

SP559 (01-13-11)

SECTION 00559 - SILICA FUME AND LATEX MODIFIED CONCRETE OVERLAYS

Section 00559, which is not a Standard Specification, is included in this Project by Special Provision.

Description

00559.00 Scope - This work consists of preparing bridge decks and resurfacing them with silica fume concrete (SFC) or with latex modified concrete (LMC).

00559.04 Replacement Conferences:

(a) Supervisory Personnel - Hold a pre-placement conference with all supervisory personnel, subcontractors, suppliers, the quality control technician, the concrete control technician, and all other personnel who will be involved in the resurfacing work. Meet at a mutually agreed time approximately two weeks in advance of the work. Present and discuss all phases of the resurfacing work.

(b) Placement Crew - Hold a second pre-placement conference with the Engineer and the entire resurfacing work crew and the QCT, at the job site one-half hour before resurfacing work begins to discuss placement duties and procedures. Do not begin the resurfacing work until this meeting is held.

Materials

00559.11 General - Furnish concrete meeting the requirements of Section 02001 except follow the concrete properties, tolerances, and limits of 00559.14.

Furnish coarse and fine aggregates meeting the requirements of Section 02690 and the following:

- Coarse aggregates that consists of uncrushed, clean gravel having hard, strong, durable particles free from adherent coatings and meeting the following grading requirements:

<u>Sieve Size</u>	<u>Percent Passing (by Weight)</u>
<u>3/4"</u>	<u>100</u>
<u>3/8"</u>	<u>35 - 65</u>
<u>No. 4</u>	<u>0 - 15</u>
<u>No. 200</u>	<u>0 - 1.5</u>

- Fine aggregates with a sand equivalent of not less than 75. For LMC fine aggregate, maintain positive control of the amount of moisture by:
 - Keeping the stockpiled fine aggregate free moisture content variation to a maximum of 1.0% but in no case more than 6.0% free moisture.

- Being able to report, at any time, the moisture content within $\pm 0.5\%$.

00559.13 Mix Designs - Prepare and submit new or current mix designs according to Section 02001 and the following:

(a) Silica Fume - Provide silica fume as a densified powder.

(b) Chemical Admixtures - Use chemical admixtures from the QPL. Determine the quantity of each admixture to be used by trial batches prior to its use in concrete. Add each chemical admixture to the concrete mix according to the manufacturer's recommendations.

(c) Strength Tests - Conduct strength testing at 7 days.

00559.14 Concrete Properties, Tolerances, and Limits - Provide a workable mixture uniform in composition and consistency having the following properties:

<u>Material or Property</u>	<u>Specification or Test Method</u>	<u>Unit</u>	<u>Property Requirements</u>
<u>Fine aggregate</u>	<u>02690.30</u>	<u>% total aggregate (by Weight)</u>	<u>45 - 55 (SFC) 50 - 60 (LMC)</u>
<u>Dry Silica Fume</u>	<u>02330.20</u>	<u>% total cementitious material</u>	<u>4</u>
<u>Fly Ash</u>	<u>02330.10</u>	<u>% total cementitious material</u>	<u>30</u>
<u>Latex Emulsion Admixture</u>	<u>02030.30</u>	<u>gal./cu. yd.</u>	<u>24.5 (min.)</u>
<u>Water-Cementitious Ratio *</u>	<u>AASHTO T 121</u>	<u>lb. water/lb. cementitious material</u>	<u>0.40 (max.)</u>
<u>Air Content</u>	<u>AASHTO T 152</u>	<u>% plastic mix</u>	<u>6 \pm 1 1/2</u>
<u>Concrete Temperature</u>	<u>WAQTC TM 10</u>	<u>$^{\circ}$ F at time of placement</u>	<u>50 (min.) 80 (max.)</u>
<u>Slump</u>	<u>AASHTO T 119</u>	<u>inch</u>	<u>6 \pm 2</u>
<u>Compressive Strength (f'c) at 7 Calendar Days</u>	<u>AASHTO T 22</u>	<u>psi</u>	<u>3,000 (min.)</u>

* Include free moisture in aggregate and for LMC, non-solids in latex

00559.15 Quality Control - Provide quality control according to Section 00165 and the following:

- Sample and test according to the MFTP.
- For all SFC and LMC, provide personnel according to 02001.50 to sample and test the mix for temperature, air content, slump, water-cementitious ratio, density, and yield when:
 - The first load of each placement is made.
 - There is a visible change in the slump of the concrete

- A set of cylinders is obtained.
- If the results of any test are outside of the specification limits, stop placement of the load. Correct the load or, if the load cannot be corrected, do not incorporate it into the work. Test subsequent loads before any further concrete placement. Correct subsequent loads if any of the tests are still outside the specification limits. Return to the specified test frequency when the test results from two consecutive loads are shown to meet the specification limits.

00559.17 Acceptance of Concrete - Acceptance of concrete will be according to Section 00165 and the following:

(a) Aggregate - Acceptance will be based on the Contractor's quality control testing, if verified, according to Section 00165.

(1) Aggregate Gradation - A stockpile contains specification aggregate gradation when the quality level for each sieve size calculated according to 00165.40 is equal to or greater than the quality level shown in Table 00165-2 for a PF of 1.00. Each required sample represents a subplot. When the quality level shown in Table 00165-2 yields a PF of less than 1.00 for any constituent, the material is non-specification.

(2) Non-specification Aggregate Gradation - Stockpiled aggregates that contain non-specification aggregate gradation will be rejected by the Engineer unless non-specification material is removed from the stockpile. Do not add additional material to the stockpile until enough non-specification material is removed so that the quality level for each constituent is equal to or greater than the quality level shown in Table 00165-2 for a 1.00 PF.

(b) Plastic Concrete - Acceptance of the plastic concrete will be based on the tests performed by the Contractor's QCT, according to the tolerances and limits for water/cementitious ratio, slump, air entrainment, and temperature of 00559.14

(c) Hardened Concrete - Acceptance of hardened concrete will be based on one set of three cylinders cast from each 50 cubic yards of concrete placed. Cast a minimum of one set per production shift. Cast and cure the test specimens according to AASHTO T 23 in 4 x 8 inch single-use plastic molds and test at 7 days according to AASHTO T 22.

(1) General - For all SFC and LMC, acceptance of hardened concrete will be based on an analysis of compressive strength tests of cylinders cast by the QCT. Test the cylinders at an Agency certified laboratory.

(2) Actual 7 Day Strength Test Value - The Actual 7 Day Strength Test Value (ASTV) is the average compressive strength of the three cylinders tested. If the compressive strength of a single test specimen varies by more than 10% from the average of the other two specimens, that compressive strength value will be discarded. The average compressive strength test of the two remaining specimens will be the ASTV.

(3) Acceptance - Hardened concrete with an ASTV meeting or exceeding the specified design strength, f'_c will be accepted for strength. If the ASTV is less

than $f'c$ but at least 85% of $f'c$, the Engineer may review the results to determine if the concrete represented by the cylinders is suitable for the intended purpose. Remove concrete that has an ASTV less than 85% of $f'c$ unless otherwise authorized in writing by the Engineer. If the concrete is removed, the cost of removal, replacement and all related work shall be the Contractor's responsibility. If the Engineer determines that the concrete is suitable for the intended purpose, the concrete may be allowed to remain in place, subject to a price adjustment according to 00150.25.

If an ASTV falls below $f'c$, the Contractor may submit a written plan outlining a proposed alternate method of evaluating compressive strength. Submit the plan for review by the Engineer within three days of the test. Provide evidence that a reasonable $f'cr$ (over-design) was maintained and that there is credible evidence (besides low strength) which warrants consideration of this option. The Engineer may allow an alternate method of acceptance if the compressive strength test results are determined to be suspect from definable external factors.

(d) Surface Tolerance - The finished surface, when tested with a 12 foot straightedge, shall not vary by more than 1/8 inch. Furnish the straightedge and operate it under the direction of the Engineer.

If the concrete surface does not meet the surface tolerance, stop the operation until revised methods, changes in equipment, or correction of procedures are proposed and approved.

Correct all non-specification surface tolerance after curing and before texturing with a self propelled diamond grinder.. Correct the surface tolerances before opening the roadway to traffic at no additional cost to the Agency.

(e) Bond Strength - Perform two bond tests for each placement in the presence of and at locations designated by the Engineer within 28 Calendar Days of overlay placement and before opening the roadway to traffic. Cut 3 inch diameter cores and conduct bond tests on the cores.

The bond tests consist of:

- Coring through the overlay and approximately 1 inch into the existing concrete.
- Attaching a device to the top of the core.
- Exerting a tensile load to the core sufficient to cause failure or achieve 300 psi, whichever occurs first.

A successful test is the failure of the concrete substrate or bond failure at or above 175 psi.

After coring and testing, restore the area voided by the cores by blowing with compressed air and filling with an approved cementitious patching material product from the QPL.

Equipment

00559.20 Equipment - Remove all equipment that leaks oil or other contaminants from the work area until they are repaired. Before SFC or LMC placement, protect the prepared deck from contaminant spills by covering with clear plastic, overlapped to prevent contaminants from contacting the deck. Do not use equipment until approval is obtained.

00559.21 Surface Preparation Equipment:

(a) Sawing Equipment - Furnish power-driven concrete saws adequate for sawing joints and for surface texturing.

(b) Scarifying Equipment - Furnish power-operated diamond grinding, micro-milling, shot-blasting, or hydroblasting scarifying equipment capable of uniformly removing the existing surface to depths required.

(1) Diamond Grinding - Furnish power-driven self-propelled machines with the cutting head made up of diamond cutting blades.

(2) Micro-milling - Furnish cold plane or rotomill grinding machines using carbide cutting tools in a rotary drum. Provide equipment with tooth spacing of not more than 1/4 inch, capable of leaving a smooth, uniform pattern of striations. Limit machines to a gross operational weight of no more than 35 tons and a forward speed of 2.5 feet per minute. Operate at a drum speed of at least 120 RPM.

(3) Shot-Blasting - Furnish mono-directional or bi-directional electric-powered shot blast machines with single or multiple blast wheels that cover a width of at least 2.5 feet per pass, and conform to EPA air pollution requirements by containing dust and steel abrasive media. If the equipment is not equipped for simultaneous bi-directional blasting, make separate passes in opposite directions to ensure equal cleaning on all sides of the exposed aggregate.

(4) Hydroblasting - Furnish hydroblasting equipment capable of removing concrete at a rate and volume acceptable to the Engineer without leaving a striated surface. Demonstrate the removal rate and accuracy of the equipment to the Engineer before beginning work.

(c) Power Washers - Furnish power washers according to 00540.28.

(d) Power-Driven Hand Tools - Furnish power-driven hand tools for removal of unsound concrete meeting the following requirements:

- Class 2 Preparation Equipment - For Class 2 deck preparation, use chipping hammers equal to or less than a nominal 15 pound class.
- Class 3 Preparation Equipment - For Class 3 deck preparation, use chipping hammers equal to or less than a nominal 30 pound class.

(e) Hand Tools - Furnish hammers and chisels to remove final particles of unsound concrete or to achieve the required depth.

(f) Air Compressor - Furnish air compressors equipped with functioning oil traps. Ensure air used for blow-down of prepared surfaces is free of oil.

00559.22 Mobile Mixer for Latex Modified Concrete - Furnish self-contained, mobile, continuous mixing equipment for proportioning, mixing and placing LMC that:

- Is self-propelled and carries sufficient unmixed dry bulk cement, sand, coarse aggregate, latex modifier, and water to produce at least 6 cubic yards of LMC on the site.
- Provides positive measurement of cement being introduced into the mix that has a recording meter visible at all times and is equipped with a ticket print-out that indicates the quantity.
- Provides positive control of the flow of water and latex emulsion into the mixing chamber and indicates water flow by a flow meter that can be readily adjusted to provide for minor variations in aggregate moisture. Ensure flow meters for water and latex emulsion are accurate to within $\pm 2.0\%$.
- Is calibrated to automatically proportion and blend all components of indicated composition on a continuous or intermittent basis, as required by the finishing operation, and discharges mixed material full-width directly in front of the finishing machine and has sufficient mixing capacity to permit placement without interruption.

Perform calibration including flow meters, in the presence of the Engineer, to proportion the specified mix according to the manufacturer's recommendations before beginning placement work. Perform new calibrations as follows:

- Whenever the source of material changes.
- Following material or equipment failures.
- Whenever the actual yield varies from the calibration yield by more than $\pm 2.0\%$.
- Before reuse, whenever the mixer leaves the Project for repair or other use.
- When requested by the Engineer.

00559.23 Finishing Equipment - Furnish a concrete finishing machine for all new surfaces that is:

- Self-propelled with positive control in both forward and reverse direction.
- Capable of mechanically raising the screed, pan, and any other parts of the finishing mechanical operation to clear the screeded surface, and capable of automatically returning to the specified grade.
- Equipped with augers, followed by oscillating, vibrating screed, vibrating roller tamper, or a vibrating pan, followed by a finish roller or rollers.
- Capable of transmitting vibration at frequencies between 3,500 and 4,500 impulses per minute.

Provide continuous supporting rails for the finishing machine that are adequately supported and sufficiently rigid so there is no visible deflection under the weight of the fully loaded machine. Provide anchorage for the supporting rails to ensure horizontal and vertical stability.

Set the finishing machine so it is capable of finishing to the edge of previously placed concrete.

Set the screed rails on the completed lane surface when placing concrete in a lane abutting a previously completed lane.

00559.24 Miscellaneous Equipment:

(a) Hand Tools - Furnish hand tools for placing and finishing concrete. Use manual type screeds with approved vibrators attached to consolidate and finish smaller areas where it is impractical to use a finishing machine. Use spud vibrators when depths exceed 2 1/2 inches. Use supplemental vibration along the meet lines where adjacent pours come together at bulkheads, and along curb lines, unless it can be shown that vibration reaches the meet lines.

(b) Straightedge - Furnish a 12 foot metal straightedge.

(c) Recording Thermometer - Furnish a 24-hour recording thermometer accurate to ± 1 °F.

(d) Coring Equipment - Furnish core cutting equipment that can produce a core at least 3 inches in diameter.

(e) Bond Testing Equipment - Furnish bond testing equipment that:

- Is compatible with the core tested.
- Can exert a tensile load to the core sufficient to exceed 300 psi.
- Is equipped with a measuring device capable of reading tensile force exerted within 1 percent accuracy.

(f) Wet-dry Vacuum Equipment - Furnish vacuum equipment that can remove puddled water ahead of the concrete placement.

Labor

00559.30 Quality Control Personnel - Provide certified technicians according to 02001.50.

Construction

00559.41 Surface Preparation:

(a) General - Remove surface concrete by approved hand methods that cannot be reached by power-driven equipment.

Remove existing asphalt wearing surfaces according to Section 00503.

Dispose of all materials according to 00290.20.

Repair all damage to abutting concrete surfaces or other surfaces that are damaged by Contractor's operations at no additional cost to the Agency.

(b) Bridge Deck Drains - Temporarily block all deck drains and catch basins while preparing the surface. Do not allow any scarifying, chipping, sawing, sandblasting, shot-blasting, sweeping, water blasting, or flushing material to enter them.

(c) Expansion Joints - Remove material that is within 12 inches of all joints in a manner acceptable to the Engineer. Do not damage the joints.

(d) Initial Surface Preparation - Perform surface preparation far enough in advance of resurfacing so that all further deck preparation can be satisfactorily completed. Prepare bridge decks according to the following:

(1) Class 1 Preparation - Before beginning Class 1 preparation, construct a 50 foot long by 5 foot wide test strip in an area approved by the Engineer. Roughen the existing concrete surface to an exposed aggregate surface texture depth profile of at least 1/8 inch, determined according to the standard volumetric test (ASTM E 965). Do not proceed with Class 1 preparation until the Engineer approves the test strip results.

Continue to roughen the existing concrete surface to match the test strip.

Protect visible reinforcing steel and reinforcing steel where the plans show it to be within 1/2 inch of the surface.

(2) Class 2 Preparation - In Class 2 areas, remove concrete with nominal 15 pound powered chipping hammers or hydroblasting equipment as follows:

- Remove all unsound concrete from the lower limit of Class 1 preparation down to sound concrete.
- Remove a minimum of 3/4 inch of concrete around and below reinforcing steel that is not at least 50% embedded in the existing concrete surface.
- Sandblast reinforcing steel coated or pitted with rust to a bright finish.

(3) Class 3 Preparation - When Class 3 preparation is required, it will be designated by the Engineer and performed as Extra Work.

Perform Class 3 preparation as follows:

- Remove the full thickness of deck remaining below the lower limit of Class 2 preparation, using jackhammers or hydroblasting equipment.
- Sandblast reinforcing bars pitted with rust to remove all rust.

When concrete is removed to the limits of Class 2 and Class 3 preparation, repair the deck with a rapid-setting cementitious patching material from the QPL or with Class 4000 - 3/4 PCC meeting the requirements of Section 02001. Place the SFC or LMC after the patching material cures at least 7 Calendar Days or according to the manufacturer's recommendations. Cure the PCC for at least 7 Calendar Days or until it achieves 4000 psi whichever occurs first according to 00559.42.

(e) Final Surface Preparation - Roughen the surface leaving an exposed aggregate surface texture depth profile of at least 1/8 inch, determined according to ASTM E 965 (standard volumetric test). Take at least two tests for each placement or for every 350 square yards of surface area whichever is greater.

(1) Diamond Grinding - When diamond grinding is used, prepare final surfaces by:

- Shot-blasting.
- Sweeping the area magnetically to remove metal residue.
- Cleaning with a power washer and saturating the surface with water for a minimum of 8 hours before resurfacing.
- Removing standing water with compressed air or wet-dry vacuum ahead of concrete placement.
- Repeating cleaning and water saturation on areas that are allowed to dry before resurfacing.

(2) Hydroblasting, Chipping, and Jack Hammers - When hydroblasting, chipping, or jack hammering is used, prepare final surfaces by:

- Cleaning with a power washer and saturating the surface with water for a minimum of 8 hours before resurfacing.
- Removing standing water with compressed air or wet-dry vacuum ahead of concrete placement.
- Repeating cleaning and water saturation on areas that are allowed to dry before resurfacing.

(3) Micro-milling - When micro-milling is used, prepare final surfaces by:

- Shot-blasting.
- Sweeping the area magnetically to remove metal residue.
- Cleaning with a power washer and saturating the surface with water for a minimum of 8 hours before placing resurfacing.
- Removing standing water with compressed air or wet-dry vacuum ahead of concrete placement.
- Repeating cleaning and water saturation on areas that are allowed to dry before resurfacing.

(4) Shot blasting - When shot-blasting is used, prepare surfaces by:

- Sweeping the area magnetically to remove shot and metal residue.
- Cleaning with a power washer and saturating the surface with water for a minimum of 8 hours before resurfacing.
- Removing standing water with compressed air or wet-dry vacuum ahead of concrete placement.
- Repeating cleaning and water saturation on areas that are allowed to dry before resurfacing.

00559.42 Placing:

(a) **Mixing and Delivering Silica Fume Concrete** - Mix SFC in either batch plant mixers or truck mixers as the Contractor elects. Add the silica fume at the time recommended by the CCT.

(1) **Batch Plant Mixing** - Mix and deliver SFC in batches no larger than 8 cubic yards. Mix according to ASTM C 94 but not less than 120 seconds. Mix at the mixing speed recommended by the mixer manufacturer beginning after all materials, including water, are in the mixer.

(2) **Truck Mixing** - Mix and deliver SFC to the jobsite in batches no larger than 63% of the drum volume. Before leaving the batch plant, mix the batch for not less than 100 revolutions at the rate of rotation recommended by the mixer manufacturer.

(3) **Jobsite Adjustments** - Air content and slump may be adjusted at the jobsite to meet specification limits with the addition of chemical admixtures according to CCT instructions. After addition of chemical admixtures, mix the load for a minimum of 30 revolutions at mixing speed.

(4) **Delivery** - Deliver, discharge, and place SFC in final position before the allowable mix temperature is exceeded, within 90 minutes of initial mixing and before the total revolutions of the mixer drum have not exceeded 300 revolutions.

(b) **Mixing and Delivering Latex Modified Concrete** - Mix and deliver LMC with mobile mixers.

(c) **Placement Conditions** - Place SFC and LMC on prepared surfaces only when all of the following conditions exist:

- The combination of air temperature, relative humidity, concrete temperature, and wind velocity produces an evaporation rate of less than 0.10 pounds per square foot of surface area per hour according to Figure 00540-1.
- The surface temperature of the prepared deck is 40 °F or greater and less than 80 °F. The surface temperature is rising if it is between 40 °F and 45 °F. In the presence of the Engineer, measure the surface temperature with an infra-red thermometer at at least three locations on the deck.
- The air temperature is at least 40 °F at the start of and during placement of concrete. Do not place concrete if the air temperature is, or is forecast to be, below 40 °F the day of placement or is forecast to be below 40 °F on any of the next 7 Calendar Days after placement unless a Cold Weather Plan has been approved by the Engineer.
- If precipitation is not forecast between 2 hours before and 2 hours after the scheduled placement duration. An acceptable forecast will have less than 30% chance of precipitation for the entire placement window. Provide a forecast to the Engineer 1 hour before placement.

- During the hours of darkness, work areas are illuminated. Submit an illumination plan for approval at the preplacement conference.

To place concrete when the temperature is below 40 °F, submit a Cold Weather Plan that identifies the methods that will be used to prevent the concrete temperature from falling below 50 °F. Methods include heated enclosures and insulated forms. Also include in the plan measures that will be taken if the concrete temperature falls below 50 °F. Provide a 24 hour continuous recording thermometer to verify the concrete temperature. Do not place concrete until the Cold Weather Plan is approved.

(d) Thickness - Place SFC and LMC a minimum 1 1/4 inch thick or greater as shown.

(e) Construction Limitations - Place SFC and LMC against a firmly fixed bulkhead. Control sagging or running of freshly placed SFC and LMC in areas of steep gradient by one or both of the following methods:

- Modifying direction or method of placement
- Modifying slump

Except when allowed, keep traffic off the lane adjacent to a placement for at least four hours after the placement is completed. When allowed, slow traffic by flagging for at least four hours after completion of the pour. In both cases, the Engineer may increase the time limits due to weather or traffic conditions.

(f) Placement Procedures - Furnish at least two transverse work bridges, not counting the finishing machine for SFC and LMC.

(1) Preceding Placement - Each day before placing concrete operate the finishing machine, in the presence of the Engineer, over the deck to check that the required thickness of concrete overlay will be achieved. Place concrete working up-grade, unless otherwise approved.

(2) Joints - At transverse and longitudinal joints, saw cut the section previously placed to form a straight, vertical edge before placing any adjacent sections. Saw cutting joints may be omitted if the bulkhead produces a straight, smooth, vertical surface. On both saw cut and formed joints remove all loose material by sand blasting or water blasting the face of the joints.

a. Longitudinal Joint - A longitudinal construction joint will be allowed only at the centerline of the roadway or at lane lines unless otherwise shown or directed.

b. Transverse Joint - When placement operation is delayed by one-half hour or more, form a construction joint by removing all material not up to finish grade, in a straight line.

(3) Placing:

a. Silica Fume Concrete - After the deck surface has been cleaned and immediately before resurfacing, scrub a thin coating of SFC mortar onto the prepared deck. Ensure that all parts receive a thorough, even coating and that no

excess mortar or aggregate collects in pockets. Scrub mortar at a rate so that it does not become dry before being covered by SFC. If the mortar does dry, stop the overlay and re-clean and re-prepare the effected area of the deck.

b. Latex Modified Concrete - After the deck surface has been cleaned and before resurfacing, scrub a slurry latex, cement, and water onto the prepared deck. Scrub slurry at a rate so that it does not become dry before being covered by LMC. If the slurry does dry, stop the overlay and re-clean and re-prepare the effected area of the deck.

Stop all placement operations if it starts to rain. Protect fresh previously placed concrete from rain. The Engineer may order removal of all concrete damaged by rain.

(4) Roadway Finish - After the deck has been struck off with a finishing machine, mist the surface horizontally with water and float it, if necessary, to produce a smooth, uniform, sealed surface. Do not spray water directly on the freshly placed concrete and do not allow water to puddle or pond. Hand finishing may be required along edges of concrete placement. Use a 12 foot straight edge during placement to verify deck grades and to correct defects in hand finished areas.

Texture the concrete according to 00540.50(c).

(5) Curing - Cure SFC and LMC by doing the following:

- Provide wind breaks or other approved methods when exposed to conditions which may cause premature drying during placement operations. Premature drying is defined as an evaporation rate equal to or greater than 0.10 pounds per square foot per hour, as determined from Figure 00540-1, or as the loss of surface sheen.
- For curing applications that require water, provide potable water according to 02020.10(b).
- Provide power washers fitted with fog nozzles and apply a fog spray upwind of the concrete placement after finishing according to 00540.28. Do not allow larger water droplets that drip from nozzles to fall onto the freshly finished plastic concrete.
- Cover the concrete with a single layer of clean initial covering immediately after finishing. Apply initial covering no later than 20 minutes after final pass of the finishing machine and no greater than 20 feet from the back of the finishing machine. Provide an initial covering with a minimum length sufficient to cover the bridge deck from side to side of the concrete placement. Use one of the following:
 - Saturated wet burlap having a minimum dry weight of 10 ounces per yard for material 40 inches wide. Presoak the burlap by immersing it completely in water for 72 hours prior to the concrete placement and presoak new burlap with a wetting agent. Overlap the edges at least 6 inches.
 - Non-woven, needle punched polypropylene fabric curing blanket from the QPL. Thoroughly wet fabric within 15 minutes of fabric placement. Overlap the edges at least 12 inches.

- Provide soaker hoses for additional soaking of the initial covering. Place over the full width of the concrete placement, at a maximum of 10 foot intervals. Do not allow initial wetting of burlap or fabric to dry before soaker hoses are in place and operational. Operate soaker hoses continuously to keep the initial covering saturated at all times.
- Place a layer of 4 mil polyethylene film over the initial covering and soaker hoses. Provide clear or white polyethylene film if the air temperature is forecasted to be above 65 °F within 24 hours of the concrete placement, and black at other times, as determined by the Engineer. Overlap the edges of polyethylene film by 12 inches. Keep the film in place by taping and weighting the edges where they overlap or are vulnerable to movement by wind. Once a particular type of film has been placed, do not change it during the curing period.

Wet cure SFC surfaces for 7 Calendar Days.

Wet cure LMC surfaces for 36 hours then air cure LMC a minimum additional 60 hours. Extend the air cure time period by the number of hours that the surface is wet from either rain or other sources but no more than 120 hours from time of placement.

If during the curing time, the temperature on the 24-hour recording thermometer falls below 45 °F, extend the cure time by the number of hours the temperature is below 45 °F.

00559.43 Crack and Delamination Survey and Repair - Check the deck surface for cracks 30 Calendar Days after concrete placement. Seal all visible cracks with a low modulus methacrylate or epoxy sealer from the QPL unless the Engineer determines removal and replacement are required.

In areas where the cracks are numerous or are less than 10 feet apart, provide a commercial shot blast and flood the entire deck with a low modulus methacrylate or epoxy sealer from the QPL. Cover the sealer with dry washed sand prior to the sealer setting. Perform sealing work and all associated traffic control at no additional cost to the Agency.

The surface will also be inspected by the Engineer for delamination, bond failure, or other damage by use of a chain drag, coring, or other devices. Areas of delamination of less than 1 square foot will not require repair. Core samples that do not achieve a bond strength of at least 175 psi will be at no additional cost to the Agency. Core samples with a bond strength of 175 psi or greater will be paid as Extra Work.

Complete all repairs, at no additional cost to the Agency, before opening to traffic. If the resurfaced area is opened to traffic at the Contractor's request before completing repairs, all additional traffic control to complete the repairs will be at no additional cost to the Agency.

00559.44 Use of New Surface:

(a) Vehicles - Do not allow vehicles or construction equipment on the new concrete surface until curing is complete.

(b) Traffic - Do not open sections to traffic until the deck has been tested, repaired if necessary, and accepted.

Measurement

00559.80 Measurement - The quantities of work performed under this Section will be measured according to the following:

- **Class 2 Preparation** - Class 2 preparation will be measured on the area basis.
- **Furnish Silica Fume Concrete or Furnish Latex Modified Concrete** - Furnishing silica fume concrete material or latex modified concrete material will be measured on the volume basis. The quantities will be determined by converting the weight identified on the mixer's automatic metering device to volume using the yield factor according to AASHTO T 121 (ASTM C 138).

A deduction will be made for material placed and removed beyond saw cuts or formed construction joints.

- **Constructing Silica Fume Concrete or Latex Modified Concrete** - Constructing silica fume concrete or latex modified concrete will be measured on the area basis. The area will be determined by measuring the actual surface area of the resurfaced bridge deck.

Payment

00559.90 Payment - The accepted quantities of work performed under this Section will be paid at the Contract unit price, per unit of measurement, for the following items:

<u>Pay Item</u>	<u>Unit of Measurement</u>
<u>(a) Class 2 Preparation.....</u>	<u>Square Yard</u>
<u>(b) Furnish Silica Fume Concrete.....</u>	<u>Cubic Yard</u>
<u>(c) Furnish Latex Modified Concrete.....</u>	<u>Cubic Yard</u>
<u>(d) Construct SFC Resurfacing.....</u>	<u>Square Yard</u>
<u>(e) Construct LMC Resurfacing.....</u>	<u>Square Yard</u>

Payment will be payment if full for furnishing and placing all materials, and for furnishing all equipment, labor, and incidentals necessary to complete the work as specified.

No separate or additional payment will be made for Class 1 preparation work.

Class 3 preparation will be paid for as Extra Work according to Section 00196.