment will be by one of the following methods

- (a) The invoiced quantity as delivered. Samples for moisture determination will be taken daily as delivered and tested in accordance with Tex-103-E. Moisture in excess of 2.5% will be deducted from the pay quantity.
- (b) The volume of aggregate in stockpile as computed by the average end area method.
- (c) Aggregate volume in stockpile calculated from the dry unit weight using Tex-404-A. Samples for unit weight will be taken from each stockpile. Moisture samples will be taken at a minimum of one per day per stockpile in accordance with Tex-103-E. All moisture will be deducted from the net weight of material delivered prior to unit weight conversion.
- (d) The volume of materials in measured vehicles.

ITEM 303

AGGREGATE FOR SURFACE TREATMENTS (Lightweight)

303.1. Description. This Item shall govern for lightweight aggregate and precast lightweight aggregate used in the construction of surface treatments.

303.2. Materials.

(1) Aggregate. Aggregate shall be composed of lightweight aggregate, defined as expanded shale, clay or slate produced by the rotary kiln method.

At the Engineer's discretion, aggregate for quality testing may be sampled either at the source, job site or both. Additional samples for testing may be taken when deemed necessary by the Engineer.

Coarse aggregate to be used in surface courses shall have a minimum surface aggregate classification as shown on the plans. The surface aggregate classifications for sources on the Aggregate Quality Monitoring Program (AQMP) are listed in the Rated Source Quality Catalog (RSQC) along with the criteria used to determine surface aggregate classifications. When aggregates are supplied from a source that is not on the AQMP program, the aggregate will be sampled and tested prior to use. The procedures will be in accordance with the AQMP program.

Blending of aggregates will not be allowed.

Aggregate with a minimum classification of "A" will be used unless otherwise shown on plans.

**TABLE 1
SUMMARY OF SPECIFICATION REQUIREMENTS FOR AGGREGATES**

Test	Test Method	Specification Requirement
Determination of Unit Mass (Weight) of Aggregates	Tex-404-A	35-60, \pm 6 percent of acceptance sample
Decantation Test for Coarse Aggregates	Tex-406-A: Part II	Maximum 1.0 percent loss from fine dust, clay-like particles and/or silt
Coarse Aggregate Freeze-Thaw Test	Tex-432-A	Maximum 7.0 percent freeze-thaw loss
Pressure Slaking Test of Synthetic Coarse Aggregate	Tex-431-A	Maximum 4.0 pressure slaking value
24-Hour Water Absorption	Tex-433-A	Maximum 12.0 water absorption in 24-hours, unless otherwise shown on plans
Determination of Flakiness Index	Tex-224-F	Maximum 17, unless otherwise shown on plans

(2) Precoated Aggregate. -The grade of aggregate specified shall meet all requirements of Article 303.2 and 303.4 prior to the application of the precoat material

Materials that are not uniformly and/or properly coated in the opinion of the Engineer, will

(3) Asphaltic Material. The precoating material shall meet the requirements of Item 300, Asphalts, Oils and Emulsions. Unless otherwise shown on the plans, any of the types and grades shown in Item 300, "Asphalts, Oils and Emulsions" may be used.

303.3. Types. The aggregate types are identified as follows:

Type L. Type L shall consist of lightweight aggregate.

Type PL. Type PL shall consist of precoated lightweight aggregate.

303.4. Grades. When tested by Test Method Tex-200-F, Part I, the gradation requirements shall be as follows:

	Percent by Weight
Grade 3: Retained on 3/4" Sieve.....	0
Retained on 5/8" Sieve.....	0-2
Retained on 1/2" Sieve.....	10-25
Retained on 3/8" Sieve.....	60-80
Retained on 1/4" Sieve.....	95-100
Retained on No. 10 Sieve.....	98-100
Grade 4: Retained on 5/8" Sieve.....	0
Retained on 1/2" Sieve.....	0-5
Retained on 3/8" Sieve.....	20-40
Retained on No. 4 Sieve.....	95-100
Retained on No. 10 Sieve.....	98-100
Grade 5: Retained on 1/2" Sieve.....	0
Retained on 3/8" Sieve.....	0-2
Retained on No. 4 sieve.....	60-80
Retained on No. 10 sieve.....	98-100

303.5. Equipment. Equipment shall meet the requirements of Article 340.4

303.7. Measurement and Payment. Aggregate will be delivered at the locations indicated on the plans or purchase contract. Unless other wise noted, measurement and payment will be by one of the following methods.

- (a) The invoiced quantity as delivered. Samples for moisture determination will be taken daily as delivered and tested in accordance with Tex-103-E. Moisture in excess of 2.5% will be deducted from the pay quantity.

- (b) The volume of aggregate in stockpile as computed by the average end area method.
- (c) Aggregate volume in stockpile calculated from the dry unit weight using Tex-404-A. Samples for unit weight will be taken from each stockpile. Moisture samples will be taken at a minimum of one per day per stockpile in accordance with Tex-103-E. All moisture will be deducted from the net weight of material delivered prior to unit weight conversion.
- (d) The volume of materials in measured vehicles.



ITEM 352
CLEANING AND/OR SEALING JOINTS AND CRACKS
(ASPHALTIC CONCRETE)

352.1. Description. This Item shall govern for the cleaning and sealing of joints and cracks that are 1/16 inch or greater in width in asphaltic concrete pavement, in accordance with the details on the plans or as directed by the Engineer.

352.2. Materials. Joints and/or cracks shall be sealed with the materials shown on the plans. Materials shall meet the requirements show below.

Material	Specification	Recommended Use
Polymer Modified Emulsion	Subarticle 300.2.(8)	Fine Cracks
Rubber-Asphalt Crack Sealing Compound	Subarticle 300.2.(8)	Cracks

Fine aggregate used to cover the crack sealing compound shall meet with the approval of the Engineer.

352.3. Equipment. Equipment, tools and machinery necessary for proper prosecution of the work shall be on the project and approved by the Engineer prior to beginning of the joint and crack cleaning and sealing operations.

(1) Heating and Application Equipment.

(a) Polymer Modified Emulsion. Polymer modified emulsion may be heated in a conventional asphalt distributor or in an asphalt heater equipped with an agitator to insure that the emulsified asphalt is circulate during the heating process to achieve a uniform temperature rise Temperature gauges shall be provided at strategic locations to enable the operator to accurately control the temperature of the emulsion to avoid overheating the material. The unit shall be equipped with a gear-driven asphalt pump with adequate pressure to dispense the emulsion in joints and cracks.

(b) Rubber-Asphalt Crack Sealing Compound and Hot Poured Rubber. These sealants shall be heated in a double jacketed heater using a heat transfer oil so that no direct flame comes in contact with the shell of the vessel containing the sealing compound. The heater reservoir shall be equipped with an agitator to insure that the sealing compound is circulated during the heating process to achieve a uniform temperature rise and to maintain the desired temperature. Accurate temperature gauges shall be provided to monitor the temperature of the vessel contents and avoid overheating the material. The heater shall be equipped with a gear-driven asphalt pump with adequate pressure to dispense the rubber-asphalt crack sealing compound or the hot poured rubber.

(c) Self-Leveling Low Modulus Silicone. This sealant shall be prepared and dispensed using the manufacturer's recommended equipment.

(2) Joint and Crack Cleaning Equipment. All equipment used in cleaning joints and cracks shall be capable of delivering a sufficient volume of filtered air, free of oil, water or other contaminants, to remove all loose debris from the joints or cracks to be sealed.

(3) Joint Router, When specified on the plans, joints shall be routed. The router shall be of sufficient size to rout the joints to the widths and depths shown on the plans.

352.4. Construction Methods. All joint and cracks shall be cleaned of infiltrated material with compressed air or other methods approved by the Engineer to a depth at least twice the joint or crack width. When routing of the joints is indicated on the plans, the joints shall be routed and blown clean with filtered compressed air. All material removed from joints and cracks shall be removed from the paved surface of the roadway.

The joint or crack sealing material shall be applied using a pressure nozzle. Polymer modified emulsion, rubber-asphalt crack sealing compound and hot poured rubber shall penetrate and completely fill each crack and/or joint. The amount of sealing compound used shall be limited so that after the squeegee has been applied, the finished band shall not be more than 1-1/2 inches wide and shall not exceed a depth of 1/8 inch above the pavement surface. All cracks and/or joints filled with these materials shall be squeegeed. Self-leveling low modulus silicone joint sealing compound shall be applied so that it penetrates the joint and fills so that the top of the sealant shall be 1/4 inch to 3/8 inch below the pavement surface.

When directed by the Engineer, a light coating of fine aggregate shall be applied to the cracks and joints prior to opening to traffic to prevent tracking.

When the number of cracks is so great that crack sealing in the described manner is impractical, the area shall be squeegee sealed. When all cracks in the area have been cleaned, the crack sealing material shall be applied and the excess shall be squeegeed over the area between the cracks. Areas to be squeegee sealed will be determined and marked by the Engineer. All polymer modified emulsion or hot poured rubber squeegee sealed areas shall be covered immediately with a light coating of fine aggregate.

No sealing of any joints or cracks shall be done when the joints or cracks are damp, unless drying of the joints and cracks with compressed air can be demonstrated and meets with the approval of the Engineer.

352.5. Measurement. This Item will be measured by one or more of the following methods as shown on the plans.

Square Yard Method (Squeegee Seal). When cleaning and sealing of joints and cracks is either by the linear foot method or the lane mile method, squeegee-sealed areas will be measured by the square yards of surface area sealed. The square yard calculations for squeegee seal will be based on the neat dimensions of the sealed area.

Linear Foot Method. Measurement will be made by the linear foot of joints and cracks cleaned and sealed, excluding squeegee sealed areas. Squeegee sealed areas are to be paid for separately.

Lane Mile Method. Measurement will be made by the lane mile for cleaning and sealing all joints and cracks in the entire lane width and length, including lane lengths with squeegee sealed areas. Squeegee sealed areas are to be paid for separately. The shoulder shall be considered as an additional lane.

Pound Method. Measurement will be made by the pounds of rubber-asphalt crack sealing compound or hot poured rubber used for cleaning and sealing joints and cracks, including squeegee sealed areas.

Gallon Method. Measurement will be by the gallons of polymer modified emulsion or self-leveling low modulus silicone used for cleaning and sealing joints and cracks, including squeegee sealed areas.

The Lane Mile Method shall be used for crack sealing operations.

352.6. Payment. The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Joint and Crack Sealing", of the type of sealant specified; "Joint and Crack Sealing (Squeegee); " or Joint and Crack Sealing". This price shall be full compensation for routing, cleaning and sealing all joints and cracks, for furnishing and placing all materials including fine aggregate and for all labor, equipment, tools and incidental necessary to complete the work.

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APPENDIX B

ILLUSTRATION OF ROLLER REQUIREMENT CALCULATION PROCEDURE

In order to ensure that the rolling rate is achieved, a procedure to calculate the number of rollers and number of passes based on principles of construction equipment management is required. The following procedure is based on minimum rolling time and distributor production is recommended for this purpose.

$$N = \frac{Px}{A} \quad (5)$$

Where: N is the number of rollers required

P is the production rate of rollers in yards per hour (assumed to be same as the production rate of distributor)

A is the rolling requirement in square yards per hour and x is the shot width in yards.

$$P = Sf = \frac{G_t}{9.77WR} \quad (6)$$

Where: G_t is the spray bar output (gal/min)

W is the sprayed width (ft)

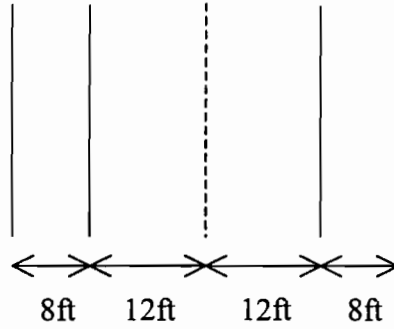
R is the rate of binder application (gal/sy).

The conversion factor from yards per minute to lineal mile per hour is 9.77.

Case Study

The following case study illustrates the above calculation procedure using the following assumptions.

1. The Dynapac™ CP-132 roller is used for this case study. The roller has two gears that enable one lower and one higher speed of 6.2 mph and 12.4 mph, respectively. The width of the roller is 69.3 inches. The lower speed of 6.2 miles is used in the calculations.
2. The roadway geometry used is indicated in the figure below. A lane width of 12 ft. and a shoulder width of 8 ft. are assumed.



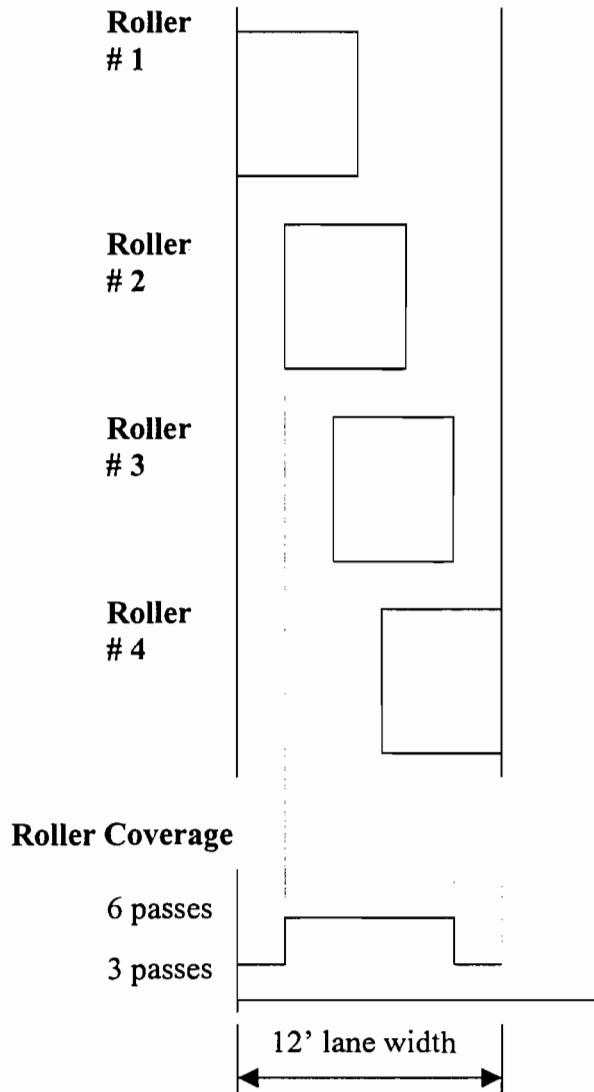
3. A minimum 1 hr. of rolling time is required per 5000 square yards.
4. The production rate of distributor is specified as 90 gal/min value for the G_t parameter.
5. For driving lanes, a binder rate of 0.33 gal/sy and aggregate Grade 4 were selected.
 $x = 4$ yd , $W = 12$ ft

$$Sf = \frac{G_t}{9.77WR} = \frac{(90)}{(9.77)(12)(0.33)} = 2.33 \text{ linear miles per hour}$$

Assuming: $P = Sf$

$$N = \frac{Px}{A} = \frac{(2.33)(4)(1760)}{5000} = 3.28 \text{ rollers} \Rightarrow 4 \text{ rollers}$$

Therefore, four rollers are required to keep up with the distributor. The roller coverage for four rollers is illustrated in the figure below.



For the shoulders, the rate of binder application will be different from the lanes. The correction factor for traffic less than 50 ADT per lane for aggregate type Grade 4 is 0.05.

Therefore, binder application rate is given by the following equation.

$$R = 0.33 + 0.05 = 0.38 \text{ gal/sy}$$

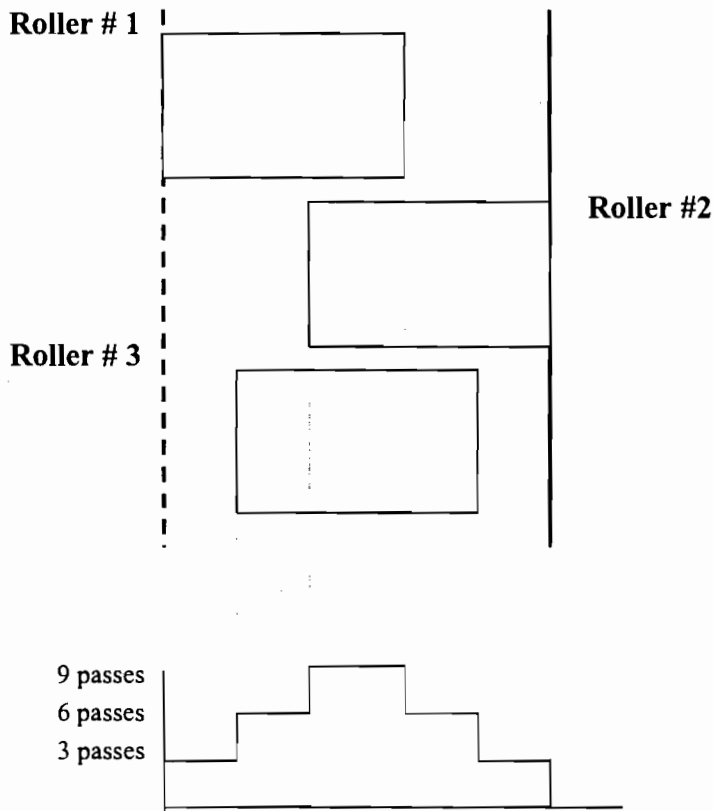
For the spraying geometry of $x=8$ ft. and $W=8$ ft,

$$Sf = \frac{Gt}{9.77WR} = \frac{(90)}{(9.77)(8)(0.38)} = 3.03 \text{ linear miles per hour}$$

Assuming: $P = Sf$

$$N = \frac{Px}{A} = \frac{(3.03)(8/3)(1760)}{5000} = 2.84 \text{ rollers} \Rightarrow 3 \text{ rollers}$$

Therefore, three rollers would be required to keep up with the distributor for the spraying of the shoulders. The roller coverage for three rollers is illustrated in the figure below.



APPENDIX C

EXAMPLE TABLES TO DETERMINE SEAL COAT BINDER RATES

These binder adjustment factors were developed for Modified Kearby Method for specific conditions in Brownwood and Abilene districts. All binder rates are in gallons per square yard.

Table 1. Binder Base Rates (AC)

Aggregate Gradation	GR3	GR4	GR5
Binder Rate	0.37	0.32	0.22

Table 2. Binder Rate Adjustment Factors for Traffic Level

ADT per Lane	GR3	GR4	GR5
0-50	+0.07	+0.05	+0.04
50-100	+0.06	+0.04	+0.02
100-300	+0.04	+0.03	0
300-500	+0.03	+0.02	* -0.02
500-700	0	0	N/A
700-1000	-0.01	-0.01	N/A
1000-1500	-0.02	-0.02	N/A
1500-2000	-0.03	* -0.03	N/A
>2000	-0.04	* -0.04	N/A

* This grade aggregate not recommended for traffic volumes shown

Table 3. Alternate Binder Rate Adjustment Factors for Traffic Level

ADT/Lane	Adjustment	Highway Description
0	+ .10	Shldrs
0-100	+ .05	Very low vol FM
100-250	+ .04	Low vol FM
250-400	+ .03	Med vol FM or
400-600	+ .01	Low vol US or SH
600-800	0	Med vol US or SH or High vol FM
800-1000	- .02	High vol US or SH
1000-1500	- .03	High vol US or SH
1500-2000	- .04	Very high vol US
>2000	- .06	Key ave etc...

Table 4. Binder Rate Adjustment Factors for Truck Traffic

% Trucks	GR3	GR4	GR5
5%	0	0	0
15%	-0.01	-0.01	N/A
30%	-0.02	-0.02	N/A
40%	-0.03	-0.02	N/A

Table 5. Alternate Binder Rate Adjustment Factors for Truck Traffic

	GR5	GR4	GR3
High %	- .02	- .04	- .05
Medium %	- .01	- .02	- .03
Low %	0	0	0

Table 6. Binder Rate Adjustment Factors for Pavement Condition (existing or new pavement-wheel path conditions)

Surface Type	Surface Condition	GR3	GR4	GR5
ACP	Very dry ACP with many cracks	+0.08	+0.06	+0.05
	Dry ACP with some cracks	+0.05	+0.04	+0.03
	Good ACP with few cracks	+0.02	+0.02	+0.01
	Flushed seal	-0.02	-0.02	-0.01
	Bleeding ACP	-0.04	-0.04	-0.03
SEAL	Very dry seal with many cracks	+0.06	+0.06	+0.04
	Dry seal with few cracks	+0.03	+0.03	+0.02
	Good seal with few cracks	0	0	0
	Flushed Seal	-0.02	-0.02	-0.01
	Bleeding seal	-0.04	-0.04	-0.02
PATCHES	Dry or fresh patch	+0.03	+0.03	+0.02
	Flogged patch	0	0	0
	Flushed patch	-0.03	-0.03	-0.03
PRIME	Dry surface, light rate	+0.02	+0.02	+0.02
	Penetrated well, good rate	0	0	0
	Waxy and wet, not penetrated well	-0.03	-0.03	-0.02

Table 7. Alternate Binder Rate Adjustment Factors for Pavement Condition on wheel path (Hunger Factor)

Surface Condition	Adjustment
Very dry ACP with many cracks	+ .10
Dry ACP with some cracks	+ .06
Good ACP with few cracks	0
Flushed ACP	- .05
Bleeding surface	- .10
Dry seal with many cracks	+ .08
Dry seal with few cracks	+ .05
Good seal with few cracks	0
Flushed seal	- .05
Fogged patch	0
Dry patch	+ .08
Flushed patch	- .06

Table 8. Alternate Binder Rate Adjustment Factors for Pavement Texture (wheel path only)

Existing Surface Texture	Aggregate Gradation		
	GR5	GR4	GR3
Very coarse seal		+ .04	
Coarse seal or premix patch		+ .02	
Good seal or premix patch; texture with little or no flushing		+ .01	
Flushed or smooth surface	0	0	0

Table 9. Binder Rate Adjustment Factors for Aggregate Gradation

	GR5	GR4	GR3
Coarse	+ .02	+ .05	+ .08
Fine	- .02	- .03	- .05

Table 10. Binder Rate Adjustment Factors Based on Type of Rock

Type of Aggregate	Binder Rate Adjustment
Light weight	+ .02
Limestone, etc...	0

Table 11. Suggested Nozzle Configurations

Lane Width (ft)	Nozzle Configuration							Total Nozzles	Comments	Uniform Binder Rate Factor (20% Variance)	Uniform Binder Rate Factor (30% Variance)
	DEFL (BIG)	BIG	SM	BIG	SM	BIG	DEFL (BIG)				
9	1	0	9	6	9	2	1	28		1.072	1.108
10	1	2	9	6	9	3	1	31		1.084	1.126
11	1	4	9	6	9	4	1	34		1.094	1.141
12	1	5	9	8	9	4	1	37		1.102	1.153
13	1	6	9	8	9	6	1	40		1.110	1.165
14	1	6	9	8	9	9	1	43	Outside shoulder	1.117	1.175
14	1	9	9	8	9	6	1	43	Inside shoulder	1.117	1.175
15	1	6	9	8	9	12	1	46	Outside shoulder	1.121	1.182
16	1	6	9	8	9	15	1	49	Outside shoulder	1.126	1.189
16	1	16	9	8	9	5	1	49	Inside shoulder	1.126	1.189

* Configuration of 1-5-9-8-9-4-1 may be shown as 6-9-8-5 etc. on design and application reports

Table 12. Lane Traffic Distribution Factors

Total Number of Lanes	Lane Traffic Distribution Factor
2 lane	ADT x 0.5
4 lane rural outside ln	ADT x 0.35
4 lane rural inside ln	ADT x 0.15
4 lane urban (all) ln	ADT x 0.25
Shoulder	0

Table 13. Typical Truck Percentages

Highway Description	Typical Truck Traffic Level (Percent of ADT)
Low volume FM's, ADT 250 or less	5
Moderate volume FM/SH/US Highways	15
High Volume US Highways	30
Interstate Highways	40

Note: Seal coat not recommended for 40% truck volumes

APPENDIX D

GENERAL NOTES BY DISTRICT

Name of District	Item	General Notes
San Angelo	8	Open season for AC-5(latex), AC-10(latex) and AC-10 asphalts shall be from second Monday of May to September 1 unless an exception is specifically authorized in writing by the engineer.
San Angelo	8	Open season for AC-15-5TR shall be from the second Monday in May to August 15 unless an exception is specifically authorized in writing by the engineer.
San Angelo	8	Open season for application of emulsion shall be from the second Monday in the may to September 15 unless an exception is specifically authorized in writing by the engineer.
San Angelo	213	Primary rolling equipment shall meet the requirements of "medium pneumatic roller (Type B)".
San Angelo	213	Four rollers of the type specified shall be required for this contract.
San Angelo	213	Basis of estimate is 2 hours minimum per lane mile.
San Angelo	302	Type E aggregate shall consist of crushed gravel, crushed stone or precoated natural limestone rock asphalt.
San Angelo	302	All precoated aggregate, except LRA, shall be precoated with Type AC asphalt, Type LRA should be precoated with a material containing a minimum of 25 percent asphalt
San Angelo	302	Representative samples from stockpiles shall not have more loss than 28 percent after five cycles of magnesium sulfate soundness testing
San Angelo	316	Latest Roadway start date shall be June
San Angelo	316	Aggregate shall be uniformly applied. Lack of uniformity, such as spots where coverage is not complete, shall be corrected by hand spotting or some other equally satisfactory method approved by the engineer before any subsequent operations are undertaken.
San Angelo	316	Application rates of asphalt and aggregate shown on the plans are for estimating purposes and may be varied by the engineer.
San Angelo	316	Asphalt Distributor shall be equipped with standard size nozzles over the wheel paths and nozzles of one size larger over the remainder of the roadway.
San Angelo	316	If an uncoated aggregate is used, all aggregate furnished for any one index shall have the same color.
San Angelo	316	In cases where flying aggregate becomes a hazard to the public, the contractor shall furnish additional flags on each end of the project to slow the traffic.
San Angelo	316	All vehicles used to transport aggregate to the chip spreader shall be of the same capacity when water level full.
Paris	8	The open season for application of asphalt is from May 1 to September 1; however, fog seal shall not be applied until after September 15 and shall be completed by October 1.
Paris	210	Flat wheel roller shall only be used in Franklin and Hopkins counties and shall not be required in the other counties.
Paris	210	The aggregate shall be rolled with a single pass of a flat wheel roller after application to the roadway. The flat wheel roller will follow behind pneumatic roller(s) as the final roller.

- Paris 210 The flat wheel roller may be either tandem or three wheel, but the resulting pressure shall be between 7 and 6 kg. per linear mm. of the roller width.
- Paris 302 The aggregate will be evaluated for moisture susceptibility (test method TEX-530-C) following the precoat process. A minimum 1%, by weight of the asphalt, antistripping, that conforms to the requirements of item 301, will be required to improve the overall quality of the aggregate.
- Paris 302 The flakiness index for the aggregate (test method TEX-224-F) shall not exceed 16 for grade 3 aggregate, nor 20 for grade 4 aggregate.
- Paris 302 Five cycle magnesium sulfate soundness loss (test method TEX-411-A) shall be no greater than 20%.
- Paris 302 The precoating asphaltic material shall be AC-20.
- Paris 316 Variable rate nozzles shall be required and employed on the asphalt distributor.
- Paris 316 New work under this item shall not be conducted later than 1 hour before sunset, unless otherwise approved by the engineer.
- Paris 316 The contractor shall schedule and control his work so that no more than 10 minutes lapses between the application of asphalt and the mineral aggregate.
- Paris 316 When wind velocities are sufficient to produce noticeable distortion of the spray from the distribution bar, asphaltic material shall not be placed.
- Pharr 8 The open season for application of asphalt is from April 15 to September 1.
- Pharr 302 The aggregate for the surface treatment shall be surface dry before application unless otherwise directed by the engineer.
- Pharr 316 When applying surface treatment at railroad crossings, a strip of paper shall be placed over the rail and flange areas across the pavement.
- Pharr 316 The rates of application and the estimated quantities of aggregate are based on the usual or average gradation of known materials, prior to shipping aggregate to the project, the contractor shall furnish the engineer with samples of the proposed aggregate which is intended to be used so that the gradation may be determined and rate of application changed if necessary.
- Pharr 316 To minimize windshield damage, sealed sections of roadways and all paved surfaces adjacent to sealed sections shall be broomed and cleaned of surplus aggregate before opening to traffic. All surfaces sealed during a working day and adjacent paved surfaces will be broomed before the end of the day as directed by the engineer. This brooming shall be subsidiary to this bid item.
- Austin 7 Upon completion of all work provided for in the contract for any individual project, the engineer will make an inspection and, if the work is found to be satisfactory, the contractor will be released from further maintenance on that project.
- Austin 8 The open season for application of asphalt is from May 1 to September 1
- Austin 210 Flat wheel roller of a size approved by the engineer will be required on the two course surface treatment.
- Austin 302 Asphalt used to precoat aggregate will be ionically compatible to the asphalt specified.
- Austin 302 Precoated aggregate shall remain in the roadway stockpile at least two weeks prior to use.
- Austin 316 Brooming operation will require the use of up to three flashing arrow boards. A lead vehicle will be required and shall be equipped with one forward and one rear facing flashing arrow board, on a four lane undivided highway. A trailing vehicle will be required and shall be equipped with the third flashing arrow

		board, on two lane and four lane undivided highways. The positioning of these vehicles shall be as directed by the engineer.
Austin	316	No asphalt shall be applied when rain chances are 40% or greater.
Austin	316	No asphalt shall be applied when overnight temperatures are expected to fall below 15 C.(60 degrees Fahrenheit)
Austin	316	Minimum air temperature for application of AC-15-5TR shall be 29 C.
Austin	316	No asphalt shall be applied later than one and one-half hours before sunset
Austin	316	Loose and surplus aggregate shall be broomed off the surface as directed by the engineer.
Austin	316	The contractor will schedule their operation to allow a minimum of 3 hours cure time before opening the roadway to traffic on SH 71 and US 290. Brooming will be required before opening to traffic on all roadways.
Austin	316	A blade broom or approved equivalent capable of uniforming the first course aggregate will be required on the two course surface treatment.
Austin	316	Both the first and second course of the two course surface treatment shall be placed the same day and rolling completed before opening to traffic.
Austin	316	The asphalt distributor spray bar shall be equipped so that nozzles not over the wheel paths of the through lanes will have the capability of an increase of up to 20% or as directed by the engineer. These nozzles will not be used on the shoulders.
Corpus Christi	8	The open season for application of asphalt shall be between May 1 and September 30 unless otherwise authorized by the engineer in writing.
Corpus Christi	213	All rolling for these items shall be in accordance with item 213, light pneumatic tire, except for measurement and payment, and at a rate directed by the engineer.
Corpus Christi	213	The contractor will be required to use four light pneumatic rollers with each seal coat operation unless otherwise directed by the engineer. The contractor may be required to furnish a flat wheel roller if deemed necessary by the engineer.
Corpus Christi	302	When emulsions are used as the precoat material, the precoat aggregate shall be adequately dried to the satisfaction of the engineer.
Corpus Christi	302	Aggregates used shall be subjected to 5 cycles of magnesium sulfate soundness test in accordance with test method TEX-411-A. The loss shall not be greater than 30%.
Corpus Christi	316	The asphalt distributions shall be equipped with a spray bar that can apply variable rate along the length of the spray bar. The asphalt rate shall be less in the wheel path as directed by the engineer. Each roadway shall be sealed using a variable asphalt rate.
Corpus Christi	316	Seal coat shall be applied in such a manner that the edge of finished work will be true and straight to the satisfaction of the engineer. The engineer may require the contractor to use a stringline as a guide.
Bryan	213	Contractor shall provide pneumatic tire rollers.
Bryan	302	Asphalt used to precoat aggregate shall be ionically compatible to the asphalt used for surface treatment.
Bryan	316	The contractor shall be required to furnish and set string line to insure straight and uniform alignment as directed by the engineer. The contractor may use other methods subject to approval of the engineer.
Bryan	316	The asphalt distributor spray bar shall be equipped so that the nozzles over the wheel paths of the travelway are capable of a reduction of up to 30%. The shall be furnished by the contractor. When directed by the engineer, the nozzle configuration may be changed from project to project and shall be

- calibrated according to the test method TEX-922-K.
- Bryan 316 AC-15P will be used during warm weather placement. CRS-1P will be used for cool weather placement as directed by the engineer.
- Yoakum 8 The open season for the application of asphalt is from May 15 to September 15.
- Yoakum 213 Rolling for this item shall meet the requirements of item 213, "Rolling(Pneumatic Tire)", except for measurement and payment and as directed by the engineer. A minimum of three rollers will be required unless otherwise directed by the engineer.
- Yoakum 302 The type PE precoated aggregate shall consist of crushed slag, crushed stone or natural limestone rock asphalt.
- Yoakum 316 On curves where widened sections exist, the seal coat shall conform to the edge of the existing paved surface. Seal coat placement on bridges and intersections shall be approved by the engineer.
- Yoakum 316 The asphalt type, grade and rate of application, and the application rate for the aggregate shall be as shown on the basis of estimate and/or as directed by the engineer.
- Yoakum 316 The asphalt distributor shall be equipped with end nozzles as approved by the engineer.
- Yoakum 316 A patch truck and crew will be required behind the aggregate spreader box as directed by the engineer.
- Lubbock 8 The asphalt season for this project is May 1st through September 15th.
- Lubbock 213 Directly, but shall be considered subsidiary to the various bid items. Rolling shall be light pneumatic tire. Sprinkling and rolling shall conform to the requirements of items 204 and 213 except for measurement and payment.
- Lubbock 302 Precoated aggregate shall be precoated with asphalt of the type and grade approved by the engineer. The use of flux oil will not be permitted.
- Lubbock 302 Type PE aggregate shall have a minimum curing time of 72 hours between precoating operations and application of the aggregate to the roadway surface.
- Lubbock 302 The aggregate not intended to be precoated shall have from 99.5 to 100 percent weight retained on the 75 micrometer sieve.
- Lubbock 316 All excess aggregate shall be removed by brooming after sufficient curing has occurred but no later than the end of the day and also as directed by the engineer.
- Laredo 7 Upon completion of all work provided for in the contract for any individual Project, the engineer will make an inspection and, if the work is found to be satisfactory, the contractor will be released from further maintenance on that individual project. Such partial acceptance will be made in writing and shall in no way void or alter any terms of contract.
- Laredo 8 The open season for the application of asphalt is from April 15 to September 30 unless otherwise authorized by the engineer in writing.
- Laredo 213 All rolling shall be in accordance with item 213(Medium, Type B) at the approximate rate of 1 hr/2500 m² or as directed/approved by the engineer. The light pneumatic roller will be acceptable at the approximate rate of 1hr/1700 m². The tire pressure and ballast of all pneumatic rollers will be an item of continuing interest by the engineer, and will be in accordance with item 213.
- Laredo 302 Previously tested aggregate delivered to the project, which are found to Contain excessive quantities of dust(more than 0.5 percent passing the 0.425mm sieve) due to degradation during precoating, stockpiling or hauling operations, may be rejected by the engineer. Test method TEX-200-F, part I

- shall be used for testing.
- Laredo 302 Aggregate type shall be precoated aggregate consisting of crushed slag, crushed stone or natural limestone rock asphalt.
- Laredo 302 Aggregate used in driving lanes shall have a flakiness index not to exceed 15 and shall be subjected to 5 cycles of soundness test in accordance with test method TEX-411-A. The percent loss shall not be greater than 30 when magnesium sulfate is used. This test will not apply to blends with crushed trap rock, crushed rhyolite, crushed limestone rock asphalt or lightweight aggregate.
- Laredo 316 The rate of asphalt application shall be decreased on the roadways that show signs of flushing.
- Laredo 316 Asphalt and aggregate rates are estimating purposes only and may be varied by the engineer. Aggregate rates shall be kept to a minimum as directed by the engineer.
- Laredo 316 All pavement shall be surfaced in lane widths or as directed by the engineer.
- Laredo 316 The location of aggregate stockpiles at the project shall be approved by the engineer. The aggregate shall be free of excess surface moisture, as directed by the engineer, before the application.
- Laredo 316 Flux oil or emulsions may be used for precoating LRA and LRA-trap rock blends. The type and amount of precoat material will be approved by the engineer prior to production. When emulsions are used as the precoat material, the precoated aggregate shall be adequately dried to the satisfaction of the engineer. It will be responsibility of the contractor/producer to provide adequate drying and curing periods before delivery of the aggregates. The engineer reserves the right to reject any precoated aggregate which is improperly coated or otherwise unsatisfactory for use.
- Laredo 316 If the aggregate to be precoated are found to have stripping characteristics, the engineer may require the addition of a lime slurry. Lime meeting the requirements of item 264 shall be added to the aggregate at the rate of 1% hydrated lime by the mass of aggregate. The lime shall be added to the aggregate in slurry form at the cold feed. If approved by the engineer the lime slurry may be added at the stockpile but not more than 24 hours in advance of use.
- Laredo 316 It shall be the contractor's responsibility to ensure that the asphalt used for precoating the aggregate at the plant and asphalt used for the surface treatment at the project site will not result in a reaction that may adversely effect the bonding of aggregate and asphalt during the surface treatment operation.
- Laredo 316 The addition of baghouse fines will not be permitted in the production of precoated material.
- Laredo 316 Mixes that do not maintain flow qualities where the precoated aggregate can not be satisfactorily spread by approved mechanical spreading devices will not be acceptable.
- Laredo 316 Stockpiles of aggregate precoated with AC may generate excessive heat built-up resulting in damage to the asphalt and/or aggregates if adequate cooling has not been initially provided. Stockpiles showing evidence of excessive heat built-up can be rejected by the engineer.
- San Antonio 8 The open season for application of asphalt is from April 15 to September 30 unless , due to unusual situations, it is specifically authorized otherwise in writing by the engineer.
- San Antonio 213 All rolling shall be in accordance with item 213(Medium, Type B) at the

- approximate rate of 1 hr/3000 m² or as directed/approved by the engineer. The light pneumatic roller will be acceptable at the approximate rate of 1 hr/2000 m². The tire pressure and ballast of all pneumatic rollers will be of continuing interest by the engineer, and will be in accordance with item 213.
- San Antonio 302 Aggregates used as the final surface on the driving lanes shall have a flakiness index not to exceed 15 and shall be subjected to 5 cycles of the soundness test in accordance with test method TEX-411-a. The percent loss shall not be greater than 30 when magnesium sulfate is used. This test will not apply to blends with crushed trap rock, crushed rhyolite, crushed limestone rock asphalt or lightweight aggregate.
- San Antonio 302 Previously tested aggregate delivered to the project, which are found to contain excessive quantities of dust (more than 0.5 percent passing the 0.425 mm sieve) during precoating, stockpiling or hauling operations, may be rejected by the engineer. Test method TEX-200-F, part I shall be used for testing.
- San Antonio 302 Aggregate type shall be precoated aggregate consisting of crushed slag, crushed stone or natural limestone rock asphalt.
- San Antonio 314 Emulsified asphalt shall be used during the flexible base finishing process of the final lift. The amount used shall be within the percentile limits determined/approved by the engineer and shall not be less than 2 percent of the total mixture.
- San Antonio 316 It is the intent to use AC-15P. Material rates shown are for estimating purposes only and may be adjusted by the engineer. Aggregate rates shall be kept to a minimum as directed by the engineer.
- San Antonio 316 It is the intent to use AC-10W/Latex, CRS-1P or HFRS-2P. Material rates shown are based on AC and may be adjusted by the engineer depending on the the material used. In the event emulsions are used, a minimum 24 hour curing period shall elapse before placing any subsequent asphalt courses. Because of the required curing period, the contractor shall obtain approval from the engineer before using emulsions.
- San Antonio 316 The contractor will be required to set a string line for all surface treatment operations unless otherwise approved by the engineer.
- San Antonio 316 The location of aggregate stockpiles at the project shall be approved by the engineer. The aggregate shall be free of excess surface moisture, as determined by the engineer, before application.
- San Antonio 316 All pavement shall be surfaced in lane widths or as directed by the engineer.
- San Antonio 316 Precoated aggregates, other than LRA or LRA-trap rock blends, may be precoated with AC-10, AC-20, MS-2, CSS-1, SS-1 or precoat oil.
- San Antonio 316 Flux oil or emulsions may be used for precoating LRA and LRA-trap rock blends. When emulsions are used as the precoat material, the precoated aggregate shall be adequately dried to the satisfaction of the engineer. It will be the responsibility of the contractor/producer to provide adequate drying and curing periods before delivery of the aggregates. The engineer reserves the right to reject any precoated aggregate which is improperly coated or otherwise unsatisfactory for use.
- San Antonio 316 If the aggregate to be precoated are found to have stripping characteristics, the engineer may require the addition of a lime slurry. Lime meeting the requirements of item 264 shall be added to the aggregate at the rate of 1% hydrated lime by the mass of aggregate. The lime shall be added to the aggregate in slurry form at the cold feed. If approved by the engineer the lime slurry may be added at the stockpile but not more than 24 hours in

		advance of use.
San Antonio	316	It shall be the contractor's responsibility to ensure that the asphalt used for precoating the aggregate at the plant and asphalt used for the surface treatment at the project site will not result in a reaction that may adversely effect the bonding of aggregate and asphalt during the surface treatment operation.
San Antonio	316	The addition of baghouse fines will not be permitted in the production of precoated material.
San Antonio	316	Mixes that do not maintain flow qualities where the precoated aggregate can not be satisfactorily spread by approved mechanical spreading devices will not be acceptable.
San Antonio	316	Stockpiles of aggregate precoated with AC may generate excessive heat built-up resulting in damage to the asphalt and/or aggregates if adequate cooling has not been initially provided. Stockpiles showing evidence of excessive heat built-up can be rejected by the engineer.
San Antonio	316	The maintenance of the surface treatment shall be the contractor's entire responsibility until the work is approved by the engineer in accordance with article 7.12 the contractor must provide, when needed, material to be used for controlling of bleeding surface.
San Antonio	510	The length of the work area shall be limited to 5 kilometers or as directed by the engineer.
Tyler	8	The open season for application of asphalt under item 316 shall be from June 1 to October 1.
Tyler	8	AC-5 or AC-10 shall be placed between May 1 and October 1 unless otherwise authorized or directed by the engineer.
Tyler	213	Rolling, meeting the requirements of item 213 (medium pneumatic rolling type B), will be considered subsidiary to the varies bid items and shall be performed as directed by the engineer.
Tyler	302	The aggregate for use with AC-15-5TR shall be precoated with AC-3, unless otherwise approved by the engineer. The aggregate for use with CRS-2P shall not be coated.
Tyler	302	All aggregate for each reference and references that are adjacent to each other shall come from the same source.
Tyler	316	No asphalt shall be applied later than 1 hour before sunset unless otherwise approved by the engineer.
Tyler	316	Rates of application of asphalt and aggregate will be determined by the engineer after a screen analysis of the aggregate delivered to the jobsite has been made. The rate of application of asphalt and aggregate may vary for each lane where there is more than one traffic lane in one direction. The rate of application for each lane shall be as directed by the engineer.
Tyler	316	When AC-5 or AC-10 is placed, the air temperature shall be at least 20 degrees Celsius and rising.
Wichita Falls	213	The rolling rates shown on the basis of estimate are for estimating purpose only. Rates shown may be adjusted by the engineer. Each roller used on this project will be equipped with high level flags as approved by the engineer.
Wichita Falls	302	Aggregate shall have polish values as shown on the plans.
Wichita Falls	316	In designated areas, the engineer may require a variation in the transverse rate of asphalt application. These rates will be determined by the engineer.
Childress	8	Asphaltic material shall be placed between May 15 and September 15, unless otherwise authorized by the engineer. Stockpiling of aggregate may begin at any time after issuance of the work order for this project.

Childress	213	100% of item 213, roll (medium pneumatic tire) shall be performed on the day of application of the surface unless otherwise approved by the engineer.
Childress	302	Minimum polish values for each project are shown on project data sheets.
Childress	302	The contractor shall be responsible for the removal of any remaining aggregate after the completion of the project. The removal of said material shall be completed before the final estimate is paid.
Childress	302	Type PL Gr 4 aggregate shall be used within the city limits of cities or as directed by the engineer.
Childress	316	Existing paved intersections and shoulders 1.2 meters or wider shall be sealed with AC-5 asphalt and type B grade 4 aggregate. Existing paved shoulders less than 1.2 meters shall be sealed with the same type and grade of asphalt and aggregate as proposed on the traffic lanes.
Childress	316	The asphalt application will begin with a running start thereby allowing the asphalt distributor to reach the proper application speed upon crossing the paper joint.
Childress	316	The asphalt distributor spray bar shall be equipped so that nozzles over the wheel paths of the road shall be one size smaller than the nozzles over other areas of the roadway. The nozzle configuration may be changed from project to project as directed by the engineer. The asphalt spray bar nozzles will be furnished by the state.
Childress	316	To alleviate dust, when directed by the engineer, surfacing aggregate shall be thoroughly sprinkled with water conforming to item 204, "sprinkling", as directed while in stockpiles prior to application on the road.
Childress	316	Asphalt shall be applied on intersections with the asphalt distributor bar to the maximum extend possible.
Odessa	8	The open season for application of asphalt is from May 1 to September 15.
Odessa	302	Representative samples from each aggregate source will be subjected to five cycles of the soundness test in accordance with test method TEX-411-A. The loss shall not be greater than 28 percent when magnesium sulfate is used. This will be performed by the district laboratory as a project acceptance test. The minimum number of tests required will be one for every 15,000 cubic meters of aggregate.
Odessa	302	Polish value shall be as indicated under specification data.
Odessa	316	On projects that have curb and gutter, the full width will be seal coated. In transitions, the seal coat will be from full width curbed section to the metric widths.
Odessa	316	On projects that do not have curb and gutter but have paved shoulders the lanes and shoulders will be seal coated to the metric width as shown in plans unless otherwise directed by the engineer.
Odessa	316	The grade and type of asphalt to be used for seal coat application shall be AC-5. The grade and type of asphalt to be used for precoating operations shall be AC-20.
Amarillo	8	The open season for application of asphalt is from May 1 to August 31.
Amarillo	302	Type AC-20 asphalt shall be used as the precoating material for precoated aggregate.
Amarillo	302	The flakiness index of aggregates shall not exceed 20.
Amarillo	316	The application rates shown on the plans for asphalt and aggregate are estimates only. The engineer or his representative will determine the actual rates to be used before work is begun based on an inspection of the road surface.
Amarillo	316	The one course surface treatment shall be applied within two weeks after the

		final base course has been placed, unless directed otherwise by the engineer.
Amarillo	316	Asphalt for one course surface treatment shall be AC if applied during the open season and shall be CRS-1P if applied during the closed season, unless directed otherwise by the engineer.
Amarillo	318	The asphalt-rubber blend shall be introduced into hot mix plant using a method approved by the engineer. The method shall produce the required proportion of asphalt-rubber blend and aggregate as determined by the engineer.
Amarillo	318	The laboratory stability shall not be less than 25.
Abilene	8	The open season for application of asphalt is from May 15 to September 1.
Abilene	302	For all PB and surface aggregate, representative samples of the total material from each coarse aggregate stockpile and from each aggregate source will be subjected to five cycles of the soundness test in accordance with test method TEX-411-A and department research report No.SS15.12. The loss shall not be greater than 25 percent for type A or B and not greater than 30 percent for type PB when magnesium sulfate is used. This will be performed by the district laboratory as a project control test. The minimum number of tests perform random sampling and testing to assure that soundness requirements are met.
Abilene	316	Unless otherwise directed by the engineer, intersections shall be sealed before the roadway section.
Abilene	316	When directed by the engineer, variable rate nozzles shall be used. These nozzles shall be furnished by the engineer.
Abilene	316	The engineer will determine the type and grade of asphalt that shall be used.
Beaumont	8	The open season for application of asphalt is from May 1 to October 1.
Beaumont	213	For these projects a minimum of six(6) rollers (light pneumatic tire) in good working order will be required at all times.
Beaumont	302	The aggregate shall have a polish value of no less than 32.
Houston	8	Placement of one course surface treatment shall be limited to the period of April 1 to October 31, inclusive, except that if in the opinion of the engineer weather conditions warrant an extension of the placement period, such extension will be permitted when approved in writing by the engineer.
Houston	213	Rolling under item 213 will be limited to light pneumatic type.
Houston	302	Minimum polish value for coarse aggregate and combined coarse aggregates shall be 32 for riding surface or finish courses.
Houston	316	The asphalt cement used for this item shall be modified with either latex or SBS(Styrene-Butadiene Styrene) additives. If a latex modified asphalt is selected it shall consist of AC-5 or AC10 asphalt cement to which has been added a minimum of 2% by weight styrene-butadiene rubber latex. If an SBS modified asphalt is selected it shall consist of an asphalt cement to which has been added a minimum of 3% by weight of the SBS additive, to achieve the properties meeting the requirements for AC-15P.
Houston	316	The rate of asphalt application shown on the "Basis of estimate" is an average rate for calculating asphalt quantities. This rate shall be varied as deemed necessary based on pavement conditions and other factors such as type and grade of aggregate used, weather, traffic, etc.
Atlanta	8	The open season for application of asphalt is from May 15 to August 31.
Atlanta	316	Cover stone aggregate shall be stockpiled at sites agreed upon by the contractor and area engineer. As the cover stone is delivered to the stockpile site, it shall be consolidated into a uniform stockpile in a manner that will prevent segregation or degradation. It is the intent that stockpiling operations

- be performed continuously during daily deliveries.
- Atlanta 316 All existing roadway surfaces within the limits of each project shall be sealed including extra widths, crossovers, roadside parks, picnic areas, mailbox turnarounds, public road intersections and public drives. Intersections surfaced with a higher type surface such as asphaltic concrete or concrete pavement shall not be sealed. Intersections and driveways will be sealed prior to sealing the main lanes.
- Atlanta 316 Upon completion of rolling, the roadway surface shall be broomed when and directed by the engineer.
- Atlanta 316 Rates of application of asphalt and aggregate will be determined by the engineer.
- Atlanta 316 The engineer will require the distributor spray bar to be equipped so that the asphalt or emulsion rate over the wheelpaths can be set at a rate different than the application rate over the rest of the travel lane.
- Lufkin 8 The open season for application of asphalt is from June 1 to September 1. The engineer may give written permission for placement of asphalt in advance of the open season or after the close of the season provided weather conditions are favorable for doing the work.
- Lufkin 302 Grade 4 rock will be type PE, or type PL, GR4 aggregate. Type PE aggregate shall be precoated aggregate consisting of crushed slag, crushed stone or natural limestone rock asphalt.
- Lufkin 316 The rates of application of asphalt and aggregate shown hereon are for estimating purposes only. The actual rates to be used during construction will be as directed by the engineer.
- Lufkin 316 Asphalt type AC 5, or AC 10, shall be used with grade 4 aggregate on all highways.
- Lufkin 316 The engineer shall select the type of asphalt from those shown in the bid description and basis of estimate and shall determine the type of asphalt to be used for precoating aggregate.
- Lufkin 316 The contractor will be required to provide a transverse spray bar, capable of applying lighter rates in the wheel paths, when directed by the engineer due to existing surface conditions.
- Lufkin 316 The type and grade as well as the amount of asphalt used in precoating aggregate shall be approved by the engineer.
- Lufkin 316 Uniformity and rate of distribution of asphaltic material will be checked periodically during construction as directed by the engineer. The surface treatment shall be applied in lane widths unless otherwise directed by the engineer. Where extra width of surfacing has been provided in transitions and climbing lanes, the entire width of surface shall be treated. Intersection areas for connecting paved roads are to be resurfaced as directed by the engineer.
- Lufkin 316 Surfacing shall be done on paved intersections prior to surfacing of the roadway.
- Lufkin 316 Application of asphalt shall cease two(2) hours before sunset unless otherwise directed by the engineer.
- Lufkin 316 When ordered by the engineer, aggregate stockpiled for surface treatment shall be flushed with water in order to remove excessive dust particles. This work shall be done in such sequence that will permit free water to drain from the stockpiled aggregate prior to surfacing operations.
- Brownwood 8 Asphaltic material shall be placed between May 1 and October 1, unless otherwise authorized by the engineer.

Brownwood	213	Light pneumatic rolling, in accordance with item 213 at the rate directed by the engineer will be required.
Brownwood	316	The engineer shall select the grade and type of emulsion to be used after the contractor designates his source of supply and after it is determined in which season of the year the material will be placed.
Brownwood	316	The asphalt distributor spray bar shall be equipped so that nozzles over the wheel paths of the road shall be one size smaller than the nozzles over the other areas of the roadway. The nozzle configuration may be changed from project to project as directed by the engineer. the asphalt spray bar nozzles will be furnished by the state.
Brownwood	316	State personnel will run an asphalt transverse distribution check on the contractor's distributor prior to its use on surfacing items, unless otherwise directed by the engineer.
Brownwood	316	The asphalt rates shown here on are for average conditions. The rate may be varied by the engineer to obtain proper embedment of aggregate
Brownwood	316	Intersections, mailbox turnouts and city streets shall be sealed prior to sealing the mainlanes and/or shoulders.
Brownwood	316	Asphalt shall be applied on the intersections with the asphalt distributor bar to the maximum extent possible.
Dallas	8	The open season for application of asphalt is from June 1 to September 1.
Dallas	302	The flakiness index of the aggregate shall not be greater than 16, when tested by the test method TEX-224-F.
Dallas	302	The moisture content of the lightweight aggregate shall not exceed five percent prior to being applied to the roadway.
Dallas	302	Polish value shall not be less than 32.
Dallas	316	The rate of application of asphalt and aggregate as shown on the plans is for estimating purposes only and may be varied as directed by the engineer. The rate and type of rolling is to be specified in the basis of estimate or otherwise approved by the engineer in the field.
Dallas	316	After completion of any section of seal coat, aggregate will be properly rolled and swept off as soon as practical.
Dallas	316	When wind velocities are sufficient to produce noticeable distortion of the spray from the distribution bar, asphaltic materials can not be placed.
Dallas	316	Presently surfaced intersections will be sealed. The limit of seal coat will be as directed by the engineer.
Dallas	316	Sufficient truck loads of aggregate shall be ready to deliver aggregate behind the distributor for a length of an asphalt shot before the distributor can apply asphalt to the roadway. The asphalt shot shall be covered by the aggregate within a maximum time period of five minutes after the distributor has shot.
Fort Worth	316	The rates of application of asphalt and aggregate are for estimating purposes only and may be varied as directed by the engineer.
Fort Worth	316	The emulsified asphalt shall be MS-2. The amount of emulsified asphalt in the mixture of water and asphalt shall be from 30 to 50 percent, as directed by the engineer. The water shall be heated and added at the plant.
Fort Worth	316	The asphalt distributor spray bar shall be equipped so that nozzles over the wheel paths of the road shall be one size smaller than the nozzles over the other areas of the roadway. The nozzle configuration may be changed as directed by the engineer as conditions warrant. The asphalt spray bar nozzle will be furnished by the state. The area engineer will be responsible for having the nozzles on the projects. Upon completion of the work, the nozzles will remain the property of state and shall be delivered to the area engineer.

Fort Worth

316 Sprinkling methods capable of removing accumulated dust will be required. All stockpiled aggregates shall be sprinkled either in the stockpile or in the transport vehicle immediately prior to application on the road as directed by the engineer.

APPENDIX E

GENERAL NOTES BY SPECIFICATION ITEM

Name of District	Item	General Notes
Laredo	7	Upon completion of all work provided for in the contract for any individual project, the engineer will make an inspection and, if the work is found to be satisfactory, the contractor will be released from further maintenance on that individual project. Such partial acceptance will be made in writing and shall in no way void or alter any terms of contract.
Austin	7	Upon completion of all work provided for in the contract for any individual project, the engineer will make an inspection and, if the work is found to be satisfactory, the contractor will be released from further maintenance on that project.
San Angelo	8	Open season for AC-5(latex), AC-10(latex) and AC-10 asphalts shall be from second Monday of May to September 1 unless an exception is specifically authorized in writing by the engineer.
San Angelo	8	Open season for AC-15-5TR shall be from the second Monday in May to August 15 unless an exception is specifically authorized in writing by the engineer.
San Angelo	8	Open season for application of emulsion shall be from the second Monday in the may to September 15 unless an exception is specifically authorized in writing by the engineer.
Paris	8	The open season for application of asphalt is from May 1 to September 1; however, fog seal shall not be applied until after September 15 and shall be
Pharr	8	The open season for application of asphalt is from April 15 to September 1.
Corpus Christi	8	The open season for application of asphalt shall be between May 1 and September 30 unless otherwise authorized by the engineer in writing.
Yoakum	8	The open season for the application of asphalt is from May 15 to September 15.
Lubbock	8	The asphalt season for this project is May 1st through September 15th.
Laredo	8	The open season for the application of asphalt is from April 15 to September 30 unless otherwise authorized by the engineer in writing.
San Antonio	8	The open season for application of asphalt is from April 15 to September 30 unless , due to unusual situations, it is specifically authorized otherwise in writing by the engineer.
Tyler	8	The open season for application of asphalt under item 316 shall be from June 1 to October 1.
Tyler	8	AC-5 or AC-10 shall be placed between May 1 and October 1 unless otherwise authorized or directed by the engineer.
Odessa	8	The open season for application of asphalt is from May 1 to September 15.
Amarillo	8	The open season for application of asphalt is from May 1 to August 31.
Abilene	8	The open season for application of asphalt is from May 15 to September 1.
Beaumont	8	The open season for application of asphalt is from May 1 to October 1.
Atlanta	8	The open season for application of asphalt is from May 15 to August 31.
Lufkin	8	The open season for application of asphalt is from June 1 to September 1. The engineer may give written permission for placement of asphalt in advance of the open season or after the close of the season provided weather conditions are favorable for doing the work.
Austin	8	The open season for application of asphalt is from May 1 to September 1

Houston	8	Placement of one course surface treatment shall be limited to the period of April 1 to October 31, inclusive, except that if in the opinion of the engineer weather conditions warrant an extension of the placement period, such extension will be permitted when approved in writing by the engineer.
Brownwood	8	Asphaltic material shall be placed between May 1 and October 1, unless otherwise authorized by the engineer.
Dallas	8	The open season for application of asphalt is from June 1 to September 1.
Childress	8	Asphaltic material shall be placed between May 15 and September 15, unless otherwise authorized by the engineer. Stockpiling of aggregate may begin at any time after issuance of the work order for this project.
Paris	210	Flat wheel roller shall only be used in Franklin and Hopkins counties and shall not be required in the other counties.
Paris	210	The aggregate shall be rolled with a single pass of a flat wheel roller after application to the roadway. The flat wheel roller will follow behind pneumatic roller(s) as the final roller
Paris	210	The flat wheel roller may be either tandem or three wheel, but the resulting pressure shall be between 7 and 6 kg. per linear mm. of the roller width.
Austin	210	Flat wheel roller of a size approved by the engineer will be required on the two course surface treatment.
San Angelo	213	Primary rolling equipment shall meet the requirements of "medium pneumatic roller (Type B)".
San Angelo	213	Four rollers of the type specified shall be required for this contract.
San Angelo	213	Basis of estimate is t2 hours minimum per lane mile.
Corpus Christi	213	All rolling for these items shall be in accordance with item 213, light pneumatic tire, except for measurement and payment, and at a rate directed by the engineer.
Corpus Christi	213	The contractor will be required to use four light pneumatic rollers with each seal coat operation unless otherwise directed by the engineer. The contractor may be required to furnish a flat wheel roller if deemed necessary by the engineer.
Bryan	213	Contractor shall provide pneumatic tire rollers.
Yoakum	213	Rolling for this item shall meet the requirements of item 213, "Rolling(Pneumatic Tire)", except for measurement and payment and as directed by the engineer. A minimum of three rollers will be required unless otherwise directed by the engineer.
Laredo	213	All rolling shall be in accordance with item 213(Medium, Type B) at the approximate rate of 1 hr/2500 m2 or as directed/approved by the engineer. The light pneumatic roller will be acceptable at the approximate rate of 1hr/1700 m2. The tire pressure and ballast of all pneumatic rollers will be an item of continuing interest by the engineer, and will be in accordance with item 213.
San Antonio	213	All rolling shall be in accordance with item 213(Medium, Type B) at the approximate rate of 1 hr/3000 m2 or as directed/approved by the engineer. The light pneumatic roller will be acceptable at the approximate rate of 1 hr/2000 m2. The tire pressure and ballast of all pneumatic rollers will be of continuing interest by the engineer, and will be in accordance with item 213.
Tyler	213	Rolling, meeting the requirements of item 213 (medium pneumatic rolling type B), will be considered subsidiary to the various bid items and shall be performed as directed by the engineer.
Childress	213	100% of item 213, roll (medium pneumatic tire) shall be performed on the day of application of the surface unless otherwise approved by the engineer.

Beaumont	213	For these projects a minimum of six(6) rollers (light pneumatic tire) in good working order will be required at all times.
Houston	213	Rolling under item 213 will be limited to light pneumatic type.
Brownwood	213	Light pneumatic rolling, in accordance with item 213 at the rate directed by the engineer will be required.
San Angelo	302	Type E aggregate shall consist of crushed gravel, crushed stone or precoated natural limestone rock asphalt.
San Angelo	302	All precoated aggregate, except LRA, shall be precoated with Type AC asphalt, Type LRA should be precoated with a material containing a minimum of 25 percent asphalt
San Angelo	302	Representative samples from stockpiles shall not have more loss than 28 percent after five cycles of magnesium sulfate soundness testing
Paris	302	The aggregate will be evaluated for moisture susceptibility (test method TEX-530-C) following the precoat process. A minimum 1%, by weight of the asphalt, antistrip, that conforms to the requirements of item 301, will be required to improve the overall quality of the aggregate.
Paris	302	The flakiness index for the aggregate (test method TEX-224-F) shall not exceed 16 for grade 3 aggregate, nor 20 for grade 4 aggregate.
Paris	302	Five cycle magnesium sulfate soundness loss (test method TEX-411-A) shall be no greater than 20%.
Paris	302	The precoating asphaltic material shall be AC-20.
Pharr	302	The aggregate for the surface treatment shall be surface dry before application unless otherwise directed by the engineer.
Austin	302	Asphalt used to precoat aggregate will be ionically compatible to the asphalt specified.
Austin	302	Precoated aggregate shall remain in the roadway stockpile at least two weeks prior to use.
Corpus Christi	302	When emulsions are used as the precoat material, the precoated aggregate shall be adequately dried to the satisfaction of the engineer.
Corpus Christi	302	Aggregates used shall be subjected to 5 cycles of magnesium sulfate soundness test in accordance with test method TEX-411-A. The loss shall not be greater than 30%.
Bryan	302	Asphalt used to precoat aggregate shall be ionically compatible to the asphalt used for surface treatment.
Yoakum	302	The type PE precoated aggregate shall consist of crushed slag, crushed stone or natural limestone rock asphalt.
Lubbock	302	Precoated aggregate shall be precoated with asphalt of the type and grade approved by the engineer. The use of flux oil will not be permitted.
Lubbock	302	Type PE aggregate shall have a minimum curing time of 72 hours between precoating operations and application of the aggregate to the roadway surface.
Lubbock	302	The aggregate not intended to be precoated shall have from 99.5 to 100 percent weight retained on the 75 micrometer sieve.
Laredo	302	Previously tested aggregate delivered to the project, which are found to contain excessive quantities of dust(more than 0.5 percent passing the 0.425mm sieve) due to degradation during precoating, stockpiling or hauling operations, may be rejected by the engineer. Test method TEX-200-F, part I shall be used for testing.
Laredo	302	Aggregate type shall be precoated aggregate consisting of crushed slag, crushed stone or natural limestone rock asphalt.
Laredo	302	Aggregate used in driving lanes shall have a flakiness index not to exceed 15 and shall be subjected to 5 cycles of soundness test in accordance

		with test method TEX-411-A. The percent loss shall not be greater than 30 when magnesium sulfate is used. This test will not apply to blends with crushed trap rock, crushed rhyolite, crushed limestone rock asphalt or lightweight aggregate.
San Antonio	302	Aggregates used as the final surface on the driving lanes shall have a flakiness index not to exceed 15 and shall be subjected to 5 cycles of the soundness test in accordance with test method TEX-411-a. The percent loss shall not be greater than 30 when magnesium sulfate is used. This test will not apply to blends with crushed trap rock, crushed rhyolite, crushed limestone rock asphalt or lightweight aggregate.
San Antonio	302	Previously tested aggregate delivered to the project, which are found to contain excessive quantities of dust (more than 0.5 percent passing the 0.425 mm sieve) during precoating, stockpiling or hauling operations, may be rejected by the engineer. Test method TEX-200-F, part I shall be used for testing.
San Antonio	302	Aggregate type shall be precoated aggregate consisting of crushed slag, crushed stone or natural limestone rock asphalt.
Tyler	302	The aggregate for use with AC-15-5TR shall be precoated with AC-3, unless otherwise approved by the engineer. The aggregate for use with CRS-2P shall not be coated.
Tyler	302	All aggregate for each reference and references that are adjacent to each other shall come from the same source.
Childress	302	Minimum polish values for each project are shown on project data sheets.
Childress	302	The contractor shall be responsible for the removal of any remaining aggregate after the completion of the project. The removal of said material shall be completed before the final estimate is paid.
Childress	302	Type PL Gr 4 aggregate shall be used within the city limits of cities or as directed by the engineer.
Odessa	302	Representative samples from each aggregate source will be subjected to five cycles of the soundness test in accordance with test method TEX-411-A. The loss shall not be greater than 28 percent when magnesium sulfate is used. This will be performed by the district laboratory as a project acceptance test. The minimum number of tests required will be one for every 15,000 cubic meters of aggregate.
Odessa	302	Polish value shall be as indicated under specification data.
Amarillo	302	Type AC-20 asphalt shall be used as the precoating material for precoated aggregate.
Amarillo	302	The flakiness index of aggregates shall not exceed 20.
Beaumont	302	The aggregate shall have a polish value of no less than 32.
Houston	302	Minimum polish value for coarse aggregate and combined coarse aggregates shall be 32 for riding surface or finish courses.
Lufkin	302	Grade 4 rock will be type PE, or type PL, GR4 aggregate. Type PE aggregate shall be precoated aggregate consisting of crushed slag, crushed stone or natural limestone rock asphalt.
Dallas	302	The flakiness index of the aggregate shall not be greater than 16, when tested by the test method TEX-224-F.
Dallas	302	The moisture content of the lightweight aggregate shall not exceed five percent prior to being applied to the roadway.
Dallas	302	Polish value shall not be less than 32.
Wichita Falls	302	Aggregate shall have polish values as shown on the plans.
Abilene	302	For all PB and surface aggregate, representative samples of the total

material from each coarse aggregate stockpile and from each aggregate source will be subjected to five cycles of the soundness test in accordance with test method TEX-411-A and department research report No.SS15.12. The loss shall not be greater than 25 percent for type A or B and not greater than 30 percent for type PB when magnesium sulfate is used. This will be performed by the district laboratory as a project control test. The minimum number of tests perform random sampling and testing to assure that soundness requirements are met.

San Angelo	316	Application rates of asphalt and aggregate shown on the plans are for estimating purposes and may be varied by the engineer.
Pharr	316	The rates of application and the estimated quantities of aggregate are based on the usual or average gradation of known materials, prior to shipping aggregate to the project, the contractor shall furnish the engineer with samples of the proposed aggregate which is intended to be used so that the gradation may be determined and rate of application changed if necessary.
Yoakum	316	The asphalt type, grade and rate of application, and the application rate for the aggregate shall be as shown on the basis of estimate and/or as directed by the engineer.
Laredo	316	The rate of asphalt application shall be decreased on the roadways that show signs of flushing.
Laredo	316	Asphalt and aggregate rates are estimating purposes only and may be varied by the engineer. Aggregate rates shall be kept to a minimum as directed by the engineer.
San Antonio	316	It is the intent to use AC-15P. Material rates shown are for estimating purposes only and may be adjusted by the engineer. Aggregate rates shall be kept to a minimum as directed by the engineer.
San Antonio	316	It is the intent to use AC-10W/Latex, CRS-1P or HFRS-2P. Material rates shown are based on AC and may be adjusted by the engineer depending on the the material used. In the event emulsions are used, a minimum 24 hour curing period shall elapse before placing any subsequent asphalt courses. Because of the required curing period, the contractor shall obtain approval from the engineer before using emulsions.
Tyler	316	Rates of application of asphalt and aggregate will be determined by the engineer after a screen analysis of the aggregate delivered to the jobsite has been made. The rate of application of asphalt and aggregate may vary for each lane where there is more than one traffic lane in one direction. The rate of application for each lane shall be as directed by the engineer.
Wichita Falls	316	In designated areas, the engineer may require a variation in the transverse rate of asphalt application. These rates will be determined by the engineer.
Amarillo	316	The application rates shown on the plans for asphalt and aggregate are estimates only. The engineer or his representative will determine the actual rates to be used before work is begun based on an inspection of the road surface.
Brownwood	316	The asphalt rates shown here on are for average conditions. The rate may be varied by the engineer to obtain proper embedment of aggregate
Dallas	316	The rate of application of asphalt and aggregate as shown on the plans is for estimating purposes only and may be varied as directed by the engineer. The rate and type of rolling is to be specified in the basis of estimate or otherwise approved by the engineer in the field.
Fort Worth	316	The rates of application of asphalt and aggregate are for estimating purposes only and may be varied as directed by the engineer.

Houston	316	The rate of asphalt application shown on the "Basis of estimate" is an average rate for calculating asphalt quantities. This rate shall be varied as deemed necessary based on pavement conditions and other factors such as type and grade of aggregate used, weather, traffic, etc.
Atlanta	316	Rates of application of asphalt and aggregate will be determined by the engineer.
Lufkin	316	The rates of application of asphalt and aggregate shown hereon are for estimating purposes only. The actual rates to be used during construction will be as directed by the engineer.
Abilene	316	When directed by the engineer, variable rate nozzles shall be used. These nozzles shall be furnished by the engineer.
San Angelo	316	Asphalt Distributor shall be equipped with standard size nozzles over the wheel paths and nozzles of one size larger over the remainder of the roadway.
Paris	316	Variable rate nozzles shall be required and employed on the asphalt distributor.
Austin	316	The asphalt distributor spraybar shall be equipped so that nozzles not over the wheel paths of the through lanes will have the capability of an increase of up to 20% or as directed by the engineer. These nozzles will not be used on the shoulders.
Corpus Christi	316	The asphalt distributions shall be equipped with a spray bar that can apply variable rate along the length of the spray bar. The asphalt rate shall be less in the wheel path as directed by the engineer. Each roadway shall be sealed using a variable asphalt rate.
Bryan	316	The asphalt distributor spray bar shall be equipped so that the nozzles over the wheel paths of the travelway are capable of a reduction of up to 30%. The shall be furnished by the contractor. When directed by the engineer, the
Yoakum	316	The asphalt distributor shall be equipped with end nozzles as approved by the engineer.
Childress	316	The asphalt distributor spray bar shall be equipped so that nozzles over the wheel paths of the road shall be one size smaller than the nozzles over other areas of the roadway. The nozzle configuration may be changed from project to project as directed by the engineer. The asphalt spray bar nozzles will be furnished by the state.
Atlanta	316	The engineer will require the distributor spraybar to be equipped so that the asphalt or emulsion rate over the wheelpaths can be set at a rate different than the application rate over the rest of the travel lane.
Lufkin	316	The contractor will be required to provide a transverse spray bar, capable of applying lighter rates in the wheel paths, when directed by the engineer due to existing surface conditions.
Brownwood	316	The asphalt distributor spray bar shall be equipped so that nozzles over the wheel paths of the road shall be one size smaller than the nozzles over the other areas of the roadway. The nozzle configuration may be changed from project to project as directed by the engineer. the asphalt spray bar nozzles will be furnished by the state.
Brownwood	316	State personnel will run an asphalt transverse distribution check on the contractor's distributor prior to its use on surfacing items, unless otherwise directed by the engineer.
Fort Worth	316	The asphalt distributor spray bar shall be equipped so that nozzles over the wheel paths of the road shall be one size smaller than the nozzles over the other areas of the roadway. The nozzle configuration may be changed as

directed by the engineer as conditions warrant. The asphalt spray bar nozzle will be furnished by the state. The area engineer will be responsible for having the nozzles on the projects. Upon completion of the work, the nozzles will remain the property of state and shall be delivered to the area engineer.

Paris	316	New work under this item shall not be conducted later than 1 hour before sunset, unless otherwise approved by the engineer.
Paris	316	The contractor shall schedule and control his work so that no more than 10 minutes lapses between the application of asphalt and the mineral aggregate.
Austin	316	No asphalt shall be applied when rain chances are 40% or greater.
Austin	316	No asphalt shall be applied when overnight temperatures are expected to fall below 15 C.(60 degrees Fahrenheit)
Austin	316	Minimum air temperature for application of AC-15-5TR shall be 29 C.
Austin	316	No asphalt shall be applied later than one and one-half hours before sunset
Austin	316	Both the first and second course of the two course surface treatment shall be placed the same day and rolling completed before opening to traffic.
Tyler	316	No asphalt shall be applied later than 1 hour before sunset unless otherwise approved by the engineer.
Tyler	316	When AC-5 or AC-10 is placed, the air temperature shall be at least 20 degrees Celsius and rising.
Childress	316	The asphalt application will begin with a running start thereby allowing the asphalt distributor to reach the proper application speed upon crossing the paper joint.
Amarillo	316	The one course surface treatment shall be applied within two weeks after the final base course has been placed, unless directed otherwise by the engineer.
Lufkin	316	Surfacing shall be done on paved intersections prior to surfacing of the roadway.
Lufkin	316	Application of asphalt shall cease two(2) hours before sunset unless otherwise directed by the engineer.
Bryan	316	AC-15P will be used during warm weather placement. CRS-1P will be used for cool weather placement as directed by the engineer.
San Antonio	316	It is the intent to use AC-10W/Latex, CRS-1P or HFRS-2P. Material rates shown are based on AC and may be adjusted by the engineer depending on the the material used. In the event emulsions are used, a minimum 24 hour curing period shall elapse before placing any subsequent asphalt courses. Because of the required curing period, the contractor shall obtain approval from the engineer before using emulsions.
Childress	316	Existing paved intersections and shoulders 1.2 meters or wider shall be sealed with AC-5 asphalt and type B grade 4 aggregate. Existing paved shoulders less than 1.2 meters shall be sealed with the same type and grade of asphalt and aggregate as proposed on the traffic lanes.
Odessa	316	The grade and type of asphalt to be used for seal coat application shall be AC-5. The grade and type of asphalt to be used for precoating operations shall be AC-20.
Amarillo	316	Asphalt for one course surface treatment shall be AC if applied during the open season and shall be CRS-1P if applied during the closed season, unless directed otherwise by the engineer.
Houston	316	The asphalt cement used for this item shall be modified with either latex or SBS(Styrene-Butadiene Styrene) additives. If a latex modified asphalt is

		selected it shall consist of AC-5 or AC10 asphalt cement to which has been added a minimum of 2% by weight styrene-butadiene rubber latex. If an SBS modified asphalt is selected it shall consist of an asphalt cement to which has been added a minimum of 3% by weight of the SBS additive, to achieve the properties meeting the requirements for AC-15P.
Lufkin	316	Asphalt type AC 5, or AC 10, shall be used with grade 4 aggregate on all highways.
Lufkin	316	The engineer shall select the type of asphalt from those shown in the bid description and basis of estimate and shall determine the type of asphalt to be used for precoating aggregate.
Lufkin	316	The type and grade as well as the amount of asphalt used in precoating aggregate shall be approved by the engineer.
Brownwood	316	The engineer shall select the grade and type of emulsion to be used after the contractor designates his source of supply and after it is determined in which season of the year the material will be placed.
San Angelo	316	In cases where flying aggregate becomes a hazard to the public, the contractor shall furnish additional flags on each end of the project to slow the traffic.
Pharr	316	To minimize windshield damage, sealed sections of roadways and all paved surfaces adjacent to sealed sections shall be broomed and cleaned of surplus aggregate before opening to traffic. All surfaces sealed during a working day and adjacent paved surfaces will be broomed before the end of the day as directed by the engineer. This brooming shall be subsidiary to this bid item.
Austin	316	Brooming operation will require the use of up to three flashing arrow boards. A lead vehicle will be required and shall be equipped with one forward and one rear facing flashing arrow board, on a four lane undivided highway. A trailing vehicle will be required and shall be equipped with the third flashing arrow board, on two lane and four lane undivided highways. The positioning of these vehicles shall be as directed by the engineer.
Austin	316	Loose and surplus aggregate shall be broomed off the surface as directed by the engineer.
Austin	316	A blade broom or approved equivalent capable of uniforming the first course aggregate will be required on the two course surface treatment.
Lubbock	316	All excess aggregate shall be removed by brooming after sufficient curing has occurred but no later than the end of the day and also as directed by the engineer.
Atlanta	316	Upon completion of rolling, the roadway surface shall be broomed when and directed by the engineer.
Dallas	316	After completion of any section of seal coat, aggregate will be properly rolled and swept off as soon as practical.
Pharr	316	When applying surface treatment at railroad crossings, a strip of paper shall be placed over the rail and flange areas across the pavement.
Corpus Christi	316	Seal coat shall be applied in such a manner that the edge of finished work will be true and straight to the satisfaction of the engineer. The engineer may require the contractor to use a stringline as a guide.
Bryan	316	The contractor shall be required to furnish and set string line to insure straight and uniform alignment as directed by the engineer. The contractor may use other methods subject to approval of the engineer.
San Antonio	316	The contractor will be required to set a string line for all surface treatment operations unless otherwise approved by the engineer.
Yoakum	316	On curves where widened sections exist, the seal coat shall conform to the

		edge of the existing paved surface. Seal coat placement on bridges and intersections shall be approved by the engineer.
Childress	316	Asphalt shall be applied on intersections with the asphalt distributor bar to the maximum extend possible.
Odessa	316	On projects that have curb and gutter, the full width will be seal coated. In transitions, the seal coat will be from full width curbed section to the metric widths.
Odessa	316	On projects that do not have curb and gutter but have paved shoulders the lanes and shoulders will be seal coated to the metric width as shown in plans unless otherwise directed by the engineer.
Abilene	316	Unless otherwise directed by the engineer, intersections shall be sealed before the roadway section.
Laredo	316	All pavement shall be surfaced in lane widths or as directed by the engineer.
San Antonio	316	All pavement shall be surfaced in lane widths or as directed by the engineer.
Atlanta	316	All existing roadway surfaces within the limits of each project shall be sealed including extra widths, crossovers, roadside parks, picnic areas, mailbox turnarounds, public road intersections and public drives. Intersections surfaced with a higher type surface such as asphaltic concrete or concrete pavement shall not be sealed. Intersections and driveways will be sealed prior to sealing the main lanes.
Brownwood	316	Intersections, mailbox turnouts and city streets shall be sealed prior to sealing the mainlanes and/or shoulders.
Brownwood	316	Asphalt shall be applied on the intersections with the asphalt distributor bar to the maximum extent possible.
Dallas	316	Presently surfaced intersections will be sealed. The limit of seal coat will be as directed by the engineer.
Laredo	316	The location of aggregate stockpiles at the project shall be approved by the engineer. The aggregate shall be free of excess surface moisture, as directed by the engineer, before the application.
San Antonio	316	The location of aggregate stockpiles at the project shall be approved by the engineer. The aggregate shall be free of excess surface moisture, as directed by the engineer, before the application.
Atlanta	316	Cover stone aggregate shall be stockpiled at sites agreed upon by the contractor and area engineer. As the cover stone is delivered to the stockpile site, it shall be consolidated into a uniform stockpile in a manner that will prevent segregation or degradation. It is the intent that stockpiling operations be performed continuously during daily deliveries.
Lufkin	316	When ordered by the engineer, aggregate stockpiled for surface treatment shall be flushed with water in order to remove excessive dust particles. This work shall be done in such sequence that will permit free water to drain from the stockpiled aggregate prior to surfacing operations.
Childress	316	To alleviate dust, when directed by the engineer, surfacing aggregate shall be thoroughly sprinkled with water conforming to item 204, "sprinkling", as directed while in stockpiles prior to application on the road.
Fort Worth	316	Sprinkling methods capable of removing accumulated dust will be required. All stockpiled aggregates shall be sprinkled either in the stockpile or in the transport vehicle immediately prior to application on the road as directed by the engineer.
Laredo	316	Flux oil or emulsions may be used for precoating LRA and LRA-trap rock blends. The type and amount of precoat material will be approved by the engineer prior to production. When emulsions are used as the precoat

- material, the precoated aggregate shall be adequately dried to the satisfaction of the engineer. It will be responsibility of the contractor/producer to provide adequate drying and curing periods before delivery of the aggregates. The engineer reserves the right to reject any precoated aggregate which is improperly coated or otherwise unsatisfactory for use.
- Laredo 316 If the aggregate to be precoated are found to have stripping characteristics, the engineer may require the addition of a lime slurry. Lime meeting the requirements of item 264 shall be added to the aggregate at the rate of 1% hydrated lime by the mass of aggregate. The lime shall be added to the aggregate in slurry form at the cold feed. If approved by the engineer the lime slurry may be added at the stockpile but not more than 24 hours in advance of use.
- Laredo 316 It shall be the contractor's responsibility to ensure that the asphalt used for precoating the aggregate at the plant and asphalt used for the surface treatment at the project site will not result in a reaction that may adversely effect the bonding of aggregate and asphalt during the surface treatment operation.
- Laredo 316 The addition of baghouse fines will not be permitted in the production of precoated material.
- Laredo 316 Mixes that do not maintain flow qualities where the precoated aggregate can not be satisfactorily spread by approved mechanical spreading devices will not be acceptable.
- Laredo 316 Stockpiles of aggregate precoated with AC may generate excessive heat built-up resulting in damage to the asphalt and/or aggregates if adequate cooling has not been initially provided. Stockpiles showing evidence of excessive heat built-up can be rejected by the engineer.
- San Antonio 316 Precoated aggregates, other than LRA or LRA-trap rock blends, may be precoated with AC-10, AC-20, MS-2, CSS-1, SS-1 or precoat oil.
- San Antonio 316 Flux oil or emulsions may be used for precoating LRA and LRA-trap rock blends. When emulsions are used as the precoat material, the precoated aggregate shall be adequately dried to the satisfaction of the engineer. It will be the responsibility of the contractor/producer to provide adequate drying and curing periods before delivery of the aggregates. The engineer reserves the right to reject any precoated aggregate which is improperly coated or otherwise unsatisfactory for use.
- San Antonio 316 If the aggregate to be precoated are found to have stripping characteristics, the engineer may require the addition of a lime slurry. Lime meeting the requirements of item 264 shall be added to the aggregate at the rate of 1% hydrated lime by the mass of aggregate. The lime shall be added to the aggregate in slurry form at the cold feed. If approved by the engineer the lime slurry may be added at the stockpile but not more than 24 hours in advance of use.
- San Antonio 316 It shall be the contractor's responsibility to ensure that the asphalt used for precoating the aggregate at the plant and asphalt used for the surface treatment at the project site will not result in a reaction that may adversely effect the bonding of aggregate and asphalt during the surface treatment operation.
- San Antonio 316 The addition of baghouse fines will not be permitted in the production of precoated material.
- San Antonio 316 Mixes that do not maintain flow qualities where the precoated aggregate can not be satisfactorily spread by approved mechanical spreading devices

		will not be acceptable.
San Antonio	316	Stockpiles of aggregate precoated with AC may generate excessive heat built-up resulting in damage to the asphalt and/or aggregates if adequate cooling has not been initially provided. Stockpiles showing evidence of excessive heat built-up can be rejected by the engineer.
Fort Worth	316	The emulsified asphalt shall be MS-2. The amount of emulsified asphalt in the mixture of water and asphalt shall be from 30 to 50 percent, as directed by the engineer. The water shall be heated and added at the plant.
Paris	316	When wind velocities are sufficient to produce noticeable distortion of the spray from the distribution bar, asphaltic material shall not be placed.
Dallas	316	When wind velocities are sufficient to produce noticeable distortion of the spray from the distribution bar, asphaltic materials can not be placed.
San Angelo	316	Aggregate shall be uniformly applied. Lack of uniformity, such as spots where coverage is not complete, shall be corrected by hand spotting or some other equally satisfactory method approved by the engineer before any subsequent operations are undertaken.
Dallas	316	Sufficient truck loads of aggregate shall be ready to deliver aggregate behind the distributor for a length of an asphalt shot before the distributor can apply asphalt to the roadway. The asphalt shot shall be covered by the aggregate within a maximum time period of five minutes after the distributor has shot.
San Angelo	316	If an uncoated aggregate is used, all aggregate furnished for any one index shall have the same color.
San Angelo	316	All vehicles used to transport aggregate to the chip spreader shall be of the same capacity when water level full.
Austin	316	The contractor will schedule their operation to allow a minimum of 3 hours cure time before opening the roadway to traffic on SH 71 and US 290. Brooming will be required before opening to traffic on all roadways.
Yoakum	316	A patch truck and crew will be required behind the aggregate spreader box as directed by the engineer.
San Antonio	316	The maintenance of the surface treatment shall be the contractor's entire responsibility until the work is approved by the engineer in accordance with article 7.12 the contractor must provide, when needed, material to be used for controlling of bleeding surface.

