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13 -



SM No. CHSIP0099010101

PROPOSAL AND CONTRACT DOCUMENTS

FOR THE CONSTRUCTION OF

13

Traffic Signal Improvements on US 82 & SR 1 in Greenville, known as Federal Aid
Project No. HSIP-0099-01(010) / 107573301 in Washington County.

Project Completion: 07/30/2021

(STATE DELEGATED)

NOTICE

**BIDDERS MUST COMPLETE AN ONLINE REQUEST
FOR PERMISSION TO BID THIS PROJECT.**

Electronic addendum updates will be posted on www.gomdot.com

SECTION 900
OF THE CURRENT
2017 STANDARD SPECIFICATIONS
FOR ROAD AND BRIDGE CONSTRUCTION
JACKSON, MISSISSIPPI

**MISSISSIPPI DEPARTMENT OF TRANSPORTATION
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PROJECT: HSIP-0099-01(010)/107573301 - Washington

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OF SECTION 905 AS ADDENDA)

10/30/2019 12:00 PM

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 901 - ADVERTISEMENT

Electronic bids will be received by the Mississippi Transportation Commission at 10:00 o'clock A.M., Tuesday, November 26, 2019, from the Bid Express Service and shortly thereafter publicly read on the Sixth Floor for:

Traffic Signal Improvements on US 82 & SR 1 in Greenville, known as Federal Aid Project No. HSIP-0099-01(010) / 107573301 in Washington County.

The attention of bidders is directed to the Contract Provisions governing selection and employment of labor. Minimum wage rates have been predetermined by the Secretary of Labor and are subject to Public Law 87-581, Work Hours Act of 1962, as set forth in the Contract Provisions.

The Mississippi Department of Transportation hereby notifies all bidders that it will affirmatively insure that in any contract entered into pursuant to this advertisement, disadvantaged business enterprises will be afforded full opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, sex, age, disability, religion or national origin in consideration for an award.

The award of this contract will be contingent upon the Contractor satisfying the DBE requirements.

Contractors may request permission to bid online at <http://shopmdot.ms.gov> at no cost. Upon approval, Contractors shall be eligible to submit a bid using Bid Express at <http://bidx.com>. Specimen proposals may be viewed and downloaded online at no cost at <http://mdot.ms.gov> or purchased online at <http://shopmdot.ms.gov> at a cost of Ten Dollars (\$10.00) per proposal plus a small convenience fee. Cash or checks will not be accepted as payment.

Plans must be purchased online at <<https://shopmdot.ms.gov>>. Costs of plans will be on a per sheet basis plus a small convenience fee. If you have any questions, you can contact the MDOT Plans Print Shop at (601) 359-7460, or e-mail at plans@mdot.state.ms.us. Plans will be shipped upon receipt of payment. Cash or checks will not be accepted as payment.

Bid bond, signed or countersigned by a Mississippi Agent or Qualified Nonresident Agent, with Power of Attorney attached, a Cashier's check or Certified Check for five (5%) percent of bid, payable to STATE OF MISSISSIPPI, must accompany each proposal.

The attention of bidders is directed to the provisions of Subsection 102.07 pertaining to irregular proposals and rejection of bids.

MELINDA L. MCGRATH
EXECUTIVE DIRECTOR

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 1

CODE: (IS)

DATE: 03/01/2017

SUBJECT: Governing Specifications

The current (2017) Edition of the Standard Specifications for Road and Bridge Construction adopted by the Mississippi Transportation Commission is made a part hereof fully and completely as if it were attached hereto, except where superseded by special provisions, or amended by revisions of the Specifications contained within this proposal. Copies of the specification book may be purchased from the MDOT Construction Division, or online at shopmdot/default.aspx?StoreIndex=1.

A reference in any contract document to controlling requirements in another portion of the contract documents shall be understood to apply equally to any revision or amendment thereof included in the contract.

In the event the plans or proposal contain references to the 2004 Edition of the Standard Specifications for Road and Bridge Construction, it is to be understood that such references shall mean the comparable provisions of the 2017 Edition of the Standard Specifications.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 2

CODE: (IS)

DATE: 03/01/2017

SUBJECT: Status of Right-of-Way

Although it is desirable to have acquired all rights-of-way and completed all railroad agreements, utility adjustments and work to be performed by others prior to receiving bids, sometimes it is not considered to be in the public interest to wait until each and every such clearance has been obtained. The bidder is hereby advised of possible unacquired rights-of-way, relocations, railroad agreements and utilities adjustments which have not been completed.

The status of right-of-way acquisition, utility adjustments, encroachments, potentially contaminated sites, railroad facilities, improvements, and asbestos contamination are set forth in the following attachments.

In the event right of entry is not available to ALL parcels of right-of-way and/or all work that is to be accomplished by others on the date set forth in the contract for the Notice to Proceed is not complete, the Department will issue a restricted Notice to Proceed.

STATUS OF RIGHT-OF-WAY

HSIP-0099-01(010)

107573/301000

Washington County

All rights of way and legal rights of entry have been acquired **except:**

None.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

Inter-Departmental Memorandum

To:	Right of Way Division Trudi Loflin	Date:	October 10, 2019
From:	Pre-Construction Engineer District 3 Jarrett Taylor	Project No:	107573/301000 HSIP-0099-01(010)
		County:	Washington

DISTRICT STATUS REPORT

1. **STATUS OF RIGHT OF WAY:** All work to be done within existing ROW.
2. **RIGHT OF WAY CLEARANCE:** There are no encroachments.
3. **STATUS OF AFFECTED RAILROAD OPERATING FACILITIES:** None affected.
4. **STATUS OF REQUIRED UTILITY RELOCATIONS:** No utility conflicts.
5. **STATUS OF CONSTRUCTION AGREEMENT:** None required.

JT:jt

pc: Charlie Milner (District Three)
 Leroy Crisco (Construction Division)
 Katherine Lamey (Construction Division)
 Ann Russell (Right of Way)
 File

ASBESTOS CONTAMINATION STATUS OF BUILDINGS
TO BE REMOVED BY THE CONTRACTOR
HSIP-0099-01(010)
107573-301000
Washington County
October 10, 2019

Reference is made to notices to bidders entitled "Asbestos National Emission Standards for Hazardous Air Pollutants (NESHAP)" and "Removal of Obstructions".

The following pertinent information is furnished concerning asbestos containing materials (ACMs), if any, found in buildings to be removed by the Contractor.

There is no Right of Way required for this project. There are no buildings to be removed by the contractor.

STATUS OF POTENTIALLY CONTAMINATED SITES

HSIP-0099-01(010)

107573-301000

Washington County

October 10, 2019

THERE IS NO RIGHT OF WAY REQUIRED FOR THIS PROJECT. NO INITIAL SITE ASSESSMENT WILL BE PERFORMED. IF CONTAMINATION ON EXISTING RIGHT OF WAY IS DISCOVERED, IT WILL BE HANDLED BY THE DEPARTMENT.

Improvements to be included in Notice to Bidders to be removed by the Construction Contractor
FMS Construction Project No: 107573-301000
External ROW No: HSIP-0099-01(010)

Parcel No:
Station No:
Property Owner:
Description/Pictures:

NA

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 3

CODE: (SP)

DATE: 01/17/2017

SUBJECT: Final Clean-Up

Immediately prior to final inspection for release of maintenance, the Contractor shall pick up, load, transport and properly dispose of all litter from the entire highway right-of-way that is within the termini of the project.

Litter shall include, but not be limited to, solid wastes such a glass, paper products, tires, wood products, metal, synthetic materials and other miscellaneous debris.

Litter removal is considered incidental to other items of work and will not be measured for separate payment.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SUPPLEMENT TO NOTICE TO BIDDERS NO. 7

DATE: 01/17/2017

The goal is 6 percent for the Disadvantaged Business Enterprise. The low bidder is required to submit Form OCR-481 for all DBEs. Bidders are advised to check the bid tabulation link for this project on the MDOT website at:

<http://sp.gomdot.com/Contract%20Administration/BidSystems/Pages/letting%20calendar.aspx>

Bid tabulations are usually posted by 3:00 pm on Letting Day.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 7

CODE: (IS)

DATE: 03/01/2017

SUBJECT: Disadvantaged Business Enterprises In Federal-Aid Highway Construction

This contract is subject to the "Moving Ahead for Progress in the 21st Century Act (MAP-21)" and applicable requirements of "Part 26, Title 49, Code of Federal Regulations". Portions of the Act are set forth in this Notice as applicable to compliance by the Contractor and all of the Act, and the MDOT DBE Program, is incorporated by reference herein.

The Department has developed a Disadvantaged Business Enterprise Program that is applicable to this contract and is made a part thereof by reference.

Copies of the program may be obtained from:

Office of Civil Rights
Mississippi Department of Transportation
P. O. Box 1850
Jackson, Mississippi 39215-1850

POLICY

It is the policy of the Mississippi Department of Transportation to provide a level playing field, to foster equal opportunity in all federally assisted contracts, to improve the flexibility of the DBE Program, to reduce the burdens on small businesses, and to achieve that amount of participation that would be obtained in a non-discriminatory market place. In doing so, it is the policy of MDOT that there will be no discrimination in the award and performance of federally assisted contracts on the basis of race, color, sex, age, religion, national origin, or any handicap.

ASSURANCES THAT CONTRACTORS MUST TAKE

MDOT will require that each contract which MDOT signs with a sub-recipient or a Contractor, and each subcontract the Prime Contractor signs with a Subcontractor, includes the following assurances:

“The Contractor, sub-recipient or Subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The Contractor shall carry out applicable requirements of 49 CFR 26 in the award and administration of federally assisted contracts. Failure by the Contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as MDOT deems appropriate.”

DEFINITIONS

For purposes of this provision the following definitions will apply:

"Disadvantaged Business" means a small business concern: (a) which is at least 51 percent owned by one or more socially and economically disadvantaged individual(s) or in the case of any publicly owned business, at least 51 percent of the stock of which is owned by one or more socially and economically disadvantaged individual(s); and (b) whose management and daily business operations are controlled by one or more of the socially and economically disadvantaged individual(s) who own it. It is important to note that the business owners themselves must control the operations of the business. Absentee ownership or title ownership by an individual who does not take an active role in controlling the business is not consistent with eligibility as a DBE under CFR 49 Part 26.71.

CONTRACTOR'S OBLIGATION

The Contractor and all Subcontractors shall take all necessary and reasonable steps to ensure that DBE firms can compete for and participate in the performance of a portion of the work in this contract and shall not discriminate on the basis of race, color, national origin, religion or sex. Failure on the part of the Contractor to carry out the DBE requirements of this contract constitutes a breach of contract and after proper notification the Department may terminate the contract or take other appropriate action as determined by the Department.

When a contract requires a zero percent (0%) DBE goal, the Contractor still has the responsibility to take all necessary and reasonable steps to ensure that DBE firms can compete for and participate in the performance of the work in the contract. In this case, all work performed by a certified DBE firm is considered to be a "race neutral" measure and the Department will receive DBE credit towards the overall State goals when the DBE firm is paid for their work. If the Prime Contractor is a certified DBE firm, the Department can receive DBE credit only for the work performed by the Prime Contractor's work force or any work subcontracted to another DBE firm. Work performance by a non-DBE Subcontractor is not eligible for DBE credit.

CONTRACT GOAL

The goal for participation by DBEs is established for this contract in the attached Supplement. The Contractor shall exercise all necessary and reasonable steps to ensure that participation is equal to or exceeds the contract goal.

If the percentage of the contract that is proposed for DBEs is 1% or greater, the Contractor shall agree to meet or exceed the contract goal on the last bid sheet of the proposal.

The apparent lowest responsive bidder shall submit to the Office of Civil Rights Form OCR-481, signed by the Prime Contractor and the DBE Subcontractors, no later than the 3rd business day after opening of the bids.

Form OCR-481 is available on the MDOT website at GoMDOT.com, then Divisions, Civil Rights, Forms, DBE, MDOT Projects, or by calling 601-359-7466.

The OCR-481 Form must contain the following information:

The name and address of each certified DBE Contractor / Supplier;

The Reference Number, percent of work and the dollar amount of each item. If a portion of an item is subcontracted, a breakdown of that item including quantities and unit price must be attached, detailing what part of the item the DBE firm is to perform and who will perform the remainder of the item.

If the DBE Commitment shown on the last bid sheet of the proposal, does not equal or exceed the contract goal, the bidder must submit, to MDOT Contract Administration Division prior to bid opening, information to satisfy the Department that adequate good faith efforts have been made to meet the contract goal.

Failure of the lowest bidder to furnish acceptable proof of good faith efforts, submitted to MDOT Contract Administration Division prior to bid opening, shall be just cause for rejection of the proposal. Award may then be made to the next lowest responsive bidder or the work may be re-advertised.

The following factors are illustrative of matters the Department will consider in judging whether or not the bidder has made adequate good faith effort to satisfy the contract goal.

- (1) Whether the bidder attended the pre-bid meeting that was scheduled by the Department to inform DBEs of subcontracting opportunities;
- (2) Whether the bidder advertised in general circulation, trade association, and minority-focus media concerning the subcontracting opportunities;
- (3) Whether the bidder provided written notice to a reasonable number of specific DBEs that their interest in the contract is being solicited;
- (4) Whether the bidder followed up initial solicitations of interest by contacting DBEs to determine with certainty whether they were interested;
- (5) Whether the bidder selected portions of the work to be performed by DBEs in order to increase the likelihood of meeting the contract goal;
- (6) Whether the bidder provided interested DBEs with adequate information about the plans, specifications and requirements of the contract;
- (7) Whether the bidder negotiated in good faith with interested DBEs and did not reject them as unqualified without sound reasons based on a thorough investigation of their capabilities; and
- (8) Whether the bidder made efforts to assist interested DBEs in obtaining any required bonding or insurance.
- (9) Whether the bidder has written notification to certified DBE Contractors soliciting subcontracting for items of work in the contract.
- (10) Whether the bidder has a statement of why an agreement was not reached.

The bidder’s execution of the signature portion of the proposal shall constitute execution of the following assurance:

The bidder hereby gives assurance pursuant to the applicable requirements of "Moving Ahead for Progress in the 21st Century Act (MAP-21)" and applicable requirements of "Part 26, Title 49, Code of Federal Regulations" that the bidder has made a good faith effort to meet the contract goal for DBE participation for which this proposal is submitted.

DIRECTORY

A list of “Certified DBE Contractors” which have been certified as such by the Mississippi Department of Transportation and other Unified Certification Partners (UPC) can be found on the Mississippi Department of Transportation website at www.gomdot.com. The list is in the top left corner of the current Letting Calendar under Contracts & Letting. The DBE firm must be certified at the time the project is let and approved by MDOT to count towards meeting the DBE goal.

REPLACEMENT

If a DBE Subcontractor cannot perform satisfactorily, and this causes the OCR-481 commitment to fall below the contract goal, the Contractor shall take all necessary reasonable steps to replace the DBE with another certified DBE Subcontractor or submit information to satisfy the Mississippi Department of Transportation that adequate good faith efforts have been made to replace the DBE. The replacement DBE must be a DBE who was on the Department's list of "Certified DBE Contractors" when the job was let, and who is still active. All DBE replacements must be approved by the Department.

Under no circumstances shall the Prime or any Subcontractor perform the DBE's work (as shown on the OCR-481) without prior written approval from the Department. See "Sanctions" at the end of this document for penalties for performing DBE's work.

When a Contractor proposes to substitute/replace/terminate a DBE that was originally named on the OCR-481, the Contractor must obtain a release, in writing, from the named DBE explaining why the DBE Subcontractor cannot perform the work. A copy of the original DBE's release must be attached to the Contractor's written request to substitute/replace/terminate along with appropriate Subcontract Forms for the substitute/replacement/terminated Subcontractor, all of which must be submitted to the DBE Coordinator and approved, in advance, by MDOT.

GOOD FAITH EFFORTS

To demonstrate good faith efforts to replace any DBE that is unable to perform successfully, the Contractor must document steps taken to subcontract with another certified DBE Contractor. Such documentation shall include no less than the following:

- (1) Proof of written notification to certified DBE Contractors by certified mail that their interest is solicited in subcontracting the work defaulted by the previous DBE or in subcontracting other items of work in the contract.

- (2) If the Prime Contractor is a certified DBE firm, only the value of the work actually performed by the DBE Prime can be counted towards the project goal, along with any work subcontracted to a certified DBE firm.
- (3) If the Contractor is not a DBE, the work subcontracted to a certified DBE Contractor will be counted toward the goal.
- (4) The Contractor may count toward the goal a portion of the total dollar value of a contract with a joint venture eligible under the standards of this provision equal to the percentage of the DBE partner in the joint venture.
- (5) Expenditures to DBEs that perform a commercially useful function may be counted toward the goal. A business is considered to perform a commercially useful function when it is responsible for the execution of a distinct element of the work and carries out its responsibilities by actually performing, managing, and supervising the work involved.
- (6) The Contractor may count 100% of the expenditures for materials and supplies obtained from certified DBE suppliers and manufacturers that produce goods from raw materials or substantially alters them for resale provided the suppliers and manufacturers assume the actual and contractual responsibility for the provision of the materials and supplies. The Contractor may count sixty percent (60%) of the expenditures to suppliers that are not manufacturers, provided the supplier performs a commercially useful function in the supply process. Within 30 days after receipt of the materials, the Contractor shall furnish to the DBE Coordinator invoices from the certified supplier to verify the DBE goal.
- (7) Any work that a certified DBE firm subcontracts or sub-subcontracts to a non-DBE firm will not count towards the DBE goal.
- (8) Only the dollars actually paid to the DBE firm may be counted towards the DBE goal.

Failure of the Contractor to demonstrate good faith efforts to replace a DBE Subcontractor that cannot perform as intended with another DBE Subcontractor, when required, shall be a breach of contract and may be just cause to be disqualified from further bidding for a period of up to 12 months after notification by certified mail.

PRE-BID MEETING

A pre-bid meeting will be held in Amphitheater 1 & 2 of the Hilton Jackson located at I-55 and County Line Road, Jackson, Mississippi at 2:00 P.M. on the day preceding the date of the bid opening.

This meeting is to inform DBE firms of subcontracting and material supply opportunities. Attendance at this meeting is considered of prime importance in demonstrating good faith effort to meet the contract goal.

PARTICIPATION / DBE CREDIT

Participation shall be counted toward meeting the goal in this contract as follows:

- (1) If the Prime Contractor is a certified DBE firm, only the value of the work actually performed by the DBE Prime can be counted towards the project goal, along with any work subcontracted to a certified DBE firm.
- (2) If the Contractor is not a DBE, the work subcontracted to a certified DBE Contractor will be counted toward the goal.
- (3) The Contractor may count toward the goal a portion of the total dollar value of a contract with a joint venture eligible under the standards of this provision equal to the percentage of the DBE partner in the joint venture.
- (4) Expenditures to DBEs that perform a commercially useful function may be counted toward the goal. A business is considered to perform a commercially useful function when it is responsible for the execution of a distinct element of the work and carries out its responsibilities by actually performing, managing, and supervising the work involved.
- (5) The Contractor may count 100% of the expenditures for materials and supplies obtained from certified DBE suppliers and manufacturers that produce goods from raw materials or substantially alters them for resale provided the suppliers and manufacturers assume the actual and contractual responsibility for the provision of the materials and supplies. The Contractor may count sixty percent (60%) of the expenditures to suppliers that are not manufacturers, provided the supplier performs a commercially useful function in the supply process. Within 30 days after receipt of the materials, the Contractor shall furnish to the DBE Coordinator invoices from the certified supplier to verify the DBE goal.
- (6) Any work that a certified DBE firm subcontracts or sub-subcontracts to a non-DBE firm will not count towards the DBE goal.
- (7) Only the dollars actually paid to the DBE firm may be counted towards the DBE goal. The participation of a DBE Firm cannot be counted towards the Prime Contractor's DBE goal until the amount being counted towards the goal has been paid to the DBE.

AWARD

Award of this contract to the low bidder will be contingent upon the following conditions:

- (1) Concurrence from Federal Highway Administration, when applicable.
- (2) Bidder must submit to the Office of Civil Rights for approval, Form OCR-481 (DBE Commitment) no later than the 3rd business day after opening of the bids to satisfy the Department and that adequate good faith efforts have been made to meet the contract goal. For answers to questions regarding Form OCR-481, contact the MDOT Office of Civil Rights at (601) 359-7466.
- (3) Bidder must include OCR-485 information with their bid proposal listing all firms that submitted quotes for material supplies or items to be subcontracted. OCR-485 information

must be included with the bid proposal. If the OCR-485 information is not included as part of bid proposal, your bid will be deemed irregular.

Prior to the start of any work, the bidder must notify the Project Engineer, in writing, of the name of the designated "DBE Liaison Officer" for this project. This notification must be posted on the bulletin board at the project site.

DEFAULT

If the contract goal established by MDOT in this proposal is 1% or greater, it must be met to fulfill the terms of the contract. The Contractor may list DBE Subcontractors and items that exceed MDOT's contract goal, but should unforeseen problems arise that would prevent a DBE from completing its total commitment percentage, the Contractor will meet the terms of the contract as long as it meets or exceeds MDOT's Contract Goal. For additional information, refer to "Replacement" section of this Notice.

DBE REPORTS

- (1) OCR-481: Refer to "CONTRACT GOAL" section of this Notice to Bidders for information regarding this form.
- (2) OCR-482: OCR-482: At the conclusion of the project, before the final estimate is paid and the project is closed out, the Prime Contractor will submit to the Project Engineer for verification of quantities and further handling Form OCR-482 whereby the Contractor certifies to the amounts of payments made to all Contractors / Suppliers over the life of the contract. The Project Engineer shall submit the completed Form OCR-482 to the DBE Coordinator (Office of Civil Rights). Final acceptance of the project is dependent upon Contract Administration Division's receipt of completed Form OCR-482 which they will receive from the Office of Civil Rights.
- (3) OCR-483: The Project Engineer/Inspector will complete Form OCR-483, the Commercially Useful Function (CUF) Performance Report, in accordance with MDOT S.O.P. No. OCR-03-09-01-483. Evaluations reported on this form are used to determine whether or not the DBE firm is performing a CUF. The Prime Contractor should take corrective action when the report contains any negative evaluations. DBE credit may be disallowed and/or other sanctions imposed if it is determined the DBE firm is not performing a CUF. This form should also be completed and returned to the DBE Coordinator (Office of Civil Rights).
- (4) OCR-484: Each month, the Prime Contractor will submit to the Project Engineer OCR-484 that certifies payments to all Subcontractors and shows all firms even if the Prime Contractor has paid no monies to the firm during that estimate period (negative report). The Project Engineer will attach the form to the monthly estimate before forwarding to the Contract Administration Division for further processing. Failure of the Contractor to submit the OCR-484 will result in the estimate not being processed and paid.

- (5) OCR-485: ALL BIDDERS must submit signed form with bid proposal of all firms that submitted quotes for material supplies or items to be subcontracted. If the OCR-485 information is not included as part of bid proposal, the bid will be deemed irregular.
- (6) OCR-487: Only used by Prime Contractors that are certified DBE firms. This form is used in determining the exact percentage of DBE credit for the specified project. It should be returned to MDOT with the OCR-481 form, or can also be returned with the Permission to Subcontract Forms (CAD-720, CAD-725 and CAD-521).

DBE Forms, can be obtained from the Office of Civil Rights Division, MDOT Administration Building, 401 North West Street, Jackson, MS, or at www.gomdot.com under Divisions, Civil Rights, and Forms.

SANCTIONS

The Department has the option to enforce any of the following penalties for failure of the Prime Contractor to fulfill the DBE goal as stated on the OCR-481 form or any violations of the DBE program guidelines:

- (1) Disallow credit towards the DBE goal
- (2) Withhold progress estimate payments
- (3) Deduct from the final estimate or recover an amount equal to the unmet portion of the DBE goal which may include additional monetary penalties as outlined below based on the number of offenses and the severity of the violation as determined by MDOT.

1 st Offense	10% of unmet portion of goal	or	\$5,000 lump sum payment	or	Both
2 nd Offense	20% of unmet portion of goal	or	\$10,000 lump sum payment	or	Both
3 rd Offense	40% of unmet portion of goal	or	\$20,000 lump sum payment	or	\$20,000 lump sum payment and debarment

- (4) Debar the Contractor involved from bidding on MDOT federally funded projects.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 9

CODE: (IS)

DATE: 03/01/2017

SUBJECT: Federal Bridge Formula

Bidders are hereby advised that the latest revision of Federal Highway Administration Publication No. FHWA-HOP-06-105, **BRIDGE FORMULA WEIGHTS**, dated August 2006, is made a part of this contract when applicable.

Prior to the preconstruction conference, the Contractor shall advise the Engineer, in writing, what materials, if any, will be delivered to the jobsite via Interstate route(s).

Copies of the **BRIDGE FORMULA WEIGHTS** publication may be obtained by contacting:

Federal Highway Administration
400 7th Street, SW
Washington, DC 20590
(202) 366-2212

or

http://www.ops.fhwa.dot.gov/Freight/publications/brdg_frm_wgths/bridge_formula_all_rev.pdf

An on line **BRIDGE FORMULA WEIGHTS CALCULATOR** is available at

http://ops.fhwa.dot.gov/freight/sw/brdgcalc/calc_page.htm

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 296

CODE: (SP)

DATE: 07/25/2017

SUBJECT: Reduced Speed Limit Signs

Bidders are advised that when the plans or contract documents require the speed limit on a project to be reduced, the Contractor shall begin work within 48 hours of installing the reduced speed limit signs. Should the Contractor not start work or have no plans to start work within 48 hours of installing the signs, the reduced speed limit signs shall be covered and existing speed limit signs uncovered.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 445

CODE: (SP)

DATE: 10/10/2017

SUBJECT: Mississippi Agent or Qualified Nonresident Agent

Bidders are hereby advised of the requirements of Subsections 102.08, 103.05.2, and 107.14.2.1 of the *2017 Standard Specifications for Road and Bridge Construction* as it refers to bonding agents. Proposal guaranties, bonds, and liability insurance policies must be signed by a **Mississippi Agent or Qualified Nonresident Agent.**

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 516

CODE: (IS)

DATE: 11/28/2017

SUBJECT: Errata and Modifications to the 2017 Standard Specifications

<u>Page</u>	<u>Subsection</u>	<u>Change</u>
16	102.06	In the seventh full paragraph, change “Engineer” to “Director.”
33	105.05.1	In the sixth sentence, change “Contract Administration Engineer” to “Contract Administration Director.”
34	105.05.2.1	In subparagraph 2, change “SWPPP, ECP” to “SWPPP and the ECP”
35	105.05.2.2	In subparagraphs 2, add “ and” to the end of the sentence. In subparagraph 3, remove “, and” and add “.”.
90	109.04.2	In the last paragraph of subparagraph (a), place a period “.” at the end of the sentence.
93	109.04.2	In the last paragraph of subparagraph (g), place a period “.” at the end of the sentence. Also, in the first paragraph of subparagraph (h), place a period “.” at the end of the sentence.
97	109.07	Under ADJUSTMENT CODE, subparagraph (A1), change “HMA mixture” to “Asphalt mixtures.”
98	109.11	In the third sentence, change “Engineer” to “Director.”
219	308.04	In the last sentence of the last paragraph, change “Contractor’s decision” to “Engineer’s decision.”
300	405.02.5.9	In the first sentence of the second paragraph, change “Hot Mix Asphalt” to “Asphalt Mixtures.”
502	630.01.1	In the first paragraph, change “AASHTO” to “AASHTO’s LRFD”.
636	646.05	Change “each” to “per each” for the pay item units of payment.
640	656.02.6.2	In item 7), change “down stream” to “downstream”.
688	630.03.2	Change the subsection number from “630.03.2” to “680.03.2.”

725 702.08.3 In the second sentence of the first paragraph, change “hot-mix” to “asphalt.”

954 804.02.13.1.6 In the definition for “M” in the % Reduction formulas, change “paragraph 7.3” to “paragraph 5.3.”

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 977

CODE: (IS)

DATE: 07/25/2018

SUBJECT: DUNS Requirement for Federal Funded Projects

Bidders are advised that the Prime Contractor must maintain a current registration in the System for Award Management (<http://www.sam.gov>) at all times during this project. A Dun and Bradstreet Data Universal Numbering System (DUNS) Number (<http://www.dnb.com>) is one of the requirements for registration in the System for Award Management.

Bidders are also advised that prior to the award of this contract, they MUST be registered, active, and have no active exclusions in the System for Award Management.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 1206

CODE: (SP)

DATE: 10/16/2018

SUBJECT: MASH Compliant Devices

Bidders are hereby advised that the Standard Specifications may require certain traffic control and permanent safety hardware devices to meet the requirements of the Manual for Assessing Safety Hardware (MASH). However, devices meeting the requirements of NCHRP Report 350 will be allowed until the mandatory effective date for MASH compliance. The following table shows the effective dates for MASH compliant devices.

Device	Effective Date for MASH Compliance
W-beam barriers, cast-in-place concrete barriers	December 31, 2017
W-beam terminals - non-flared	June 30, 2018
Crash cushions	December 31, 2018
Cable barriers, cable barrier terminals, bridge rails, transitions, all other longitudinal barriers including portable barriers installed permanently, W-beam terminals - flared, all other terminals, sign supports, all other breakaway hardware	December 31, 2019

Temporary work zone devices, including portable barriers manufactured after December 31, 2019, must have been successfully tested to the 2016 Edition of MASH. Such devices manufactured on or before this date and successfully tested to NCHRP Report 350 or the 2009 Edition of MASH may continue to be used throughout their normal service lives.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 1225

CODE: (SP)

DATE: 11/13/2018

SUBJECT: Early Notice to Proceed

Bidders are advised that if an early notice to proceed is allowed by the Department and the Contractor experiences problems or delays between the early notice to proceed date and the original notice to proceed date, this shall not be justification for any monetary compensation or an extension of contract time.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 1226

CODE: (SP)

DATE: 11/16/2018

SUBJECT: Material Storage Under Bridges

Bidders are advised that Subsection 106.08 of the Standard Specifications allows the Contractor to store materials and equipment on portions of the right-of-way. However, the Contractor will not be allowed to store or stockpile materials under bridges without written permission from the Project Engineer. The Contractor shall submit a detailed request of all proposed materials to be stored under bridges to the Engineer a minimum of 14 calendar days prior to anticipated storage. This detail shall include, but not limited to, bridge location, material type, material quantity, and duration of storage. The Project Engineer and any other needed Division will review this information and determine whether to grant approval. The Contractor shall not store any material under any bridge without written approval from the Project Engineer.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 1241

CODE: (SP)

DATE: 11/27/2018

SUBJECT: Fuel and Material Adjustments

Bidder's attention is brought to the last paragraph of Subsection 109.07 of the Standard Specifications which states that no fuel or material adjustment will be made after the completion of contract time. Any fuels consumed or materials incorporated into the work during the monthly estimate period falling wholly after the expiration of contract time will not be subject a fuel or material adjustment.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 1972

CODE: (SP)

DATE: 10/15/2019

SUBJECT: Contract Time

PROJECT: HSIP-0099-01(010) / 107573301 – Washington County

The calendar date for completion of work to be performed by the Contractor for this project shall be **July 30, 2021** which date or extended date as provided in Subsection 108.06 shall be the end of contract time. It is anticipated that the Notice of Award will be issued no later than **December 10, 2019** and the effective date of the Notice to Proceed / Beginning of Contract Time will be **March 12, 2020**.

Should the Contractor request a Notice to Proceed earlier than **March 12, 2020** and it is agreeable with the Department for an early Notice to Proceed, the requested date will become the new Notice to Proceed date.

All requests for an early Notice to Proceed shall be sent to the Project Engineer who will forward it to the Contract Administration Division.

Contract time was established with the assumption that Shop Drawing Submittals and Fabrication will begin upon Notice of Award.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 1973

DATE: 10/15/2019

SUBJECT: Specialty Items

PROJECT: HSIP-0099-01(010)/107573301 - WASHINGTON

Pursuant to the provisions of Section 108, the following work items are hereby designated as "Specialty Items" for this contract. Bidders are reminded that these items must be subcontracted in order to be considered as specialty items.

CATEGORY: DISPOSAL OF BUILDINGS, RIGHT OF WAY CLEARING & GRUBBING

Line No	Pay Item	Description
0030	202-B240	Removal of Traffic Stripe

CATEGORY: PAVEMENT STRIPING AND MARKING

Line No	Pay Item	Description
0080	626-A001	6" Thermoplastic Double Drop Traffic Stripe, Skip White
0090	626-B002	6" Thermoplastic Double Drop Traffic Stripe, Continuous White
0100	626-C002	6" Thermoplastic Double Drop Edge Stripe, Continuous White
0110	626-D001	6" Thermoplastic Double Drop Traffic Stripe, Skip Yellow
0120	626-E001	6" Thermoplastic Double Drop Traffic Stripe, Continuous Yellow
0130	626-G004	Thermoplastic Double Drop Detail Stripe, White
0140	626-G005	Thermoplastic Double Drop Detail Stripe, Yellow
0150	626-H001	Thermoplastic Double Drop Legend, White
0160	626-H002	Thermoplastic Double Drop Legend, White
0170	627-J001	Two-Way Clear Reflective High Performance Raised Markers
0180	627-K001	Red-Clear Reflective High Performance Raised Markers
0190	627-L001	Two-Way Yellow Reflective High Performance Raised Markers

CATEGORY: SURVEY AND STAKING

Line No	Pay Item	Description
0420	699-A001	Roadway Construction Stakes

CATEGORY: TRAFFIC CONTROL - PERMANENT

Line No	Pay Item	Description
0200	630-A001	Standard Roadside Signs, Sheet Aluminum, 0.080" Thickness
0210	630-A003	Standard Roadside Signs, Sheet Aluminum, 0.125" Thickness
0220	630-A005	Standard Roadside Signs, Sheet Aluminum, 0.1" Thickness
0230	630-B002	Interstate Directional Signs, Bolted Extruded Aluminum Panels, Ground Mounted
0240	630-C001	Square Tube Posts, 4.0 lb/ft
0250	630-C004	Square Tube Posts, 9.0 lb/ft
0260	630-C005	Square Tube Posts, 2.0 lb/ft
0270	630-C1001	Square Post Inner Sleeve

CATEGORY: TRAFFIC CONTROL - PERMANENT

Line No	Pay Item	Description
0280	630-D007	Structural Steel Beams, W6 x 15
0290	630-D008	Structural Steel Beams, W6 x 9
0300	630-E002	Structural Steel Angles & Bars, 3" x 3" x 1/4" Angles
0310	630-E004	Structural Steel Angles & Bars, 7/16" x 2 1/2" Flat Bar

CATEGORY: TRAFFIC CONTROL - TEMPORARY

Line No	Pay Item	Description
0430	907-619-E3001	Changeable Message Sign

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 1974

CODE: (SP)

DATE: 10/15/2019

SUBJECT: Cooperation Between Contractors

PROJECT: HSIP-0099-01(010) / 107573301 – Washington County

The Bidder's attention is hereby called to Subsection 105.07, Cooperation between Contractors, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction.

The Bidder is advised that this project adjoins the following project that may be under construction before the Completion Date set forth in this contract:

NH-0099-01(011) / 107723301 – Washington County, Mill & Overlay approximately 5 miles of US 82 from Hughes Street to Woodlawn Drive

The Contractor shall cooperate in all respects and shall coordinate construction of all phases of work with the Contractor of the adjoining projects. Failure to coordinate work schedules, such as but not limited to lane closures, shall not be reason to modify contract time.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 1975

CODE: (SP)

DATE: 10/17/2019

SUBJECT: Lane Closure Restrictions

PROJECT: HSIP-0099-01(010) / 107573301 -- Washington County

Bidders are hereby advised of the following restrictions on the above captioned project.

The Contractor shall be allowed to erect a single lane closure between the hours of **9:00 A.M. to 3:00 PM on Monday through Friday** and between the hours of **7:00 A.M. to 4:00 PM on Saturday**.

Lane closures will be **limited to five (5) hours** in length.

No excuses will be accepted by the Department, and the Contractor will be charged a fee of **\$500.00** for each full or partial five minute period until the roadway is back in compliance with the restrict requirements stated above.

For the purpose of this contract, official time shall be the announced time available at the Jackson area telephone number (601) 355-9311.

Note:

See NTB entitled Traffic Signal Installation Requirements for additional restrictions.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 2050

CODE: (SP)

DATE: 10/10/2019

SUBJECT: Traffic Signal Installation Requirements

PROJECT: HSIP-0099-01(010) / 107573301 -- Washington County

The Bidders attention is called to General Note 13 on Working Sheet TSI-GN1, Sheet Number 2001, in the plans.

Traffic signal downtime shall be limited to one (1) intersection at a time.

Traffic signal downtime shall last no more than five (5) hours.

The Contractor will be charged a fee of **\$500.00** for each full or partial five (5) minutes over the time restriction stated above.

For the purpose of this contract, official time shall be the announced time available at the Jackson area telephone number (601) 355-9311.

General Decision Number: MS190120 01/04/2019 MS120

Superseded General Decision Number: MS20180224

State: Mississippi

Construction Type: Highway

County: Washington County in Mississippi.

HIGHWAY CONSTRUCTION PROJECTS

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.60 for calendar year 2019 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.60 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2019. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate, if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/04/2019

SUMS2010-043 08/04/2014

	Rates	Fringes
CARPENTER (Form Work Only).....	\$ 14.28	0.00
CARPENTER, Excludes Form Work....	\$ 14.03	0.00
CEMENT MASON/CONCRETE FINISHER...	\$ 14.09	0.00
ELECTRICIAN.....	\$ 21.80	7.93
HIGHWAY/PARKING LOT STRIPING:		
Truck Driver (Line Striping		
Truck).....	\$ 14.11	0.00

INSTALLER - GUARDRAIL.....	\$ 11.42	0.00
INSTALLER - SIGN.....	\$ 11.73	0.00
IRONWORKER, REINFORCING.....	\$ 16.29	0.00
LABORER: Common or General, Including Asphalt Raking, Shoveling, Spreading.....	\$ 10.49	0.00
LABORER: Concrete Worker.....	\$ 10.91	0.00
LABORER: Flagger.....	\$ 11.48	0.00
LABORER: Grade Checker.....	\$ 11.32	0.00
LABORER: Landscape.....	\$ 9.77	0.00
LABORER: Mason Tender - Cement/Concrete.....	\$ 11.08	0.00
LABORER: Pipelayer.....	\$ 11.34	0.00
LABORER: Laborer-Cones/ Barricades/Barrels - Setter/Mover/Sweeper.....	\$ 12.93	0.00
OPERATOR: Asphalt Spreader.....	\$ 16.03	0.00
OPERATOR: Backhoe/Excavator/Trackhoe.....	\$ 15.00	0.00
OPERATOR: Broom/Sweeper.....	\$ 10.77	0.00
OPERATOR: Bulldozer.....	\$ 13.67	0.00
OPERATOR: Concrete Saw.....	\$ 12.95	0.00
OPERATOR: Crane.....	\$ 25.75	0.00
OPERATOR: Distributor.....	\$ 12.38	0.00
OPERATOR: Drill.....	\$ 19.22	0.00
OPERATOR: Grader/Blade.....	\$ 13.97	0.00
OPERATOR: Grinding/Grooving Machine.....	\$ 19.83	2.26
OPERATOR: Loader.....	\$ 12.21	0.00
OPERATOR: Mechanic.....	\$ 14.67	0.00
OPERATOR: Milling Machine.....	\$ 18.25	0.00
OPERATOR: Oiler.....	\$ 12.33	0.48
OPERATOR: Paver (Asphalt, Aggregate, and Concrete).....	\$ 12.69	0.00

OPERATOR: Piledriver.....	\$ 15.13	0.00
OPERATOR: Roller (All Types)....	\$ 10.81	0.00
OPERATOR: Scraper.....	\$ 12.96	0.00
OPERATOR: Tractor.....	\$ 10.05	0.00
OPERATOR: Trencher.....	\$ 15.00	0.00
TRUCK DRIVER: Flatbed Truck.....	\$ 12.64	0.00
TRUCK DRIVER: Lowboy Truck.....	\$ 13.80	0.00
TRUCK DRIVER: Mechanic.....	\$ 14.08	0.00
TRUCK DRIVER: Off the Road Truck.....	\$ 12.29	0.00
TRUCK DRIVER: Water Truck.....	\$ 9.44	0.00
TRUCK DRIVER: Dump Truck (All Types).....	\$ 10.00	0.00
TRUCK DRIVER: Semi/Trailer Truck.....	\$ 15.29	0.00

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date

for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board

U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

SUPPLEMENT TO FORM FHWA-1273

DATE: 12/17/2018

SUBJECT: **Federal Contract Provisions for Subcontracts and Cargo Preference Act**

Federal Contract Provisions for Subcontracts

All subcontracts shall be in writing and contain all pertinent provisions and requirements of the prime contract.

Each “Request for Permission to Subcontract” (Mississippi Department of Transportation Form CAD-720) shall include a copy of the subcontract. The federal contract provisions (FHWA-1273, SUPPLEMENT TO FORM FHWA-1273, NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY (EXECUTIVE ORDER 11246), DAVIS-BACON AND RELATED ACT PROVISIONS (WAGE RATES)) must be physically incorporated as part of the subcontract. A completed Mississippi Department of Transportation Form CAD-521 and Form CAD-725 must be attached to the CAD-720.

Cargo Preference Act

The Contractor is hereby advised of the requirements set forth in the following Attachment (Title 46 - Shipping) as it pertains to the implementation of Cargo Preference Act (CPA) requirements in the Federal-aid Highway Program.

By signing this contract, the Contractor agrees to conform to the requirements of the CPA.

Attachment

Title 46- Shipping

Volume: 8

Date: 2014-10-01

Original Date: 2014-10-01

Title: Section 381.7 - Federal Grant, Guaranty, Loan and Advance at Funds Agreements.

Context: Title 46- Shipping. CHAPTER II- MARITIME ADMINISTRATION, DEPARTMENT OF TRANSPORTATION. SUBCHAPTER J - MISCELLANEOUS. PART 381 - CARGO PREFERENCE-U.S.-FLAG VESSELS.

§ 381.7 Federal Grant, Guaranty, Loan and Advance of Funds Agreements.

In order to insure a fair and reasonable participation by privately owned United States-flag commercial vessels in transporting cargoes which are subject to the Cargo Preference Act of 1954 and which are generated by U.S. Government Grant, Guaranty, Loan and/or Advance of Funds Programs, the head of each affected department or agency shall require appropriate clauses to be inserted in those Grant, Guaranty, Loan and/or Advance of Funds Agreements and all third party contracts executed between the borrower/grantee and other parties, where the possibility exists for ocean transportation of items procured, contracted for or otherwise obtained by or on behalf of the grantee, borrower, or any of their contractors or subcontractors. The clauses required by this part shall provide that at least 50 percent of the freight revenue and tonnage of cargo generated by the U.S. Government Grant, Guaranty, Loan or Advance of Funds be transported on privately owned United States-flag commercial vessels. These clauses shall also require that all parties provide to the Maritime Administration the necessary shipment information as set forth in § 381.3. A copy of the appropriate clauses required by this part shall be submitted by each affected agency or department to the Secretary, Maritime Administration, for approval no later than 30 days after the effective date of this part. The following are suggested acceptable clauses with respect to the use of United States-flag vessels to be incorporated in the Grant, Guaranty, Loan and/or Advance of Funds Agreements as well as contracts and subcontracts resulting therefrom:

(a) *Agreement Clauses.* "Use of United States-flag vessels:

"(1) Pursuant to Pub. L 664 (43 U.S.C. 1241(b)) at least 50 percent of any equipment, materials or commodities procured, contracted for or otherwise obtained with funds granted, guaranteed, loaned, or advanced by the U.S. Government under this agreement, and which may be transported by ocean vessel, shall be transported on privately owned United States-flag commercial vessels, if available.

"(2) Within 20 days following the date of loading for shipments originating within the United States or within 30 working days following the date of loading for shipments originating outside the United States, a legible copy of a rated, 'on-board' commercial ocean bill-of-lading in English for each shipment of cargo described in paragraph (a)(1) of this section shall be furnished to both the Contracting Officer (through the prime contractor in the case of subcontractor bills-of-lading) and to the Division of National Cargo, Office of Market Development, Maritime Administration, Washington, DC 20590."

(b) *Contractor and Subcontractor Clauses.* "Use of United States-flag vessels: The contractor agrees --

"(1) To utilize privately owned United States-flag commercial vessels to ship at least 50 percent of the gross tonnage (computed separately for dry bulk carriers, dry cargo liners, and tankers) involved, whenever shipping any equipment, material, or commodities pursuant to this contract, to the extent such vessels are available at fair and reasonable rates for United States-flag commercial vessels.

"(2) To furnish within 20 days following the date of loading for shipments originating within the United

States or within 30 working days following the date of loading for shipments originating outside the United States, a legible copy of a rated, 'on-board' commercial ocean bill-of-lading in English for each shipment of cargo described in paragraph (b) (1) of this section to both the Contracting Officer (through the prime contractor in the case of subcontractor bills-of-lading) and to the Division of National Cargo, Office of Market Development, Maritime Administration, Washington, DC 20590.

"(3) To insert the substance of the provisions of this clause in all subcontracts issued pursuant to this contract."

(Reorganization Plans No.21 of 1950(64 Stat. 1273) and No. 7 of 1961 (75 Stat. 840) as amended by Pub. L 91.469 (84 Stat 1036) and Department of Commerce Organization Order 10-8 (38 FR 19707, July 23, 1973)) (42 FR 57126, Nov. 1, 1977]

**REQUIRED CONTRACT PROVISIONS
FEDERAL-AID CONSTRUCTION CONTRACTS**

- I. General
- II. Nondiscrimination
- III. Nonsegregated Facilities
- IV. Davis-Bacon and Related Act Provisions
- V. Contract Work Hours and Safety Standards Act Provisions
- VI. Subletting or Assigning the Contract
- VII. Safety: Accident Prevention
- VIII. False Statements Concerning Highway Projects
- IX. Implementation of Clean Air Act and Federal Water Pollution Control Act
- X. Compliance with Governmentwide Suspension and Debarment Requirements
- XI. Certification Regarding Use of Contract Funds for Lobbying

ATTACHMENTS

A. Employment and Materials Preference for Appalachian Development Highway System or Appalachian Local Access Road Contracts (included in Appalachian contracts only)

I. GENERAL

1. Form FHWA-1273 must be physically incorporated in each construction contract funded under Title 23 (excluding emergency contracts solely intended for debris removal). The contractor (or subcontractor) must insert this form in each subcontract and further require its inclusion in all lower tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services).

The applicable requirements of Form FHWA-1273 are incorporated by reference for work done under any purchase order, rental agreement or agreement for other services. The prime contractor shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Form FHWA-1273 must be included in all Federal-aid design-build contracts, in all subcontracts and in lower tier subcontracts (excluding subcontracts for design services, purchase orders, rental agreements and other agreements for supplies or services). The design-builder shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Contracting agencies may reference Form FHWA-1273 in bid proposal or request for proposal documents, however, the Form FHWA-1273 must be physically incorporated (not referenced) in all contracts, subcontracts and lower-tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services related to a construction contract).

2. Subject to the applicability criteria noted in the following sections, these contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract.

3. A breach of any of the stipulations contained in these Required Contract Provisions may be sufficient grounds for withholding of progress payments, withholding of final payment, termination of the contract, suspension / debarment or any other action determined to be appropriate by the contracting agency and FHWA.

4. Selection of Labor: During the performance of this contract, the contractor shall not use convict labor for any purpose within the limits of a construction project on a Federal-aid highway unless it is labor performed by convicts who are on parole, supervised release, or probation. The term Federal-aid highway does not include roadways functionally classified as local roads or rural minor collectors.

II. NONDISCRIMINATION

The provisions of this section related to 23 CFR Part 230 are applicable to all Federal-aid construction contracts and to all related construction subcontracts of \$10,000 or more. The provisions of 23 CFR Part 230 are not applicable to material supply, engineering, or architectural service contracts.

In addition, the contractor and all subcontractors must comply with the following policies: Executive Order 11246, 41 CFR 60, 29 CFR 1625-1627, Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The contractor and all subcontractors must comply with: the requirements of the Equal Opportunity Clause in 41 CFR 60-1.4(b) and, for all construction contracts exceeding \$10,000, the Standard Federal Equal Employment Opportunity Construction Contract Specifications in 41 CFR 60-4.3.

Note: The U.S. Department of Labor has exclusive authority to determine compliance with Executive Order 11246 and the policies of the Secretary of Labor including 41 CFR 60, and 29 CFR 1625-1627. The contracting agency and the FHWA have the authority and the responsibility to ensure compliance with Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), and Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The following provision is adopted from 23 CFR 230, Appendix A, with appropriate revisions to conform to the U.S. Department of Labor (US DOL) and FHWA requirements.

1. Equal Employment Opportunity: Equal employment opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (28 CFR 35, 29 CFR 1630, 29 CFR 1625-1627, 41 CFR 60 and 49 CFR 27) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140 shall constitute the EEO and specific affirmative action standards for the contractor's project activities under

this contract. The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR 35 and 29 CFR 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:

a. The contractor will work with the contracting agency and the Federal Government to ensure that it has made every good faith effort to provide equal opportunity with respect to all of its terms and conditions of employment and in their review of activities under the contract.

b. The contractor will accept as its operating policy the following statement:

"It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, color, national origin, age or disability. Such action shall include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, pre-apprenticeship, and/or on-the-job training."

2. EEO Officer: The contractor will designate and make known to the contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active EEO program and who must be assigned adequate authority and responsibility to do so.

3. Dissemination of Policy: All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action, or who are substantially involved in such action, will be made fully cognizant of, and will implement, the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:

a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer.

b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.

c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minorities and women.

d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.

e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

4. Recruitment: When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minorities and women in the area from which the project work force would normally be derived.

a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minorities and women. To meet this requirement, the contractor will identify sources of potential minority group employees, and establish with such identified sources procedures whereby minority and women applicants may be referred to the contractor for employment consideration.

b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, the contractor is expected to observe the provisions of that agreement to the extent that the system meets the contractor's compliance with EEO contract provisions. Where implementation of such an agreement has the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Federal nondiscrimination provisions.

c. The contractor will encourage its present employees to refer minorities and women as applicants for employment. Information and procedures with regard to referring such applicants will be discussed with employees.

5. Personnel Actions: Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, national origin, age or disability. The following procedures shall be followed:

a. The contractor will conduct periodic inspections of project sites to insure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.

b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.

c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.

d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with its obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of their avenues of appeal.

6. Training and Promotion:

a. The contractor will assist in locating, qualifying, and increasing the skills of minorities and women who are

applicants for employment or current employees. Such efforts should be aimed at developing full journey level status employees in the type of trade or job classification involved.

b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs, i.e., apprenticeship, and on-the-job training programs for the geographical area of contract performance. In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision. The contracting agency may reserve training positions for persons who receive welfare assistance in accordance with 23 U.S.C. 140(a).

c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.

d. The contractor will periodically review the training and promotion potential of employees who are minorities and women and will encourage eligible employees to apply for such training and promotion.

7. Unions: If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use good faith efforts to obtain the cooperation of such unions to increase opportunities for minorities and women. Actions by the contractor, either directly or through a contractor's association acting as agent, will include the procedures set forth below:

a. The contractor will use good faith efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minorities and women for membership in the unions and increasing the skills of minorities and women so that they may qualify for higher paying employment.

b. The contractor will use good faith efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, national origin, age or disability.

c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the contracting agency and shall set forth what efforts have been made to obtain such information.

d. In the event the union is unable to provide the contractor with a reasonable flow of referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, national origin, age or disability; making full efforts to obtain qualified and/or qualifiable minorities and women. The failure of a union to provide sufficient referrals (even though it is obligated to provide exclusive referrals under the terms of a collective bargaining agreement) does not relieve the contractor from the requirements of this paragraph. In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the contracting agency.

8. Reasonable Accommodation for Applicants / Employees with Disabilities: The contractor must be familiar

with the requirements for and comply with the Americans with Disabilities Act and all rules and regulations established there under. Employers must provide reasonable accommodation in all employment activities unless to do so would cause an undue hardship.

9. Selection of Subcontractors, Procurement of Materials and Leasing of Equipment: The contractor shall not discriminate on the grounds of race, color, religion, sex, national origin, age or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment. The contractor shall take all necessary and reasonable steps to ensure nondiscrimination in the administration of this contract.

a. The contractor shall notify all potential subcontractors and suppliers and lessors of their EEO obligations under this contract.

b. The contractor will use good faith efforts to ensure subcontractor compliance with their EEO obligations.

10. Assurance Required by 49 CFR 26.13(b):

a. The requirements of 49 CFR Part 26 and the State DOT's U.S. DOT-approved DBE program are incorporated by reference.

b. The contractor or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the contracting agency deems appropriate.

11. Records and Reports: The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following the date of the final payment to the contractor for all contract work and shall be available at reasonable times and places for inspection by authorized representatives of the contracting agency and the FHWA.

a. The records kept by the contractor shall document the following:

(1) The number and work hours of minority and non-minority group members and women employed in each work classification on the project;

(2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women; and

(3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minorities and women;

b. The contractors and subcontractors will submit an annual report to the contracting agency each July for the duration of the project, indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on [Form FHWA-1391](#). The staffing data should represent the project work force on board in all or any part of the last payroll period preceding the end of July. If on-the-job training is being required by special provision, the contractor

will be required to collect and report training data. The employment data should reflect the work force on board during all or any part of the last payroll period preceding the end of July.

III. NONSEGREGATED FACILITIES

This provision is applicable to all Federal-aid construction contracts and to all related construction subcontracts of \$10,000 or more.

The contractor must ensure that facilities provided for employees are provided in such a manner that segregation on the basis of race, color, religion, sex, or national origin cannot result. The contractor may neither require such segregated use by written or oral policies nor tolerate such use by employee custom. The contractor's obligation extends further to ensure that its employees are not assigned to perform their services at any location, under the contractor's control, where the facilities are segregated. The term "facilities" includes waiting rooms, work areas, restaurants and other eating areas, time clocks, restrooms, washrooms, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing provided for employees. The contractor shall provide separate or single-user restrooms and necessary dressing or sleeping areas to assure privacy between sexes.

IV. DAVIS-BACON AND RELATED ACT PROVISIONS

This section is applicable to all Federal-aid construction projects exceeding \$2,000 and to all related subcontracts and lower-tier subcontracts (regardless of subcontract size). The requirements apply to all projects located within the right-of-way of a roadway that is functionally classified as Federal-aid highway. This excludes roadways functionally classified as local roads or rural minor collectors, which are exempt. Contracting agencies may elect to apply these requirements to other projects.

The following provisions are from the U.S. Department of Labor regulations in 29 CFR 5.5 "Contract provisions and related matters" with minor revisions to conform to the FHWA-1273 format and FHWA program requirements.

1. Minimum wages

a. All laborers and mechanics employed or working upon the site of the work, will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages

paid to such laborers or mechanics, subject to the provisions of paragraph 1.d. of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph 1.b. of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

b. (1) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(i) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(ii) The classification is utilized in the area by the construction industry; and

(iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(2) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(3) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Wage and Hour Administrator for determination. The Wage and Hour Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise

the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(4) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs 1.b.(2) or 1.b.(3) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

c. Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

d. If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

2. Withholding

The contracting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor under this contract, or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the contracting agency may, after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

3. Payrolls and basic records

a. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-

Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

b. (1) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the contracting agency. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <http://www.dol.gov/esa/whd/forms/wh347instr.htm> or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the contracting agency for transmission to the State DOT, the FHWA or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the contracting agency..

(2) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(i) That the payroll for the payroll period contains the information required to be provided under §5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under §5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(ii) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(iii) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(3) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph 3.b.(2) of this section.

(4) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

c. The contractor or subcontractor shall make the records required under paragraph 3.a. of this section available for inspection, copying, or transcription by authorized representatives of the contracting agency, the State DOT, the FHWA, or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the FHWA may, after written notice to the contractor, the contracting agency or the State DOT, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

4. Apprentices and trainees

a. Apprentices (programs of the USDOL).

Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice.

The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed.

Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly

rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination.

In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

b. Trainees (programs of the USDOL).

Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration.

The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration.

Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.

In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

c. Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

d. Apprentices and Trainees (programs of the U.S. DOT).

Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeymen shall not be greater than permitted by the terms of the particular program.

5. Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

6. Subcontracts. The contractor or subcontractor shall insert Form FHWA-1273 in any subcontracts and also require the subcontractors to include Form FHWA-1273 in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

7. Contract termination: debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

9. Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

10. Certification of eligibility.

a. By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

b. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

c. The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

V. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

The following clauses apply to any Federal-aid construction contract in an amount in excess of \$100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by 29 CFR 5.5(a) or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

1. Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

2. Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (1.) of this section, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1.) of this section, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1.) of this section.

3. Withholding for unpaid wages and liquidated damages. The FHWA or the contacting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2.) of this section.

4. Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (1.) through (4.) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1.) through (4.) of this section.

VI. SUBLETTING OR ASSIGNING THE CONTRACT

This provision is applicable to all Federal-aid construction contracts on the National Highway System.

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the contracting agency. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR 635.116).

a. The term "perform work with its own organization" refers to workers employed or leased by the prime contractor, and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor or lower tier subcontractor, agents of the prime contractor, or any other assignees. The term may include payments for the costs of hiring leased employees from an employee leasing firm meeting all relevant Federal and State regulatory requirements. Leased employees may only be included in this term if the prime contractor meets all of the following conditions:

(1) the prime contractor maintains control over the supervision of the day-to-day activities of the leased employees;

(2) the prime contractor remains responsible for the quality of the work of the leased employees;

(3) the prime contractor retains all power to accept or exclude individual employees from work on the project; and

(4) the prime contractor remains ultimately responsible for the payment of predetermined minimum wages, the submission of payrolls, statements of compliance and all other Federal regulatory requirements.

b. "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid or propose on the contract as a whole and in general are to be limited to minor components of the overall contract.

2. The contract amount upon which the requirements set forth in paragraph (1) of Section VI is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.

3. The contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the contracting officer determines is necessary to assure the performance of the contract.

4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the

contracting agency has assured that each subcontract is evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract.

5. The 30% self-performance requirement of paragraph (1) is not applicable to design-build contracts; however, contracting agencies may establish their own self-performance requirements.

VII. SAFETY: ACCIDENT PREVENTION

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

1. In the performance of this contract the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract.

2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under construction safety and health standards (29 CFR 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704).

3. Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C.3704).

VIII. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

In order to assure high quality and durable construction in conformity with approved plans and specifications and a high degree of reliability on statements and representations made by engineers, contractors, suppliers, and workers on Federal-aid highway projects, it is essential that all persons concerned with the project perform their functions as carefully, thoroughly, and honestly as possible. Willful falsification, distortion, or misrepresentation with respect to any facts related to the project is a violation of Federal law. To prevent any misunderstanding regarding the seriousness of these and similar acts, Form FHWA-1022 shall be posted on each Federal-aid highway project (23 CFR 635) in one or more places where it is readily available to all persons concerned with the project:

18 U.S.C. 1020 reads as follows:

"Whoever, being an officer, agent, or employee of the United States, or of any State or Territory, or whoever, whether a person, association, firm, or corporation, knowingly makes any false statement, false representation, or false report as to the character, quality, quantity, or cost of the material used or to be used, or the quantity or quality of the work performed or to be performed, or the cost thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction on any highway or related project submitted for approval to the Secretary of Transportation; or

Whoever knowingly makes any false statement, false representation, false report or false claim with respect to the character, quality, quantity, or cost of any work performed or to be performed, or materials furnished or to be furnished, in connection with the construction of any highway or related project approved by the Secretary of Transportation; or

Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 1, 1916, (39 Stat. 355), as amended and supplemented;

Shall be fined under this title or imprisoned not more than 5 years or both."

IX. IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

By submission of this bid/proposal or the execution of this contract, or subcontract, as appropriate, the bidder, proposer, Federal-aid construction contractor, or subcontractor, as appropriate, will be deemed to have stipulated as follows:

1. That any person who is or will be utilized in the performance of this contract is not prohibited from receiving an award due to a violation of Section 508 of the Clean Water Act or Section 306 of the Clean Air Act.

2. That the contractor agrees to include or cause to be included the requirements of paragraph (1) of this Section X in every subcontract, and further agrees to take such action as the contracting agency may direct as a means of enforcing such requirements.

X. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, consultant contracts or any other covered transaction requiring FHWA approval or that is estimated to cost \$25,000 or more – as defined in 2 CFR Parts 180 and 1200.

1. Instructions for Certification – First Tier Participants:

a. By signing and submitting this proposal, the prospective first tier participant is providing the certification set out below.

b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this

covered transaction. The prospective first tier participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective first tier participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction.

c. The certification in this clause is a material representation of fact upon which reliance was placed when the contracting agency determined to enter into this transaction. If it is later determined that the prospective participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the contracting agency may terminate this transaction for cause of default.

d. The prospective first tier participant shall provide immediate written notice to the contracting agency to whom this proposal is submitted if any time the prospective first tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

e. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. "First Tier Covered Transactions" refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contractor). "Lower Tier Covered Transactions" refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). "First Tier Participant" refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). "Lower Tier Participant" refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

f. The prospective first tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction.

g. The prospective first tier participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transactions," provided by the department or contracting agency, entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the \$25,000 threshold.

h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (<https://www.epls.gov/>), which is compiled by the General Services Administration.

i. Nothing contained in the foregoing shall be construed to require the establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of the prospective participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

j. Except for transactions authorized under paragraph (f) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default.

* * * * *

2. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – First Tier Participants:

a. The prospective first tier participant certifies to the best of its knowledge and belief, that it and its principals:

(1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency;

(2) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (a)(2) of this certification; and

(4) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

b. Where the prospective participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

2. Instructions for Certification - Lower Tier Participants:

(Applicable to all subcontracts, purchase orders and other lower tier transactions requiring prior FHWA approval or estimated to cost \$25,000 or more - 2 CFR Parts 180 and 1200)

a. By signing and submitting this proposal, the prospective lower tier is providing the certification set out below.

b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department, or agency with which

this transaction originated may pursue available remedies, including suspension and/or debarment.

c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances.

d. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations. "First Tier Covered Transactions" refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). "Lower Tier Covered Transactions" refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). "First Tier Participant" refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). "Lower Tier Participant" refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.

f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the \$25,000 threshold.

g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (<https://www.epls.gov/>), which is compiled by the General Services Administration.

h. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the

department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

* * * * *

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--Lower Tier Participants:

1. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency.

2. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

* * * * *

XI. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts which exceed \$100,000 (49 CFR 20).

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

3. The prospective participant also agrees by submitting its bid or proposal that the participant shall require that the language of this certification be included in all lower tier subcontracts, which exceed \$100,000 and that all such recipients shall certify and disclose accordingly.

**NOTICE OF REQUIREMENTS FOR AFFIRMATIVE
ACTION TO ENSURE EQUAL EMPLOYMENT
OPPORTUNITY (EXECUTIVE ORDER 11246)**

1. The Offeror’s or Bidder’s attention is called to the “Equal Opportunity Clause” and the “Standard Federal Equal Employment Opportunity Construction Contract Specifications” set forth herein.

2. The goal for female participation, expressed in percentage terms for the Contractor’s aggregate workforce in each trade on all construction work, is 6.9%.

Until further notice	Goals for minority participation for each trade (percent)
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SHSA Cities:	
Pascagoula - Moss Point -----	16.9
Biloxi - Gulfport -----	19.2
Jackson -----	30.3

SMSA Counties:	
Desoto -----	32.3
Hancock, Harrison, Stone-----	19.2
Hinds, Rankin -----	30.3
Jackson -----	16.9

Non-SMSA Counties:	
George, Greene-----	26.4

Alcorn, Benton, Bolivar, Calhoun, Carroll, Chickasaw, Clay, Coahoma, Grenada, Itawamba, Lafayette, Lee, Leflore, Marshall, Monroe, Montgomery, Panola, Pontotoc, Prentiss, Quitman, Sunflower, Tallahatchie, Tate, Tippah, Tishomingo, Tunica, Union, Washington, Webster, Yalobusha -----	26.5
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Attala, Choctaw, Claiborne, Clarke, Copiah, Covington, Franklin, Holmes, Humphreys, Issaquena, Jasper, Jefferson, Jefferson Davis, Jones Kemper, Lauderdale, Lawrence, Leake, Lincoln, Lowndes, Madison, Neshoba, Newton, Noxubee, Oktibbeha, Scott, Sharkey, Simpson, Smith, Warren, Wayne, Winston, Yazoo-----	32.0
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Forrest, Lamar, Marion, Pearl River, Perry, Pike, Walthall-----	27.7
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Adams, Amite, Wilkinson -----	30.4
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These goals are applicable to all the Contractor’s construction work (whether or not it is Federal or federally assisted) performed in the covered area. If the contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this second area, the contractor also is subject to the goals for both its federally involved and nonfederally involved construction.

The Contractor’s compliance with the Executive Order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3(a), and its efforts to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor’s goals shall be a violation of the contract, the Executive Order and the regulations in 41 CFR Part 60-4.2(d). Compliance with the goals will be measured against the total work hours performed.

3. The Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs within 10 working days of award of any construction subcontract in excess of \$10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address and telephone number of the subcontractor, employer identification number of the subcontractor, estimated dollar amount of the subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the subcontract is to be performed.

4. As used in this Notice, and in the contract resulting from this solicitation, the “covered area” is to the county and city (if any), stated in the advertisement.

5. The notification required in Paragraph 3 shall be addressed to the following:

Contract Compliance Officer
Mississippi Department of Transportation
P.O. Box 1850
Jackson, Mississippi 39215-1850

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-102-2

CODE: (IS)

DATE: 11/22/2017

SUBJECT: Bidding Requirements and Conditions

Section 102, Bidding Requirements and Conditions, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-102.01--Prequalification of Bidders. Delete the last sentence of the third paragraph of Subsection 102.01 on page 13, and substitute the following.

The Bidder's Certificate of Responsibility number must be on file with the Department's Contract Administration Division prior to request for permission to bid.

907-102.02--Contents of Proposal Forms. Delete the fourth paragraph in Subsection 102.02 on page 13, and substitute the following.

Prospective bidders must complete an online request for permission to be eligible to bid a project. Upon approval, the bidder will be authorized to submit a bid electronically using Bid Express at <http://bidx.com>.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-103-2

CODE: (SP)

DATE: 06/22/2017

SUBJECT: Award and Execution of Contract

Section 103, Award and Execution of Contract, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-103.01--Consideration of Proposal. Delete the second and third paragraphs of Subsection 103.01 on page 19, and substitute the following.

907-103.01.1--For Projects Constructed Without Federal Funds. Resident Contractors actually domiciled in Mississippi are to be granted preference over nonresidents in awarding of Contracts financed 100% with State funds.

In consideration of proposals that are equal to or in excess of \$50,000 and financed 100% with State funds, a nonresident bidder domiciled in a state having laws granting preference to local Contractors will be considered for such contracts on the same basis as the nonresident bidder's state awards contracts to Mississippi Contractors bidding under similar circumstances. When a nonresident Contractor submits a bid equal to or in excess of \$50,000 on a contract financed 100% with State funds, a copy of the current laws from the state of domicile and an explanation thereof pertaining to treatment of nonresident Contractors shall be attached. If no preferential treatment is provided for Contractors in the state of domicile and contracts are awarded to the lowest responsible bidder, a statement to this effect shall be attached. Should the attachment not accompany the bid when submitted, the Contractor shall have 10 days following the opening of the bids to furnish the required information to the Contract Administration Director for attachment to the bid. Failure to provide the attachment within 10 days will result in the nonresident Contractor's bid being rejected and not considered for award. As used herein, the term "resident Contractor" includes a nonresident person, firm or corporation that has been qualified to do business in this State and has maintained a permanent full-time office in the State of Mississippi for two years prior to the submission of the bid, and the subsidiaries and affiliates of such a person, firm or corporation.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-109-1

CODE: (SP)

DATE: 05/08/2019

SUBJECT: Measurement and Payment

Section 109, Measurement and Payment, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-109.01--Measurement of Quantities. Delete the sixth full paragraph of Subsection 109.01 on page 88, and substitute the following.

If appropriate based on the specific circumstances of the project, the Contractor may request that material specified to be measured by the cubic yard or ton be converted to the other measure. The Contractor must submit this request to the Engineer. The Engineer will provide an approval or denial in writing. The decision is in the sole discretion of the Engineer. If approved, factors for this conversion will be determined by the District Materials Engineer and agreed to by the Contractor. The conversion of the materials along with the conversion factor will be incorporated into the Contract by supplemental agreement. The supplemental agreement must be executed before such method of measurement is used.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-619-5

CODE: (IS)

DATE: 01/17/2018

SUBJECT: Traffic Control for Construction Zones

Section 619, Traffic Control for Construction Zones, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-619.02--Materials.

907-619.02.8--Traffic Signals and Flashers. Delete Subsection 619.02.8.1 on pages 452 thru 455, and substitute the following.

907-619.02.8.1-Portable Traffic Signals. Portable traffic signals shall be trailer or pedestal mounted units that provide for easy, legal transportation and quick setup and deployment. Each unit shall be self-contained. The types of portable traffic signals are as follows.

- Type 1 portable traffic signal shall include two signal heads per trailer with one signal head mounted on an overhead mast arm that can be extended over the travel lane, and the other signal head shall be mounted on the vertical upright of the trailer.
- Type 2 portable traffic signal shall include one signal head that is mounted on the vertical upright of the pedestal/cart or trailer. Pedestal/Cart mounted shall be designated as Type 2A and Trailer mounted shall be designated as Type 2B. Type 2 portable traffic signals shall be tested to MASH Standards or NCHRP Test Level 3 crash testing requirements by an accredited independent test facility, with supporting documentation available upon request.
- Type 3 portable traffic signal shall be the same as Type 1 mentioned above but with enhanced capabilities as mentioned in each applicable section below.

The portable traffic signals shall be MUTCD Compliant and utilize standard ITE signal heads, and adhere to the ITE Specifications and Standards for Vehicle Traffic Control Signal Heads, Light Emitting Diode (LED) Circular Signal Supplement. The units shall be battery powered with a solar charging system, and be equipped with an onboard battery charger capable of being used with a 120V AC power source. Portable traffic signals shall be able to communicate with other portable signals via 900 MHz or other accepted wireless communications. If wireless connectivity is not feasible, hardwired connectivity shall be an acceptable alternative, as approved by the Engineer. Portable Traffic Signals shall include all the major components listed below or be able to perform the functions of these components. The major components of the unit shall include, but are not limited to, the trailer or pedestal/cart, telescoping mast arm (on Type 1 and 3), signal head(s) and back plates, traffic signal controller with operating software, solar charging system with batteries, input and output devices, vehicle detection, flasher units, conflict monitor, relays,

communications system and other equipment required for the safe operation and installation of the unit.

907-619.02.8.1.1--Signal Heads. The signal heads and all applicable components of the portable traffic signal shall meet the physical display and operational requirements of conventional traffic signals as specific in the Manual on Uniform Traffic Control Devices (MUTCD). The signal heads shall be cast aluminum or polycarbonate and shall meet the requirements laid out in the Mississippi Standard Specification for traffic signal heads and associated MDOT material specifications for traffic signal heads. The signal heads shall accommodate standard 12-inch LED indications meeting the ITE Specification “Vehicle Traffic Control Signal Heads” and ITE Specifications and Standards for Vehicle Traffic Control Signal Heads, Light Emitting Diode (LED) Circular Signal Supplement.

For Type 1, Type 2 and Type 3 portable traffic signals, the signal heads shall have the ability to be rotated 180 degrees to face in the opposite direction and shall have the ability to rotate and lock in approximately 10 degree increments to position the signal head for the optimum visibility to motorists.

For Type 1 portable traffic signals, each unit shall contain two signal heads with one signal head mounted on an overhead mast arm that can be extended over the travel lane with a minimum clearance of 17 feet measured from the bottom of the signal head unit to the road surface. The lower signal head shall be mounted to the vertical upright of the trailer at a minimum height of eight feet (8') from the bottom of the signal head unit to the road surface.

For Type 2 portable traffic signals, the signal head shall be mounted to the vertical upright of the trailer at a minimum height of eight feet (8') from the bottom of the signal head unit to the road surface.

For Type 3 portable traffic signals, each unit shall be the same as Type 1 mentioned above but with enhanced capabilities as mentioned below.

907-619.02.8.1.2--Controller and Operating Requirements. The portable traffic signal (Types 1, 2, and 3) shall include a solid state Controller Unit (CU) that is in compliance with NEMA TS 5 Performance Standard. The CU shall have an easy to read front panel backlit display for viewing and programming the configuration settings and CU status. The CU shall be capable of operating the portable traffic signal system in a fixed time, traffic actuated or manual control mode. Multiple portable traffic signals shall have the capability to be interconnected to form a portable traffic signal system. Each portable traffic signal within a connected system shall have the capability to serve as either the master or remote signal. Each portable traffic signal shall include a Conflict Monitor Unit (CMU), or Malfunction Management Unit (MMU) to ensure phase conflicts do not exist during operation.

For Type 1 and Type 2 portable traffic signals, a minimum of five (5) automatic time-of-day timing plans within a 24-hour period should be available in fixed time mode. The CU should have the ability to control a minimum of four (4) traffic phases with programmable cycle time adjustments and user adjustable red, amber, minimum green and maximum green times. The CU shall have

the capability of programming green and red times from 1 to 999 seconds and yellow times up to 15 seconds in one-second increments. The CU shall also have the capability of facilitating standby modes of red, red flash and yellow flash.

For Type 3 portable traffic signals, a minimum of ten (10) automatic time-of-day timing plans within a 24-hour period should be available in fixed time mode. The CU should have the ability to control a minimum of 16 traffic phases with programmable cycle time adjustments and user adjustable red, amber, minimum green and maximum green times. The CU shall have the capability of programming green and red times from 1 to 999 seconds and yellow times up to 15 seconds in one-second increments. The CU shall also have the capability of facilitating standby modes of red, red flash and yellow flash.

The system shall also have the ability to operate in vehicle actuation mode when vehicle detection components are used. The operating system shall have the capability to allow the Portable Traffic Signal to be connected to and controlled by a standard NEMA controller.

The system shall have the capability to be controlled remotely using a hardwired or wireless remote. The wireless radio remote shall be capable of communicating at a clear line of site distance up to ¼ mile from the master.

The CU shall have the capability of interfacing with a Remote Monitoring System (RMS) capable of reporting signal location, battery voltage, and system faults. The RMS shall include a password-protected web site, viewable via an internet connection. In the event of a system fault, the RMS shall provide specific information concerning the cause of the system fault (example: "red lamp on signal number 1 out"). The RMS shall immediately contact previously designated individuals via SMS text messaging or email, upon a fault event.

The active timing program operating the PTS system shall be available and viewable through the RMS website at all times. The RMS shall maintain a history of the operating system in each signal including total operating hours, alerts, and the location of the PTS trailer.

907-619.02.8.1.3--Wireless Communications. The portable traffic signals shall communicate with other portable traffic signals within the signal system via license-free wireless 900 MHZ radio link communications as specified in Subsection 662.02.2 of the radio Interconnect System specification. The radio units shall maintain communications at a minimum distance of one (1) mile. The radio system shall conform to the applicable Federal Communications Commission requirements and all applicable state and local requirements.

The portable traffic signals shall be in direct communication at all times either by wireless or hardware connection to provide for the required conflict monitoring / malfunction management system.

907-619.02.8.1.4--Power Requirements. Each Portable Traffic Signal shall be equipped with a power source consisting of a solar collection array, solar controller and/or charging unit and batteries sufficient to operate the signal system. The number and size of batteries shall be sufficient to operate the Type 1 and Type 3 signals for a minimum of 30 days and Type 2A signals for

minimum of five (5) days, and Type 2B signals for minimum of 15 days without additional charging or assist from the solar array. An on-board battery charger shall be compatible with both the solar array and with a 120V AC power source.

For Type 1 signals, the solar panel array shall provide for a minimum of 440 watts of solar collection capability.

For Type 2A signals, the solar panel array shall provide for a minimum of 90 watts of solar collection capability.

For Type 2B signals, the solar panel array shall provide for a minimum of 110 watts of solar collection capability.

For Type 3 signals, the solar panel array shall provide for a minimum of 480 watts of solar collection capability and shall include a tilt and rotate system to optimally position the panels.

All instrumentation for the electrical system and battery compartment shall be contained in a lockable weatherproof enclosure. Solar panels shall be secured to the mounting brackets for theft prevention.

907-619.02.8.1.5--Trailer and Lift System. The trailer or pedestal/cart and all mounted components shall conform to the wind loading requirements as follows: 100 mph minimum for Type 1 portable traffic signals, 55 mph minimum for Type 2A portable traffic signals, 75 mph minimum for Type 2B portable traffic signals, and 90 mph minimum for Type 3 portable traffic signals as described in the AASHTO *Standard Specifications for Highway Signs, Luminaries and Traffic Signals*, as specified in the plans including all interims and updates. At the request of the Engineer, proof of conformance to these wind load ratings shall be verified by a third-party. No additional loose ballast shall be used to meet these wind load requirements. The trailer shall be made of structural steel and shall include four (4) leveling/stabilizer jacks capable of lifting the trailer a minimum of six inches (6”).

The trailer or pedestal shall be equipped with a mechanical, hydraulic or electric lift system sufficient for one person to be able to raise and lower the vertical upright and/or horizontal mast arm to and from the operating position.

For Type 1, 2B, and Type 3 signals, the trailer shall be equipped to provide legal and safe transport on the public highway system at speeds up to 55 mph.

All exterior metal surfaces, except signal heads and back plates, shall be powder-coat painted highway safety orange.

907-619.02.9--Impact Attenuators. Delete the sentence in the first paragraph of Subsection 619.02.9 on page 455, and substitute the following.

Impact attenuators must be listed on the Department's APL.

907-619.02.11--Snap-Back Delineators. Delete the sentence in the paragraph of Subsection 619.02.11 on page 456, and substitute the following.

Snap-back delineators shall be selected from the list of surface mounted flexible delineator posts as shown on the Department's APL.

907-619.02.14--Changeable Message Sign.

907-619.02.14.5--PCMS Controller and Storage Cabinets. Delete the fifth sentence in the first paragraph of Subsection 619.02.14.5 on pages 462 and 463, and substitute the following.

The controller cabinet shall be illuminated.

907-619.05--Basis of Payment. Add the following to the list of pay items ending on page 480.

907-619-E3: Changeable Message Sign ***** - per each

907-619-H2: Traffic Signal, Portable, Type ____ - per each

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-631-1

CODE: (IS)

DATE: 11/15/2017

SUBJECT: Traffic Signal Systems - General

Section 631, Traffic Signal Systems - General, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-631.02--Materials.

907-631.02.4--Operations. Delete the second paragraph in Subsection 631.02.4 on page 513 and substitute the following.

The Contractor shall conduct the work at all times in such a manner as to ensure the least possible inconvenience to the traveling public, and to property owners on the streets, alleys, and other public places where the construction will take place.

907-631.02.5--Electrical Service. Delete the first paragraph in Subsection 631.02.5 on page 515 and substitute the following.

It shall be the Contractor's responsibility to make the necessary arrangements with the local power company to provide the electrical service for any new installation. The Contractor shall pay for, at no cost to the Department, all deposits, hook-up charges, or other service fees required by the power company for the establishment of new service. The cost of all such fees shall be considered incidental and absorbed within existing pay items. The Department or the local agency will be responsible for payment of the monthly service bill for the new power service installation. It shall be the responsibility of the Contractor to swap the electrical service account over to the Department or local agency.

907-631.03--Construction Requirements.

907-631.03.2--Electrical Service Equipment. Delete the paragraphs of Subsection 631.03.2 on pages 515 and 516, and substitute the following.

The power supply assembly shall consist of all equipment mounted in a Power Service Pedestal as described in Subsection 722.13 or as otherwise shown in the plans. The configuration and installation of the equipment mounted on the assembly shall meet the safety requirements and approval of the utility company or municipality furnishing power for operation.

When required, service poles shall be provided by the Contractor and consist of wood poles with required pole line hardware, conduit, ground rods, guy wires and anchors and all other accessories and appurtenances mounted on the pole, except those items furnished by the utility company or

municipality, or as specified separately in the contract or plans. Costs of service poles shall be included in other items bids.

Main disconnect switches shall be separately housed on the power supply assembly. Circuit breaker cabinets and meters shall not be installed on the street or walk side of the pole or pedestal.

907-631.03.3--Performance Tests. Delete the second sentence of Subsection 631.03.3 on page 516.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-632-1

CODE: (IS)

DATE: 11/15/2017

SUBJECT: Traffic Signal Cabinet Assemblies

Section 632, Traffic Signal Cabinet Assemblies, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

Delete Section 632 on pages 517 thru 538, and substitute the following.

SECTION 907-632 - TRAFFIC SIGNAL CABINET ASSEMBLIES

907-632.01--Description. This work consists of furnishing, assembling, configuring and installing all component materials and software required to form completed traffic signal controller assemblies, closed loop master controller assemblies and signal system installation of the types specified, in conformity with these specifications, to ensure fully operational traffic signal installations as shown on the plans.

907-632.02--Materials.

907-632.02.1--Cabinet Assembly. Cabinet Assemblies shall meet the NEMA 3R requirements and be constructed principally of 0.125-inch thick, 5052-H32 aluminum. The aluminum shall have a mill finish per NEMA TS 2 7.7.3. Intermittent welds may be used for construction and any unwelded cabinet seams shall be sealed with clear RTV silicone. All external fasteners shall be stainless steel and no holes will be allowed in top of cabinet.

The door handles shall be stainless steel or cast aluminum. Door hinges shall be of the continuous type with a stainless steel hinge pin. Rivets are not be used to attach the hinge. The main door stop rod shall be constructed using stainless steel. The door stop mechanism shall be adjustable and capable of being securely latched in multiple opened positions including 90 degrees and a maximum of 120 degrees. The brackets attaching the stop rod to the door and cabinet shall be aluminum and welded in place. The main door cylinder lock shall be a #2 key type lock. Two (2) traffic industry standard No. 2 keys shall be provided with each cabinet and shall be made using heavy duty key blanks.

Extruded aluminum channels permanently attached to the right and left cabinet sides shall be provided for attaching adjustable shelving and mounting of other component panels. The cabinet shall have two (2) shelves installed. Both shelves shall be provided with the front edge pre-drilled with 0.25-inch holes located twelve (12) inches apart.

907-632.02.2--Physical Features.

907-632.02.2.1--Pull Out Drawer. A pull out drawer shall be installed and centered under the

bottom shelf. The drawer shall be made of 0.080-inch thick, 5052-H32 aluminum and come out on full extension drawer slides. The pull out drawer shall provide an approximate 16-inch x 14-inch working area and have the ability to bear a constant 25 pound burden. There shall be a compartment for document storage. The lid shall be hinged at the rear, to gain access to the storage area. The drawer will be used to store documents as well as support a notebook computer. The drawer slides shall be of the full extension ball bearing type. Dimensions of the drawer shall be large enough to support a notebook computer and a drawer of sufficient size to hold at least two (2) copies of the cabinet drawings and other related cabinet documentation. The surface of the lid shall have a non-slip surface.

907-632.02.2.2--Cabinet Lighting. Cabinets shall be provided with a minimum of two (2) white light LED modules. One (1) lighting module shall be installed along the front top section of the cabinet and the second lighting module shall be installed underneath the bottom cabinet shelf in such a location as to provide direct lighting of the load bay area of the cabinet but must not interfere with the cabinet drawer operation.

Both LED lighting modules shall be controlled by a NEMA rated, commercial quality, pushbutton door switch. The cabinet lighting shall turn on when the cabinet main door is opened and shall turn off when the main door is closed or an ON/OFF NEMA rated, commercial quality, toggle switch mounted on the inside cabinet door service panel shall be provided to turn both LED lighting modules on or off.

907-632.02.2.3--Police Panel Switches. Police panel switches shall be provided with all controller cabinets. All switches shall be hard wired and labeled as to their function.

NORMAL-FLASH: When this switch is in the FLASH position, all signal indications shall transfer to the flashing mode. AC power shall be removed from the load switches when the signal indications transfer to the flashing mode.

The controller unit shall operate in accordance with appropriate specifications during the flashing mode. When the switch is placed in the NORMAL position, transfer from the flash mode to normal operation shall be made in accordance with uniform code flash requirements.

SIGNAL ON-OFF: AC power shall be removed from the signal heads and the intersection will become dark when this switch is in the OFF position.

MANUAL CONTROL ON-OFF: When this switch is in the ON position, a logic ground shall be applied to the manual control enable input of the controller unit.

INTERVAL ADVANCE INPUT JACK: A manual jack shall be installed on the police panel. The jack shall inter-mate with a 3-circuit, ¼-inch diameter phone plug. The tip and ring (middle) circuits of the jack shall be connected to the logic ground and the interval advance inputs of the controller unit. When the manual hand cord is plugged into the jack and the pushbutton is pressed, logic ground shall be connected to the interval advance input of the controller unit.

When specified in the contract documents, an interval advance cord shall be provided. The cord

shall have a minimum length of three (3) feet. It shall have a 1/4-inch diameter, three circuit plug connected to one end and a manual pushbutton enclosed in a hand-held enclosure at the other end. A complete cycle (push-release) of the manual pushbutton shall terminate the controller unit interval which is active except the vehicular yellow and red clearance intervals. Cycling the push-button during the vehicular yellow or all red clearance intervals shall not terminate the timing of those intervals.

907-632.02.2.4--Service Panel Switches. Service panel switches shall be hard wired and clearly labeled to identify as to their functions. Service panel switches shall be mounted on the service panel located on the inside of the main cabinet door. Alternate switch locations may be described in the plans or contract documents but final switch design and location shall be approved by the Engineer prior to cabinet fabrication.

NORMAL-FLASH: When this switch is in the FLASH position, all signal indications shall transfer to the flashing mode. AC power shall be removed from the load switches when the signal indications transfer to the flashing mode.

The controller unit shall operate in accordance with appropriate specifications during the flashing mode. When the switch is placed in the NORMAL position transfer from the flash mode to normal operation shall be made in accordance with uniform code flash requirements.

CONTROLLER ON-OFF: When this switch is in the OFF position, AC power shall be removed from the controller. When this switch is returned to the ON position, the controller unit shall perform normal start up functions and resume normal operation in accordance with the applicable specification.

STOP TIME-RUN-NORMAL: A 3-position manual switch shall be provided which places the controller into Stop Time mode manually or through remote input.

VEHICLE DETECTORS: A 3-position switch shall be provided for each vehicle and pedestrian detector circuit. All switches shall be located on a panel mounted on the inside of the main cabinet door. The switch panel shall be labeled CALL SWITCH. Labeling of phase number and intended function (vehicles or pedestrian calls) shall be provided for each switch.

The vehicle detector switch functions are defined as follows:

- Locked Call Call is continually placed into the controller unit.
- Off (center) Vehicle detector is connected to the controller unit vehicle detector input, i.e. normal detector operation.
- Momentary Call Call is continuous as long as the switch is manually held in this position.

907-632.02.2.5--Police and Service Panel Locations. The police and service panels shall be constructed of 5052-H32 0.125-inch thick aluminum.

The police panel shall be located behind the police door which is enclosed within the main door.

The police door shall be hinged and provided with a neoprene gasket seal. Access to any portion or equipment contained behind the main cabinet door shall not be accessible through any part of the police panel. The police panel shall be of appropriate dimensions to accommodate all switch or devices described within this specification, the plans or contract document. The police door shall be provided with a treasury #2 key type lock and two (2) keys for the police door lock shall be provided with each cabinet.

The service panel shall be mounted on the inside portion of the main cabinet door, adjacent to the back side of the police panel or on the left hand side of the cabinet.

907-632.02.2.6--Cabinet Ventilation. Cabinets shall be vented to allow dissipation of the heat generated by the equipment contained within. All cabinets shall have a thermostatically controlled exhaust fan located at the top of the cabinet that is capable of 100 cubic feet per minute air displacement. The thermostat shall be mounted on the inside top of the cabinet and shall have a nominal temperature range from 80°F to 170°F.

The intake vent shall be louvered or equivalent design to prevent rain infiltration. The vent area will be located along the bottom portion of the cabinet door. A 16-inch x 12-inch x 1-inch disposable pleated air filter shall be provided on the inside portion of the cabinet and shall fully cover the vent area.

907-632.02.2.7--Air Filter Assembly. Air filters shall be one piece and shall be held firmly in place against the cabinet door in order to prevent dust from bypassing the perimeter of the filter and shall fully cover the vent area. Wing nuts or thumbscrews are preferred. Air filter shall be a 16-inch x 12-inch x 1-inch disposable pleated filter.

907-632.02.2.8--Cabinet Sizes.

907-632.02.2.8.1--Type I Cabinet. A Type I cabinet, 51”H x 30”W x 18”D, may be used for both pole and base mounted cabinets that require a maximum eight (8) position load bay. Pole mounted cabinets do not require rear access.

907-632.02.2.8.2--Type II Cabinet. A Type II cabinet, 51”H x 36”W x 18”D, may be used for both pole and base mounted cabinets that require a maximum twelve (12) position load bay. Pole mounted cabinets do not require rear access.

907-632.02.2.8.3--Type III Cabinet. A Type III cabinet, 56”H x 44”W x 27”D, shall be used for base mount installations and shall require a sixteen (16) position load bay and rear access door.

907-632.02.2.8.4--Type IV Cabinet. A Type IV dual chamber cabinet, 56”H x 57”W x 29”D, shall be used for base mount installations and shall require a sixteen (16) position load bay, rear access door, and external generator plug. When called for in the plans, a UPS shall be housed inside this cabinet.

907-632.02.2.8.5--Type V Cabinet. A Type V cabinet, 77”H x 44”W x 27”D, shall be used for base mount installations and shall require a sixteen (16) position load bay and rear access door.

907-632.02.3--Power Distribution Panel. The power panel shall be wired to provide the necessary power to all equipment. It shall be manufactured from 0.125-inch thick, 5052- H32 aluminum. The power panel shall house the following components: Main Breaker, Auxiliary Breakers, and Terminal Block. The panel shall be of such design so as to allow a technician to easily access the main and auxiliary breakers.

A 3-position terminal block with a removable insulated cover accepting up to AWG #4 stranded wire shall be supplied for accepting only the incoming power lines. This terminal block shall be in advance of and supply only the 30-amp main breaker, 10-amp and 5-amp Auxiliary breakers, AC neutral buss and earth ground buss.

907-632.02.3.1--Ground and Neutral Busbars. Cabinet grounding shall meet the requirements set forth in Subsection 722.09 for grounding and ground rods. A solid copper ground busbar shall be mounted on the side of the cabinet wall adjacent to the power panel for the connection of chassis ground wires. If more than one (1) ground busbar is used in a cabinet, a minimum of an AWG #6 copper wire shall be used to bond them.

The copper ground busbar shall have a minimum of thirteen (13) connector points, each capable of securing at least one (1) AWG #6 conductor.

A solid copper neutral busbar shall be mounted on the side of the cabinet wall adjacent to the power panel for the connection of AC neutral wires.

The copper neutral busbar shall have a minimum of thirteen (13) connector points, each capable of securing at least one (1) AWG #6 conductor.

907-632.02.3.2--Terminal Strips. Conductors shall be terminated on terminal strips with insulated terminal lugs. When two (2) or more conductors are terminated on field wiring terminal strip screws, a terminal ring lug shall be used for termination of those conductors. The voltage and current rating of terminal strips shall be greater than the voltage and current rating of the wire which is terminated on the terminal strip.

907-632.02.3.3--Cabinet Receptacles. A 3-wire 115 Volt AC (15A) Ground Fault Circuit Interrupt (GFCI) duplex receptacle shall be provided in the cabinet for maintenance use. It shall be securely mounted near the bottom right side of the cabinet and easily accessible.

Two (2) 3-wire 115 Volt AC (15A) non-GFCI protected outlets shall be installed, one on each side of the cabinet. These two (2) outlets are used for communication or other auxiliary equipment.

907-632.02.3.4--Operating Line Voltage. All equipment shall be designed to operate from a 120 volt, 60 cycle AC supply. Operation shall be satisfactory at voltages from 105 volts to 130 volts. All operating voltages into and out of the controller shall be NEMA level DC voltages except for the controller AC power source (Connector A, Pin p – AC-Control and Pin U – AC Common).

907-632.02.3.5--Circuit Breakers. Circuit breakers shall meet the requirements set forth in

Subsection 722.07. A 30-amp main breaker, with a minimum of 10,000 amp interrupting capacity, shall be provided for all cabinets to supply power to the controller, MMU, signals, and rack power supply.

Two (2) auxiliary breakers shall be provided. The first breaker, 10-amp, shall supply power to the fan, light, GFCI utility receptacle and two (2) auxiliary standard receptacles. The second breaker, 5-amp, shall be installed to supply power for the Controller Unit and MMU2. The above circuit breakers line side shall be jumpered together and will be fed from an external main circuit. A third 5-amp breaker shall be required if an ITS camera panel is called for in the plans.

907-632.02.3.6--Main Line Arrestors. Surge protection shall be provided that meets the requirements set forth in Subsection 722.12. A main line arrestor shall be provided to reduce the effects of voltage transients on the AC power line. It shall be installed after the circuit breaker. The main line arrestor shall be sufficient to protect all equipment and devices as per the plans and the following minimum specifications.

- Multi-stage Hybrid Design
- Series induction filtering
- Thermally protected Metal Oxide Varistors (TMOV's)
- Operating Voltage: 120 VAC
- Clamping Voltage: 395 VAC
- Operating Current: 15 A
- Peak Surge Current: 50 kA/Mode, 100 kA/Phase
- Operating Frequency: 47-63Hz
- EMI Attenuation: 40 dB Typ
- SPD Technology: TMOV's w/ W-C Filter
- Modes of Protection: L-N, L-G, N-G
- Status Indication: Power On & TMOV's Functional
- Connection Type: ¼-20 Stainless Steel Stud
- Operating Temperature: -40°F to +185°F

907-632.02.3.7--Solid State Main Line Relay (SSR). A normally-open, 75-amp, hybrid SSR shall be provided on the power distribution panel. The relay shall include a LED indicator to verify circuit power.

907-632.02.4--Terminal Facilities Board. The Terminal Facility shall be a hardwired load bay for NEMA TS 2 Type 1 actuated controllers. The load bay shall include either eight (8), twelve (12) or sixteen (16) load switch positions, as specified by the plans, and shall be centered along the back of the cabinet below the bottom shelf.

All wires terminated behind the backboard, as well as any additional panels, shall be soldered. No pressure or solderless connectors shall be used, unless they are soldered to the wire and tab after connection.

907-632.02.4.1--Load Switches and Flashers. Solid State Load Switches, compatible with low

wattage LED signals, shall be provided for the sequence called for on the plans. The load switch sockets shall be wired for triple-signal load switches conforming to NEMA TS 1-1994 and NEMA TS 2-2003 requirements.

The flasher socket shall be wired for and provided with a Type 3, two (2) circuit Solid State Flasher conforming to NEMA TS 1-1994 and NEMA TS 2-2003 requirements. It shall be possible to flash either the amber or red indication on any load switch outputs. It shall be possible to easily change the flash indication from the front side of the panel using readily available tools such as a screwdriver. A nominal flash rate of 50 to 60 FPM shall be provided. Flash rate shall be stable when used with generators or inverters.

Support(s) shall be provided to support the Flasher and Load Switches at some point approximately half of the total length from the panel surface. Sufficient area beneath the Load Switch or Flasher shall be clear in order to allow for free flow of air across the Load Switches or Flasher. Load Switches and Flashers must be provided with LED indicator lights on the side facing the cabinet door.

907-632.02.4.2--Flash Transfer Relay. All flash transfer relays, as a minimum, shall meet NEMA TS 1 requirements. The number of relays that shall be supplied with each cabinet shall accommodate the number of signal phases as indicated in the project plans. The coil of the flash transfer relay must be de-energized for flash operation.

907-632.02.5--Cabinet Wiring. Controller cabinets shall be wired in accordance with the signal phasing plans. If phases are indicated as omitted for future use, or if phases are not shown to be used in the plans, the cabinet shall be wired for use of the phases shown as future or unused. Load Switches shall not be provided for future or unused phases.

Wiring in the cabinets shall conform to the requirements of the National Electrical Code (NEC) and all of these specifications. All conductors in the cabinet shall be stranded copper. All wiring shall be laced. All wiring shall be in accordance as specified by Section 636 and Subsection 722.03 for Electric Cable and IMSA Specification 19 and/or 20 for Signal Wiring.

Connector harnesses for controller, conflict monitor, vehicle detectors, and accessory equipment (including NEMA defined Card Rack with power supply and pre-wired optical detection slots) shall be provided and wired into the cabinet circuitry. Connecting cables for controller and conflict monitor harnesses shall be sleeved in a braided mesh. All wires shall be securely terminated on terminal strips. The lay of the interconnect cable between the components must be such that when the door is closed, it does not press against the cables or force the cables against the various components inside the cabinets.

All communication wiring shall be bundled and routed independently of all other wiring. All live conductors shall be covered with suitable insulating material. All equipment grounds shall run directly and independently to the grounding bus.

All wires shall be cut and terminated as close as possible to the proper length before assembly. Consideration of equipment location adjustments must be made when determining appropriate

wire lengths. Excessive lengths of wire or cable shall not be allowed. All line voltage conductors used in controller cabinet shall conform to the following color code:

- AC Neutral: White
- AC Hot: Black
- Safety Ground: Green

907-632.02.5.1--Signal Terminal Arrestor Grounding Bar. A field terminal arrestor grounding bar shall be provided along the back portion of the cabinet for the installation of signal arrestors. This bar shall be attached using an AWG #10 stranded copper to the earth ground circuitry.

907-632.02.5.2--Signal Terminal Arrestors. The field terminal arrestor shall be a three (3) circuit protective device intended for use on traffic control load relay outputs. The arrestor shall be furnished with three (3) leads and a grounding stud which will be used to attach the arrestor to the grounding bar. The field terminal arrestor shall meet the following minimum specifications:

- Operating Voltage: 120 VAC
- Clamping Voltage: 475 VAC
- Peak Surge Current: 10 kA
- Operating Frequency: 47 – 63 Hz
- SPD Technology: MOV's
- Connection Type: Wire Leads
- Lead Wire: 14 AWG 12" Length
- Ground Stud: 10 x 32 5/8" Length
- Operating Temperature: -40°F to +185°F

907-632.02.6--Accessory Components.

907-632.02.6.1--Traffic Actuated Controller Unit. The fully actuated controller unit shall, at a minimum, meet the requirements of both NEMA TS 1-1989 and NEMA TS 2-2003 requirements for actuated controller units. The controller shall be of the TS 2 Type 2 configuration. The controller shall be provided with the multiple communication interface devices or properties as defined below.

- 10 Base-T Ethernet with front panel RJ-45 connector
- IEEE defined MAC address
- EIA-232 port
- External Serial Fiber options for both single and multi-mode (optional as per plans)
- External FSK 1200 bps modem (optional as per plans)
- D connector with 37 pin configuration for TS 1 compatibility
- USB port for signal controller database upload/download to the controller flash
- Controller
- ECOMM Compatible

The controller unit must have an alphanumeric backlit LCD display with a minimum of sixteen

(16) lines at 40 characters per line. The controller must be air-cooled with sufficient ventilation openings and capable of operating between -30°F and 165°F. The controller unit must be provided with a time-of-day clock, automatic daylight savings time adjustment and a power supply for maintaining SRAM during a power outage. The controller unit shall be capable of being used in a Closed-Loop System and must be capable of operating in the role of master controller in a Closed Loop System. The controller unit firmware shall be fully compatible with the Department's existing Traffic Signal Management Software. The Contractor shall ensure all controller firmware versions are compatible with the existing Traffic Signal Management Software that the Regional Department staff currently utilizes prior to submitting the controller for approval. The Contractor shall notify the Department if any special controller configuration or firmware is needed prior to submitting the controller for approval based on project requirements.

Where Flashing Yellow Arrow (FYA) operations are being used, all traffic signal controller firmware shall be capable of delaying the onset of the flashing yellow arrow.

All operator entered data shall be stored and backed up on to a flash memory device provided with the controller unit at no cost. This flash memory device shall require no battery to support value storage. No internal components of circuitry shall require battery support. The database shall be able to be backed up to a USB drive via the USB drive on the controller.

Traffic Actuated Controllers shall be of the Type shown on the plans. Type 1 Controllers shall have a Linux based processor and a minimum of one (1) USB port. Type 2 Controllers shall have the same features as Type 1 Controllers with the addition of an ATC backplane.

Type 3 Controllers shall have all features of the Type 2 Controller with the addition of the ATC module. All three (3) types of actuated controllers shall have Master controller capability, and if required shall be designated with 'M' in the plans.

907-632.02.6.2--Closed Loop Master Controller Unit. When called for in the plans, this work also consists of furnishing, installing and configuring the equipment, software and accessories necessary to connect one (1) traffic Closed-Loop Master Controller to its corresponding central or portable PC-based Traffic Computer Facility Control System via a communications connection. The communications or network connection device will be either existing or provided by the Contractor.

907-632.02.6.2.1--General. The Master shall monitor intersections in the system, display status and operational state and provide traffic flow data from intersection vehicle detectors. The Master shall include all communications equipment and software necessary to provide reporting to a remote terminal as well as upload/download of all local intersection data and provide timing synchronization. Communications to local controllers from the Master and from the Master to the central-office computer facility shall be by FSK, 900 MHz Radio, Broadband Radio, Serial Fiber, Ethernet, Fiber, Cell Modem or Leased Line, as indicated in the plans. The Master shall be able to run on the same controller simultaneously operating the intersection, with the local signal control software, on any given controller unit.

907-632.02.6.2.2--System Configuration. The system architecture shall be designed to minimize

the effect of equipment failures on system operation and performance. The system consists of four (4) principal elements:

- Local System Intersection Controllers
- Communication (Telemetry Links)
- On-Street Master(s)
- Central-Office Computer Software

907-632.02.6.2.3--Local System Intersection Controller. The local system intersection controllers connected to the Master controller unit shall be capable of controlling a fully actuated two (2) to sixteen (16) phase intersection and shall meet or exceed NEMA TS 1-1989 and TS 2-2003 standards for fully actuated traffic control units. The local controller shall have internal communication capability with direct access to the data memory. The local system controller shall be capable of processing controller and detector data and provide all necessary intersection control functions. The local system intersection controller shall meet the requirements of the Traffic Actuated Controller Unit.

907-632.02.6.2.4--Communications (Telemetry) Links. The communications links for the “Closed-Loop” System shall perform the following functions:

- Provide the medium (radio/fiber/hardwire/etc.) for two-way communications between the On-Street Master and the local intersection controllers.
- Provide the medium for two-way communication between the On-Street Master and the central-office computer facility.
- Error checking shall be included in both mediums to assure transmission and reception of valid data.

907-632.02.6.2.5--On-Street Master. The On-Street Master may be located at an intersection and connected via the communication network to at least 32 local intersection controllers. The Master shall be capable of implementing Traffic Responsive Control, Time Base Control, Manual Control or Remote Control modes of operation.

Analysis of sampling sensor data from at least 64 system detectors and corresponding selection of the best Traffic Responsive timing pattern shall be provided by the On-Street Master during the Traffic Responsive mode of operation.

Automatic and continuous monitoring of system activity shall be provided by the On-Street Master to include both Master and intersection alarm conditions.

System parameter entry shall be provided via the On-Street Master including all Master and local intersection assignment and group parameters. Master parameters shall include:

- System coordination setup and pattern data entry by group
- System time base event scheduler
- System traffic responsive computational and pattern selection setup by group
- Intersection system group and detector assignments

The On-Street Master shall provide comprehensive system report generation including, as a minimum: system, intersection, detector and failure status and history reports in addition to system performance reporting.

A RS-232C interface shall be provided on the On-Street Master to allow for printing of reports or for interconnecting to a remote central site.

To enhance overall system operation and increase system management flexibility, the On- Street Master shall also support two-way dial-up communications to a central office computer for control, monitoring, data collection and for timing pattern updating purposes, all from a remote central office location. Continuous, seven (7) days/week - 24 hours/day, system monitoring shall be enhanced by the On-Street Master's capability to automatically dial-up the central office computer upon detection of user defined critical alarm conditions.

907-632.02.6.2.6--System Functional Requirements.

907-632.02.6.2.6.1--Operator Interface. In order to provide ease in programming and operation, the system shall provide a simplified user-friendly menu format at each local, master and central office facility. No special programming skills shall be required for the user to fully access and operate this control and monitoring system at any level.

All programming, both of the local intersection controllers and the On-Street Master(s) shall be via a front panel keyboard and display, driven by English Language menus. All data change entries will be automatically verified against established ranges prior to acceptance to prevent programming data errors. Data access shall be controlled by user- definable access controls.

907-632.02.6.2.6.2--System Traffic Control. The system shall have the capability of controlling a minimum of sixteen (16) vehicle phases and eight (8) pedestrian phases. The system shall have the capability of implementing a minimum of four (4) timing rings, fifteen (15) alternate sequences, and sixteen (16) offsets.

The system shall provide the capability of selecting any of the following operational modes on a group basis:

- Traffic Responsive
- Time Base (Time-of-Day/Day-of-Week)
- Remote (External Command)
- Manual (Operator Entry)

The system shall be capable of implementing system FLASH and system FREE operation. The system shall have the capability to command, on/off based on time, up to eight (8) independent special functions.

907-632.02.6.2.6.3--Detectors. The system shall have the capability of accepting and processing data from at least 632 system detectors for Traffic Responsive program selection.

907-632.02.6.2.6.4--Pattern Selection. In addition to providing Manual and Remote program selection capability, the Master shall provide for Traffic Responsive and Time Base modes of operation for timing pattern selection.

907-632.02.6.2.6.4.1--Traffic Responsive Mode. Traffic plan selection in the Traffic Responsive mode shall be user-enabled and supplied with the controller, per the plans and specifications. The pattern selection shall be based on sampling detector volume and occupancy analysis by the On-Street Master.

907-632.02.6.2.6.4.2--Time Base Mode. The system shall provide the capability of implementing time-of-day, day-of-week and week-of-year control for each of the two (2) groups using an internal time clock referenced to the 60-Hz AC power line frequency for its time base. The Time Base mode shall contain automatic adjustment for leap year and daylight savings time changes.

The system Time Base mode shall provide, as a minimum, 100 events each capable of requesting any of the 48 traffic control patterns along with Traffic Responsive override enable or auxiliary events consisting of enable/disable any of up to four (4) system-wide special functions and setting sample and log interval time periods.

907-632.02.6.2.6.5--System Control Priority. The system coordination control (program-in-effect) for each group shall be selected on a priority basis. The priority from highest to lowest shall be as follows:

- Manual Control Entry
- External Control (Remote Command)
- Time Base Control (Time-of-Day/Day-of-Week) (Traffic Responsive control will prevail whenever Traffic Responsive Override Enable is active and the selected cycle length is greater than that being commanded by Time Base)
- Traffic Responsive Control

907-632.02.6.2.6.6--Measures of Effectiveness. The system shall have the capability to report selected Measures of Effectiveness (MOE's) on an intersection basis. MOE calculations shall be made on all phases by the local system intersection controller and as a minimum shall include measures such as: volume, number of stops, delays and green utilization. These measures shall be calculated on the basis of the active timing plan. Alternate ways of reporting MOE'S may be approved on a case-by-case review.

907-632.02.6.2.6.7--Uploading and Downloading. The system shall provide, for any selected local system intersection controller, the capability of uploading and downloading any or all, new or modified local intersection parameters from the central-office computer and the Department Central Traffic Signal Management Software, and shall include, as a minimum, all: Phase Timing and Unit Data; Coordination Data, Time Base Data; Preemption Data, System Communication Parameters, System Traffic Responsive Data, and any other System Data residing at the intersection such as Detector Diagnostic Values, Report Parameters and Speed Parameters.

During either uploading or downloading operations, normal traffic control operations shall not be suspended. All data shall be continually accessible and may be displayed at the On- Street Master or the central office computer.

907-632.02.6.2.6.8--System Monitoring and Diagnostics. The system shall automatically and continually monitor system activity and log/report occurrences of Master and intersection alarm conditions. All alarm condition events shall include at the intersection, (Master and central-office computer) an alpha-numeric description of the event as well as the time and date of occurrence.

As a minimum, monitored master alarms conditions shall include:

- Insufficient or Improper Data
- Failed Computational Channels
- Failed System Detectors
- Intersection Communication Failure
- Failed Controllers
- Minimum of six (6) special user defined alarms for user application flexibility
- Monitored intersection alarms conditions shall include as a minimum:
 - Cycle Faults and Failures
 - Coordination Failures
 - Voltage Monitor
 - Conflict, Local and Remote Flash Conditions
 - Preempt
 - Local Free
- Minimum of six (6) special user defined alarms for additional user flexibility.

When the Master detects a critical alarm condition, as defined by the user, it shall automatically dial-up the central office computer and report the condition. On a BUSY or NO ANSWER, the system may be programmed, at user option, to alert a secondary computer.

The system shall also automatically and continually monitor, verify and attempt to correct Sync Pulse, Time Base Clock and Pattern-In-Effect. The system shall provide capabilities to perform diagnostics on system and local detectors, communications and intersection operations. When a fault has been detected, an indication shall be provided. It shall be possible to isolate the fault to the failed unit from controls and indicators available on the Master unit. Auxiliary equipment such as a data terminal or CRT shall not be required to identify the failure.

907-632.02.6.2.6.9--Real Time Display. The Master shall provide for any selected local system intersection controller, real-time status information on its front panel. Real-time intersection status information shall include simultaneous display of: vehicle and pedestrian signal and detector status by phase, overlap signal status and cars waiting count by phase. Real-time controller status information shall include simultaneous display of: two (2) Ring Active timers, On/Next, Call/Recall and Hold/Omit Status by phase, Coordination, Preempt and Stop Time Status.

907-632.02.6.2.6.10--System Management. The system, without hardware changes but with its

ability to directly modify Master and intersection parameters, shall provide the user system configuration and operational controls of the following functions: add/delete controllers and system detectors, enable Traffic Responsive mode, assign intersections to groups, assign system detectors to computational channels and channels to pattern select routines, and assign special and/or standard detectors as system detectors for use with computational channels or to track activity.

907-632.02.6.2.6.11--System Logging and Reports. The system shall automatically and continually process system data and log/report on occurrence of changes in intersection status, system detector status, communications status, controller status and local detector status in addition to system program changes, Traffic Responsive computations, measures of effectiveness and performance.

907-632.02.6.2.6.12--Security. The On-Street Master shall provide for a user-specified security code entry before any data may be altered. In order to view any parameter, security code entry shall not be required. Security access shall be automatically rescinded approximately ten (10) minutes after either access was gained or the last parameter change was entered. The Master and local controller shall have the ability via keyboard to disable security code requirements, allowing for perpetual access without requiring hardware changes.

907-632.02.6.2.7--Design Characteristics. The On-Street Master shall be designed to operate in either an office or field environment and shall be suitably housed in a separate enclosure or in a local intersection cabinet. The Master shall be designed to meet the following electrical and mechanical requirements:

907-632.02.6.2.7.1--Programming and Security. Operator programmable data entry shall be accomplished through panel keyboard(s). The Master shall prevent the alteration of keyboard set variables prior to the user having entered a specific access code through the keyboard. The Master shall maintain user-programmable variables in non-volatile memory with a battery-backed RAM to assure continued efficient system operation.

907-632.02.6.2.7.2--Test and Repair. To enhance maintenance and trouble-shooting activities, On-Street Masters shall include resident diagnostics as a standard. No extender- cards, special tools or PROMs shall be necessary to fully maintain these components. The Master unit design shall ensure that all printed circuit boards be readily accessible for maintenance testing purposes. All fuses, connectors and controls shall be accessible from the front of the Master unit.

907-632.02.6.2.8--Traffic Signal System Software. All Traffic Signal System Software shall be compatible with the latest version of the Department's existing Master and local controllers and existing Traffic Signal Management Software for the Department region.

907-632.02.6.2.8.1--Traffic Signal Closed Loop Software. The Traffic Signal Closed-Loop Software shall provide the ability to manage Master and local controller databases including the uploading and downloading of data parameters. The software shall provide status information and provide reporting capabilities for Master and local controller data, alarms and logs.

907-632.02.6.2.8.2--Traffic Signal System Workstation Software. The Traffic Signal System Workstation shall provide the ability to manage Master and local controller databases including the uploading and downloading of data parameters. The software shall provide status information and provide reporting capabilities for Master and local controller data, alarms and logs.

The Traffic Signal System Workstation Software shall also be capable of operating as a network-connected user workstation to existing centralized signal systems and their associated databases.

When disconnected from the centralized signal system, the software shall be capable of running as a standalone system similar to the Closed-Loop Software. Under this mode, the software shall provide management, report and status functions for Master and local controllers. Under Standalone Mode of operation the software shall allow for its own database(s) for data management without the need for connecting to a centralized signal system database.

907-632.02.6.2.9--Services. Technical services shall be provided, as required, to assist in installation and initial setup of the Closed-Loop Master System and its sub-components. Technical assistance with database migration and/or setup, as well as the development of graphics (such as master maps and local intersection depictions) and the assignment of associated attributes such as detectors, phasing, signals, etc., shall be provided as required. Additionally, training shall be provided on a basic or advanced target user level, as required.

907-632.02.6.3--Malfunction Management Unit (MMU2). The Malfunction Management Unit (MMU2) shall be a shelf-mountable, sixteen (16) channel, solid-state, IP addressable MMU. The MMU2 shall accomplish the detection of, and response to, improper and conflicting signals and improper operating voltages in a traffic signal controller assembly, including support for four (4) section Flashing Yellow Arrow (FYA) left turn displays. The MMU2 shall be capable of running a minimum of twelve (12) different modes of FYA operation.

The MMU2 shall meet or exceed Section 4 requirements of the NEMA Standards Publication No. TS 2-2003 including NEMA TS 2 Amendment #4-2012 and provide downward compatibility to NEMA Standards Publication No. TS 1-1989: Type 12 Operation, in addition to those specifications set forth in this document.

The MMU2 shall include a graphics based Liquid Crystal Display (LCD) to view the current monitor status and navigate the unit's menus. An RJ-45 Ethernet Port shall be provided for communications.

A built-in Diagnostic Wizard shall be provided that displays detailed diagnostic information regarding the fault being analyzed. This mode shall provide a concise view of the signal states involved in the fault, pinpoint faulty signal inputs and provide guidance on how the technician should isolate the cause of the malfunction. The Diagnostic Wizard shall be automatically invoked when the MMU2 is in the fault mode and the HELP button is pressed. It shall also be automatically invoked when the MMU2 is in the Previous Fail (PF) event log display and the HELP button is pressed.

A built-in Setup Mode shall be provided that automatically configures the Dual Indication Enable, Field Check Enable, Red Fail Enable and Minimum Yellow Plus Red Clearance Enable parameters from user input consisting only of channel assignment and class (vehicle, ped, pp-turn, FYA, etc.) responses.

The MMU2 shall be capable of operating in the Type 12 mode with SDLC communications enabled on Port 1. The Channel Status display shall operate in the Type 12 configuration and provide the Field Check function for up to four (4) Pedestrian Walk inputs.

In the interest of reliability and repair ability, printed circuit board mounted MS connectors shall not be acceptable. Internal MS harness wire shall be a minimum of nineteen (19) strand AWG 22 wire.

907-632.02.6.4--NEMA defined Card Rack and Power Supply. A minimum of one (1) NEMA compliant detector card rack with five (5) slot positions (first slot for power supply and four (4) available slots) shall be provided in each cabinet. The detector rack shall be installed on the bottom shelf of the cabinet. The power supply for the NEMA defined card slots shall be provided as a 175W minimum with four (4) independent regulated channels of 24 VDC each rated at 0.75 amps over the full NEMA operating temperature range of -30°F to +165°F. The output should be regulated to 24 VDC +/- 15%. Each of the four (4) outputs shall be independently fused, each with a separate LED for displaying output and fuse status for each of the four (4) outputs. Each of the four (4) outputs shall be protected against voltage transients by a minimum 1500 watt suppressor. All card racks shall be wired for the type detection shown in the plan sheets.

Card Guides shall be provided on the top and bottom of the card rack for each connector position.

907-632.02.6.5--In-Cabinet Network.

907-632.02.6.5.1--Communications Arrestor. The Controller Cabinet network shall consist of an SDLC connection between the Controller Unit and MMU2. Surge suppression for this network shall meet the requirements set forth in Subsection 722.12 and the following minimum requirements below:

- Operating Voltage: 5 VDC
- Clamping Voltage: 8 VDC
- Operating Current: 1.5 A
- Peak Surge Current: 47 A (10x1000 μ s)
- Frequency Range: 0 to 20 MHz
- Insertion Loss: < 0.1 dB at 20 MHz
- SPD Technology: SAD
- Connection Type: DB-15
- Operating Temperature: -40°F to +185°F

907-632.02.6.6--System Communications.

907-632.02.6.6.1--Traffic Signal Ethernet Switch. When specified in the plans or contract

documents, a traffic signal Ethernet switch shall be installed in the cabinet assembly. It shall meet the requirements for the type specified in Section 907-663. Ethernet patch cables of sufficient length shall be provided for all supplied Ethernet ready cabinet components. The switch and all components shall be connected and configured.

907-632.02.6.6.2--Fiber Optic Patch Panel. When specified in the plans or contract documents, fiber optic attenuator patch cords shall be installed in the cabinet assembly as specified in Section 907-661.

907-632.02.6.6.3--Wireless Communications. When specified in the plans or contract documents, wireless communication components shall be installed in the cabinet assembly and shall be as specified in Section 907-662.

907-632.02.6.6.4--Serial Port Server or Terminal Server. When specified in the plans or contract documents, serial port servers shall be installed in the cabinet assembly and shall be as specified in Subsection 907-663.02.2.

907-632.02.6.6.5--GPS Clock. This work includes furnishing a Global Positioning System (GPS) Synchronization clock that can be used to sync the internal clocks in traffic signal controllers when coordination is desired, but communication is not necessary. The GPS Clock System shall provide GPS based time and date synchronization to provide coordination of traffic controllers to a common time base. The system shall process GPS Time data using a tamper/vandal resistant GPS antenna and correct for Time Zone, Daylight Savings Time, Leap Years, and GPS Leap Seconds. The processed time information shall be sent to the traffic controller in the native format for the respective controller. A contact closure synchronization pulse with variable pulse width shall be available for a once per day update. If the GPS antenna is blocked for up to one (1) hour prior to scheduled time of synchronization, the system shall synchronize the traffic controllers with less than 0.4 seconds variance from the accuracy provided under normal operation with GPS satellites in view.

- The GPS Clock shall also meet the following minimum specifications:
- Input Voltage: 9-24 VDC
- Current Draw: 150 mA (max) at 12 VDC: 125 mA (max) at 24 VDC
- Contact Closure: 750 mA at 30 VDC
- Temperature Rating: -29.4°F to +167°F

GPS unit shall be mounted to the traffic signal controller cabinet as per the manufacturer's recommendation. Any and all holes created in the cabinet for the purpose of mounting the GPS unit shall be sealed to the satisfaction of the Engineer at no direct pay.

907-632.02.6.6.6--Power-Over-Ethernet Arrestor. Surge suppression that meets the requirements set forth in Subsection 722.12 shall be provided. In addition, the following minimum specifications shall be supplied for loads that require Power-Over-Ethernet with isolated shielded or non-shielded cable:

- Operating Voltage: 48 VDC
- Clamping Voltage: 68 VDC
- Operating Current: 0.75 A per Pin Continuous
- Peak Surge Current: 10 kA
- Insertion Loss: < 0.1 dB
- SPD Technology: GDT, SAD, with series PTC
- Modes of Protection: All Lines (1-8) Protected (L-L) and (L-G): Signal High- Low; High-Ground; Low-Ground
- Transmission Speeds: 10BaseT; 100BaseT; 1000BaseT
- Connection Type: RJ-45
- Operating Temperature: -40°F to +185°F

907-632.02.7--Detector Panel. A vehicle detector harness shall be provided to connect the detector panel to the card rack. The detector panel shall accept the connection of sixteen (16) field loop inputs and four (4) pedestrian detector inputs.

907-632.02.7.1--Detector Input Arrestors. Field Loop and Pedestrian input arrestors shall meet the requirements set forth in Subsection 722.12. Field loop arrestors shall have differential and common mode protection and be provided with the following minimum specifications:

- Operating Voltage: 75 VDC
- Clamping Voltage: 130 VDC
- Peak Surge Current: 250 A
- SPD Technology: Silicon Break-Over
- Operating Temperature: -40°F to +185°F

Pedestrian input arrestors shall be a four (4) circuit device provided with the following minimum specifications:

- Operating Voltage: 30 VDC
- Clamping Voltage: 36 VDC
- Operating Current: 0.15 A
- Peak Surge Current: 10 kA (8 x 20 μ s)
- Frequency Range: 0 to 20 MHz
- Insertion Loss: < 0.1 dB at 20 MHz
- SPD Technology: GDT, SAD, with Series PTC
- Connection Type: Terminal Block with compression lugs; Terminals accept up to 10 AWG
- Operating Temperature: -40°F to +185°F

907-632.02.8--System Detectors. The controller shall have the ability to receive input data from up to eight (8) special system detectors in addition to the normal actuated controller unit phase detectors. The user shall have the option to assign any of the phase detectors as “system detectors”.

907-632.02.9--Preemption. The cabinet shall be completely wired to accept and service calls from preemption phase selector modules, associated optical detector units and GPS units. Optical detector units and GPS unit cabinet components shall be as specified in Section 639. Provision for two (2) standard card modules shall be accommodated in a separate card rack for preemption. The preemption card rack shall provide a minimum of eight (8) channels.

Provisions shall also be made in the cabinet to accommodate Railroad Preemption when specified in the plans or contract documents. Railroad Preemption shall meet the requirements set forth in Section 639. While it is not necessary that a Railroad Preemption interface board be provided with the cabinet, the cabinet and back panel shall be designed so that a Railroad Preemption interface panel that uses a relay to isolate the track switch from the controller cabinet circuitry can be installed. Preempt 1 and 2, in the case of gate down preemption, shall be reserved for Railroad Preemptions; all subsequent preemptions shall be reserved for Emergency Vehicle, Fire Station, or Police Preemption.

907-632.02.10--Uninterruptable Power Supply. When specified in the plans or contract documents an Uninterruptable Power Supply (UPS) System shall be installed in the cabinet assembly. The UPS shall be installed in the cabinet and meet the requirements set forth in Section 633.

907-632.02.11--Power Service Pedestal. A Power Service Pedestal shall be provided as described in Section 631.03.2.

907-632.03--Construction Requirements.

907-632.03.1--Mounting. Traffic Signal Cabinet Assemblies shall be wall or pole mounted, base mounted on a concrete cabinet pad, or base mounted using a composite enclosure as specified below and as shown in the plans.

Power Service Pedestal shall be base mounted on a concrete cabinet pad or on a composite enclosure as specified below and as shown in the plans.

907-632.03.1.1--Wall or Pole Mounted. Wall or pole mount hardware shall be provided for mounting cabinets in specific installations as indicated in the design plans. Wall or pole mounted cabinets shall be manufactured with rigid tabs, rigid brackets or other acceptable configuration for attachment of the cabinet to the wall or pole support. Rigid attachment devices must allow for field alignment of cabinet to the wall or pole support.

907-632.03.1.2--Concrete Cabinet Pad. Concrete foundations shall be constructed of Class B concrete in specific installations as indicated in the design plans.

Cabinets for installation on a concrete base shall be manufactured with rigid tabs, rigid brackets or other acceptable configuration for attachment of the cabinet bottom to its flat support structure. Rigid attachment devices must allow for field alignment of cabinet with the support base. Concrete base construction details shall be provided in the design plan drawings.

907-632.03.1.3--Composite Enclosure. Cabinets for installation on a composite enclosure base shall be manufactured with rigid tabs, rigid brackets or other acceptable configuration for attachment of the cabinet bottom to its' flat support structure. Rigid attachment devices must allow for field alignment of cabinet with the composite enclosure. Composite enclosure attachment details shall be provided as shown in the plans.

907-632.03.2--Documentation. Documentation packages shall be delivered for each unit at the same time as the equipment to which it pertains.

A minimum of two (2) sets of complete schematic drawings and equipment documentation shall be supplied with each cabinet. The first copy shall be placed in a clear re-sealable print pouch of sufficient size to accommodate one (1) complete set of folded cabinet prints and placed in the pull-out drawer of the cabinet and the second copy shall be provided to the Department. Comprehensive controller data shall be included as part of the cabinet documentation package and shall be placed in the cabinet drawer pouch. Digital copies of all cabinet documentation shall be provided to the Department before final acceptance.

The documentation packages shall contain a schematic wiring diagram of the controller cabinet assembly and all auxiliary equipment. The schematic wiring diagram, including a symbols legend, shall show in detail all integrated circuits, transistors, resistors, capacitors, inductors as well as switches and indicators. All parts shown shall be easily identified on both in the cabinet and on the schematic diagram. Model numbers shall be used on schematic diagram when available.

A complete physical description of the signal cabinet assembly shall be provided to include at least the physical dimensions of the unit, weight, temperature ratings, voltage requirements, power requirements, material of construction, and complete performance specifications.

A complete set of operation guides, user manuals, and performance specifications shall be provided.

Detailed programming instructions, preventative maintenance requirements, and troubleshooting procedures shall also be provided for the controllers. These documents shall fully cover all programming procedures and programmable options capable of being made to the controllers and associated traffic control equipment. Instructions for modifications within the range of the capabilities of the unit such as changes in phases or sequences and programming matrix boards shall be included.

An intersection diagram shall be provided on the cabinet door showing geometric configuration, lane use assignments, controller cabinet and signal pole locations, vehicle and pedestrian signal head locations, vehicle and pedestrian detector zone locations, ring-barrier phasing diagram, and detector channel assignments. The intersection diagram shall be labeled with, at a minimum, a North Arrow, main street name(s), side street name(s), signal pole numbers, vehicle and pedestrian head type(s), detector zone designations, volume density and phase recall requirements, flash sequence. All field wires within the cabinet shall be labeled to coincide with those shown on the intersection diagram.

907-632.04--Method of Measurement. Traffic Signal Cabinet Assembly will be measured as a unit per each.

Remove and Replace Existing Traffic Signal Cabinet Assembly will be measured as unit per each.

Modify Existing Traffic Signal Cabinet will be measured as a unit per each.

Solid State Traffic Actuated Controller, of the type specified in the project plans, will be measured as a unit per each.

Signal Software License, of the type specified in the project plans, will be measured as a unit per each.

Malfunction Management Unit, of the type specified in the project plans, will be measured as a unit per each.

Card Rack, of the type specified in the project plans, will be measured as a unit per each.

GPS Clock, as specified in the project plans, will be measured as a unit per each.

Power Service Pedestal, as specified in the project plans, will be measured as a unit per each.

All pay items shall be inclusive of all materials, work, system integration, testing and incidentals necessary for a complete and operable unit in place and accepted. All removal, turn on, and acceptance of equipment, devices, traffic signals, and traffic signal assemblies shall follow Section 631 - Traffic Signal Systems-General prior to payment.

907-632.05--Basis of Payment. Traffic Signal Cabinet Assembly, measured as prescribed above, will be paid for at the contract unit price per each for each type(s) specified in the contract, which price shall be full compensation for furnishing, installing, configuring, wiring, testing, and mounting foundation construction, cabinets, relays, terminals, circuit breakers, modules, coordination and time base control programs, connectors wiring, overlap equipment, load switches, power cables, power supplies, controller mechanism and housing, MMU2, mounting material, all other materials, and all equipment, labor, tools, and incidentals necessary to complete the work.

Remove and Replace Existing Traffic Signal Cabinet Assembly, measured as prescribed above, will be paid for at the contract unit price per each for each type(s) specified in the contract, which price shall be full compensation for furnishing, installing, configuring, wiring, testing, cabinets, relays, terminals, circuit breakers, modules, coordination and time base control programs, connectors wiring, overlap equipment, load switches, power cables, power supplies, controller mechanism and housing, MMU2, mounting material, all other materials, removal, disposal, transfer, storage, and/or resetting of components that are existing, all other components included in the traffic signal cabinet, and all equipment, labor, tools, and incidentals necessary to complete the work.

Modify Existing Traffic Signal Cabinet, measured as prescribed above, will be paid for at the

contract unit price per each, which price shall be full compensation for furnishing, installing, configuring, and mounting all components, wiring, and devices; rewiring, reconfiguring, removal, disposal, transfer, storage, and/or resetting of existing components and devices, installing or changing coordination and time base control programs in the traffic signal cabinet assemblies, testing, final cleanup, all equipment, labor, tools, and incidentals necessary to complete the work.

Solid State Traffic Actuated Controller, measured as prescribed above, will be paid for at the contract unit price per each for each type(s) specified in the contract, which price shall be full compensation for all labor, equipment, tools, materials inclusive of the controller mechanism(s) and housing(s), all power cables, power supplies, wiring, factory and manufacturing inspection, attachment hardware, testing, storage, packaging, shipping, warranty, and all work, equipment, and appurtenances, and all incidentals necessary to provide a fully functional traffic controller ready for use. It shall also include all documentation including operations and maintenance manuals and other material necessary to document the operation of the traffic controller.

Signal Software Licenses, measured as prescribed above, will be paid for at the contract unit price per each for each type(s) specified in the contract, which price shall be full compensation for all labor, equipment, tools, materials inclusive of furnishing, installing and configuring the Signal Software, all power cables, power supplies, wiring, factory and manufacturing inspection, testing, storage, packaging, shipping, warranty, appurtenances, and all incidentals necessary to provide fully functional Signal Software ready for use. It shall also include all documentation including operations and maintenance manuals and other material necessary to document the operation of the Signal Software.

Malfunction Management Unit, measured as prescribed above, will be paid for at the contract unit price per each for each type(s) specified in the contract, which price shall be full compensation for all labor, equipment, tools, materials inclusive of furnishing, installing and configuring the Malfunction Management Unit (MMU2), all power cables, power supplies, wiring, attachment hardware, factory and manufacturing inspection, testing, storage, packaging, shipping, warranty, and all work, equipment, and appurtenances, and all incidentals necessary to provide a fully functional Malfunction Management Unit (MMU2) ready for use. It shall also include all documentation including operations and maintenance manuals and other material necessary to document the operation of the Malfunction Management Unit (MMU2).

Card Rack, measured as prescribed above, will be paid for at the contract unit price per each for each type(s) specified in the contract, which price shall be full compensation for all labor, equipment, tools, materials inclusive of furnishing, installing and configuring the Card Rack, all power cables, power supplies, wiring, attachment hardware, factory and manufacturing inspection, testing, storage, packaging, shipping, warranty, and all work, equipment, and appurtenances, and all incidentals necessary to provide a fully functional Card Rack ready for use. It shall also include all documentation including operations and maintenance manuals and other material necessary to document the operation of the Card Rack.

GPS Clock, measured as prescribed above, will be paid for at the contract unit price per each for each type(s) specified in the contract, which price shall be full compensation for all labor, equipment, tools, materials inclusive of furnishing, installing and configuring the Global

Positioning System (GPS) Clock(s), all power cables, power supplies, wiring, attachment hardware, factory and manufacturing inspection, testing, storage, packaging, shipping, warranty, and all incidentals necessary to provide a fully functional GPS Clock ready for use. It shall also include all documentation including operations and maintenance manuals and other material necessary to document the operation of the GPS Clock.

Power Service Pedestal, measured as prescribed above, will be paid for at the contract unit price per each for each type(s) specified in the contract, which price shall be full compensation for furnishing, installing, configuring, wiring, testing, and mounting foundation construction, cabinets, circuit breakers, connectors wiring, mounting material, all other materials, and all equipment, labor, tools, and incidentals necessary to complete the work.

Payment will be made under:

- 907-632-A: Solid State Traffic Signal Cabinet Assembly,
Type __ Cabinet, Type __ Controller - per each
- 907-632-B: Remove and Replace Existing Traffic Signal Cabinet Assembly,
Type __ Cabinet, Type __ Controller - per each
- 907-632-C: Modify Existing Traffic Signal Cabinet Assembly - per each
- 907-632-D: Solid State Traffic Actuated Controller, Type _____ - per each
- 907-632-E: Single-user Workstation Signal Software License - per each
- 907-632-F: Single-user Server Signal Software License - per each
- 907-632-G: Malfunction Management Unit - per each
- 907-632-H: Card Rack, ____ Position - per each
- 907-632-I: GPS Clock - per each
- 907-632-J: Power Service Pedestal - per each

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-633-1

CODE: (IS)

DATE: 11/15/2017

SUBJECT: Uninterruptable Power Supply

Section 633, Uninterruptable Power Supply, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-633.02--Materials.

907-633.02.1--Electronics Module. Delete the fourth bullet in Subsection 633.02.1 on page 538, and substitute the following.

- Local and remote communication capabilities.

907-633.02.4--UPS Operation. Delete the fourth subparagraph of Subsection 633.02.4.1 on page 539, and substitute the following.

- 4) The UPS system shall be capable of providing continuous, fully conditioned and regulated sinusoidal (AC) power to selected devices such as signal controllers, modems, communication hubs, National Transportation Communications for ITS Protocol (NTCIP) adapters and video equipment, for a minimum of 8 continuous hours.

907-633.02.4.3--Electric Specifications.

907-633.02.4.3.1--Input Specifications. Change the value of the Input Voltage Range in the Table in Subsection 633.02.4.3.1 on page 540, from “75 VAC to 155 VAC (without drawing energy from batteries)” to “75 VAC to 150 VAC (without drawing energy from batteries).”

Delete Subsection 633.02.4.4 on page 540, and substitute the following.

907-633.02.4.4--Blank.

907-633.03--Construction Requirement. Delete the first sentence of the second paragraph of Subsection 633.03 on page 541, and substitute the following.

Field tests shall be performed with various devices as noted in design plans to verify that each device operates optimally.

907-633.05--Basis of Payment. Delete the pay item listed on page 541, and substitute the following.

907-633-A: Uninterruptable Power Supply

- per each

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-634-2

CODE: (IS)

DATE: 08/13/2019

SUBJECT: Traffic Signal and ITS Equipment Poles

Section 634, Traffic Signal and ITS Equipment Poles, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-634.02--Materials.

907-634.02.1--Poles. Delete the bullets for Type X poles in Subsection 634.02.1 on page 542 and substitute the following.

- Type X -- Aluminum Pole for Detectors

After Type XI poles in Subsection 634.02.1 on page 542, add the following.

- Type XII -- ITS Extension Poles

907-634.02.1.1--Traffic Signal Poles. Delete the first, third, fourth, and fifth bullets in Subsection 634.02.1.1 on pages 542 and 543, and substitute the following.

- Self-supporting straight or upswept mast arm(s), in accordance with Plan details. Where possible, the mast arms shall match the adjacent signal poles in the area unless otherwise stated;
- Self-supporting straight or upswept mast arm(s), in accordance with Plan details. Where possible, the mast arms shall match the adjacent signal poles in the area unless otherwise stated;
- Tag installed on shaft side opposite the mainline highway and located approximately 48 inches above the top of the Baseplate;
- Minimum nominal size of four (4) inches wide by 26 inches tall reinforced hand-hole with included terminal block(s);
- A ½-inch coarse thread grounding stud shall be located on the interior side of the pole hand-hole opening;

907-634.02.1.2--Galvanized Steel Poles for Cameras. Delete the second paragraph of Subsection 634.02.1.2 on page 543, and substitute the following.

Unless specified otherwise in the plans, poles shall be designed in accordance with the AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals*, as specified in the plans, including all interims and updates. Design life shall be 50 years for all poles. The design wind speed for all parts of the structure shall meet the wind requirements

set forth in the latest edition of the AASHTO Wind Map, as stated in Subsection 722.02.3. The pole shall meet the design wind loading with all equipment installed.

After the fourth bullet in Subsection 634.02.1.2 on page 544, add the following.

- Top of pole deflection shall not exceed one (1) inch deflection from center due to 30 mph (non-gust) winds or the maximum deflection allowed by Subsection 722.02.3, whichever is more restrictive, for 80-foot poles.

907-634.02.1.3--Galvanized Steel Poles for Detectors. Delete the second paragraph of Subsection 634.02.1.3 on page 546, and substitute the following.

Unless specified otherwise in the plans, poles shall be designed in accordance with the AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals*, as specified in the plans, including all interims and updates. Design life shall be 50 years for all poles. The design wind speed for all parts of the structure shall meet the wind requirements set forth in the latest edition of the AASHTO Wind Map, as stated in Subsection 722.02.3.

Delete the last two sentences of the fifth paragraph of Subsection 634.02.1.3 on page 546, and substitute the following.

Design wind loading shall be as indicated in Subsection 722.02.3 unless otherwise noted in the plans. The pole shall meet design wind loading with all equipment installed.

907-634.02.1.4--Aluminum Poles for Detectors. Delete the second paragraph of Subsection 634.02.1.4 on page 547, and substitute the following.

Unless specified otherwise in the plans, poles shall be designed in accordance with the AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals*, as specified in the plans, including all interims and updates. Design life shall be 50 years for all poles. The design wind speed for all parts of the structure shall meet the wind requirements set forth in the latest edition of the AASHTO Wind Map, as stated in Subsection 722.02.3. The pole shall meet design wind loading with detector(s) installed.

907-634.02.1.5--Structure-Mounted ITS Equipment Poles. Delete the second paragraph of Subsection 634.02.1.5 on page 548, and substitute the following.

Unless specified otherwise in the plans, poles shall be designed in accordance with the AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals*, as specified in the plans, including all interims and updates. Design life shall be 50 years for all poles. The design wind speed for all parts of the structure shall meet the wind requirements set forth in the latest edition of the AASHTO Wind Map, as stated in Subsection 722.02.3. For projects that are in areas with higher wind standards, the higher standard is required. The pole shall meet design wind loading with all equipment installed.

After the second bullet in Subsection 634.02.1.5 on page 548, add the following.

- Consideration shall be given for all possible loading combinations including ice and wind loads, as stated in Subsection 722.02.

After Subsection 634.02.1.8 on page 549, add the following.

907-634.02.1.9--ITS Extension Poles. ITS extension poles are used to provide ITS devices a mounting location with a vertical or horizontal clearance away from an existing pole or structure to which they are to be attached. As such, extension poles and the mounting and attachment hardware shall be of a material that will not cause galvanic corrosion with existing or proposed equipment. If possible, the extension poles shall be similar in color to the base pole or structure, unless otherwise directed. They shall meet the requirements of the base pole, the plans, and Subsection 722.02. Design considerations shall be given to the additional loading being subjected to the base pole or structure.

907-634.02.2--Camera Lowering Device. The lowering device system shall be designed to support, raise, and lower a standard CCTV camera, lens, housing, PTZ mechanism, cabling, connectors, and other supporting field components. The camera connector box shall be cast ZA-12 (12% Al and 88% Zn) and have a minimum weight that ensures stability of the camera during raising and lowering operation. The camera connector box shall have fully gasketed doors to prevent water intrusion. The bottom of the camera connector box shall be equipped with a condensation/moisture exit system. The camera connector block shall be molded in thermoset, weather-resistant, synthetic rubber designed to handle harsh environments.

Electrical contacts must also be designed to handle harsh environments. There shall be a locking mechanism between the fixed and movable components. For the movable components, a latching mechanism shall be provided to hold the device in place (when latched all weight shall be removed from the lowering cable) and to raise or lower the assembly using the lowering tool and lowering cable. The suspension contact unit housing shall be weatherproof with a gasket to isolate the interior from dust and moisture.

All pulleys shall have sealed, self-lubricated bearings, oil tight bronze bearings, or sintered bronze bushings. The lowering cable shall be a minimum 1/8-inch diameter stainless steel aircraft cable. Internal wireways shall prevent the stainless steel lifting cable from contacting power or video cabling. The only cable permitted to move is the lifting cable, all other cables must remain stable and secure during lowering and raising operations.

The lowering tool shall consist of a lightweight metal frame and winch assembly, a quick release cable connector, an adjustable safety clutch, and a variable speed industrial duty electric drill motor. This tool shall be able to access the lifting cable through a pole hand hole, shall support itself and the load during lowering, and shall provide a means to prevent freewheeling when loaded. This tool shall have a reduction gear to reduce the manual effort required during lifting operations. In addition, this tool shall be provided with an adapter for operating the lowering device with a portable drill using a clutch mechanism. The portable lowering tool shall be included as part of the installed system. The lowering device shall include customized adapter brackets to install cylindrical type PTZ CCTV cameras that have a mounting base below the camera assembly

and is require to be installed in an upright position.

907-634.03--Construction Requirements.

907-634.03.1--Foundations. Delete the last sentence of the fourth paragraph of Subsection 632.03.1 on page 550, and substitute the following.

Where foundations are constructed in areas where the pavement edge elevation and shoulder edge elevation differ more than twelve (12) inches, taller foundations may be used but must be approved by the Engineer.

907-634.04--Method of Measurement. After the last sentence of the fourth paragraph of Subsection 634.04 on page 552, add the following.

Field conditions may require taller foundations than specified in the plans. In which case, the addition concrete will be paid for at the contract bid price per cubic yard for pole foundations.

After the sixth paragraph of Subsection 634.04 on page 553, add the following.

ITS extension poles of the type specified will be measured as a unit quantity per each.

Delete the last paragraph in Subsection 634.04 on page 553 and substitute the following.

Wooden poles will be measured as a unit quantity per each.

Camera lowering device will be measured as a unit quantity per each.

907-634.05--Basis of Payment. After the fourth paragraph of Subsection 634.05 on page 553, add the following.

Camera lowering device and camera lowering tool, as described above, shall be paid for at the contract unit price per each. This price shall be full compensation for all materials, design, installation, equipment, tools, labor and incidentals associated with providing and installing the camera lowering device and the camera lowering tool.

After the sixth paragraph of Subsection 634.05 on page 553, add the following.

ITS extension poles, measured as prescribed above, will be paid for at the contract unit price per each, which price shall be full compensation for furnishing all materials, for installing the extension pole, mounting attachments as necessary, adjusting the pole to meet specific project needs, and for all equipment, tools, labor, and incidentals necessary to complete the work.

After the last paragraph of Subsection 634.05 on page 554, add the following.

Sizing poles and their appurtenances to field conditions is the Contractor's responsibility. No separate payment will be made for designing to meet project specifications and field conditions.

Delete the pay items listed on page 554, and substitute the following.

907-634-A: Traffic Signal Equipment Pole, Type __, __' Shaft, __' Arm *	- per each
907-634-B: Traffic Signal Equipment Pole Shaft Extension, ___' **	- per each
907-634-C: Pole Foundations, Class ___ Concrete	- per cubic yard
907-634-D: Slip Casing, ___" Diameter	- per linear foot
907-634-E: Camera Pole with Foundation, ___' Pole	- per each
907-634-F: Detector Pole with Foundation, ___' Pole	- per each
907-634-G: Traffic Signal Equipment Pole Mast Arm Extension, ___' **	- per each
907-634-H: ITS Equipment Pole, Structure Mounted, ___' Pole	- per each
907-634-I: Wood Pole, Class ___ Height ___'	- per each
907-634-J ITS Extension Pole, _____' **	- per each
907-634-K: Camera Lowering Device	- per each

* Multiple Arms may be indicated

** Additional information may be indicated

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-636-2

CODE: (IS)

DATE: 11/15/2017

SUBJECT: Electrical Cable

Section 636, Electrical Cable, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-636.01--Description. Delete the last sentence of the last paragraph in Subsection 636.01 on page 555 and substitute the following.

It shall include excavating, laying, placing tracer cable or tape, backfilling, replacing sod, aerial supports and/or pull-through conduits, as applicable; and transformer enclosures and/or terminal boxes when not placed under other items of the contract.

907-636.02--Materials. After the paragraph of Subsection 636.02 on page 555, add the following.

907-636.02.1--ITS Ground Mounted Meter Enclosure.

907-636.02.1.1--Meter Base. Meter bases shall be NEMA Type 3R with a minimum rating of 100 amps and shall meet the requirements of the local utility. The meter base shall be provided with ampere rating of meter sockets based on sockets being wired with insulated wire rated at least 167°F. The meter base shall be designed for underground service.

Meter bases shall be 4-terminal, 600 volt, single phase, 3-wire furnished with the following:

- (a) Line, load and neutral terminals accepting #8 to 2/0 AWG copper/aluminum wire,
- (b) Ringed or ringless type, with or without bypass,
- (c) Made of galvanized steel,
- (d) Listed as meeting UL Standard UL-414, and
- (e) Underground service entrance as specified.

The meter bases shall have electrostatically applied dry powder paint finish, light gray in color, with a minimum thickness of 2.4 mils.

A 1-inch watertight hub for threaded rigid conduit shall be furnished with meter base.

907-636.02.1.2--Disconnect. External electrical service disconnects shall be furnished with a single pole 50-amp inverse time circuit breaker with at least 10,000 RMS symmetrical amperes short circuit current rating in a lockable in open or closed position in accordance with National Electric Code (NEC) and be a NEMA 3R Type enclosure. The disconnect shall be listed as meeting UL Standard UL-489 and marked as being suitable for use as service equipment.

The disconnect enclosure shall be fabricated from galvanized steel and electrostatically apply dry powder paint finish, light gray in color, to yield a minimum thickness of 2.4 mils. Ground bus and neutral bus shall be provided with at least four terminals with minimum wire capacity range of number 14 through number 4.

For 480V service, a local utility approved, lockable, non-fused disconnect switch on the supply side of the meter base shall be furnished, installed, and labeled as "Utility Disconnect". A separate load side disconnect with overcurrent protection shall be provided within two feet (2') of the meter.

907-636.02.1.3--Ground Mounted – Pedestal – Service Panel. The pedestal shall be of NEMA Type 3R rainproof construction and shall be UL Listed as "Enclosed Industrial Control Equipment" (UL 508A). External construction shall comply with UL50 requirements and shall be of G90 galvanized steel with light green #14672 Federal Specification 595 polyurethane industrial grade powder paint.

Hinges shall be stainless steel and of the continuous piano hinge type.

The pedestal mounting bolts shall not be externally accessible. The pedestal shall be able to be embedded in concrete or use anchor bolts for mounting on concrete base. Either pedestal mounting base or anchor bolt kit shall be used for installation.

The service pedestal should have three separate isolated sections for metering equipment, utility termination and customer equipment.

The metering section shall be pad-lockable and sealable and have a hinged swing hood with an integral hinged polycarbonate sealable window for access to demand meters. Meter socket type shall meet the requirements of the serving utility.

The utility termination section shall be pad-lockable and sealable and shall have a stainless steel handle provided on a lift-off cover. Sufficient clearance shall be provided for a 4-inch diameter conduit for utility cables entrance. Utility landing lugs shall be UL listed and shall accommodate conductor sizes between AWG #6 – 350 kcmil.

The customer compartment door shall be hinged on the left hand side. A stainless pad-lockable hasp shall be provided to secure customer compartment. A door keeper shall be provided to keep the door in an open position. A print pocket shall be provided on the inside of the door in a weatherproof sleeve. Required UL labeling shall be located on the inside of the customer door. Distribution and control equipment shall be behind an internal dead-front door with a quarter-turn securing latch and be hinged to open more than 90 degrees. The dead-front door shall be hinged on the same side as the customer section door. All distribution and control equipment shall be factory wired using 600-volt wire sized to NEC and UL requirements.

The service pedestal shall be rated for operation at 10K minimum amps interrupting capacity (AIC). The provided documentation shall list circuit breaker combinations and those to be used for de-rated operation for series ratings. Circuit breakers shall be permanently labeled with engraved name plates.

The serving utility shall be contacted for necessary requirements before ordering or installing equipment.

907-636.02.2--ITS Ground Mounted Transformer Enclosure.

907-636.02.2.1--Disconnect. The disconnect shall meet the requirements of Subsection 907-636.01.2.

907-636.02.2.2--Ground Mounted - Pedestal – Service Panel. The ground mounted - pedestal – service panel shall meet the requirements of Subsection 907-636.01.3. In addition, the transformer shall be rated to match the requirement of the primary service and the types of load served as specified in the plans. The transformer unit shall be installed inside the enclosure and meet all applicable codes. Each transformer shall be furnished as one complete unit and wiring of multiple transformers to meet the required ratings at each enclosure location is not allowed. Step-up and Step-down transformers shall be designed specifically for each application. Reverse feeding of step-up and step-down transformers is not allowed. All transformers shall be designed for outdoor installation and rated 600 VAC and below.

907-636.04--Method of Measurement. Delete the first paragraph of Subsection 636.04 on page 557, and substitute the following.

Electric cable of the type specified, constructed as specified on the plans, will be measured by the linear foot. Measurement will be computed horizontally along the conduit, messenger cable or mast arm and vertically along the pole. Measurement in underground conduit is only in the horizontal plane and no additional quantity shall be added for conduit depth or change in elevation of the conduit. No extra length will be allowed for cable inside signal heads, drip loops, or sag in aerial supported cable. Tracer tape, when required in the plans, used with tracer cable will not be measured for separate payment but shall be included in the contract price for Tracer Cable. The terminals for the measurements of lengths will be considered specifically as the center of the pull boxes, poles, signal heads or controller cabinets.

After the first paragraph of Subsection 636.04 on page 557, add the following.

ITS Ground Mounted Enclosures, complete in place and accepted, will be measured as a unit quantity per each for a complete and operable unit in accordance with the contract provisions.

907-636.05--Basis of Payment. After the first paragraph of Subsection 636.05 on page 557, add the following.

ITS Ground mounted enclosures, measured as prescribed above, will be required wherever ground mounted meter enclosures or step-up or step-down transformers are noted as required in the plans. The enclosures shall be paid for at the contract unit price bid per each; which price shall be full compensation for any transformers (as described in the plans), foundation construction, cabinets, pedestals, meter bases, disconnects, relays, terminals, circuit breakers, sockets, hubs, buses, connectors, mounting material, all other materials for constructing, installing, connecting, testing

and final cleanup; and for all equipment, labor, tools and incidentals necessary to complete the work in accordance with the contract documents.

In the first sentence of the second paragraph of Subsection 636.05 on page 557, change “relaid” to “re-laid”.

Delete the list of pay items on pages 557 and 558, and substitute the following.

- 907-636-A: Electric Cable, Direct Burial, Type, AWG ____, ____ Conductor - per linear foot
- 907-636-B: Electric Cable, Underground in Conduit, Type, AWG ____,
____ Conductor - per linear foot
- 907-636-C: Electric Cable, Aerial Supported, Type, AWG ____,
____ Conductor - per linear foot
- 907-636-D: Electric Cable, Aerial Supported in Conduit, Type, AWG ____,
____ Conductor - per linear foot
- 907-636-E: Electric Cable, Underground in Conduit, Tracer Cable - per linear foot
- 907-636-F: Electric Cable, Repair - per linear foot
- 907-636-G: Underground Cable and Conduit, Removed - per linear foot
- 907-636-H: Underground Cable and Conduit, Removed and Re-laid - per linear foot
- 907-636-I: ITS Ground Mounted * Enclosure - per each

* Indicates Meter or Transformer Enclosure Type

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-637-2

CODE: (IS)

DATE: 11/15/2017

SUBJECT: Traffic Signal Conduit and Pull Boxes

Section 637, Traffic Signal Conduit and Pull Boxes, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-637.02--Materials.

907-637.02.1--Pull Box / Enclosures. Delete the first sentence of the second paragraph of Subsection 637.02.1 on page 558, and substitute the following.

For grade level pull boxes and enclosures only, Tier 22 (22,500-pound design load, 33,750-pound test load) enclosures with minimum size dimensions as shown in the detail drawings on the plans shall be installed for use in traffic signal construction. Enclosure boxes shall be open bottom.

Delete the fourth sentence of the second paragraph of Subsection 637.02.1 on page 558.

907-637.03--Construction Requirements.

907-637.03.1--Pull box/Enclosures. Delete the sixth sentence of the first paragraph of Subsection 637.03.1 on page 559, and substitute the following.

Enclosures located in soil or sodded areas shall be installed with a supporting poured concrete collar or approved composite collar assembly, as shown by details on the plans.

907-637.03.2.1--Conduit Duct Bank. Delete the first sentence of subparagraph a) under Bored or drilled conduit in Subsection 637.03.2.1 on page 560, and substitute the following.

All conduits under railroad tracks shall be horizontal directional bored or drilled at a minimum of ten (10) feet below the railroad bed, or as required by the Railroad Company.

Delete Subsections 637.03.2.4 and 637.03.2.5 on pages 561 & 562, and substitute the following.

907-637.03.2.4--Blank.

907-637.03.2.5--Blank.

907-637.04--Method of Measurement. Delete subparagraphs a) and b) in Subsection 637.04 on page 563, and substitute the following.

- a) From center to center of pull box and/or foundation.

- b) Any above ground vertical conduit runs, as indicated in the plans. Measurement in underground conduit is only in the horizontal plane and no additional quantity shall be added for conduit depth or change in elevation of the conduit.

907-637.05--Basis of Payment. Delete the fourth and fifth paragraphs of Subsection 637.05 on page 564, and substitute the following.

Duct Plugs and Sealant will be included in the cost of the conduit and will not be measured separately.

Delete the pay items listed on page 564 and substitute the following.

- 907-637-A: Pull Box Enclosure, Type - per each
- 907-637-B: Pull Box Enclosure, Structure Mounted, Type - per each
- 907-637-C: Traffic Signal Conduit, Underground, Type, Size - per linear foot
- 907-637-D: Traffic Signal Conduit, Underground Drilled or Jacked, Type, Size - per linear foot
- 907-637-E: Traffic Signal Conduit, Structural Conduit, Type, Size - per linear foot
- 907-637-F: Traffic Signal Conduit, Aerial Supported, Type, No., Size - per linear foot
- 907-637-G: Traffic Signal Conduit, Underground Encased in Concrete, Type, Size - per linear foot
- 907-637-H: Traffic Signal Conduit Bank, Underground, Type, No., Size - per linear foot
- 907-637-I: Traffic Signal Conduit Bank, Underground Drilled or Jacked, Type, No., Size - per linear foot
- 907-637-J: Traffic Signal Conduit Bank, Structural Conduit, Type, No., Size - per linear foot
- 907-637-K: Traffic Signal Conduit Bank, Aerial Supported, Type, Size and Number - per linear foot

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-641-1

CODE: (IS)

DATE: 11/15/2017

SUBJECT: Radar Vehicle Detection

Section 641, Radar Detection Systems, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

Delete the title of Section 641 on page 584 and substitute the following.

SECTION 907-641 - RADAR VEHICLE DETECTION

Delete Subsection 641.01 on page 584, and substitute the following.

907-641.01--Description. This work shall consist of providing all labor, materials, equipment, and incidentals necessary to furnish, install, test, train and operate Radar Vehicle Detection, including Signal Radar Vehicle Detection (SRVD) and Intelligent Transportation Systems (ITS) Radar Vehicle Detection (IRVD). These systems will provide roadway monitoring capabilities via electromagnetic microwave radar signals through the air. The signals bounce off vehicles in their paths and the signal is returned to the detector. The returned signals are processed to determine traffic parameters.

907-641.01.1--Signal Radar Vehicle Detection. SRVD provide traffic parameters necessary to the traffic signal controller operation for vehicle detection. All Signal Radar Vehicle Detection shall be supplied from the same manufacturer per construction project.

Type 1 SRVD shall be used for basic vehicle detection at signalized intersections as described below in this specification. Type 2 SRVD shall have all of the functionality of the Type 1 SRVD with additional features described below in this specification.

Type 2 SRVD shall utilize a matrix of radar signals for two-dimensional coverage and shall track vehicles through each type of detection's specified Area of Coverage. The Type 2 SRVD shall report real-time detection of both moving and stopped vehicles.

907-641.01.2--ITS Radar Vehicle Detection. IRVD shall provide data, including, but not limited to speeds, volume, lane occupancy and classification.

907-641.02--Materials.

907-641.02.1--Radar Design. Delete the first sentence of the first paragraph of Subsection 641.02.1 on page 584, and substitute the following.

The IRVD and the SRVD stop bar microwave shall operate in the 24.0 to 24.25 GHz frequency band.

907-641.02.1.1--Cabinet Interface Unit (CIU) Design. Delete the last paragraph of Subsection 641.02.1.1 on page 585, and substitute the following.

The CIU shall operate in the harsh conditions of a signal cabinet, and comply with the applicable standards stated in the NEMA TS 2-2003 standard for shock, vibration, and temperature.

Delete Subsection 641.02.2 and 641.02.3 on pages 585 and 586, and substitute the following.

907-641.02.2--Area of Coverage--SRVD.

907-641.02.2.1--Stop Bar Radar Vehicle Detection. Type 1 SRVD stop bar radar sensor shall track vehicles through a field of view that extends out a minimum of 100 feet

The Type 1 SRVD stop bar radar sensor shall be able to detect and report presence in lanes located within a minimum 100-foot from the face of the detector. Any variance of the detectable area shall be approved by the Engineer.

The Type 1 SRVD stop bar radar sensor shall be able to detect up to four (4) lanes with eight (8) or sixteen (16) individual zones as indicated in the plans.

Type 2 SRVD stop bar radar sensor shall have all the functionality of the Type 1 SRVD stop bar sensor with the addition of the following:

- Type 2 SRVD stop bar radar sensor shall detect true presence of vehicles whether in motion or still without using Locking or Latching Algorithms.
- Type 2 SRVD stop bar radar sensor shall report presence in lanes with a minimum 90 degree arc from the face of the detector.
- Type 2 SRVD stop bar radar sensor shall be able to detect a minimum of ten (10) lanes.

907-641.02.2.2--Advanced Radar Vehicle Detection. The Type 1 SRVD advanced radar sensor shall be able to detect and report vehicle information such as range and speed when mounted within 50 feet of the center of the lanes of interest. Variance of this distance shall be approved by the Engineer per the application.

The Type 1 SRVD advanced radar sensor shall be forward fired and be able to detect and report vehicle information when mounted at heights above the road surface, as per manufacturer's recommendations.

The Type 1 SRVD advanced radar sensor shall be able to detect and report vehicles on the roadway up to 600 feet from the detector.

The Type 2 SRVD advanced radar sensor shall have all the functionality of the Type 1 SRVD advanced radar sensor with the following additions:

- Type 2 SRVD advanced radar sensor shall be able to detect and report heavy vehicles on the roadway up to 900 feet from the detector.
- Type 2 SRVD advanced radar sensor shall be able to detect Estimated Time of Arrival (ETA) for vehicles. The advanced radar sensors shall support user configurable upper and lower ETA filters for each zone. The sensors shall support the configuring of ETA filters in increments of 0.1 seconds.

907-641.02.3--Area of Coverage-IRVD. The IRVD's field of view shall cover an area with a minimum detection range of six (6) feet from the IRVD and a maximum detection range of 250 feet from the IRVD.

Delete the title of Subsection 641.02.4 on page 586, and substitute the following.

907-641.02.4--Detection Zones--SRVD.

Delete the title of Subsection 641.02.4.1 on page 586, and substitute the following.

907-641.02.4.1--Stop Bar Radar Vehicle Detection.

After the last sentence of the second paragraph of Subsection 641.02.4.1 on page 586, add the following.

A minimum of one (1) separate detection zone per lane is required.

Delete the title of Subsection 641.02.4.2 on page 586, and substitute the following.

907-641.02.4.2--Advanced Radar Vehicle Detection.

Delete the third paragraph of Subsection 641.02.4.2 on page 586, add the following.

The advanced radar sensors shall provide vehicle call and extend data on up to eight (8) channels that can connect to contact closure modules compliant with NEMA TS 1, NEMA TS 2, and 170/2070 controller cabinets.

Delete the title of Subsection 641.02.5 on page 586, and substitute the following.

907-641.02.5--Detection Zones--IRVD.

Delete the title of Subsection 641.02.6 on page 586, and substitute the following.

907-641.02.6--Capabilities--SRVD.

Delete the title of Subsection 641.02.6.1 on page 587, and substitute the following.

907-641.02.6.1--Stop Bar Radar Vehicle Detection.

Delete the title of Subsection 641.02.6.2 on page 587, and substitute the following.

907-641.02.6.2--Advanced Radar Vehicle Detection.

After item 2) of Subsection 641.02.6.2 on page 587, add the following.

- 3) Maintain a detection accuracy of 95% for each detection zone set-up on the graphical user interface.

Delete the title of Subsection 641.02.7 on page 587, and substitute the following.

907-641.02.7--Capabilities--IRVD.

Delete the first sentence of the first paragraph of Subsection 641.02.7 on page 587, and substitute the following.

The IRVD shall detect true presence of vehicles whether in motion or still without using Locking or Latching Algorithms.

Delete item 5) in Subsection 641.02.7 on page 587, and substitute the following.

- 5) IRVD in forward-looking configuration shall monitor traffic in one lane and be capable providing the following data: Volume, occupancy, average speed and travel direction in the lane.

907-641.02.8--Environmental Conditions and Protection. Delete the last sentence of the first paragraph of Subsection 641.02.8 on page 588, and substitute the following.

Except as stated otherwise herein, the equipment shall meet all its specified requirements during and after subjecting to any combination of the NEMA TS 2-2003 standard and the following:

907-641.02.10--Electrical. Delete the first paragraph of Subsection 641.02.10 on page 588, and substitute the following.

The radar sensors shall consume less than 10 W and shall operate with a DC input between 12 VDC and 28 VDC for IRVD and 9 VDC and 32 VDC for SRVD, or POE. POE injectors shall be approved by the Engineer.

Delete the title of Subsection 641.02.11 on page 589, and substitute the following.

907-641.02.11--Radar Design.

907-641.02.12--Communication Ports. Delete the second sentence of the first paragraph of Subsection 641.02.12 on page 589, and substitute the following.

The IRVD shall be upgradable (optional) to include integral 10/100 Base-T Ethernet supporting TCP, UDP, IP, ARP, ICMP.

Delete the second sentence of the second paragraph of Subsection 641.02.12 on page 589, and substitute the following.

For SRVD, any external device needed to convert serial to IP Ethernet within the cabinet for remote communications shall be provided with the radar sensor unit at no additional cost.

Delete Subsection 641.02.13 on page 589, and substitute the following.

907-641.02.13--Radar Detection Cabling. All Radar Detection cable shall be paid per the unit cost of the pay item for Radar Detection Cable, as shown on the plans or details. The manufacturer is responsible for obtaining plan sets and ensuring cable lengths are properly measured and accounted for in the bid price for each sensor unit and as shown on the plans.

The cable shall have a single continuous run with no splices, unless inside a manufacturer supplied junction box. The cable shall be terminated only on the two (2) farthest ends of the cable. The cable shall meet the requirements of the manufacturer.

Delete the title of Subsection 641.02.15 on page 590, and substitute the following.

907-641.02.15--Configuration--SRVD.

Delete the title of Subsection 641.02.15.1 on page 590, and substitute the following.

907-641.02.15.1--Stop Bar Radar Vehicle Detection.

Delete the title of Subsection 641.02.15.2 on page 590, and substitute the following.

907-641.02.15.2--Advanced Radar Vehicle Detection.

907-641.03--Construction Requirements. Delete the first sentence of the first paragraph of Subsection 641.03 on page 590, and substitute the following.

Radar Detection System shall be constructed to withstand and operate in sustained winds of up to 90 mph and a 30% gust factor.

Delete the title of Subsection 641.03.1 on page 590, and substitute the following.

907-641.03.1--SRVD Installation Requirements.

Delete the first sentence of the third paragraph of Subsection 641.03.1 on page 590, and substitute the following.

Unused conductors in the cable shall be ground or terminated in the cabinet in accordance with the manufacturer's recommendations.

Delete the last sentence of the third paragraph of Subsection 641.03.1 on page 590, and substitute the following.

If required by the plans and installation methods, impedance termination and testing of multi drop runs shall be required per RS485 multi-drop standards.

Delete the title of Subsection 641.03.2 on page 591, and substitute the following.

907-641.03.2--IRVD Installation Requirements.

Delete Items 1) and 2) of Subsection 641.03.2 on page 591, and substitute the following.

- 1) The IRVD shall be mounted in side-fired or front facing configuration on poles as shown in the plans, using mounting brackets. The brackets shall be attached with approved 3/4-inch wide stainless steel bands.
- 2) The Contractor shall install the detector unit on a pole at the manufacturer's recommended height above the road surface so that the masking of vehicles is minimized and that all detection zones are contained within the specified elevation angle as suggested by the manufacturer.

Delete Items 4) and 5) of Subsection 641.03.2 on page 591, and substitute the following.

- 4) The IRVD mode of operation, detection zones and other calibration and set up will be performed using a MS Windows™ based software and a Notebook PC. The software shall allow verification of correct setup and diagnostics. It shall include facilities for saving verification data and collected data as well as saving and retrieving sensor setup from disk file.
- 5) Unused conductors in the ITS Radar Vehicle Detector Cable shall be grounded or terminated in the cabinet in accordance with the manufacturer's recommendations. Terminated conductors shall be individually doubled back and taped, then loosely bundled and secured.

Delete Item 7) of Subsection 641.03.2 on page 591, and substitute the following.

- 7) Any new, additional or updated drivers required for the existing ATMS software to communicate and control new IRVD installed by the Contractor shall be the responsibility of the Contractor.

Delete Subsection 641.03.3 on pages 591 and 592, and substitute the following.

907-641.03.3--Blank.

Delete Subsection 641.03.4 on page 592, and substitute the following.

907-641.03.4--Blank.

907-641.04--Method of Measurement. Delete the paragraphs of Subsection 641.04 on page 593, and substitute the following.

The Radar Vehicle Detection Sensors, of the type specified, will be measured as a unit per each.

Radar Vehicle Detection Cable will be measured by the linear foot, measured horizontally along the conduit, messenger cable or mast arm and vertically along the pole.

Radar Vehicle Detection Training will be measured per lump sum.

907-641.05--Basis of Payment. Delete the paragraphs of Subsection 641.05 on pages 593 & 594, and substitute the following.

Radar Vehicle Detection Sensor, of the type specified, measured as prescribed above, will be paid for at the contract unit price bid per each, which price shall be full compensation for furnishing all materials, construction installation, connecting, testing, for all equipment, tools, labor and incidentals required to complete the work. Work shall include furnishing, installing, system integration, testing and training (if required) of complete radar sensor system that includes the unit, cabling between the unit and the cabinet, surge protection devices, communication converters (if required), all conduit, risers and weatherhead between the radar sensors and the cabinet, interconnection wiring, power supply, connections to support structures (includes all incidental components, attachment hardware, mounting brackets, mounting arms, bolts, or any other items to mount the radar sensor as intended), satisfactory completion of testing and training requirements and all work, equipment and appurtenances as required to effect the full operation including remote and local control of the radar site complete in place and ready to use. The price bid shall also include all system documentation including: shop drawings, operations and maintenance manuals, wiring diagrams, block diagrams and other material necessary to document the operation of the radar sensor. Cabinet Interface Units shall be provided, and installed as specified in the plans, which shall be inclusive of any testing, connections, terminations, and testing required for interfacing the radar sensors and signal controller within the signal cabinet environment.

Radar Vehicle Detection Cable will be paid at the contract unit price per linear foot, which price shall be full compensation for all labor, materials, equipment tools, furnishing, installing, system integration, connections, testing, and all incidentals necessary to complete the work.

Radar Vehicle Detection Training, measured as prescribed above, will be paid for as a lump sum unit price.

Delete the pay items listed on page 594, and substitute the following.

907-641-A: Signal Stop Bar Radar Vehicle Detection Sensor, Type _____ - per each

- 907-641-B: Signal Advanced Radar Vehicle Detection Sensor, Type _____ - per each
- 907-641-C: ITS Radar Vehicle Detection Sensor - per each
- 907-641-D: Radar Vehicle Detection Cable - linear foot
- 907-641-E: Radar Vehicle Detection Training - lump sum

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-645-1

CODE: (IS)

DATE: 11/15/2017

SUBJECT: Pedestrian Detection Assemblies

Section 645, Pedestrian Detection Assemblies, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-645.02--Materials.

907-645.02.1--Standard Pedestrian Pushbutton Detector. Before the first sentence of the paragraph in Subsection 645.02.1 on page 629, add the following.

The Standard Pedestrian Pushbutton Detector shall meet the latest ADA Compliant Specifications.

907-645.02.1.2--Pushbutton. Delete the second sentence of the paragraph in Subsection 645.02.1.2 on page 629, and substitute the following.

The switch, when activated, shall give an audible (i.e., click) and visual indication of actuation. The visual indication shall remain illuminated until the pedestrian's WALK indication is displayed.

907-645.02.5--Environmental. Delete the paragraph in Subsection 645.02.5 on page 631, and substitute the following.

Ensure equipment performs all required functions during and after being subjected to the environmental testing procedures described in NEMA TS 2, Sections 2.2.7, 2.2.8, and 2.2.9.

907-645.05--Basis of Payment. Add the "907" prefix to the list of pay items on page 631.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-650-2

CODE: (SP)

DATE: 08/30/2017

SUBJECT: On-Street Video Equipment

Section 907-650, On-Street Video Equipment, is hereby added to and made part of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction as follows.

SECTION 907-650 - ON-STREET VIDEO EQUIPMENT

907-650.01--Description. This work shall consist of providing all labor, materials, equipment, and incidentals necessary to furnish, install, test, train, and operate CCTV Camera Systems. CCTV Camera System shall be provided to provide TMC personnel with live streaming video of the roadway network via CCTV Camera Systems. CCTV Camera Systems include both fixed and PTZ cameras.

907-650.02--Materials. All materials furnished, assembled, fabricated or installed shall be new, corrosion resistant.

Support equipment for the CCTV Camera Systems shall be provided in a Type B ITS Equipment Cabinet as described in Section 660.

The CCTV Camera System shall comply with the following minimum materials specifications:

907-650.02.1--General Capabilities and Performance Requirements. Overall CCTV Camera System capabilities and performance requirements include the following:

- 1) CCTV PTZ Cameras shall be placed and installed at fixed locations to provide full coverage of the mainline travel lanes and shoulders.
- 2) CCTV Fixed Cameras shall be placed and installed at fixed locations to provide coverage of the mainline travel lanes. The cameras shall be provided with a varifocal lens which shall be adjusted by the Contractor for the desired view of the mainline. At major intersections fixed cameras shall also be adjusted to the desired view of the surface streets. The Contractor shall record the adjusted views and submit to the MDOT ITS Engineer or his designee for approval and the MDOT Project Engineer. This recording shall be in a format playable with Windows Media Player or pre approved by MDOT ITS Engineer.
- 3) The CCTV Camera System components shall be compatible with each other and be of rugged design and suitable for reliable operation when mounted in their fixed locations.
- 4) The PTZ and the Fixed cameras shall be provided as either Ethernet IP-based or Analog as indicated in either project plan sheets or Notice to Bidders or should be assumed Ethernet IP if description isn't provided.
- 5) The CCTV Camera System shall be capable of attended and unattended, continuous 24 hours per day operation at fixed sites.

- 6) The Contractor shall ensure that the installed equipment provides unobstructed video of the roadway, traffic, and other current conditions around a roadside CCTV field site; that it responds to camera control signals from an operator of the system; and that the video images can be transmitted to remote locations interfaced to the system for observation.
- 7) PTZ and IP based cameras shall be capable of being remotely controlled and programmed.
- 8) All PTZ enclosures shall be provided with the ability to be pressurized for environmental protection.
- 9) PTZ Dome type cameras shall be mounted together with the zoom lens and integrated into the pan and tilt device within the dome enclosure forming a totally integrated, easily removable assembly.
- 10) All cameras shall include a high quality integrated camera/lens combination.
- 11) The camera shall also be equipped with an auto-iris lens capability compatible with the zoom lens supplied.
- 12) Iris capability shall include a provision for manual override via software.
- 13) The PTZ camera shall be capable of auto-focus during zoom-in or zoom-out, with provisions for override via software.
- 14) Overexposure protection shall be provided - the camera shall not be degraded or damaged under normal reasonable operating conditions.
- 15) The capability for local control of pan, tilt and zoom functions shall be provided at the roadside cabinet using vendor-supplied software installed on a laptop computer.
- 16) All IP Based CCTV cameras shall support the NTCIP 1205 v1.08 or later version if backward compatible communication protocol.

907-650.02.2--Analog Camera Unit. The minimum Camera Unit requirements include:

- 1) The camera unit shall incorporate solid-state design and provide digital signal processing (DSP) capable of providing clear and low-bloom color video pictures during daylight hours and monochrome video at night when the roadway is illuminated with minimal roadway lighting.
- 2) The Analog Camera shall be fully compliant with all aspects of the National Television Standards Committee (NTSC) specification, and produce NTSC compatible video.
- 3) The Analog camera shall operate over wide dynamic light conditions ranging from low light/dusk to full sunlight having day (color)/night (monochrome) switchover and iris control, with user-selectable manual and automatic control capabilities.
- 4) The camera unit shall be equipped with a low light level sensor to automatically switch the camera to Black and White mode.
- 5) The camera unit shall be equipped with an override capability to allow the camera to be manually switched via software to turn off the automatic low light level sensor switch feature for Color or Monochrome operation.
- 6) Image sensor: 1/3 inch charge-coupled device (CCD) employing digital video signal processing (DSP) technology with a minimum Effective Picture Elements of 768 horizontal x 494 vertical pixels.
- 7) The camera unit shall include integrated image stabilization.
- 8) Sensitivity: The camera shall maintain usable video under both day and nighttime lighting conditions.

- 9) Video output synchronization shall be 2 to 1 interlace and will observe the NTSC (color) and EIA RS-170 (black and white) standards.
- 10) Resolution: 470 lines horizontal and 350 TV lines vertical, NTSC equivalent.
- 11) Signal-to-noise ratio: 48 dB, minimum with AGC off, un-weighted, and 4.5MHz filter.
- 12) Video Signal Format: National Television Standards Committee (NTSC) composite video output of 1 Volt_{p-p} at 75 ohms, unbalanced.

907-650.02.3--Internet Protocol IP Camera Unit. IP cameras shall provide the same functionality as the analog camera units specified in subsection 907-650.02.2, in addition to the following minimum requirements:

- 1) Power over Ethernet or 24 VAC Power Input.
- 2) Open Architecture.
- 3) Shall utilize H.264 (Video Coding Experts Group (VCEG)/Moving Picture Experts Group) Video Compression Technology types as directed by the Intelligent Transportation Systems Program Manager
- 4) Standard Definition (SD) Units Shall be capable of 2 simultaneous H.264 video streams.
 - a. The primary stream shall provide 480p at 30 fps and the ability to be reduced to D1 resolution at 30 fps.
 - b. The secondary stream shall provide a minimum CIF resolution 30fps.
- 5) High Definition Units (HD) Shall be capable of 2 simultaneous H.264 video streams.
 - a. The primary stream shall provide 720p at 30 fps at a minimum and the ability to be reduced to D1 resolution at 30 fps.
 - b. The secondary stream shall provide a minimum CIF resolution 30fps.
- 6) Image sensor: 1/3 inch charge-coupled device (CCD)
- 7) Shall be capable to take video snapshots in JPEG format and transfer image via FTP.
- 8) IP encoded streams and Video Compression Technology shall be compatible with the existing video streaming servers and decoders for the www.mdottraffic.com WEB site or as approved by the Intelligent Transportation Systems Program Manager.
- 9) Internet Protocols: TCP, UDP (Unicast, Multicast IGMP V2), UPnP, DNS, DHCP, RTP, NTP
- 10) Support Real Time Streaming Protocol (RTSP)
- 11) Multilevel Password Protection.
- 12) EDR (Extended Dynamic Range).
- 13) C/CS Lens Mount.
- 14) Backlight Compensation.
- 15) Low Profile Top/Bottom Mount.
- 16) BNC Service Connector. Tap shall be installed inside cabinet.

907-650.02.4--PTZ Camera Lens. The minimum camera lens requirements include:

- 1) The camera lens shall have a minimum F-Stop of 1.4 to 1.6.
- 2) Optical and Digital Zoom:
 - a. Shall provide an optical zoom of 35X for analog dome cameras.
 - b. Shall provide a minimum optical zoom of 18X and a minimum digital zoom of 6X for IP PTZ cameras.

- 3) Zoom Control: The zoom magnification shall be fully controllable via the remote PTZ mechanism. The time to pass through the full range of movement of Iris, Zoom and Focus shall in no case exceed 10 seconds.
- 4) Iris and Focus: Support automatic iris and focus control with manual override capability. The iris shall be in a closed position when there is no power.
- 5) White or Color Balance: Support automatic or set to yield optical results under various outdoor lighting conditions.
- 6) Shutter Speed: Support automatic or set to yield optimal results under low lighting conditions without blooming or smearing, auto-iris on. Provide electronic shutter that is selectable in steps.
- 7) The lens shall be equipped for continuous remote control of zoom, focus and iris.
- 8) Mechanical or electrical means shall be provided to protect motors from overrunning in extreme positions.
- 9) The zoom lens shall be an integrated camera/lens combination.
- 10) Vibration or ambient temperature changes shall not affect the automatic iris function, focus mechanism and zoom mechanism.
- 11) The lens shall be optically clear, impact resistant and acrylic. The acrylic lens shall not yellow and shall not introduce appreciable light loss or geometric distortion over a 10-year service life when exposed to the environment.
- 12) The zoom mechanism shall be designed for maintenance-free operations. All gearing and bearings shall be self-lubricating with lubrication and gearing tolerances compatible with the environmental specifications contained herein.

907-650.02.5--Character Generator. The minimum character generator requirements include:

- 1) The capability of generating and superimposing lines of English language text on the video image/stream shall be provided.
- 2) A minimum of 20 characters per line that are between 10 and 30 horizontal TV lines in height shall be provided.
- 3) Control (enable, disable and edit) of this feature shall be available remotely and at the field site using a laptop computer.
- 4) The text messages shall be stored in non-volatile memory.
- 5) Characters shall be white with a black border to ensure legibility in varied scenes.
- 6) The following minimum text insertion requirements shall be provided with the ability to individually turn each one on or off:
 - a. Camera ID
 - b. Sector Message
 - c. Alarm Messages
 - d. Pan/Tilt Azimuth/Elevation
 - e. Compass Direction in 8 discreet zones

907-650.02.6--PTZ Enclosure. The minimum PTZ enclosure requirements include:

- 1) Sealed, pressurized dome enclosure that provides complete protection for the camera and lens assembly from moisture and airborne contaminants.

- 2) Environmental resistant and tamper proof meeting NEMA 4X or IP-67 rating requirements.
- 3) The dome enclosure shall be constructed in such a way that unrestricted camera views can be obtained at all camera and lens positions.
- 4) Dome environmental control shall be provided by nitrogen pressurization with a Schrader Valve for pressurization and purging. The enclosure shall be designed to be pressurized to the manufactures recommended level .with dry nitrogen. The notation “CAUTION – PRESSURIZED” shall be printed on the rear plate of the enclosure and shall be clearly visible and readable.
- 5) An alarm shall be displayed under low-pressure conditions and displayed on the camera video. The low-pressure alarm shall be on/off selectable by the operator at the TMC.
- 6) The PTZ dome enclosure shall consist of a two-piece (upper and lower half) dome.
- 7) A harness and cables shall be provided with each enclosure to extend the video, power and data from the CCTV Camera System to the field cabinet. No harness shall be exposed. All entry points shall have gaskets to prevent moisture entry. A sealed connector shall be at the top of the dome.
- 8) The dome enclosure shall assist in preventing lens fogging and effectively reduce internal temperatures.
- 9) The enclosure shall minimize glare and provide overexposure protection for the camera when pointed directly at the sun.
- 10) The enclosure shall be equipped with a heater, a defroster and a thermostat.
- 11) The camera equipment inside the dome enclosure shall meet all its specified requirements when operating under the following conditions:
 - a. Ambient Temperatures: From -40°C to +65°C (-40°F to +149°F). A heater/blower shall be used to maintain internal dome temperatures within the manufacturer required operating temperatures for their equipment.
 - b. Relative Humidity: 5% and 95%, non-condensing.
- 12) Total weight of CCTV cameras (including the housing, sunshield, and all internal components shall be less than 18 pounds.
- 13) At a minimum, dome enclosures shall be secured with a mounting plate/attachment designed to withstand a 90mph sustained wind speed with a 30% gust factor. For projects that are in areas with higher wind standards, the higher standard is required.

907-650.02.7--Pan and Tilt Unit (PTU). The minimum pan and tilt unit requirements include:

- 1) The motorized, remotely controlled Pan/Tilt unit shall be mounted within the dome enclosure. The unit shall be integrated with the CCTV control system.
- 2) For dome enclosed units, the unit shall provide a minimum continuous tilt (vertical) movement of 90 degrees from horizontal and continuous pan (horizontal) movement of 360 degrees. Tilt speed shall be variable from zero up to 40 degrees per second, minimum, and the pan speed shall be variable from zero up to 80 degrees per second, minimum.
- 3) For separately housed tilt motor units (non-Dome Cameras), the unit shall provide a minimum continuous tilt (vertical) movement of +90° to -90° degrees from horizontal and continuous pan (horizontal) movement of 360 degrees. Tilt speed shall be variable from zero up to 34 degrees per second, minimum, and the pan speed shall be variable from zero up to 80 degrees per second, minimum.

- 4) The unit shall be capable of simultaneous pan, tilt movements and zoom on one camera
- 5) Drive motors shall be capable of instantaneous reversing, be corrosion resistant, not require lubrication, and have overload protection.
- 6) Braking shall be provided in both pan and tilt movements to enable fast stop and reversal and to prevent drifting.
- 7) The viewing limits shall be set by a minimum of eight (8) discreet privacy zones that are software selectable.

907-650.02.8--Camera Control Receiver – Driver. The minimum camera control receiver-driver requirements include:

- 1) The camera control receiver shall provide a single point interface for control, power and video communications.
- 2) The camera control receiver-driver shall be included within the dome enclosure and control the camera, pan/tilt and lens functions at each CCTV site.
- 3) The unit shall provide alphanumeric generation for on-screen titles.
- 4) The unit shall provide the ability to display diagnostic information on the screen in response to user commands.
- 5) The diagnostic information shall include current pan, tilt, zoom and focus positions, and error codes for power, communication, position and memory problems.
- 6) The capability for programmed tours shall be provided.
- 7) The camera control receiver shall use non-volatile memory to store the required information for presets, camera ID and sector text.
- 8) Presets shall meet the following requirements:
 - a. A minimum of 64 presets shall be supported. Each preset shall consist of pan, tilt, zoom and focus positions.
 - b. The Contractor shall develop and install ten (10) presets for each camera. The Contractor shall submit the preset locations to the MDOT ITS Engineer for review and approval.
- 9) Protocols: CCTV cameras shall support at a minimum the Pelco D and the NTCIP 1205 v1.08 communication protocol. No camera control receiver-driver shall use non-published protocols. The Contractor shall provide protocol documentation.
- 10) Communications Interface: The communications interface shall support communications compliant with RS- 232, and/or 485 (user selectable), or shall provide a network interface port.
- 11) Serial communications interface shall be compatible with the Video Encoder serial port as defined in Section 907-662 .
- 12) Standard interface connectors shall be provided.
- 13) The local video input and output connections shall be the BNC type for analog cameras. IP Based Cameras should stream video over the Ethernet connection but include a BNC type connection for local testing, configuration, and calibration.
- 14) Connector(s) shall also be used for connecting the control outputs from the control receiver-driver unit to the camera, lens and pan/tilt mechanisms.

907-650.02.9--Fixed Camera Lens. The fixed camera lens shall meet the following minimum requirements.

- 1) Type Varifocal
- 2) Format Size 1/3 Inch
- 3) Mount Type CS
- 4) Focal Length 5-50
- 5) Zoom Ratio 1.4 -360
- 6) Relative Aperture (F) 1.6-360
- 7) Iris Auto (Direct Drive)
- 8) Focus Manual
- 9) Zoom Manual
- 10) Minimum Object Distance 0.5 m
- 11) Back Focal Length 10.05 mm
- 12) The camera lens shall have a minimum F-Stop of 1.4 to 1.6.
- 13) Shall provide a varifocal zoom of 5-50 mm.
- 14) Iris: Support automatic iris control with manual override capability. The iris shall be in a closed position when there is no power.
- 15) White or Color Balance: Support automatic or set to yield optical results under various outdoor lighting conditions.
- 16) Shutter Speed: Support automatic or set to yield optimal results under low lighting conditions without blooming or smearing, auto-iris on. Provide electronic shutter that is selectable in steps.
- 17) Vibration or ambient temperature change shall not affect the automatic iris function, focus mechanism or zoom mechanism.
- 18) The lens shall be optically clear, impact resistant and acrylic. The acrylic lens shall not yellow and shall not introduce appreciable light loss or geometric distortion over a 10-year service life when exposed to the environment.

907-650.02.10--Fixed Camera Enclosure. The fixed camera lens shall meet the following minimum requirements.

- 1) Designed for Outdoor Applications
- 2) Maintenance access for servicing
- 3) Environmental resistant and tamper proof meeting NEMA 4X or IP-66 rating requirements.
- 4) A harness and cables shall be provided with each enclosure to extend the video, power and data from the CCTV Camera System to the field cabinet. No harness shall be exposed. All entry points shall have gaskets to prevent moisture
- 5) The enclosure shall minimize glare and provide overexposure protection for the camera when pointed directly at the sun.
- 6) The enclosure shall be equipped with a heater, a defroster and a thermostat.
- 7) The camera equipment inside the enclosure shall meet all its specified requirements when operating under the following conditions:

- a. Ambient Temperatures: -10°C to +50°C (14°F to +122°F). A heater/blower shall be used to maintain internal temperatures within the manufacturer required operating temperatures for their equipment.
- b. Relative Humidity: 5% and 95%, non-condensing.
- 8) Total weight of CCTV cameras (including the housing, sunshield, and all internal components shall be less than 18 pounds.
- 9) The enclosure shall be secured with a mounting plate/attachment designed to withstand a 90mph sustained wind speed with a 30% gust factor. For projects that are in areas with higher wind standards, the higher standard is required.

907-650.02.11--Electrical. The minimum electrical requirements include:

- 1) The CCTV Camera System shall be furnished with any and all equipment required for a fully functional system, including all appropriate power and communications cables as defined by the manufacturer.
- 2) The power cables shall be sized to meet the applicable National Electrical Code (NEC) requirements.
- 3) Total power consumption shall not exceed 125 watts.
- 4) All devices supplied as system components shall accept, as a primary power source, 120 volts of alternating current (VAC) at an input of 60 hertz. Any device that requires source input other than 120 VAC at 60 hertz, such as cameras, PTUs, receiver/drives and dome heaters/blowers that operate at 24 volts or other, shall be furnished with the appropriate means of conversion.
- 5) IP fixed cameras shall receive Power over Ethernet (POE) with appropriate cabling.

907-650.02.12--Coaxial Cabling. The minimum coaxial interconnect cable requirements include:

- 1) The coaxial cable from the CCTV Camera System to the equipment cabinet shall be **double braided (95% coverage) coaxial cable**.
- 2) RG 59/U, 20AWG, bare copper conductor, polyethylene insulation.
- 3) 98% tinned copper, double braid shield, black polyethylene jacket.
- 4) Characteristic Impedance: 75 ohms, nominal.
- 5) Capacitance (conductor to shield): 21pF/ft; Inductance: 0.131uH/ft, nominal.

907-650.02.13--Surge Protection. All CCTV Camera System electrical interconnects shall be protected from voltage surges caused by lightning and external electromagnetic fields. The minimum surge protection requirements include:

- 1) Surge protectors shall be furnished for all non-dielectric cable and conductors (video, data/signal and device/assembly power) between the CCTV Camera System and the equipment cabinet.
- 2) The surge protectors shall have leads that are kept to a minimum length as recommended by the surge device manufacturer.
- 3) All surge protection devices shall be designed to meet the temperature and humidity requirements expected in this type of outdoor application.

- 4) All Surge protectors shall be U.L. listed (UL 1449, UL 497, 497A, 497B, etc., as appropriate) and bonded to the same single-point ground point.
- 5) Coaxial Cable Surge protectors for coaxial cable shall meet/provide the following functionality:
 - a. Attenuation: 0.1dB @10 MHz, typical
 - b. Input/Output Impedance: 75 ohms nominal
 - c. Operating Voltage of the surge protector shall match characteristics of the ITS device/assembly
 - d. Peak Surge Current: 5,000-amperes for an 8x20 microsecond waveform
 - e. Response Time: 1 nanosecond or less
- 6) Low Voltage/Signal Cable Surge protectors for data/signal/control cable shall meet/provide the following functionality:
 - a. Peak Surge Current: 10,000-amperes for an 8x20 microsecond waveform
 - b. Response Time: 1 nanosecond or less
 - c. Life Expectancy: Capable of surviving at a minimum of 25 occurrences at 2000-amperes
- 7) CCTV power surge protectors for power from equipment cabinet power distribution to the CCTV Camera System shall meet/provide the following functionality:
 - a. Frequency: DC to 10MHz
 - b. Clamping Voltage: < 30VAC (rms) or 42VDC
 - c. Insertion Loss: < 0.2dB
 - d. Input/Output Impedance: 75 ohms, typical
 - e. Peak Surge Current: 3000-amperes
 - f. Response Time: 1 nanosecond or less
- 8) Surge protection for the IP Fixed cameras shall include provisioning for the Power over ETHERNET (POE) cabling and voltages.

907-650.03--Installation Requirements. All equipment shall be installed according to the manufacturer's recommendations, the Plans and as follows:

- 1) The Contractor shall provide the MDOT with a written inventory of items received and the condition in which they were received. Inventory shall be inclusive of make, model, and serial numbers, MAC address, and installation GPS coordinates. All equipment shall be installed according to the manufacturer's recommendations or as directed by the MDOT.
- 2) Materials and associated accessories/adapters shall not be applied contrary to the manufacturer's recommendations and standard practices.
- 3) Shall include all materials needed to permanently mount the CCTV camera to the support structure as indicated in the plans.
- 4) Furnish and install power, video, and data cables, and any and all ancillary equipment required to provide a complete and fully operational CCTV system site.
- 5) Verify all wiring meets NEC requirements where applicable.
- 6) All above requirements apply to both new CCTV sites as well as sites where an existing CCTV is being replaced.
- 7) Any new, additional or updated drivers required for the existing ATMS software to communicate and control new CCTV installed by the Contractor shall be the responsibility of the Contractor.

907-650-03.1--CCTV Test Requirements. The Contractor shall conduct a Project Testing Program. All costs associated with the Project Testing Program shall be included in overall contract prices; no separate payment will be made for any testing.

- 1) The Contractor is responsible for planning, coordinating, conducting and documenting all aspects of the Project Testing Program. The Project Engineer, ITS Engineer, and/or their designee(s) are only responsible for attending and observing each test, and reviewing and approving the Contractor's test results documentation. The ITS Engineer, Project Engineer and/or their designee(s) reserve the right to attend and observe all tests. The Contractor is required to perform the final project acceptance test with the MDOT ITS Engineer or his designee present.
- 2) Each test shall fully demonstrate that the equipment being tested is clearly and definitely in full compliance with all project requirements. Test procedures shall be submitted and approved for each test as part of the project submittals. Test procedures shall include every action necessary to fully demonstrate that the equipment being tested is clearly and definitely in full compliance with all project requirements. Test procedures shall cross-reference to these Technical Specifications or the Project Plans. Test procedures shall contain documentation regarding the equipment configurations and programming.
- 3) No testing shall be scheduled until approval of all project submittals and approval of the test procedures for the given test.
- 4) The Contractor shall provide all ancillary equipment and materials as required in the approved test procedures.
- 5) The Contractor shall request in writing the Project Engineer's approval for each test occurrence a minimum of 14 days prior to the requested test date. Test requests shall include the test to be performed and the equipment to be tested. The Project Engineer reserves the right to reschedule test request if needed.
- 6) All tests shall be documented in writing by the Contractor in accordance with the test procedure and submitted to the Project Engineer within seven (7) days of the test. Any given test session is considered incomplete until the Project Engineer has approved the documentation for that test session.
- 7) All tests deemed by the Project Engineer to be unsatisfactorily completed shall be repeated by the Contractor. In the written request for each test occurrence that is a repeat of a previous test, the Contractor shall summarize the diagnosis and correction of each aspect of the previous test that was deemed unsatisfactory. The test procedures for a repeated test occurrence shall meet all the requirements of the original test procedures, including review and approval by the Project Engineer and ITS Program Manager or his designee.
- 8) The satisfactory completion of any test shall not relieve the Contractor of responsibility to provide a completely acceptable and operating system that meets all requirements of this project.
- 9) Standalone Acceptance Test (SAT). The Contractor shall perform a complete SAT on all equipment and materials associated with the field device site, including but not limited to electrical service, conduit, pull boxes, communication links (fiber, leased copper, wireless), control cables, poles, etc. An SAT shall be conducted at every field device site. Where applicable, a SAT shall be conducted for a fully installed and completed connection to the designated Traffic Management Center (TMC) or central data/video collection site.

- 10) The SAT shall demonstrate that all equipment and materials are in full compliance with all project requirements and fully functional as installed and in final configuration. The SAT shall also demonstrate full compliance with all operational and performance requirements of the project. All SATs will include a visual inspection of the cabinet and all construction elements at the site to ensure they are compliant with the specifications.

907-662.03.2--Warranty. Minimum warranty requirements are as follows:

- 1) All warranties and guarantees shall be assigned to the Mississippi Department of Transportation.
- 2) The warranty shall be a **minimum of one (1) year warranty** per CCTV and all other installed and/or attached appurtenances.
- 3) The one year warranty period begins upon final acceptance of the video subsystem.
- 4) During the warranty period, the Contractor shall repair or replace with new or refurbished material, at no additional cost to the State, any product containing a warranty defect, provided the product is returned postage-paid by the Department to the manufacturer's factory or authorized warranty site.
- 5) Products repaired or replaced under warranty by the manufacturer shall be returned prepaid by the manufacturer.
- 6) During the warranty period, technical support shall be available from the Contractor via telephone within **four (4) hours** of the time a call is made by the Department, and this support shall be available from factory certified personnel.
- 7) During the warranty period, **updates and corrections to hardware**, software and firmware shall be made available to the Department by the Contractor at no additional cost.

907-662.03.3--MDOT Employee Training. Minimum Training requirements are as follows:

- 1) The Contractor shall provide a camera system training plan that includes a schedule, documentation to be provided, identified trainer, and location at a minimum to MDOT Project Manager. The camera system training plan must be accepted by the MDOT Project Manager and ITS Engineer and training must be completed before burn in period may start.
- 2) The training shall be approved two (2) weeks ahead of the scheduled date.
- 3) For provided devices that MDOT already has the same make and model existing in the system:
 1. One (1) day of on site device operation, maintenance, and configuration training for up to 10 individuals.
 2. One (1) day of on site system training at TMC for up to 10 people, that is separate from above training and specifically for software control of integrated devices.
- 4) For provided devices that MDOT does not have the same make and model existing in the system:
 1. Three (3) days of on site device operation, maintenance, and configuration training for up to 10 individuals.
 2. Three (3) days of on site system training at TMC for up to 10 people, that is separate from above training and specifically for software control of integrated devices.

907-650.04--Method of Measurement. On-Street Video Equipment will be measured per each camera installation.

907-650.05--Basis of Payment. On-Street Video Equipment, measured as prescribed above, will be paid for at the contract unit price bid per each, which price shall be full compensation for furnishing all materials inclusive of camera unit, housing, pan/tilt drive, receiver/driver, software driver, mounting hardware, any necessary enclosures, items necessary to mount the camera unit from a mast arm pole, steel strain pole, pole extension pipe, etc., for all installing, connecting, cutting, pulling and testing and for all equipment, tools, labor, and incidentals necessary to complete the work.

Required cabinet facilities, including transformer and/or disconnects, will not be measured for separate payment.

Progress payments for the On-Street Video System will be paid as follows:

- 1) 50% of the contract unit price upon delivery of equipment and approval of any bench and/or pre-installation test results, as prescribed in Project Testing Program;
- 2) An additional 40% of the contract unit price upon approval of Stand Alone Acceptance Test results; and
- 3) Final 10% of the contract unit price upon Final Project Acceptance.

Payment will be made under:

907-650-A: On-Street Video Equipment Type _____ - per each

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-653-1

CODE: (IS)

DATE: 11/15/2017

SUBJECT: Traffic and Street Name Signs

Section 653, Traffic and Street Name Signs, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-653.02--Materials.

907-653.02.1--Reflective Sheeting. Delete the paragraph in Subsection 653.02.1 on page 637, and substitute the following.

Reflective sheeting for traffic and street name signs shall be Type XI retroreflective and of the color as specified in the plans.

907-653.04--Method of Measurement. Delete the sentence in the paragraph of Subsection 653.04 on page 638, and substitute the following.

Traffic sign and street name sign will be measured by the square foot, which measurement being inclusive of aluminum sign blank, applied reflective sheeting, mounting brackets and banding materials and begin inclusive of all materials, work and services necessary for a properly constructed sign.

907-653.05--Basis of Payment. Delete the pay items listed on page 638, and substitute the following.

907-653-A: Traffic Sign - per square foot

907-653-B: Street Name Sign - per square foot

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-659-1

CODE: (SP)

DATE: 01/17/2017

SUBJECT: Traffic Management Center (TMC) Modifications

Section 907-659, Traffic Management Center (TMC) Modifications, is hereby added to and made part of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction as follows.

SECTION 907-659 - TRAFFIC MANAGEMENT CENTER (TMC) MODIFICATIONS

907-659.01--Description. The MDOT Statewide Traffic Management Center (TMC) is located in the Traffic Engineering Division in the MDOT Shop Complex at 2567 North West Street, Jackson, Mississippi. Regional and City Traffic Management Centers may be located statewide. The following is a list of existing/planned centers and their addresses:

City of Jackson TMC – 300 North State Street, Jackson, Mississippi (basement)

Northwest Regional Combined TMC – 8791 Northwest Drive, Southaven, Mississippi (Police Department)

City of Ridgeland TOC – 304 Hwy 51, Ridgeland, Mississippi (City Hall)

Oxford Combined TMC – 715 Mollybarr Road, Oxford, Mississippi (Oxford Police Department)

Hattiesburg Regional TMC/EOC – 6356 Hwy 49N, Hattiesburg, Mississippi (MDOT District 6 Headquarters)

Batesville Regional TMC/EOC – 150 Hwy 51N, Batesville, Mississippi (MDOT District 2 Headquarters)

Natchez Combined TMC – 233 Devereaux Drive, Natchez, Mississippi (Police Department)

Gulf Regional TMC – 16499 Hwy 49, Saucier, Mississippi (MDOT Lyman Project Office)

Additional Traffic Management Centers may be added as needed.

907-659.02--Blank.

907-659.03--Construction and Operation Requirements.

907-659.03.1--TMC Modifications. The MDOT TMC modifications required to integrate and operate the traffic systems and devices shall be provided. These include, but are not limited to, expanding the central video management system, interconnecting the appropriate number of video interfaces to the TMC video management systems, expanding the MSTraffic backbone network through radio communications, wireless communications, T1 lines or fiber communications, expanding the TACTICS signal system, or upgrading existing signal systems, expanding or modifying existing adaptive control signal software systems (i.e. SCOOT, ACS Lite, etc.), expanding the Automated Traffic Management System (ATMS), and integrating all the existing

computing facilities. All TMC modifications must meet U.S. Department of Transportation Intelligent Transportation System (ITS) Standards, Policies, and Architectures as well as MDOT's applicable Statewide or Regional Architecture.

907-659.03.2--TMC Modifications - Monitor Systems. Roadway traffic monitor locations shall provide local control functions related to traffic slowdowns and other congestion monitors as defined by MDOT Traffic Engineering. Additionally, the traffic monitor systems shall provide on-line data for use by the existing MDOT ATMS for engineering, operations, planning, incident, and mstraffic.com purposes. This data shall include, but is not limited to, per vehicle data raw data which shall be transmitted to and stored and managed by the ATMS. The traffic monitor systems shall be capable of utilizing both or either loop, microloop, radar, and/or video detection information. The system shall provide a consistent communication and management system regardless of detection methods used. All Traffic Monitoring Systems must meet U.S. Department of Transportation Intelligent Transportation System (ITS) Standards, Policies, and Architectures as well as MDOT's applicable Statewide or Regional Architecture.

907-659.03.3--TMC Modifications – Installation Requirements. All equipment shall be installed according to the manufacturer's recommendations, the Plans and as follows:

- 1) Any new, additional or updated drivers required for the existing ATMS software to communicate and control new devices installed by Contractor shall be the responsibility of the Contractor.
- 2) Installation of all equipment and software shall be included. The Contractor must provide the MDOT ITS Manager with an Installation Schedule. The Installation Schedule must be approved by the State Traffic Engineer.
- 3) All equipment and software must be fully functional and pass a Final Inspection by the ITS Manager and Project Engineer before being accepted by MDOT.

907-659.03.4--MDOT Employee Training. Training shall be provided covering the system architecture, operations, and maintenance of the TMC systems. If training requirements include travel on the part of training participants then the cost of the travel shall be included.

907-659.04--Method of Measurement. Traffic Management Center Modifications and Traffic Management Center Modifications – Monitor Systems, complete in place, tested and accepted, will be measured per each intersection or on a lump sum basis. Traffic Management Center Modifications – Training will be measured on a lump sum basis.

907-659.05--Basis of Payment. Traffic Management Center Modifications, Traffic Management Center Modifications – Monitor Systems, and Traffic Management Center Modifications - Training, measured as prescribed above, will be paid for at the contract unit price per each or contract lump sum price, which price shall be full compensation for furnishing all materials for all installing, connecting, cutting, pulling and testing and for all equipment, tools, labor and incidentals necessary to complete the work.

Payment will be made under:

907-659-A: Traffic Management Center Modifications - per each or lump sum

907-659-B: Traffic Management Center Modifications – Monitor Systems - per each or lump sum

907-659-C: Traffic Management Center Modifications – Training - lump sum

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-661-1

CODE: (SP)

DATE: 01/17/2017

SUBJECT: Fiber Optic Cable

Section 907-661, Fiber Optic Cable, is hereby added to and made a part of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction as follows.

SECTION 907-661 – FIBER OPTIC CABLE (OSP)

907-661.01--Description. The work shall consist of the construction of the infrastructure required to install, replace, or upgrade fiber optic cable. The infrastructure shall include all necessary conduits, pull boxes, pole line hardware, building entries, risers and fiber cable to make a complete system.

907-661.02--Materials.

907-661.02.1--Single Mode Fiber Optic Cable (FO Cable). The Contractor shall provide 72-count fiber optic cable that meets the following requirements:

- All-dielectric, outside plant, loose tube cable with central strength/anti-buckling member
- Dry water blocking materials and construction
- Reverse oscillating “SZ” stranded buffer tube construction
- High tensile strength yarn
- Medium density polyethylene outer jacket
- 72-fiber cable with six (6) active buffer tubes and 12 individual stranded fibers per buffer tube
- Cable construction design that allows no more than six (6) buffer tube positions
- Maximum diameter 0.48 inches
- Maximum weight 0.07 pounds per foot.

The Contractor shall provide a cable in accordance with the Plans and contract documents. This cable shall be designated as a trunk cable.

The Contractor shall ensure that the cable can withstand a maximum pulling tension of 600 pounds (lbf) during installation and 180 pounds (lbf) installed long term (at rest).

The cable shall have a shipping, storage and operating temperature range of -22°F to +158°F and installation temperature range of -22°F to +140°F.

The Contractor shall provide cable with outer jacket marking using the following template.

Manufacturer's Name - “Optical Cable” - Month/Year of Manufacture - Telephone Handset

Symbol - "MDOT" - "72F SM"

The Contractor shall include in the outer jacket marking the cable sequential length in accordance with the following:

- In English units every two (2) feet
- Within -0/+1% of the actual length of the cable
- In contrasting color to the cable jacket
- Marking font height no less than 0.10 inch
- On any single length of cable on a reel, the sequential length markings do not run through "00000"

907-661.02.2--Single Mode Fiber Optic Cable Indoor/Outdoor Riser Rated. The Contractor shall provide fiber optic plenum rated cable that meets the following requirements when called for on the Plans:

- All-dielectric, inside plant, loose tube central core cable
- High tensile strength yarn surrounding the central tube core
- Dry water blocking materials and construction
- 72-fiber cable with six (6) active buffer tubes and 12 individual stranded fibers per buffer tube
- The Contractor shall provide a cable in accordance with the Plans and contract documents. This cable shall be designated as the building entry cable.

The Contractor shall ensure that the cable can withstand a maximum pulling tension of 300 pounds (lbf) during installation.

The cable shall have a shipping, storage and operating temperature range of -22°F to +158°F and an installation temperature range of 14°F to 140°C shall be provided.

The Contractor shall provide cable with outer jacket marking using the following template.

Manufacturer's Name - "Optical Cable" - Month/Year of Manufacture - Telephone Handset
Symbol - "MDOT" - "72F SM"

The Contractor shall include in the outer jacket marking the cable sequential length in accordance with the following:

- English units every two (2) feet.
- Within -0/+1% of the actual length of the cable
- Contrasting color to the cable jacket
- Marking font height no less than 0.10 inch
- The sequential length markings do not run through "00000" on any single length of cable on a reel

907-661.02.3--Single Mode Fiber Optic Drop Cable (FO Drop Cable). The Contractor shall

provide 12-count Single Mode Fiber, Pre-Terminated Drop Cable Assemblies. These assemblies shall be employed when connecting a camera, traffic controller, DMS or other device to the main cable.

Assemblies shall be factory assembled and terminated on one end with ceramic ferrule, LC compatible, heat cured epoxy connectors with an operational temperature of -40°F to +158°F. Each connector shall have a minimum of a 1-inch strain relief boot.

Insertion loss for each connector shall not exceed 0.30 dB.

Return loss for single mode connectors shall be greater than 45 dB.

Each assembly shall be fully tested and those test results placed on a test tag for each assembly.

Each assembly shall be individually packaged within a box or reel, with the submitted manufacturer's part number marked on the outside of the package.

Individual 250- μ m coated fibers shall be up-jacketed to 1/8-inch using fan-out tubing. This tubing shall contain a 900- μ m Teflon inner tube, aramid yarn strength members and an outer jacket.

The fan-out tubing shall be secured to the cable in a hard epoxy plug transition. Length of the individual legs shall be a minimum of three feet with the length difference between the shortest and longest legs of the assembly being no more than two inches.

The 12-Fiber, Pre-terminated Drop Cable Assemblies provided shall meet the following minimum requirements:

- All-dielectric, outside plant, loose tube central core cable shall be used
- High tensile strength yarn surrounding the central tube core
- Dry water blocking materials and construction
- Twelve (12) individual stranded fibers contained within the central tube core
- The Contractor shall provide a cable in accordance with the Plans and contract documents. This cable shall be designated as the drop cable.

The Contractor shall ensure that the cable can withstand a maximum pulling tension of 300 pounds (lbf) during installation.

The cable shall have a shipping, storage and operating temperature range of -22°F to +158°F and an installation temperature range of 14°F to 140°F.

The Contractor shall provide cable with outer jacket marking using the following template.

Manufacturer's Name - "Optical Cable" - Month/Year of Manufacture - Telephone Handset Symbol - "MDOT" - "12F SM"

The Contractor shall include in the outer jacket marking the cable sequential length in accordance

with the following:

- English units every two (2) feet
- Within -0/+1% of the actual length of the cable
- Contrasting color to the cable jacket
- Marking font height no less than 0.10 inch
- The sequential length markings do not run through “00000” on any single length of cable on a reel

907-661.02.4--Multimode Fiber Optic Drop Cable (MM FO Drop Cable). The Contractor shall provide 12-count Multimode Fiber, Pre-Terminated Drop Cable Assemblies. These assemblies shall be employed when connecting a camera, traffic controller, DMS or other device to the main cable.

Cable Assembly shall be rated for outdoor environment and have operational temperature of -40°F to +158°F. Each connector shall have a minimum of a 1-inch strain relief boot. The Cable Assembly shall also be pre-terminated on one end.

Insertion loss for each connector shall not exceed 0.30 dB.

Fiber loss shall not exceed 3dB/km for 850 nm and 1 dB/km for 1300 nm.

Each assembly shall be fully tested and those test results placed on a test tag for each assembly.

Each assembly shall be individually packaged within a box or reel, with the submitted manufacturer's part number marked on the outside of the package.

The fan-out tubing shall be secured to the cable in a hard epoxy plug transition. Length of the individual legs shall be a minimum of three feet with the length difference between the shortest and longest legs of the assembly being no more than two inches.

The 12-Fiber, Pre-terminated Drop Cable Assemblies provided shall meet the following minimum requirements:

- All-dielectric, outside plant, loose tube central core cable
- High tensile strength yarn surrounding the central tube core
- Dry water blocking materials and construction
- Twelve (12) individual stranded fibers contained within the central tube core
- The Contractor shall provide a cable in accordance with the Plans and contract documents. This cable shall be designated as the drop cable.

The Contractor shall ensure that the cable can withstand a maximum pulling tension of 300 pounds (lbf) during installation.

The cable shall have a shipping, storage and operating temperature range of -22°F to +158°F and an installation temperature range of 14°F to 140°F.

The Contractor shall provide cable with outer jacket marking using the following template.

Manufacturer's Name - "Optical Cable" - Month/Year of Manufacture - Telephone Handset
Symbol - "MDOT" - "12F MM"

The Contractor shall include in the outer jacket marking the cable sequential length in accordance with the following:

- English units every two (2) feet
- Within -0/+1% of the actual length of the cable
- Contrasting color to the cable jacket
- Marking font height no less than 0.10 inch
- The sequential length markings do not run through "00000" on any single length of cable on a reel

907-661.02.5--Plenum Rated Nonmetallic Corrugated Raceway. The Contractor shall provide plenum rated nonmetallic corrugated raceway inside buildings when cable is not in rigid conduit when called for on the plans.

The installation shall conform to NEC articles 770 and 800.

Raceway shall meet UL Standards 910 and 2024.

The Contractor shall provide 2-inch diameter raceway unless larger is called for in the plans.

The Contractor shall provide Fiber Optic Fusion Splice (FO Splice Fusion) for splicing of all fibers with a fully automatic portable fusion splicer that provides consistent low loss (max 0.10 dB) splices.

SPLICER shall provide three-axis fiber core alignment using light injection and loss measurement techniques.

The fusing process shall be automatically controlled.

The splicer shall provide splice loss measurements on an integral display, as well as a magnified image of the fiber alignment.

The Contractor shall retain ownership of the fusion splicer.

907-661.02.6--Fiber Optic Connectors. The Contractor shall provide fiber optic connectors for all fiber optic infrastructures including but not limited to fiber optic termination cabinets, fiber optic drop panels, and fiber optic patch cords.

The Contractor shall provide only factory-installed keyed LC compatible connectors for all fiber optic infrastructures.

Field-installed connectors shall not be used.

Adapter couplers shall not be used to change connector types.

Ceramic ferule connectors, factory-installed, with a thermal-set heat-cured epoxy and machine polished mating face shall be used.

Connectors shall be installed as per manufacturer application and recommendations, including proper termination to the outer-tubing (900-micron tubing, 3-mm fan out tubing, etc.) required for the application.

Connectors rated for an operating temperature of -40°F to +167°F shall be used.

Simplex connectors for all male LC connectors shall be used and a latching cover for two male connectors being used in a duplex configuration shall be provided. Female couplers may be duplex but must allow simplex mating connectors.

Dust caps shall be provided for all exposed male connectors and female couplers at all times until permanent connector installation.

907-661.02.7--Fiber Optic Termination Cabinet (FO Termination Cabinet). Fiber optic termination cabinets shall be provided in communications hubs, field junctions, and the MDOT Traffic Management Center (TMC) as shown in the Plans for termination of 72-fiber outside plant (OSP) cable.

The Contractor shall provide wall/shelf mount 12-fiber distribution cabinet equipped with fiber optic connector modules in a 12-fiber configuration. These will be used in field equipment and communication cabinet locations.

Termination cabinets with cable management features included shall be provided.

The Contractor shall use termination cabinets that are fully compatible with all components of the fiber optic infrastructure as specified, including, but not limited to, fiber optic cable, fiber optic fusion splices and fiber optic connectors.

The Contractor shall provide rack-mount termination cabinets designed to fit standard 19-inch EIA equipment racks.

The Contractor shall provide all mounting hardware and supports to mount the termination cabinets in the locations shown in the Plans.

The Contractor shall provide fiber optic termination cabinets providing 72-fiber connectors and capable of storing 72 fusion splices in splice trays.

The Contractor shall provide termination cabinets that integrate the splice trays and connector

modules into one compartment within one cabinet, or houses the splice trays and connector modules in separate compartments integrated into one cabinet.

The maximum dimensions of a complete termination cabinet shall be 7-rack units, 12.25 inches high by 16 inches deep.

Fiber optic termination cabinets shall be fully enclosed metallic construction with a protective hinged front cover for the connector ports.

The cabinet shall have cable access on all sides of the enclosed area behind the connector port panel.

The Contractor shall provide sufficient splice trays for storing 72 fusion splices in 12 or 24-splice increments.

The Contractor shall provide termination cabinets with fiber optic connector modules in a 12 fiber configuration of six (6) rows of one (1) duplex connector couplers. Connector modules shall mount vertically in the termination cabinet front panel.

Connector modules shall include clearly legible and permanent labeling of each of the 12 fiber connector couplers, and shall be labeled and identified as shown in the Plans.

The Contractor shall provide factory-assembled 12-fiber termination interconnect cables (pigtail cables) to be fusion spliced to the outside plant or indoor cable and connected to the rear of the connector modules.

Termination interconnect cables shall be all-dielectric, single jacketed cable with high tensile strength yarn surrounding 12 individual 900-micron fibers following EIA/TIA-598B color identification with factory-installed connectors.

The Contractor shall provide all incidental and ancillary materials including but not limited to grommets, cable strain relief and routing hardware, blank connector panels and labeling materials.

The cable shall be new (unused) and of current design and manufacture.

907-661.02.8--OSP Closures for Aerial, Pole Mount, Pedestal and Hand Hold Environments.

OSP closures for aerial, pole mount, pedestal and hand hole shall be capable of accepting up to eight cables. The closures shall be capable of storing up to eight 90-inch lengths of expressed buffer tubes and up to 96 splices.

Assembly shall be accomplished without power supplies, torches, drill kits or any special tools. Re-entry shall require no additional materials.

Sealing shall be accomplished by enclosing the splices in a polypropylene case that is clamped together with a stainless steel latch and sealed with an O-ring.

Closure shall be capable of strand mounting with the addition of a strand mounting bracket.

Splice case shall be non-filled, non-encapsulate to prevent water intrusion, and shall allow re-entry without any special tools.

The closure shall be capable of preventing a 10-foot water head from intruding into the splice compartment for a period of seven (7) days.

It is the responsibility of the Contractor to ensure that the water immersion test has been performed by the manufacturer or an independent testing laboratory, and the appropriate documentation has been submitted to the Engineer.

907-661.02.9--OSP Closures for Drop Cable Splice Points. OSP closures for aerial, pole mount, pedestal and hand hold shall be capable of accepting the trunk cable and two drop cables. The closures shall be capable of storing up to eight 90-inch lengths of expressed buffer tubes and up to 48 splices.

Assembly shall be accomplished without power supplies, torches, drill kits or any special tools. Re-entry shall require no additional materials.

Sealing shall be accomplished by enclosing the splices in a polypropylene case that is clamped together with a stainless steel latch and sealed with an O-ring.

Closure shall be capable of strand mounting with the addition of a strand mounting bracket.

Splice case shall be non-filled, non-encapsulate to prevent water intrusion, and shall allow re-entry without any special tools.

The closure shall be capable of preventing a 10-foot water head from intruding into the splice compartment for a period of seven days.

It is the responsibility of the Contractor to ensure that the water immersion test has been performed by the manufacturer or an independent testing laboratory, and the appropriate documentation has been submitted to the Engineer.

907-661.02.10--Patch Cords and Jumper Cables. Any patch cords or jumper cables required to connect the new fiber and equipment at existing locations shall be considered incidental and shall be included in the cost of pay items Fiber Optic Cable and Fiber Optic Drop Cable.

Any patch cords used for system configuration shall be compatible with fiber types and connectors specified herein.

Single-mode patch cords shall be yellow in color.

Jacketing material shall conform to the appropriate NEC requirement for the environment in which installed.

All cordage shall incorporate a 900- μ m buffered fiber, aramid yarn strength members and an outer jacket.

Patch cords may be simplex or duplex, depending on the application.

Attenuation shall be less than 1.0 dB/km @ 1310 nm, 0.75 dB/km @ 1550 and have a total attenuation of less than 0.5 dB.

The Contractor shall be responsible to determine and provide attenuators with the proper attenuation to not exceed the optical budgets of the equipment connected by patch cables.

907-661.02.11 Cable Labels. The Contractor shall provide cable labels that meet the following requirements:

- Self-coiling wrap-around type
- PVC or equivalent plastic material with UV and fungus inhibitors
- Base materials and graphics/printing inks/materials designed for underground outside plant use including solvent resistance, abrasion resistance and water absorption
- Minimum size of 2.5 inches wide by 2.5 inches long
- Minimum thickness of 0.010 inches
- Orange label body with pre-printed text in bold black block-style font with minimum text height of 0.375 inches
- The Contractor shall pre-print the following text legibly on labels used for all fiber optic trunk cables:

Caution Fiber Optic Cable Mississippi Department of Transportation (601) 359-1454

- The Contractor shall pre-print the following text legibly on labels used on all fiber optic drop cables (FO Drop Cable):

Caution Fiber Optic Drop Cable Mississippi Department of Transportation (601) 359-1454

- On all cable labels, the Contractor shall print the text specified above twice on the label with the text of the second image inverted. The end result shall be text which “reads correctly” when the label is coiled onto a cable.

907-661.02.12--Cable Markers. The Contractor shall provide low profile soil cable markers which meet the following requirements:

- 3.5 inches in diameter
- UV stabilized for Maximum fade resistance
- Durable and abrasion resistant
- Lawn mower resistant
- Orange in color

- Printed Legend:

Fiber Optic Cable
Mississippi Department of Transportation
Traffic Engineering Division (601)359-1454

The Contractor shall install cable markers with a 13-inch nylon stake every 500 feet along the fiber run.

907-661.02.13--Conduit Detection Wire. Conduit detection wire shall be #10 AWG stranded copper, orange-insulated, THHN -THWN conductor.

The Contractor shall furnish and install a detection wire surge protection system. The Contractor shall ensure that detection wires are attached to a surge protection system designed to dissipate high transient voltages or other electrical surges.

The Contractor shall ensure that the detection wire surge protection system is grounded to a driven rod within 10 feet of the system using AWG #6 single conductor wire. Grounding must be done through a stand alone system not connected to power or ITS device grounding.

The Contractor shall ensure that the surge protection system normally allows signals generated by locate system to pass through the protection system without going to ground.

907-661.02.14--Project Submittal Program Requirements. The Contractor shall provide project submittals for all fiber optic infrastructures. The project submittals for fiber optic infrastructure shall include all items in this provision and any additional requirements included in any Notice to Bidders.

The Contractor shall provide project submittals including manufacturer recommended operations, maintenance and calibration procedures for the following equipment:

- Fiber optic installation and testing tools
- Fusion splicers
- Cable pulling strain dynamometers and breakaway links
- Cable air jetting/blowing systems
- OTDRs
- Optical attenuation testers (light sources and power meters)

The Contractor shall submit documentation and proof of manufacturer recommended operator training and certification for the following equipment:

- Fusion splicers
- Cable air jetting/blowing systems
- OTDRs
- Optical attenuation testers (light sources and power meters)

907-661.03--Construction Requirements. All equipment shall be installed according to the manufacturer's recommendations, the Plans and as follows.

907-661.03.1--General Requirements. The Contractor shall install all fiber optic infrastructures according to the manufacturer's recommended procedures and specifications.

The Contractor shall provide all necessary interconnections, services and adjustments required for a complete and operable data transmission system.

The Contractor shall install all fiber trunk, drop, and patch cables such that attenuation shall be less than 1.0 dB/km @ 1310 nm, 0.75 dB/km @ 1550.

All pole attachments, service loops and conduit risers shall be placed to minimize the possibility of damage as well as to facilitate future expansion or modernization.

The cable shall be installed in continuous runs as indicated on the plans. Splices shall be allowed only at drop points or reel end points specified in the plans.

At drop locations only, those fibers necessary to complete the communication path shall be spliced. Other fibers in the cable(s) shall be left undisturbed, with a minimum of five feet of buffer tube coiled inside the closure.

Sufficient slack shall be left at each drop point to enable access of the cable components and splicing to occur on the ground. This is typical two times the pole height plus 15 feet.

For aerial installations, the following minimum slack requirements shall apply:

- For aerial slack storage at splice points, a radius controlling device, commonly referred to as a SNO-SHOE, shall be used for securing resulting cable slack at aerial splice points and shall be mounted directly to the strand.
- For aerial cable runs exceeding 6-pole spans between splice points as indicated on the plans, two opposing SNO-SHOES shall be placed on the span 50 feet apart to provide for a 100-foot service loop for future drops and for slack for repair and pole relocations.

For aerial supported installations, the slack requirements shall be the same as in the underground conduit runs. The slack will be coiled in the structure-mounted pull boxes.

Drop cable shall be routed to the controller cabinets via conduit risers as illustrated in the plans. The cable entrance shall be sealed with a duct plug designed for fiber optic cable to prevent water ingress.

The minimum requirement for fiber protection outside a fiber optic enclosure in ALL cases shall be 1/8-inch fan-out tubing, containing a hollow 900- μ m tube, aramid strength members and an outer jacket, and shall be secured to the cable sheath.

The minimum requirement for fiber protection inside wall mount or rack mount fiber enclosure

shall be 900- μ m buffering, intrinsic to the cable in the case of tight buffered fibers, or in the case of 250- μ m coated fibers, a fan-out body and 900- μ m tubing secured to the buffer tube(s).

During installation, even if the tension specifications for the cable are not exceeded, the first ten feet shall be discarded.

Warning tape shall be placed 12 inches above the cable not to deviate \pm 18 inches from the centerline of the optical cable. Warning tape shall be at least two inches wide and colored orange.

907-661.03.2--Cable Shipping and Delivery. The cable shall be packaged on reels for shipment. Each package shall contain only one continuous length of cable. The packaging shall be constructed as to prevent damage to the cable during shipping and handling.

Both ends of the cable shall be sealed to prevent the ingress of moisture.

A weatherproof reel tag shall be attached to each reel identifying the reel and cable so that it can be used by the manufacturer to trace the manufacturing history of the cable and the fiber. A cable data sheet shall be included with each reel containing the following information:

- Manufacturer name
- Cable part number
- Factory order number
- Cable length.
- Factory measured attenuation of each fiber

The Contractor shall cover the cable with a protective and thermal wrap.

The outer end of the cable shall be securely fastened to the reel head so as to prevent the cable from becoming loose in transit. The inner end of the cable shall be projected a minimum of 6.5 feet into a slot in the side of the reel, or into housing on the inner slot of the drum, in such a manner as to make it available for testing.

Each reel shall be plainly marked to indicate the direction in which it is to be rolled to prevent loosening of the cable on the reel.

907-661.03.3--Cable Handling and Installation. The Contractor shall not exceed the maximum recommended pulling tension during installation as specified by the cable manufacturer.

The Contractor shall continuously monitor pulling tensions with calibrated measuring devices, such as a strain dynamometer.

The Contractor shall ensure that the depth of the cable is a minimum of 36 inches unless shown otherwise in plans.

All pulled installations shall be protected with calibrated breakaway links.

The Contractor shall ensure that the minimum recommended bend radius is not exceeded during installation as specified by the cable manufacturer. Unless the manufacturer's recommendations are more stringent, the following guidelines shall be used for minimum bend radius:

- 20 X Cable Diameter Short Term - During Installation
- 10 X Cable Diameter Long Term - Installed

Before cable installation, the cable reels and reel stands shall be carefully inspected for imperfections or faults such as nails that might cause damage to the cable as it is unreeled.

All necessary precautions shall be taken to protect reeled cable from vandals or other sources of possible damage while unattended. Any damage to reeled cable or the reel itself shall necessitate replacement of the entire cable section at no additional cost to the State.

Whenever unreeled cable is placed on the pavement or surface above a pull box, the Contractor shall provide means of preventing vehicular or pedestrian traffic through the area in accordance with the safe maintenance of traffic provisions.

The cable shall be kept continuous throughout the pull. Cable breaks and reel end splices are permitted only in Type 5 pull boxes and occur at a minimum of 10,000 feet.

Where a cable ends in an underground fiber optic closure, all unused fibers and buffer tubes shall be secured and stored in splice trays in preparation for future reel end splicing and continuation.

907-661.03.4--Cable Storage. The Contractor shall properly store all cable to minimize susceptibility to damage. The proper bend radius shall be maintained, both short and long term, during cable storage.

Storage coils shall be neat in even length coils, with no cross over or tangling.

Storage coils of different cables shall be kept completely separate except when the cables terminate in the same splice closure.

Storage coils shall be secured to cable racking hardware with tie wraps, Velcro straps, or non-metallic cable straps with locking/buckling mechanism. No adhesive or self-adhering tapes, metal wires and straps, or rope/cord shall be used to secure coils.

Unless otherwise noted on the plans, the following are the requirements for cable storage for underground applications:

Trunk cable in Type 4 pull box	25 feet
Trunk cable in Type 5 pull box	200 feet
Drop cable in Type 4 pull box	10 feet
Drop cable in Type 5 pull box, not terminated in a splice closure	10 feet
Drop cable in Type 5 pull box, terminated in a splice closure with the trunk cable	100 feet

Trunk cable end in Type 5 pull box 200 feet
 Drop cable terminated in same splice closure as trunk cable end 200 feet

The Contractor shall label each pull box with a numbered disk obtained from the Traffic Engineering Division. The disk shall be installed in accordance with the manufactures specification on the lid of each pull box. Numbers shall be noted on the As-Built plans for each pull box.

No slack cable shall be stored inside the communications hub building or Control Center.

907-661.03.5--Cable Labels. Cable labels shall be installed on all trunk and drop fiber optic cables. The installed cable shall be cleaned of all dirt and grease before applying any label.

The Contractor shall label all cables in or at every location where the cable is exposed outside of a conduit, innerduct or pole using the cable IDs for trunk cables or the device number for drop cables.

As a minimum, cable labels shall be installed in the following locations:

- Within 12 inches of every cable entry to a pull box, equipment cabinet, communications hub, or the TMC
- Within 12 inches of the exterior entry point of every fiber optic splice closure, termination cabinet and drop panel
- Every 30 feet for the entire length of cable in any storage coil in pull boxes
- Within one (1) foot of every pole attachment
- On every riser
- On every splice enclosure

907-661.03.6--Conduit Detection Wire. The Contractor shall install one conduit detection wire in all conduit banks. Conduit detection wire is required in all conduit banks installed by any installation method, including trenching, directional boring or plowing.

Only one conduit detection wire is required per installed conduit bank regardless of the number of conduits installed in that segment. Conduit detection wire shall be installed inside the conduit.

Conduit detection wire is not required for structure mounted conduit, except where underground segments of structure mounted conduit are greater than 20 feet in length.

The conduit detection wire shall be continuous and unspliced between pull boxes and shall enter the pull boxes at the same location as the conduit with which it is installed, entering under the lower edge of the pull box.

Four (4) feet of conduit detection wire shall be coiled and secured in each pull box or vault.

When two or more detection wires are in any pull box, the Contractor shall mechanically splice all detection wire together.

Conduit detection wire is required in drop cable conduits.

A detection wire surge protection system shall be furnished and installed. Detection wires shall be attached to surge protection systems designed to dissipate high transient voltages or other electrical surges. The detection wire surge protection system shall be grounded to a driven rod within 10 feet of the system using AWG #6 single conductor wire. Grounding shall be done through a stand alone system not connected to power or ITS device grounding. The surge protection system shall normally allow signals generated by locate system to pass through the protection system without going to ground.

907-661.03.7--Splicing into Existing Fiber Optic Cable. At some locations, the Contractor may be required to splice new drop cable into existing fiber optic cable at existing pull boxes. The Contractor is responsible to protect all existing fiber during this work. No separate payment shall be made for splicing into the existing fiber. The cost for all fiber optic work and equipment shall be included in the bid price for pay items Fiber Optic Cable and Fiber Optic Drop Cable.

The Contractor must notify the Project Engineer in writing no less than 10 days in advance of doing any work to existing fiber optic cable. Before any work can begin the Contractor must have obtain approval from the Project Engineer.

907-661.03.8--Replace Fiber Optic Cable. In locations specified in the Plans, the Contractor shall be required to remove and replace existing fiber optic cable with new fiber optic cable. The new fiber optic cable shall be an equivalent cable having the same cable type, assembly, connectors, size, construction, buffer tube construction, temperature characteristics, tensile strength, and optical characteristics. The cable type and mode shall be the same unless specified as otherwise in the Plans or contract documents. The new cable shall be a compatible replacement having equivalent or improved link characteristics. The Contractor shall install the cable as per manufacturer application and recommendations and adhere to the Installation Requirements and Testing specifications as stated herein. No separate payment will be made for this work. The cost for pulling new fiber optic cable for cable replacement, and splicing/terminating all fibers shall be included in the cost of the pay item Replace Fiber Optic Cable.

907-661.03.9--Replace Fiber Optic Drop Cable. In locations specified in the Plans, the Contractor shall be required to remove and replace existing fiber optic drop cable with new fiber optic drop cable. The new fiber optic drop cable shall be an equivalent cable having the same cable type, assembly, connectors, size, construction, buffer tube construction, temperature characteristics, tensile strength, and optical characteristics. The cable type and mode shall be the same unless specified as otherwise in the Plans or Notice to Bidders. The new cable shall be a compatible replacement having equivalent or improved link characteristics. The Contractor is required to install the cable as per manufacturer application and recommendations and adhere to the Installation Requirements and Testing specifications as stated herein. No separate payment will be made for this work. The cost for pulling new fiber optic drop cable for cable replacement, and splicing/terminating all fibers shall be included in the cost of pay item Replace Fiber Optic Drop Cable.

907-661.03.10--Upgrade Fiber Optic Cable. In locations specified in the Plans, the Contractor shall be required to upgrade existing fiber optic cable to new cable that adheres to the respective cable specification and requirements. The cable type and mode shall be the same unless specified as otherwise in the Plans or contract documents. The cable upgrade shall be treated as a new cable installation and adhere to all corresponding specifications and requirements stated herein. No separate payment will be made for this work. The cost for pulling new fiber optic to upgrade existing cable, and splicing/terminating all fibers shall be included in the cost of pay item Replace Fiber Optic Cable, Aerial.

907-661.03.11--Fiber Optic Connections at Existing Communication Nodes. In some locations, the Contractor shall be required to pull new fiber optic cable into an existing communications huts. No separate payment will be made for this work. The cost for pulling the fiber into the hut, providing and installing the termination equipment, and terminating all the fibers shall be included in the cost of pay items Fiber Optic Cable and Fiber Optic Drop Cable.

907-661.03.12--Drop and Insert Applications. The signal from the TMC to local controllers, cameras, and/or dynamic message signs will be conveyed via the backbone and branch cables.

The appropriate closure, as set out in Subsection 907-661.02.8, shall be used.

A 12-port fiber distribution cabinet and appropriate jumper shall be installed within the cabinet at locations approved by the Engineer.

At each device, the applicable fibers will be routed in and out of the equipment cabinet using a pre-terminated drop cable.

Only fibers required for the drop and insert shall be cut, no other fibers in the cable shall be cut without the approval of the Engineer.

The fibers shall be connected to the transmission equipment via LC/LC fiber optic patch cables.

The drop cable shall be routed in a position that will allow access to all installed components without movement of the cable.

In traffic signal control boxes the drop cable shall be routed up the left rear corner to a shelf mounted fiber optic termination cabinet.

In ITS equipment or communication cabinets the cable shall be routed neatly allowing for service of all installed components.

907-661.03.13--Testing.

907-661.03.13.1--General Requirements. The project testing program for fiber optic infrastructure shall include but is not limited to the specific requirements in this subsection.

All test results shall confirm physical and performance compliance with this TSP including but

not limited to optical fibers and fusion splices. No event in any given fiber may exceed 0.10 dB. Any event measured above 0.10 dB shall be replaced or repaired at the event point.

The Contractor shall provide the tentative date, time and location of fiber optic infrastructure testing no less than seven (7) days in advance of the test. The Contractor shall provide confirmed date, time and location of fiber optic infrastructure testing no less than 48 hours before conducting the test.

The Contractor shall provide test results documentation in electronic format (3 copies) and printed format (3 copies). Electronic formats shall be readable in Microsoft Excel or other approved application. Printed copies shall be bound and organized by cable segment.

- Two sets are for the Traffic Engineering ITS Department
- One set are for the Engineer

All test results shall be provided in English units of measure of length.

All test results documentation shall be submitted to the Engineer within 14 days of completion of the tests.

The ITS Engineer, Project Engineer and/or their designee(s) are only responsible for attending and observing each test, and reviewing and approving the Contractor's test results documentation. The ITS Engineer, Project Engineer and/or their designee(s) reserve the right to attend and observe all tests. The Contractor shall perform the Pre-Installation test and the Standalone Acceptance test with the the Department ITS Engineer or their designee present.

907-661.03.13.2--Pre-Installation Test (PIT). The Contractor shall perform a PIT on all FO Cable prior to any cable removal from the shipping reels.

The Contractor shall perform a PIT on each cable reel delivered to the job site.

The PIT for FO Cable shall include but is not limited to:

- A visual inspection of each cable and reel
- An OTDR Test and documentation as required in the Standalone Acceptance Test (SAT) for three randomly selected fibers from each buffer tube

An Optical Attenuation Test is not required. However, if the Contractor decides to perform one of these tests for their own protection, it shall be documented and provided to the Engineer.

907-661.03.13.3--Standalone Acceptance Test (SAT). The Contractor shall perform an SAT on all fiber optic infrastructures on this project after field installation is complete, including but not limited to all splicing and terminations. All fiber in pull boxes shall be in its final position mounted to the racks prior to the start of testing.

An SAT for each fiber in each cable shall include OTDR Tests and Optical Attenuation Tests.

For the Attenuation Tests, all fibers in all FO Cables and FO Drop Cables shall be tested from termination point to termination point, including:

- Fibers from FO Termination Cabinet to FO Termination Cabinet
- Fibers from FO Termination Cabinet to FO Drop Panel
- Fibers from FO Drop Panel to FO Drop Panel
- Fibers from FO Termination Cabinet to the end of the cable run in the last FO closure

All test results shall confirm compliance with this TSP including but not limited to optical fibers and fusion splices. No event in any given fiber may exceed 0.10 dB. Any event measured above 0.10 dB shall be replaced or repaired at the event point.

Test documentation shall include but is not limited to:

- Cable & fiber identification
- Cable & fiber ID and location - Physical location (device ID and station number of FO Termination Cabinet, FO Drop Panel, or cable end FO closure), fiber number, and truck or drop cable ID for both the beginning and end point
- Operator name
- Engineer's representative
- Date & time
- Setup and test conditions parameters
- Wavelength
- Pulse width Optical Time Domain Reflectometer (OTDR)
- Refractory index (OTDR)
- Range (OTDR)
- Scale (OTDR)
- Ambient temperature
- Test results for OTDR test (each direction and averaged)
- Total fiber trace (miles)
- Splice loss/gain (dB)
- Events > 0.05 dB
- Measured length (cable marking)
- Total length (OTDR measurement)
- Test results for attenuation test (each direction and averaged)
- Measured cable length (cable marking)
- Total length (OTDR measurement from OTDR test)
- Number of splices (determined from as-builts)
- Total link attenuation

The OTDR Test shall be conducted using the standard operating procedure and recommended materials as defined by the manufacturer of the test equipment.

The Contractor shall use a factory patch cord ("launch cable") of a length equal to the "dead zone"

of the OTDR to connect the OTDR and the fiber under test.

Bi-directional OTDR tests shall be conducted and bi-directional averages calculated for each fiber.

All tests shall be conducted at 1310 and 1550 nm for single mode cable.

The Contractor shall conduct the Optical Attenuation Test using the standard operating procedure and recommended materials as defined by the manufacturer of the test equipment.

Bi-directional Optical Attenuation tests shall be conducted and bi-directional averages calculated for each fiber.

A continuity or tone test shall be performed after installation to confirm that a continuous run of conduit detection wire was installed between pull boxes or vaults.

The Contractor shall prepare a test plan, supply equipment, conduct the test and document the results.

The test plan shall be submitted at least 15 working days prior to the desired testing date.

Testing shall not begin until the Engineer has approved the test plan, and all tests shall be conducted in the presence of the Engineer. The Traffic Engineering ITS Department representative shall be notified of the testing dates and invited to observe all testing.

The Traffic Engineering ITS Department may perform additional testing of any and all infrastructure using their own equipment. The Contractor may observe this testing.

The burn in period cannot start until the Traffic Engineering ITS Department is satisfied with the installation.

907-661.03.14--Documentation - As-Built Plans. The Contractor shall provide GPS locations of all pull boxes, splices, termination equipment cabinets, DMS, CCTV, Detectors and all pole locations.

The Contractor shall record the sequential footage markers from the fiber optic trunk and drop cables for each GPS location.

The Contractor shall provide scanned PDF files of all plan sheets with pen and ink markups.

The Contractor shall also provide the Department with an electronic file containing all of the data and test reports required above in a format that is compatible with Microsoft Excel.

A copy of all documentation shall be provided to the the Department Traffic Engineering ITS Department and Project Office

The Contractor shall provide a site location inventory of ITS devices to include manufacturer

model, serial numbers, and quantity. It shall also include the following:

- OTN Nodes and OTN Cards
- Fiber modems
- Video Encoders and Decoders
- Cameras
- Dome Camera housings
- DMS Signs
- Any other serial numbered devices installed

All documentation timing will be due to the Department by the close of business on the Friday of the week following the installation.

907-661.03.15--MDOT Employee Training. Minimum training requirements are as follows:

After the installation is complete, the Contractor shall provide formal classroom training and "hands-on" operations training for proper operation and maintenance of the fiber optic plant. The training shall be provided for up to six personnel designated by the Engineer and shall be a minimum of one day in duration. The training shall cover as a minimum preventive maintenance, troubleshooting techniques, fault isolation and OTDR trace analysis. All training materials shall be provided by the Contractor.

A Training Plan shall be submitted within 90 days of the Notice-to-Proceed. Approval of the Plan shall be obtained from the Engineer and the Traffic Engineering ITS Department. A detailed explanation of the contents of the course and the time schedule of when the training shall be given shall be included in the Training Plan.

Prior to training, the Contractor shall submit resume and references of the training instructor(s) along with an outline of the training course in a Training Plan. Training instructor(s) shall be manufacturer-certified, experienced in the skill of training others. The training shall be conducted by a trainer with a minimum of four years of experience in training personnel on the operation and maintenance of fiber optic systems.

The Contractor shall furnish all handouts, manuals and product information for the training. The same models of equipment furnished for the project shall be used in the training. The Contractor shall furnish all media and test equipment needed to present the training. Training shall be conducted in the Jackson area.

907-661.04--Method of Measurement. Fiber optic cable of the type specified will be measured by the linear foot. The measurement will be made horizontally along the conduit, aerially along the messenger cable, or from the trunk line to the controller cabinet.

The cost for all fiber optic work, equipment and testing shall be included in the bid price for fiber optic cable.

All required cabinet facilities shall not be measured for separate payment. All standard or special

fiber optic modems, fan out boxes, connectors, termination cabinets, patch cords, raceways, splicing devices, splicing, detection wire, warning tape, above ground markers, backplane facilities, twisted pair communications cable interface devices, etc., and any other cabinet modifications required for the fiber optic system shall be included in the price bid for other items of work.

907-661.05--Basis of Payment. Fiber optic cable, measured as prescribed above, will be paid for at the contract unit price bid per linear foot, which price shall be full compensation for furnishing all materials, for all installing, connecting, cutting, pulling and testing and for all equipment, tools, labor and incidentals necessary to complete the work.

Payment will be made under:

- 907-661-A: Fiber Optic Cable, * - per linear foot
- 907-661-B: Fiber Optic Drop Cable, * - per linear foot
- 907-661-C: Fiber Optic Cable, Aerial, * - per linear foot
- 907-661-D: Replace Fiber Optic Cable - per linear foot
- 907-661-E: Replace Fiber Optic Drop Cable - per linear foot
- 907-661-F: Replace Fiber Optic Cable, Aerial - per linear foot
- 907-661-G: Upgrade Fiber Optic Cable - per linear foot

* Indicate the type of cable

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-663-3

CODE: (SP)

DATE: 08/02/2017

SUBJECT: Networking Equipment

Section 907-663, Network Switch, is hereby added to and becomes part of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction as follows.

SECTION 907-663 -- NETWORKING EQUIPMENT

907-663.01--Description. This section specifies the minimum requirements for providing networking communication equipment, including network switches, terminal servers, fiber optic modems, cell modems, and associated cabling, furnished and installed.

Type A, Type B, Type D, Type E, and Type F switches shall be environmentally hardened and rated for an operating temperature of 70 degrees celcius. These switches support Intelligent Transportation Elements deployed on arterial streets and the highway system. Elements include but are not limited to traffic signals, dynamic message signs, surveillance cameras, and vehicle detection systems. Type C switches will support the Intelligent Transportation System and be installed in the Traffic Management Center and Communications Huts which are environmentally controlled. Type C switches are not required to be hardened.

This Section also specifies the minimum requirements for stand alone and network switch module Terminal Servers, stand alone and network switch module cellular modems, and Category 6 cable. The Terminal Servers shall be hardened. The Terminal Server device, also commonly referred to as a Port Server device, will be used to communicate bi-directionally between IP-based Ethernet network systems and existing field devices that communicate or are controlled via a full-duplex serial interface. Cellular modems shall be used to communicate via cell to remote sites such as portable traffic signal sites, portable CMS, smart work zones or ITS site locations, or sites or devices, that need serial or Ethernet communication that can be provided over cellular service.

The Category 6 cable will be installed in conduit and cabinets between elements that are within 300 feet of each other to eliminate the need for two hardened switches. The work shall consist of providing all labor, materials, equipment, and incidentals necessary to furnish, install, and test the networking equipment.

907-663.02--Materials. Network Switches Type A, Type B, Type C, Type D, Type E, Terminal Servers, Cell Modems, and associated cabling will be placed in the field device cabinets and shall meet the following requirements:

907-663.02.1--Network Switch Requirements. The Type A, Type B, Type C, Type D, Type E and Type F Network switches shall adhere to the following minimum requirements.

- 1) Field switch optical ports shall meet the following:

- a. The minimum optical budget between transmit and received ports shall be 18dB.
 - b. Shall include LC connector types.
 - c. Optical receiver maximum input power level shall not be exceeded.
 - d. Optical attenuators shall be added as needed; fiber optic attenuator patch cords shall be in accordance with Section 657 of the Standard Specifications. It is the Contractor's responsibility to determine where attenuators are needed and shall be included in the cost of the switch.
 - e. The Contractor shall be required to measure the optical power on each optical port to ensure that power entering the receiver is within the acceptable power budget of the optical port.
 - f. Optical interface equipment shall operate at 1310 nm.
- 2) Operate from 100 VAC to 200 VAC.
 - 3) The field switches [this excludes Type C] shall operate between -34° to +74° Celsius, including power supply.
 - 4) The field switches [this excludes Type C] shall operate from 10% to 90% non-condensing humidity.
 - 5) Meet the IEEE 802.3 (10Mbps Ethernet) standard.
 - 6) Meet the IEEE 802.3u (Fast Ethernet 100 Mbps) standard.
 - 7) Meet the IEEE 802.3x (Full Duplex with Flow Control) standard.
 - 8) Meet the IEEE 802.1p (Priority Queuing) standard.
 - 9) Meet the IEEE 802.1Q (VLAN) standard per port for up to four VLAN's.
 - 10) Meet the IEEE 802.1w (Rapid Spanning Tree Protocol) standard.
 - 11) Meet the IEEE 802.3ad (Port Trunking) standard for a minimum of two groups of four ports.
 - 12) The field switches shall meet IEEE 802.3D (Spanning Tree Protocol) standard.
 - 13) Capable of mirroring any port to any other port within the switch.
 - 14) Password manageable through:
 - a. SNMP
 - b. Telnet/CLI
 - c. HTTP (Embedded Web Server) with Secure Sockets Layer (SSL)
 - 15) Full implementation of SNMPv1 and SNMPv2c.
 - 16) Full implementation of GVRP (Generic VLAN Registration Protocol).
 - 17) Full implementation of IGMP and IGMP snooping.
 - 18) Minimum MTBF of 100,000 hrs using Bellcore TS-332 standard.
 - 19) Full implementation of RFC 783 (TFTP) to allow remote firmware upgrades.
 - 20) UL approved.
 - 21) The field switch shall provide status indicators as follows: 1) power on an off, 2) network status per port (transmit, receive, link, speed), and 3) status indicators shall be LED.
 - 22) Unused ports (copper and optical) shall be covered with rubber or plastic dust caps/cover.

907-663.02.1.1--Type A Network Switch. Type A network switches shall adhere to the following minimum requirements.

- 1) Minimum of six 10/100/1000 Base-TX ports. Each port shall connect via RJ-45 connector.
- 2) Minimum of two 1000 Base Long Reach optical ports.
- 3) Full implementation of RMON I and RMON II.
- 4) Rack, shelf or DIN Rail mountable. If shelf mounted, the Contractor must furnish and install a shelf if shelf space is not available in the facility. Any shelf used shall be ventilated as per the Network Switch manufacturer recommendation.

- 5) All power transformers provided shall be “fastening mechanism” type. No plug-in types shall be permitted. All corded transformers shall be mountable with the ability to neatly secure power cords.

907-663.02.1.2--Type B Network Switch. Type B network switches shall adhere to the following minimum requirements.

- 1) Minimum of twelve 10/100/1000 Base-TX ports. Each port shall connect via RJ-45 connector.
- 2) Minimum of one 10/100/1000 Base-TX ports. Each port shall connect via RJ-45 connector.
- 3) Full implementation of RMON I and RMON II.
- 4) Minimum of two 1000 Base Long Reach optical ports.
- 5) Rack, shelf or DIN Rail mountable. If shelf mounted, the Contractor must furnish and install a shelf if shelf space is not available in the facility. Any shelf used shall be ventilated as per the Network Switch manufacturer recommendation.
- 6) All power transformers provided shall be “fastening mechanism” type. No plug-in types shall be permitted. All corded transformers shall be mountable with the ability to neatly secure power cords.

907-663.02.1.3--Type C Network Switch. Type C network switches shall be installed in the communication hubs and shall meet the following requirements:

- 1) Each switch shall be populated with modules including the following features and capabilities:
 - i. Layer 2/3 switching and routing services
 - ii. Minimum of 64Gbps/48Mpps module Bandwidth
 - iii. Min of 8-GE uplink ports available per network switch assembly. The Contractor shall provide an uplink SFP optical module compatible with the interface for the uplink as indicated in the Location & Configuration of Communication Nodes notice to bidders for each uplink
 - b. In one (or more)Fiber SFP-based module(s): a minimum of 48 1000Base-X (SFP-based) compatible access ports and a minimum of 8 1000Base-X (SFP-based) uplink ports. The Contractor shall provide whichever is greater between a min number of SFP optic modules to interface to the fiber as indicated in the plans and NTBs, or a min of 14 and shall meet the following minimum requirements:
 - i. Optical budget of 18dB
 - ii. Hot-swappable network modules
 - iii. Same optical wavelength as Type A & B switches
 - iv. Same optical transmitter power as Type A & B switches
 - c. In one (or more) modules: 24 Ethernet 10/100/1000 RJ-45 ports
- 2) Optical receiver maximum input power level shall not be exceeded.
- 3) Optical attenuators shall be added as needed; fiber optic attenuator patch cords shall be in accordance with Section 657 of the Mississippi Standard Specifications for Road and Bridge Construction. It is the Contractor’s responsibility to determine where attenuators are needed and shall be included in the cost of the switch.
- 4) 19” rack mountable.
- 5) Operate from 5° to 40° Celsius.

- 6) NEBS Level 3 compliant.
- 7) Operate from 10 to 80 non-condensing humidity
- 8) Designed as a chassis with easy to remove modules.
- 9) Chassis backplane shall be passive.
- 10) All modules shall be hot-swappable.
- 11) Meet the IEEE 802.1d (Virtual Bridge) standard.
- 12) Meet the IEEE 802.1x (authentication) standard.
- 13) Meet the requirements of :
 - a. IEEE 802.3z
 - b. IEEE 802.3ab
 - c. GR-20-CORE: Generic requirements for Optical Fiber and Optical Fiber Cable
 - d. GR-326-CORE: Generic Requirements for Singlemode
- 14) Full implementation of RIP protocol as outlined by RFCs: 1058, 1723, 1812
- 15) Full implementation of OSPF protocol as outlined by RFCs: 2178, 1583, 1587, 1745, 1765, 1850, 2154, 2328, 1850, 1997, 2385, 2439, 2842, 2918, 2370.
- 16) Capable of mirroring any port to any other port within the switch.
- 17) Password manageable through SSH (Secure Shell).
- 18) Full implementation of MLD (Multicast Listener Discovery).
- 19) Full implementation of IGMPv2.
- 20) Full implementation of PIM-SM and PIM-DM.
- 21) Comply with FCC 47 CRF Part 15 Class A emissions.
- 22) Bandwidth flow rate limiting policing support per port.
- 23) Full security implementation of
 - a. Support SSH, 802.1x (rel 2)
 - b. Access Control Lists (ACL's)
 - c. RADIUS authentication
 - d. TACACS+ authentication
- 24) Have redundant power supplies installed.
- 25) The power supply units shall be hot swappable.
- 26) Switch assembly shall have a minimum of 4 module slots.
- 27) Blank covers for all remaining slots.

907-663.02.1.4--Type D Network Switch. Type D network switches shall be of chassis design. The switch shall be able to accept a minimum of four (4) different type modular cards and have Layer 2 switch and Layer 3 routing capabilities. The Type D network switch shall meet the minimum requirements specified below:

- 1) The switch shall be chassis designed with a minimum of four (4) module slots.
- 2) Each switch shall be able to accept the following type modules:
 - a. Ethernet module:
 - i. A minimum number of six (6) 10/100Base-TX compatible RJ45 ports.
 - ii. The Contractor shall provide the minimum number of modules necessary to meet or exceed the required number of ports as indicated in the plans and NTBs.
 - iii. Total required bandwidth shall per chassis shall not exceed 10 Gbps
 - b. Fiber based modules:
 - i. The module shall accept SFP type fiber modules

- ii. The Contractor shall supply any necessary fiber modules that meet the requirements of speed, type of fiber, and link budget connection.
- iii. The Contractor shall provide the minimum number of modules necessary to meet or exceed the required number of ports as indicated in the plans and NTB
- c. WAN module:
 - i. T1, DS3 or Metro Ethernet Interface (as per NTB or project plans)
 - 1) The Interface shall be T1, DS3 or Metro Ethernet
 - 2) The ports shall connect via RJ45 connector.
 - ii. Cellular Interface
 - 1) Contractor shall provide information to the Project Engineer to enable activation of the modem.
 - 2) Contractor shall get prior approval from the Project Engineer on selection of cellular radio type (HSPA/EVDO)
- d. Terminal Server module:
 - i. Module that meets Terminal Server requirements Subsection 663.02.6.
- e. Power Supply module:
 - i. The power module provided shall be "screw terminal block" type. No pluggable terminal block.
 - ii. Input power: Same as Type A and Type B switches.
 - iii. Power module shall be hot-swappable.
 - iv. The Contractor shall supply the necessary amount of power supplies to meet power requirements for all cards installed and the chassis itself
- 3) Software license shall provided to match functionality of installed modules.
- 4) Shall be DIN or Panel mountable.
- 5) The switch shall provide layer 2 and 3 switching and routing services
- 6) Meet the IEEE 802.1d (Virtual Bridge) standard.
- 7) Meet the IEEE 802.1x (authentication) standard.
- 8) Password manageable through SSHv2 (Secure Shell).
- 9) Full implementation of VRRP.
- 10) Comply with FCC 47 CRF Part 15 Class A emissions.
- 11) Bandwidth flow rate limiting policing support per port.
- 12) Full security implementation of
 - a. Support SSH2, 802.1x (rel 2)
 - b. Access Control Lists (ACL's)
 - c. RADIUS
- 13) Blank covers for all remaining slots.
- 14) Electronic surfaces shall be covered with conformal coating for additional environmental protection.

907-663.02.1.5--Type E Network Switch. Type E network switches will be installed in locations where multiple backbone fibers converge or high concentration of ports are needed for a field location but need a hardened switch and shall meet the following requirements:

- 1) Each switch shall be populated with redundant switch fabric modules that meet the following minimum requirements:
 - a. Layer 2/3 switching and routing services
 - b. 64Gbps/48Mpps module Bandwidth

- c. Min of 2-GE uplinks available per card with a minimum capability to expand to 8. The Contractor shall provide an uplink SFP optical module compatible with the interface for the uplink as indicated in the Location & Configuration of Communication Nodes notice to bidders for each uplink.
- 2) Optical interfaces shall include 1000 Base-X (SFP-based module(s)) with a minimum of 8 ports. The Contractor shall provide whichever is greater between a min number of SFP optic modules to interface to the fiber as indicated in the plans and NTBs, or a min of six (6) and shall have a minimum Optical budget of 18dB and be the same optical wavelength as Type A & B switches.
 - a. Optical receiver maximum input power level shall not be exceeded.
 - b. Optical attenuators shall be added as needed; fiber optic attenuator patch cords shall be in accordance with Section 657 of the Standard Specifications. It is the Contractor's responsibility to determine where attenuators are needed and shall be included in the cost of the switch.
- 3) Include a minimum 8 Ethernet 10/100/1000 ports
- 4) 19" rack mountable.
- 5) Operate from -30° to +70° Celsius.
- 6) Operate from 10 to 90 non-condensing humidity
- 7) Chassis backplane shall be passive.
- 8) All modules shall be hot-swappable.
- 9) Meet the IEEE 802.1d (Virtual Bridge) standard.
- 10) Meet the IEEE 802.1x (authentication) standard.
- 11) Meet the requirements of :
 - a. IEEE 802.3z
 - b. IEEE 802.3ah
 - c. GR-20-CORE: Generic requirements for Optical Fiber and Optical Fiber Cable
 - d. GR-326-CORE: Generic Requirements for Singlemode
- 12) Full implementation of RIP protocol as outlined by RFCs: 1058, 1723, 1812
- 13) Full implementation of OSPF protocol as outlined by RFCs: 2178, 1583, 1587, 1745, 1765, 1850, 2154, 2328, 1850, 1997, 2385, 2439, 2842, 2918, 2370.
- 14) Capable of mirroring any port to any other port within the switch.
- 15) Password manageable through SSHv2 (Secure Shell).
- 16) Full implementation of GMRP (Generic Multicast Registration Protocol).
- 17) Full implementation of IGMPv2.
- 18) Full implementation of PIM-SM and PIM-DM.
- 19) Full implementation of DVMRPv3.
- 20) Full implementation of VRRP.
- 21) Comply with FCC 47 CRF Part 15 Class A emissions.
- 22) Bandwidth flow rate limiting policing support per port.
- 23) Full security implementation of
 - a. Support SSH2, 802.1x (rel 2)
 - b. Access Control Lists (ACL's)
 - c. RADIUS
 - d. TACACS
- 24) Have redundant power supplies installed.
- 25) Blank covers for all remaining slots.
- 26) Have options or modules to add a terminal server as specified in Subsection 663.02.2

27) Have options or modules to add a cellular interface as specified in Subsection 663.02.3

907-663.02.1.6--Type F Network Switch. Type F network switches will be layer 3 switches installed in field locations with wireless communications or access points and shall meet the following requirements:

- 1) Each switch shall be populated with switch modules that meet the following minimum requirements:
 - a. Layer 2/3 switching and routing services
 - b. 20Gbps Aggregate Bandwidth
 - c. Min of 4-GE uplinks available per switch with a minimum of 2 being fiber ports. The Contractor shall provide an uplink SFP optical module compatible with the interface for the uplink as indicated in the Location & Configuration of Communication Nodes notice to bidders for each uplink.
 - d. SD flash port for swappable Management Card configuration
 - e. Supports High Density Power over Ethernet (PoE) for up to 8 devices
 - f. Supports Cisco Common Industrial Protocol (CIP)
 - g. Support of SCADA (Supervisory Control And Data Acquisition) connectivity.
 - h. Can be supported with IP services.
 - i. 5 year PID warranty
- 2) In addition to the uplink ports, interfaces ports shall include:
 - a. 8 PoE 10/100/1000
 - b. 4 SFP ports
 - i. Optical receiver maximum input power level shall not be exceeded.
 - ii. Optical attenuators shall be added as needed; fiber optic attenuator patch cords shall be in accordance with Section 657 of the Mississippi Standard Specifications for Road and Bridge Construction. It is the Contractor's responsibility to determine where attenuators are needed and shall be included in the cost of the switch.
- 3) Din Rail Mountable.
- 4) Operate from -40° to +70° Celsius.
- 5) Operate from 5 to 95 non-condensing humidity
- 6) Supports IEEE 802.1AE MACsec, Security Group Access Control Lists (SGACL)
- 7) Meet the IEEE 802.1d (Virtual Bridge) standard.
- 8) Meet the IEEE 802.1x (authentication) standard.
- 9) RIPng, OSPFv6, and EIGRPv6 support
- 10) Full implementation of GMRP (Generic Multicast Registration Protocol).
- 11) Full implementation of IGMPv2.
- 12) Full implementation of PIM-SM and PIM-DM.
- 13) Full implementation of DVMRPv3.
- 14) Full implementation of VRRP.
- 15) Supports Redundant DC input voltage
- 16) Power supplies with PoE support and 6-foot minimum power cord(s).

907-663.02.2--Terminal Server. Terminal server shall adhere to the following minimum requirements.

- 1) 10/100 Base-T Ethernet port connection

- 2) RJ-45/DB9 Serial port connection
- 3) RS-232/422/485 selectable serial connections
- 4) Baud rates up to 230 Kbps
- 5) Full Modem and hardware flow control
- 6) TCP/UDP Socket Services
- 7) UDP Multicast
- 8) Telnet and Reverse Telnet
- 9) Modem emulation
- 10) SNMP (Read/Write)
- 11) PPP
- 12) Port buffering
- 13) HTTP
- 14) Remote management
- 15) DHCP/RARP/ARP-Ping for IP address assignment
- 16) LED status for link and power
- 17) The Terminal Server shall support a minimum of Four (4) bi-directional serial communications over Ethernet 10/100 Base-TX.
- 18) Each Terminal Server shall have a minimum of four (4) EIA-232/422/485 serial interface ports. These ports shall be individually and independently configurable, directly or over the network, to EIA-232/422/485 mode of operation as defined by the EIA for data format, data rate and data structure (e.g., the number of bits, parity, stop bits, etc.). Each serial port shall support up to 230 Kbps.
- 19) Each serial port shall support IP addressing and socket number selection.
- 20) The equipment shall provide the capability to establish an IP connection directly from a workstation to any encoder IP address and socket number transport serial data.
- 21) Each Terminal Server shall have an Ethernet Interface (10/100Base-TX protocol, Full/Half-Duplex, Auto Sense (802.3), RJ-45).

907-663.02.3--Cell Modem. Cellular Modem, and associated equipment shall be new and constructed using the highest quality, commercially available components and techniques to assure high reliability and minimum maintenance and meet the following requirements.

907-663.02.3.1--Functional Requirements. Cellular Modem, antenna, wiring assemble, configuration software, and installation necessary shall be provided and furnished for a working cellular wireless communication connection in accordance with plans and specifications and compatible with the requirements of the MDOT system, and the wireless service carrier used by MDOT. Unless otherwise indicated on the plans, all items that are required to complete the installation and ensure an operational system shall be supplied by the Contractor whether listed above or not. Items required but not listed above shall be at no direct pay. All components supplied by the Contractor are the responsibility of the Contractor. It shall be the responsibility of the Contractor to properly configure and deliver a working cellular communications system. It shall be the responsibility of the Contractor to determine the final configuration of all electrical connections. Cellular account setup shall be coordinated with MDOT Traffic Engineering Division. Warranty and cellular carrier account shall be transferred into MDOT's name upon acceptance of the project.

907-663.02.3.2--Cellular Modem System. The cellular modem shall adhere to the following

minimum requirements.

- 1) Model and Type provided shall be pre-approved on a MDOT cellular service carrier.
- 2) Highest available on a MDOT cellular service carrier of 4G, EVO, or higher service.
- 3) Minimum of one 10/100 Base-T RJ45 Ethernet port
- 4) Minimum of one RS-232 serial port
- 5) Minimum of one external antenna connector
- 6) GPS Data available
 - a. Acquisition Time under 2 seconds
 - b. Accuracy: under 5m 90% of time
 - c. Tracking Sensitivity: -161 dBm
- 7) Device Configuration and Management Software via web interface.
- 8) Communications and Protocols supported:
 - a. Network: TCP/IP, UDP/IP, DNS
 - b. NAT and DHCP routing with VLAN, VRRP, and Static Routes configurable
 - c. Includes TELNET, SMTP, SNMP, SMS sessions and services
 - d. Serial: TCP/UDP PAD Mode, Modbus (ASCII,
 - e. GPS: NMEA V3.0, TAIP, RAP
 - f. Provides VPN security with up to five (5) tunnels
- 9) Provides event reporting for GPS/AVL, Network Parameters, Data Usage, Time, Power, and Device Temperature over SMS, SNMP, or Email, SNMP.
- 10) Input Voltage: 10 to 36 VDC
- 11) Operating Temperature of -30° to +70° Celsius

907-663.02.4--Category 6 Cable. Category 6 cable shall adhere to the following minimum requirements.

- 1) 4 Pair #24 AWG UTP Category 6 Cable
- 2) This item is paid for Category 6 cables installed between cabinets and does not apply to other patch cords installed inside cabinets or huts.
- 3) Supplied Category 6 cable shall be suitable for use outdoors in duct and as a minimum meet the following requirements:
- 4) Fully water blocked
- 5) Conforms to the National Electrical Code Article 800
- 6) UL 1581 certified
- 7) Voltage Rating 300 Volts or greater
- 8) Operating and installation temperature (-4°F to 140°F)
- 9) Bend Radius 10 x Cable OD or smaller
- 10) Recommended for 1000Base-T applications for a distance of 100 meters.

907-663.02.4.1--Category 6 Patch Cords. The Cat 6 Patch Cords shall be furnished and installed as needed to connect the Network Switches with other equipment. Cat 6 Patch Cords shall be considered an incidental component for this project and furnished and installed as needed to provide a functional system. Cat 6 Patch Cords shall meet the following minimum requirements:

- 1) All patch cords shall be from the same manufacturer.
- 2) Shall incorporate four (4) pair 24 AWG stranded PVC Category 6.

- 3) Shall be factory made; Contractor or vendor assembled patch cords are not permitted.
- 4) Shall be TIA/EIA 568-B.2-1 compliant. Patch Cords shall be compliant to T568B pin configuration (which ever is used).
- 5) Certified by the manufacturer for Category 6 performance criteria.
- 6) Length as needed. Excessive slack is not permitted.

907-663.02.5--Project Submittal Program Requirements. The Contractor shall provide project submittals for network switches including scheduling requirements. The project submittals for network switches, terminal servers, cellular modems, and fiber optic modems shall include but are not limited to the specific requirements in this subsection.

- 1) The Contractor shall submit detailed cut sheets which document compliance with all parameters required in this section. If a parameter is not covered in the cut sheet a signed statement from the manufacturer on letterhead shall be submitted as an attachment. Failure to address all requirements will result in rejection of the submittal.
- 2) The Contractor shall submit documentation and proof of manufacturer-recommended training and certification for the installation and configuration of network switches.
- 3) The Contractor shall submit technical specifications for the minimum transmitter port to receiver port optical attenuation required for the switches to function in accordance with this specification for the optical links shown on the plans.

907-663.03--Construction Requirements. All networking equipment shall be installed according to the manufacturer's recommendations, the Plans and as follows:

- 1) Network switches shall only be configured and installed by the switch manufacturer trained personnel.
- 2) Network switches shall be installed in accordance with manufacturer's guidelines and requirements.
- 3) The Contractor shall request from the Department, switch configuration information (such as IP address, VLAN Tag values, etc.) not more than 30 days after the switch submittals have been approved.
- 4) The Contractor shall provide as needed the necessary Cat 6 patch cords and fiber optic patch cords for a complete and functional installation.
- 5) Category 6 cable installed in conduit shall be installed and terminated per the manufacturers recommended procedures. Slack CAT-6 cable shall be provided in pullboxes as indicated in the plans.
- 6) The Contractor shall provide training for proper management of the equipment installed. This training should cover daily operation as well as maintenance and configuration of the switching equipment installed as part of this project and meet the requirements of Subsection 663.03.4 of this document.
- 7) The Contractor shall provide the MDOT with a written inventory of items received and the condition in which they were received. Inventory shall be inclusive of make, model, and serial numbers, MAC address, and installation GPS coordinates. All equipment shall be installed according to the manufacturer's recommendations or as directed by the MDOT.
- 8) Any new, additional or updated drivers required for the existing ATMS software to communicate and control new Networking Equipment installed by the Contractor shall be the responsibility of the Contractor.

907-663.03.1--Switch Configuration Requirements. The Contractor shall configure network switches as follows:

- 1) All 100 Base-TX ports shall be configured as follows:
 - a. RSTP/STP – Off.
 - b. Unused TX ports shall be disabled.
 - c. Operating TX ports shall be programmed to filter only for the MAC address of the connected device.
- 2) All 1000 Base-FX ports shall be configured as follows:
 - a. RSTP/STP – On.
 - b. IGMP Snooping – On.
- 3) The Type D switch configuration shall be as outline in the Project plans and details.
- 4) All network switches shall be installed and configured with the same firmware configuration. The optimum settings shall be used consistently system-wide. Any locations that require different settings for optimum performance shall be approved by the Engineer.
- 5) The Switches shall be configured to enable multicasting and turn on multicast protocols.
- 6) The Contractor may submit an alternate switch configuration to the ITS Engineer for review and approval; The ITS Engineer will review alternate switch configuration documentation. The goal of the switch configuration is to reduce the network delay, as well as provide network redundancy.
- 7) The Contractor shall submit an electronic copy of all final and approved configurations of all switches to the Project engineer and to the ITS Engineer.

907-663.03.2--Testing. The Contractor shall conduct a Project Testing Program as required below. All costs associated with the Project Testing Program shall be included in the overall contract price; no separate payment will be made for any testing.

- 1) All test results shall confirm physical and performance compliance with these Special Provisions.
- 2) Each test shall fully demonstrate that the equipment being tested is clearly and definitely in full compliance with all project requirements.
- 3) Contractor shall submit all test results documentation to the Engineer for review within 14 calendar days of completion of the tests.
- 4) All tests deemed by the Project Engineer to be unsatisfactorily completed shall be repeated by the Contractor. In the written request for each test occurrence that is a repeat of a previous test, the Contractor shall summarize the diagnosis and correction of each aspect of the previous test. The Contractor shall summarize the diagnosis and correction of each aspect of the previous test that was deemed unsatisfactory. The test procedures for a repeated test occurrence shall meet all the requirements of the original test procedures, including review and approval by the Project Engineer and ITS Manager or designee.
- 5) The satisfactory completion of any test shall not relieve the Contractor of responsibility to provide a completely acceptable and operating system that meets all requirements of this project.

907-663.03.3--Documentation. As-built Plans showing switch configuration and connections shall be provided to the Project Engineer and ITS Engineer in electronic format.

The Contractor shall submit documentation and proof of measured optical power budgets to all optical links of all type switches. All equipment and software must be fully functional and pass a Final Inspection by the ITS Manager and Project Engineer before being accepted by the MDOT

907-663.03.4--Warranty. Minimum warranty requirements shall be as follows.

- 1) All warranties and guarantees shall be assigned to the Mississippi Department of Transportation.
- 2) The warranty shall be a minimum of one (1) year warranty unless otherwise stated.

907-663.03.5--MDOT Employee Training. After the installation is complete, the Contractor shall provide formal classroom training and "hands-on" operations training for proper operation and maintenance of the network switch. The training shall be provided for up to six personnel designated by the ITS Engineer and shall be a minimum of four hours in duration. The training shall cover as a minimum preventive maintenance, troubleshooting techniques, fault isolation and circuit analysis. All training materials shall be provided by the Contractor.

- 1) Prior to training, submit resume and references of instructor(s). Also submit an outline of the training course in a Training Plan. Submit the Training Plan within 90 days of Contract Notice to Proceed. Obtain approval of the Plan from the Engineer and the Traffic Engineering ITS Department. Explain in detail the contents of the course and the time schedule of when the training will be given.
- 2) Furnish all handouts, manuals and product information.
- 3) For the training, use the same models of equipment furnished for the project. Furnish all media and test equipment needed to present the training.
- 4) Training shall be conducted in the Jackson area.
- 5) Training instructor(s) shall be manufacturer-certified, experienced in the skill of training others.
- 6) The training shall be conducted by a trainer with a minimum of four years of experience in training personnel on the operation and maintenance of fiber optic systems.

907-663.04--Method of Measurement. Network Switches of the type specified, Terminal Server, and Cellular modem will be measured per each installation as specified in the Plans.

Category 6 Cable, Installed in Conduit, will be measured by the linear foot, obtained by accurate measurement of the runs including horizontally, vertically, aerially along the messenger cable, from the device to the device cabinet, and with liberal allowances made for slack in boxes, as indicated in the plans.

907-663.05--Basis of Payment. Network Switches, measured as prescribed above, will be paid for at the contract price per each installation, which price shall be inclusive of furnishing, installing, system integration and testing of a Network Switch including all chassis, modules, power cables, power supplies, software, license, fiber optic patch cords, fiber optic attenuator patch cords, Cat 6 patch cords, and all incidental components, attachment hardware, mounting shelf and hardware, testing and training requirements, and all work, equipment and appurtenances as required to provide a fully functional switch ready for use. Type C, Type D, and Type E Network Switch

module cards shall be specified per Project plans or NTBs for each site location. It shall also include all system documentation including: shop drawings, operations and maintenance manuals, wiring diagrams, block diagrams, and other material necessary to document the operation of the switch and network.

Terminal Server, measured as prescribed above, will be paid for at the contract price per each, which price shall be inclusive of furnishing, installing, system integration and testing of a Terminal Server including all incidental components, attachment hardware, mounting shelf and hardware, testing and training requirements, and all work, equipment and appurtenances as required to provide a fully functional Terminal Server ready for use.

Cellular modem, measured as prescribed above, will be paid for at the contract unit price per each, which price shall include the modem, antenna, reset timers, cabling, factory and manufacturing inspection, testing, storage, packaging, shipping, warranty, and all work, equipment, and appurtenances as required to effect the full operation and control of the cellular modem complete in place and ready for use.

Category 6 Cable, Installed in Conduit, measured as prescribed above shall be paid for at the contract price per the linear foot, which price shall include all incidentals necessary to complete the work.

Payment will be made under:

- 907-663-A: Network Switch, Type ___ - per each
- 907-663-B: Terminal Server - per each
- 907-663-C Cellular Modem - per each
- 907-663-D: Category 6 Cable, Installed in Conduit - per linear foot

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-666-1

CODE (SP)

DATE: 01/17/2017

SUBJECT: Bluetooth Detection System

Section 907-666, Bluetooth Detection System, is hereby added to and made part of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction as follows.

SECTION 907-666 - BLUETOOTH DETECTION SYSTEM

907-666.01--Description. This section specifies the minimum requirements for Bluetooth Detection Systems (BDS) furnished and installed in accordance with the plans and contract documents. The work consists of providing all labor, materials, equipment, and incidentals necessary to furnish, install, and test a fully operational BDS. The Contractor shall install a fully operational BDS that supplies a compatible data format for the detection data that can be integrated into the existing ITS or traffic management system.

The BDS will provide point-to-point detection of vehicles carrying devices that utilize Bluetooth technology. The vehicles are anonymously detected by discovering Bluetooth enabled devices and collecting their Media Access Control (MAC) addresses. The MAC addresses are stored such that the data retrieved is in a format that cannot be tracked, and any data distinctive to a device is not retrieved (i.e., device name or description). The MAC address is affixed with a time stamp and origin or destination information which is used to determine travel time, direction, and speed data. The BDS will support Traffic Management Center (TMC) operations by providing personnel with concurrent travel time and speed data corresponding to the traffic sampled.

The BDS shall be located in an equipment cabinet, pole-mounted, or mounted to overhead structures. The system shall include power source, processor, antenna, data processing/monitoring software, mounting equipment, up to 100 feet of cable per detector to the nearest ITS or traffic signal cabinet, and all items necessary for a complete fully functional installation. The software package shall include all necessary software licenses for functionality including, but not limited to, web interface, configuration tools, GIS map, data processing, data archiving, XML and GPS data transmission to be used with the MDOT ATMS information systems.

907-666.02--Materials. Bluetooth Detection Systems Type A, Type B, and associated equipment shall meet the following requirements.

907-666.02.1--Functional Requirements. The Bluetooth Detection System (BDS) shall process and analyze data collected from vehicles traveling along a route. The BDS shall discover devices within a distance of 150 feet from its antenna at the height suggested by the manufacturer. The system shall detect visible Bluetooth devices at the point of origin/destination and temporarily store their associated MAC addresses to memory to be transmitted to a centralized server/database. The MAC addresses shall be anonymous or encrypted. Each anonymous MAC address shall be

affixed with the time of detection and the location of origin or destination. Travel time and speed shall be processed for each unique MAC address by utilizing the times of detection and locations detected. The BDS shall not be used to monitor vehicle presence or traffic volume as the system accuracy is dependent on Bluetooth device sample rates.

The BDS shall transmit detection information over an Ethernet connection or cellular data connection to a centralized remote database or server. A software package shall be available to provide a web interface used to monitor BDS data, monitor BDS status information, and view statistical reports. The web interface shall provide real-time BDS data on a GIS map with reporting tools. The reporting tools shall include, but not limited to, real-time and statistical travel time data, real-time and statistical traffic speed data, anonymous MAC addresses, location(s) of detection, time of detection, and date of detection.

907-666.02.2--Bluetooth Detection System. The BDS Type A and Type B shall adhere to the following minimum requirements.

The Bluetooth radio and antenna shall operate in the unlicensed ISM band at 2.4 GHz. The radio shall comply with all FCC regulations and standards. A single Cat-5e Outdoor Rated Ethernet cable shall provide power and network connection to each BDS unit. No coaxial cable shall be allowed. The antenna shall be omnidirectional or directional as indicated in the plans and per the manufacturer's recommendations. The BDS shall not interfere with any other ITS devices operating on the same frequency. If separation is needed for such devices to operate, it shall be surveyed and determined by the Contractor prior to installation, and then relocated with approval of the Engineer. Costs for positioning and/or moving the BDS shall be included in the cost of the BDS unit.

The microcontroller shall include SD host and card for data logging and processing by standalone BDS detector units detached from the MDOT Network. The Bluetooth microcontroller shall include sufficient non-volatile RAM(NVRAM), Flash memory, SD host, SD card, and Ethernet controller/module.

The BDS system shall be capable of utilizing either directional or Omni directional antennas. Omni directional antennas shall be standard unless indicated otherwise in plans or as approve by the Engineer.

907-666.02.3--Type A Bluetooth Detector. The Type A Bluetooth Detector shall be a pole mounted self-enclosed unit capable of detecting Bluetooth enabled devices traveling along a roadway. The following are the minimum Type A Bluetooth Detector requirements.

- 1) The Type A BDS shall be located outside the equipment cabinet and enclosed inside a NEMA 4X enclosure that is resistant to damage by weather or vandalism. The cabinet shall be mounted on a pole, or overhead structure as appropriate for the site and as specified in the plans.
- 2) The Contractor shall provide a power supply or PoE injector to convert the available single phase 110 – 220 VAC to the manufactures specified operational voltage. The power supply or PoE injector shall be located in the equipment cabinet. The PoE injector shall conform to

the IEEE 802.3af and IEEE 802.3at PoE standards.

907-666.02.4--Solar Power. A Type A BDS with solar power shall be optional to include a solar panel, battery, mounting equipment, cables, and all items necessary for a complete fully functional installation. All solar panels shall be in accordance with UL1703, or equivalent. The solar cell shall have a minimum power capacity of 30 watts. The battery shall provide sufficient power for all BDS component operation for a minimum of 168 hours (7 days). The supplier shall provide documentation specifying approximate daily power generation, power consumption, storage capacity, and charge rates representing an optimal power source to the satisfaction and approval of the Project Engineer. The Contractor shall test the battery for faulty irregularities and provide documentation to the Project Engineer stating the battery's voltage, and resistance. The battery voltage and resistance shall be meet the manufacturer's specifications. Should solar power be specified with the Type A BDS, the NEMA 4 enclosure shall be sized appropriately for the solar power components.

907-666.02.5--Type B Bluetooth Detector. The Type B Bluetooth Detector shall be a unit that is mounted inside a typical ITS or Signal equipment cabinet, capable of detecting Bluetooth enabled devices traveling along a roadway. The following are the minimum Type B Bluetooth Detector requirements.

The Type B BDS shall be located inside the equipment cabinet and be shelf, rack, module, or DIN rail mountable. Other mounting options may be submitted for review by the Project Engineer.

The Contractor shall provide a power supply to convert the available single phase 110 – 220 VAC to the manufactures specified operational voltage. The power supply shall be located in the equipment cabinet.

POE injectors shall conform to the distances shown on the plans.

907-666.02.6--Wireless Communications. The Type A and Type B BDS shall be upgradable to include a cellular modem and antenna capable of transmitting data using the Department cellular service provider. The Contractor shall coordinate with the Department for cellular service. The Contractor shall be responsible for establishing cellular service. The cellular modem shall be Quad-band GSM 850/900/1800/1900 MHz GSM/GPRS. The GSM modem shall have the option to use a high gain omnidirectional antenna or directional antenna via an external SMA connector on the enclosure. The cellular modem shall support the TCP/IP networking protocols: TCP, UDP, DNS, DHCP, HTTP, HTTPS, FTP and NTP.

907-666.02.7--Bluetooth Detection System Server. The Bluetooth Detection System Server shall be a centralized server capable of analyzing and processing BDS Detector data from the roadways where the detectors are deployed and distributed to the MDOT ATMS system. The following are the minimum requirements for the BDS software package and database.

- 1) No more than one (1) software package (i.e., software license) shall be required for each regional TMC network.
- 2) The software package shall include a secure web-based monitoring system (web GUI).

- The web GUI shall allow the Contractor or TMC personnel to view, analyze and configure data.
- 3) The web GUI shall include a GIS map overlay and display dynamic real-time BDS detector data.
 - 4) The server shall be located locally at the regional TMC or hosted offsite by a third party as specified in the plans.
 - 5) The server shall be capable of adding an undefined number of detectors forming a BDS network.
 - 6) The web GUI shall be used to monitor data (i.e., speed and travel times) from any BDS detector pair on the network.
 - 7) The server shall be capable of logging any change in a devices status in its network.
 - 8) The logging of devices shall include unique device identifier, BDS detector status, and BDS detector battery status (solar power option).
 - 9) The server shall be capable of logging all data collected from each device in its network. The logging of devices shall include MAC address pairs, detection origin, detection destination, origin detection time, destination detection time, number of paired MAC addresses, percentage of paired MAC addresses, real-time speed, and travel times.
 - 10) The web server shall archive all BDS data for a minimum of 365 days at a frequency equivalent to the detection sampling rate.
 - 11) The server shall be capable of generating performance measurement reports including traffic speed, travel times, raw data and smoothed data, origin and destination. All reports generated shall be in the format that includes day, month, year, hours, minutes, and seconds.
 - 12) All data served from the server shall be transmitted via XML.
 - 13) The Contractor shall provide an uninterruptable power supply (UPS) for the server. The UPS cost shall be absorbed into the BDS Server cost. The UPS shall meet the following minimum operational requirements.
 - a. The UPS shall protect the server and associated equipment from power surges, spikes, and other power disturbances. The UPS shall be capable of restoring power automatically upon return of utility power.
 - b. In the event of a power disturbance the UPS battery backup shall maintain a 1000W load for a minimum runtime of 3600 seconds (1 hour).
 - c. The UPS shall indicate the availability of battery backup power.
 - d. The UPS shall be configurable over the network via remote management.
 - e. The UPS battery shall be hot-swappable for uninterrupted power to the server and associated equipment.

907-666.02.8--Network Requirements. The Type A and Type B BDS shall meet the following minimum network requirements.

- 1) The network connection shall be Ethernet Compliant IEEE 802.3, 802.3u, and 802.3x; 10/100 Mbps or higher, auto sensing full/half-duplex operations.
- 2) The BDS shall connect to a network device (i.e., media converter, Ethernet switch /router, etc.) via a RJ45 port/connector through outdoor rated Category 5e or higher cable.
- 3) All RJ45 ports shall be standard EIA/TIA-568-A pin-outs and shall be rated at 10/100 Base-T or better.

- 4) The BDS shall support protocols TCP, UDP, DNS, DHCP, HTTP, HTTPS, FTP and NTP.

907-666.02.9--Environmental Conditions. Unless stated otherwise, the equipment shall meet all operational requirements during and after exposure to any variation of the following environmental conditions.

- 1) Ambient temperature range of -22°F to +149°F
- 2) Relative humidity from 5% to 90% humidity
- 3) Rain and other precipitation up to 3.5 inches/hour

907-666.02.10--Mounting Requirements. The BDS and antenna shall be mounted in accordance with the manufacturers specifications at the location stated in the plans so that it collects data from each travel lane in both directions of travel. Mounting of the antenna shall meet any FCC rules and regulations and include any special permits and licenses given the geographical location. The Contractor shall be responsible for attaining all FCC licenses and permissions.

907-666.02.11--Surge Suppression. Surge Suppression shall be provided to protect the equipment from surges across the BDS power or communications cables. The minimum surge protection requirements include the following.

Surge protectors shall be furnished for all non-dielectric cable and conductors between the BDS or BDS antenna and the equipment cabinet.

The surge protectors shall have leads that are kept to a minimum length as recommended by the surge device manufacturer.

All surge protection devices shall be designed to meet the temperature and humidity requirements expected in this type of outdoor application.

All surge protectors shall be U.L. listed and bonded to the same single-point ground point.

907-666.03--Construction Requirements. All equipment shall be installed according to the manufacturer's recommendations, the plans, and as follows.

The Contractor shall install the BDS or BDS antenna on a pole at the manufacture's recommended height above the road surface so the best sampling rate is achieved.

The Contractor shall provide the Department with a written inventory of items received and the condition in which they were received. Inventory shall be inclusive of make, model, and serial numbers, MAC address, and installation GPS coordinates. All equipment shall be installed according to the manufacturer's recommendations or as directed by the Department.

All equipment and software must be fully functional and pass a Final Inspection by the ITS Manager and Project Engineer before being accepted by the Department

The Contractor is responsible for the installation and configuration of the server and server

software. The Contractor shall provide a fully-functional server integrated into the Department existing ITS management system network that maintains all operational requirements. The server shall meet the Bluetooth Detection System manufacturer's recommendation for hardware requirements, software requirements and network requirements.

907-666.03.1--Testing. The Contractor shall conduct a Project Testing Program as required below. All costs associated with the Project Testing Program shall be included in the overall contract price; no separate payment will be made for any testing.

907-666.03.1.1--General Requirements. The Contractor shall conduct a project testing program for all BDS provided. The project testing program for BDS shall include but is not limited to the following specific requirements.

All test results shall confirm physical and performance compliance with this Section.

Each test shall fully demonstrate that the equipment being tested is clearly and definitely in full compliance with all project requirements.

Contractor shall submit all test results documentation to the Engineer for review within 14 calendar days of completion of the tests.

All tests deemed by the Project Engineer to be unsatisfactorily completed shall be repeated by the Contractor. In the written request for each test occurrence that is a repeat of a previous test, the Contractor shall summarize the diagnosis and correction of each aspect of the previous test. The Contractor shall summarize the diagnosis and correction of each aspect of the previous test that was deemed unsatisfactory. The test procedures for a repeated test occurrence shall meet all the requirements of the original test procedures, including review and approval by the Project Engineer and ITS Manager or designee.

The satisfactory completion of any test shall not relieve the Contractor of responsibility to provide a completely acceptable and operating system that meets all requirements of this project.

907-666.03.1.2--Standalone Acceptance Test (SAT). The Contractor shall perform a complete SAT on all BDS equipment and materials associated with the field device site, including but not limited to electrical service, cabling, etc. A SAT shall be conducted at every field device site with BDS equipment.

The SAT shall demonstrate that all BDS equipment and materials are in full compliance with all Department project requirements and fully functional as installed and in final configuration. The SAT shall demonstrate full compliance with all operational and performance requirements of the project requirements. All SATs also include a visual inspection of the cabinet and all construction elements at the site to ensure they are compliant with the contract documents. The SATs for each site type shall include but are not limited to the following.

- 1) Verify that physical construction has been completed as detailed in the plans.
- 2) Inspect the quality and tightness of ground and surge protector connections.

- 3) Inspect the integrity of all cable connections and terminations and verify that the cables are connected and terminated as specified in the plans.
- 4) Verify proper voltages for all power supplies and related power circuits.
- 5) Verify that the power applied to the BDS meets the power rating stated in the manufacture specifications.
- 6) Verify network connection to the BDS through ping and telnet session from a remote PC.
- 7) Confirm that the system is fully functional, detecting Bluetooth devices at a sample rate approved by the ITS Engineer.

907-666.03.2--Warranty. All warranties and guarantees shall be assigned to the Mississippi Department of Transportation.

The warranty shall be a minimum of one (1) year warranty per BDS, BDS Server, BDS Server software and all other installed and/or attached appurtenances.

The warranty period shall begin upon final acceptance of the BDS system.

During the warranty period, the Contractor shall repair or replace with new or refurbished material, at no additional cost to the State, any product containing a warranty defect, provided the product is returned postage-paid by the Department to the manufacturer's factory or authorized warranty site.

Products repaired or replaced under warranty by the manufacturer shall be returned prepaid by the manufacturer.

During the warranty period, technical support shall be available from the Contractor via telephone within four (4) hours of the time a call is made by the Department, and this support shall be available from factory certified personnel.

During the warranty period, updates and corrections to hardware, software and firmware shall be made available to the Department by the Contractor at no additional cost.

During the warranty period, software updates including bug/ error patches, performance improvements, and firmware shall be made available to the Department by the Contractor at no additional cost to the Department.

907-666.03.3--Maintenance and Technical Support. The supplier shall maintain a sufficient inventory of parts to provide support and maintenance/repair of the Bluetooth Detection System. These parts shall be available for delivery within 30 days of receipt of a purchase order by the supplier at the supplier's then current pricing and terms of sale.

The supplier shall maintain an ongoing program for customer support for the system. This support shall be via telephone, email or personnel sent to the installation upon receipt of a purchase order at the suppliers then current pricing and terms of sale for technical support services.

907-666.04--Method of Measurement. Bluetooth Detection System of the Type specified,

Bluetooth Detection System Server, and Bluetooth Detection System Server Licensing will be measured per each installation as specified in the plans.

907-666.05--Basis of Payment. Bluetooth Detection System, Bluetooth Detection System Server, and Bluetooth Detection System Server Licensing, measured as prescribed above, will be paid for at the contract price per each, which price shall be full compensation for installation, system integration, documentation, training and testing of a complete BDS system site including radio, processor, antenna, system enclosure, solar power, surge protection devices, and all cables between BDS and the cabinet (up to 100'), attachment hardware and brackets, completion of all testing requirements and all work, labor, tools, materials, equipment, incidentals equipment, and appurtenances as required to provide and install a complete BDS system. It shall also include all system documentation including shop drawings, operations and maintenance manuals, wiring diagrams, block diagrams and other materials necessary to document the operation of the BDS.

Payment will be made under:

907-666-A:	Bluetooth Detection System, Type __	- per each
907-666-B:	Bluetooth Detection System Server	- per each
907-666-C:	Bluetooth Detection System Server Licensing	- per each

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-701-1

CODE: (SP)

DATE: 10/23/2018

SUBJECT: Hydraulic Cement

Section 701, Hydraulic Cement, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-701.01--General. In the first sentence of the third paragraph of Subsection 701.01 on page 718, change “mills” to “plants.”

In the second sentence of the seventh paragraph of Subsection 701.01 on pages 718 and 719, change “shall” to “will.”

907-701.02--Portland Cement.

907-701.02.1-General.

907-701.02.1.2--Alkali Content. Delete the sentence in Subsection 701.02.1.2 on page 719, and substitute the following.

The Equivalent alkali content for all cement types in this Subsection shall not exceed 0.60%.

907-701.02.2--Replacement by Other Cementitious Materials. Delete the paragraph in Subsection 701.02.2 on page 719, and substitute the following.

The maximum replacement of cement by weight is 25% for fly ash or 50% for ground granulated blast furnace slag (GGBFS). Replacement contents below 20% for fly ash or 45% for GGBFS may be used, but will not be given any special considerations, such as the maximum acceptance temperature for portland cement concrete containing pozzolans in Subsection 804.02.13.1.5. Special considerations shall only apply for replacement of cement by fly ash or GGBFS.

Delete Subsection 701.02.2.1 on pages 719 and 720, and substitute the following.

907-701.02.2.1--Portland Cement Concrete Exposed to Soluble Sulfate Conditions or Seawater.

When portland cement concrete is exposed to moderate or severe soluble sulfate conditions, or to seawater, cement types and replacement of cement by Class F fly ash or GGBFS shall be as follows in Table 1. Class C fly ash shall not be used as a replacement for cement in any of the sulfate exposure conditions listed in Table 1.

Table 1- Cementitious Materials for Soluble Sulfate Conditions or Seawater

Sulfate Exposure	Water-soluble sulfate (SO ₄) in soil, % by mass	Sulfate (SO ₄) in water, ppm	Cementitious material required
Moderate and Seawater	0.10 - 0.20	150 - 1,500	Type I cement with one of the following replacements of cement by weight: 24.5 - 25.0% Class F fly ash, or 49.5 - 50.0% GGBFS or Type II ^{*,**} cement
Severe	0.20 - 2.00	1,500 - 10,000	Type I cement with a replacement by weight of 49.5 - 50.0% GGBFS, or Type II [*] cement with one of the following replacements of cement by weight: 24.5 - 25.0% Class F fly ash, or 49.5 - 50.0% GGBFS

* Type III cement conforming to AASHTO M85 with a maximum 8% tricalcium aluminate (C₃A) may be used in lieu of Type II cement as allowed in Subsection 701.02.1; this cement is given the designation “Type III(MS).”

** Class F fly ash or GGBFS may be added as a replacement for cement as allowed in Subsection 907-701.02.2.

Delete Subsection 701.02.2.2 on page 720, and substitute the following.

907-701.02.2.2--Portland Cement for Soil Stabilization Exposed to Soluble Sulfate Conditions or Seawater. When portland cement for use in soil stabilization is exposed to moderate or severe soluble sulfate conditions, or to seawater, cement types and replacement of cement by Class F fly ash or GGBFS shall meet the requirements of Subsection 701.02.2.1.

907-701.04--Blended Hydraulic Cement.

907-701.04.1--General. Delete Subsection 701.04.1.1 on page 720, and substitute the following.

907-701.04.1.1--Types of Blended Hydraulic Cement. Blended hydraulic cements (blended cements) shall be of the following types and conform to AASHTO M 240:

- Type IL – Portland-limestone cement
- Type IP – Portland-pozzolan cement
- Type IS – Portland blast-furnace slag cement

Blended cement Types IL, IP, and IS meeting the “MS” sulfate resistance requirement listed in AASHTO M 240, Table 3 shall have the “(MS)” suffix added to the type designation.

907-701.04.1.2--Alkali Content. Delete the sentence in Subsection 701.04.1.2 on page 720, and substitute the following.

All blended cement types shall be made with clinker that would result in cement meeting the requirements of Subsection 701.02.1.2 when used in the production of AASHTO M 85, Type I or Type II cement.

907-701.04.2--Replacement by Other Cementitious Materials. Delete the paragraph in Subsection 701.04.2 on page 720, and substitute the following.

The maximum replacement of blended cement Type IL by weight is 35% for fly ash or 50% for GGBFS. Replacement contents below 20% for fly ash or 45% for GGBFS may be used, but will not be given any special considerations, such as the maximum acceptance temperature for blended cement concrete containing pozzolans in Subsection 804.02.13.1.5. Special considerations shall only apply for replacement of blended cement by fly ash or GGBFS.

No additional cementitious materials, such as portland cement, blended cement, fly ash, GGBFS, or others, shall be added to or as a replacement for blended cement Types IP and IS.

Delete Subsection 701.04.2.1 on pages 720 and 721, and substitute the following.

907-701.04.2.1--Blended Cement Concrete Exposed to Soluble Sulfate Conditions or Seawater. When blended cement concrete is exposed to moderate or severe soluble sulfate conditions, or to seawater, cement types and replacement of cement by Class F fly ash or GGBFS shall be as follows in Table 2. Class C fly ash shall not be used as a replacement for cement in any of the sulfate exposure conditions listed in Table 2.

Table 2- Cementitious Materials for Soluble Sulfate Conditions or Seawater

Sulfate Exposure	Water-soluble sulfate (SO ₄) in soil, % by mass	Sulfate (SO ₄) in water, ppm	Cementitious material required
Moderate and Seawater	0.10 - 0.20	150 - 1,500	Type IL (MS)* cement, Type IL cement with one of the following replacements of cement by weight: 24.5 - 35.0% Class F fly ash, or 49.5 - 50.0% GGBFS, Type IP (MS) cement, or Type IS (MS) cement
Severe	0.20 - 2.00	1,500 - 10,000	Type IL cement with a replacement of cement by weight of 49.5 - 50.0% GGBFS, or Type IL (MS) cement with one of following replacements of cement by weight: 24.5 - 35.0% Class F fly ash, or 49.5 - 50.0% GGBFS

- * Class F fly ash or GGBFS may be added as a replacement for cement as allowed in Subsection 907-701.04.2.

Delete Subsection 701.04.2.2 on page 721, and substitute the following.

907-701.04.2.2--Blended Cement for Soil Stabilization Exposed to Soluble Sulfate Conditions or Seawater. When blended cement for use in soil stabilization is exposed to moderate or severe soluble sulfate conditions, or to seawater, cement types and replacement of cement by Class F fly ash or GGBFS shall meet the requirements of Subsection 701.04.2.1.

Delete Subsection 701.04.3 on page 721.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-702-4

CODE: (IS)

DATE: 09/11/2018

SUBJECT: Bituminous Materials

Section 702, Bituminous Materials, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-702.04--Sampling. Delete the sentence in Subsection 702.04 on page 722, and substitute the following.

Sampling of bituminous materials shall be as set out in AASHTO R 66.

907-702.07--Emulsified Asphalt. Delete the last sentence in Subsection 702.07 on page 724, and substitute the following.

Asphalt for fog seal shall conform to the requirements of Subsection 907-702.12, Table V.

907-702.12--Tables. Delete Table V in Subsection 702.12 on page 729, and substitute the following.

**TABLE V
SPECIFICATION FOR FOG SEAL**

Test Requirements	LD-7		CHPF-1		Test Method
	Min.	Max.	Min.	Max.	
Viscosity, Saybolt Furol, @ 25°C, Sec.	10	100	-	100	AASHTO T 72
Storage Stability Test, 24 hr, %	-	1	-	1	AASHTO T 59
Settlement, 5 day, %	-	5	-	-	AASHTO T 59
Oil Distillate, %	-	1	-	-	AASHTO T 59
Sieve Test, % *	-	0.3	-	0.1	AASHTO T 59
Residue by Distillation, %	40	-	40	-	AASHTO T 59
Test on Residue from Distillation					
Penetration @ 25°C, 100g, 5 sec	-	20	40	90	AASHTO T 49
Softening Point, °C	65	-	-	-	ASTM D 36
Solubility in trichloroethylene, %	97.5	-	-	-	AASHTO T 44
Elastic Recovery @ 25°C, %	-	-	40	-	AASHTO T 301
Original DSR @ 82° (G*/Sinδ, 10 rad/sec)	1	-	-	-	AASHTO T 111

* The Sieve Test result is tested for reporting purposes only and may be waived if no application problems are present in the field.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-703-1

CODE: (IS)

DATE: 06/13/2018

SUBJECT: Gradation

Section 703, Aggregates, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-703.03--Course Aggregates for Hydraulic Cement Concrete.

907-703.03.2--Detail Requirements.

907-703.03.2.4--Gradation. In the table in Subsection 703.03.2.4 on page 734, add 100 for the percent passing by weight on the 1½-inch sieve for Size No. 67 aggregates.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-705-1

CODE: (IS)

DATE: 06/13/2018

SUBJECT: Stone Riprap

Section 705, Stone Blanket Protection and Filter Blanket Materials, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-705.04--Stone Riprap. Delete the last sentence of the first paragraph of Subsection 705.04 on page 750, and substitute the following.

Quality requirements for rock to be furnished under these specifications will come from a pre-approved source and be visually approved prior to use.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-707-2

CODE: (SP)

DATE: 06/05/2019

SUBJECT: Joint Materials

Section 707, Joint Materials, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-707.02.3--Wood. Delete paragraph (b) of Subsection 707.02.3 on page 755, and substitute the following:

- (b) Dimensions shall be as shown on the plans. Dimensions shown on the plans are “dressed” sizes in accordance with Table 3 of the American Softwood Lumber Standard, SP-20. At the discretion of the Engineer, a 3/4-inch dressed board may be used in lieu of a 1-inch dressed board. A tolerance of plus or minus 1/16 inch thickness and plus or minus 1/8 inch width will be permitted. For slip-form paving a tolerance of minus 1/4 inch on each end in length will be permitted.

907-707.06--Flexible Plastic Gasket for Joining Conduit. Delete the third paragraph of Subsection 707.06 on page 756, and substitute the following.

The Department may require the performance test described in ASTM C 990.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-711-2

CODE: (IS)

DATE: 09/11/2018

SUBJECT: Plain Steel Wire

Section 711, Reinforcement and Wire Rope, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-711.02--Deformed and Plain Carbon-Steel Bars for Concrete Reinforcing.

907-711.02.3--Steel Welded and Non-Welded Wire Reinforcement, Plain and Deformed, for Concrete.

907-711.02.3.1--Plain Steel Wire. Delete the sentence in Subsection 711.02.3.1 on pages 780 and 781, and substitute the following.

Plain steel wire and plain steel welded wire shall conform to the requirements of AASHTO M 336.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-720-2

CODE: (IS)

DATE: 09/11/2018

SUBJECT: Acceptance Procedure for Glass Beads

Section 720, Pavement Marking Materials, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-720.01--Glass Beads.

907-720.01.4--Acceptance Procedures. Delete the last sentence of the paragraph in Subsection 720.01.4 on page 841, and substitute the following.

Acceptance sampling and testing of glass beads will be in accordance with the Department's Materials Division Inspection, Testing, and Certification Manual, Section 2.9.2 -- Glass Beads.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-722-1

CODE: (IS)

DATE: 11/15/2017

SUBJECT: **Materials for Traffic Signal Installation**

Section 722, Materials for Traffic Signal Installation, of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follow.

907-722.02.3--Design Strength Requirements. Delete Subsection 722.02.3 on pages 864 thru 866, and substitute the following.

Unless specified otherwise in the plans, poles shall meet the requirements of the AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals*, as specified in the plans with all interim supplements. All components of the assemblies shall be designed to the following:

- Importance Factor: 1.0; 50 year mean recurrence interval
- Basic Wind Speed (3 second gust): As shown on the project plans
- Minimum Gust Effect Factor: 1.14
- Fatigue Category: II
- Ice Loading: As shown on the project plans
- Natural Wind Gust Pressure Loads: Included
- Truck Induced Gust Pressure Loads: Not included
- Galloping: Not included

907-722.02.5--Mast Arms for Traffic Signal and Equipment Poles. Delete the first four sentences of the third paragraph of Subsection 722.02.5 on page 867, and substitute the following.

Anchor base plates must meet the minimum requirements of ASTM A36 or ASTM A709 Grade 36 or ASTM A572 Grade 50 and must be welded to the shaft by either telescoped with two continuous arc welds or by back up ring using full penetration welds.. Flange plate shall telescope the large end of the arm and be welded by either two (2) continuous arc welds, one (1) being on the outside of the plate, adjacent to the shaft, and the other one (1) on the inside at the end of the tubular cross section or by back up ring using full penetration welds. The thru-bolt flange plate or tapped flange plate supporting the mast arm shall be welded to the pole near the top and supported side plate tangent to the pole and gusset plates both top and bottom. The thru-bolt or tapped flange plate must be sufficient to develop the full capacity of the connecting bolts.

907-722.03--Electric Cable. Delete the paragraphs for Loop Detector Wire and Loop Detector Lead-in Cable in Subsection 722.03 on page 869.

Delete the first sentence of “Communication Cable” in Subsection 722.03 on page 870, and substitute the following.

Communication cables shall be as per the manufacturer's recommendation.

907-722.05.4--Type III or Type IV Rigid Non-Metallic Conduit. After the last sentence of Subsection 722.05.4 on page 871, add the following.

Schedule 40 conduit shall be used unless otherwise noted in the plans.

Delete the title of Subsection 722.13.3 on page 876, and substitute the following.

907-722.13.3--Power Service Pedestal.

Delete the first paragraph of Subsection 722.13.3 on page 876, and substitute the following.

The pedestal shall be of NEMA Type 3R rainproof construction and shall be UL Listed as "Enclosed Industrial Control Equipment" (UL 508A). External construction shall comply with UL50 requirements and shall be unpainted aluminum.

Nominal size of the pedestal shall be 48"H x 16"W x 16"D.

Pedestal shall have a voltage rating or 120v/240v single phase with an Amperage rating of 800A.

After the first sentence of the seventh paragraph of Subsection 722.13.3 on page 876, add the following.

An outdoor rated heavy duty combination lock shall be provided to lock the customer compartment door.

907-722.14.1.3--Optical System. Delete the sixteenth paragraph of Subsection 722.14.1.3 on page 879, and substitute the following.

The signal module on-board circuitry shall include voltage surge protection to withstand high-repetition noise transients and low-repetition high-energy transients as stated in Section 2.1.6, NEMA Standard TS 2, 1992.

Delete the last sentence of the seventeenth paragraph of Subsection 722.14.1.3 on page 879, and substitute the following.

Load switches shall be compatible with NEMA TS 1 or later, or Model 170-1989 or later.

Delete Subsection 722.14.5 on page 882, and substitute the following.

907-722.14.5--Blank.

Delete Subsections 722.14.7 and 722.14.8 on page 882.

SECTION 905 - PROPOSAL

Date _____

Mississippi Transportation Commission
Jackson, Mississippi

Sirs: The following proposal is made on behalf of _____
_____ of _____

for constructing the following designated project(s) within the time(s) hereinafter specified.

The plans are composed of drawings and blue prints on file in the offices of the Mississippi Department of Transportation, Jackson, Mississippi.

The Specifications are the current Standard Specifications of the Mississippi Department of Transportation approved by the Federal Highway Administration, except where superseded or amended by the plans, Special Provisions and Notice(s) to Bidders attached hereto and made a part thereof.

I (We) certify that I (we) possess a copy of said Standard and any Supplemental Specifications.

Evidence of my (our) authority to submit the Proposal is hereby furnished. The proposal is made without collusion on the part of any person, firm or corporation. I (We) certify that I (we) have carefully examined the Plans, the Specifications, including the Special Provisions and Notice(s) to Bidders, herein, and have personally examined the site of the work. On the basis of the Specifications, Special Provisions, Notice(s) to Bidders, and Plans, I (we) propose to furnish all necessary machinery, tools, apparatus and other means of construction and do all the work and furnish all the materials in the manner specified. I (We) understand that the quantities mentioned herein are approximate only and are subject to either increase or decrease, and hereby propose to perform any increased or decreased quantities of work at the unit prices bid, in accordance with the above.

I (We) acknowledge that this proposal will be found irregular and/or non-responsive unless a certified check, cashier's check, or Proposal Guaranty Bond in the amount as required in the Advertisement (or, by law) is submitted electronically with the proposal or is delivered to the Contract Administration Engineer prior to the bid opening time specified in the advertisement.

INSTRUCTION TO BIDDERS: Alternate and Optional Items on Bid Schedule.

1. Two or more items entered opposite a single unit quantity WITHOUT DEFINITE DESIGNATION AS "ALTERNATE ITEMS" are considered as "OPTIONAL ITEMS". Bidders may or may not indicate on bids the Optional Item proposed to be furnished or performed WITHOUT PREJUDICE IN REGARD TO IRREGULARITY OF BIDS.
2. Items classified on the bid schedule as "ALTERNATE ITEMS" and/or "ALTERNATE TYPES OF CONSTRUCTION" must be preselected and indicated on bids. However, "Alternate Types of Construction" may include Optional Items to be treated as set out in Paragraph 1, above.
3. Optional items not preselected and indicated on the bid schedule MUST be designated in accordance with Subsection 102.06 prior to or at the time of execution of the contract.
4. Optional and Alternate items designated must be used throughout the project.

I (We) further propose to perform all "force account or extra work" that may be required of me (us) on the basis provided in the Specifications and to give such work my (our) personal attention in order to see that it is economically performed.

I (We) further propose to execute the attached contract agreement (Section 902) as soon as the work is awarded to me (us), and to begin and complete the work within the time limit(s) provided for in the Specifications and Advertisement. I (We) also propose to execute the attached contract bond (Section 903) in an amount not less than one hundred (100) percent of the total of my (our) part, but also to guarantee the excellence of both workmanship and materials until the work is finally accepted.

I (We) shall submit electronically with our proposal or deliver prior to the bid opening time a certified check, cashier's check or bid bond for **five percent (5%) of total bid** and hereby agree that in case of my (our) failure to execute the contract and furnish bond within Ten (10) days after notice of award, the amount of this check (bid bond) will be forfeited to the State of Mississippi as liquidated damages arising out of my (our) failure to execute the contract as proposed. It is understood that in case I am (we are) not awarded the work, the check will be returned as provided in the Specifications.

SECTION 905 -- PROPOSAL (CONTINUED)

I (We) hereby certify by digital signature and electronic submission via Bid Express of the Section 905 proposal below, that all certifications, disclosures and affidavits incorporated herein are deemed to be duly executed in the aggregate, fully enforceable and binding upon delivery of the bid proposal. I (We) further acknowledge that this certification shall not extend to the bid bond or alternate security which must be separately executed for the benefit of the Commission. This signature does not cure deficiencies in any required certifications, disclosures and/or affidavits. I (We) also acknowledge the right of the Commission to require full and final execution on any certification, disclosure or affidavit contained in the proposal at the Commission's election upon award. Failure to so execute at the Commission's request within the time allowed in the Standard Specifications for execution of all contract documents will result in forfeiture of the bid bond or alternate security.

Respectfully Submitted,

DATE _____

Contractor

BY _____
Signature

TITLE _____

ADDRESS _____

CITY, STATE, ZIP _____

PHONE _____

FAX _____

E-MAIL _____

(To be filled in if a corporation)

Our corporation is chartered under the Laws of the State of _____ and the names, titles and business addresses of the executives are as follows:

President Address

Secretary Address

Treasurer Address

The following is my (our) itemized proposal.

Traffic Signal Improvements on US 82 & SR 1 in Greenville, known as Federal Aid Project No. HSIP-0099-01(010) / 107573301 in Washington County.

Line no.	Item Code	Adj Code	Quantity	Units	Description[Fixed Unit Price]
Roadway Items					
0010	202-B174		5	Each	Removal of Light and Foundation
0020	202-B215		389	Each	Removal of Sign Including Post & Footing
0030	202-B240		100	Linear Feet	Removal of Traffic Stripe
0040	601-B001	(S)	29	Cubic Yard	Class "B" Structural Concrete, Minor Structures
0050	618-A001		1	Lump Sum	Maintenance of Traffic
0060	618-B001		1	Square Feet	Additional Construction Signs (\$10.00)
0070	620-A001		1	Lump Sum	Mobilization
0080	626-A001		13	Mile	6" Thermoplastic Double Drop Traffic Stripe, Skip White
0090	626-B002		1	Mile	6" Thermoplastic Double Drop Traffic Stripe, Continuous White
0100	626-C002		11	Mile	6" Thermoplastic Double Drop Edge Stripe, Continuous White
0110	626-D001		1	Mile	6" Thermoplastic Double Drop Traffic Stripe, Skip Yellow
0120	626-E001		16	Mile	6" Thermoplastic Double Drop Traffic Stripe, Continuous Yellow
0130	626-G004		50,924	Linear Feet	Thermoplastic Double Drop Detail Stripe, White
0140	626-G005		27,426	Linear Feet	Thermoplastic Double Drop Detail Stripe, Yellow
0150	626-H001		6,000	Square Feet	Thermoplastic Double Drop Legend, White
0160	626-H002		16,870	Linear Feet	Thermoplastic Double Drop Legend, White
0170	627-J001		673	Each	Two-Way Clear Reflective High Performance Raised Markers
0180	627-K001		2,017	Each	Red-Clear Reflective High Performance Raised Markers
0190	627-L001		2,478	Each	Two-Way Yellow Reflective High Performance Raised Markers
0200	630-A001		1,110	Square Feet	Standard Roadside Signs, Sheet Aluminum, 0.080" Thickness
0210	630-A003		1,480	Square Feet	Standard Roadside Signs, Sheet Aluminum, 0.125" Thickness
0220	630-A005		2,455	Square Feet	Standard Roadside Signs, Sheet Aluminum, 0.1" Thickness
0230	630-B002		920	Square Feet	Interstate Directional Signs, Bolted Extruded Aluminum Panels, Ground Mounted
0240	630-C001		1,852	Linear Feet	Square Tube Posts, 4.0 lb/ft
0250	630-C004		218	Linear Feet	Square Tube Posts, 9.0 lb/ft
0260	630-C005		3,536	Linear Feet	Square Tube Posts, 2.0 lb/ft
0270	630-C1001		200	Linear Feet	Square Post Inner Sleeve
0280	630-D007		60	Linear Feet	Structural Steel Beams, W6 x 15
0290	630-D008		15	Linear Feet	Structural Steel Beams, W6 x 9
0300	630-E002		179	Pounds	Structural Steel Angles & Bars, 3" x 3" x 1/4" Angles
0310	630-E004		2,714	Pounds	Structural Steel Angles & Bars, 7/16" x 2 1/2" Flat Bar
0320	635-A059		178	Each	Traffic Signal Head, Type 1
0330	635-A065		54	Each	Traffic Signal Head, Type 2 FYA
0340	635-A070		11	Each	Traffic Signal Head, Type 3
0350	635-A073		3	Each	Traffic Signal Head, Type 4

Line no.	Item Code	Adj Code	Quantity	Units	Description Fixed Unit Price
0360	635-A076		44	Each	Traffic Signal Head, Type 6
0370	638-A003		5	Each	Flashing Assembly, Be Prepared to Stop When Flashing
0380	647-A001		1	Lump Sum	Removal of Existing Traffic Signal Equipment
0390	660-A003		3	Each	Equipment Cabinet, Type B
0400	660-A004		1	Each	Equipment Cabinet, Type C
0410	660-B001		1	Each	Cabinet Modifications
0420	907-619-E3001		2	Each	Changeable Message Sign
0430	907-632-A004		5	Each	Solid State Traffic Cabinet Assembly, Type II Cabinet, Type 1 Controller
0440	907-632-A007		18	Each	Solid State Traffic Cabinet Assembly, Type III Cabinet, Type 1 Controller
0450	907-632-A010		1	Each	Solid State Traffic Cabinet Assembly, Type IV Cabinet, Type 1 Controller
0460	907-632-J001		8	Each	Power Service Pedestal
0470	907-633-A001		1	Each	Uninterruptable Power Supply
0480	907-634-A003		8	Each	Traffic Signal Equipment Pole, Type 1, 35' Shaft
0490	907-634-A548		23	Each	Traffic Signal Equipment Pole, Type VII, 5'6" Shaft
0500	907-634-B001		3	Each	Traffic Signal Equipment Pole Shaft Extension, 10'
0510	907-634-PP001		8	Each	Luminaire Fixture and Arm, Per Plans
0520	907-636-B005		180	Linear Feet	Electric Cable, Underground in Conduit, IMSA 20-1, AWG 12, 2 Conductor
0530	907-636-B014		3,825	Linear Feet	Electric Cable, Underground in Conduit, IMSA 20-1, AWG 14, 5 Conductor
0540	907-636-B016		955	Linear Feet	Electric Cable, Underground in Conduit, IMSA 20-1, AWG 14, 8 Conductor
0550	907-636-B053		400	Linear Feet	Electric Cable, Underground in Conduit, THHN, AWG #6, 3 Conductor
0560	907-636-C002		976	Linear Feet	Electric Cable, Aerial Supported, IMSA 20-1, AWG 12, 2 Conductor
0570	907-636-C007		4,222	Linear Feet	Electric Cable, Aerial Supported, IMSA 20-1, AWG 14, 5 Conductor
0580	907-636-C009		10,751	Linear Feet	Electric Cable, Aerial Supported, IMSA 20-1, AWG 14, 8 Conductor
0590	907-636-D002		344	Linear Feet	Electric Cable, Aerial Supported in Conduit, IMSA 20-1, AWG 12, 2 Conductor
0600	907-636-D006		2,455	Linear Feet	Electric Cable, Aerial Supported in Conduit, IMSA 20-1, AWG 14, 5 Conductor
0610	907-636-D008		2,788	Linear Feet	Electric Cable, Aerial Supported in Conduit, IMSA 20-1, AWG 14, 8 Conductor
0620	907-637-A002		24	Each	Pullbox Enclosure, Type 2
0630	907-637-A003		1	Each	Pullbox Enclosure, Type 3
0640	907-637-A004		59	Each	Pullbox Enclosure, Type 4
0650	907-637-A005		59	Each	Pullbox Enclosure, Type 5
0660	907-637-C028		1,330	Linear Feet	Traffic Signal Conduit, Underground, Type 4, 2"
0670	907-637-D002		2,810	Linear Feet	Traffic Signal Conduit, Underground Drilled or Jacked, Rolled Pipe, 2"

Line no.	Item Code	Adj Code	Quantity	Units	Description[Fixed Unit Price]
0680	907-637-I001		90,015	Linear Feet	Traffic Signal Conduit Bank, Underground, Drilled or Jacked, Rolled Pipe, 2 @ 2"
0690	907-641-A002		92	Each	Signal Stop Bar Radar Vehicle Detection Sensor, Type 2
0700	907-641-B002		50	Each	Signal Advanced Radar Vehicle Detection Sensor, Type 2
0710	907-641-D001		20,479	Linear Feet	Radar Vehicle Detection Cable
0720	907-645-B001		44	Each	Accessible Pedestrian Detection Assembly
0730	907-650-A002		9	Each	On Street Video Equipment, Fixed Type
0740	907-650-A003		7	Each	On Street Video Equipment, PTZ Type
0750	907-653-B001		848	Square Feet	Street Name Sign
0760	907-659-A001		1	Lump Sum	Traffic Management Center Modifications
0770	907-661-A004		90,015	Linear Feet	Fiber Optic Cable, 72 SM
0780	907-661-B002		1,565	Linear Feet	Fiber Optic Drop Cable, 12 SM
0790	907-663-A001		25	Each	Network Switch, Type A
0800	907-663-A005		2	Each	Network Switch, Type E
0810	907-663-D001		2,052	Linear Feet	Category 6 Cable, Installed in Conduit
0820	907-666-A001		7	Each	Bluetooth Detection System, Type A

SECTION 905 - COMBINATION BID PROPOSAL (Continued)

CONDITIONS FOR COMBINATION BID

If a bidder elects to submit a combined bid for two or more of the contracts listed for this month's letting, the bidder must complete and execute these sheets of the proposal in each of the individual proposals to constitute a combination bid. In addition to this requirement, each individual contract shall be completed, executed and submitted in the usual specified manner.

Failure to execute this Combination Bid Proposal in each of the contracts combined will be just cause for each proposal to be received and evaluated as a separate bid.

It is understood that the Mississippi Transportation Commission not only reserves the right to reject any and all proposals, but also the right to award contracts upon the basis of lowest separate bids or combination bids most advantageous to the State.

It is further understood and agreed that the Combination Bid Proposal is for comparison of bids only and that each contract shall operate in every respect as a separate contract in accordance with its proposal and contract documents.

I (We) agree to complete each contract on or before its specified completion date.

COMBINATION BID PROPOSAL

This proposal is tendered as one part of a Combination Bid Proposal utilizing option ___* of Subsection 102.11 on the following contracts:

* Option to be shown as either (a), (b), or (c).

	<u>Project No.</u>	<u>County</u>	<u>Project No.</u>	<u>County</u>
1.	_____	_____	6.	_____
2.	_____	_____	7.	_____
3.	_____	_____	8.	_____
4.	_____	_____	9.	_____
5.	_____	_____	10.	_____

(a) If Combination A has been selected, your Combination Bid is complete.

(b) If Combination B has been selected, then complete the following page.

SECTION 905 - COMBINATION BID PROPOSAL (Continued)

Project Number	Pay Item Number	Unit	Unit Price Reduction	Total Item Reduction	Total Contract Reduction
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					

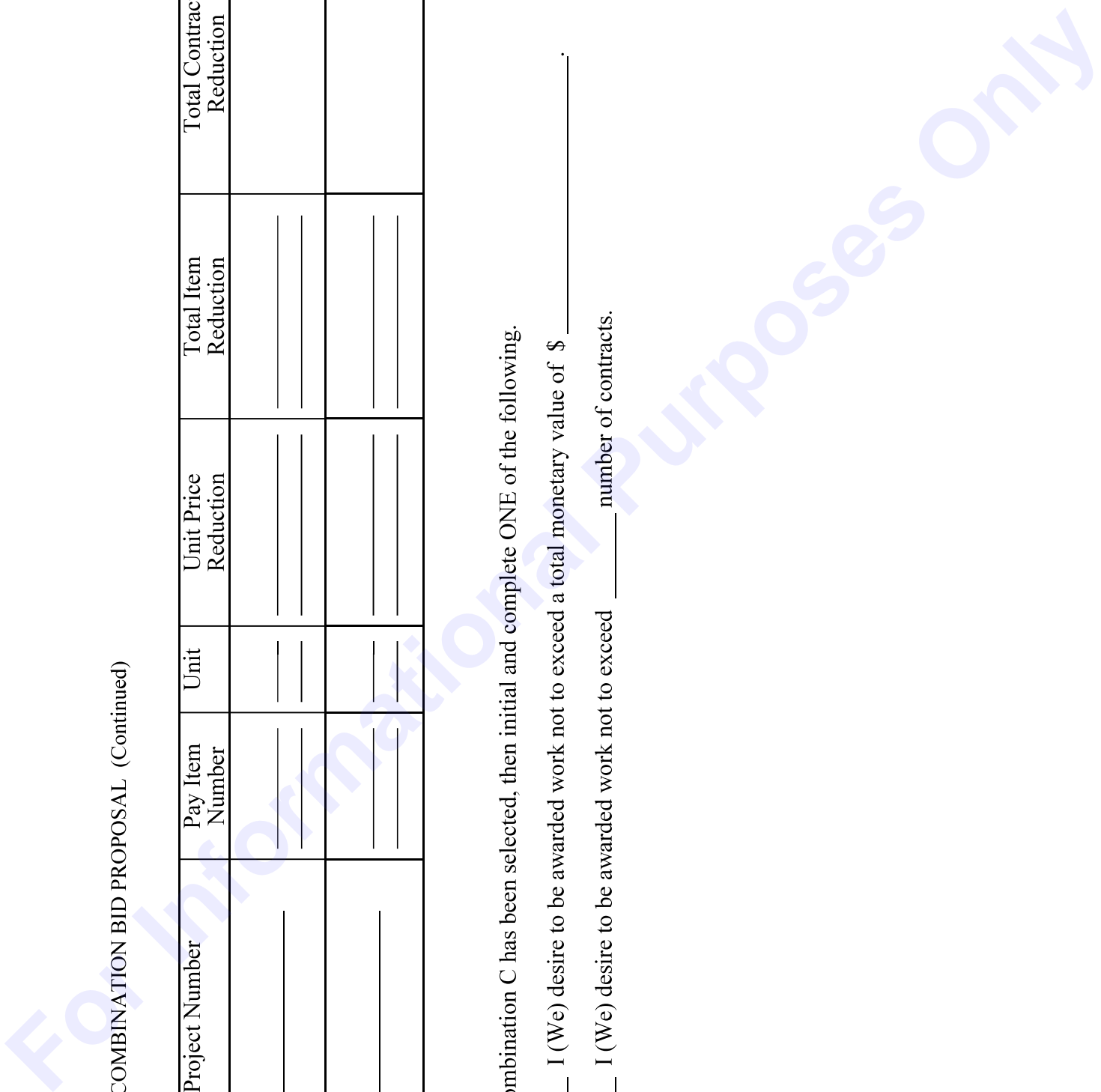
For Informational Purposes Only

SECTION 905 - COMBINATION BID PROPOSAL (Continued)

Project Number	Pay Item Number	Unit	Unit Price Reduction	Total Item Reduction	Total Contract Reduction
9.					
10.					

(c) If Combination C has been selected, then initial and complete ONE of the following.

- _____ I (We) desire to be awarded work not to exceed a total monetary value of \$ _____.
- _____ I (We) desire to be awarded work not to exceed _____ number of contracts.



**Certification with regard to the Performance of Previous
Contracts or Subcontracts subject to the Equal Opportunity
Clause and the filing of Required Reports**

The Bidder hereby certifies that he has _____, has not _____, participated in a previous contract or subcontract subject to the Equal Opportunity Clause, as required by Executive Orders 10925, 11114, or 11246, and that he has _____, has not _____, filed with the Joint Reporting Committee, the Director of the Office of Federal Contract Compliance, a Federal Government contracting or administering agency, or the former President's Committee on Equal Employment Opportunity, all reports due under the applicable filing requirements.

(COMPANY)

DATE: _____

NOTE: The above certification is required by the Equal Employment Opportunity Regulations of the Secretary of Labor (41 CFR 60-1.7 (b) (1)), and must be submitted by bidders and proposed subcontractors only in connection with contracts and subcontracts which are subject to the Equal Opportunity Clause. Contracts and Subcontracts which are exempt from the Equal Opportunity Clause are set forth in 41 CFR 60-1.5. (Generally only contracts or subcontracts of \$10,000 or under are exempt.)

Currently, Standard Form 100 (EEO-1) is the only report required by the Executive Orders or their implementing regulations.

Proposed prime Contractors and Subcontractors who have participated in a previous contract or subcontract subject to the Executive orders and have not filed the required reports should note that 41 CFR 60-1.7 (b) (1) prevents the award of contracts and subcontracts unless such Contractors submit a report covering the delinquent period or such other period specified by the Federal Highway Administration or by the Director, Office of Federal Contract Compliance, U. S. Department of Labor.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION
CERTIFICATION

I, _____,
(Name of person signing bid)

individually, and in my capacity as _____ of
(Title of person signing bid)

_____ do hereby certify under
(Name of Firm, partnership, or Corporation)

penalty of perjury under the laws of the United States and the State of Mississippi that _____

_____, Bidder
(Name of Firm, Partnership, or Corporation)

on Project No. **HSIP-0099-01(010)/ 107573301000**

in **Washington** County(ies), Mississippi, has not either

directly or indirectly entered into any agreement, participated in any collusion; or otherwise taken any action in restraint of free competitive bidding in connection with this contract; nor have any of its corporate officers or principal owners.

Except as noted hereafter, it is further certified that said legal entity and its corporate officers, principal owners, managers, auditors and others in a position of administering federal funds:

- a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;
- b) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
- c) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in (b) above; and
- d) Have not within a three-year period preceding this application/ proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

Do exceptions exist and are made a part thereof? Yes / No

Any exceptions shall address to whom it applies, initiating agency and dates of such action.

Note: Exceptions will not necessarily result in denial of award but will be considered in determining bidder responsibility. Providing false information may result in criminal prosecution or administrative sanctions.

The bidder further certifies that the certification requirements contained in Section XI of Form FHWA 1273, will be or have been included in all subcontracts, material supply agreements, purchase orders, etc. except those procurement contracts for goods or services that are expected to be less than the Federal procurement small purchase threshold fixed at 10 U.S.C. 2304(g) and 41 U.S.C. 253(g) (currently \$25,000) which are excluded from the certification requirements.

The bidder further certifies, to the best of his or her knowledge and belief, that:

1) No Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this contract, Standard Form-LLL, Disclosure Form to Report Lobbying, in accordance with its instructions will be completed and submitted.

The certification contained in (1) and (2) above is a material representation of fact upon which reliance is placed and a prerequisite imposed by Section 1352, Title 31, U.S. Code prior to entering into this contract. Failure to comply shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000. The bidder shall include the language of the certification in all subcontracts exceeding \$100,000 and all subcontractors shall certify and disclose accordingly.

All of the foregoing is true and correct.

Executed on _____

Signature

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SAM.GOV Registration and DUNS Number

Bidders are advised that the Prime Contractor must maintain current registration in the **System for Award Management** (<http://www.sam.gov>) at all times during the project. A Dun and Bradstreet Data Universal Numbering System (DUNS) Number (<http://www.dnb.com>) is one of the requirements for registration in the System for Award Management.

Bidders are advised that prior to the award of this contract, they **MUST** be registered in the System for Award Management.

I (We) acknowledge that this contract cannot be awarded if I (We) are not registered in the System for Award Management prior to the award of this contract. _____ (Yes / No)

I (We) have a DUNS Number . _____ (Yes / No)

DUNS Number: _____

Company Name: _____

Company e-mail address: _____

(6/2015F)

For Informational Purposes Only

SECTION 902

CONTRACT FOR HSIP-0099-01(010)/ 107573301000

LOCATED IN THE COUNTY(IES) OF Washington

STATE OF MISSISSIPPI,
COUNTY OF HINDS

This contract entered into by and between the Mississippi Transportation Commission on one hand, and the undersigned contractor, on the other witnesseth;

That, in consideration of the payment by the Mississippi Transportation Commission of the prices set out in the proposal hereto attached, to the undersigned contractor, such payment to be made in the manner and at the time of times specified in the specifications and the special provisions, if any, the undersigned contractor hereby agrees to accept the prices stated in the proposal in full compensation for the furnishing of all materials and equipment and the executing of all the work contemplated in this contract.

It is understood and agreed that the advertising according to law, the Advertisement, the instructions to bidders, the proposal for the contract, the specifications, the revisions of the specifications, the special provisions, and also the plans for the work herein contemplated, said plans showing more particularly the details of the work to be done, shall be held to be, and are hereby made a part of this contract by specific reference thereto and with like effect as if each and all of said instruments had been set out fully herein in words and figures.

It is further agreed that for the same consideration the undersigned contractor shall be responsible for all loss or damage arising out of the nature of the work aforesaid; or from the action of the elements and unforeseen obstructions or difficulties which may be encountered in the prosecution of the same and for all risks of every description connected with the work, exceptions being those specifically set out in the contract; and for faithfully completing the whole work in good and workmanlike manner according to the approved Plans, Specifications, Special Provisions, Notice(s) to Bidders and requirements of the Mississippi Department of Transportation.

It is further agreed that the work shall be done under the direct supervision and to the complete satisfaction of the Executive Director of the Mississippi Department of Transportation, or his authorized representatives, and when Federal Funds are involved subject to inspection at all times and approval by the Federal Highway Administration, or its agents as the case may be, or the agents of any other Agency whose funds are involved in accordance with those Acts of the Legislature of the State of Mississippi approved by the Governor and such rules and regulations issued pursuant thereto by the Mississippi Transportation Commission and the authorized Federal Agencies.

The Contractor agrees that all labor as outlined in the Special Provisions may be secured from list furnished by

It is agreed and understood that each and every provision of law and clause required by law to be inserted in this contract shall be deemed to be inserted herein and this contract shall be read and enforced as though it were included herein, and, if through mere mistake or otherwise any such provision is not inserted, then upon the application of either party hereto, the contract shall forthwith be physically amended to make such insertion.

The Contractor agrees that he has read each and every clause of this Contract, and fully understands the meaning of same and that he will comply with all the terms, covenants and agreements therein set forth.

Witness our signatures this the ___ day of _____, _____.

Contractor(s)

By _____

MISSISSIPPI TRANSPORTATION COMMISSION

Title _____

By _____

Signed and sealed in the presence of:
(names and addresses of witnesses)

Executive Director

Secretary to the Commission

Award authorized by the Mississippi Transportation Commission in session on the ___ day of _____, _____, Minute Book No. _____, Page No. _____.

Revised 8/06/2003

SECTION 903
PERFORMANCE AND PAYMENT BOND

CONTRACT BOND FOR: HSIP-0099-01(010)/107573301000

LOCATED IN THE COUNTY(IES) OF: Washington

STATE OF MISSISSIPPI,
COUNTY OF HINDS

Know all men by these presents: that we, _____

(Contractor)

Principal, a _____

residing at _____ in the State of _____

and _____

(Surety)
residing at _____ in the State of _____,

authorized to do business in the State of Mississippi, under the laws thereof, as surety, effective as of the contract date

shown below, are held and firmly bound unto the State of Mississippi in the sum of _____

_____ Dollars, lawful money of the United States of America, to be paid to it for which payment well and truly to be made, we bind ourselves, our heirs, administrators, successors, or assigns jointly and severally by these presents.

The conditions of this bond are such, that whereas the said _____

principal, has (have) entered into a contract with the Mississippi Transportation Commission, bearing the date of

_____ day of _____ A.D. _____ hereto annexed, for the construction of certain projects(s) in

the State of Mississippi as mentioned in said contract in accordance with the Contract Documents therefor, on file in the

offices of the Mississippi Department of Transportation, Jackson, Mississippi.

Now therefore, if the above bounden _____

in all things shall stand to and abide by and well and truly observe, do keep and perform all and singular the terms, covenants, conditions, guarantees and agreements in said contract, contained on his (their) part to be observed, done, kept and performed and each of them, at the time and in the manner and form and furnish all of the material and equipment specified in said contract in strict accordance with the terms of said contract which said plans, specifications and special provisions are included in and form a part of said contract and shall maintain the said work contemplated until its final completion and acceptance as specified in Subsection 109.11 of the approved specifications, and save harmless said Mississippi Transportation Commission from any loss or damage arising out of or occasioned by the negligence, wrongful or criminal act, overcharge, fraud, or any other loss or damage whatsoever, on the part of said principal (s), his (their) agents, servants, or employees in the performance of said work or in any manner connected therewith, and shall be liable and responsible in a civil action instituted by the State at the instance of the Mississippi Transportation Commission or any officer of the State authorized in such cases, for double any amount in money or property, the State may lose or be overcharged or otherwise defrauded of, by reason of wrongful or criminal act, if any, of the Contractor(s), his (their) agents or employees, and shall promptly pay the said agents, servants and employees and all persons furnishing labor, material, equipment or supplies therefor, including premiums incurred, for Surety Bonds, Liability Insurance, and Workmen's Compensation Insurance; with the additional obligation that such Contractor shall promptly make payment of all taxes, licenses, assessments, contributions, damages,

any liquidated damages which may arise prior to any termination of said principal's contract, any liquidated damages which may arise after termination of the said principal's contract due to default on the part of said principal, penalties and interest thereon, when and as the same may be due this state, or any county, municipality, board, department, commission or political subdivision: in the course of the performance of said work and in accordance with Sections 31-5-51 et seq. Mississippi Code of 1972, and other State statutes applicable thereto, and shall carry out to the letter and to the satisfaction of the Executive Director of the Mississippi Department of Transportation, all, each and every one of the stipulations, obligations, conditions, covenants and agreements and terms of said contract in accordance with the terms thereof and all of the expense and cost and attorney's fee that may be incurred in the enforcement of the performance of said contract, or in the enforcement of the conditions and obligations of this bond, then this obligation shall be null and void, otherwise to be and remain in full force and virtue.

_____	_____
(Contractors) Principal	Surety
By _____	By _____
	(Signature) Attorney in Fact
	Address _____

Title _____	_____
(Contractor's Seal)	(Printed) MS Agent

	(Signature) MS Agent
	Address _____

	(Surety Seal)

	Mississippi Insurance ID Number



BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we _____
Contractor

Address

City, State ZIP

As principal, hereinafter called the Principal, and _____
Surety

a corporation duly organized under the laws of the state of _____

as Surety, hereinafter called the Surety, are held and firmly bound unto **State of Mississippi, Jackson, Mississippi**

As Obligee, hereinafter called Obligee, in the sum of **Five Per Cent (5%) of Amount Bid**

Dollars(\$ _____)

for the payment of which sum will and truly to be made, the said Principal and said Surety, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has submitted a bid for **Traffic Signal Improvements on US 82 & SR 1 in Greenville, known as Federal Aid Project No. HSIP-0099-01(010) / 107573301 in Washington County.**

NOW THEREFORE, the condition of this obligation is such that if the aforesaid Principal shall be awarded the contract, the said Principal will, within the time required, enter into a formal contract and give a good and sufficient bond to secure the performance of the terms and conditions of the contract, then this obligation to be void; otherwise the Principal and Surety will pay unto the Obligee the difference in money between the amount of the bid of the said Principal and the amount for which the Obligee legally contracts with another party to perform the work if the latter amount be in excess of the former, but in no event shall liability hereunder exceed the penal sum hereof.

Signed and sealed this _____ day of _____, 20__

(Principal) (Seal)

(Witness)

By: _____
(Name) (Title)

(Surety) (Seal)

(Witness)

By: _____
(Attorney-in-Fact)

(MS Agent)

Mississippi Insurance ID Number

MISSISSIPPI DEPARTMENT OF TRANSPORTATION
OFFICE OF CIVIL RIGHTS
JACKSON, MISSISSIPPI

LIST OF FIRMS SUBMITTING QUOTES

I/we received quotes from the following firms on:

Letting Date: **November 26, 2019**

Project No: **HSIP-0099-01(010)/ 107573301000**

County: **Washington**

Disadvantaged Business Enterprise (DBE) Regulations as stated in 49 CFR 26.11 require the Mississippi Department of Transportation (MDOT) to create and maintain a comprehensive list of all firms quoting/bidding subcontracts on prime contracts and quoting/bidding subcontracts on federally-funded transportation projects. For every firm, we require the following information:

Firm Name: _____
Contact Name/Title: _____
Firm Mailing Address: _____
Phone Number: _____
_____ DBE Firm _____ Non-DBE Firm

Firm Name: _____
Contact Name/Title: _____
Firm Mailing Address: _____
Phone Number: _____
_____ DBE Firm _____ Non-DBE Firm

Firm Name: _____
Contact Name/Title: _____
Firm Mailing Address: _____
Phone Number: _____
_____ DBE Firm _____ Non-DBE Firm

Firm Name: _____
Contact Name/Title: _____
Firm Mailing Address: _____
Phone Number: _____
_____ DBE Firm _____ Non-DBE Firm

Firm Name: _____
Contact Name/Title: _____
Firm Mailing Address: _____
Phone Number: _____
_____ DBE Firm _____ Non-DBE Firm