*Effective Date: 02/15*

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***Usage Statement:***

***This specification is to be used for repair and rehabilitation projects.***

***In general use the repair items where work items may be similar, but different in nature, need to be identified by type of repair, would require many new one time use specifications, and specific bid history is not beneficial to future estimation of similar work.***

**Louisiana Department of Transportation and Development**

**Supplemental Specification**

The Louisiana Standard Specifications for Roads and Bridges 2006 is amended to include the following:

**Section 830**

**Repair and Rehabilitation**

830.01 DESCRIPTION

Perform structural repairs and rehabilitation as specified.

830.02 MATERIALS

Materials shall be specific to the required actions of the contract. Comply with the following sections:

Concrete Roadway Barriers 733

Structural Concrete 805

Reinforcing Steel 806

Structural Metals 807

Steel Grid Flooring 808

Movable Bridges 809

Bridge Railings and Barriers 810

Painting and Protective Coatings 811

Concrete Approach Slabs 813

Portland Cement Concrete 901

Epoxy Systems 1017

830.02.1 Structural Concrete Patching

Conform to Table 830-1 for structural concrete patching unless otherwise specified. An exception is made for the specific case of patching tops of decks, where rapid setting patching materials for concrete from the Approved Materials List (AML) may be used.

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|  |  |  |
| --- | --- | --- |
| Table 830-1  Structural Concrete Patching Material Requirements | | |
| Parameter | Test | Value |
| Minimum Compressive Strength | ASTM C39 or ASTM C109 | 2000 psi (min.) at 24 hrs  4000 psi (min.) at 7 days |
| Curing Shrinkage | ASTM C157 | 0.07% max. at 28 days |
| Curing Expansion | ASTM C157 | 0.03% max. at 1 day |
| Thermal Expansion | ASTM C531 | 5.0 x 10-6 in/in/°F (min.) at 28 days  9.0 x 10-6 in/in/°F (max.) at 28 days |
| Bond Strength by Slant Shear | ASTM C882 | 750 psi (min.) at 7 days |

830.03 SUBMITTALS

Submit to the Bridge Engineer for review and acceptance. Allow as a minimum at least 14 calendar days for review. Resubmittals will require an additional 14 calendar day review period. This review process will continue until submittal acceptance.

830.03.1 Structural Concrete Patching

As a minimum, submit the following information for review:

830.03.1.1 For Pre-Package Mixed Cementitous Mortar:

1. Name and type of the proposed repair mortar material and associated Portland cement concrete;
2. Name and address of supplier and manufacturer of the repair mortar and associated bonding agent;
3. Product data sheets showing compliance in accordance with the latest approved materials sampling manual specifications. The engineer may require documentation from an approved independent testing authority to confirm the performance criteria stated on product data sheets;

830.03.1.2 For site mixed cementitous mortar, the following additional information is required:

1. Name, type, and manufacturer of the proposed cement;
2. Name, type, and supplier of the proposed aggregates;
3. Test sample for DOTD testing labs; and,

830.03.1.3 Detailed proposal of concrete removal, application, and curing techniques to be used;

830.03.1.4 Details for repairs of damaged deformed reinforcing steel. These details shall conform to section 806.

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830.03.2 Span Movement

Prior to beginning work, submit to the Bridge Engineer for review a span movement plan designed, sealed, signed and dated by a Professional Engineer registered in the State of Louisiana which addresses all structural, environmental and traffic management goals and commitments of the contract.

830.03.3 Structure Jacking

Prior to beginning work, submit to the Bridge Engineer for review a structure jacking plan designed, sealed, signed and dated by a Professional Engineer registered in the State of Louisiana. Provide as a minimum the following information:

1. Design of the structure jacking system
2. Equipment
3. Loads and capacities
4. Sequence of operations
5. Shoring and bracing
6. Traffic management goals and commitments

830.03.4 Bolt-Rivet Replacement (Structural Steel)

Submit to the engineer for review a fastener removal plan demonstrating that the proposed sequence and method of removal is a safe method and will not damage or adversely affect the structural members involved.

830.04 CONSTRUCTION REQUIREMENTS

Construction requirements will be specific to the structural repair and rehabilitation work specified.

830.04.1 Structural Concrete Patching

Repair designated areas shown on the plans. Remove loose or defective concrete. Saw cut and/or chip a perpendicular or back-tapered face along the periphery of the repair area so that the minimum depth of repair is approximately 1/2-inch to prevent feathered edges. Sandblast and remove all loose particles, dirt, deteriorated concrete or other substances from the repair area that could impair the bond between the existing concrete and reinforcing steel to remain and repair material. Maintain all reinforcing steel at its original position and clean exposed steel to meet SSPC-SP3 or SSPC-SP6 prior to placement of repair material. Replace damaged or corroded reinforcing steel with bars and splices of equal or greater capacity and as directed. Add reinforcing steel as specified in the plans.

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Apply a bonding agent to the entire repair area including the reinforcing steel prior to placement of the patch material. Mix, apply and cure materials all in accordance with the manufacturer’s recommendations.

Remove forms as directed by the engineer. Do not allow mortar or concrete to freeze during placement or curing. Sound completed repairs to locate any defective areas. Remove and repair defective areas at no additional cost or time to the Department. Finish patched areas in accordance with the plans and 805.13.

Temporary shoring is required for structure members that have insufficient load carrying capacity during the patching process. Orientation of repair area may affect material and construction requirements.

Maintain materials in original sealed containers until the time of use and store in accordance with the manufacturer’s recommendations.

Materials shall be accompanied by a certificate of manufacture. Materials stored beyond the manufacturer’s recommended shelf life shall not be used and will be rejected.

830.04.2 Span Movement

Span movement may involve transportation of a span to or from a staging area, jacking and sliding a span from one location to another, lifting a span from one location to another, etc. as specified.

Provide all equipment, temporary works, staging areas for span construction, jacking, lifting, movement of a superstructure span or unit using mechanized methods, placement of the span or unit, and the restoration of the staging areas to their original condition. All work shall be in accordance with the contract.

830.04.3 Structure Jacking

Structure jacking is the raising and lowering of structures as specified.

Jack the structure in accordance with the Contract and as directed by the engineer. Do not damage the structure. Temporary bracing and shoring may be required to prevent damage to the structure and to temporarily support structure loads. If used, bracing and shoring shall be designed, sealed, signed and dated by a Professional Engineer, registered in the State of Louisiana.

Damage is defined as any change in the structure which permanently decreases the capacity and/or reduces the life span of the structure or any of its components. Whether or not jacking has caused damage will be determined by the engineer and repairs shall be made to the satisfaction of the engineer at no additional cost or time to the Department.

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830.04.4 Epoxy Injection

Repair cracks in concrete using an epoxy injection system in accordance with the contract, the manufacturer’s recommendations, and as directed by the engineer.

830.04.5 Bolt-Rivet Replacement (Structural Steel)

Remove existing fasteners identified in the Contract and replace with new high strength fastener assemblies conforming to Section 807.21. Do not damage any structural steel to remain during fastener removal. Unless specified otherwise, remove fasteners by mechanical means only. Removal by torching is not allowed. Unless specified otherwise, all removed fasteners and any coating material will become the property of the contractor and disposed of in accordance with Section 202. Comply with Section 811 for removal of the existing coatings.

Any damaged structural steel resulting from fastener removal shall be repaired or replaced to the satisfaction of the engineer at no cost or time to the Department.

Unless specified otherwise, all fastener holes shall be reamed up to a circular hole having a diameter 1/16-inch larger than the nominal size of the replacement fastener. Grind fastener assembly contact areas flat and smooth. Clean fastener assembly contact area to SSPC SP-11 and apply one coat of cold galvanizing repair compound from the AML prior to fastener assembly installation.

Testing, installation and inspection of bolts, nuts, washers and DTI devices shall be in accordance with the contract and Section 807.

830.05 MEASUREMENT

830.05.1 Bridge Superstructure / Substructure Repair

Bridge Superstructure/Substructure Repair will be measured for payment per each contiguous repair as defined in the Contract.

830.05.2 Tunnel Repair

Tunnel Repair will be measured for payment per each contiguous repair, per square foot of repair area, or per lump sum as defined in the contract.

830.05.3 Girder Strengthening

Girder strengthening will be measured per each girder strengthened.

830.05.4 Span Movement

Span movement will be measured per each move specified in the plans.

830.05.5 Structure Jacking

Structure jacking will be measured on a lump sum basis.

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830.05.6 Epoxy Injection

Epoxy injection will be measured per linear foot repaired.

830.05.7 Bolt – Rivet Replacement

This item, completed and accepted, will be measured for payment per each fastener replacement, and will include all materials, coatings, testing, labor, equipment, fastener removal plan, tools, and the performance of all work necessary to remove and dispose of the existing coatings and fasteners, and furnish, install, inspect and test high strength bolts, nuts, washers and DTI devices.

830.05.8 Structural Concrete Patching

Structural Concrete Patching will be measured by the square foot of patched material placed*.* When a repair involves multiple surfaces, such as a corner, measurement will be made on all surfaces repaired.

Measurement will include concrete removal, repair and replacement of reinforcing steel, placement of specified additional reinforcing steel, surface preparation, placement of repair materials, and all work required to complete the item in accordance with the contract. When the contract requires concrete removal by hydro-blasting or milling, the concrete removal will be measured and paid for under a separate removal item.

830.06 PAYMENT

Payment will be made at the contract unit price and will include all labor, equipment, materials, and incidentals required to complete the work.

Payment will be made under:

Item No. Pay Item Pay Unit

830-01-00100 Bridge Superstructure Repair Each

830-02-00100 Bridge Substructure Repair Each

830-03-00100 Tunnel Repair Each

830-04-00100 Tunnel Repair Square Foot

830-05-00100 Tunnel Repair Lump Sum

830-06-00100 Girder Strengthening (Type) Each

830-07-00100 Structural Concrete Patching Square Foot

830-08-00100 Span Movement Each

830-09-00100 Structure Jacking Lump Sum

830-10-00100 Epoxy Injection Linear Foot

830-11-00100 Bolt-Rivet Replacement (Structural Steel) Each