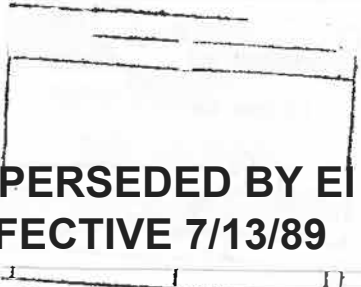
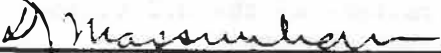


10:  SUPERSEDED BY EI 89-010 EFFECTIVE 7/13/89	<h1>ENGINEERING INSTRUCTION</h1> <p>NEW YORK STATE DEPARTMENT OF TRANSPORTATION</p> <p>SUBJECT: REVISED SECTION 584-SPECIALIZED CONCRETE OVERLAYS FOR STRUCTURAL SLABS</p> <p>Subject Code: 7.27-1-584</p>
Distribution: 30 Main Office 32 Regions 34 Special	Code: 87-26
APPROVED:  7/15/87 Assistant Deputy Chief Engineer (Structures)	Date: 7/17/87 Supersedes:

Effective with the letting of 10/29/87, (PS&E 8/6/87) the specification requirement for High Density Concrete Overlay, Item 584.01 and Latex Modified Concrete Overlay, Item 584.11 will be modified and new item numbers issued as follows:

<u>Item No.</u>	<u>Description</u>	<u>Pay Unit</u>
584.0101	High Density Concrete Overlay	Sq. Ft.
584.1101	Latex Modified Concrete Overlay	Sq. Ft.

The changes are minor construction, materials, and equipment changes not adding any expense. They are listed below:

1. The latex admixture shall not contain more than 1000 ppm total chloride ions. Also the certification submitted by the latex manufacturer shall contain the following additional information:
 - a. Particle Size
 - b. Surface Tension
 - c. Infra Red Fingerprint
2. Latex bonding grout and brooming the stones from the Latex Modified Concrete (LMC) for use as a bonding grout have been eliminated. Portland Cement bonding grout shall be used for bonding L.M.C.
3. Polyethylene curing covers used for L.M.C. shall now be white.
4. The vibrations on the vibrating pan on the finishing machine used for L.M.C. shall be between 2500 and 7000 vpm.
5. The free moisture content of the sand and stone shall not exceed 7% or 8% total for both aggregates for High Density Concrete (H.D.C.) and L.M.C., respectively.

Subject: BRIDGE DECK OVERLAY

6. Wetting the structural slab before L.M.C. placement shall be for 1 hour. The surface shall be visibly moist when bonding grout application begins.
7. If slab reconstruction concrete is placed separately from the H.D.C. overlay, the slab reconstruction concrete can be H.D.C. at a maximum slump of 4".
8. The addition of superficial water to be surface of the H.D.C. to assist in finishing operations shall not be permitted.
9. The time period for application of wet burlap curing blankets for both H.D.C. and L.M.C. shall not exceed 10 minutes.
10. The white polyethylene film shall be placed over the wet burlap curing blankets on L.M.C. as soon as possible. The burlap under the polyethylene film shall remain saturated for the 24 hour cure period.
11. A defective or damaged concrete section has been added to the specification defining defective or damaged concrete and outlining repairs.

Copies of the text of the new specifications have been sent to the Regional Bridge Engineers under separate cover.

SPECIALIZED CONCRETE OVERLAYS FOR STRUCTURAL SLABS

Make the following changes to the Standard Specifications of January 2, 1985

Page 5-96

Delete "Section 584—SPECIALIZED CONCRETE OVERLAYS FOR STRUCTURAL SLABS" and replace with the following:

SECTION 584 — SPECIALIZED CONCRETE OVERLAYS FOR STRUCTURAL SLABS

584-1 DESCRIPTION. The work shall consist of furnishing and placing a specialized concrete overlay on top of a structural slab. Unless otherwise indicated on the plans, the Contractor may place any one of the specialized overlays allowed by the terms of this section. Only one type of overlay will be allowed on any one structure.

584-1.01 Other Work. The following work will also be done under the terms of this Section:

- A. Clean the structural slab.
- B. Clean exposed reinforcing steel.*
- C. Support and tie reinforcing steel.*
- D. Place slab reconstruction concrete.*
- E. Coat all surfaces to be in contact with the overlay with portland cement grout.

* Done only when required by the nature of the project.

584-1.02 Definitions.

A. Specialized Concrete Overlay Type. There are two allowable types of specialized concrete overlay. They are:

- 1. **High Density Concrete.** This is a portland cement concrete of very high density made from standard materials. After manufacture it exhibits a slump of one inch (1") or less.
- 2. **Latex Modified Concrete.** This is a portland cement concrete to which a special latex admixture has been added.

B. Slab Reconstruction Concrete. For the purposes of this SECTION, Slab Reconstruction concrete is that concrete, placed completely around exposed reinforcing bars. Refer to the CONSTRUCTION DETAILS for particulars regarding placement.

C. Curing Hour. A curing hour is defined as any hour, beginning with the hour of placement, during which the ambient air temperature at the concrete surface remains at, or above, 45 °F as measured by a recording thermometer.

D. Curing Temperature. This shall be the air temperature at the concrete surface, or the air temperature between the concrete surface and its protective covering.

584-2 MATERIALS

584-2.01 General. The following materials are to be used in the manufacture of any specialized concrete overlay:

- A. Portland Cement.** Portland Cement shall be Type 2. It shall meet the requirements of §701-01.
- B. Fine Aggregate.*** Fine aggregate shall be either a natural sand or a sand manufactured from gravel. It shall meet the requirements of §703-07, except that the percent passing by weight for the No. 200 sieve shall be 2% maximum.
- C. Coarse Aggregate.*** The coarse aggregate shall be crushed stone, or crushed gravel - Size Designation No. 1. It shall meet the requirements of §703-02, with the following exception: For Table 703-3, the maximum percent by weight (No. 2 size and smaller) of material passing the No. 200 sieve shall be 0.7%. In addition to the foregoing the coarse aggregate shall also meet the requirements of any one of the following:
 - 1. Coarse aggregate shall be crushed limestone, or dolomite, that has an acid insoluble content of not less than ten percent (10%), excluding particles of chert and similar siliceous rocks.
 - 2. Coarse aggregate shall be crushed sandstone, granite, chert, traprock, ore tailings, or similar material.
 - 3. Coarse aggregates shall be crushed gravel or natural blends of two or more of the following types of materials: limestone, dolomite, sandstone, granite, chert, traprock, ore tailings, or other similar materials. Not less than 20% (by weight, with adjustments to equivalent volumes for materials of different specific gravities), of the total coarse aggregate particles shall be non-carbonate. Non-carbonate particles are defined as those having an acid insoluble content of not less than 80%.

SPECIALIZED CONCRETE OVERLAYS FOR STRUCTURAL SLABS

* Fine and coarse aggregates shall be stockpiled in accordance with the requirements of the CONSTRUCTION DETAILS.

D. *Water.* Water shall meet the requirements of §712-01.

584-2.02 Materials and Manufacture — High Density Concrete.

A. *Admixtures.* All admixtures shall meet the requirements of §711-08.

B. *Bonding Grout.* This shall consist of equal parts, by volume, of portland cement and concrete sand mixed with sufficient water to form a slurry. The consistency of the slurry shall be such that it can be applied with a stiff synthetic bristle brush, or broom, to the prepared concrete surfaces in a thin, even coating that will not run, or puddle. No retempering will be permitted.

C. *Curing Covers.*

1. *Burlap.* This shall meet the requirements of §711-06.

2. *Quilted Covers.* These shall meet the requirements of subsection 711-02.

D. *White Pigmented Curing Compound.* This shall meet the requirements of §711-05.

E. *Class D Concrete.* This shall meet the requirements of section 501.

F. *Manufacture.*

1. High density concrete shall be proportioned as follows:

SOLID VOLUMES

Cement	Fine Aggregate	Coarse Aggregate	Total Aggregate
1.000	2.006	2.006	4.012

NOTES:

The proportions are based upon the following criteria:

- | | |
|---|---|
| 1. Bulk specific gravities (saturated surface dry for aggregate). | 4. Slump: 3/4 inch. |
| 2. Fine aggregate fineness modulus: 2.80. | 5. Water/cement ratio (by weight): 0.327. |
| 3. Air content: 6.0 percent. | |

No adjustments shall be made to the proportions without the approval of the Director, Materials Bureau

2. Slump and air content placement limits shall be:

(a)	Min.	Desired	Max.
Slump (inches)	—	3/4	1
Air Content (%)	4.0	6.0	8.0

NOTE a. Slump shall be measured 3-5 minutes after discharge from the mixer. The sample shall not be disturbed during the waiting period.

3. A water-reducing admixture shall be required to improve workability. It shall be added to a measured quantity of the mix water at a dosage rate established by the Engineer, before the water is introduced into the mixer. The mixture shall be handled and dispensed in a manner that will ensure uniform distribution of the admixture.

4. The Contractor shall supply the Regional Materials Engineer with sufficient quantities of cement, fine aggregate, coarse aggregate and all admixtures for laboratory test batches. The material submitted shall be the same type and size and from the same source as that used to produce the concrete. The material supplied for test batches shall be submitted at least three (3) weeks in advance of mixer calibration testing. Fine and coarse aggregate samples shall be from stockpiles established and approved at the project site unless otherwise approved by the Regional Director.

The fine and coarse aggregate and all bulk cement shall be placed in Department furnished, moisture retaining, burlap bags. The admixtures shall be placed in Department furnished, one quart plastic jars.

584-2.03 Materials and Manufacture — Latex Modified Concrete.

A. *Admixture.* The latex admixture shall be a non-hazardous, film forming polymeric emulsion to which all stabilizers have been added at the point of manufacture. It shall be homogeneous, uniform in composition and have less than 1000 ppm of total chloride ions. When tested in accordance with the Department's test method for Total Weight Percent Solids in the Latex, the admixture shall have a solids content of not less than 46%.

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The latex admixture shall be accepted at the work site provided it meets all of the following requirements:

1. It shall be one of the products on the Department's approved list. Only one brand shall be supplied.
2. Manufacturer's written certification that the material supplied is identical in composition to that prequalified in accordance with procedural directives of FHWA RD 78-35. This certification shall also list particile size, surface tension and infra red fingerprint information for the lot supplied.
3. Written certification that the material supplied has been tested and meets the requirements of the procedural directives of the Materials Bureau.

The latex admixture shall be agitated as necessary to prevent separation of the emulsion. It shall be maintained in storage within the temperature range of 32°F to 85°F. Admixture exposed to temperatures outside the foregoing limits shall be removed and replaced at no cost to the State.

Field samples, for testing by the Department, will be taken. Refer to the CONSTRUCTION DETAILS, §584-3.09B.

B. Portland Cement Bonding Grout. The requirements of §584-2.02B shall apply.

C. Curing Covers.

1. **Burlap.** The requirements of §584-2.02C1 shall apply.
2. **Polyethylene Curing Covers.** These shall be white and meet the requirements of §711-04.
3. **Polyethylene Coated Burlap Blankets.** These shall meet the requirements of §711-03.

D. Class D Concrete. This shall meet the requirements of Section 501.

E. Manufacture. Latex modified concrete shall consist of a homogeneous mixture of cement, fine aggregate, coarse aggregate, latex admixture and water mixed in accordance with the requirements of the MIX CRITERIA TABLE, given in this subsection. Any proposed concrete mix which does not meet the requirements of that table shall be subject to the approval of the Director, Materials Bureau

The actual proportions of aggregates will be determined by the Department based upon aggregate properties. The Contractor shall inform the Engineer, in writing, of the sources of coarse and fine aggregate. This notification shall be given at least ten (10) working days prior to concrete placement.

The Contractor shall inform the Engineer, in writing, of which brand of latex is to be used. Notification shall be given at least ten (10) working days prior to concrete placement.

MIX CRITERIA (a)

Cement content (Sacks/c.y.)	7.0
Sand content (% Total Aggregate by Volume)	60.0
Latex Admixture (Gal./Sack)	3.5
Air Content (% Max.)	6.5
Water (Gal./Sack) (b)	2.5
Slump Desired (Inches) (c)	2.0-4.0
Slump Maximum (Inches) (c)	6.0

NOTE (a) The criteria are given for design information and the data is based on a fine aggregate modulus of 2.80. The initial mix design shall be based on an expected air content range of 3 to 6 percent. The mixture proportions shall be determined using actual conditions for fineness modulus and bulk specific gravities (saturated surface dry for aggregates). The proportions shall be computed according to Department written instructions.

NOTE (b) The amount of added water shall be adjusted to provide slump at, or below the prescribed limit.

NOTE (c) Concrete for the slump test shall be deposited in a clean container and allowed to stand covered without disturbance for 3-5 minutes prior to performing the slump test. Care shall be taken during the test to exclude the effects of vibrations caused by traffic and concrete placement operations.

584-2.04 Equipment — General. All equipment proposed for use, shall have the Engineer's approval prior to the start of the work. The finishing machine shall also be approved by the D.C.E.S. prior to the start of the work.

A. Sawing Equipment. This shall be capable of sawing concrete to the specified depth.

B. Blastcleaning Equipment. This shall be capable of removing rust from reinforcing bars and small chips of partially loosened concrete. Certain qualities of rust are not necessary to be removed. These will be designated by the Engineer. (Refer to §584-3.04).

C. Porportioning and Mixing Equipment. This shall be a self-contained, continuous mixing and proportioning mobile unit. A minimum of two units shall be supplied. They shall be subject to the following requirements:

SPECIALIZED CONCRETE OVERLAYS FOR STRUCTURAL SLABS

1. Each unit shall be self-propelled. Each unit shall be capable of carrying sufficient unmixed material to produce on site, no less than six (6) cubic yards of specialized concrete.
2. Each unit will be inspected by the Engineer. Units not functioning in a manner the Engineer considers acceptable shall be repaired. If repair is impractical, the unit shall be replaced. Conditions which will automatically designate a unit not acceptable are: hydrated cement deposits; broken, bent, loose or scalloped mixing paddles; mixing paddles worn 20 percent in any dimension; and mixing paddles heavily caked with mortar.
3. Proportioning devices shall deliver the materials within the following tolerances (by weight):

Coarse Aggregate	± 2%
Fine Aggregate	± 2%
Cement	- 0% + 4%
Water	± 2%
Latex Admixture	± 1%
Other Admixtures	± 3%

The quantity of cement introduced into the mix shall be measured by a meter which is clearly visible and kept clean at all times. The quantity of cement shall be recorded by a ticket printer. The recording may consist of a print of the number of revolution counts of the cement feeder.

4. There shall be positive control of the flow of water into the mixing chamber. Water flow shall be indicated by flowmeter and readily adjustable to provide for minor variations in aggregate moisture. The system shall be equipped with a bypass valve, or hose, for determining proportioning accuracy.

a. High Density Concrete. There shall be positive control of the flow of air-entraining admixtures into the unit's water mix system. Flowmeters shall be used to control the quantity of admixtures added. Admixtures shall be dispensed in a manner that will ensure uniform distribution of the material. The system shall be capable of adding admixture in the amounts necessary to achieve the required air content. The system shall be equipped with a bypass valve suitable for obtaining a calibrated sample of admixture to determine batching accuracy.

b. Latex Modified Concrete. There shall be positive control of the flow of latex admixture into the mixing chamber. The latex admixture discharge pipe shall be readily accessible for determining proportioning accuracy.

5. The units shall be capable of combining aggregates, cement, admixtures and water into a thoroughly mixed and uniform mass. Discharging the mixture shall be accomplished without segregation.

6. The units shall be made available to the Regional Materials Engineer for calibration tests in accordance with Department written instructions. The Materials Engineer shall have at least two working days for the calibration of each unit the Contractor proposes to use. The Contractor shall notify the Engineer-in-Charge and Materials Engineer, in writing, at least one week in advance of the dates each unit will be available for calibration. No calibration shall be performed while it is raining.

Note a. If high density concrete is to be placed at a width in excess of the limit established by '584-3.09C, the Contractor shall be required to supply additional mobile mixers to ensure continuous production by two mobile mixers operating simultaneously. He shall also supply sufficient equipment and personnel to ensure prompt placement of the concrete produced.

D. Mixer Unit — Testing. Calibration and yield tests shall be performed by the Regional Materials Engineer according to the Department's written instructions, with the cooperation of the Contractor as required:

1. The Contractor shall supply sufficient quantities of cement, fine aggregate, coarse aggregate, water and admixture for the tests. Materials supplied shall be of the same type and size as well as from the same source as those materials which will be used to produce the concrete.

The Contractor shall supply a 36" × 36" × 9" container to be used for a yield test.

The Contractor shall supply a portable, beam-type platform scale of at least 500-pound capacity, and two (2) containers of sufficient capacity to obtain cement samples of as much as 188 pounds each. Two fifty pound (50 lb.) weights for determining scale accuracy shall also be supplied.

2. The Materials Engineer will supervise proportioning and yield tests as part of the calibration tests. The proportioning test will consist of weighing each component to verify the proposed gate settings and the implementing of any necessary adjustments.

E. Placing and Finishing Equipment. This shall include adequate hand tools for the placement of plastic concrete and for working down to approximately the correct level for the auger strike-off. A self-propelled finishing machine will be required to place and finish all concrete, except in areas inaccessible to the machine. The specific method and equipment the Contractor proposes to use for finishing will be

SPECIALIZED CONCRETE OVERLAYS FOR STRUCTURAL SLABS

subject to the approval of the Regional Construction Engineer. The Contractor shall provide access to the finishing machine at the work site, for inspection by the Engineer. A qualified Finishing Machine Operator shall be available during the inspection. The Engineer shall have one working day for the inspection of the finishing machine. The Contractor shall provide, to the Engineer two weeks prior to the inspection date, a legible copy of the operating manual for his exclusive use.

The finishing machine shall be capable of forward and reverse motion under positive control. Provisions shall be made for raising the screeds to clear the screeded surface, if traveling in reverse.

Supporting rails shall be required. They shall exhibit no bends, or kinks. Rail supports shall be fully adjustable (not shimmed), to obtain the correct profile. Rail supports shall be spaced at a maximum of 2'-0" on center.

When placing concrete on a lane abutting a previously completed lane, the side of the finishing machine adjacent to the completed lane shall be equipped to travel on the completed lane.

1. *High Density Concrete Overlay.*

a. Hand tools shall be adequate to place and work concrete which exhibits a slump of 3/4", or less.

b. The self-propelled finishing machine shall be a type which appears on the Department's approved list, or an equal approved by the Regional Construction Engineer.

If shall be equipped with at least two (2) oscillating screeds, and an auger strike-off. The auger strike-off shall be capable of, and be required to, provide a uniform thickness of concrete in front of the forward oscillating screed.

The forward oscillating screed shall be designed to consolidate the concrete by vibration. A sufficient number of identical vibrators shall be installed such that at least one vibrator is provided for each five (5) feet of screed length. The bottom face of each screed shall be at least five (5) inches wide and with a turned-up, or rounded, leading edge to minimize tearing of the plastic concrete surface. Each screed shall have an effective weight of at least 75 pounds for each square foot or bottom face area. Each screed shall be provided with positive control of the vertical position and the angle of tilt.

Design of the finishing machine, together with appurtenant equipment, shall be such that positive machine screeding of the plastic concrete will be obtained within six inches (6") of the face of the existing curbs. The screed length shall be sufficient to extend at least six inches (6") beyond the line designated to form the edge of a subsequent placement section, and shall overlay the edge of a previous placement by at least six inches. The auger strike-off shall be adjusted to operate within six inches (6") of the placement edges.

2. *Latex Modified Concrete.*

a. The self-propelled finishing machine shall be a type approved by the Engineer.

b. The finishing machine shall be equipped with a vibrating pan to consolidate the concrete, a power driven strike-off auger, a power driven finishing roller, and a pan float. The vibrating pan shall vibrate at a frequency between 2500 and 7000 vpm.

3. *Small Inaccessible Areas.* Manual type screeds, metal plates equipped with electric vibrators, or hand vibrators shall be used to consolidate and finish these areas. The Engineer shall approve the equipment used for any specific area.

4. *Bonding Grout.*

a. The mixer shall be the type known as a mortar mixer which is designed for mixing mortar. It shall have a minimum capacity of 4.0 cubic feet. The requirements of §501-3.04A shall apply.

b. At least two (2) batching boxes of one (1) cubic foot capacity each shall be provided at the site for the proportioning of sand and cement.

c. A sufficient number of stiff nylon-bristle push brooms, nylon-bristle straight brooms, and pails for grout application, shall be provided.

5. *Slab Reconstruction Concrete.* Slab reconstruction concrete shall be finished with equipment meeting the requirements of §584-2.04E3.

F. *Recording Thermometer.* The Contractor shall supply a continuous recording thermometer capable of recording temperatures in the 30 - 100°F range. It shall likewise provide a recording capability over a 24 hour continuous period, minimum. The Contractor shall provide any ancillary equipment, supplies and labor necessary for calibration of this equipment. The cost of calibration shall be included in the unit price bid.

584-3 CONSTRUCTION DETAILS

584-3.01 *Stockpiling Aggregates.* The requirements of §501-3.03A - Stockpiles shall apply with the following modifications:

SPECIALIZED CONCRETE OVERLAYS FOR STRUCTURAL SLABS

A. Unless otherwise approved by the Regional Director, fine and coarse aggregates shall be stockpiled at the work site.

B. Stockpiles shall be completely covered and no additions to approved stockpiles are permitted.

C. The free moisture content of each aggregate type, at the time of batching, shall not exceed seven percent (7%) of the saturated-surface dry weight of the fine or coarse aggregate or 8% total for both aggregates.

584-3.02 Vehicular and Equipment Restrictions. The operation of vehicles and equipment on, or over, the structural slab area where concrete removal operations have been completed is subject to the following restrictions:

A. Vehicular traffic is limited to necessary construction equipment. No vehicle, or construction equipment, weighting in excess of 4000 pounds shall be allowed to operate on, or over, any area of structural slab which exhibits exposed reinforcing steel. (Refer to §584-3.09A)

B. Runways shall be provided when concrete transporting devices are expected to operate over exposed reinforcing steel.

584-3.03 Placement Preconditions. Slab reconstruction concrete, or overlay concrete shall be placed only after all of the following preconditions are satisfied:

A. The Contractor has submitted to the Engineer, in writing, the proposed sequence of operations, equipment, number of personnel, and category of personnel to be used during the concrete placement.

B. First stage sandblasting and cleaning has been completed on an area large enough to require one working day for concrete overlay placement. In no case shall this be less than one span length.

C. The Engineer has approved first stage sandblasting and cleaning.

D. Second stage sandblasting and cleaning, if required, has been completed and approved on an area large enough to require one working day for concrete overlay placement. In no case shall this be less than one span length.

E. Bonding grout placement work has begun.

584-3.04 First Stage Sandblasting and Cleaning.

A. First stage sandblasting shall be done to thoroughly clean all receiving surfaces. All reinforcing steel, or other steel, which will be in contact with the new concrete shall be cleaned of all grease, dirt, concrete mortar and injurious rust. Injurious rust shall include all scale, loose rust deposits, or all rust not firmly bonded to the steel. Rust deposits, which in the Engineer's opinion, cannot be removed by sandblasting shall be considered firmly bonded and may remain. All concrete surfaces which will be in contact with new concrete, shall have laitance and partially loosened chips of concrete removed by sandblasting.

B. All debris from the sandblasting operation shall be removed. After removal the exposed reinforcing steel shall be supported and tied. Rustproof chairs shall be provided in conformance with §556-2.01. If a continuous length of six feet (6' - 0") or more, of reinforcing bar is exposed, the Engineer may require supports and positive tie-downs at a maximum spacing of 4' - 0". Positive tie-downs shall consist of anchors drilled into the structural slab and connected to the reinforcing bars.

C. First stage sandblasting and cleaning operations may be commenced in an area after all necessary concrete removal has been completed there. The Contractor is forewarned however, that should more than 48 hours elapse from the termination of first stage sandblasting and cleaning operations, second stage sandblasting and cleaning will be required regardless of the apparent condition of the receiving surfaces.

D. The Engineer shall be allowed one working day to inspect the work after the supporting and tying of the reinforcing steel has been completed.

584-3.05 Second Stage Sandblasting and Cleaning. If in the Engineer's opinion, contaminants, which might interfere with bond, are present on the prepared surface, second stage sandblasting and cleaning shall be performed. It shall be done where the Engineer directs. A light coating of orange colored rust, that forms on the reinforcing steel after first stage sandblasting, is not considered detrimental to bond and may remain unless the time limit that follows is exceeded.

Second stage sandblasting and cleaning shall also be performed if more than 48 hours have elapsed from the time of termination of first stage sandblasting and cleaning operations.

584-3.06 Structural Slab Wetting. Structural slab wetting shall be governed by the following:

A. **High Density Concrete.** Structural slab surfaces, prior to the application of bonding grout, shall be free of standing water. The surfaces shall be dry to the touch.

B. **Latex Modified Concrete.** The structural slab surface and any other porous surface which will be in contact with latex modified concrete shall be thoroughly wetted for 1 hour with water (§712-01), prior to the placement of bonding grout. The surface shall be visibly moist when bonding grout placement begins. All standing water in depressions, or areas of concrete removal shall be blown out with oil-free compressed air.

SPECIALIZED CONCRETE OVERLAYS FOR STRUCTURAL SLABS

584-3.07 Bonding Grout.

A. *Type.* The bonding grout used shall meet the requirements of §584-2.02B.

B. *Bonding Grout Mixing.*

1. No bonding grout mixing, or replacement, will be permitted until the Engineer has approved all sandblasting and cleaning operations.

2. Bonding grout shall be thoroughly mixed at the site in an approved mechanical mixer. The fine aggregate and cement shall be deposited into separate one cubic foot batch boxes. The fine aggregate shall be deposited in the mixer prior to the addition of cement. The fine aggregate and cement shall be dry mixed for one minute and then water shall be added to produce a slurry. After the water is added, the bonding grout shall be mixed for a minimum of three minutes.

3. The Engineer may require that the mixer be thoroughly cleaned and rinsed before mixing a fresh batch of bonding grout.

4. Bonding grout that has dried, or become unworkable, as determined by the Engineer, shall not be incorporated in the work. No retempering will be permitted.

C. *Bonding Grout Placement — High Density Concrete.*

1. After the surface has been cleaned and immediately before placing concrete, a thin (approximately 1/8 inch) coating of bonding grout shall be vigorously and thoroughly broomed or brushed into the dry prepared surface. All surfaces to be in contact with new concrete, including the slab, curb, longitudinal and transverse joints shall be coated with bonding grout.

2. Bonding grout shall be broomed with push brooms. At all joints, and in areas around or below reinforcing steel, brooming shall be done with straight brooms. Care shall be exercised to ensure that all prepared surface areas receive a thorough even coating, and that no excess bonding grout be permitted to collect in pockets. This shall be done to ensure that the bonding grout is evenly absorbed into the prepared surface.

3. The rate of bonding grout application shall be limited to that surface area which can be covered with new concrete before the bonding grout begins to dry out. Time limits will depend on atmospheric conditions and will be determined by the Contractor at the site. In the event drying does occur as evidenced by a light grey color the Contractor shall remove the bonding grout and place new bonding grout. Bonding grout removal shall be by sandblasting, or other means approved by the Engineer.

D. *Bonding Grout Placement — Latex Modified Concrete.* The requirements of §584-3.07C shall apply except that the prepared surface, and any other porous surface to be in contact with concrete shall be thoroughly wetted with water according to the requirements of §584-3.06B.

584-3.08 Placing, Finishing and Curing Slab Reconstruction Concrete.

A. Slab reconstruction concrete shall be preplaced separately from overlay concrete except when both of the following conditions are, in the opinion of the Engineer, demonstrably present:

1. Areas of exposed reinforcing steel do not exceed 5% of the total slab area from which concrete has been removed, regardless of the concrete removal method employed.

2. Individual areas of exposed reinforcing shall not exceed 25 square feet in area, nor shall any dimension of an individual area exceed six feet in length.

Where both of the foregoing conditions are present, slab reconstruction concrete may be placed integrally with overlay concrete.

The Contractor has the following choices of concrete placed as slab reconstruction concrete depending on overlay type:

Overlay Type	Slab Reconstruction Concrete
High Density*	High Density**, or Class D
Latex Modified*	Latex Modified, or Class D

* Slab reconstruction concrete placed integrally with overlay concrete shall be overlay concrete.

** If slab reconstruction concrete is placed separately from overlay concrete, the contractor may use High Density Concrete meeting §584-2.02F except that the maximum slump shall not exceed 4 inches.

B. Bonding grout shall be placed against all surfaces receiving slab reconstruction concrete. Bonding grout for Class D concrete shall be mixed and placed in accordance with §584-3.07B and §584-3.07C.

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C. If Class D concrete is used the requirements of section 501 shall apply. A self-contained mobile mixer may be used for batching the concrete. The mixer shall meet the requirements of §584-2.04C.

D. If concrete transporting devices are operated on the prepared surface, protection shall be provided to prevent contamination of the prepared surface. Exposed reinforcing steel shall be protected from concrete transporting devices such that no debonding, loosening, bending or breakage occurs.

E. After sandblasting and cleaning is completed, and bonding grout mixing and placement is progressing, the Contractor shall place slab reconstruction concrete in the locations where reinforcing bars have been exposed. The concrete shall be consolidated by internal vibration in accordance with §555-3.04B. It shall be screeded to the level of the surrounding concrete, or to 1/2 inch above the reinforcing steel, whichever is higher. The slab reconstruction concrete surface shall be intentionally roughened. The Engineer may require that a coarse textured drag be used on the surface of the plastic concrete.

F. Curing shall be accomplished in the following manner.

1. **High Density and Class D Concrete.** Curing shall be by means of quilted covers, or polyethylene coated blankets. Quilted covers, if used, shall be kept wet for the entire curing period in accordance with §584-3.10A. The curing period shall be 72 curing hours, minimum.

2. **Latex Modified Concrete.** Curing shall be done in accordance with §584-3.10B, except that the air cure period shall be 48 curing hours, minimum.

Regardless of the type of concrete placed the use of membrane curing compounds will not be allowed.

G. The slab reconstruction concrete shall be thoroughly sandblasted after the curing period is over, but prior to the placement of bonding grout and overlay. The sandblasting shall remove laitance, expose 50% of the surface coarse aggregate, and leave an irregular surface acceptable to the Engineer.

H. Placement of slab reconstruction concrete in accordance with this subsection shall not relieve the Contractor of the requirement to provide at least the minimum thickness of overlay material required by the plans. There will be no separate payment for any grade changes necessitated by this requirement.

584-3.09 Placing and Finishing Overlay.

A. **General.** The following requirements shall apply for both high-density and latex modified concrete placements:

1. The prepared surface of the structural slab shall be protected from contamination by any source.
2. The concrete may be mixed at the point of deposition.

At areas where slab reconstruction concrete is to be placed integrally with overlay concrete as allowed by §584-3.08A, the following requirements shall also apply:

3. The concrete shall be mixed at the work site, but not on a prepared area of the structural slab. If this requirement creates a conflict with §584-3.09A2, then this requirement shall apply.
4. No construction equipment in excess of 4000 pounds, fully loaded, shall be allowed on the prepared surface of the structural slab. If this requirement creates a conflict with §584-3.09A2, then this requirement shall apply.
5. Exposed reinforcing steel shall be protected from concrete transporting devices, so that no debonding, loosening, bending, or breaking occurs.

If the Engineer deems §584-3.09A3, and §584-3.09A4 unnecessary, based upon his opinion of the structural slab integrity, he may waive them.

B. **Latex Modified Concrete – Latex Sampling.**

1. If the overlay placement is latex modified concrete, daily sampling of the latex admixture will be required. The sample shall be provided under the direction of the Engineer. The minimum sample size will be one quart of latex for each day's placement. The latex shall be taken from a bypass valve in the latex feed line on the mobile mixer, and placed directly in a Department furnished one quart plastic jar. The sample will be sent to the Materials Bureau for testing.

2. The latex admixture shall exhibit a solids content of not less than 46% when tested in accordance with the Department's test method "Total Weight Percent Solids in the Latex."

C. **Maximum Widths.** Maximum placement width shall be:

Type	Max. Width
High Density	24' - 0"*
Latex Modified	None

* Unless the contract plans specifically require a single placement of greater width. (Refer to §584-2.04C Note a).

SPECIALIZED CONCRETE OVERLAYS FOR STRUCTURAL SLABS

D. Finishing Equipment. An approved finishing machine will be required.

1. Supporting rails upon which the finishing machine travels shall be placed outside the area to be concreted. Said rails shall be supported at two feet on center maximum spacings. However, no deflection will be permitted. If deflections occur spacings shall be reduced, or rails shall be replaced by more resistant rail material. Plans for anchoring support rails shall be submitted in writing to the Engineer for approval. Provision for anchorage of supporting rails shall provide for horizontal and vertical stability and positive anchorage may be required by the Engineer. A hold-down device shot into the prepared surface, or new overlay, will not be permitted.

2. Immediately prior to the beginning of overlay operations, the finishing machine shall be operated over the full length of bridge segment to be overlaid. This test run shall be made with the screed adjustment to its finishing position. While operating the finishing machine during the test, the screed rails shall be checked for deflection, the intended cover on exposed reinforcing steel verified, and the minimum overlay thickness confirmed. All necessary corrections shall be made before the concrete placement is begun.

E. Placement — High Density Concrete.

1. Concrete shall be deposited as nearly as possible in its final position, so that the use of hand tools will be kept to a minimum. Internal vibrators shall not be used for moving concrete into position.

2. In areas where the depth is three (3) inches, or greater, the concrete shall be consolidated by internal vibration immediately before strike-off by the finishing machine auger. Internal vibration in all areas where the depth is three (3) inches, or greater, shall be in accordance with the requirements of §555-3.04B.

3. The new concrete shall be placed slightly above final grade. It shall then be struck-off, screeded and finished to final grade.

4. The finished surface, before texturing, shall be uniformly smooth, dense and even. Variations in pavement surface in excess of 1/8 inch above, or below, the proper finished elevation, or surface irregularities of more than 1/8 inch in 10 feet will not be accepted.

5. The concrete surface shall be checked at random by the Engineer with an approved straight-edge not less than 10 feet long. The straight-edge shall be furnished by the Contractor. It shall be maintained in good, usable condition by him at all times.

6. The concrete shall be placed, consolidated, and finished at final grade to a minimum density of 98% of the theoretical project unit weight. The measurement of percent consolidation shall be performed in accordance with Department instructions. The Contractor shall provide a construction bridge so the Engineer may perform the measurement.

7. All concrete not meeting the minimum requirement for percent consolidation shall be revibrated. Revibrated concrete shall be tested for percent consolidation. Revibrated concrete not meeting the requirement for percent consolidation shall be removed and replaced.

8. A construction dam, or bulkhead shall be installed in case of a delay in the placement operations exceeding 30 minutes duration. During any delays of 30 minutes, or less, the placement shall be protected from drying with several layers of wet burlap. If the concrete placement is stopped, or delayed, for 90 minutes, or more, further placement shall be discontinued and may be resumed only after 48 hours has elapsed. This restriction does not prohibit continuation of the placement provided a gap is left in the placement. This gap shall be sufficient in length to allow the finishing machine to clear the previously placed concrete.

9. Adequate precautions shall be taken to protect freshly placed concrete from rainfall. All placement operations shall stop when it starts to rain. The Engineer may order removal and replacement of material damaged by rainfall.

10. The addition of superficial water to the surface of the concrete to assist in finishing operations will not be permitted.

11. At transverse and longitudinal construction joints, the overlay material placement shall be continued beyond the joint location a distance at least equal to the placement depth, and shall be allowed to stand free, or shall be formed. After the overlay material has cured for a minimum of 48 curing hours, the concrete shall be sawed to a depth of $3/4" \pm 1/8"$. The overlay material beyond the saw cut shall be chipped out to the level of the original prepared surface, or to the level of the reinforcing bars, whichever is higher. The chipped face of the construction joints shall not undercut the saw cut and shall have a slope of approximately 45°.

F. Placement — Latex Modified Concrete.

The requirements of §584-3.09E shall apply except for §584-3.09E6 and §584-3.09E7.

SPECIALIZED CONCRETE OVERLAYS FOR STRUCTURAL SLABS

G. Surface Texturing. After a uniformly smooth, dense and even surface has been achieved, the surface shall be given a suitable texture with an artificial turf drag approved by the Engineer. The drag shall be made of molded polyethylene with synthetic turf blades approximately 0.50 inches long. There shall be approximately 6000 blades per square foot of drag. The artificial turf drag shall be of a type and brand which appears on the Department's Approved List.

The Contractor may texture in a transverse direction, or a longitudinal direction. The Engineer shall be notified of the chosen direction at least one day prior to the placement of structural slab concrete. Once begun, the direction of texturing shall not change. All texturing shall be done from a work bridge placed no closer than 10'-0" from the back of the finishing machine. Texturing shall be done prior to the beginning of curing operations. Only one pass of the turf drag over the finished area will be permitted.

If texturing is done in the transverse direction, the Contractor shall texture by hand methods as soon as practicable after finishing machine passage.

If texturing is done in the longitudinal direction the turf drag shall be a seamless strip and shall be attached to the work bridge such that the surface of the concrete is textured as soon as practicable after finishing machine passage. Small areas, otherwise inaccessible to the attached drag, may be textured by hand methods, if approved by the Engineer. Only one pass of the turf drag over the finished area will be permitted.

The finishing movement and resulting progress of the turf drag shall be done in a manner so as to prevent ridges, or gouges, forming in the concrete surface. The drag shall be weighted and the contact area changed as required to produce a texture acceptable to the Engineer. The drag shall be cleaned periodically as directed by the Engineer, to remove all hardened concrete particles.

Texture resulting from the drag shall stop within one foot of curbs.

After the concrete surface has hardened sufficiently, the Engineer shall examine it using a straight edge supplied by the Contractor. The straight edge shall be not less than 10 feet long. It shall be maintained in good usable condition, at the paving site, at all times. Surface irregularities greater than 3/16 inch in 10 feet shall be corrected in a manner acceptable to the Engineer, as the expense of the Contractor.

584-3.10 Curing Overlay.

A. High Density Concrete.

1. After the completion of finishing and texturing, and immediately before covering the surface with wet burlap, the top of all construction joints and all other joints between a vertical surface and the plastic concrete shall be sealed by painting with bonding grout conforming to §584-2.02B.
2. After the painting operation, the overlay surface shall be completely covered with clean, wet burlap. The burlap shall be thoroughly saturated over its entire area, but shall be drained of excess water before application. The wet burlap shall be applied as soon as the surface will support it with minimum deformation. Burlap shall be lapped a minimum of twelve (12) inches.
3. Failure to apply wet burlap within 10 minutes after the concrete has been placed shall be cause for rejection of the work as determined by the Engineer. The ten minute time period may be extended by the Engineer when consolidation measurements are being taken.
4. Care shall be exercised to ensure that the wet burlap is well drained. The burlap shall be kept continuously wet for a minimum of 72 curing hours by means of an automatic intermittent sprinkling, or a continuous wetting, system.
5. At the completion of the wet burlap curing period, white-pigmented curing compound, shall be applied in accordance with §555-3.09A. The minimum curing period after application of the curing compound, shall be 24 curing hours. Prior to application of the curing compound the surface shall be allowed to air-dry, or may be air-blown to eliminate all free water.

B. Latex Modified Concrete.

1. The requirements of §584-3.10A1 shall apply.
2. The requirements of §584-3.10A2 shall apply.
3. The requirements of §584-2.10A3 shall apply except that the 10 minute time limit shall not be extended.
4. A layer of 4 mil thick white polyethylene film shall be placed over the burlap as soon as possible. The overlay shall then be wet cured for 24 curing hours. Care should be exercised to ensure the burlap remains saturated for the 24 hour cure period. Wet burlap-polyethylene sheets may be substituted for the polyethylene film, but shall not replace the initial wet burlap. After the wet cure, the polyethylene film and burlap shall be removed and the concrete shall be air-cured for 72 curing hours minimum. Rainfall during this air-cure period will have no detrimental effect.

584-3.11 Limitation of Operations.

- A. No loads, other than construction loads approved by the Engineer, shall be permitted on portions of the structural slab where concrete has been removed.

SPECIALIZED CONCRETE OVERLAYS FOR STRUCTURAL SLABS

B. The plastic concrete, as discharged from the mobile mixer, shall be at a temperature of 50°F, minimum. If conditions are such that, in the opinion of the Engineer, the minimum temperature of 50°F may not be met, the provisions of §501-3.03B, shall apply.

C. No traffic, or loads, shall be permitted on the slab reconstruction concrete or overlay concrete until the specified curing period has been completed.

D. No structural slab concrete removal work shall be performed on structural slab areas adjoining new concrete during the time the new concrete is curing.

584-3.12 Hot Weather Provisions.

A. High Density Concrete.

1. The requirements of §555-3.04A shall apply except no concrete shall be placed below 50°F or above 85°F. The time limitations for the placement of wet burlap, as required by §555-3.09C, shall also apply.

B. Latex Modified Concrete.

1. The provisions of §584-3.12A shall apply.

584-3.13 Cold Weather Provisions.

A. No concrete shall be placed if the ambient air temperature is below 50°F, except as noted. Concrete may be placed at an ambient air temperature of 50°F, if rising air temperatures are predicted, and then only if the prediction indicates a temperature of over 50°F, for the eight hours immediately after placement. If air temperatures are such that the minimum temperature will not be met, the Contractor may place concrete if the structure is enclosed and external heat is provided in accordance with §584-3.14.

B. If the curing temperature drops below 45°F during the curing period, then the structure shall be enclosed and external heat shall be provided in accordance with the provisions of §584-3.14. The time required for tenting will not be counted as curing time. Once external heat provisions are required, they shall remain on the structure until curing is complete, regardless of ambient air temperature. The use of white pigmented curing compound will not be allowed.

C. If the curing temperature falls below 32°F, at any time during the curing period, the concrete will be rejected.

D. Continuous wetting shall be replaced by wetting at regular intervals if, in the opinion of the Engineer, expected ambient air temperatures could result in freezing of run off water.

584-3.14 External Heat Provisions.

A. High Density Concrete.

1. The provisions of §555-3.06B, and the following modifications, shall apply:

a. The concrete shall be Class D or high density concrete.

b. Temperature limits shall be maintained for 168 curing hours.

c. Continuous wetting will not be required, but the burlap shall be kept wet by wetting at regular intervals in a manner satisfactory to the Engineer.

2. Enclosures for heat retention shall be properly vented to prevent surface disintegration from carbon dioxide gas.

B. Latex Modified Concrete.

1. The provisions of §555-3.06B, and the following modifications, shall apply:

a. Temperature limits shall be maintained for the number of curing hours required by §584-3.08F1, or §584-3.08F2 or §584-3.10B, as applicable.

b. The concrete shall be Class D concrete, or latex modified concrete.

c. If the concrete is latex modified concrete then steam equipment shall not be used to supply external heat after the initial 24 curing hours.

2. Enclosures for heat retention shall be properly vented to prevent surface disintegration from carbon dioxide gas.

SPECIALIZED CONCRETE OVERLAYS FOR STRUCTURAL SLABS

584-3.15 Defective or Damaged Concrete. All defective or damaged concrete which occurs prior to the final acceptance of the work shall be repaired or replaced at the contractors expense. The defects shall include but not be limited to cracking, tearing, openness and damage or other imperfections caused by the contractor's operations. Repair methods shall be proposed by the contractor for approval by the Engineer. All concrete requiring removal and replacement, as determined by the Engineer, shall be replaced in kind as originally called for in the plans or proposal. When a repair is made, the defective or damaged concrete area shall be removed by sawcutting the perimeter to a depth of $3/4" \pm 1/8"$. The damaged concrete shall then be chipped out to the level of the original prepared surface. The chipped face shall not undercut the sawcut and shall have a slope of approximately 45 degrees. The chipping hammers shall weigh less than 45 pounds and only chisel bits shall be used. The prepared surface shall be sandblast cleaned prior to applying the bonding grout and replacement concrete.

584-4 METHOD OF MEASUREMENT. Measurement will be taken as:

- A. The number of square feet of slab reconstruction concrete placed, Plus
- B. The number of square feet of plan area of actual overlay placed.

Measurement "A" will be taken prior to the placement of the overlay.

584-5 BASIS OF PAYMENT. The unit price bid shall include the cost of all labor, materials and equipment necessary to complete the work.

No separate or additional payment will be made for:

- A. Enclosing the structure.
- B. Providing external heat.
- C. Material rejected, removed and replaced.
- D. All other operations specifically excluded for payment by the terms of this Section.

Payment will be made under:

Item No.	Item	Pay Unit
584.0101	High Density Concrete Overlay	Square Foot
584.1101	Latex Modified Concrete Overlay	Square Foot

Addendum 1

Pages 34 and 35

Under Pages 5-97, 5-98, 5-99, 5-100, 5-101, 5-105, 5-106 and 5-107 *delete* all the material.