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STATE OF LOUISIANA
DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT

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WILLIAM D. ANKNER, Ph.D.
SECRETARY

February 16, 2009

STATE PROJECT NO. 450-37-0022
FEDERAL AID PROJECT NO. 4507(502)
MISSISSIPPI RIVER BRIDGE (LULING) CABLE STAY REPLACEMENT
ROUTE I-310
ST. CHARLES PARISH

SUBJECT: ADDENDUM NO. 3 (CONSTRUCTION PROPOSAL REVISION)

Gentlemen:

The following proposal revision dated 2/16/2009 on the captioned project for which bids will be received on Wednesday, February 25, 2009 have been posted on <http://www.dotd.la.gov/cgi-bin/construction.asp>.

1. Revised the special provision entitled **Item S-102, New Cable Stay System and Installation** (re: Subsection c.1 and c.3 of section New Stay Cable System). (6 pages)

Please note this revision in the proposal and bid accordingly. Mandatory electronic bidding is required for this project, and electronic bids and electronic bid bonds must be submitted via www.bidx.com for this letting date.

Sincerely,

RANDAL D. SANDERS, P. E.
CONTRACTS & SPECIFICATIONS ENGINEER

Attachments

cc: Mr. Brian Buckel
Mr. Michael Stack
Mr. Alan Weber
Mr. Paul Fossier
Ms. Margaret Thompson
Mr. Masood Rasoulia

ITEM S-102, NEW CABLE STAY SYSTEM AND INSTALLATION:

This task consists of supply and installation of a new parallel strand stay cable system including qualification testing. The Contractor shall supply all labor, supervision, equipment and material for the New Stay Cable System in accordance with the Plans, specifications, and the Project Engineer.

All work must be performed in accordance with the traffic control requirements shown in the Plans. The use of equipment on the bridge deck (e.g. trucks, lifts, cranes, etc.) will be limited by the width of the work area and the capacity of the bridge deck as shown in the Plans. The Contractor shall submit the magnitude and location of proposed loads for approval by the Engineer. Any deviation from these limits will not be allowed without the written approval from the Engineer

The Contractor will be responsible for protection of vehicular and marine traffic against falling objects and other potential hazards resulting from construction activities, in accordance with the safety plan prepared under Special Provision S-101.

Experience and Submittal Requirements:

The contractor shall submit the qualifications to perform the work included for this special provision for approval by the DOTD Chief Construction Engineer. The contractor's or sub-contractor's stay cable system installation qualifications shall meet or exceed the experience requirements as noted in this section.

The contractor or sub-contractor shall have direct recent experience in the construction of stay cable systems and shall submit descriptions of that experience. The descriptions of the stay cable projects shall contain names and telephone numbers of owner representatives who can verify the contractor or sub-contractor's recent direct participation on those projects.

The contractor shall designate senior personnel with recent demonstrated technical experience in stay cable construction to be directly involved in the project throughout the stay cable replacement operations. The contractor shall submit the name, qualifications and experience records of senior personnel directly involved with the stay cable replacement operations.

The contractor shall submit the stay cable qualifications prior to initiation of construction of this work. Within 20 days of submittal of the qualification submittal, the engineer shall approve or reject the qualification submittal. If the contractor submittal is not approved, the contractor shall resubmit any changes in the contractor or sub-contractor's qualifications submittal for approval within 14 days.

Reference Documents:

Reference documents in order of precedence:

- a. Plans
- b. Louisiana Bridge Design Manual 2006 Edition

- c. American Association of State Highway and Transportation Officials Standard Specifications for Highway Bridges 17th Edition (AASHTO)
- d. Recommendations for Stay Cable Design, Testing and Installation by the Post-Tensioning Institute (PTI), 5th Edition (PTI Recommendations)

Any conflicts or omissions shall be referred to the Engineer for resolution.

Contractor Submittal Requirements:

- a. Drawings – Within 60 days of Contract Award, the Contractor shall submit Shop and Working drawings, in accordance with Section 801.03 of the Louisiana Standard Specifications for Roads and Bridges, 2006 Edition, for all components of the New Stay Cable System. All working drawings shall be stamped by an engineer licensed to practice civil engineering in the State of Louisiana.
- b. Construction Manual – The Contractor shall submit for review and approval a construction manual detailing all erection procedures. The construction manual shall be stamped by an engineer licensed to practice civil engineering in the State of Louisiana.
- c. Test Reports – Prior to the installation of any new stay cable components, the contractor shall submit for approval test reports prepared by an independent laboratory demonstrating the satisfactory performance of the proposed stay cable system in accordance with the testing requirements of this special provision.
- d. User Manual – At the completion of the project, the Contractor shall submit an Inspection and Maintenance Manual for the New Stay Cable System, in accordance with PTI Recommendations article 7.7.
- e. HDPE Sheathing Pipe Color Sample – Prior to purchasing sheathing pipes, the contractor shall submit a sample of HDPE sheathing pipe for approval of color

New Stay Cable System:

- a. The New Stay Cable System shall include all components and cable sizes as shown on the Plans. It shall include dampers, exit pipes, anti-vandalism tubes, cross ties, anchorage chairs and any other related items.
- b. The New Stay Cable System shall allow for individual replacement of the stay cable strands.
- c. All new stay cables shall be installed with damping devices to prevent excessive vibrations.

The Contractor shall supply damping devices that meet the following criteria:

- 1- Internal dampers shall be designed and fabricated by the Contractor and installed at both tower and deck anchorage zones as shown in the plans. Alternative means can be submitted for Engineer's review and approval.
- 2- The damping system shall provide minimum 6% logarithmic decrement for all levels of vibration amplitude in addition to cable intrinsic damping.
- 3- Dampers shall suppress vibrations occurring in the in-plane & out-of-plane directions at a rate required by item c.2 above.
- 4- The Contractor shall design the damping system based on actual damping curves. Calculations and design shall be submitted for Engineer's review and approval.
- 5- The Contractor shall provide laboratory test results for durability and performance through dynamic testing in accordance with a test procedure approved by the engineer. There shall not be a significant deterioration of the damping curve at the completion of testing. Dampers shall have a service life of at least 20 years.

- 6- The performance of dampers shall be also field tested by the Contractor. Such test shall include field measurement of damping of the new stay cables before and after installation of the dampers.
 - 7- The proposed damping system shall be fully integrated with the New Stay Cable System with minimal aesthetic impact. The damping system and attachment to the new cables shall be protected against moisture penetration and water leakage.
 - 8- The damping system shall be designed in a manner to allow easy inspection, maintenance and/or replacement during the life of the bridge.
 - 9- Surface of the stay cable sheathing pipes shall include a helical fillet. This surface configuration shall not increase significantly the drag coefficient of the cables. The Contractor shall submit the surface configuration to the Engineer for approval.
 - 10- Transverse ties between vertically paired cables shall be supplied as shown on the plans.
- d. The Contractor Shall ensure the stay cables are aerodynamically stable during construction.
 - e. The capacity of stay cable anchorages shall exceed the minimum breaking load of the cables.
 - f. The stressing end anchorage shall be equipped with a ring nut to allow for future cable force adjustment with a minimum adjustment length of 4 in. (100 mm).
 - g. The stay cables shall be protected with weather resistant HDPE pipe with an outer, white, ultraviolet resistant layer meeting the requirements of the PTI Recommendations. The color of the HDPE sheathing pipe shall be approved by the Engineer.
 - h. Portions of the stay cables accessible from the bridge deck shall be protected by an anti-vandalism tube as shown on the Plans. The Contractor shall be responsible to develop the details of anti vandalism tubes to meet the following criteria:
 1. Anti-vandalism tubes shall extend from the lower exit pipe to a minimum of 10 ft vertically above the bridge deck.
 2. Anti-vandalism tube components and connections shall be weather tight and shall not breach the corrosion protection system provided by the stay cable sheathing pipes.
 3. Anti-vandalism tubes shall accommodate cable sag and potential misalignment between the cable and the exit pipe.
 4. Anti-vandalism tubes shall be removable to allow inspection of dampers and cables within the lower exit pipes.
 5. Material type, thickness and details of anti-vandalism tubes shall provide protection against fire and mechanical harm.
 - i. Strand for Stay Cables
 1. The stay cables shall be made of weldless low relaxation Grade 270 (270 ksi, 1860 MPa), seven-wire 0.60-in (15.2-mm) diameter strands meeting or exceeding the requirements of ASTM A416.
 2. Minimum breaking load: 58.6 kip (260 kN) per strand.
 3. The strands shall be individually protected with High Density Polyethylene (HDPE) sheathing and all voids within a strand shall be filled with a corrosion resistant material, all meeting the PTI Recommendations.
 4. The substitution of 0.62-in. diameter strands meeting the requirements of this specification shall be allowed, as long as individual cables provide a strand area equal to or greater than the total area of strands (excluding monitoring strands) described in the plans, and the substitution does not conflict with other contract provisions. A total of 24

monitoring strands, no more than one per each cable, distributed among all cables, shall be added.

j. Stay Cable Anchorages

1. Anchorage assemblies shall be protected at all times against corrosion. The ends of the strands and wedges shall be protected by a removable cap injected with a corrosion protective material. The removable caps and anchorage blockout cover plates shall be painted using a pre-qualified paint system, approved by the Engineer, in accordance with Section 811 of the Standard Specifications.
2. The lower anchorage chairs, bearing plates, guide pipes and anti-vandalism tubes shall be painted using a pre-qualified paint system, to be approved by the Engineer, in accordance with Section 811 of the Standard Specifications. The top coat color of guide pipes and anti-vandalism tubes shall match the color of the stay cable sheathing pipes.
3. The upper guide pipes and bearing plates shall be painted using a pre-qualified paint system, to be approved by the Engineer, in accordance with Section 811 of the Standard Specifications. The top coat color of the guide pipes shall match the color of the stay cable sheathing pipes.

k. Cable Cross Ties

1. Stay cable cross ties and connections shall be provided as shown on plans
2. All cross tie components, including cable bands, turnbuckles, bolts, and miscellaneous hardware shall be Grade 316 stainless steel.
3. Cable cross tie connection details shall provide positive connection between cable sheathing pipes and strand at cross-tie locations and allow unimpeded replacement of individual strands.

Testing

The New Stay Cable System shall be tested at an independent laboratory, selected by the contractor and approved by the Engineer, in accordance with Section 4 of the PTI Recommendations, except as noted below. The stress range for the testing shall be in accordance with Table 3.1 of the PTI Recommendations.

In lieu of the leak test requirements of PTI Section 4.1.6, a single cable assembly, representative of the average cable size, shall be subjected to a water tightness test in accordance with Section 6.2.3 Leak Tightness Testing, of FIB Bulletin 30, Acceptance of Stay Cable Systems Using Prestressing Steels, 2005.

The acceptance testing requirements of PTI Section 4.2 shall be reduced to two cable specimens, representing the largest and the smallest cable sizes. The two specimens shall be tested in accordance with Section 4.2 of the PTI Recommendations, 5th Edition. Both tests shall include ultimate strength tests at the completion of the fatigue testing.

Tests must be completed and final test reports approved prior to the installation of any stay cable components in the bridge

The quality of the New Stay Cable System components shall be tested in accordance with Section 3 of the PTI Recommendations:

- a. Strands: Art. 3.2.2.1
- b. High density polyethylene for sheathed strands: Art. 3.3.6
- c. Corrosion inhibiting coating for the strand wires: Art. 3.3.8
- d. Performance tests for individually sheathed strands: 3.3.9
- e. Stay cable polyethylene pipe: Art. 3.5.3

Construction Requirements

- a. General: This work shall include all construction operations related to the replacement of the stay cables on the Hale Boggs Bridge. Field workmanship shall be in accordance with best practice, and all work shall conform to these special provisions and other specifications as appropriate. All work must be performed in accordance with the traffic control requirements shown in the Plans.
- b. Definitions: The following definitions shall apply to the installation of stay cables:
Extension – the change in the length of a strand between anchorages.
Projection – the movement of a strand, measured relative to the anchorage.
“Extension” is the result of the change in the strain in the strand plus the change in sag, whereas “projection” is “extension” plus the change in distance between the anchorages as a result of deformations in the structure (i.e. the deck and the pylon). Projection can be measured directly, but extension can only be determined if the movements of the anchorages at the pylon and the deck are known.
- c. Handling and Installation
 1. The stay cables shall be protected against corrosion, heat, abrasion and other harmful effects throughout the fabrication and installation process.
 2. Flame cutting of the strands shall not be permitted
 3. The minimum bending radius of the cable during installation shall be 25 times the diameter of the cable sheath.
 4. Strands within a cable shall be installed parallel to each other
 5. The stay cable guide pipes shall be installed within 0.4 degrees of the designed pipe alignment.
 6. All damage to stay cable components shall be repaired before installation of the stay cable. Damaged strands shall be replaced.
- d. Erection Stages: See the Plans for detailed description of the erection stages.
- e. Stressing Requirements: The Stay Cable Installer may use the strand-by-strand stressing method or stress the stay cables as a single unit with a multi strand jack. When using strand-by-strand installation, the minimum elongation for any step shall be 2 in. (50 mm).
 1. Jacks and gauges for stay cable stressing shall be calibrated with a load cell prior to the beginning of stay cable installation and every six months thereafter.
 2. Stay cable stressing sequence shall be according to the information provided in the Plans.
 3. Geometry control of the bridge towers and superstructure and cable force verification shall be conducted in accordance with Special Provision S-104, Geometry Control and Cable Force Verification.

For each stressing stage, the Engineer will provide the Contractor with the following data:

1. Limits to the stay cable loads for all stressing stages,
2. The estimated deck stiffness for calculating the decay curve for strand-by-strand installation,
3. The estimated deflection of the deck, before and after stressing.

For each stressing stage, The Contractor shall provide the following data:

1. The stressing force in each strand, when using the strand-by-strand stressing method, or the total force in the stay cable when a multi-strand stressing method is used.

2. The position of the locking nut together with the protruding length of strand at each anchorage.

Permanent records shall be established by the Contractor during each stay cable installation. Information recorded shall include:

1. An estimate of the total force in each cable,
2. The actual measured stay cable projections.
3. Ambient temperature and weather conditions; and
4. Deck loading/traffic conditions.

The force in the stay cables shall not deviate from the specified values by more than 5%. If the force varies by more than 5% from the predicted values, stressing operations shall halt and the Engineer shall be consulted, so that overall structural capacity and deformation may be checked and appropriate adjustments implemented.

The Stay Cable Installer shall develop procedures to ensure that, after all stressing stages, the tension in each strand of each stay cable is equalized, within a range of $\pm 2.5\%$ of the strand ultimate tensile strength.

The number of stressed strands at each stressing stage shall not deviate from the stressing plan shown on the Plans by more than two strands total.

Alternatives: Any alternative for the supply and installation of the New Stay Cable System proposed by the contractor shall be submitted for approval by the Engineer as a Value Engineering Proposal in accordance with Section 105.19 of Louisiana Standard Specifications for Roads and Bridges, 2006 Edition, and shall include adequate engineering backup in the form of calculations and drawings to allow proper review.

Payment: Payment will be made at the contract price for Supply and Installation of New Stay Cable System, which shall include all materials, tools, equipment, labor, incidentals and the performance of all work necessary to complete this task.

Payment will be made based on a percentage of the work completed under:
Item S-102, New Cable Stay System and Installation, per lump sum.