STANDARD SPECIFICATIONS

STATE OF CALIFORNIA

BUSINESS, TRANSPORTATION AND HOUSING AGENCY

DEPARTMENT OF TRANSPORTATION

JULY, 1999

ISSUED BY

DEPARTMENT OF TRANSPORTATION

Current Price For Additional Copies Of This Book May Be Obtained By Writing

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
PUBLICATION DISTRIBUTION UNIT
1900 Royal Oaks Drive
Sacramento, California 95815
Telephone (916) 445-3520

SECTION 41: PAVEMENT SUBSEALING AND JACKING

41-1 PAVEMENT SUBSEALING

41-1.01 DESCRIPTION

This work shall consist of filling voids beneath existing portland cement concrete pavement, at the locations shown on the plans, by drilling holes through the existing pavement, injecting grout through the holes and filling the drilled holes with mortar or concrete.

41-1.02 MATERIALS

Grout for filling the voids beneath the existing pavement shall be composed of portland cement, fly ash and water. Portland cement and fly ash shall be proportioned by mass at the rate of one part portland cement to 2.4 to 2.7 parts fly ash. Water shall be added in an amount to provide a grout efflux time of 10 to 16 seconds as determined by California Test 541, Part D.

Portland cement for the grout shall be Type II Modified conforming to the provisions in Section 90-2.01, "Portland Cement."

Fly ash shall conform to the requirements in ASTM Designation: C 618 for either Class C or Class F fly ash, except that the loss on ignition shall not exceed 4-percent. The brand of fly ash used in the work shall conform to the provisions for approval of admixture brands in Section 90-4.03, "Admixture Approval."

When fly ash, cement, or fly ash and cement are delivered in packages, each package shall be marked plainly with the class, type, name and brand of producer, and the mass of material contained therein. Similar information shall be provided in the shipping invoices accompanying the shipment of packaged or bulk fly ash and cement.

Chemical admixtures and calcium chloride conforming to the provisions in Section 90-4, "Admixtures," may be used in the grout mixture, subject to the Engineer's written approval.

In advance of grouting operations, the Contractor shall submit a proposal for the materials to be used in the work accompanied with independent laboratory test data that indicates the initial set time and the one-day, 3-day, and 7-day compressive strengths of the grout at 10-, 12- and 14-second efflux times using specimen molds and curing conditions specified in ASTM Designation: C 109.

Grout having a 7-day compressive strength of less than 5.2 MPa at a 12-second efflux time as determined by the independent laboratory tests will not be acceptable.

No change in the grout materials shall be made unless a resubmittal of the above information and requirements is furnished to the Engineer.

Mortar for filling the holes in the concrete pavement shall be composed of one part portland cement to 3 parts fine aggregate, by volume, and only enough water to permit placing and packing of the mortar in the holes. A commercial quality premixed rapid set mortar or concrete may be used to fill the holes.

41-1.03 CONSTRUCTION

Holes shall be drilled through the pavement and underlying base to a depth of 380 to 460 mm below the pavement surface. The holes shall be drilled to the diameter necessary to accommodate the equipment used for injecting the grout. Care shall be taken to protect the pavement surrounding each hole from damage.

The location of the holes shall conform to the configuration shown on the plans unless otherwise directed or permitted by the Engineer. Before beginning grouting operations, and continuing thereafter to the end of each run or work shift, the holes in at least 2 consecutive slabs requiring subsealing shall be drilled ahead of the grouting operations.

Open drilled holes shall not remain ungrouted for more than 2 working days.

The side of the injection hole shall be washed with a minimum water gage pressure of 0.3-MPa just prior to grout injection. The washing device shall be constructed such that a minimum of 4 jets shall direct water horizontally at the slab-base interface.

The grout plant shall consist of a positive displacement cement injection pump and a high-speed colloidal mixer. The colloidal mixer shall operate between a minimum speed of 800 RPM and a maximum speed of 2000 RPM. The injection pump shall be capable of sustaining a gage pressure of one MPa when pumping a grout mixed to a 12-second flow time. A pressure gage shall be located immediately adjacent to the grout hose supply valve and shall be positioned so it can be easily monitored by the Engineer.

Dry cement and fly ash shall be accurately measured by mass, if in bulk, or shall be packaged in containers of uniform mass.

Water shall be introduced into the mixing process through a meter or scale.

Grout not used in the work within one hour after mixing shall be disposed of as directed by the Engineer.

Grout shall be pressure injected through the holes until all voids under the pavement slab are filled. No portion of the slab shall be moved or raised more than 2 mm as a result of pressure grouting. The Engineer will furnish and utilize suitable devices to monitor slab movement during pressure grouting.

The injection nozzle shall prevent leakage during injection and shall not protrude below the concrete slab. Grout shall be injected into only one hole at a time on any slab. When grout appears at any longitudinal or transverse joint, crack, or adjacent hole, or when monitoring devices indicate slab movement in excess of 2 mm, pressure injection of grout shall cease at that hole.

In the event that grout flow does not occur after 7 seconds of sustained one megapascal injection pump gage pressure and if there is no indication of slab movement, continued injection at that hole shall cease.

Immediately after the nozzle is removed, the hole shall be temporarily plugged with a round, tapered wooden plug. The plug shall remain in place until pressure grouting at adjacent holes progresses to the point where grout will not be forced up through previously grouted holes.

In the event the Engineer determines that continued grouting at a location is no longer advantageous, the Engineer may direct the Contractor to cease subsealing operations at that location.

Grouting shall not be performed when the atmospheric or subgrade temperature is below 5°C, or during inclement weather. When standing rainwater is present in the holes, grouting shall not be performed unless permitted by the Engineer.

The Contractor shall take necessary precautions to prevent grout from being injected into any drainage facility or other open structure.

Cracks in the pavement which occur during the injection of grout will be considered as damage to the pavement due to the Contractor's operations. The

damage shall be repaired by the Contractor at the Contractor's expense and as directed by the Engineer.

Upon completion of the grouting operation, grout shall be removed from the drilled holes to a depth of not less than 100 mm below the pavement surface. The holes shall be cleaned and then filled with mortar or premixed, rapid set concrete and finished flush with the concrete pavement surface.

At the end of each work shift, the work area shall be left in a clean, swept and neat condition.

41-1.04 MEASUREMENT

The quantity of drilled holes will be measured as units determined by actual count. Any hole drilled that is not shown on the plans or ordered by the Engineer will not be measured nor paid for.

The quantities of dry cement and fly ash used in the grout mix will be measured by the tonne and will be paid for as grout (subsealing). Quantities of grout not used in the work and grout that is wasted by leaking through to the pavement surface because of not taking preventative measures to avoid wasting of grout, will not be paid for. The quantity of grout wasted or disposed of will be determined by the Engineer. Quantities of grout, cement or fly ash remaining on hand after completion of the work will not be paid for.

41-1.05 PAYMENT

Items of work, measured as specified in Section 41-1.04, "Measurement," will be paid for at the contract unit price for drill hole (subsealing) and the contract price per tonne for grout (subsealing).

The above prices and payments shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in subsealing existing portland cement concrete pavement as shown on the plans, as specified in these specifications and the special provisions, and as directed by the Engineer.

Full compensation for furnishing and placing mortar or concrete for filling the drilled holes shall be considered as included in the contract unit price paid for drill hole (subsealing) and no additional compensation will be allowed therefor.

41-2 PAVEMENT JACKING

41-2.01 DESCRIPTION

This work shall consist of raising existing portland cement concrete pavement to grade, at the locations shown on the plans, by drilling holes through the existing pavement, injecting grout through the holes to fill voids beneath the pavement and raise the pavement to grade, and filling the drilled holes with mortar or concrete.

41-2.02 MATERIALS

The grout for pavement jacking and mortar or concrete for filling the drilled holes shall conform to the provisions for grout and mortar or concrete for pavement subsealing in Section 41-1.02, "Materials," except that the grout for pavement jacking shall contain water in an amount to provide a grout efflux time of 16 to 26 seconds. Additional water may be added to reduce the grout efflux time to not less than 10 seconds to initiate the pressure injection of the grout.

41-2.03 CONSTRUCTION

Pavement jacking shall conform to the provisions for pavement subsealing in Section 41-1.03, "Construction," except for the following:

The positive displacement grout injection pump shall be capable of providing a sustained gage pressure of 1.4 MPa. Gage pressures exceeding 1.4 MPa, but not exceeding 4.1 MPa, may be used for brief periods of time to start the movement of the slab.

Slabs shall be raised uniformly to grade. The Contractor shall furnish and utilize stringlines to monitor the movement of the pavement.

The final elevation of the surface of the concrete pavement shall not vary at any point more than 3 mm above or below the grade established by the Engineer. If the surface of the pavement at any point is higher than 3 mm above the grade established by the Engineer, the surface shall be ground to meet the above specified tolerance; however, the entire slab shall be removed and replaced with new concrete pavement if the surface at any point is higher than 30 mm above the grade established by the Engineer. Grinding of the concrete pavement or removal and replacement of the pavement, if necessary, shall conform to the provisions in Section 42-2, "Grinding," except for payment.

Adjacent slabs, not requiring adjustment in grade, shall not be moved. Corrections to grade of adjacent slabs, if necessary, and as determined by the Engineer, shall be made in the same manner that is required for pavement that is raised to grade.

41-2.04 MEASUREMENT

The quantity of drilled holes will be measured as units determined by actual count. Any hole drilled that is not shown on the plans or ordered by the Engineer will not be measured nor paid for.

The quantities of dry cement and fly ash used in the grout mix will be measured by the tonne and will be paid for as grout (jacking). Quantities of grout not used in the work and grout that is wasted by leaking through to the pavement surface because of not taking preventative measures to avoid wasting of grout, will not be paid for. The quantity of grout wasted or disposed of will be determined by the Engineer. Quantities of grout, cement or fly ash remaining on hand after completion of the work will not be paid for.

41-2.05 PAYMENT

Items of work, measured as specified in Section 41-2.04, "Measurement," will be paid for at the contract unit price for drill hole (jacking) and the contract price per tonne for grout (jacking).

The above prices and payments shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in jacking existing portland cement concrete pavement as shown on the plans, as specified in these specifications and the special provisions, and as directed by the Engineer.

Full compensation for furnishing and placing mortar or concrete for filling the drilled holes shall be considered as included in the contract unit price paid for drill hole (jacking) and no additional compensation will be allowed therefor.

Full compensation for grinding the existing surface of the concrete pavement to meet the specified surface tolerance or for removing and replacing the existing pavement with new pavement shall be considered as included in the contract price paid per tonne for grout (jacking) and no separate payment will be made therefor.