

VIRGINIA DEPARTMENT OF TRANSPORTATION  
SPECIAL PROVISIONS FOR  
**PRE-CAST CONCRETE PAVEMENT SYSTEM APPROVAL**

November 26, 2008

**I. DESCRIPTION**

This specification covers requirements for approval of pre-cast concrete pavement slab systems.

**II. REQUIREMENTS FOR SYSTEM APPROVAL**

The system approval process consists of two phases:

- Submittal and review of Fabricator Standard Drawings and Standard Installation Procedures.
- Construction and evaluation of a Trial Installation.

Each of these phases is described below.

**A. Submittal of Pre-Cast Concrete Pavement System Standard Drawings and Standard Installation Procedures**

**1. *Pre-Cast Concrete Pavement System Standard Drawings***

The manufacturer shall provide the Pre-Cast Concrete System Standard Drawings (developed or approved by the system designer) to the Department for review. These drawings shall include the following details:

- Transverse joint type, locations and spacing, and the mechanism used to transfer loads across transverse joints after slabs are placed.
- Longitudinal joint type, locations and spacing, and the mechanism used to tie adjacent slabs together (if appropriate).
- Calculations to demonstrate load transfer for transverse and longitudinal joints equivalent to standard PR-2.
- Pre-stressed Systems: Pre-stressing materials, stressing/de-stressing procedures and sequence.
- Lifting insert type, location, positions, and grout capping method.
- Grout port type, location, positioning, and capping method.
- These drawings shall include the tolerance, texturing, curing, sampling and testing requirements listed in the Fabrication and Construction Specification for Pre-cast Concrete Pavement Slab Systems.

**2. *Installation Instructions***

The manufacturer shall provide Standard Installation Instructions (developed or approved by the system designer) to the Department a minimum of 7 days prior to the Trial Installation. After the completion of the Trial Installation, the instructions shall be evaluated by the Agency and revised by the manufacturer as required prior to final approval.

These instructions will include the need for any special equipment and will address the following:

Sub-base Preparation (if appropriate)

Include complete instructions for required sub-base preparation procedures.

Pre-overlay Preparation (if appropriate)

Include complete instructions for preparing the existing pavement surface (either asphalt or concrete) to receive a pre-cast concrete pavement overlay.

#### Slab Installation

Include complete instructions for lifting, moving, protecting, lowering and adjusting the positions of the slabs.

#### Post-Tensioning (if appropriate)

Include complete instructions for post-tensioning and describe any special requirements for post-tensioning sequencing.

#### Bed and Level Slabs

Include complete instructions for ensuring that the slabs are fully supported by underlying layers at the correct line, grade, and cross-slope while meeting contract smoothness requirements. Slabs may be placed by one of the following means:

- Grade-supported: Placed on a precisely graded bedding layer and stabilized in place using cementitious grout to fill any small, isolated voids between the slabs and bedding layer.
- Grout- or Urethane Polymer-Supported: Placed or held near final position and anchored/supported in place using cementitious grout (grout-supported), urethane polymer foam (urethane polymer-supported) or another accepted material.
- Placed by other methods approved by the Department.

For grade-supported slabs, include all pertinent bedding and leveling instructions, including:

- Bedding material composition and gradation.
- Method used to place the bedding material.
- Stabilizing grout mix design and anticipated strength gain. (Note: Stabilizing grout must develop a minimum compressive strength 200 psi within 24 hours.)
- Method used to place stabilizing grout beneath the slab.
- Method(s) used to ensure complete support after placement, as described for the Trial Installation below.

For grout- or urethane polymer-supported slabs, include all pertinent support and leveling instructions, including:

- Material properties, composition, mix design (if appropriate), and required strength gain of any slab-supporting material. (Note: Cementitious support grouts must develop a minimum compressive strength of 200 psi before opening to construction or service traffic. Urethane polymer materials must be fully cured before opening to construction or service traffic.)
- Method used to place the slab-supporting material (i.e., urethane polymer or cementitious grout) beneath the slab.
- Equipment and experience required to successfully install the slab-supporting material.
- Method(s) used to ensure complete slab contact with the slab-supporting material after placement, as described for the Trial Installation below.

#### Encasing Pavement Hardware and Filling Block-outs

Include instructions for completely encasing load transfer devices and longitudinal joint ties, as well as for filling grout ports, and lifting insert holes. Include all pertinent information, including:

- Material properties, composition, mix design and required strength gain of any encasement and/or grout fill materials that are not named in the Standard Specifications or Special Provisions.

- Revised instructions for those materials for which the manufacturer's instructions are not to be followed exactly.
- Methods used to place encasement and/or grout fill materials.
- Method(s) used to ensure complete hardware encasement, as described for the Trial Installation below.

After the standard drawings and installation instructions have been approved, any subsequent changes must be submitted to and approved by the Department to maintain product status on the Approved List. The Department reserves the right to require additional trial installations if the changes are deemed significant.

### **3. Trial Installation**

Arrange for a trial installation, on-site or at a facility agreeable to the Agency, such that Agency personnel, particularly those directly involved with the approval process and those involved with any projects, will be present during the installation. Place a *minimum* of four (4) slabs in a manner that simulates the construction of pavement over a minimum length of 24 ft. Provide a drill rig, with operator, capable of retrieving 4-in diameter cores from any portion of the slab, and a technician capable of fabricating test specimens in accordance with ASTM c31. As a minimum, the following will be evaluated:

#### Stabilizing Grout Properties and Completeness of Placement (for grade-supported applications)

Fabricate and test 24 cube specimens meeting the requirements of the Special Provision for Pre-cast Concrete Pavement and demonstrate completeness of placement. Completeness of placement must be demonstrated by retrieving and inspecting at least three cores (6-inch diameter) from random locations within the trial installation area.

#### Supporting Material Properties and Completeness of Placement (for grout- and urethane polymer-supported systems)

For grout-supported systems, fabricate and test 24 cube specimens according to the requirements of the Special Provision for Pre-cast Concrete Pavement. For urethane polymer-supported systems, the urethane polymer material must be pre-approved and used according to the manufacturer's recommendations; no further testing of the material is required. Completeness of placement of either material must be demonstrated by retrieving and inspecting at least three cores (6-inch diameter) from random locations within the trial installation area.

#### Encasement, Grout Fill and Capping Material Properties and Completeness of Placement

If a material identified in the Fabrication and Construction Specifications (under Material Requirements) as Encasement Material for Pavement Hardware is used in accordance with the manufacturer's written instructions, no further material testing is required. If a different material is used or if a material is not used in accordance with the manufacturer's instructions, fabricate a sufficient number of test specimens of appropriate sizes to determine the properties identified in the special provision for Pre-Cast Concrete Pavement. Completeness of placement must be demonstrated through encasement areas by drilling, retrieving and inspecting at least 2 cores (6-inch diameter) from randomly selected hardware encasement locations (e.g. through dowel bars).

#### Panel Fit

For post-tensioned systems utilizing keyed joints between panels, ensure proper contact between the vertical faces of adjacent panels and proper fit of mating keyways, and ensure uniform joint width between adjacent panels.

#### Dimensions and Tolerance

Slabs must conform to the Fabricator Standard Drawings and be capable of being placed to meet the specified joint width and vertical deviation tolerances. Provide allowable tolerances for length, width, thickness, squareness, horizontal alignment, vertical alignment, deviation of ends (horizontal and vertical batter), keyway dimensional tolerance, position of strands (pre-stressed systems), , vertical and horizontal dowel alignment, dowel location, dowel embedment, position of lifting anchors and location of reinforcing steel.

Instruction Completeness

Manufacturer's instructions must accurately reflect the processes used in the trial installation.

Load Transfer

Load transfer for transverse and longitudinal points shall equal, or exceed, the load transfer provided in Standard PR-2. The Department reserves the right to conduct falling weight deflectometer (FWD) tests to determine the LTE at the joints. Inadequate load transfer (i.e.,  $LTE \leq 80\%$  when differential deflection ( $d_{loaded} - d_{unloaded}$ ) exceeds 0.125 mm [0.005 in] for a load of 40-kN [9000 lb] applied in the wheel path) may be cause for rejection.

Instruction Completeness

Manufacturer's instructions must accurately reflect the processes used in the trial installation.

Load Transfer Efficiency (LTE)

The [Agency] reserves the right to conduct falling weight deflectometer (FWD) tests to determine the LTE at the joints. Inadequate load transfer (i.e.,  $LTE \leq 80\%$  when differential deflection ( $d_{loaded} - d_{unloaded}$ ) exceeds 0.125 mm [0.005 in] for a load of 40-kN [9000 lb] applied in the wheel path) may be cause for rejection.

No payment will be made for trial installations except when the trial installation is performed as part of a specific contract and the contract includes provision for payment of the trial installation.

### **III. BASIS FOR APPROVAL**

Approval will be based upon successful demonstration that the proposed system meets the requirements of the Special Provision for Pre-cast Concrete Pavement based upon a) submitted documents and b) field testing performed by the Department and the Contractor at the Trial Installation. Field testing shall include the items listed above (e.g. FWD, cores, etc.). Partial approval may be granted contingent upon successful completion of field testing at the Trial Installation. Approved systems will be placed on the Materials Division's List No. 67 "Approved Pre-cast Concrete Pavement Systems". Rejection may be based upon unsuccessful past performance.