

**DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA**

**SPECIAL PROVISION
ATLANTA BELTLINE NORTHEAST TRAIL**

SECTION 521 – PATCHING CONCRETE BRIDGE

Add the following:

521.1 General Description

This work includes patching of substructure or superstructure concrete bridge components by removing the concrete, cleaning existing reinforcement, adding supplemental reinforcement when required, and patching with approved conventional or accelerated Portland cement concrete or rapid setting patching materials according to this Specification and as shown on the Plans.

521.1.01 Definitions

General Provisions 101 through 150.

“Sound” – the act of striking a concrete surface with a chipping hammer or similar tools to detect unsound concrete.

521.1.02 Related References

A. Standard Specifications

Section 500—Concrete Structures

Section 504—Twenty-Four Hour Accelerated Strength Concrete

Section 511—Reinforcement Steel

Section 853—Reinforcement and Tensioning Steel

Section 886—Epoxy Resin Adhesives

Section 934—Rapid Setting Patching Materials for Portland Cement Concrete

B. Referenced Documents

QPL 10

QPL 27

521.1.03 Submittals

General Provisions 101 through 150.

521.2 Materials

Ensure that the materials used to repair and patch bridge components meet the following requirements:

A. Portland Cement Concrete Patching Materials

1. Conventional Portland Cement Concrete (Repair Method 1)
 - a. Use Class “A” or Class “AA” concrete or as indicated on the Plans.

- b. Meets the requirements of Section 500 of the Specifications.
 - c. Use concrete manufactured at plants that qualify as approved sources according to the Standard Operating Procedure for Ready Mix Concrete. See QPL 10 for a list of approved plants.
2. Twenty-Four Hour Accelerated Strength Concrete (Repair Method 2)
- a. Meets the requirements of Section 504 of the Specifications, except that the use of a portable concrete mixer is required.

B. Rapid Setting Patching Materials (Repair Method 3)

- 1. Use rapid setting patching materials meeting the requirements of Section 934. See QPL 27 for a list of approved patching materials. Patching materials not listed on QPL 27 will require testing and approval by the Office of Materials and Research before use.
- 2. When shown on the Plans, use Type III rapid setting patching material to patch vertical and overhead repair areas.

521.2.01 Delivery, Storage, and Handling

General Provisions 101 through 150.

521.3 Construction Requirements

521.3.01 Personnel

General Provisions 101 through 150.

521.3.02 Equipment

To clean the repair areas, use air compressors equipped with traps that can remove surplus water and oil in the compressed air. Ensure that the compressor can deliver compressed air at a continuous pressure of at least 90 psi (620 kPa).

The Engineer will check the compressed air daily for contamination. Do not use contaminated air.

521.3.03 Preparation

A. Limits of Repair

Repair all patches as shown on the Plans and as directed by the Engineer.

B. Concrete Removal

- 1. Remove concrete to a minimum depth of 3³/₄" inches or as shown on the Plans with power chipping or hand tools. Pneumatic hammers heavier than 15 lb. class nominal (30 lb. maximum) are not permitted. Exercise extreme care not to saw or damage the reinforcing steel.
- 2. Operate pneumatic hammers and chipping tools at an angle not to exceed 60 degrees relative to the surface of the concrete. After starting the tool in the vertical position, immediately tilt the tool to a 60 degree operating angle.
- 3. Do not damage or fracture the sound concrete substrate to be left on the bottom of the patch area. Do not use sharp pointed bits.

C. Surface Preparation

- 1. Clean all exposed reinforcing steel of all rust and corrosive products including oil, dirt, concrete fragments, loose scale and any other coating of any character that would destroy or inhibit the bond with the patching material.
- 2. Immediately before placing the patching material, thoroughly clean the surfaces within the repair areas by sandblasting and air blasting to remove oil, dust, dirt, slurry from saw operation, and other contaminants.

3. Place formwork as required to complete patch repair. Provide access in formwork for placement of patch material.
4. Ensure that the finished surface meets a surface tolerance of 1/16 in. (1.5 mm).
5. Use approved measures as necessary to keep the adjacent concrete surfaces free of excess grout and other materials.

521.3.04 Fabrication

General Provisions 101 through 150.

521.3.05 Construction

A. Concrete Patching

Patch concrete safely and rapidly to minimize inconvenience to the traveling public.

1. Accomplish this work with other operations in progress within an area if possible.
2. Remove and replace completed patches that contain cracks, shrinkage, compression failures, or are damaged by construction or traffic before Final Acceptance at no cost to the Department.

B. Placing Patching Material

Only use Repair Method 1 with the class of concrete on bridge components designated on the Plans.

Use Repair Method 2 unless the Engineer gives written approval to use Repair Method 3. Use Repair Method 1 and 2 when the average daily temperature is 50 °F (10 °C) or above. Use of Repair Method 3, if approved, is limited to the manufacturer's written recommendations.

For the following repair methods, begin the placement when the surface within the repair area is dry and thoroughly free of contaminants.

1. Repair Method 1: Conventional Portland Cement Concrete
 - a. Completely coat the concrete surface areas within the repair area with a film of Type II epoxy adhesive as specified in Section 886 approximately 10 to 20 mils (0.25 to 0.50 mm) thick or according to the manufacturer's written recommendations.
 - b. Deposit the concrete in the repair area while the epoxy is still tacky. Vibrate it to form a dense, homogeneous mass of concrete that completely fills the patch area.
 - c. Screed the concrete to the proper grade and do not disturb it until the water sheen disappears from the surface.
 - d. Cover the concrete with wet burlap or membrane curing compound. Allow the curing to continue until the required minimum design compressive strength is achieved as designated by the class of concrete used or as shown on the Plans. Complete curing prior to transferring load to the repaired section.
2. Repair Method 2: Twenty-Four Hour Accelerated Strength Concrete
 - a. Prepare, remove and place as outlined in Subsections 521.3.03 and 521.3.05.B and 521.3.05.B.1.
 - b. Mix the concrete on site in a portable mixer of adequate capacity. Obtain approval for the mix design and mixing method from the Office of Materials and Research.
 - c. The material must meet a slump range of 1.0 to 3.0 in. (25 to 75 mm).
3. Repair Method 3: Rapid-Setting Patching Material
 - a. In addition to the requirements outlined in Subsection 521.3.03, prepare the surfaces in the repair areas according to the manufacturer's written recommendations.
 - b. Perform the patching material handling, mixing, placing, consolidating, finishing, and curing according to the manufacturer's written recommendations as approved by the Office of Materials and Research.

- c. Continue curing until a minimum design compressive strength of 3,500 psi (20 MPa) or as shown on the Plans is achieved. Complete curing prior to transferring load to the repaired section.

C. Special Requirements

The following special requirements apply to this work:

1. During sandblasting, protect traffic in adjacent travel lanes.
2. After the sandblasting operations:
 - a. Thoroughly clean the area to be repaired with compressed air.
 - b. Remove sand from the sandblasting operation from adjacent concrete surfaces.
3. Do not “over-cut” concrete surfaces beyond marked areas whenever possible.
4. Remove saw slurry and other contaminates from the over-cutting.
5. Repair the over-cuts by filling full-depth with an approved low-viscosity epoxy compound using a Type II epoxy adhesive specified in Section 886. Make these repairs as soon as possible.

521.3.06 Quality Acceptance

General Provisions 101 through 150.

521.3.07 Contractor Warranty and Maintenance

General Provisions 101 through 150.

521.4 Measurement

The area measured for payment is the number of square feet (meters) of patching complete in place and accepted.

521.4.01 Limits

General Provisions 101 through 150.

521.5 Payment

The area measured as specified above will be paid for at the Contract Unit Price per square foot (meter). Payment is full compensation for equipment, tools, labor, incidentals to complete the work, including but not limited to:

- Removing existing patching material or the spalled, broken, or damaged concrete
- Cleaning the open area by sandblasting
- Furnishing, placing, finishing, and curing the patching material
- Supplemental reinforcement

Payment will be made under:

Item No. 521	Patching concrete bridge	Per square foot (meter)
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521.5.01 Adjustments

General Provisions 101 through 150.

Bridge Management Unit