

Special Specification 4136

Precast Concrete Pavement Panels for CRCP Repair



1. DESCRIPTION.

Fabricate and install precast concrete pavement panels used for repairing Continuously Reinforced Concrete Pavement (CRCP). This Item covers fabrication of the precast panels, transportation to the jobsite, underslab grouting, and closure pours. The pavement panel system may consist of panels pretensioned during fabrication.

2. MATERIALS

Provide new materials that comply with the details shown on the plans, the requirements of this Item, and the pertinent requirements of the following Items:

- Item 361, "Repair of Concrete Pavement"
- Item 421, "Hydraulic Cement Concrete"
- Item 424, "Precast Concrete Structural Members (Fabrication)"
- Item 425, "Precast Prestressed Concrete Structural Members"
- Item 440, "Reinforcement for Concrete"
- Item 585, "Ride Quality for Pavement Surfaces"

- 2.1. **Rapid Setting Fiber Reinforced Concrete (RSFRC).** Provide RSFRC meeting the requirements of Table 1. Use a material meeting the requirements of DMS-4655, Type A or Type B that has been approved for use with coarse aggregate extension.

Table 1
RSFRC Properties

Description	Test Method	Requirement
3 hour Compressive Strength, min, psi	Tex-418-A	3000
5 hour Pull-Out Strength, min % of reinforcing bar yield strength ¹	ASTM E 488	75

1. Perform during trial batch testing only.

- 2.2. **Water.** Furnish water meeting the requirements of Item 421.
- 2.3. **Chemical Admixtures.** Furnish chemical admixtures necessary to control setting and workability as needed. Consult with the rapid setting cement manufacturer to determine the appropriate chemical admixtures and dosages.
- 2.4. **Steel Fibers.** Furnish steel fibers meeting ASTM C 1116, Type I fibers with a tensile strength greater than 250 ksi and a fiber length of 1/2-inch and a diameter of 0.008 inch. Determine the fibers dosage needed to meet the pull out strength requirement in Table 1.
- 2.5. **Trial Batch Testing for RSFRC.** Perform trial batches, at least 2 months before repairing the pavement, using proposed RSFRC materials and equipment to demonstrate RSFRC can be mixed and placed properly. Conduct the necessary testing to ensure the proposed RSFRC meets the Table 1 requirements.

During trial batching, cast six 12-in. diameter x 8-in. deep cylinders. Embed a 24 in. long #6 reinforcing steel bar in the center of the each cylinder to a depth of 5 in. Ensure the axis of the bar is perpendicular to the finished surface. Test the pullout strength in accordance to ASTM E488.

- 2.6. **Underslab grout.** Use a prepackaged grout material meeting the requirements of ASTM C 1107 and capable of achieving at least 500 psi compressive strength at time of opening repair area to traffic.

3. EQUIPMENT

Provide the necessary equipment for all work including but not limited to fabrication and handling of the precast panels at the fabrication plant; transportation of the precast panels to the jobsite; handling of the panels at the jobsite; underslab grouting; and closure pour concrete mixing, placing and curing.

- 3.1.1. **Mixing and Pumping Equipment.** Provide concrete or mortar mixer capable of uniformly mixing RSFRC. Provide equipment for underslab grouting similar to that used for tendon grouting. The equipment will consist of at least the following:
- Equipment for accurately measuring and proportioning by volume or weight the various materials composing the grout,
 - A colloidal mixer, capable of operating in a range from 800 rpm to 2,000 rpm and thoroughly mixing the various components of the grout in an approved manner,
 - A positive action pump capable of forcing grout through grout holes in the slab and into voids and cavities beneath the pavement slab. The injection pump must be capable of continuous pumping at rates as low as 1-1/2 gal. per minute,
 - A discharge line equipped with a positive cut-off valve at the nozzle end, and a bypass return line for recirculating the grout back into a holding tank or mixer unless otherwise approved, and
 - A stop watch and flow cone conforming to the dimensions and other requirements of Test Method Tex-437-A, "Method of Test for Flow of Grout Mixtures (Flow-Cone Method)."

4. CONSTRUCTION

- 4.1. **Panel Fabrication.** Fabricate and store precast panels in accordance with Item 424, "Precast Concrete Structural Members (Fabrication)," Item 425, "Precast Prestressed Concrete Structural Members," and the requirements of this Item.
- 4.1.1. **Tolerances.** Provide precast panels, regardless of type, that meet the tolerances specified in Table 1.

Table1
Fabrication Tolerances

Panel Dimension	Tolerance
Length (parallel to long axis of panel)	± 3/16"
Width (normal to long axis of panel)	± 3/16"
Squareness (difference in diagonal measurements, from corner to corner, across top surface)	± 1/8"
Horizontal Alignment –Deviation from straightness of mating edge of panels	± 1/8"
Vertical Alignment–Camber (upon release of stress) ¹	± 1/8"
Deviation of ends (horizontal skew)	± 1/8"
Deviation of ends (vertical batter)	± 1/8"
Position of Strands ¹	± 1/4" Vertical ² ± 1/4" Horizontal
Position of lifting anchors	3"
Position of non-prestressed reinforcement	± 1/4"
Dimensions of blockouts/pockets	± 1/4"

1. Only for prestressed panels.

2. Measured from the bottom of the panel.

- 4.1.2. **Finishing.** Unless otherwise shown on the plans, apply a carpet drag and tined texture finish to the top surface of the panels (driving surface), as per Item 360, "Concrete Pavement." Apply the texture in a timely manner after final screeding so the desired texture depth is achieved without disturbing the underlying concrete or turning over aggregate. Apply the surface texture perpendicular to the direction of traffic on the panel.
- 4.1.3. **Curing.** Cure the precast panels in accordance with Item 424, "Precast Concrete Structural Members (Fabrication)." Begin curing immediately following surface finish texturing.
- Membrane curing, in accordance with Item 360, "Concrete Pavement" is permitted at the discretion of the Engineer. If membrane curing is used, apply a minimum 2 applications of the curing compound immediately after surface texture finishing.
- Maintain curing for a minimum of 72 hours from the beginning of curing operations on the sides and top surface of the panels. Form curing will be considered adequate curing for the sides of the panels. If any part of the form is removed, apply curing to the exposed surface as described above. Ensure curing for any given panel is not interrupted for more than 4 hours during removal of panels from the forms to the storage area.
- 4.1.4. **Removal from Forms and Storage.** Prevent damage to the panels when removed from the forms. Handle and store panels in accordance with Item 425, "Precast Prestressed Concrete Structural Members." Prevent damage to either the panels or blockouts when removing blockout forming materials from the panels, if used.
- Store panels with adequate support to prevent cracking or creep-induced deformation (sagging). Stack panels no higher than 5 panels per stack, with adequate support between panels. Store panels by avoiding contact with adjacent stacks.
- 4.1.5. **Lifting and Handling.** Prevent damage to panels during lifting or moving. Use the lifting anchors, cast into the panels, when lifting and moving the panels.
- 4.1.6. **Transportation.** Transport panels in such a manner to avoid damage. Properly support panels during transportation to prevent cracking or deformation (sagging). If more than one panel is transported, provide proper support and separation between the individual panels. Position panels horizontally during transportation, unless otherwise approved.
- 4.1.7. **Repairs.** Repairs of damage caused to the panels during fabrication, lifting and handling, or transportation will be addressed on a case-by-case basis, and in accordance with Item 424, "Precast Concrete Structures

(Fabrication).” Repetitive damage to panels will be cause to cease fabrication operations until the cause of the damage is corrected.

- 4.2. **Removal of Existing Concrete Pavement.** Repair areas will be as indicated on the Plans or identified by the Engineer. Saw-cut the full depth through the concrete around the perimeter of the repair area before removal. Schedule work so that concrete placement follows full-depth saw-cutting not more than 7 days later unless otherwise shown on the plans or approved.

Remove the slab by lifting with minimal disturbance to the base materials and surrounding concrete. Do not spall or fracture concrete adjacent to the repair area. Saw-cut and remove additional concrete as directed, after slab removal, if distresses are found in the surrounding concrete pavement. Repair damage to concrete pavement caused by the Contractor's operation without additional compensation. Perform repairs as directed.

Completely remove loose or damaged base material. Recompact base materials to the satisfaction of the Engineer.

- 4.3. **Panel Installation on Site.**

- 4.3.1. **Equipment.** Provide onsite all necessary equipment required for cutting and removing existing pavement, installing panels, grouting underslab, and performing closure pour before commencement of this work. Ensure that lifting and transporting equipment does not damage the existing pavement during panel installation.

- 4.3.2. **Placement Technique.** Submit an installation plan, before any installation, detailing methods to remove existing pavement, preparing base, placing panels and ensuring proper alignment and grade, and joint sealing.

- 4.3.3. **Placement Tolerances.** For vertical alignment, ensure that the top surface of an individual panel is no more than 1/8-in. higher or lower than the top surface of the existing pavement or an adjoining panel at any point along the joints. Ensure that the width of the gap between adjoining panels at the top surface of the joint is no more than 1/2-in.

- 4.3.4. **Repairs and Patching.** Repair damage caused to the precast panels or existing pavement during any part of the panel installation process at the Contractor's expense to the satisfaction of the Engineer. Repairs of damaged areas will be addressed on a case-by-case basis by the Engineer. Repair damage within acceptable limits caused to the top surface (driving surface) of the panels using an approved repair method. Repetitive damage to panels will be cause to cease installation operations until the cause of the damage is corrected. Patch lifting anchor recesses, and all other recesses, using approved patching materials and methods.

- 4.4. **Closure Pour.** Place RSFRC as soon as panels are placed, leveled, and all steel within the closure is installed. Provide a tined texture surface finish. Wet mat cure the RSFRC until pavement is opened to traffic.

- 4.5. **Underslab Grouting.** Perform underslab grouting to fill voids beneath the precast panels that may be present after placing and setting the panels to grade. Use the grout channels and ports shown on the plans for underslab grouting. Proportion and mix grout materials as recommended by the manufacturer. Do not add water to the grout mixture after it is discharged from the mixer into the pumping equipment.

Check the fluidity of the grout at the beginning of each grouting operation and after each time the grout pump is flushed. Measure grout fluidity in accordance with test method Tex-437-A, "Test for Flow of Grout Mixtures (Flow Cone Method).” Adjust fluidity to achieve the necessary flow requirements for proper undersealing. If excessive bleeding of the grout is observed, the Engineer may require the Contractor to adjust the grout mixture.

- 4.5.1. **Cleanup.** Upon completion of grouting, fill recesses in the surface of the panels at the grout ports with an approved mortar and finish to the satisfaction of the Engineer. Immediately flush grout that flows on the

finished pavement surface during the grouting operation. Remove residual grout which hardens on the pavement surface using an approved technique to the satisfaction of the Engineer and at the expense of the Contractor.

- 4.6. **Sealing Joints.** Seal all longitudinal joints as required on the plans.
- 4.7. **Opening to Traffic.** Repair area can be opened to traffic once the underslab grout has achieved a minimum compressive strength of 500 psi, and the closure pour RSFRC has achieved a minimum compressive strength of 3000 psi.
- 4.8. **Ride Quality.** Ensure a finished ride quality of the repaired area has no locations more than 1/8 in between any 2 points within a 10 ft. straightedge. Correct locations as approved by the Engineer. The surface ride quality measurement will be conducted by the Contractor.

5. **MEASUREMENT**

This Item will be measured by the square yard of surface area of completed pavement.

6. **PAYMENT**

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Repair of Concrete Pavement (Precast)." This price will be full compensation for furnishing equipment, labor, materials, tools, and incidentals.