



Addendum No. 1

DATE: August 24, 2016

TO: ALL PLANHOLDERS OF THE 2016 PAVEMENT RESURFACING PROJECT

FROM: City of Morgan Hill

RE: Missing Slurry Seal Section in Project Technical Specifications

1. Attach Section 23 Slurry Seal as part of the technical specification in the project bid document.

ADDENDUM ACKNOWLEDGMENT

Bidder acknowledges receipt of this addendum, which shall be attached to the proposal.

Contractor's Representative

Date

THIS DOCUMENT SHALL BECOME A PART OF THE PROJECT SPECIFICATIONS

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23.00 Slurry Seal

a. Description: The work to be done consists of furnishing all labor, equipment and materials and performing all operations necessary for the application of Type II polymer modified asphalt slurry seal surface over the existing AC pavement surfaces.

The slurry seal shall consist of a mixture of a polymer modified asphalt emulsion, mineral aggregate, mineral filler, water, and specified additives. The materials shall be properly proportioned, mixed and uniformly spread over a properly prepared surface as specified in these Technical Provisions, and as directed by the Engineer. The slurry seal shall conform to the requirements of Section 37-2 "Slurry Seal" of the CSS except where specified otherwise in these Technical Provisions.

The completed slurry seal shall leave a homogeneous mat, adhere firmly to the prepared surface, and have a friction resistant surface texture throughout its service life. The work shall include furnishing all surface preparation and any additional work, not mentioned above, that is required to be performed by the CSS and these Technical Provisions.

b. Contractor Experience: The Contractor shall be experienced with slurry seal. The Contractor shall submit, during the pre-construction meeting, a list of at least three public works projects of slurry seal completed within the last 18 months. The project list shall show the name of the project, name of the public agency/owner, address, telephone number of an appropriate party to contact, year and square yard application in each case.

c. Material Sampling: The minimum acceptable sampling frequency shall be as follows:

- Asphalt Emulsion (minimum sampling frequency - once daily)
- Mineral Aggregate (minimum sampling frequency - once weekly)

All samples of asphalt emulsion and aggregate for slurry seal shall be captured from the storage tank of the slurry seal application truck in use on the work. Inspector shall observe the sampling of 1 gallon of the emulsion and 50 lbs. of the slurry seal aggregate. Contractor shall provide the samples and containers to the Engineer.

The Engineer or his representative shall be permitted to take samples of materials from the project at anytime. The City may elect to perform testing on the samples to verify compliance of the materials with the specifications.

d. Testing: Testing shall be undertaken by the Engineer whenever deemed necessary. The Engineer, or his representative, may suspend the application of the slurry seal whenever changes in the materials or quality of the applied slurry are noted. Work shall resume only when the noted deficiencies are corrected to the satisfaction of the Engineer. When work is suspended for this reason, samples will be taken immediately.

The Engineer may send samples to a testing laboratory. Testing will be at the City's expense unless deficiencies are verified by the testing. The Contractor shall reimburse the City for the cost of any testing required by deficient materials or application of the slurry mix.

Aggregate, if tested, should at a minimum be tested for the following:

Gradation	CTM 202; AASHTO T11, T27; ASTM C117, C136
Sand Equivalent	ASTM D2419
Moisture Content	CTM 226, 231; AASHTO T265; ASTM D2216

e. Materials:

1. Asphalt Emulsion

The emulsified asphalt shall be designated as grade PMCQS-1h.

The polymer within the asphalt emulsion shall be, at the option of the Contractor, Neoprene, SBR, EVA or SBS. Solid polymers such as EVA or SBS shall be adequately blended into the asphalt prior to emulsification. If a liquid latex such as Neoprene, SBR or similar is used, the latex shall be “co-milled” into the emulsion through the water phase during manufacturing. Each load of polymer asphaltic emulsion shall have a certificate from the asphalt emulsion manufacturer guaranteeing that either asphalt blending or “co-milling” processes were used. The certificate shall also state the percentage of the solid rubber polymer added by weight of the asphalt as well as the composition of the polymer. The addition of latex to the emulsion after emulsion manufacturing is prohibited. The certificate shall state if the emulsion supplied is the same as that used in the mix design.

The polymer modified asphalt emulsion shall conform to the following specifications:

TEST	TEST METHOD	REQUIREMENT	
		Minimum	Maximum
<i>Tests on emulsion:</i>			
Viscosity SSF, @ 77°F, seconds	AASHTO T 59	15	90
Settlement, 5 days, %	AASHTO T 59	--	5
Storage Stability Test, 1 day, %	AASHTO T 59	--	1.0
Distillation:			

TEST	TEST METHOD	REQUIREMENT	
Oil distillate by volume of emulsion, %	AASHTO T 59	--	3
Residue by Evaporation, %	CTM 331	60	--
<i>Tests on residue from Evaporation using CTM 331:</i>			
Penetration, 77°F, 100 grams for 5 seconds, dmm	AASHTO T 59	40	65
Ductility, 77°F, 5 cm/min, cm (RTFO Aged Residue)	AASHTO T 51	60	--
Ring & Ball Softening Point, °F	AASHTO T 53	123	--
Polymer Content *, % *Solid polymer content based on weight of asphalt	CTM 401	3.0%	--
OR			
Torsional Recovery, %	CTM 32	18	--

2. Mineral Aggregate

Any aggregate or combination of aggregates shall be produced by crushing rock. To assure the material is totally crushed, 100% of the parent aggregate shall be larger than the largest stone in the gradation to be used. All materials shall be free from vegetable matter and other deleterious substances, oversized particles and caked lumps.

When tested in accordance to AASHTO T27 (ASTM C136) and AASHTO T11 (ASTM C117), the aggregate gradation (including the mineral filler) shall be within following bands:

3. Aggregate

<u>Sieve Sizes</u>	<u>Percentage Passing</u>	<u>Percentage Passing</u>
	Type I	Type II
9.5 mm (3/8")		100
4.75 mm (#4)	100	94-100
2.36 mm (#8)	90-100	65-90
1.18 mm (#16)	60-90	40-70
600 um (#30)	40-65	25-50
75 um (#200)	10-20	5-15

After the target gradation has been submitted and identified in the mix design then the percent passing each sieve shall not vary by more than the stockpile tolerance and still remain within the gradation band during the application of slurry seal.

The mineral aggregate shall also conform to the following:

Test	Test Method	Requirements	
		Type I	Type II
Sand Equivalent	217	68 Minimum	70 Minimum
Durability Index	229	70 Minimum	75 Minimum

4. Mineral Filler

Mineral Filler shall be either Portland cement, hydrated lime, limestone dust, fly ash or other approved filler meeting the requirements of ASTM D242 and shall be used if required by the mix design. The mineral filler shall be considered as part of the aggregate in calculations regarding slurry seal asphalt content.

5. Water

The water added to the slurry seal shall be potable and free of harmful salts and contaminants.

6. Additives

Additives may be used to accelerate or retard the mixing and setting characteristics of the slurry seal, or improve the resulting finished surface. The use of additives in the slurry mix (or individual materials) shall be made initially in quantities predetermined by the mix design with field adjustments if required. If the use of additive during application requires a greater than + or - 1.0% deviation from the recommendations of the mix design, a new mix design will be performed to verify system performance at higher or lower additive levels.

f. Mix Design and Pre-Qualification of Materials: During the pre-construction meeting, the Contractor shall submit a signed mix design covering the specific materials to be used on the project. Compatibility of the aggregate, emulsion, mineral filler, and other additives shall be verified by the mix design. The mix design shall be made with the same aggregate gradation that the Contractor shall provide on the project.

The mix design shall be performed and dated within 30 days prior to the application of slurry seal. This mix design testing shall be performed by a laboratory capable of performing all tests listed in these specifications. The laboratory shall certify on the mix design that it has had at least two years of experience in the design of slurry seals.

After the mix design has been approved, no substitution or changes of materials shall be permitted, unless approved by the Engineer. If changes in materials are approved by the Engineer, a new mix design shall be performed by the Testing Laboratory before the application of new materials.

Required tests and values are as follows:

<u>TEST</u>	<u>DESCRIPTION</u>	<u>SPEC</u>
ISSA TB-113	Mix Time (Mixing test and set time test shall be done at the highest temperatures expected during construction.)	Controllable to 180 sec minimum
ISSA TB-139	Wet Cohesion	
	30 minutes min 60 minutes min	12kg-cm minimum 20kg-cm minimum
ISSA TB-109	Excess Asphalt by LWT Sand Adhesion	50g/ft ² maximum (538 g/m ² maximum)
ISSA TB-114	Wet Stripping	Pass (90% minimum)
ISSA TB-100	Wet Track Abrasion Loss	50g/ft ² maximum
	One hour soak	(807 g/m ² maximum)

The Wet Track Abrasion test is used to determine the minimum asphalt content.

The laboratory shall also report the quantitative effects of moisture content on the unit weight of the aggregate (bulking effect). The report must clearly show the proportions of aggregate, mineral filler (min. and max.), water (min. and max.), additive(s) (usage), and asphalt emulsion based on the dry weight of the aggregate.

The percentages of each individual material required shall be shown in the laboratory report. Adjustments may be required during the construction, based on the field conditions. The Engineer shall give final approval for all such adjustments.

The Engineer shall approve the mix design and all slurry seal materials and methods prior to use. The component materials shall be within the following limits:

RESIDUAL ASPHALT 7.5% - 13.5% (approx.12.0 - 22.0% emulsion).
Based on dry weight of aggregate.

MINERAL FILLER 0.0% - 2.0%
Based on dry weight of aggregate.

ADDITIVES As needed to control mixing and setting times.

WATER As needed to achieve proper mix consistency.

The Contractor shall submit samples at the pre-construction meeting from all suppliers furnishing a minimum of the following materials with corresponding MSDS sheets. Each sample shall be clearly labeled as to its contents, the related project name and job number.

1. One gallon of the base asphalt
2. One pint of the polymer additive (with clear labeling of polymer type)
3. One quart of asphalt emulsion
4. Fifty pounds of slurry seal aggregate

g. Proportioning: Proportioning shall conform to the provisions in Section 37-2.04, "Proportioning" of the CSS and these Technical Provisions.

The aggregate shall be proportioned using a belt feeder operated with an adjustable cutoff gate. The height of the gate opening shall be readily determinable. The emulsion shall be proportioned by a positive displacement pump. Any variable rate emulsion pump, if used, shall be equipped with a means to seal the adjusting unit in its calibrated condition.

The delivery rate of aggregate and emulsion per revolution of the aggregate feeder shall be calibrated at the appropriate gate settings for each mixer-spreader truck used on the project. The calibration shall demonstrate that delivery rates of dry aggregate and emulsion residue are within the recommended percentages stated in the laboratory mix design. The Contractor shall provide written calibration documentation for each application truck which has been performed within the last calendar year. The Contractor shall further provide a short calibration demonstrating gate settings and liquids are delivering job materials within the mix design recommended ranges.

h. Mixing and Spreading Equipment: Mixing and spreading equipment shall conform to the provisions in Section 37-2.05, "Mixing and Spreading Equipment" of the CSS and these Technical Provisions. A minimum of two slurry seal machines shall be on the job and in good operating condition at all times.

The following equipment will be required:

The slurry seal shall be mixed in a self-propelled mixing machine equipped with a continuous flow pugmill, capable of accurately delivering and automatically proportioning the aggregate, emulsified asphalt, mineral filler, water and admixtures to a double shafted, multi-blade pugmill mixer capable of minimum speeds of 200 revolutions per minute. Mix retention time in the pugmill shall be less than three seconds. The mixing machine shall have sufficient

storage capacity of aggregate, emulsified asphalt, mineral filler and water to maintain an adequate supply to the proportioning controls and make 15 tons of emulsion mix.

The mixing machine shall be equipped with hydraulic controls for proportioning the material by volume to the mix. Each material control device shall be calibrated, properly marked, pre-set and lockable.

The mixing machine shall be equipped with a water pressure system and nozzle type spray bars to provide a water spray immediately ahead of the spreader box.

The mixing machine shall be equipped with an approved fines feeder that provides a uniform, positive, accurately metered, pre-determined amount of the mineral filler at the same time and location that the aggregate is fed.

i. Placing: Placement of slurry seal shall conform to the provisions in Section 37-2.06, “Placing” of the CSS and these Technical Provisions.

The slurry mix shall be placed over the surface by means of a spreader box equipped with augers to distribute the material uniformly throughout the full width with flexible seals to prevent loss of mixture from the box. The box shall have 6 to 8 foot skids to provide for leveling and filling of uneven depressed areas. The strike off assembly shall be adjustable metal plate to ensure uniform placement on super elevated sections and shoulder slopes. There shall be a walkway across the rear of the screed to facilitate strike-off and texturing adjustments along with material sample taking.

The emulsion mix shall not be placed when the atmospheric temperature is below 50°F or during unsuitable weather.

Immediately prior to placing the latex emulsion mix, the surface shall be thoroughly cleaned of all vegetation, loose materials, dirt, mud and all other extraneous materials by a combination of sweeping and blowing. The latex emulsion mixture shall fill all minor cracks, depressions or low areas and leave a uniform surface free from ruts, humps, depressions or irregularities. Any ridges, indentations or other objectionable marks left in the surface shall be eliminated by rolling or other means.

The Engineer shall approve all surface preparation prior to application of the slurry seal.

Utility covers, manholes, and other permanent fixtures shall be protected from coverage by the slurry seal and referenced for prompt location and cleaning following application. The Contractor shall be responsible for locating, removing, and cleaning protection from the above items following the slurry seal operations. The methods of protection and referencing, locating and cleaning shall be submitted by the Contractor and shall be subject to approval by the Engineer.

Slurry sealing of driveway aprons, returns, and other incidental work shall be accomplished concurrently with application of the street proper. The joint between the pavement

and the PCC gutter shall be sealed with slurry seal and the gutter edge overlapped by approximately two inches. When slurry starts or finishes, a straight line cut-off shall be obtained by laying down a strip of building paper or other approved material. Such paper and any excess slurry shall be removed by the Contractor after application of the slurry. Edge limits of the slurry on both sides of the street shall be maintained in a neat and uniform line.

Construction joints shall be neat in appearance and shall be tapered or feathered to conform to the existing surfacing. All excess material shall be removed from surfaces upon completion of each run.

Areas, which cannot be reached with slurry seal machines, shall be surfaced using hand squeegees to provide complete and uniform coverage. The area to be hand worked shall be lightly dampened prior to mix placement and the slurry worked immediately. Care shall be exercised to leave no unsightly appearance from handwork. The same type finish as applied by the spreader box shall be required. Handwork shall be completed during machine applying process.

Once the slurry seal has cured and is open to traffic, any excessive raveling of the aggregate from the mixture shall be swept up by the Contractor. The surface shall be maintained and re-swept *three separate times after streets have been completed or* as required by the Engineer until such time as the raveling ceases or the surface is rejected by the Engineer. Sweeping shall be provided when required within 48 hours notice.

Ranges for spread rates shall be as follows:

Type I	3.63 - 5.44 kg/m ² (8 - 12 lbs/yd ²)
Type II	5.44 - 9.07 kg/m ² (12 - 20 lbs/yd ²)
Type III	8.16 - 13.60 kg/m ² (18 - 30 lbs/yd ²)

The exact rate will be as determined by specific weight of aggregate, the surface demand of the pavement, and the size of the largest particle size of the aggregate. The application rate will produce finished slurry seal as defined elsewhere in these specifications.

At the end of each day's production, the Contractor will provide to the Engineer a report containing the following information:

1. Tons of dry aggregate consumed that day;
2. Tons of asphalt emulsion consumed that day; and
3. Footage covered that day.

This report shall be received no later than 10:00 a.m. of the following day.

j. Installation: The Contractor shall perform the service in a safe, acceptable, workmanlike manner, and in accordance with the requirements of Section 37-2, “Slurry Seals”, of the CSS.

1. Personnel shall be experienced, knowledgeable and capable in all aspects of performing the service. The same personnel that start the project shall remain on the project for the life of the contract.
2. The equipment shall be in good repair and serviceable to operate in a reliable and safe manner.
3. When slurry is being placed over a brick, concrete, or other highly absorbent or polished surface, a 1-part emulsion, 3-part water tack coat of the same asphalt emulsion (if possible) type and grade as specified for the slurry is recommended. This can be applied with an asphalt distributor. The normal application rate is 0.05 to 0.10 gal. /sq. yd. of the diluted emulsion.
4. The Contractor shall place slurry seal to the beginning and ending limits of the work as directed by the Engineer.
5. The Contractor shall be responsible for providing the street cleaning, “No Parking” posting, and traffic control.
6. The Contractor shall be responsible for all cleanup of the work areas and staging areas.
7. The Contractor shall be responsible for covering and uncovering all structure covers, such as manholes, valve and monument covers.
8. All streets (full width and gutters) shall be swept by mechanical means no sooner than 5 days and no later than 15 days after slurry placement is complete.
 - a. Measurement and Payment: Slurry seal will be measured by the square yard. The contract price paid per square yard for “Slurry Seal” of the type” shown in the Bid Schedule shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals and for doing all the work involved in the furnishing and placing the slurry seal, complete in place, including cleaning the surface and protecting the slurry seal until it has set, as specified in the CSS and these Technical Provisions, and as directed by the Engineer.