



PROPOSAL AND CONTRACT DOCUMENTS

FOR THE CONSTRUCTION OF (STATE DELEGATED)

12

Installing ITS equipment on Interstate 20 and U.S. Highway 84 at the Mississippi River Bridges, known as Federal Aid Project No. ITS-9999-09(028) / 106397301 & 106397302 in Warren and Adams Counties of Mississippi & Madison and Concordia Parishes of Louis

Project Completion: August 25, 2014

NOTICE

**BIDDERS MUST PURCHASE A BOUND PROPOSAL
FROM MDOT CONTRACT ADMINISTRATION DIVISION
TO BID THIS PROJECT.**

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

SECTION 900

OF THE CURRENT

2004 STANDARD SPECIFICATIONS

FOR ROAD AND BRIDGE CONSTRUCTION

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

JACKSON, MISSISSIPPI

**BIDDER CHECK LIST
(FOR INFORMATION ONLY)**

- _____ All unit prices and item totals have been entered in accordance with Subsection 102.06 of the Mississippi Standard Specifications for Road and Bridge Construction.
- _____ If the bid sheets were prepared using the Electronic Bid System, proposal sheets have been stapled and inserted into the proposal package.
- _____ First sheet of SECTION 905--PROPOSAL has been completed.
- _____ Second sheet of SECTION 905--PROPOSAL has been completed and signed.
- _____ Addenda, if any, have been acknowledged. Second sheet of Section 905 listing the addendum number has been substituted for the original second sheet of Section 905. Substituted second sheet of Section 905 has been properly completed, signed, and added to the proposal.
- _____ DBE/WBE percentage, when required by contract, has been entered on last sheet of the bid sheets of SECTION 905 - PROPOSAL.
- _____ Form OCR-485, when required by contract, has been completed and signed.
- _____ The last sheet of the bid sheets of SECTION 905--PROPOSAL has been signed.
- _____ Combination Bid Proposal of SECTION 905--PROPOSAL has been completed for each project which is to be considered in combination (See Subsection 102.11).
- _____ Equal Opportunity Clause Certification, when included in contract, has been completed and signed.
- _____ The Certification regarding Non-Collusion, Debarment and Suspension, etc. has been executed in duplicate.
- _____ A certified check, cashier's check or bid bond payable to the State of Mississippi in the principal amount of 5% of the bid has been included with project number identified on same. A bid bond has been signed by the bidder and has also been signed or countersigned by a Mississippi Agent or Qualified Nonresident Agent for the Surety with Power of Attorney attached.
- _____ **ON FEDERAL FUNDED PROJECTS, the Notice To Bidders regarding DUNS Requirements has been completed and included in the contract documents.**
- _____ Non-resident Bidders: ON STATE FUNDED PROJECTS ONLY, a copy of the current laws regarding any preference for local Contractors from State wherein domiciled has been included. See Subsection 103.01, Mississippi Standard Specifications for Road and Bridge Construction, and Section 31-7-47, MCA, 1972 regarding this matter.

Return the proposal and contract documents in its entirety in a sealed envelope. DO NOT remove any part of the contract documents; exception - an addendum requires substitution of second sheet of Section 905. A stripped proposal is considered as an irregular bid and will be rejected.

Failure to complete any or all of the applicable requirements will be cause for the proposal to be considered irregular.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

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SECTION 905 - PROPOSAL,
PROPOSAL BID ITEMS,
COMBINATION BID PROPOSAL,
CERTIFICATION OF PERFORMANCE - PRIOR FEDERAL-AID CONTRACTS,
CERTIFICATION REGARDING NON-COLLUSION, DEBARMENT AND SUSPENSION,
SECTION 902 - CONTRACT FORM, AND SECTION 903 - CONTRACT BOND FORMS,
OCR-485.

(REVISIONS TO THE ABOVE WILL BE INDICATED ON THE SECOND SHEET
OF SECTION 905 AS ADDENDA)

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 901 - ADVERTISEMENT

Sealed bids will be received by the Mississippi Transportation Commission in the Office of the Contract Administration Engineer, Room 1013, Mississippi Department of Transportation Administration Building, 401 North West Street, Jackson, Mississippi, until 10:00 o'clock A.M., Tuesday, April 23, 2013, and shortly thereafter publicly opened on the Sixth Floor for:

Installing ITS equipment on Interstate 20 and U.S. Highway 84 at the Mississippi River Bridges, known as Federal Aid Project No. ITS-9999-09(028) / 106397301 & 106397302, in Warren and Adams Counties of Mississippi & Madison and Concordia Parishes of Louisiana.

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.

Bid proposals must be purchased online at <https://shopmdot.ms.gov>. Specimen proposals may be viewed and downloaded online at no cost at <http://mdot.ms.gov> or purchased online. Proposals are available 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: 05/03/2004

SUBJECT: Governing Specifications

The current (2004) 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 herein. Copies of the specification book may be purchased from the MDOT Construction Division.

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 1990 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 2004 Edition of the Standard Specifications.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

| SECTION 904 - NOTICE TO BIDDERS NO. 640

CODE: (IS)

| DATE: 09/26/2005

SUBJECT: Fiber Reinforced Concrete

Bidders are hereby advised that synthetic structural fibers meeting the requirements of Subsection 907-711.04 may be used in lieu of wire mesh in some items of construction. Substitution of fibers for wire mesh will be allowed in the construction of paved ditches, paved flumes, paved inlet apron, driveways, guard rail anchors and pile encasements. Substitution in any other items of work must be approved by the State Construction Engineer prior to use.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 883

CODE: (IS)

DATE: 04/28/2006

SUBJECT: Payroll Requirements

Bidders are hereby advised that the Contractor and Subcontractor(s) are required to submit payroll information to the Project Engineers on a weekly basis.

On Federal-Aid Projects, CAD-880, CAD-881 and certified payroll submissions are required each week the Contractor or a Subcontractor performs work on the project. This is addressed in Section V, page 6 of Form FHWA-1273.

On State-Funded Projects, CAD-880 is required each week the Contractor or a Subcontractor performs work on the project.

When no work is performed on either Federal-Aid and State-Funded Projects, the Contractor should only submit CAD-880 showing no work activities.

The Contractor shall make all efforts necessary to submit this information to the Project Engineer in a timely manner. The Engineer will have the authority to suspend the work wholly or in part and to withhold payments because of the Contractor's failure to submit the required information. Submission of forms and payrolls shall be current through the first full week of the month for the estimate period in order for the Project Engineer to process an estimate.

Bidders are advised to review the requirements regarding payroll submissions in Section 110 of the Standard Specifications.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 1405

CODE: (IS)

DATE: 03/15/2007

SUBJECT: ERRATA AND MODIFICATIONS TO THE 2004 STANDARD SPECIFICATIONS

<u>Page</u>	<u>Subsection</u>	<u>Change</u>
101	201.01	In the second sentence of the first paragraph, change “salvable” to “salvageable”.
107	202.04	In the fourth sentence of the fourth paragraph, change “yard” to “feet”.
107	202.05	In the list of units measurements for 202-B, add “square foot”.
132	211.03.4	In the second sentence of the second paragraph, change “planted” to “plated”.
192	306.02.4	In the first line of the first paragraph, delete the word “be”.
200	307.03.7	In the fourth sentence of the second paragraph, change “lime-fly ash” to “treated”.
236	401.01	Change the header from “Section 403” to “Section 401”.
242	401.02.3.2	In the first sentence of the third full paragraph, add “1/8” in the blank before the inch mark.
250	401.02.6.3	In the second sentence of the first paragraph on page 250, change “rutting over ”” to “rutting over 1/8" ”.
253	401.02.6.4.2	In the paragraph preceding the table, change “91.0” to “89.0”.
259	401.03.1.4	In the first paragraph, change “92.0 percent” to “the specified percentage (92.0 or 93.0)”.
269	403.03.2	In the table at the top of page 269, change the PI requirement from “= ” to “≤ ”.

- 278 404.04 In the second sentence, change the subsection from “401.04” to “403.04”.
- 283 409.02.2 Change “PG 64-22” to “PG 67-22”.
- 294 413.02 In the first sentence of the second paragraph, change “707.02.1.3” to “Subsection 707.02.1.3”.
- 340 511.04 In the second sentence of the second paragraph, change “412” to “512”.
- 349 601.03.3 In the first sentence, change “804.03.2” to “804.03.5”.
- 355 603.02 Change the subsection reference for Joint mortar from “707.03” to “714.11”.
- 369 604.04 In the first sentence, change “601.04” to “Subsection 601.04”.
- 427 619.04 Delete the second paragraph.
- 442 625.04 In the third paragraph, change “626.04” to “Subsection 626.04”.
- 444 626.03.1.2 Delete the third sentence of the first paragraph.
- 464 631.02 Change the subsection reference for Water from “714.01.0” to “714.01.1”.
- 570 682.03 Change the subsection number from “682-03” to “682.03”.
- 575 683.10.4 Change the subsection number from “683.10.4” to “683.04”.
- 575 683.10.5 Change the subsection number from “683.10.5” to “683.05”.
- 596 701.02 In the table under the column titled “Cementations material required”, change Class F, FA” to “Class F FA,”.
- 603 702.11 In the first sentence, change “702.12” to “Subsection 702.12”.
- 612 703.04.2 In the fifth paragraph, delete “Subsection 703.11 and”.
- 616 703.07.2 In the Percentage By Weight Passing Square Mesh Sieves table, change the No. 10 requirement for Class 7 material from “30 - 10” to “30 - 100”.

- 618 703.13.1 In the first sentence of the first paragraph, change “703.09” to “703.06”.
- 618 703.13.2 In the first sentence, change “703.09” to “703.06”.
- 671 712.06.2.2 In the first sentence, change “712.05.1” to “Subsection 712.05.1”.
- 689 714.11.2 In the first sentence, change “412” to “512”.
- 709 715.09.5 In the first sentence of the first paragraph, change “guage” to “gauge”.
- 717 717.02.3.4 In the top line of the tension table, change “1 1/2” to “1 1/8” and change “1 1/8” to “1 1/2”.
- 741 720.05.2.2 In the last sentence of this subsection, change “720.05.2.1” to “Subsection 720.05.2.1”.
- 827 803.03.2.3.7.5.2 In the first sentence of the second paragraph, change “803.03.5.4” to “803.03.2.3.4”.
- 833 803.03.2.6 In the first sentence, change “803.03.7” to “803.03.2.5”.
- 854 804.02.11 In the last sentence of the first paragraph, change “automatically” to “automatic”.
- 859 804.02.13.1.3 In the last sentence, change Subsection “804.02.12.1” to “804.02.12”.
- 879 804.03.19.3.2 In the first sentence of the third paragraph, change “listed on of Approved” to “listed on the Approved”.
- 879 804.03.19.3.2 In the last sentence of the last paragraph, change “804.03.19.3.1” to “Subsection 804.03.19.3.1”.
- 962 814.02.3 In the first sentence, change “710.03” to “Subsection 710.03”.
- 976 820.03.2.1 In the first sentence, change “803.02.6” to “803.03.1.7”.
- 976 820.03.2.2 In the first sentence, change “803.03.9.6” to “803.03.1.9.2”.
- 985 Index Change the subsection reference for Petroleum Asphalt Cement from “702.5” to “702.05”.

985	Index	Change the subsection reference for the Definition of Asphaltic Cement or Petroleum Asphalt from “700.2” to “700.02”.
985	Index	Change the subsection reference for Automatic Batchers from “501.03.2.4” to “804.02.10.4”.
986	Index	Delete “501.03.2” as a subsection reference for Batching Plant & Equipment.
988	Index	Change the subsection reference for the Central Mixed Concrete from “501.03.3.2” to “804.02.11”.
988	Index	Change the subsection reference for the Concrete Batching Plant & Equipment from “501.03.2” to “804.02.11”.
999	Index	Delete “501.03.3.3” as a subsection reference for Truck Mixers.
1001	Index	Change the subsection reference for Edge Drain Pipes from “605.3.5” to “605.03.5”.
1002	Index	Change the subsection reference for Metal Posts from “713.05.2” to “712.05.2”.
1007	Index	Change the subsection reference for Coarse Aggregate of Cement Concrete Table from “703.3” to “703.03”.
1007	Index	Change the subsection reference for Composite Gradation for Mechanically Stabilized Courses Table from “703.8” to “703.08”.
1009	Index	Delete “501.03.3.3” as a subsection reference for Truck Mixers and Truck Agitators.
1010	Index	Delete reference to “Working Day, Definition of”.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

| SECTION 904 - NOTICE TO BIDDERS NO. 1928

CODE: (IS)

| DATE: 04/14/2008

SUBJECT: Federal Bridge Formula

Bidders are hereby advised that Federal Highway Administration Publication No. FHWA-MC-94-007, **BRIDGE FORMULA WEIGHTS**, dated January 1994, 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://ops.fhwa.dot.gov/freight/sw/brdgcalf/calf_page.htm

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

| SECTION 904 - NOTICE TO BIDDERS NO. 2382

CODE: (IS)

| DATE: 02/12/2009

| SUBJECT: Status of Right-of-Way

Although it is desirable to have acquired all rights-of-way and completed all 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, relocatees and utilities which have not been completed.

| The status of right-of-way acquisition, utility adjustments, encroachments, potentially contaminated sites and asbestos containation 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

ITS-9999-09(028)

106397/301000

Warren County

March 8, 2013

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

NONE.

ASBESTOS CONTAMINATION STATUS OF BUILDINGS
TO BE REMOVED BY THE CONTRACTOR

ITS-9999-09(028)

106397-301000

Warren County

March 1, 2013

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

ITS-9999-09(028)

106397-301000

Warren County

March 1, 2013

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.

ENCROACHMENT CERTIFICATION

ITS-9999-09(028)

106397301

WARREN COUNTY(IES)

March 6, 2013

This is to certify that the above captioned project has been inspected and no encroachments were found.

UTILITY STATUS REPORT

ITS-9999-09(028)

106397301

WARREN COUNTY(IES)

03/06/2013

This is to certify that the above captioned project has been inspected and there are no known utilities in conflict with the project.

Forty-eight hours prior to commencing any excavation, the Contractor is advised to call MS-One-Call at 1-800-227-6477.

STATUS OF RIGHT-OF-WAY

ITS-9999-09(028)

106397/302000

Adams County

March 12, 2013

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

NONE.

ASBESTOS CONTAMINATION STATUS OF BUILDINGS
TO BE REMOVED BY THE CONTRACTOR
ITS-9999-09(028)
106397-302000
Adams County
March 1, 2013

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

ITS-9999-09(028)

106397-302000

Adams County

March 1, 2013

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.

ENCROACHMENT CERTIFICATION

ITS-9999-09(028)

106397302

ADAMS COUNTY(IES)

March 12, 2013

This is to certify that the above captioned project has been inspected and no encroachments were found.

UTILITY STATUS REPORT

ITS-9999-09(028)

106397302

ADAMS COUNTY(IES)

March 5, 2013

This is to certify that the above captioned project has been inspected and there are no known utilities in conflict with the project.

Forty-eight hours prior to commencing any excavation, the Contractor is advised to call MS-One-Call at 1-800-227-6477.



Office of the Secretary
PO Box 94245 | Baton Rouge, LA 70804-9245
ph: 225-379-1232 | fx: 225-379-1863

Bobby Jindal, Governor
Sherri H. LeBas, P.E., Secretary

March 12, 2013

Mr. Charles Bolinger
Division Administrator
FHWA – Louisiana Division
5304 Flanders Drive, Suite A
Baton Rouge, Louisiana 70808

Subject: State Project No.: 451-09-0023 / H.003358
Federal No.: BR 3307(506)
I-20 Mississippi River Bridge at Vicksburg
Bridge Modification for 24" Movement

Dear Mr. Bolinger:

RIGHT-OF-WAY CERTIFICATION

This project will be constructed within existing highway right-of-way delineated on plans for previous State and Federal Aid Projects on file in offices of the Department of Transportation and Development in Baton Rouge. Since no additional right-of-way is required, there are no relocations, improvements or potentially contaminated sites involved in this project.

Sincerely,

A handwritten signature in blue ink, appearing to read "Kevin Szatmary", is written over a faint, larger version of the same signature.

Kevin Szatmary
Right of Way Administrator

KS/sh

Copy: James Hall
Eric Burges
James Street
Deborah Boutwell



Office of the Secretary
PO Box 94245 | Baton Rouge, LA 70804-9245
ph: 225-379-1232 | fx: 225-379-1863

Bobby Jindal, Governor
Sherri H. LeBas, P.E., Secretary

March 13, 2013

Mr. Charles Bolinger
Division Administrator
FHWA – Louisiana Division
5304 Flanders Drive, Suite A
Baton Rouge, Louisiana 70808

Subject: State Project No.: 026-01-0016 / H.none
Federal No.: BRF 07-04(009)
I-20 Mississippi River Bridge at Natchez-Vidalia
U.S. 84
Concordia Parish

Dear Mr. Bolinger:

RIGHT-OF-WAY CERTIFICATION

This project will be constructed within existing highway right-of-way delineated on plans for previous State and Federal Aid Projects on file in offices of the Department of Transportation and Development in Baton Rouge. Since no additional right-of-way is required, there are no relocations, improvements or potentially contaminated sites involved in this project.

Sincerely,


Kevin Szatmary
Right of Way Administrator

KS/sh

Copy: James Hall
Eric Burges
James Street
Blayne Mayard

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 2596

CODE: (IS)

DATE: 05/13/2009

SUBJECT: DBE Forms, Participation and Payment

Bidders are hereby advised that the participation of a DBE Firm can not be counted towards the Prime Contractor's DBE goal until the amount being counted towards the goal has been paid to the DBE.

Form OCR-482 has been developed to comply with this requirement. Bidders are hereby advised that at the end of the job, the Prime Contractor will submit this form to the Project Engineer before the final estimate is paid and the project is closed out. This form certifies payments to all DBE Subcontractors over the life of the contract.

Form OCR-484 has also been developed to comply with this requirement. Bidders are hereby advised that each month, the Prime Contractors will submit this form to the Project Engineer no later than the last day of each month. This form 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 this form to the monthly estimate before forwarding the estimate to the Contract Administration Division for processing.

Bidders are also advised that Form OCR-485 will be completed by ALL BIDDERS submitting a bid proposal and must be signed and included in the bid proposal package. Failure to include Form OCR-485 in the bid proposal package will cause the Contractor's bid to be considered irregular.

DBE Forms, including Forms OCR-482, OCR-484 and OCR-485, 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 *Business, Disadvantaged Enterprise, Applications and Forms for the DBE Program, MDOT Forms*.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 2818

CODE: (SP)

DATE: 10/01/2009

SUBJECT: Non-Quality Control / Quality Assurance Concrete

Bidders are advised that the following pay items will not be accepted based on the Quality Control / Quality Assurance (QC/QA) requirements of Section 804 of the specifications. The acceptance of these pay items will be based on sampling and testing at the project site by MDOT forces. The Contractor is required to submit mix designs to accomplish this work in accordance with Section 804 and perform normal Quality Control functions at the concrete plant. Acceptance will be in accordance with the requirements of 907-601, Structural Concrete, and TMD-20-04-00-000. At the discretion of the Engineer, the Contractor may request that the concrete be accepted based on QC/QA requirements.

<u>Pay Item</u>	<u>Description</u>
221	Paved Ditches
601	Minor Structures - manholes, inlets, catch basins, junction boxes, pipe headwalls, and pipe collars.
606	Guardrail Anchors
607	Fence Post Footings
608	Sidewalks
609	Curb and Gutter
614	Driveways
616	Median and Island Pavement
630	Sign Footings, except Overhead Sign Supports

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 2937

CODE: (SP)

DATE: 01/11/2010

SUBJECT: Reduced Speed Limit Signs

Bidders are advised that all black and white speed limits signs that are used to reduce the speed limit through construction zones shall be covered or removed during times when the Contractor is not performing work. If the Contractor has a routine daytime operation and is not working at night, the signs shall be covered or removed during the nighttime when there is no work activity.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 3039

CODE: (SP)

DATE: 03/23/2010

SUBJECT: Alternate Asphalt Mixture Bid Items

Bidders are advised that the asphalt mixture used on this project will be bid as an alternate pay item: Hot Mix Asphalt (HMA) or Warm Mix Asphalt (WMA). Bidders must select one of the alternates at the time of bid. **The Contractor must use the selected asphalt mixture, HMA or WMA, throughout the entire project.**

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 3242

CODE: (SP)

DATE: 09/21/2010

SUBJECT: Warm Mix Asphalt

Bidders are advised that MDOT approved products and processes for the production of Warm Mix Asphalt is available at the following MDOT website.

<http://www.gomdot.com/Divisions/Highways/Resources/MPL/Home.aspx>

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 3414

CODE: (SP)

DATE: 02/16/2011

SUBJECT: DUNS Requirement for Federal Funded Projects

Bidders are advised that the Prime Contractor must maintain current registrations in the Central Contractor Registration (<http://www.ccr.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 Central Contractor Registration.

Bidders are also advised that the following information needs to be completed and included in the bid documents:

DUNS: _____

Company Name: _____

Company e-mail address: _____

By: _____

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 3512

CODE: (SP)

DATE: 04/26/2011

SUBJECT: Wage Rates

Bidders are advised that when a contract consists of work in two or more counties, workers shall be paid the higher wage rate listed in the contract regardless of the county in which work is being performed.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 3655

CODE: (SP)

DATE: 10/04/2011

SUBJECT: Type III Barricade Rails

Bidders are advised that the use of 2-inch nominal thickness timber for rails on Type III barricades has not been approved by NCHRP as a crashworthy device. Therefore, the use of 2-inch nominal thickness timbers will not be allowed for rails on Type III Barricades. Timber rails for Type III Barricades shall be as follows.

- For barricades up to four feet (4') wide, the maximum thickness of timber rails shall be one inch (1") and the material shall be pine timber or ¾-inch ACX plywood.
- For barricades more than four feet (4') wide, timber rails shall be constructed of ¾-inch ACX plywood.

A list of crashworthy Type III Barricades can be found at the below FHWA website.

http://safety.fhwa.dot.gov/roadway_dept/policy_guide/road_hardware/wzd/

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 3893

CODE: (SP)

DATE: 04/10/2012

SUBJECT: Petroleum Products Base Prices

Bidders are advised that monthly petroleum products base prices will be available at the web site listed below. Current monthly prices will be posted to this web site on or before the 15th of each month. Bidders are advised to use the petroleum base prices on this web site when preparing their bids. The current monthly petroleum products base prices will be acknowledged by the Bidder and become part of the contract during the execution process.

Monthly Petroleum Products Base Prices can be viewed at:

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

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 3980

CODE: (SP)

DATE: 07/25/2012

SUBJECT: Questions Regarding Bidding

Bidders are advised that all questions that arise regarding the contract documents (proposal) or plans on this project shall be directed to the www.gomdot.com current letting webpage. Click on the call number for this project to open an email form to submit your question. Questions must be submitted by 8:00 a.m. on Monday prior to the letting on Tuesday. Answers to questions will be posted by 6:00 p.m. on Monday prior to the letting on Tuesday. Answers can be viewed by clicking on Q&A link under the Proposal Addenda column.

It shall be the Bidders responsibility to familiarize themselves with the questions and answers that have been submitted on this project.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SUPPLEMENT TO NOTICE TO BIDDERS NO. 4103

DATE: 09/12/2012

The goal is 1 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. 4103

CODE: (IS)

DATE: 9/12/2012

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, subrecipient 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.

The percentage of the contract that is proposed for DBEs shall be so stated 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 10th 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.

FORMS ARE AVAILABLE FROM THE OFFICE OF CIVIL RIGHTS

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, with the proposal, 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 with the bid proposal, 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 readvertised.

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 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.

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 10th day after opening of the bids, or submit information with the bid proposal 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 submit a list of all firms that submitted quotes for material supplies or items to be subcontracted. This information must be submitted on form OCR-485 in the back of the contract proposal. [Form OCR-485 must be signed and submitted with the bid proposal.](#)

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

The contract goal established by MDOT in this proposal 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: At the conclusion of the project the 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 each Contractor / Supplier. 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 Contractor will submit to the Project Engineer OCR-484 certifying payments to all Subcontractors.
- (5) OCR-485: The bidder must submit **with the bid proposal** a list of all firms that submitted quotes for material supplies or items to be subcontracted.
- (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 or CAD-725).

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 an amount equal to the unmet portion of the DBE goal
- (4) Recover an amount equal to the unmet contract goal
- (5) Debar the Contractor involved from bidding on Mississippi Department of Transportation projects.
- (6) Deduct from the Contractor's final estimate all or any combination of the following.

<u>Offense</u>	<u>Percentage of the monetary amount disallowed from (1) above</u>	<u>Lump Sum</u>
# 1	10%	\$ 5,000 or both
# 2	20%	\$ 10,000 or both
# 3	40%	\$ 20,000 & debarment

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 4214

CODE: (IS)

DATE: 11/29/2012

SUBJECT: Safety Apparel

Bidders are advised that the Code of Federal Regulations CFR 23 Part 634 final rule was adopted November 24, 2006 with an effective date of November 24, 2008. This rule requires that "All workers within the right-of-way of a Federal-Aid Highway who are exposed either to traffic (vehicles using the highway for the purposes of travel) or to construction equipment within the work area shall wear high-visibility safety apparel". High-visibility safety apparel is defined in the CFR as "personnel protective safety clothing that is intended to provide conspicuity during both daytime and nighttime usage, and that meets the Performance Class 2 or 3 requirements of the ANSI/ISEA 107-2004 publication entitled American National Standard for High-Visibility Safety Apparel and Headwear". All workers on Mississippi State Highway right-of-way shall comply with this Federal Regulation. Workers are defined by the CFR as "people on foot whose duties place them within the right-of way of a Federal-Aid Highway, such as highway construction and maintenance forces, survey crews, utility crews, responders to incidents within the highway right-of-way, and law enforcement personnel when directing traffic, investigating crashes, and handling lane closures, obstructed roadways, and disasters within the right-of-way of a Federal-Aid Highway".

More information regarding high visibility safety apparel can be found at the following sites.

<http://www.gpo.gov/fdsys/pkg/CFR-2008-title23-vol1/pdf/CFR-2008-title23-vol1-sec634-1.pdf>

<http://ops.fhwa.dot.gov/wz/resources/policy.htm#hv>

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904- NOTICE TO BIDDERS NO. 4303

CODE: (SP)

DATE: 02/07/2013

SUBJECT: Add Option Bidding

PROJECT: ITS-9999-09(028) / 106397301 & 302 -- Warren & Adams Counties

Bidders are hereby advised that this project contains Add Option items that will be used to determine the low bidder. Bidders are required to bid the base items (Roadway and/or Bridge Items) and **ALL** Add Options. All options are of the same priority.

Prices for all Add Option items will be added to the base items and the project will be awarded to the bidder that has the lowest total bid (base plus all Add Options) for the project. After the project has been awarded to the lowest bidder and prior to the execution of the contract, MDOT will select which, if any, Add Options will be deleted from the contract.

Plan sheets and bid items associated with add options that are not selected should be removed and/or disregarded as part of the contract.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 4376

CODE: (SP)

DATE: 03/21/2013

SUBJECT: Contract Time

PROJECT: ITS-9999-09(028) / 106397301 & 302 -- Warren and Adams Counties

The calendar date for completion of work to be performed by the Contractor for this project shall be **August 25, 2014** which date shall be the end of contract time. It is anticipated that the Notice of Award will be issued no later than be **May 14, 2013** and the effective date of the Notice to Proceed / Beginning of Contract Time will be **May 30, 2013**.

The 60-calendar day burn-in period required in this contract has been included in the contract time.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 4377

CODE: (SP)

DATE: 03/20/2013

SUBJECT: Cooperation Between Contractors

PROJECT: ITS-9999-09(028) / 106397301 & 302 -- Warren and Adams Counties

The Bidder's attention is hereby called to Subsection 105.07, Cooperation between Contractors, of the 2004 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:

BR-0015-01(112) / 105416301 – Adams County, Bridge Maintenance on the Mississippi River Bridge at Natchez

IM-0020-01(199) / 106175301 – Warren County, Overlay on I-20 near the Mississippi River Bridge

The Contractor shall cooperate in all respects and shall coordinate construction of all phases of work with the Contractor of the adjoining project. 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. 4379

CODE: (SP)

DATE: 03/05/2013

SUBJECT: Applicable State Taxes

PROJECT: ITS-9999-09(028) / 106397301 & 302 -- Warren & Adams Counties

Bidders are hereby advised that based on the estimated plan quantities for all pay items associated with the base bid and all add options, 34% of the work required on these projects is in the State of Mississippi and 66% of the work is in the State of Louisiana. Therefore, 34% of the monies earned on these projects will be subject to Mississippi taxes and 66% will be subject to Louisiana taxes. Should all add options not be used, the percent of work in each state will vary.

The Contractor will be responsible for paying all applicable Mississippi taxes on all work performed in Mississippi, and likewise, all work performed in Louisiana will be subject to applicable Louisiana taxes.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 4380

CODE: (SP)

DATE: 03/05/2013

SUBJECT: Form W-9 Requirements

PROJECT: ITS-9999-09(028) / 106397301 & 302 -- Warren & Adams Counties

Bidders are hereby advised that if you have not received payments directly from the State of Mississippi as a prime contractor for MDOT or as a vendor from another agency, you are required to submit a W-9 form with your completed bid proposal. The completed W -9 form will be used to assign a State Vendor ID number. Vendor ID's are required for payment from the State and the assignment is not controlled by MDOT but by the Department of Finance and Administration.

If the above description applies to you, please complete the Form W-9 in the back of the proposal and return in the pocket of your bid proposal.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904- NOTICE TO BIDDERS NO. 4381

CODE: (SP)

DATE: 03/05/2013

SUBJECT: Preconstruction Conference

PROJECT: ITS-9999-09(028) / 106397301 & 302 -- Warren and Adams Counties

Bidders are hereby advised that a Preconstruction Conference as addressed in Subsection 108.03.2 will have to be scheduled within 30 calendar days after the Notice to Proceed / Beginning of Contract Time. Should the Contractor fail to schedule a preconstruction conference within this 30-day period, the Project Engineer will set the date and make arrangements for the preconstruction conference.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904- NOTICE TO BIDDERS NO. 4382

CODE: (SP)

DATE: 03/14/2013

SUBJECT: Submittals

PROJECT: ITS-9999-09(028) / 106397301 & 302 -- Warren and Adams Counties

Bidders are hereby advised that all work on this project that requires shop drawings or product submittals to be approved by the Engineer should be submitted at the time of the Preconstruction Conference. Failure to submit these items at the preconstruction conference may cause delays that make it difficult for the Contractor to complete the work within the allowed contract time and shall not be a reason for an extension of contract time.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 4383

CODE: (SP)

DATE: 03/05/2013

SUBJECT: Construction Operations on the River

PROJECT: ITS-9999-09(028) / 106397301 & 302 -- Warren & Adams Counties

It is imperative the contractor be aware of the complexity and challenges related to conducting construction operations on the Mississippi River at the Bridges. The Mississippi River is a critical transportation corridor for U.S. commerce and any delays in the transit of commercial vessels along the river associated with the construction activities could have significant impacts. Therefore, minimizing potential interference with river traffic shall be of high importance.

The U.S. Coast Guard has jurisdiction over the Mississippi River and is responsible for the safe navigation of vessels on the river. The Contractor will be required to coordinate all proposed construction activities with the St. Louis, Missouri Office of the Coast Guard. The Contractor should anticipate that the Coast Guard may require the following of the Contractor.

- Submittal of written work plan describing how the construction work will be conducted, the types of vessels involved and the anticipated duration of the activities. It is likely the Coast Guard will want this several weeks in advance of the proposed work.
- The Contractor may be required to move any barges or support vessels used in the construction effort away from the bridges at night and to a safe and secure position.
- The Contractor may be required to have a tug on station with the barge throughout the entire time the barge is at the bridge location.
- River closures may be required for certain portions of the project and the periods available for closure of the river may be limited.

It is recommended that the Contractor familiarize themselves with the typical requirements for conducting construction operation on the Mississippi River and account for them in their proposal. Contractor shall also follow the requirements set forth in the attached letter from the Coast Guard.

U.S. Department of
Homeland Security

United States
Coast Guard



- 2 -

Commander
Eighth Coast Guard District

Notice To Bidder No. 4383 -- Cont'd.

1222 Spruce Street, Room 2.102D
St. Louis, MO 63103
Staff Symbol: (dwb)
Phone: 314-269-2382
Fax: 314-269-2737
Email: david.a.orzechowski@uscg.mil
www.uscg.mil/d8/westernriversbridges

16593.1/661.7, 530.8
435.7, 363.3 LMR
March 1, 2013

Mr. Nick J. Altobelli, PE
Director of Structures, State Bridge Engineer
Mississippi Department of Transportation
P.O. Box 1850
Jackson, MS 39215-1850

Subj: INSTALLATION OF REAL TIME RIVER CURRENT SYSTEMS ON BRIDGE PIERS

Dear Mr. Altobelli:

This is in reply to your letter dated February 13, 2013 regarding the installation of Real Time River Current (RTRC) systems on the following Lower Mississippi River bridges: Helena Bridge, Mile 661.7; U.S. Highway 82 Mississippi River Bridge, Mile 530.8; I-20 Highway Bridge, Mile 435.7 and the Natchez-Vidalia Dual Bridge, Mile 363.3.

We understand the RTRC's will be installed on one of the bridges navigational piers and will not encroach into the navigational opening nor obstruct the vertical clearance gauges previously installed on the piers.

The Coast Guard Bridge Office, St. Louis, MO does not have any issues with the proposed location or method of installation of the RTRC system. However, if a different location of the RTRC system requires it to be installed on a pier with a vertical clearance gauge, the Coast Guard Bridge Office must be notified in advance and will require a separate approval for each bridge.

Before work begins, a Contractor Work Plan, to include showing the location of work barges, shall be submitted to this office for approval.

If you have any questions about our requirements, please call Mr. David Orzechowski at the above number.

Sincerely,

A handwritten signature in blue ink, appearing to read "Erica Washburn".

ERICA WASHBURN
Bridge Administrator, Western Rivers
By direction of the District Commander

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 4384

CODE: (SP)

DATE: 03/12/2013

SUBJECT: On-Street Video Equipment

PROJECT: ITS-9999-09(028) / 106397301 & 302 -- Warren and Adams Counties

Bidders are hereby advised that the following will be required for this project.

Mississippi River Bridges Project On-Street Video Equipment Modifications (Full project scope)

The Contractor is to furnish and install External Position cameras at each CCTV site. The cameras shall be both analog and IP camera units and shall meet all specifications provided in Subsections 907-650.02.2 and 907-650.02.3. The cameras shall include built-in image stabilization functionality and built-in capability to reduce or remove fog from the video. The cameras shall have a +90 to -90 degree tilt movement from the horizontal. The Contractor shall supply all equipment and ancillary products to properly install each camera according to the proper orientation as per the Plans. Each camera shall be configured to properly operate in the proper orientation specified in the Plans as indicated per site location.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 4385

DATE: 03/20/2013

SUBJECT: Specialty Items

PROJECT: ITS-9999-09(028) / 106397301 & ITS-9999-09(028) / 106397302 - Warren & Adams Counties

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: ASPHALT CONCRETE

Line No	Pay Item	Description
0570	907-403-A015	Hot Mix Asphalt, ST, 9.5-mm mixture
0580	907-403-M001	Warm Mix Asphalt, ST, 9.5-mm mixture

CATEGORY: AGGR BASE AGGR SHLDR LEAN CONC BASE

Line No	Pay Item	Description
0200	907-304-F002	Size 610 Crushed Stone Base

CATEGORY: GUARDRAIL, GUIDERAIL

Line No	Pay Item	Description
0020	606-B001	Guard Rail, Class A, Type 1
0030	606-C003	Guard Rail, Cable Anchor, Type 1
0040	606-E003	Guard Rail, Terminal End Section, Non-Flared

CATEGORY: TRAFFIC CONTROL - PERMANENT

Line No	Pay Item	Description
0090	630-F001	Delineators, Guard Rail, White

CATEGORY: TRAFFIC CONTROL - TEMPORARY

Line No	Pay Item	Description
0070	619-E1001	Flashing Arrow Panel, Type C
0210	907-619-E3001	Changeable Message Sign

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 4414

CODE: (SP)

DATE: 3/13/2013

SUBJECT: Roadway Weather Information System

PROJECT: ITS-9999-09(028) / 106397301 & 302 -- Warren & Adams Counties

Bidders are hereby advised that the “BRIDGE ICES BEFORE ROAD” Signs with Flashing Beacons referred to in Special Provision 907-664-2, Roadway Weather Information System, are **not** required for this project.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SECTION 904 - NOTICE TO BIDDERS NO. 4415

CODE: (SP)

DATE: 3/20/2013

SUBJECT: Lane Closure Restrictions

PROJECT: ITS-9999-09(028) / 106397301 & 302 -- Warren and Adams Counties

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

Adams County

During the lane closures time periods set forth in the plans on Working No. TC-2, Sheet 46, no excuses will be accepted by the Department and the Contractor will be charged a fee of **\$500.00 per lane** for each full or partial five (5) minute period during which less than the designated full travel lanes are available to the traveling public in either direction of traffic flow.

Warren County

Neither lane closures nor obstructions resulting in less than the current full travel lanes of traffic flow will be permitted under any circumstances, including interstate ramps and local roads, during the following time periods unless specifically directed by the Engineer in writing.

Between the Mississippi River Bridge and U.S. 61 North, all lanes shall be open to traffic between 10:00 AM and 6:00 PM, Monday through Friday.

In addition, neither lane closures nor obstructions resulting in less than the current full travel lanes of travel flow will be permitted on the following holidays and the day preceding them: New Year's Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day. In the event that one of the aforementioned holidays occurs during a weekend or on a Monday, lanes closures will not be allowed during that weekend or on the Friday immediately preceding the holiday.

Between U.S. 61 North and the Bovina Exit, there are no restrictions on lane closures.

Lane closures will be allowed all day on Saturday and Sunday for the duration of the project, except where mentioned above with regards to holidays.

During the time periods listed above, no excuses will be accepted by the Department, and the Contractor will be charged a fee of **\$500.00 per lane** for each full or partial five (5) minute period during which less than the designated full travel lanes are available to the traveling public in either direction of traffic flow.

For the purposes of this contract, official time is considered to be the announced time available at the Jackson area telephone number (601) 355-9311.

SUPPLEMENT TO FORM FHWA-1273

DATE: 6/15/94

SUBJECT: Final Certificate and 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 subcontract for review by the Mississippi Department of Transportation. The federal contract provisions may be omitted from the subcontract copy submitted for review provided the Contractor certifies that the provisions will be physically incorporated into the agreement furnished to the Subcontractor.

In lieu of submitting a copy of the subcontract for review, the Contractor may certify that the subcontract agreement is in writing and that it contains all the requirements and pertinent provisions of the prime contract.

Each Subcontractor will be required to provide a copy of the subcontract agreement for contract compliance reviews, along with physical evidence (copy of FHWA-1273) that requirements and pertinent provisions have been provided for review and adherence.

**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

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.

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.

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
--	------

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 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

(06/28/2012)

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General Decision Number: MS130160 01/04/2013 MS160

Superseded General Decision Number: MS20120160

State: Mississippi

Construction Type: Highway

Counties: Amite, Covington, Issaquena, Jefferson Davis, Lawrence, Lincoln, Marion, Sharkey, Walthall and Warren Counties in Mississippi.

HIGHWAY CONSTRUCTION PROJECTS (excluding tunnels, building structures in rest area projects & railroad construction; bascule, suspension & spandrel arch bridges designed for commercial navigation, bridges involving marine construction; and other major bridges).

Modification Number Publication Date
 0 01/04/2013

* ELEC0480-008 07/01/2012

Amite, Covington, Issaquena, Lawrence, Lincoln, Sharkey, Walthall, and Warren Counties

	Rates	Fringes
ELECTRICIAN.....	\$ 23.10	3%+7.43

 ELEC0903-010 06/01/2011

Jefferson Davis and Marion Counties

	Rates	Fringes
ELECTRICIAN.....	\$ 23.60	12%+4.40

 SUMS2008-121 09/04/2008

	Rates	Fringes
CARPENTER, Includes Form Work....	\$ 11.42	0.12
CEMENT MASON/CONCRETE FINISHER...	\$ 10.82	0.00
IRONWORKER, REINFORCING.....	\$ 11.30	0.00
LABORER: Common or General.....	\$ 8.64	0.00
LABORER: Pipelayer.....	\$ 9.68	0.00
OPERATOR: Backhoe/Excavator.....	\$ 11.32	0.00

OPERATOR: Broom.....	\$ 10.17	0.00
OPERATOR: Bulldozer.....	\$ 10.77	0.00
OPERATOR: Crane.....	\$ 14.57	0.00
OPERATOR: Grader/Blade.....	\$ 12.46	0.00
OPERATOR: Loader.....	\$ 10.15	0.00
OPERATOR: Mechanic.....	\$ 12.04	0.00
OPERATOR: Oiler.....	\$ 12.33	0.48
OPERATOR: Roller.....	\$ 9.31	0.00
OPERATOR: Scraper.....	\$ 10.00	0.00
OPERATOR: Tractor.....	\$ 7.79	0.00
OPERATOR: Asphalt Paver and Asphalt Spreader.....	\$ 10.00	0.00
TRUCK DRIVER.....	\$ 9.22	0.00

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

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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 union or non-union.

Union Identifiers

An identifier enclosed in dotted lines beginning with characters other than "SU" denotes that the union classification and rate have found to be prevailing for that classification. Example: PLUM0198-005 07/01/2011. The first four letters , PLUM, indicate the international union and the four-digit number, 0198, that follows 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.

The date, 07/01/2011, following these characters is the effective date of the most current negotiated rate/collective bargaining agreement which would be July 1, 2011 in the above example.

Union prevailing wage rates will be updated to reflect any changes in the collective bargaining agreements governing the rates.

0000/9999: weighted union wage rates will be published annually each January.

Non-Union Identifiers

Classifications listed under an "SU" identifier were derived from survey data by computing average rates and are not union rates; however, the data used in computing these rates may include both union and non-union data. Example: SULA2004-007 5/13/2010. SU indicates the rates are not union majority rates, LA indicates the State of Louisiana; 2004 is the year of the survey; and 007 is an internal number used in producing the wage determination. A 1993 or later date, 5/13/2010, indicates the classifications and rates under that identifier were issued as a General Wage Determination on that date.

Survey wage rates will remain in effect and will not change until a new survey is conducted.

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

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General Decision Number: MS130131 01/04/2013 MS131

Superseded General Decision Number: MS20120131

State: Mississippi

Construction Type: Highway

County: Adams County in Mississippi.

HIGHWAY CONSTRUCTION PROJECTS (excluding tunnels, building structures in rest area projects & railroad construction; bascule, suspension & spandrel arch bridges designed for commercial navigation, bridges involving marine construction; and other major bridges).

Modification Number	Publication Date
0	01/04/2013

* ELEC0480-007 07/01/2012

	Rates	Fringes
ELECTRICIAN.....	\$ 23.10	3%+7.43

SUMS2008-092 09/04/2008

	Rates	Fringes
CARPENTER, Includes Form Work....	\$ 11.42	0.12
CEMENT MASON/CONCRETE FINISHER...	\$ 10.30	0.00
IRONWORKER, REINFORCING.....	\$ 11.30	0.00
LABORER: Common or General.....	\$ 7.60	0.00
LABORER: Pipelayer.....	\$ 9.68	0.00
OPERATOR: Backhoe/Excavator.....	\$ 11.32	0.00
OPERATOR: Broom.....	\$ 10.17	0.00
OPERATOR: Bulldozer.....	\$ 10.77	0.00
OPERATOR: Crane.....	\$ 14.57	0.00
OPERATOR: Grader/Blade.....	\$ 12.46	0.00
OPERATOR: Loader.....	\$ 10.15	0.00
OPERATOR: Mechanic.....	\$ 12.04	0.00
OPERATOR: Oiler.....	\$ 12.33	0.48
OPERATOR: Roller.....	\$ 9.31	0.00

OPERATOR: Scrapper.....	\$ 10.00	0.00
OPERATOR: Tractor.....	\$ 7.79	0.00
OPERATOR: Asphalt Paver and Asphalt Spreader.....	\$ 10.00	0.00
TRUCK DRIVER.....	\$ 9.22	0.00

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

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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 union or non-union.

Union Identifiers

An identifier enclosed in dotted lines beginning with characters other than "SU" denotes that the union classification and rate have found to be prevailing for that classification. Example: PLUM0198-005 07/01/2011. The first four letters , PLUM, indicate the international union and the four-digit number, 0198, that follows 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. The date, 07/01/2011, following these characters is the effective date of the most current negotiated rate/collective bargaining agreement which would be July 1, 2011 in the above example.

Union prevailing wage rates will be updated to reflect any changes in the collective bargaining agreements governing the rates.

0000/9999: weighted union wage rates will be published annually each January.

Non-Union Identifiers

Classifications listed under an "SU" identifier were derived from survey data by computing average rates and are not union rates; however, the data used in computing these rates may include both union and non-union data. Example: SULA2004-007 5/13/2010. SU indicates the rates are not union majority rates, LA indicates the State of Louisiana; 2004 is the year of the survey; and 007 is an internal number used in producing the wage determination. A 1993 or later date, 5/13/2010, indicates the classifications and rates under that identifier were issued as a General Wage Determination on that date.

Survey wage rates will remain in effect and will not change until a new survey is conducted.

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
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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.

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Washington, DC 20210

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END OF GENERAL DECISION

Screed.....\$ 15.13
 Shuttle Buggy.....\$ 14.76
 Tractor.....\$ 10.36

Truck drivers:

Dump Truck.....\$ 14.15
 Lowboy Truck.....\$ 14.04
 Water Truck.....\$ 12.53

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

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)).

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

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END OF GENERAL DECISION

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-101-4

CODE: (IS)

DATE: 11/05/2008

SUBJECT: Definitions

Section 101, Definitions and Terms, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows:

907-101.02--Definitions. Replace the following definitions in Subsection 101.02 on pages 3 through 13.

Contract - The written agreement between the Mississippi Transportation Commission and the Contractor setting forth the obligations of the parties thereunder, including but not limited to, the performance of the work, the furnishing of labor and materials, and the basis of payment.

The contract includes the invitation for bids, proposal, contract form and contract bonds, specifications, supplemental specifications, interim specifications, general and detailed plans, special provisions, notices to bidders, notice to proceed, and also any agreements that are required to complete the construction of the work in an acceptable manner, including authorized extensions thereof, all of which constitute one instrument.

Contract Bonds - The approved form of security, executed by the Contractor and the Contractor's Surety(ies), guaranteeing complete execution of the contract and all supplemental agreements pertaining thereto and the payment of all legal debts pertaining to the construction of the project. This term includes Performance and Payment Bond(s).

Surety - A corporate body, qualified under the laws of Mississippi, which is bound with and for the successful bidder by "contract bond(s)" to guarantee acceptable performance of the contract and payment of all legal taxes and debts pertaining to the construction of the project, including payment of State Sales Tax as prescribed by law, and any overpayment made to the Contractor.

Add the following to the list of definitions in Subsection 101.02 on pages 3 through 13.

Performance Bond - The approved form of security, executed by the Contractor and issued by the Contractor's Surety(ies), guaranteeing satisfactory completion of the contract and all supplemental agreements pertaining thereto.

Payment Bond - The approved form of security, executed by the Contractor and issued by the Contractor's Surety(ies), guaranteeing the payment of all legal debts pertaining to the construction of the project including, but not limited to, the labor and materials of subcontractors and suppliers to the prime contractor.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SUPPLEMENT TO SPECIAL PROVISION NO. 907-102-8

DATE: 10/25/2012

SUBJECT: Bidding Requirements and Conditions

Delete Subsection 907-102.06 on page 1, and substitute the following.

907-102.06--Preparation of Proposal. Delete the first, fifth, sixth, and seventh paragraphs of Subsection 102.06 on pages 17 & 18, and substitute the following.

The bidder's complete original proposal shall be submitted upon the forms (Certification of Performance, Certification Regarding Non-Collusion, etc.) furnished by the Department and shall include Expedite Bid printed bid sheets along with the bid data on the MDOT-supplied USB Flash Drive. Expedite Bid System (EBS) files shall be downloaded from the Department's website www.goMDOT.com. In case of discrepancy between a unit price and the extension, the unit price will govern and the extension along with the total amount of the proposal will be corrected.

Bid sheets generated by the Department's Electronic Bid System (Transport Expedite Bid) along with a completed proposal package (with all forms completed and signed) will constitute the official bid and shall be signed on the last sheet of the Expedite Bid generated bid sheets and delivered to the Department in accordance with the provisions of Subsection 102.09. Bids submitted using any other form, format or means will result in an irregular bid. The bidder's bid data shall be saved on the MDOT-supplied USB Flash Drive and submitted with the bid. Failure to return the USB Flash Drive with bid data will result in an irregular bid.

Bidders are cautioned that using other versions of the Expedite Bid may result in improperly printed bid sheets. The correct version of Expedite Bid can be obtained at no cost from the MDOT Contract Administration Division or at the MDOT website, www.gomdot.com. The current version of Expedite Bid is also included on the MDOT-supplied USB Flash Drive.

The Expedite Bid generated bid sheets should be stapled together in order beginning with page 1, signed and included in the bid proposal package in the sealed envelope. Only the Expedite Bid generated sheets will be recognized as the official bid. The MDOT-provided USB Flash Drive containing the information printed on the Expedite Bid generated bid sheets should be placed in the padded envelope included with the bid proposal package and enclosed in the sealed envelope. Bid sheets printed from Expedite Bid should be a representation of the data returned on the flash drive. To have a true representation of the bid sheets, the Bidder must copy the EBS and EBS amendment files used to prepare the bid sheets to the flash drive. Otherwise, the unit prices bid will not be recorded to the flash drive. Bidders are cautioned that failure to follow proper flash drive handling procedures could result in the Department being unable to process the flash drive. Any modification or manipulation of the data contained on the flash drive, other than entering unit bid prices and completing all required Expedite Bid sections, will not be allowed and will cause the Contractor's bid to be considered irregular.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

| SPECIAL PROVISION NO. 907-102-8

CODE: (IS)

| DATE: 01/20/2011

SUBJECT: Bidding Requirements and Conditions

907-102.06--Preparation of Proposal. Delete the fifth, sixth, and seventh paragraphs of Subsection 102.06 on page 18 and substitute the following:

Bid sheets generated by the Department's Electronic Bid System (Transport Expedite Bid) along with a completed proposal package will constitute the official bid and shall be signed on the last sheet of the Expedite Bid generated bid sheets and delivered to the Department in accordance with the provisions of Subsection 102.09.

Bidders are cautioned that using other versions of the Expedite Bid may result in improperly printed bid sheets. The correct version of Expedite Bid can be obtained at no cost from the MDOT Contract Administration Division or at the MDOT website, www.gomdot.com.

If bidders submit Expedite Bid generated bid sheets, then the bid sheets included in the proposal should not be completed. The Expedite Bid generated bid sheets should be stapled together, signed and included in the bid proposal package in the sealed envelope. If both the forms in the proposal and the Expedite Bid generated bid sheets are completed and submitted, only the Expedite Bid generated sheets will be recognized and used for the official bid. The USB Flash Drive containing the information printed on the Expedite Bid generated bid sheets should be placed in the padded envelope included with the bid proposal package and enclosed in the sealed envelope. Bid sheets printed from Expedite Bid should be a representation of the data returned on the flash drive. To have a true representation of the bid sheets, the Bidder must copy the EBS and EBS amendment files used to prepare the bid sheets to the flash drive. Otherwise, the unit prices bid will not be recorded to the flash drive. Bidders are cautioned that failure to follow proper flash drive handling procedures could result in the Department being unable to process the flash drive. Any modification or manipulation of the data contained on the flash drive, other than entering unit bid prices and completing all required Expedite Bid sections, will not be allowed and will cause the Contractor's bid to be considered irregular.

907-102.08--Proposal Guaranty. Delete the first and second paragraphs in Subsection 102.08 on page 20 and substitute the following:

No proposal will be considered unless accompanied by certified check, cashier's check or bid bond, made payable to the State of Mississippi, in an amount of not less than five percent (5%) of the total amount of the proposal offered. The guaranty shall be evidence of good faith that, if awarded the contract, the bidder will execute the contract and give performance and payment contract bond(s) as stipulated in Subsection 907-103.05.1, 907-103.05.2, and as required by law.

If a bid bond is offered as guaranty, the bond must be on a form approved by the Executive Director, made by a Surety acceptable to the Executive Director and signed or countersigned by a Mississippi Agent or Qualified Nonresident Agent and the Bidder. Such bid bond shall also conform to the requirements and conditions stipulated in Subsection 907-103.05.2 as applicable.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-103-8

CODE: (SP)

DATE: 12/15/2009

SUBJECT: Award and Execution of Contract

Section 103, Award and Execution of Contract, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows:

907-103.04--Return of Proposal Guaranty. Delete the second paragraph of Subsection 103.04 on page 23 and substitute the following:

Certified checks or cashier's checks submitted as proposal guaranties, except those of the two lowest bidders, will be returned within 10 days of contract award. The retained proposal guaranty of the unsuccessful of the two lowest bidders will be returned within ten days following the execution of a contract with the successful low bidder. The retained proposal guaranty of the successful bidder will be returned after satisfactory performance and payment bonds have been furnished and the contract has been executed.

In the event all bids are rejected by the Commission, certified checks or cashier's checks submitted as proposal guaranty by all bidders will be returned within 10 days of rejection.

Delete Subsection 103.05 on page 23 and substitute the following:

907-103.05--Contract Bonds.

907-103.05.1--Requirement of Contract Bonds. Prior to the execution of the contract, the successful bidder shall execute and deliver to the Executive Director a performance and payment bond(s), in a sum equal to the full amount of the contract as a guaranty for complete and full performance of the contract and the protection of the claimants and the Department for materials and equipment and full payment of wages in accordance with Section 65-1-85 Miss. Code Ann. (1972 as amended). In the event of award of a joint bid, each individual, partnership, firm or corporation shall assume jointly the full obligations under the contract and the contract bond(s).

907-103.05.2--Form of Bonds. The form of bond(s) shall be that provided by or acceptable to the Department. These bonds shall be executed by a Mississippi agent or qualified nonresident agent and shall be accompanied by a certification as to authorization of the attorney-in-fact to commit the Surety company. A power of attorney exhibiting the Surety's original seal supporting the Mississippi agent or the qualified nonresident agent's signature shall be furnished with each bond. The Surety company shall be currently authorized and licensed in good standing to conduct business in the State of Mississippi with a minimum rating by A.M. Best of (A-) in the latest printing "Best's Key Rating Guide" to write individual bonds up to ten percent of the policy holders' surplus or listed on the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as

published by the United States Department of the Treasury, Financial Management Service, Circular 570 (latest revision as published and supplemented on the Financial Management Service Web site and in the Federal Register) within the underwriting limits listed for that Surety. All required signatures on the bond(s) and certifications shall be original signatures, in ink, and not mechanical reproductions or facsimiles. The [Mississippi agent](#) or [qualified nonresident agent](#) shall be in good standing and currently licensed by the Insurance Commissioner of the State of Mississippi to represent the Surety company(ies) executing the bonds.

Surety bonds shall continue to be acceptable to the Commission throughout the life of the Contract and shall not be canceled by the Surety without the consent of the Department. In the event the Surety fails or becomes financially insolvent, the Contractor shall file a new Bond in the amount designated by the Executive Director within thirty (30) days of such failure, insolvency, or bankruptcy. Subsequent to award of Contract, the Commission or the Department may [require additional security for any supplemental agreements executed under the contract or replacement security in the event of the surety\(ies\) loss of the ratings required above](#). Suits concerning bonds shall be filed in the State of Mississippi and adjudicated under its laws without reference to conflict of laws principles.

907-103.08--Failure to Execute Contract. In the first sentence of Subsection 103.08 on page 24, change “bond” to “performance and payment bonds”.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-104-4

CODE: (SP)

DATE: 03/01/2011

SUBJECT: Disposal of Materials

Section 104, Scope of Work, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows:

907-104.05--Removal and Disposal of All Materials From the Project. Delete the second sentence of the first full paragraph of Subsection 104.05 on page 30 and substitute the following:

The Contractor shall also furnish the Engineer a certified letter stating that the area of disposal is not in a wetland or in Waters of the U.S.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SUPPLEMENT TO SPECIAL PROVISION NO. 907-105-6

DATE: 12/12/2011

SUBJECT: Control of Work

After Subsection 907-105.05 on page 1, add the following.

907-105.14--Maintenance During Construction. Before the first sentence Subsection 105.14 on page 39, add the following:

The Contractor will be responsible for the maintenance of existing roadways within the limits of this project starting on the date of the Notice To Proceed / Beginning of Contract Time. Anytime work is performed in a travel lane, the Contractor shall install portable lane closure signs meeting the requirement of the MDOT Standard Drawing or MUTCD.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

| SPECIAL PROVISION NO. 907-105-6

CODE: (IS)

| DATE: 01/20/2011

| SUBJECT: Control of Work

Section 105, Control of Work, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is modified as follows:

907-105.05--Cooperation by Contractor. In the third sentence of the second paragraph of Subsection 105.05 on page 35, change “Notice to Proceed” to “Notice of Award”.

Delete the fourth paragraph of Subsection 105.05 on page 35, and substitute the following.

On projects that include erosion control pay items, the Contractor shall also designate a responsible person whose primary duty shall be to monitor and maintain the effectiveness of the erosion control plan, including NPDES permit requirements. This responsible person must be a Certified Erosion Control Person certified by an organization approved by the Department. Prior to or at the pre-construction conference, the Contractor shall designate in writing the Certified Erosion Control Person to the Project Engineer. The designated Certified Erosion Control Person shall be assigned to only one (1) project. When special conditions exist, such as two (2) adjoining projects or two (2) projects in close proximity, the Contractor may request in writing that the State Construction Engineer approve the use of one (1) Certified Erosion Control Person for both projects. The Contractor may request in writing that the Engineer authorize a substitute Certified Erosion Control Person to act in the absence of the Certified Erosion Control Person. The substitute Certified Erosion Control Person must also be certified by an organization approved by the Department. A copy of the Certified Erosion Control Person's certification must be included in the Contractor's Protection Plan as outlined in Subsection 907-107.22.1. This in no way modifies the requirements regarding the assignment and availability of the superintendent.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SUPPLEMENT TO SPECIAL PROVISION NO. 907-107-9

DATE: 08/23/2011

SUBJECT: Legal Relations and Responsibility to Public

907-107.14.2.2--Railroad Protective. Delete the first sentence of subparagraph (b) of Subsection 907-107.14.2.2 on page 3 and substitute the following.

(b) **Contractor's Liability - Railroad**, including subcontractors, XCU and railroad contractual with limits of \$1,000,000 each occurrence; \$2,000,000 aggregate.

After Subsection 907-107.17 on page 4, add the following:

907-107.18--Contractor's Responsibility for Utility Property and Services. After the first sentence of Subsection 107.18 on page 63, add the following:

Prior to any excavation on the project, the Contractor shall contact MS 811 and advise them to mark all known utilities in the area of the excavation.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

| SPECIAL PROVISION NO. 907-107-9

CODE: (IS)

| DATE: 01/20/2011

SUBJECT: Legal Relations and Responsibility to Public

Section 107, Legal Relations and Responsibility to Public, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows:

907-107.02--Permits, Licenses and Taxes. Delete in toto Subsection 107.02 on page 49 and substitute the following:

The Contractor or any Subcontractor shall have the duty to determine any and all permits and licenses required and to procure all permits and licenses, pay all charges, fees and taxes and issue all notices necessary and incidental to the due and lawful prosecution of the work. At any time during the life of this contract, the Department may audit the Contractor's or Subcontractor's compliance with the requirements of this section.

The Contractor or any Subcontractor is advised that the "Mississippi Special Fuel Tax Law", Section 27-55-501, et seq. and the Mississippi Use Tax Law, Section 27-67-1, et seq., and their requirements and penalties, apply to any contract or subcontract for construction, reconstruction, maintenance or repairs, for contracts or subcontracts entered into with the State of Mississippi, any political subdivision of the State of Mississippi, or any Department, Agency, Institute of the State of Mississippi or any political subdivision thereof.

The Contractor or any Subcontractor will be subject to one or more audits by the Department during the life of this contract to make certain that all applicable fuel taxes, as outlined in Section 27-55-501, et seq., and any sales and/or use taxes, as outlined in Section 27-67-1, et seq. are being paid in compliance with the law. The Department will notify the Mississippi State Tax Commission of the names and addresses of any Contractors or Subcontractors.

| **907-107.14--Damage Claims and Insurance.**

907-107.14.2--Liability Insurance. Delete Subsection 107.14.2 beginning on page 60 and substitute:

907-107.14.2.1--General. The Contractor shall carry Contractor's liability, including subcontractors and contractual, with limits not less than: \$500,000 each occurrence; \$1,000,000 aggregate; automobile liability - \$500,000 combined single limit - each accident; Workers' Compensation and Employers' Liability - Statutory & \$100,000 each accident; \$100,000 each employee; \$500,000 policy limit. Each policy shall be signed or countersigned by a Mississippi Agent or Qualified Nonresident Agent of the Insurance Company.

The Contractor shall have certificates furnished to the Department from the insurance companies providing the required coverage. The certificates shall be on the form furnished by the Department and will show the types and limits of coverage.

907-107.14.2.2--Railroad Protective. The following provisions are applicable to all work performed under a contract on, over or under the rights-of-way of each railroad shown on the plans.

The Contractor shall assume all liability for any and all damages to work, employees, servants, equipment and materials caused by railroad traffic.

Prior to starting any work on railroad property, the Contractor shall furnish satisfactory evidence to the Department that insurance of the forms and amounts set out herein in paragraphs (a) and (b) has been obtained. Also, the Contractor shall furnish similar evidence to the Railroad Company that insurance has been obtained in accordance with the Standard Provisions for General Liability Policies and the Railroad Protective Liability Form as published in the Code of Federal Regulations, 23 CFR 646, Subpart A. Evidence to the Railroad Company shall be in the form of a Certificate of Insurance for coverages required in paragraph (b), and the original policy of the Railroad Protective Liability Insurance for coverage required in paragraph (a).

All insurance herein specified shall be carried until the contract is satisfactorily complete as evidenced by a release of maintenance from the Department.

The Railroad Company shall be given at least 30 days notice prior to cancellation of the Railroad Protective Liability Insurance policy.

For work within the limits set out in Subsection 107.18 and this subsection, the Contractor shall provide insurance for bodily injury liability, property damage liability and physical damage to property with coverages and limits no less than shown in paragraphs (a) and (b). Bodily injury shall mean bodily injury, sickness, or disease, including death at anytime resulting therefrom. Property damage shall mean damages because of physical injury to or destruction of property, including loss of use of any property due to such injury or destruction. Physical damage shall mean direct and accidental loss of or damage to rolling stock and their contents, mechanical construction equipment or motive power equipment.

(a) **Railroad Protective Liability Insurance** shall be purchased on behalf of the Railroad Company with limits of \$2,000,000 each occurrence; \$6,000,000 aggregate applying separately to each annual period for lines without passenger trains. If the line carries passenger train(s), railroad protective liability insurance shall be purchased on behalf of the Railroad Company with limits of \$5,000,000 each occurrence; \$10,000,000 aggregate applying separately to each annual period.

Coverage shall be limited to damage suffered by the railroad on account of occurrences arising out of the work of the Contractor on or about the railroad right-of-way, independent of the railroad's general supervision or control, except as noted in paragraph 4 below.

Coverage shall include:

- (1) death of or bodily injury to passengers of the railroad and employees of the railroad not covered by State workmen's compensation laws,
- (2) personal property owned by or in the care, custody or control of the railroads,
- (3) the Contractor, or any of the Contractor's agents or employees who suffer bodily injury or death as a result of acts of the railroad or its agents, regardless of the negligence of the railroads, and
- (4) negligence of only the following classes of railroad employees:
 - (i) any supervisory employee of the railroad at the job site
 - (ii) any employee of the railroad while operating, attached to, or engaged on, work trains or other railroad equipment at the job site which are assigned exclusively to the Contractor, or
 - (iii) any employee of the railroad not within (i) or (ii) above who is specifically loaned or assigned to the work of the Contractor for prevention of accidents or protection or property, the cost of whose services is borne specifically by the Contractor or Governmental authority.

(b) **Regular Contractor's Liability**, including subcontractors, XCU and railroad contractual with limits of \$1,000,000 each occurrence; \$2,000,000 aggregate. **Automobile** with limits of \$1,000,000 combined single limit any one accident; **Workers' Compensation and Employer's Liability** - statutory and \$100,000 each accident; \$100,000 each employee; \$500,000 policy limit. **Excess/Umbrella Liability** \$5,000,000 each occurrence; \$5,000,000 aggregate. All coverage to be issued in the name of the Contractor shall be so written as to furnish protection to the Contractor respecting the Contractor's operations in performing work covered by the contract. Coverage shall include protection from damages arising out of bodily injury or death and damage or destruction of property which may be suffered by persons other than the Contractor's own employees.

In addition, the Contractor shall provide for and on behalf of each subcontractor by means of a separate and individual liability and property damage policy to cover like liability imposed upon the subcontractor as a result of the subcontractor's operations in the same amounts as contained above; or, in the alternative each subcontractor shall provide same.

907-107.15--Third Party Beneficiary Clause. In the first sentence of the first paragraph of Subsection 107.15 on page 61, change "create the public" to "create in the public".

907-107.17--Contractor's Responsibility for Work. Delete the fifth sentence of the fifth paragraph of Subsection 107.17 on page 63 and substitute the following:

The eligible permanent items shall be limited to traffic signal systems, changeable message signs, roadway signs and sign supports, lighting items, guard rail items, delineators, impact attenuators, median barriers, bridge railing or pavement markings. The eligible temporary items shall be limited to changeable message signs, guard rail items, or median barriers.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-108-29

CODE: (SP)

DATE: 03/19/2013

SUBJECT: Prosecution and Progress

PROJECT: ITS-9999-09(028) / 106397301 & 302 -- Warren and Adams Counties

Section 108, Prosecution and Progress, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-108.01--Subletting of Contracts.

907-108.01.1--General. At the end of the last paragraph of Subsection 108.01.1 on page 73, add the following.

The Engineer will have the authority to suspend the work wholly or in part and to withhold payments because of the Contractor's failure to make prompt payment within 15 calendar days as required above, or failure to submit the required OCR-484 Form, Certification of Payments to Subcontractors, which is also designed to comply with prompt payment requirements.

907-108.03--Prosecution and Progress. Delete Subsection 108.03.1 on pages 75 & 76, and substitute the following.

907-108.03.1--Progress Schedule. Prior to or at the Pre-Construction Conference, the Contractor shall furnish a progress schedule and be prepared to discuss both its proposed methodologies for fulfilling the scheduling requirements and its sequence of operations. The Engineer will review the schedule and approve the schedule as it relates to compliance with the specifications and logic. The progress schedule must be approved by the Engineer prior to commencing work. The schedule shall be a bar-chart type schedule submitted on 11"x17" paper meeting the below minimum requirements. These activities shall be significantly detailed enough to communicate the Contractor's understanding of the construction sequencing and phasing of the project.

When preparing the progress schedule, the Contractor shall include the following:

- Show a time scale to graphically show the completion of the work within contract time.
- Define and relate activities to the contract pay items.
- Show all activities in the order the work is to be performed including submittals, submittal reviews, fabrication and delivery.
- Show all activities that are controlling factors in the completion of the work.
- Show the time needed to perform each activity and its relationship in time to other activities.

Should the schedule not include the above requirements or becomes unrealistic during construction, the Contractor should immediately submit a revised, more realistic schedule for approval.

907-108.03.2--Preconstruction Conference. Delete the first paragraph of Subsection 108.03.2 on page 76 and substitute the following.

Prior to commencement of the work, a preconstruction conference shall be held for the purpose of discussing with the Contractor essential matters pertaining to the prosecution and satisfactory completion of the work. The Contractor will be responsible for scheduling the preconstruction conference. The Contractor will advise the Project Engineer in writing seven (7) days prior to the requested date that a conference is requested. When the contract requires the Contractor to have a certified erosion control person, the Contractor's certified erosion control person shall be at the preconstruction conference. The Department will arrange for utility representatives and other affected parties to be present.

Delete the third paragraph of Subsection 108.03.2 on page 76.

907-108.06--Determination and Extension of Contract Time. Delete Subsections 108.06.1 and 108.06.2 on pages 79 thru 85 and substitute the following.

907-108.06.1--Blank.

907-108.06.2--Based on Calendar Date Completion.

907-108.06.2.1--Contract Time. Contract Time will be established on the basis of a Specified Completion Date as indicated in the contract documents. The span of time allowed for the completion of the physical features of work included in the contract will be known as "Contract Time."

The Contractor shall provide sufficient materials, equipment and labor to guarantee the completion of the project in accordance with the plans and specifications within the Contract Time.

907-108.06.2.2--Extension of Time. The Contractor may, prior to the expiration of the Contract Time, make a written request to the Engineer for an extension of time with a valid justification for the request. The Contractor's plea that insufficient time was specified is not a valid reason for extension of time.

The specified completion date will not be adjusted for any reason, cause or circumstance whatsoever, regardless of fault, save, and except in the instance of a catastrophic event (e.g., tornado, earthquake, hurricane, named tropical storm, or declared state of emergency) which occurs through no fault of the Contractor.

The parties to this contract anticipate that delays may be caused by or arise from any number of events during the course of the contract, included but not limited to work performed, work deleted, change orders, supplemental agreements, quantity adjustments, delays, disruptions, differing site conditions, utility conflicts, design changes/revisions or defects, extra work, right-of-way issues, permitting issues, actions of suppliers, Subcontractors or other Contractors, actions by third parties, shop drawing approval process delays, plan review and approval process delays, weather, special events, holidays, suspension of Contractor's operations, or other such events, forces or factors sometimes experienced in highway and bridge construction work. Such delays or events and their potential impact on performance by the Contractor are specifically contemplated and acknowledged by the parties in entering into this contract and shall not extend the specified completion date. Further, any and all cost or impacts whatsoever incurred by the Contractor in accelerating the Contractor's work to overcome or absorb such delays or event impacts in an effort to complete the contract by the specified completion date, regardless of whether the Contractor successfully does so or not, shall be the sole responsibility of the Contractor in every instance.

Furthermore, there will be no contract adjustment in any compensable manner which could be but not limited to further monetary adjustment, equitable contract adjustment, additional overhead, additional equipment cost, labor cost due to the waiting period that may transpire from the Contractor waiting to proceed due to river levels, navigational restrictions be them natural or imposed at any time during the life of the contract.

If a catastrophic event occurs through no fault of the Contractor (e.g., tornado, earthquake, hurricane, named tropical storm, or declared state of emergency) directly and substantially affecting the Contractor's operations on the contract, the Contractor shall provide any and all documentation to support their justification to extend the completion date to the Department within fourteen (14) calendar days of the event. The Department will have fourteen (14) calendar days to review the Contractor's request to extend the specified completion date. If the Contractor and the Department are unable to reach an agreement, the Department shall unilaterally determine the number of calendar days to extend the specified completion date reasonably necessary and due solely to the catastrophic event and the Contractor shall have no right whatsoever to contest such determination, save and except that the Contractor establishes that the number of calendar days determined by the Department was arbitrary or without reasonable basis.

907-108.06.2.3--Cessation of Contract Time. When the Engineer by written notice schedules a final inspection, time will be suspended until the final inspection is conducted and for an additional 14 calendar days thereafter. If after the end of the 14-day suspension all necessary items of work have not been completed, time charges will resume. If the specified completion date had not been reached at the time the Contractor called for a final inspection, the calendar day difference between the specified completion date and the date the Contractor called for a final inspection will be added after the 14-day period before starting liquidation damages. If a project is on liquidated damages at the time a final inspection is scheduled, liquidated damages will be suspended until the final inspection is conducted and for seven (7) calendar days thereafter. If after the end of the 7-day suspension all necessary items of work have not been completed, liquidated damages will resume. When final inspection has been made by the

Engineer as prescribed in Subsection 105.16 and all items of work have been completed, the daily time charge will cease.

907-108.07--Failure to Complete the Work on Time. Delete the Schedule of Deductions table in Subsection 108.07 on page 85, and substitute the following.

Schedule of Deductions for Each Day of Overrun in Contract Time

Original Contract Amount		Daily Charge Per Calendar Day
From More Than	To and Including	
\$ 0	100,000	\$ 150
100,000	500,000	360
500,000	1,000,000	540
1,000,000	5,000,000	830
5,000,000	10,000,000	1,200
10,000,000	20,000,000	1,800
20,000,000	-----	3,500

907-108.10--Termination of Contractor's Responsibility. In the last sentence of Subsection 108.10 on page 88, change “bond” to “performance and payment bond(s)”.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SUPPLEMENT TO SPECIAL PROVISION NO. 907-109-5

DATE: 05/15/2012

SUBJECT: Measurement and Payment

After the last paragraph of Subsection 907-109.01 on page 1, add the following.

After the second sentence of the fourth full paragraph of Subsection 109.01 on page 90, add the following.

Where loose vehicle measurement (LVM) is used, the capacity will be computed to the nearest one-tenth cubic yard and paid to the whole cubic yard. Measurements greater than or equal to nine-tenths of a cubic yard will be rounded to the next highest number. Measurements less than nine-tenths of a cubic yard will not be rounded to the next highest number. Example: A vehicle measurement of 9.9 cubic yards will be classified as a 10-cubic yard vehicle. A vehicle measurement of 9.8 cubic yards will be classified as a 9-cubic yard vehicle.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-109-5

CODE: (IS)

DATE: 1/20/2011

SUBJECT: Measurement and Payment

Section 109, Measurement and Payment, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows:

907-109.01--Measurement of Quantities. Delete the third full paragraph of Subsection 109.01 on page 90 and substitute the following.

When requested by the Contractor, material specified to be measured by the cubic yard or ton may be converted to the other measure as appropriate. 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.

907-109.04--Extra and Force Account Work. In the last sentence of subparagraph (b) in Subsection 109.04 on page 91, change “bond” to “bond(s)”.

Delete the first sentence of the second paragraph of subparagraph (d) in Subsection 109.04 on page 92 and substitute the following:

In the event an agreement cannot be reached for a particular piece of equipment, the book entitled "Rental Rate Blue Book For Construction Equipment" as published by EquipmentWatch® and is current at the time the force account work is authorized will be used to determine equipment ownership and operating expense rates.

907-109.06--Partial Payment.

907-109.06.1--General. Delete the fourth and fifth sentences of the third paragraph of Subsection 109.06.1 on page 94, and substitute the following:

In the event mutual agreement cannot be reached, the Contractor will be allowed a maximum of 25 calendar days following the Contractor’s receipt of the monthly estimate in question to file in writing, a protest Notice of Claim in accordance with the provisions Subsection 105.17. Otherwise, the Engineer's estimated quantities shall be considered acceptable pending any changes made during the checking of final quantities.

907-109.07--Changes in Material Costs. Delete the third full paragraph of Subsection 109.07 on page 96 and substitute the following:

A link to the established base prices for bituminous products and fuels will be included in the contract documents under a Notice to Bidders entitled "Petroleum Products Base Prices."

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

| **SPECIAL PROVISION NO. 907-110-2**

CODE: (SP)

| **DATE: 04/02/2010**

SUBJECT: Wage Rates

Section 110, Required Contract Provisions, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows:

907-110.02--Application. Delete Subsection 110.02.2 on page 100 and substitute the following.

907-110.02.2--Wage Rates. All persons employed or working upon the site of the work will be paid at wage rates not less than those contained in the wage determination decision of the Secretary of Labor in effect 10 days prior to taking bids.

| **Bidders are advised that regardless of the wage rates listed in the Supplement to FHWA 1273 in the contract, minimum federal wage rates must be paid.**

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

| SPECIAL PROVISION NO. 907-237-4

CODE: (SP)

| DATE: 03/13/2012

SUBJECT: Wattles

Section 907-237, Wattles, is hereby added to and made a part of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction as follows.

SECTION 907-237 - WATTLES

907-237.01--Description. This work consists of furnishing, constructing and maintaining wattles for the retention of soil around inlets, swale areas, small ditches, sediment basins and other areas as necessary. Also, the work includes removing and disposing of the wattles and silt accumulations.

Measurement and payment for wattles will be made only when a pay item is included in the bid schedule of the proposal. The quantity is estimated for bidding purposes only and will be dependent upon actual conditions which occur during construction of the project.

| **907-237.02--Materials.** Wattles used around inlets shall have a diameter of twelve inches (12") and a length adequate to meet field conditions. Wattles used at other locations shall have a diameter of twenty inches (20") and a length adequate to meet field conditions. The minimum diameter for the above wattle sizes shall be one inch (1") less than the specified diameter.

The stakes used in securing the wattles in place shall be placed approximately three feet (3') apart throughout the length of the wattle. Stakes shall be wooden and of adequate size to stabilize the wattles to the satisfaction of the Engineer.

In addition to the requirements of this specifications, wattles shall be listed on the Department's "Approved Sources of Materials".

907-237.03--Construction Requirements.

907-237.03.1--General. The wattles shall be constructed at the locations and according to the requirements shown on the erosion control plan.

907-237.03.2--Maintenance and Removal. The Contractor shall maintain the wattles and remove and dispose of silt accumulations.

When the wattles are no longer needed, they shall be removed and the Contractor shall dispose of silt accumulations and treat the disturbed areas in accordance with the contract requirements.

907-237.04--Method of Measurement. Wattles of the size specified will be measured per linear foot.

907-237.05--Basis of Payment. Wattles, measured as prescribed above, will be paid for at the contract unit price per linear foot, which price shall be full compensation for installation, maintaining and removal of the wattles, the removal and disposal of silt accumulations and any required restoration of the disturbed areas.

Payment will be made under:

907-237-A: Wattles, Size - per linear foot

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-304-13

CODE: (SP)

DATE: 06/06/2012

SUBJECT: Granular Courses

Section 907-304, Granular Courses, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-304.02--Materials. After the first paragraph of Subsection 304.02.1 on page 183, add the following.

Crushed concrete meeting the requirements of Subsection 907-703.04.3 may be used in lieu of granular courses or crushed stone courses specified in the contract. This applies to base courses, shoulders, or other required construction on a prepared foundation.

907-304.03--Construction Requirements.

907-304.03.5--Shaping, Compacting and Finishing. Delete the sixth paragraph of Subsection 304.03.5 on page 185.

Delete the first table in Subsection 304.03.5 on page 186 and substitute the following.

Granular Material Class	Lot Average	Individual Test
7,8,9 or 10	97.0	93.0
5 or 6	99.0	95.0
3 or 4	100.0	96.0
1 or 2	102.0	98.0
Crushed Courses*	99.0	95.0

* When placed on filter fabric on untreated subgrade, the individual tests and the average of the five (5) tests shall equal or exceed the following values.

Lot Average	Individual Test
96.0	92.0

907-304.05--Basis of Payment. Add the “907” prefix to the pay items listed on page 187.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SUPPLEMENT TO SPECIAL PROVISION NO. 907-401-2

DATE: 07/19/2011

SUBJECT: Hot Mix Asphalt (HMA)

Add the following before 907-401.02.6.2 on page 1.

907-401.02.4--Substitution of Mixture. Delete the table in Subsection 401.02.4 on page 242, and substitute the following:

Mixture	Single Lift Laying Thickness Inches	
	Minimum	Maximum
25 mm	3	4
19 mm	2 ¼	3 ½
12.5 mm	1 ½	2 ½
9.5 mm	1	1 ½
4.75 mm	½	¾

After Subsection 907-401-02.6.2 on page 2, add the following:

907-401.02.6.4.1--Roadway Density. Delete subparagraphs 1., 2., & 3. on page 251 and substitute the following:

1. For all leveling lifts, when full lane width and with a thickness as specified in the table in Subsection 401.02.4, the required lot density shall be 92.0 percent of maximum density.
2. For all single lift overlays, with or without leveling and/or milling, the required lot density shall be 92.0 percent of maximum density.
3. For all multiple lift overlays of two (2) or more lifts excluding leveling lifts, the required lot density of the bottom lift shall be 92.0 percent of maximum density. The required lot density for all subsequent lifts shall be 93.0 percent of maximum density.
4. For all pavements on new construction, the required lot density for all lifts shall be 93.0 percent of maximum density.

907-401.02.6.5--Acceptance Procedure for Pavement Smoothness. Delete the third sentence of the sixth paragraph of Subsection 401.02.6.5 on page 254, and substitute the following.

The wheel paths shall be designated as being located three feet (3') and nine feet (9') from centerline or longitudinal joint, respectively.

907-401.03.1.2--Tack Coat. Delete the three sentences of Subsection 401.03.1.2 on page 259, and substitute the following:

Tack coat shall be applied to previously placed HMA and between lifts, unless otherwise directed by the Engineer. Tack coat shall be applied with a distributor spray bar. A hand wand will only be allowed for applying tack coat on ramp pads, irregular shoulder areas, median crossovers, turnouts, or other irregular areas. Bituminous materials and application rates for tack coat shall be as specified in Table 410-A on page 293. Construction requirements shall be in accordance with Subsection 407.03 of the Standard Specifications.

907-401.03.1.4--Density. Delete the first sentence of the first paragraph of Subsection 401.03.1.4 on page 259 and substitute the following:

The lot density for all dense graded pavement lifts, except as provided below for preleveling, wedging [less than fifty percent (50%) of width greater than minimum lift thickness], ramp pads, irregular shoulder areas, median crossovers, turnouts, or other areas where the established rolling pattern cannot be performed, shall not be less than the specified percent (92.0% or 93.0%) of the maximum density based on AASHTO Designation: T 209 for the day's production. For all leveling lifts, when full lane width and with a thickness as specified in the table in Subsection 401.02.4, the required lot density shall be 92.0 percent of maximum density.

907-401.03.9--Material Transfer Equipment. Delete the paragraph in Subsection 401.03.9 on page 264 and substitute the following:

Excluding the areas mentioned below, the material transferred from the hauling unit when placing the top lift, or the top two (2) lifts of a multi-lift HMA pavement with density requirements, shall be remixed prior to being placed in the paver hopper or insert by using an approved Materials Transfer Device. Information on approved devices can be obtained from the State Construction Engineer. Areas excluded from this requirement include: leveling courses, temporary work of short duration, detours, bridge replacement projects having less than 1,000 feet of pavement on each side of the structure, acceleration and deceleration lanes less than 1,000 feet in length, tapered sections, transition sections for width, shoulders less than 10 feet in width, crossovers, ramps, side street returns and other areas designated by the Engineer.

After Subsection 401.03.13 on page 266, add the following:

907-401.03.14--Shoulder Wedge. The Contractor shall attach a device to the screed of the paver that confines the material at the end gate and extrudes the asphalt material in such a way that results in a compacted wedge shape pavement edge of approximately 30 degrees, but not steeper than 35 degrees. The device shall maintain contact between itself and the road shoulder surface and allow for automatic transition to cross roads, driveways, and obstructions. The device shall be used to constrain the asphalt head reducing the area by 10% to 15% increasing the density of the extruded profile. Conventional single plate strike off shall not be used.

The device shall be TransTech Shoulder Wedge Maker, the Advant-Edge, or a similar approved equal device that produces the same wedge consolidation results. Contact information for these wedge shape compaction devices is the following:

1. TransTech Systems, Inc.
1594 State Street
Schenectady, NY 12304
800-724-6306
www.transtechsys.com

2. Advant-Edge Paving Equipment, LLC
P.O. Box 9163
Niskayuna, NY 12309-0163
518-280-6090
Contact; Gary D. Antonelli
Cell: 518-368-5699
email: garya@nycap.rr.com
Website: www.advantedgepaving.com

Before using a similar device, the Contractor shall provide proof that the device has been used on previous projects with acceptable results, or construct a test section prior to the beginning of work and demonstrate wedge compaction to the satisfaction of the Engineer. Short sections of handwork will be allowed when necessary for transitions and turnouts, or otherwise authorized by the Engineer.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-401-2

CODE: (IS)

DATE: 11/04/2005

SUBJECT: Hot Mix Asphalt (HMA)

Section 401, Hot Mix Asphalt (HMA) - General, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows:

Delete in toto Subsection 401.02.6.2 on pages 248 and 249, and substitute:

907-401.02.6.2--Assurance Program for Mixture Quality. The Engineer will conduct a quality assurance program. The quality assurance program will be accomplished as follows:

- 1) Conducting verification tests.
- 2) Validate Contractor test results.
- 3) Periodically observing Contractor quality control sampling and testing.
- 4) Monitoring required quality control charts and test results.
- 5) Sampling and testing materials at any time and at any point in the production or laydown process.

The rounding of all test results will be in accordance with Subsection 700.04.

The Engineer will conduct verification tests on samples taken by the Contractor under the direct supervision of the Engineer at a time specified by the Engineer. The frequency will be equal to or greater than ten percent (10%) of the tests required for Contractor quality control and the data will be provided to the Contractor within two asphalt mixture production days after the sample has been obtained by the Engineer. At least one sample shall be tested from the first two days of production. All testing and data analysis shall be performed by a Certified Asphalt Technician-I (CAT-I) or by an assistant under the direct supervision of the CAT-I. Certification shall be in accordance with the *MDOT HMA Technician Certification Program* chapter in the Materials Division Inspection, Testing, and Certification Manual. The Department shall post a chart giving the names and telephone numbers for the personnel responsible for the assurance program.

The Engineer shall be allowed to inspect Contractor testing equipment and equipment calibration records to confirm both calibration and condition. The Contractor shall calibrate and correlate all testing equipment in accordance with the latest versions of the Department's Test Methods and AASHTO Designation: R 18.

Random differences between the Engineer's verification tests and the current running average of four quality control tests at the time of obtaining the verification sample will be considered acceptable if within the following limits:

Item	Allowable Differences
Sieve - % Passing	
3/8-inch and above	6.0
No. 4	5.0
No. 8	4.0
No. 16, for 4.75 mm mixtures ONLY	3.5
No. 30	3.5
No. 200	2.0
AC Content	0.4
Specimen Bulk SG, Gmb @ N _{Design}	0.030
Maximum SG, Gmm	0.020

If four quality control tests have not been tested prior to the time of the first verification test, the verification test results will be compared to the average of the preceding quality control tests. If the verification test is the first material tested on the project or if a significant process adjustment was made just prior to the verification test, the verification test results will be compared to the average of four subsequent quality control test results. For all other cases after a significant process adjustment, the verification test results will be compared to the average of the preceding quality control tests (taken after the adjustment) as in the case of a new project start-up when four quality control tests are not available.

In the event that; 1) the comparison of the Contractor’s running average quality control data and Engineer’s quality assurance verification test results are outside the allowable differences in the above table, or 2) if a bias exists between the results, such that one of the results is predominately higher or lower than the other, and the Engineer’s results fail to meet the JMF control limits, the Engineer will investigate the reason immediately. As soon as the need for an investigation becomes known, the Engineer will increase the quality assurance sampling rate to the same frequency required for Contractor testing. The additional samples obtained by the Engineer may be used as part of the investigation process or for routine quality assurance verification tests. The Engineer's investigation may include testing of the remaining quality control split samples, review and observation of the Contractor's testing procedures and equipment, and a comparison of split sample test results by the Contractor quality control laboratory, Department quality assurance laboratory and the Materials Division laboratory. The procedures outlined in the latest edition of MDOT’s Field Manual for HMA may be used as a guide for the investigation. In the event that the Contractor’s results are determined to be incorrect, the Engineer's results will be used for the quality control data and the appropriate payment for the mixture will be based on the procedures specified in Subsection 401.02.5.8(j).

The Engineer will periodically witness the sampling and testing being performed by the Contractor. The Engineer, both verbally and in writing, will promptly notify the Contractor of any observed deficiencies. When differences exist between the Contractor and the Engineer which cannot be resolved, a decision will be made by the State Materials Engineer, acting as the referee. The Contractor will be promptly notified in writing of the decision. If the deficiencies are not corrected, the Engineer will stop production until corrective action is taken.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-401-6

CODE: (SP)

DATE: 08/21/2012

SUBJECT: Warm Mix Asphalt (WMA)

Section 401, Hot Mix Asphalt (HMA) - General, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction as amended by this special provision is applicable to Warm Mix Asphalt Only.

907-401.01--Description.

These specifications include general requirements that are applicable to Warm Mix Asphalt (WMA).

This work consists of the construction of one or more lifts of WMA in accordance with Section 401 for Hot Mix Asphalt, with the exceptions set forth in this special provision. The WMA shall meet the specific requirements for the mixture to be produced and placed in reasonably close conformity with the lines, grades, thicknesses and typical sections shown on the plans or established by the Engineer.

907-401.02--Materials.

907-401.02.2--WMA Products and Processes. The Department will maintain a list of qualified WMA products and processes. No product or process shall be used unless it appears on this list.

The Contractor may propose other products or processes for approval by the Product Evaluation Committee. Documentation shall be provided to demonstrate laboratory performance, field performance, and construction experience.

907-401.03--Construction Requirements.

907-401.03.1.1--Weather Limitations. The air and pavement temperature at the time of placement shall equal or exceed 40°F, regardless of compacted lift thickness.

907-401.03.8--Preparation of Mixture. Warm mix asphalt is defined as a plant produced asphalt mixture that can be produced and constructed at lower temperatures than typical hot mix asphalt. Typical temperature ranges of non-polymer modified, WMA produced by foaming the asphalt binder at the plant are typically 270°F to 295°F at the point of discharge of the plant. Typical temperature ranges of polymer modified, WMA produced by foaming the asphalt binder at the plant are typically 280°F to 305°F at the point of discharge of the plant. WMA produced by addition of a terminal blended additive may allow the producer to reduce the temperatures below 270°F as long as all mixture quality and field density requirements are met. Production temperatures at the plant may need to be increased or decreased due to factors such as material

characteristics, environmental conditions, and haul time to achieve mixture temperatures at the time of compaction in which uniform mat density can be achieved.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SUPPLEMENT TO SPECIAL PROVISION NO. 907-403-4

DATE: 01/08/2013

SUBJECT: Hot Mix Asphalt (HMA)

Before Subsection 907-403.05.2 on page 1, add the following:

907-403.03--Construction Requirements.

907-403.03.2--Smoothness Tolerances. Delete the fourth paragraph of Subsection 403.03.2 on page 267 and substitute the following.

Where only a surface lift is required, the finished surface lift shall have a profile index of not more than 60.0 inches per mile.

Delete the last paragraph of Subsection 403.03.2 at the bottom of page 268, and the table at the top of page 269 and substitute the following:

Except for a single lift overlay, when the Profile Index for the final surface lift is less than or equal to eighteen inches per mile (18.0 inches / mile) per segment, a unit price increase will be added. The following schedule lists the Profile Index range and the corresponding contract price adjustment:

Profile Index inches / mile / segment	Contract Price Adjustment percent of unit bid price
less than 6.0	108
6.0 to 10.0	106
10.1 to 14.0	104
14.1 to 18.0	102
18.1 to Required P.I.	100
over Required P.I.	100 (with correction to Required P.I.)

For a single lift overlay, when the Profile Index for the final surface lift is less than or equal to eighteen inches per mile (18.0 inches / mile) per segment, a unit price increase will be added. The following schedule lists the Profile Index range and the corresponding contract price adjustment:

Profile Index inches / mile / segment	Contract Price Adjustment percent of unit bid price
less than or equal to 18.0	103
18.1 to Required P.I.	100
over Required P.I.	100 (with correction to Required P.I.)

Delete the first full paragraph of Subsection 403.03.2 on page 269 and substitute the following:

Contract price adjustments for rideability shall only be applicable to the surface lift and furthermore to only the segment(s) or portions of the segments(s) of the surface lift that require smoothness be determined by using a profilograph.

Delete the third full paragraph of Subsection 403.03.2 on page 269 and substitute the following:

Any contract price adjustment for rideability will be applied on a segment to segment basis on the theoretical tonnage based on 12-foot lanes, determined in accordance with Subsections 401.02.6.5 and 403.04, for the segment(s) or portions thereof for which an adjustment is warranted.

Delete Subsection 403.03.5.5 on page 273 and substitute the following:

907-403.03.5.5--Preliminary Leveling. All irregularities of the existing pavement, such as ruts, cross-slope deficiencies, etc., shall be corrected by spot leveling, skin patching, feather edging or a wedge lift in advance of placing the first overall lift.

907-403.04--Method of Measurement. After the first paragraph of Subsection 403.04 on page 274, add the following.

The pay quantities for each individual job mix formula (JMF) will be calculated using the approved JMF maximum specific gravity (Gmm) and the following formulas.

When the composite mixture has a maximum specific gravity of 2.540 or less,

$$T_p = T_w$$

When the composite mixture has a maximum specific gravity greater than 2.540,

$$T_p = T_w((100-(((Gmm*A*B)-C)/(Gmm*A*B))*100))/100$$

Where:

- T_p = Total tonnage for payment
- T_w = Total tonnage weighed, used and accepted

Gmm = Maximum Specific Gravity of the approved composite asphalt mixture

A = 46.725 lbs/yd²/in

B = 0.93 = 93% density

C = 110.374 lbs/yd²/in = Theoretical density at 2.540 Gmm

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-403-4

CODE: (IS)

DATE: 11/04/2005

SUBJECT: Hot Mix Asphalt (HMA)

Section 403, Hot Bituminous Pavement, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows:

907-403.05.2--Pay Items. Add the "907" prefix to the pay items listed on page 275 & 276.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-403-12

CODE: (SP)

DATE: 08/21/2012

SUBJECT: Warm Mix Asphalt (WMA)

Section 403, Hot Bituminous Pavement, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction as amended by this special provision is applicable to Warm Mix Asphalt Only.

907-403.01--Description. This work consists of constructing one or more lifts of Warm Mix Asphalt (WMA) pavement in accordance with the requirements of Section 403 for Hot Mix Asphalt, with the exceptions set forth in this special provision. The WMA shall meet the requirements of this section and placed in reasonably close conformity with the lines, grade, thicknesses, and typical cross sections shown on the plans or established by the Engineer.

907-403.04--Method of Measurement. Warm mix asphalt will be measured by the ton. The weight of the composite mixture shall be determined in accordance with the provisions of Subsection 401.03.2.1.11.

907-403.05--Basis of Payment. Subject to the adjustments set out in Subsections 401.02.6.3, 401.02.6.4, 401.02.6.5, 401.02.6.6 & 403.03.2, warm mix asphalt, measured as prescribed above, will be paid for at the contract unit price per ton for each lift of pavement specified in the bid schedule and shall be full compensation for completing the work.

907-403.05.2--Pay Items. After the last pay item listed on page 276, add the following:

907-403-M: Warm Mix Asphalt, (1) , (2) - per ton
Type Mixture

907-403-N: Warm Mix Asphalt, (1) , (3) , Leveling - per ton
Type Mixture

907-403-O: Warm Mix Asphalt, (1) , (4) , Trench Widening - per ton
Type Mixture

907-403-P: Warm Mix Asphalt, HT, (3) , Polymer Modified - per ton
Mixture

907-403-Q: Warm Mix Asphalt, HT, (3) , Polymer Modified, Leveling - per ton
Mixture

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-407-1

CODE: (SP)

DATE: 02/26/2008

SUBJECT: Tack Coat

Section 407, Tack Coat, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows:

907-407.02.1--Bituminous Material. Delete the second sentence of the first paragraph of Subsection 407.02.1 on page 281, and substitute the following:

When not specified, the materials shall be as specified in Table 410-A on page 293.

907-407.03.3--Application of Bituminous Material. Delete the first paragraph of Subsection 407.03.3 on page 281, and substitute the following.

Tack coat shall be applied with a distributor spray bar. A hand wand will only be allowed for applying tack coat on ramp pads, irregular shoulder areas, median crossovers, turnouts, or other irregular areas. Bituminous materials and application rates for tack coat shall be as specified in Table 410-A on page 293. Tack coat shall not be applied during wet or cold weather, after sunset, or to a wet surface. Emulsions shall be allowed to "break" prior to superimposed construction.

907-407.05--Basis of Payment. Delete the pay item at the end of Subsection 407.05 on page 282, and substitute the following:

907-407-A: Asphalt for Tack Coat *

- per gallon

* Grade may be specified

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-601-1

CODE: (IS)

DATE: 08/29/2007

SUBJECT: Structural Concrete

Division 600, Incidental Construction, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows:

After the heading **DIVISION 600 - INCIDENTAL CONSTRUCTION**, add the following:

Unless otherwise specified, all testing of Portland cement concrete in Division 600 shall be in accordance with the requirements of Subsection 907-601.02.1.

907-601.02--Materials.

907-601.02.1--General. Delete the second and third sentence of the first paragraph of Subsection 601.02.1 on page 348, and substitute the following:

Sampling and testing will be in accordance with TMD-20-04-00-000 or TMD-20-05-00-000, as applicable.

907-601.03.6.3--Removal of Falsework, Forms, and Housing. Delete the first paragraph, the table and second paragraph of Subsection 601.03.6.3 on pages 349 and 350, and substitute the following:

The removal of falsework, forms, and the discontinuance of heating, shall be in accordance with the provisions and requirements of Subsection 907-804.03.15, except that the concrete shall conform to the following compressive strength requirements:

Wingwall and Wall Forms not Under Stress	1000 psi
Wall Forms under Stress	2200 psi
Backfill and Cover clear	2400 psi

In lieu of using concrete strength cylinders to determine when falsework, forms, and housings can be removed, an approved maturity meter may be used to determine concrete strengths by inserting probes into concrete placed in a structure. The minimum number of maturity meter probes required for each structural component shall be in accordance with Subsection 907-804.03.15. Procedures for using the maturity meter and developing the strength/maturity relationship shall follow the requirements of Subsection 907-804.03.15. Technicians using the maturity meter or calculating strength/maturity graphs shall meet the requirements of Subsection 907-804.03.15.

907-601.05--Basis of Payment. Add the “907” prefix to the pay items listed on page 352.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-619-5

CODE: (SP)

DATE: 03/09/2009

SUBJECT: Changeable Message Signs

Section 619, Traffic Control for Construction Zones, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows:

907-619.02--Material Requirements. After Subsection 619.02.13 on page 424, add the following.

907-619.02.14--Changeable Message Sign. This work shall consist of furnishing, testing, and maintaining a trailer-mounted electronic Portable Changeable Message Sign (PCMS) assembly. The sign display shall be a LED, full matrix sign. If more than one portable changeable message sign is required for this project, they shall all be of the same model and from the same manufacturer. All parts and materials used to construct the portable changeable message signs shall be interchangeable.

The PCMS shall be a trailer-mounted, solar powered, portable changeable message sign.

Each PCMS shall include the following main components:

- a) Sign Housing
- b) LED Modules
- c) LED Drivers
- d) Battery Bank
- e) Sign Controller
- f) Trailer
- g) AC Charger
- h) Solar Panel
- i) Solar Panel Charger

The LED display shall be full matrix sign with a minimum of 28-pixel rows x 50-pixel columns. The pixel spacing shall be such that three (3) lines of text (5 columns x 7 rows, 8 characters) shall each have a nominal height of 18 inches.

The PCMS shall include a remote communications interface as specified herein. The PCMS shall be provided with a local serial and USB connection within the sign control cabinet so that a laptop computer using the remote software can communicate directly with the sign CPU.

This Special Provision incorporates normative references to other standards as outlined in Section 1 of the NEMA TS-4 standard and as listed below.

NEMA TS4-2004, Hardware Standards for Dynamic Message Signs (DMS) with NTCIP Requirements. All NEMA TS-4 requirements that are applicable to portable signs shall be used.

NTCIP Standards.

If a conflict between the standards referenced and this Special Provision, this Special Provision shall govern.

The definitions of the terms used within this Special Provision are as defined in Section 1 of the NEMA TS-4 standard.

If required in the contract, the PCMS shall include a speed radar unit as specified herein.

907-619.02.14.1--Mechanical Construction. Each PCMS shall meet the following minimum requirements.

Weather-Tight Enclosure. The entire sign and trailer assembly, including each component / equipment exposed to weather, shall be fully protected. It shall withstand the effects of sand, dirt, dust, moisture, hose-directed water, ice, snow and UV radiation (UVA and UVB). It shall withstand the effects of high wind loading and blowing rain as specified herein with all outriggers and/or leveling jacks in place. The sign and all components shall be watertight. Space shall be provided for manuals to be stored in a weatherproof environment.

Wind Loading. Wind loading requirements for the portable sign housing and trailer assembly shall be as specified in Section 3.3.2.1.2 of the NEMA TS-4 standard.

Welding. All welding on all major structural components (aluminum or steel) shall be performed by certified welders and in accordance to SAE/AWS D8.8 American Welding Society.

Protective Coatings. Protective coatings or processes, such as anodizing, e-coating, powder coat painting, plating, etc., shall be incorporated to protect all sign, cabinet, and trailer metal surfaces from corrosion. Any non-protected metallic fasteners shall be made of stainless steel or aluminum. All components shall be similar material, or be isolated to reduce galvanic reactions.

Temperature and Humidity. Each PCMS shall be designed to operate continuously in extreme ambient temperature ranges and at high humidity levels.

Operating ambient temperature range of the portable sign and trailer assembly shall be -29°F to +165°F. Storage temperature range shall be from -40°F to +185°F. The portable sign shall be capable of continued operation within the operating temperature ranges specified without the need for active systems (i.e., fans). Operating relative humidity level of the portable sign shall be up to 95% non-condensing.

Sign Face. Sign face material shall be protected by a non-glaring polycarbonate material of at least ¼-inch thickness. It shall be replaceable and manufactured of material rated for outside use and resistant to UV degradation (exposure to the sun).

All electronics and pixels shall be protected from damage due to moisture.

Sign Housing Construction. The portable sign housing, including its front face panels, shall be designed to conform to the requirements of minimum NEMA Type 3R, as described in the latest edition of NEMA 250.

It shall be comply with latest structural AASHTO requirements.

It shall be constructed of aluminum sheeting which shall not be less than 1/8-inch thick with all seams continuously welded by the inert gas process.

The front of the sign housing shall have a flat black matte finish.

Weep holes shall be provided in the housing to allow moisture from condensation to escape.

The sign housing and cabinets shall be designed to keep insects out.

The sign housing shall be constructed in such a manner as to prohibit stray light from reducing legibility.

All sides of the sign housing shall have a maintenance-free finish.

Alignment of the sign housing shall be capable of being horizontally adjusted to position the sign a full 360 degrees. It shall be capable of rotating and locking at any selected horizontal angle up to 360 degrees. A sight alignment tube/device shall be mounted to horizontally position the sign display. A positive brake assembly with lockable control arm shall be provided to position the sign display in the desired position.

It shall allow easy access to all components contained within the display housing without the removal of any external parts. Door locks shall be rigidly mounted. Gasketing shall be provided on all door openings and shall be dust-tight, permanently bonded to the door metal, and shall not stick to the mating metal surface. A gasket channel shall be provided to support the gasket on the door.

Trailer. Each PCMS trailer shall meet all requirements for trailers as outlined in Section 3.3.3 of the latest NEMA TS-4 standard as well as the following minimum requirements.

All trailers shall meet the requirements of FMVSS, Part 571 and SAE J684 for transport safety including, but not limited to the use of brakes, safety chains, coupling device, and lights. PCMS manufacturer shall provide instructions stating procedures necessary to insure safe transport.

The structural frame shall be capable of supporting the gross vehicle weight (GVW) load of the trailer corresponding to the axle and tire ratings that shall be in accordance with FMVSS, Part 571.

The tires shall be radial ST "Special Trailer" rated. The wheels shall be 15-inch steel wheels with five lug bolts per wheel. Each trailer wheel shall be equipped with one locking lug nut. A minimum of four keys for the locking lug nuts shall be supplied for each trailer.

The trailer shall be provided with a minimum of four outriggers or leveling jacks. One outrigger or leveling jack shall be mounted near each corner of the trailer. The length of the leveling jacks shall be such that when the trailer is level, all four jacks and the tongue jack can be lowered into the vertical position. The jacks shall be screw type jacks with a minimum 25-inch lift. Each jack shall include a swivel mechanism that allows the jacks to be swing up to a horizontal position for towing. The swivel mechanism shall secure the jack in both vertical and horizontal positions through a lock pin.

The trailer shall also be provided with a trailer stand mounted on the tongue of the trailer. The stand shall be corrosion resistant. It shall include a 6-inch wheel that allows horizontal positioning of the trailer. The stand shall be welded, not bolted, to the tongue of the trailer.

The trailer shall be provided with legal tail/brake lights, signals, and license plate mounting bracket. The trailer shall be supplied with an electrical harness assembly for connection to the tow vehicle and shall be terminated in a connector type to be specified by the Engineer.

The trailer shall be provided with a 2-inch "hammer blow coupler" style hitch in accordance with SAE J684 and interchangeable with a 2½-inch Pintle coupler / ring meeting SAE J847.

The trailer spring leafs shall be rated at a minimum of 3500 pounds.

The trailer shall be equipped with a sign display lift and control console. The lift shall be electric, hydraulic lift, or combination of both with manual backup lift. The lift shall be capable of lifting the display a minimum of seven feet (7') above the roadway surface. A mast safety pin shall be provided to prevent the sign display from falling in the event of an electric or hydraulic system failure.

The trailer shall have a minimum of 6,000-pound capacity hydraulic surge brake system along with a breakaway latch.

Illumination shall be provided as an integral part of the sign or trailer assembly to change the sign controller data in darkness.

The trailer shall contain batteries and photovoltaic (solar) panels as specified herein.

Photovoltaic (Solar) Panel System. Each PCMS shall include solar panels. A solar bank shall be assembled using multiple solar panels. All photovoltaic panels shall be listed in accordance with UL 1703, or equivalent. The solar cell bank shall have a minimum capacity of 240 watts. The

solar cell bank shall be mounted on a frame capable of being tilted at a minimum of one direction up to 61 degrees with zero degrees being horizontal. Solar cells shall be laminated between ethylene vinyl acetate and tempered glass. The solar panel shall incorporate an extruded aluminum frame. The solar battery charge controller shall include the following three state charger modes.

- Bulk
- Absorption
- Float

Battery Requirements. Each PCMS shall include batteries for primary energy storage on trailers. The battery bank capacity shall be a minimum of 900 amp/hours at 12VDC at 20-hour rate of discharge. The batteries shall be heavy duty deep cycle type rated for 80% discharge. A battery power disconnect shall be provided.

Battery enclosures shall be vented to prevent the accumulation of explosive gases. The battery cabinets must be lockable with a standard padlock.

AC Charging System. Each PCMS shall have an AC battery charging sub-system. The system shall be UL listed and operate from a standard 120VAC generator meeting all NEC requirements for portable equipment.

The solar battery charger shall include the following three state charger modes.

- Bulk
- Absorption
- Float

The AC battery charger shall have sufficient capacity to charge the battery bank from 80% discharged to fully charge in 24-hours, and operate the sign simultaneously. The AC battery charger shall be equipped with a male plug-in and a 50-foot long extension cord constructed of a minimum 12-gauge wire for this purpose.

907-619.02.14.2--Controller to Sign Interface. Each PCMS shall meet all applicable controller to sign interface requirements as outline in Section 4 of the NEMA TS-4 standard.

907-619.02.14.3--Display Properties. Each PCMS shall have a cone of vision (viewing angle) from the center (reference axis) shall be a minimum 15 degrees with the half-power viewing angle defined such that at a given distance from the LED, luminous intensity measured at any point at an angle of 7.5 degrees from the LED's center axis is no less than half the luminous intensity measured directly on the LED's center axis.

The minimum word legibility requirements shall be 1232 feet or greater under daytime light conditions and within the cone of visions as specified. Legibility is defined as the ability to discern the content of a display using a "word message". The minimum word legibility

requirement shall be documented either by a MDOT approved independent testing laboratory or by participation in the NTPEP test program.

The minimum visibility requirements shall be 3000 feet or greater under daytime light conditions and within the cone of vision as specified. Visibility is defined as the ability to recognize that a display exists. The minimum visibility requirement shall be documented either by a MDOT approved independent testing laboratory or by participation in the NTPEP test program.

The PCMS shall be capable of displaying standard fonts and font alphabets as specified in Sections 5.6.1 and 5.6.2.3 of the NEMA TS-4 standard and adhere to NTCIP 1203. The PCMS shall also support moving arrows.

Any NTPEP test results shall be for the PCMS model being used and shall be within the last three completed test cycles.

907-619.02.14.4--Optical Components. The pixels for the PCMS shall be manufactured using Light Emitting Diodes (LED). Changes to displays shall be performed by turning the LEDs in a pixel either on or off. The discrete, LED shall be an untinted, non-diffused, solid-state lamp that uses Aluminum Indium Gallium Phosphide (AlInGap) technology manufactured by Avago Technologies (formerly Agilent Technologies), Toshiba Corporation, Nichia Corporation, or functional equivalent. Horizontal and vertical spacing between modules shall be such that the horizontal and vertical pitch between all pixels is equal. A failure of one pixel shall not effect the operation of any other pixel.

All LEDs used to create a display in a single portable sign shall have a nominally rated LED life of 100,000 hours of operation under field conditions. This shall include a operating temperatures between -29°F to +165°F. LED life shall be defined as the time it takes for the LED light output to degrade to half of the LED's initial light output. Current through an LED shall be limited to the manufacturer's recommendation under any conditions. Each LED character module shall be rated for use over the environmental range specified herein, including heat absorption due to sunlight. The LEDs shall be protected from the outside environmental conditions, including moisture, snow, ice, wind, dust, dirt, and UV rays (UVA and UVB). All LEDs shall be mounted so that they present a uniform and legible display.

Pixels shall be replaceable in modular groupings (modules). All modules within a sign shall be the same size and interchangeable. The replacement of any module shall be possible with no more that simple non-vendor-specific hand tools, such as screw drivers or wrenches, without any physical modification to the module.

907-619.02.14.5--PCMS Controller and Storage Cabinets. All PCMS controller and storage cabinets shall be minimum NEMA 3R rated and be completely encased and lockable with a standard padlock as specified herein. A separate lockable storage cabinet shall be provided to house various accessories. The controller cabinet shall be manufactured to withstand all types of adverse weather conditions and shall be designed and installed to keep insects out. All components inside the controller cabinet shall be accessible without disconnecting any

unassociated wires or components. The controller cabinet shall be illumination. The keyboard terminal and control panel shall be housed. Lighted keys and terminal displays are acceptable.

All controls in the controller cabinet shall be labeled. The cabinet shall have a voltmeter gauge to indicate the current battery charge status. It shall have an amp gauge to indicate the current/charging status. It will be acceptable to have a display via digital readout on a control console or panel.

907-619.02.14.6--Electronics and Electrical. Each PCMS shall meet all applicable electronics and electrical requirements as outline in Section 8 of the NEMA TS-4 standard.

Sign Controller. The PCMS shall include a local sign controller with firmware. The local control interface shall have a keyboard capable of allowing full programming and control of the PCMS locally. It shall have a separate serial RS-232 or USB connection to allow a laptop computer using the remote control software to communicate directly with the sign controller.

Local and remote interfaces shall be password protected to safeguard against unauthorized use.

It shall perform and report the following minimum sign diagnostics both through the local interface and Remote Control Subsystem.

- LED brightness controls
- Sign status
- Communications status
- Battery voltage
- Photocell ambient light level.

It shall automatically report a low battery alarm to a remote user through the Remote Control Subsystem. It shall have an alarm for the controller door open and over temperature.

It shall store and display both textual and graphical symbols. It shall store a minimum of 20 pre-programmed messages and graphics. It shall display preprogrammed (by manufacturer) Manual on Uniform Traffic Control Devices (MUTCD) symbolic messages and standard arrows. It shall schedule predetermined sequences of messages based on a programmed time and date. Each sequence shall display up to four (4) programmed messages (text and/or graphics). It shall display conventional one, two, or three-line messages for display with a choice of a minimum of three font sizes. Character width shall be proportional to the letter type. The one line message font size shall be capable of displaying messages in full size to utilize the maximum area of display.

It shall allow for automatic and manual controls to adjust the brightness of the LEDs. Automatic control shall be capable of varying the LED brightness by sensing the ambient light level using photocells. Manual brightness control shall be password protected to safeguard against unauthorized use.

It shall display a preprogrammed default message or no message at all, after a power recovery from a power failure. The sign shall shut down its LED display if internal cabinet temperatures reach a level that is determined unsafe by the manufacturer.

All communications and power cabling shall be either shielded or routed within conduit to minimize potential EMI/RFI effects.

Remote Control Subsystem. The PCMS shall be supplied with all the hardware and software necessary to control the PCMS from a remote central station.

It shall have a cellular phone and/or modem capable of communication using a MDOT provided cellular service provider. The Contractor shall coordinate with MDOT for cellular service provider. The Contractor shall be responsible for establishing cellular service and providing activated phone number(s) as directed and approved by the MDOT. The Contractor shall pay for cellular service for this project until the Final Maintenance Release as documented by the State Construction Engineer at which time it will be turned over to MDOT.

The cellular service type shall be CDMA/1xRTT or GSM/GPRS, as directed by MDOT.

It shall be capable of supporting connection and remote control, programming and diagnostics via the Internet.

The subsystem shall have all necessary hardware such as external antenna, communications cables, and controller interface and NTCIP Sign controller software. The central station software meeting the following minimum requirements:

- Windows XP compatible
- Capable of running on any desktop or laptop.
- Capable of controlling all PCMS functions through windows and GUIs (Graphical User Interface)
- NTCIP compatible as specified herein.

Communications. In addition to any protocols that may be available from the PCMS Manufacturer, each sign controller shall support NTCIP as follows.

- NTCIP Protocol and Command Sets. This specification references several standards through their NTCIP designated names and numbers. Each NTCIP Component covered by these project specifications shall implement the most recent version of the standard that is available as of project advertisement date, including any and all prepared Amendments to these standards as of the same date.

Profile Implementation Conformance Specifications (PICS) for each NTCIP standard required shall be submitted for review and approval to the Department.

- RS-232 Interface. Communication interfaces using RS-232 shall conform, with the following minimum requirements.

- 1101 – NTCIP Simple Transportation Management Framework (STMF)
- 1203 - NTCIP Object Definition for Portable Dynamic Message Signs
- 2301 - NTCIP AP-STMF
- 2201 - NTCIP TP-Transportation Transport Profile
- 2103 – NTCIP SPPPP/RS232
- 2104 - NTCIP SP-PMPP/RS232

- Subnet Level. For each communication interface, the NTCIP Components may support additional Subnet Profiles at the manufacturer’s option. At any time, only one Subnet Profile shall be active on a given communication interface. The NTCIP Component shall be configurable to allow the field technician to activate the desired Subnet Profile.
- Transport Level. For each communication interface, the communication interface may support additional Transport Profiles at the manufacturer's option. Response data-grams shall use the same Transport Profile used in the request. Each communication interface shall support the receipt of data-grams conforming to any of the identified Transport Profiles at any time.
- Application Level. For each communication interface, all interfaces shall comply with NTCIP 1101 and shall meet the requirements for Conformance Level 1 (NOTE -See Amendment to standard). Optionally, the NTCIP Component may support SNMP traps. A communication interface may support additional Application Profiles at the manufacturer's option. Responses shall use the same Application Profile used by the request. Each communication interface shall support the receipt of Application data packets at any time allowed by the subject standards.

Information Level. For all communication interfaces, the information level protocol shall provide Full, Standardized Object Range Support of all objects required by these procurement specifications unless otherwise indicated below. The maximum Response Time for any object or group of objects shall be 200 milliseconds. All communication interfaces shall implement all mandatory objects of all mandatory Conformance Groups as defined in NTCIP 1203 and their respective Amendments. Table 1 indicates the modified object requirements for these mandatory objects. Table 2 shows the required minimum support of messages that are to be stored in permanent memory. The sign shall blank if a command to display a message contains an invalid Message CRC value for the desired message. Table 3 specifies the support of the required MULTI tags and their ranges.

It shall also implement all mandatory objects of the following optional conformance groups of NTCIP 1201.

- Time Management Conformal Group
- Report Conformal Group. Table 4 indicates the modified object requirements.
- Implement all objects of the Font Configuration Conformance Group, as defined in NTCIP 1203. Table 5 indicates the modified object requirements for this conformance group.

- Implement all objects of the PCMS Configuration Conformance Group, as defined in NTCIP 1203.
- Implement all objects of the Multi Configuration Conformance Group, as defined in NTCIP 1203. Table 6 indicates the modified object requirements for this conformance group.
- Implement all objects of the Multi Error Configuration, as defined in NTCIP 1203.
- Implement all objects of the Illumination/Brightness.
- Sign Status, as defined in NTCIP 1203.
- Status Error, as defined in NTCIP 1203.
- Pixel Error Status, as defined in NTCIP 1203.
- The sign display shall be capable of displaying preprogrammed Manual on Uniform Traffic Control Devices (MUTCD) symbolic messages and standard arrows. Since the display of graphics is currently not defined within the NTCIP Standards or their amendments, the vendor shall propose, and provide detailed documentation (i.e., interface protocol description level), how the specified graphical shapes can be displayed.
- Implement the optional objects listed in Table 7.

Table 1
Modified Object Ranges for Mandatory Objects

Object	Reference	Project Requirement
ModuleTableEntry	NTCIP 1201 Clause 2.2.3	Shall contain at least one row with moduleType equal to 3 (software). The moduleMake shall specify the name of the manufacturer, the moduleModel shall specify the manufacturer's name of the component and the modelVersion shall indicate the model version number of the component.
MaxGroupAddresses	NTCIP 1201 Clause 2.7.1	Shall be at least 1
CommunityNamesMax	NTCIP 1201 Clause 2.8.2	Shall be at least 3
PCMSNumPermanentMsg	NTCIP 1203 Clause 2.6.1.1.1.1	Shall be at least 20*
PCMSMaxChangeableMsg	NTCIP 1203 Clause 2.6.1.1.1.3	Shall be at least 50. Each message shall support at least 4 pages per message.
PCMSFreeChangeableMemory	NTCIP 1203 Clause 2.6.1.1.1.4	Shall be at least 70 when no messages are stored.
PCMSMessageMultiString	NTCIP 1203 Clause 2.6.1.1.1.8.3	The PCMS shall support any valid MULTI string containing any subset of those MULTI tags listed in Table 4.
PCMSControlMode	NTCIP 1203 Clause 2.7.1.1.1.1	Shall support at least the following modes: <ul style="list-style-type: none"> ▪ local ▪ external ▪ central ▪ centralOverride

Table 2
Content of Permanent Messages

Perm. Msg. Num.	Section 12 Description
1	Permanent Message #1 shall blank the display (i.e., command the sign to use PCMSMessageType 7). It shall have a run-time priority of 50.

Table 3
Required MULTI Tags

Code	Feature
f1	Field 1 - time (12hr)
f2	Field 2 - time (24hr)
f8	Field 8 - day of month
f9	Field 9 - month
f10	Field 10 - 2 digit year
f11	Field 11 - 4 digit year
Fl (and /fl)	flashing text on a line by line basis with flash rates controllable in 0.5 second increments.
Fo	Font
J12	justification - line - left
J13	justification - line - center
J14	justification - line - right
J15	justification - line - full
Jp2	justification - page - top
Jp3	justification - page - middle
Jp4	justification - page - bottom
Nl	New line
Np	New page, up to 2 instances in a message (i.e., up to 4 pages/frames in a message counting first page)
Pt	page times controllable in 0.5 second increments.

**Table 4
Modified Object Ranges for the Report Conformance Group**

Object	Reference	Project Requirement
maxEventLogConfigs	NTCIP 1201 Clause 2.5.1	Shall be at least 50
eventConfigurationMode	NTCIP 1201 Clause 2.4.3.1	The NTCIP Component shall support the following Event Configuration Modes: <ul style="list-style-type: none"> ▪ onChange ▪ greaterThanValue ▪ smallerThanValue
maxEventLogSize	NTCIP 1201 Clause 2.5.3	Shall be at least 200
maxEventClasses	NTCIP 1201 Clause 2.5.5	Shall be at least 16

**Table 5
Modified Object Ranges for the Font Configuration Conformance Group**

Object	Reference	Project Requirement
numfont	NTCIP 1203 Clause 2.4.1.1.1.1	Shall be at least 3*
maxFontCharacters	NTCIP 1203 Clause 2.4.1.1.1.3	Shall be at least 127**

* Upon delivery, the first font shall be a standard 18-inch font. The second font shall be a double-stroke 18-inch font. The third font shall be a 28-inch font.

** Upon delivery, the first three font sets shall be configured in accordance with the ASCII character set for the following characters:

"A" thru "Z" - All upper case letters.

"a" thru "z" - All lower case letters.

"0" thru "9" - All decimal digits.

Space (i.e., ASCII code 0x20).

Punctuation marks shown in brackets [. , ! ? - ' ' " " / ()]

Special characters shown in brackets [# & * + < >]

**Table 6
Modified Object Ranges for the MULTI Configuration Conformance Group**

Object	Reference	Project Requirement
defaultBackgroundColor	NTCIP 1203 Clause 2.5.1.1.1.1	The PCMS shall support the following background colors: <ul style="list-style-type: none"> ▪ black
defaultForegroundColor	NTCIP 1203 Clause 2.5.1.1.1.2	The PCMS shall support the following foreground colors: <ul style="list-style-type: none"> ▪ amber ▪ orange
defaultJustificationLine	NTCIP 1203 Clause 2.5.1.1.1.6	The PCMS shall support the following line justification: <ul style="list-style-type: none"> ▪ Left ▪ Center ▪ Right ▪ Full
defaultJustificationPage	NTCIP 1203 Clause 2.5.1.1.1.7	The PCMS shall support the following forms of page justification: <ul style="list-style-type: none"> ▪ Top ▪ Middle ▪ Bottom
defaultPageOnTime	NTCIP 1203 Clause 2.5.1.1.1.8	The PCMS shall support the full range of these objects with step sizes no larger than 0.5 seconds
defaultPageOffTime	NTCIP 1203 Clause 2.5.1.1.1.9	The PCMS shall support the full range of these objects with step sizes no larger than 0.5 seconds
defaultCharacterSet	NTCIP 1203 Clause 2.5.1.1.1.10	The PCMS shall support the following character sets: <ul style="list-style-type: none"> ▪ eightBit

Table 7
Optional Object Requirements

Object	Reference	Project Requirement
globalSetIDParameter	NTCIP 1201 Clause 2.2.1	
eventConfigLogOID	NTCIP 1201 Clause 2.5.2.7	
eventConfigAction	NTCIP 1201 Clause 2.5.2.8	
eventClassDescription	NTCIP 1201 Clause 2.5.6.4	
defaultFlashOn	NTCIP 1203 Clause 2.5.1.1.1.3	The PCMS shall support the full range of these objects with step sizes no larger than 0.5 seconds
defaultFlashOff	NTCIP 1203 Clause 2.5.1.1.1.4	The PCMS shall support the full range of these objects with step sizes no larger than 0.5 seconds
PCMSSWReset	NTCIP 1203 Clause 2.7.1.1.1.2	
PCMSMessageTimeRemaining	NTCIP 1203 Clause 2.7.1.1.1.4	
PCMSShortPowerRecoveryMessage	NTCIP 1203 Clause 2.7.1.1.1.8	
PCMSLongPowerRecoveryMessage	NTCIP 1203 Clause 2.7.1.1.1.9	
PCMSShortPowerLossTime	NTCIP 1203 Clause 2.7.1.1.1.10	
PCMSResetMessage	NTCIP 1203 Clause 2.7.1.1.1.11	
PCMSCommunicationsLossMessage	NTCIP 1203 Clause 2.7.1.1.1.12	
PCMSTimeCommLoss	NTCIP 1203 Clause 2.7.1.1.1.13	
PCMSEndDurationMessage	NTCIP 1203 Clause 2.7.1.1.1.15	
PCMSMemoryMgmt	NTCIP 1203 Clause 2.7.1.1.1.16	The PCMS shall support the following Memory

		management Modes: <ul style="list-style-type: none"> ▪ normal ▪ clearChangeableMessage ▪ clearVolatileMessages
PCMSMultiOtherErrorDescription	NTCIP 1203 Clause 2.7.1.1.1.20	If the vendor implements any vendor-specific MULTI tags, the PCMS shall be provided with documentation that includes meaningful error messages within this object whenever one of these tags generates an error.
PCMSIllumLightOutputStatus	NTCIP 1203 Clause 2.8.1.1.1.9	
watchdogFailureCount	NTCIP 1203 Clause 2.11.1.1.1.5	
PCMSStatDoorOpen	NTCIP 1203 Clause 2.11.1.1.1.6	
fanFailure	NTCIP 1203 Clause 2.11.2.1.1.8	
fanTestActivation	NTCIP 1203 Clause 2.11.2.1.1.9	
tempMinCtrlCabinet	NTCIP 1203 Clause 2.11.4.1.1.1	
tempMaxCtrlCabinet	NTCIP 1203 Clause 2.11.4.1.1.2	
tempMinSignHousing	NTCIP 1203 Clause 2.11.4.1.1.5	
tempMaxSignHousing	NTCIP 1203 Clause 2.11.4.1.1.6	

NTCIP Compliance Documentation. Software shall be supplied with full documentation, including a CD-ROM containing ASCII versions of the following Management Information Base (MIB) files in Abstract Syntax Notation 1 (ASN.1) format.

The relevant version of each official standard MIB Module referenced by the device functionality shall be included. If the device does not support the full range of any given object within a Standard MIB Module, a manufacturer specific version of the official Standard MIB Module with the supported range indicated in ASN.1 format in the SYNTAX and/or DESCRIPTION fields of the associated OBJECT TYPE macro shall be provided. The filename of this file shall be identical to the standard MIB Module, except that it will have the extension ".man".

A MIB Module in ASN.1 format containing any and all manufacturer-specific objects supported by the device with accurate and meaningful DESCRIPTION fields and supported ranges indicated in the SYNTAX field of the OBJECT-TYPE macros shall be provided. This includes a MIB containing any other objects supported by the device.

Additionally, the manufacturer shall provide a test procedure that demonstrates how the NTCIP compliance of both, the data dictionaries (NTCIP 1201, 1203, and their amendments) and the communications protocols have been tested. The manufacturer shall allow the use of any and all of this documentation by any party authorized by the Procuring Agency for systems integration purposes at any time initially or in the future, regardless of what parties are involved in the systems integration effort.

907-619.02.14.7--Additional Equipment Requirements. When the contract requires the PCMS to include a speed radar unit, the radar shall operate in the "K" band, in an "approach only" mode. In conjunction with the radar, the sign shall be capable of displaying the vehicle speeds. The unit shall be programmable to allow the interruption of user-defined messages by the vehicle speed display and/or alternate messages whenever a settable speed threshold is exceeded. The radar unit shall be encased in an aluminum enclosure with a polycarbonate lens, and the metal portion shall receive the same protective coating, priming, and painting as the rest of the sign

907-619.02.14.8--System Documentation. For each PCMS, the Contractor shall provide two (2) user manuals. The user manual shall include description and samples for all operational functions, software required to operate the sign on site and remotely, all wiring diagrams, a parts lists, the sign specifications, warranty information, maintenance information and schedule, and a trouble shooting table

Each copy shall be bound and shall contain laminated sheets.

907-619.03--Construction Requirements. After Subsection 619.03.9 on page 427, add the following.

907-619.03.10--Changeable Message Sign. Each changeable message sign shall be installed and continuously operated at the location selected by the Engineer on State right-of-way. The Contractor is advised that selected locations may be outside the planned indicated limits of the project. The Contractor shall perform all work necessary for preparation of the site selected and approved by the Engineer, to insure maximum safety for and sign visibility of the traveling public; and may be required to remove any temporary work at a later date as directed by the Engineer. The Contractor will also place a minimum of two plastic drums in advance of the sign and one beside the sign as long as it is in use. The Contractor shall be required to move the sign to a new location if directed by the Engineer.

The Contractor may be permitted to bring electric power from outside the normal right-of-way for operation of the equipment if the Department determines that the installation operation will not be hazardous to the traveling public. The Contractor will be required to secure a permit from the Department prior to any work by the power company on the right-of-way. The entire cost of

providing electrical service, power to operate the equipment, and removal of the power source from the right-of-way shall be borne by the Contractor.

The changeable message sign(s) will remain the property of the Contractor after the Engineer determines that there is no further need for the sign(s) on the project.

907-619.04--Method of Measurement. After the last paragraph of Subsection 619.04 on page 428, add the following.

Changeable message signs, as described above, will be measured by the unit. When directed, separate measurements will be made for items included in the contract and required for temporary site preparation for the sign as referenced in Subsection 907-619.03.10. Materials for which no pay items are included in the contract will not be measured for separate payment. Separate measurements will not be made for moving the changeable message sign to a new location, but materials used for which pay items are included in the contract and are necessary for repositioning the sign as directed by the Engineer will be measured for separate payment. Removal of materials used for site preparation for changeable message signs will not be measured for separate payment.

907-619.05--Basis of Payment. After the second paragraph of Subsection 619.05 on page 428, add the following.

Payment for items required by the Engineer for temporary location of the changeable message sign, and for which pay items are included in the contract, will be made by the individual pay item. No additional payment will be made for having to work outside the planned indicated project limits.

Payment for removal of materials used for site preparation at changeable message sign locations shall be included in the contract bid price for Maintenance of Traffic.

Between pay item nos. 619-E2 and 619-F1 on page 429, insert the following:

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

* Indicate when options are required

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-630-10

CODE: (SP)

DATE: 03/26/2013

SUBJECT: Contractor Designed Sign Supports

PROJECT: ITS-9999-09(028) / 106397301 & 302 -- Warren and Adams Counties

Section 630, Traffic Signs and Delineators, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-630.01--Description. Delete the last two paragraphs of Subsection 630.01 on page 454 and substitute the following:

The Contractor shall submit to the Bridge Engineer a design using steel. The design shall be a rectangular box truss connected at both the top and bottom to the vertical support posts. With the exception of cantilever mounts, overhead support structures shall have two vertical support posts at each end of the truss. Design drawings, calculations and other necessary supporting data shall be submitted as soon as possible after the Pre-Construction Conference. The design shall be prepared by a Professional Engineer registered in the State of Mississippi proficient in the design of overhead sign structures.

At a minimum, overhead sign supports shall be designed to withstand a 90 mph sustained wind speed. For projects that are in areas with higher wind standards, the higher standard is required. In addition to the loads required in the design specifications, overhead sign supports shall be designed to support a uniform load of 40 pounds per linear foot applied to the vertical truss to which the signs are attached, extending along the truss across the roadway below from points four feet outside each outer edge of pavement, unless otherwise specified. Appropriate damping or energy absorbing devices shall be installed in the event that an overhead structure is erected without installation of the permanent sign panels or if the area of permanent sign panels installed is not sufficient to prevent detrimental wind-induced vibration.

The larger of the following sign configurations shall be used in the design of overhead sign support structures:

- 1) The sign dimensions and configuration shown in the contract plans
- 2) Sign Height: 20 feet; Sign Width: Pavement Edge to Pavement Edge plus 16 feet
- 3) Sign Height: 20 feet; Sign Width: Post to Post Clear Spacing minus 44 feet

The sign widths in configurations 2) and 3) should be located symmetrically about the center of the truss.

For smaller and lighter Type 3 DMS signs where an overhead support is not specified on the plans and a walk-in enclosure is not included, a triple post support can be provided. This post

sign support shall be designed to withstand the same wind speed requirements specified above for the overhead supports.

901-630.01.1--Dynamic Message Sign Supports. In addition to the requirements above, supports for Dynamic Message Signs (DMS) shall also meet the following requirements.

The sign structure manufacturer shall consider truck induced wind loading in deflection calculations. The natural frequency response of the structure to truck induced wind loads when span type DMS structure are used shall be considered. More information can be obtained on this subject in the Transportation Research Board (National Research Council) "Truck Induced Wind Loads on Variable Message Signs", Research Record No. 1594, published in 1997.

The Contractor shall be responsible for the complete design of the structure, catwalk, footing, median barrier replacement, DMS attachments and all other related hardware.

Each structure shall be fully warranted for but not limited to rust, corrosion and structural failure as a complete assembly by the manufacturer.

The Contractor shall determine the actual span length and the actual length of support columns for all sign structures on the basis of existing field conditions and detailed survey completed by the Contractor.

All DMS over the roadway sign structures shall include a catwalk. The Contractor shall be responsible for the catwalk design and shall submit the design calculations to the Bridge Engineer for approval. For over the roadway signs, the catwalk shall span from the outside edge of the shoulder to the door on the DMS. The bottom of the catwalk shall be covered with a heavy galvanized wire mesh which shall have openings no larger than 1/4". The handrail for the catwalk shall be designed such that it can be lowered when it is not in use.

All pedestal mounted DMS sign structures shall consist of a single steel pole with the DMS centered over the front face of the pole. The top of the pole shall not extend above the top of the DMS.

All post supported type 3 DMS shall consist of a triple post support and the top of the posts shall not extend above the top of the DMS.

Pedestal mounted structures shall also include a catwalk "Landing" area on the same side as the door of the DMS. This Landing area shall be of sufficient size and design to allow someone to stand on the landing area prior to opening the door and entering the walk-in structure. If a non-walkin DMS is provided, the pedestal mounted structure shall include a catwalk of sufficient length for the entire DMS to be serviced from the catwalk. The bottom of the catwalk shall be covered with a heavy galvanized wire mesh which shall have openings no larger than 1/4". The handrail for the catwalk shall be designed such that it can be lowered when it is not in use.

The Contractor shall be responsible for performing soil borings at each location to be used in the design of the foundations and sign supports. If soil conditions required the use of any shoring,

casings, or sonotube for proper installation of the foundations, the cost of the shoring, casings or sonotube shall be included in the price of the structure.

907-630.04--Method of Measurement. After the last paragraph of Subsection 630.04 on page 463, add the following:

Pedestal Sign Supports will be measured per lump sum for each specific assembly. Such measurement shall be inclusive of the support structure, foundations, catwalk, connection hardware, conduit on the structure and foundation, soil borings, sign and footing design, and connections to the support structure. It shall also include any items necessary for median barrier repair, required repaving around median barrier foundations and all work, equipment and appurtenances as required to have the structure complete, in place and ready for use.

Post Sign Supports will be measured per lump sum for each specific assembly. Such measurement shall be inclusive of all the support posts, foundations, connection hardware, conduit on the structure and foundation, soil borings, sign and footing design, and connections to the support structure. It shall also include any items necessary for median barrier repair, required repaving around median barrier foundations and all work, equipment and appurtenances as required to have the structure complete, in place and ready for use.

907-630.05--Basis of Payment. After the first paragraph of Subsection 630.05 on page 463, add the following.

Pedestal Sign Supports, measured as prescribed above, will be paid for at the contract bid price per lump sum, which price shall include the support structure, foundations, catwalk, connection hardware, conduit on the structure and foundation, soil borings, sign and footing design, connections to the support structure, median barrier repair, required repaving around median barrier foundations and all work, equipment and appurtenances as required to have the structure complete, in place and ready for use. This price shall be full compensation for all labor, tools, materials, equipment and incidentals necessary to complete the work.

Post Sign Supports, measured as prescribed above, will be paid for at the contract bid price per lump sum, which price shall include all the support posts, foundations, connection hardware, conduit on the structure and foundation, soil borings, sign and footing design, connections to the support structure, median barrier repair, required repaving around median barrier foundations and all work, equipment and appurtenances as required to have the structure complete, in place and ready for use. This price shall be full compensation for all labor, tools, materials, equipment and incidentals necessary to complete the work

Payment will be made under:

Add the "907" prefix to pay item nos. 630-I and 630-J on page 463.

After the last pay item listed on page 463, add the following.

907-630-M: Pedestal Sign Support, Assembly No. _____,
Contractor Designed - lump sum

907-630-Q: Post Sign Support, Assembly No. _____,
Contractor Designed - lump sum

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-637-5

CODE: (SP)

DATE: 2/28/2013

SUBJECT: ITS Equipment Cabinets

PROJECT: ITS-9999-09(028) / 106397301 & 302 -- Warren and Adams Counties

Section 637, Equipment Cabinets, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby deleted and replaced as follows.

SECTION 907-637--ITS EQUIPMENT CABINETS

907.637.01--Description. This Section specifies the minimum requirements for equipment cabinets furnished and installed for Mississippi Intelligent Transportation Projects. The cabinet will provide a protective outdoor housing enclosure in which to install field hardware required for ITS devices. Major elements of the equipment cabinet include the cabinet housing and equipment mounting hardware, interior wiring and termination facilities, power supplies, electrical accessories and field installation. Work also includes making modifications to existing ITS cabinets in accordance with the plans, specials provisions, Notice to Bidders and contract documents.

907-637.02--Materials.

907-637.02.1--Blank.

907-637.02.2--Equipment And Materials. The Contractor shall furnish Only new equipment and materials as follows.

- 1) Furnish equipment cabinets and integral materials recommended by the manufacturers for outside plant use and the intended application. This requirement includes wiring and electrical materials and configurations (including connector pin-outs) that are wholly or partially related to the field device applications (CCTV, RDS, VDS, etc.).
- 2) Furnish and configure equipment cabinets to be installed at locations as shown in the Plans. Furnish and configure all equipment and materials for each specific location as shown in the Plans.
- 3) Provide electrical system and components with UL-listings.
- 4) Unless otherwise specified, provide wire and cable with stranded copper conductors, 75°/90° Celsius wet/dry rated insulation, and sized for the maximum voltage and current in the circuit.

907-637.02.3--Components Specified As Rail-Mounted. Components specified as rail-mounted shall be compliant as follows.

- 1) DIN EN 50022 (NS35) component rails.
- 2) Component rails shall be the perforated type and of sufficient length as to protrude beyond the mounted components for fastening to cabinet panels as specified herein.
- 3) UL 1059.
- 4) UL 486E.
- 5) NEMA ISC-4.
- 6) Alternate Rail configurations may be submitted to the Engineer for consideration and approval.

907-637.02.4--Terminal Blocks and Component Terminals. Terminal Blocks and Component Terminals shall meet the following.

- 1) Shall be nickel-plated copper, copper alloy or brass.
- 2) Terminal blocks shall have voltage and current ratings greater than the ratings of the wires that are terminated, be able to terminate wires from #8 AWG to #1/0 AWG wiring and shall be assembled into housing enclosures such that all exposed surfaces are touch-safe. Conductor fastening screws shall be captive. Terminal block housings shall be colored as follows:
 - a. 120 VAC line/hot: black
 - b. 120 VAC neutral: white
 - c. 24 VDC positive: red
 - d. 24 VDC negative: gray
 - e. RS485 communications: orange
 - f. Ground: green or green/yellow

907-637.02.5--Door Locks. Door Locks shall meet the following.

- 1) Provide door locks for all cabinet doors, keyed to MDOT standard Corbin No. 15481RS lock keyed to be operated with a traffic industry conventional No. 2 Key, Corbin No. 1R6380 made from heavy-duty blanks.
- 2) Provide two keys with each cabinet.

907-637.02.6--Labels. Labels shall be provided with agency name, device name and ID labels on all cabinets. Labels shall meet the following minimum requirements:

- 1) Labels shall be flat black lettering on a reflective white background. Lettering shall be a minimum of 1 inch in height.
- 2) Labels shall be manufactured from pre-coated adhesive backed reflective sheeting material meeting the minimum requirements of AASHTO M268 Type 1.
- 3) The agency name labels shall be "MDOT ITS" in one continuous adhesive sheet.
- 4) The device ID labels shall include the device name as an acronym and a hyphen, and shall be one continuous adhesive sheet. Device name acronyms are "CCTV-", "RDS-", "VDS-" or "DMS-".

- 5) The device ID shall be numerals corresponding to the location and shall be installed adjacent to the acronym sheet. Multiple device IDs of the same type shall be on the same line separated with a space. Examples: "CCTV-73", "RDS-219 220", "VDS-303 304".
- 6) Labels shall be installed along the top of the cabinet door (front cabinet door on Type B cabinets), with MDOT ITS label at the top and the device ID labels immediately underneath.

Provide a voltage label on all cabinets or enclosures in accordance with the NEC labeling requirements. Voltage labels shall meet the following minimum requirements:

- 1) Labels shall be flat black lettering on a reflective yellow background. Lettering shall be a minimum of 1 inch in height.
- 2) Labels shall be manufactured from pre-coated adhesive backed reflective sheeting material meeting the minimum requirements of AASHTO M268 Type 1.
- 3) Labels shall include the voltages entering the cabinet and shall be one continuous adhesive sheet. Examples are "120VAC" or "24VDC".
- 4) Labels shall be installed on all cabinet doors.

907-637.02.7--Type A Cabinet. Type A cabinets shall meet the following.

- 1) All Type A cabinets shall be identical in manufacture and assembly, capable of supporting Radar Detection System units.
- 2) Provide a Type A cabinet intended for outdoor use with a minimum NEMA 3R rating.
- 3) The cabinet enclosure shall be manufactured from 0.125-inch aluminum.
- 4) The cabinet shall provide a minimum of one ventilation louver on at least two sides. Any louver opening greater than 3/16 inch in any dimension shall be screened to prevent insect entry.
- 5) The cabinet shall be intended for strapped pole-mounting; provide all mounting hardware necessary including ½-inch stainless steel mounting straps.
- 6) Provide a Type A cabinet enclosure with dimensions of 18 inches (H) by 14 inches (W) by 8 inches (D) with a tolerance of +/- 0.25 inches.
- 7) Cabinet door shall reveal the entire front opening of the cabinet for accessibility. The hinge shall be designed to prevent the door from sagging.
- 8) Include a single-piece 0.125-inch aluminum back panel covering no less than 90% of the cabinet back wall. Back panel shall be affixed to the enclosure with threaded fasteners and shall be removable from the enclosure with hand tools only and without requirement to remove the cabinet door, mounting straps, or any other components other than communications or device wiring.
- 9) The cabinet shall be furnished with doorstops, which retain the doors open in a 90 degree and 120 degree positions.
- 10) Provide on the back panel a grounding lug directly bonded to the back panel capable of terminating #6 AWG wire.

907-637.02.7.1--RDS Communications Wiring. RDS communication wiring shall meet the following.

- 1) Component rail physically and electrically fastened to the cabinet back panel.
- 2) Strain relief brackets for the RDS comm. cable(s) and the RDS unit harness cables.
- 3) Parallel-connection single-stage surge suppressors for the four wire RS-485 data signal for the RDS units with integral or separate terminals for a minimum of three RDS comm. Cables.
- 4) Parallel-connection zero-power dissipation surge suppressor for the 12-24VDC power supply for the RDS units with integral or separate terminals for a minimum of three RDS comm. cables and two RDS unit harness cables.
- 5) Connection/jumper wiring between the surge suppressors and the local/remote communications disconnect module(s) shall be of the same conductor size, type, and insulation color as in the RDS comm. cable.

907-637.02.8--Type B Cabinet. Type B cabinets shall meet the following.

- 1) All Type B cabinets (except those at solar power locations) shall be uniform in manufacture and assembly, capable of supporting the field equipment as shown on the plans. As a minimum support is required for two RDS units, one Type A or B network switch, one video encoder, one Type A radio/antenna, RDS comm. cable and fiber drop panel terminations, regardless of the devices shown in the Plans at a specific location.
- 2) A complete Type B cabinet shall be an assembly consisting of a cabinet housing and electrical subsystems.
- 3) Provide a Type B cabinet housing that conforms to the standards for a Type 170 336S (approximate exterior dimensions 46 inches (H) x 24 inches (W) x 23 inches (D)), including standard EIA 19-inch rack cabinet cage, as defined in the latest version of the Caltrans Transportation Electrical Equipment Specifications (TEES). The minimum clear vertical inside dimension of the 19-inch rack for equipment mounting shall be 39.5 inches. Standard cabinet accessories for traffic signal operations, such as controller, power distribution assembly, input/output file and termination panels, and the police panel, are not required as part of this cabinet assembly.

907-637.02.8.1--Hardware. Hardware shall meet the following.

- 1) Provide all mounting hardware necessary for base or pole mounting as shown on the plans. As a minimum provide three (3) 3/4-inch stainless steel mounting straps for pole mounted cabinets.
- 2) Include hooks, welded to the inside of each cabinet door, for hanging a side-opening, opaque, resealable, heavy-duty plastic documentation pouch with metal or hard-plastic reinforced holes for the door hooks. Provide one pouch with each cabinet.
- 3) Include a rack-mounted cabinet sliding storage drawer in accordance with the following:
 - a. Approximate exterior dimensions 1.75 inches (H) x 16 inches (W) x 14 inches (D).
 - b. Telescoping drawer guides to allow full extension from the rack cage.
 - c. Opening storage compartment lid to access storage space for cabinet documentation and other items.
 - d. Supports a weight of 25 lb when extended.
 - e. Non-slip plastic laminate surface attached to the compartment lid which covers a minimum of 90% of the surface area of the lid.

- f. Mounted in the rack cage with the bottom surface approximately 9 inches above the bottom of the rack cage.
- 4) Includes side panels within the two sides of the rack cabinet cage, inserted and fastened from the inside of the cage. Use side panels fabricated from 0.125 inch 5052 sheet aluminum alloy and sized to the full inside dimensions of the rack cabinet cage. Side panel surfaces for equipment mounting are denoted by cabinet side, with the “right” side being the support pole side, and by upper or lower as related to the sliding storage drawer. Upper right side panel (support pole side of cabinet, above the drawer) and lower left side panel (opposite side from the support pole, below the drawer) are example side panel surface names.
 - a. Includes a 12-inch long DIN rail (for future components) mounted in the horizontal and vertical center of the lower left side panel.

907-637.02.8.2--Electrical Subsystems. Provide Type B cabinet electrical subsystems meeting the following requirements (Note: Type B Cabinets at Solar Power Locations are not required to meet Section 637.05.02 requirements):

- 1) Includes an electrical distribution module comprised of the following DIN rail-mounted components:
 - a. Service entrance terminal block with positions for 120VAC line, neutral, and ground and capable of terminating minimally #6 through #8 AWG wire, located at one end of the mounting rail with an approximately 0.75 inch blank spacer module adjacent to the main cabinet breaker.
- 2) Main cabinet automatic overcurrent 15A circuit breaker that is UL-listed and of the mechanical-magnetic type rated for use from -18° C to 50° C minimum.
- 3) Main cabinet surge suppressor for single-phase 120VAC service entrance, parallel wired with a clamp voltage of approximately 280V and capable of a surge current of at least 20,000 amps.
- 4) Main cabinet filter for power line noise and switching transient suppression, integral to, or separate from and wired to, the main cabinet surge suppressor.
- 5) Electrical distribution terminal block for line and neutral conductors parallel wired to the main cabinet surge suppressor but non-filtered, with a minimum terminating capability of six conductors of #10 to #18 AWG. Label the terminal block as “ACCY POWER”.
- 6) Electrical distribution terminal block for line and neutral conductors for circuits on the load/equipment side of the power line filter, with a minimum terminating capability of six conductors of #10 to #18 AWG. Label the block as “EQUIP POWER”.
- 7) Electrical distribution terminal block for grounding and bonding conductors located on the same rail but separate from the service entrance terminal block and connected to the entrance ground with a #6 AWG green insulated wire. The grounding block shall have a minimum terminating capability of two #6 AWG conductors and ten #10 to #18 AWG conductors.
- 8) Ground fault interrupt duplex receptacle (NEMA 5-15R) with 2.5A circuit breaker connected to the ACCY POWER distribution block. Permanently affixed to the receptacle, provide two red, orange or green/yellow labels with minimum 0.25 inch lettering with the legend “300 WATTS MAX”. This receptacle is for technician use only and shall not be used to power equipment.

- 9) Include two duplex non-GFCI equipment power receptacles (NEMA 5-15R) connected to the EQUIP POWER distribution block mounted on the upper rear corner of the cabinet upper right side panel. Permanently affixed to the receptacle, Provide two red, orange or green/yellow labels with minimum 0.25 inch lettering with the legend "75 WATTS MAX" permanently affixed to the receptacle.
- 10) Interconnection wiring between all electrical distribution module components and the other systems included in or housed in the Type B cabinet.

907-637.02.8.3--Lighting Subsystem. Include a cabinet lighting subsystem comprised of the following components:

- 1) One fluorescent lighting fixture, minimum 15 watt, mounted on the inside top front portion of the cabinet, with a cool white lamp with shatter-proof cover and operated by a normal power factor UL listed ballast.
- 2) A resistor-capacitor network noise suppressor installed across the light fixture power terminals.
- 3) Two door-actuated switches installed to turn on the cabinet light when either door is opened.
- 4) Powered from the ACCY POWER distribution block.

907-637.02.8.4--RDS Communications Subsystem. Where RDS are shown in the plans include DIN rail-mounted components that include the following:

- 1) Nominal 24VDC output power supply, capable of user setting between 23 and 28VDC minimum, with minimum 1A output rating and minimum operating temperature range of -25° C to +70° C. Power supply shall provide terminal facilities for a minimum of three sets of #14 AWG conductors (in the RDS comm cable). Maximum size of the power supply shall be 1 inch (W) X 7 inches (H) X 7 inches (D). Connect the power supply to the EQUIP POWER distribution block for 120VAC input.
- 2) Include interconnection wiring between the RDS communications subsystem and the Terminal Server.
- 3) Surge suppressor for the RS485 data signal, wired between the terminal server and the RDS units shall be provided. The surge suppressor shall protect the 4-wire RS485 data signal with hybrid multi-stage suppression components including gas tube and silicon avalanche diode. The surge suppressor shall have a response time no greater than 1 nanosecond. The surge suppressor shall provide terminal facilities for a minimum of four two-pair cables of #22 AWG conductors.

907-637.02.8.5--CCTV Subsystem. The requirements listed in Subsection 650.2.12 shall be met by installing the required CCTV support equipment in the Type B Cabinet.

907-637.02.9--Type C Communication Hub Cabinet. A complete Type C cabinet shall be an assembly consisting of a cabinet housing, base and electrical subsystems.

The Type C cabinet shall be an AASHTO/ITE/NEMA ITS Cabinet Standard specification Cabinet Housing #3 with two Cages #1. It shall be equipped with four (4) side mounting panels in

the rack cabinet cages. The side mounting panels shall mount from inside the rack cabinet cage only. The side panels shall be fabricated from 5052 sheet aluminum alloy with a minimum thickness of 0.125-in with minimum dimensions of 50 inches (H) x 21 inches (W). Standard cabinet accessories for traffic signal operations, such as controller, power distribution assembly, input/output file and termination panels, and the police panel, are not required as part of this cabinet assembly.

A minimum of four (4) wiring pass-through holes shall be provided on the inside mounting panels to permit patch cords to pass between the two cabinet sides. Each pass-through hole shall be five (5) inches in diameter and shall be fully grommetted for patch cord protection, with the holes positioned with two (2) in the cabinet front and two (2) in the cabinet rear and aligning horizontally between the two side panels.

907-637.02.9.1--Hardware. The hardware shall consist of a minimum of 16 plastic-coated or rubber-coated J-hooks or D-rings, minimum 1-inch depth and height, on the inside rails of the rack cabinet cages, to organize patch cords passing between the two cabinet sides. The J-hooks shall be installed in horizontally-aligned pairs on the inside rails, with four (4) pairs in the cabinet front and four (4) pairs in the cabinet rear.

Hooks shall be welded to the inside of the two front cabinet doors for hanging the plastic documentation pouch. Two plastic documentation pouches shall be provided to store the cabinet and equipment documentation. Pouches shall be side-opening, resealable, opaque, and of a heavy-duty plastic material. Pouches shall have metal or hard-plastic reinforced holes for hanging from hooks included on the cabinet door. The pouches shall be of the size and strength to easily hold all wiring diagrams, equipment documentation, maintenance logbooks, etc.

Two sliding drawers shall be installed that are aluminum storage compartments mounted in the rack assembly with the approximate following dimensions: 1.75 inches (H) x 16 inches (W) x 14 inches (D). The compartments shall have telescoping drawer guides to allow full extension from the rack assembly. When extended, the storage compartments shall open to provide storage space for cabinet documentation and other miscellaneous items. Storage compartment shall be of adequate construction to support a weight of 25 pounds when extended. The tops of the storage compartments shall have a non-slip plastic laminate attached which covers a minimum of 90% of the surface area of the top.

907-637.02.9.2--Electrical Systems. Type C cabinet electrical subsystems shall include an electrical distribution module comprised of the following components:

1. Service entrance terminal block with positions for 120VAC line, neutral, and ground and capable of terminating minimally #6 through #8 AWG wire, located at one end of the mounting rail with an approximately 0.75-inch blank spacer module adjacent to the main cabinet breaker.
2. Main cabinet automatic overcurrent minimum 30A circuit breaker that is UL-489 and CSA 22.2 approved and plainly marked with trip, frame sizes and ampere rating. All circuit breakers shall be quick-make, quick-break on either automatic or manual operation. Contacts shall be silver alloy and enclosed in an arc-quenching chamber. Overload

tripping shall not be influenced by an ambient air temperature range from -18°C to 50°C. Minimum interrupting capacity shall be 5,000 amperes RMS.

3. Main cabinet surge suppressor for single-phase 120VAC service entrance, parallel wired with a clamp voltage of approximately 280V and capable of a surge current of at least 20,000 amps.
4. Main cabinet filter for power line noise and switching transient suppression, integral to, or separate from and wired to, the main cabinet surge suppressor.
5. Electrical distribution terminal block for line and neutral conductors parallel wired to the main cabinet surge suppressor but non-filtered, with a minimum terminating capability of six conductors of #10 to #18 AWG. The terminal block shall be label as "ACCY POWER".
6. Electrical distribution terminal block for line and neutral conductors for circuits on the load/equipment side of the power line filter, with a minimum terminating capability of six conductors of #10 to #18 AWG. The block shall be as "EQUIP POWER".
7. Electrical distribution terminal block for grounding and bonding conductors located on the same rail but separate from the service entrance terminal block and connected to the entrance ground with a #6 AWG green insulated wire. The grounding block shall have a minimum terminating capability of two #6 AWG conductors and ten #10 to #18 AWG conductors.
8. Ground fault interrupt duplex receptacle (NEMA 5-15R) with 2.5A circuit breaker connected to the ACCY POWER distribution block. Two red, orange or green/yellow labels with minimum 0.25 inch lettering with the legend "300 WATTS MAX" shall be permanently affixed to the receptacle. This receptacle is for technician use only and shall not be used to power equipment.
9. Two duplex non-GFCI equipment power receptacles (NEMA 5-15R) shall be provided and connected to the EQUIP POWER distribution block mounted on the upper rear corner of the cabinet upper right side panel.

Interconnection wiring shall be installed between all electrical distribution module components and the other systems included in or housed in the Type C cabinet.

Rack mounted power strip outlets shall be connected to the EQUIP POWER distribution block, mounted near the top of the cabinet. The power strip shall incorporate eight (8) NEMA 5-15R receptacles. The power strip receptacle shall face the back of the cabinet and shall be recessed within the cabinet rack to provide a minimum spacing of thress (3) inches between the outlet's face and the cabinet door when the door is closed.

Door open switches shall be provided on four doors and configure the switches so that any single door opening will provide a circuit closure. The assembly of switches shall be wired to a single two-position terminal block, with normally open circuit that closes upon a door opening.

Two cabinet ventilation fans shall be connected to the ACCY POWER distribution block, with a minimum capacity of 200 cubic feet of free air delivery per minute. The fan thermostat shall be set at its lowest limit or 70°F, which ever is greater.

Each of the four cabinet doors shall have an intake and filter as specified in Subsection 6.2.7.1 of the AASHTO/ITE/NEMA ITS Cabinet Standard specification.

907-637.02.9.3--Lighting Subsystem. The lighting subsystem shall be four (4) fluorescent lighting fixtures mounted inside the top portions of each cabinet side. A cool white lamp, covered and operated by a normal power factor UL listed ballast shall be included with the fixture. A RC network noise suppression filter shall be installed in the light circuit. Door actuated switches shall be installed in the front and rear of each cabinet side, configured to turn on all cabinet lights when any door is opened. The lighting fixtures shall be powered from the ACCY POWER distribution block.

907-637.03--Construction Requirements.

907-637.03.1--General. This work shall meet the following general requirements.

- 1) Install and configure cabinets as shown in the Plans and according to manufacturers recommendations, including installations and dimensions given for pole-mounting in relationship to the surrounding grade.
- 2) Bond all cabinets to the pole grounding lug with minimum #6 AWG stranded copper bare or green-insulated cabinet grounding wire. Alternately on existing poles only, bond the cabinet grounding wire to an existing pole grounding wire with a cast brass or copper alloy threaded compression connector within 4 inches of the existing pole grounding lug.
- 3) Do not install electrical service or electronic devices in the cabinet or connect to the cabinet until ground testing for the pole or structure has been successfully completed and accepted, and the cabinet ground connection has been installed.
- 4) Provide a cabinet wiring and interface diagram to be included in the required hanging, side-opening, able to be resealed opaque, heavy-duty plastic documentation pouch.

907-637.03.2--Type B and C. Type B and C cabinets shall meet the following.

- 1) Install and configure equipment in the Type B and C cabinets in accordance with the requirements for that equipment, including RDS units, CCTV, Type A and B network switches, video encoders, Type A radio/antennas, RDS comm. cables and/or fiber distribution or drop panels.
- 2) Do not install electronic devices in the cabinet until electrical service has been installed and activated, and the cabinet ventilation fan is operational.
- 3) Install network switches and video encoders in the top most area of the cabinet rack. Use the equipment receptacles for power.
- 4) Install supporting equipment/electronics for CCTV on the lower area of the cabinet upper left side panel. Ensure there is no physical or access conflict with the network switch and video encoder. Use the EQUIP POWER distribution block for the power source.
- 5) Install fiber drop panels in a vertical configuration on the lower rear edge of the cabinet upper right side panel.

907-637.03.3--Testing. The Contractor shall conduct a Project Testing Program as required below. All costs associated with the Project Testing Program shall be included in overall contract prices; no separate payment will be made for any testing.

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 is required to perform the Conditional Acceptance test with the MDOT ITS Engineer or his designee present.

- 1) The Contractor shall conduct a project testing program for all equipment cabinets. The project testing program shall include but is not limited to the specific requirements in this subsection.
- 2) All test results shall confirm physical and performance compliance with this Special Provision.
- 3) Submit all test results documentation to the Engineer within 7 days of completion of the tests. The Engineer will review test documentation.

907-637.03.3.1--Standalone Acceptance Test (SAT). SAT tests shall be as follows.

- 1) Perform a SAT on all equipment cabinets on this project after field installation is complete, including but not limited to all field devices (RDS, CCTV, communications electronics, etc.) to be installed in or connected to that given cabinet.
- 2) A SAT for a given equipment cabinet shall only be performed in conjunction with the SAT for all devices installed in or connected to that given cabinet.
- 3) Visual inspection of installation.
- 4) Inspection of cabinet documentation.
- 5) Functional test of all cabinet equipment, including circuit breaker, receptacles, fan and thermostat, and lights and door switches.
- 6) Measurement of DC power supply operating under full load.

907-637.04--Method of Measurement. Equipment Cabinet of the type specified will be measured per each. . Such measurement shall be inclusive of furnishing and installing the equipment cabinet and all related material and equipment specified in the Plans and this Special Provision, and all labor, system integration, testing, system documentation and miscellaneous materials necessary for a complete and accepted installation. It shall also include but is not limited to the cabinet and all interior materials, mounting hardware foundations, external conduit entrances including conduit bodies and nipples, electrical service and pole grounding terminations.

ITS Equipment Cabinet modifications, complete in place, tested, and accepted, will be measured per each installation. Such measurement shall be inclusive of all materials, mounting hardware, fiber splicing identified in the notice to bidders for each cabinet being modified.

907-637.05--Basis of Payment. Equipment Cabinet and Equipment Cabinet Modifications, measured as prescribed above, will be paid for at the contract unit price per each, which shall be

full compensation for the labor, tools, materials, equipment and incidentals necessary to complete the work.

Progress payments for Equipment Cabinets will be paid in accordance with the following:

- 1) 40% of the contract unit price for delivery of the cabinet housings;
- 2) An additional 40% of the contract unit price for complete installation of equipment cabinet and all interior components, electrical service feed (activated), interior cabinet components, all conduit entrances, grounding connection, and testing;
- 3) An additional 10% of the contract unit price for completion of Stand Alone Site Test of all field devices housed or connected to the equipment cabinet; and
- 4) Final 10% of the contract unit price upon Final System Acceptance.

Payment will be made under:

- 907-637-A: Equipment Cabinet, Type ___ -per each
- 907-637-B: ITS Equipment Cabinet Modifications ___ -per each

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-639-7

CODE: (SP)

DATE: 03/04/2013

SUBJECT: Pole, Foundation and Lowering Device – LADOTD

PROJECT: ITS-9999-09(028) / 106397301 & 302 -- Warren and Adams Counties

907.639.01--Description. This Item consists of furnishing and installing a pole, foundation, and lowering device, with all appurtenances required in accordance with plan details, the 2006 Louisiana Standard Specifications for Roads and Bridges, these specifications, and as directed by the Engineer.

907-639.02—Materials. All equipment shall be new and constructed using the highest quality, commercially available components and techniques to assure high reliability and minimum maintenance. The contractor shall submit, prior to installation, a complete set of shop drawings of all the equipment and components listed below and included as part of the installation.

The system shall consist of the following major components:

- Pole
- Base plate and hardware
- Foundation
- Ground ring
- Ground rods
- Lowering Device
- Lowering Tool

907-639.03--Construction Requirements. The contractor shall assemble and install all necessary material and equipment and furnish a working pole and foundation in accordance with these plans and specifications and compatible with the requirements of the ITS. All items that are required to complete the installation and ensure an operational ITS 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.

The contractor shall field verify final equipment locations with the Engineer. Plans are diagrammatic and indicate the general arrangement of components and work included in these documents. Final placement and arrangement are the responsibility of the contractor.

Upon request by the Department, the contractor shall arrange for the manufacturer to grant access to the manufacturing facility for all products specified herein.

Shop drawings showing the fabrication and erection details for each support shall be submitted to the Engineer for review and acceptance. Information on the foundations required to support the

pole shall be included in shop drawings. All pole penetrations and attachments shall be factory made; no field drilling or welding shall be allowed.

Poles and fittings shall be in accordance with the plans and specifications and shall be galvanized in accordance with Subsection 811.12 of the standard specifications.

907-639.03.1--Pole Shaft. The pole shaft shall be either 35 feet or 60 feet in length as designated in the pay item and/or plans and measured from the top of the base plate to the top of the pole. The pole shaft shall be tapered and have either a round or octagonal cross section. A removable cap shall be provided to cover the shaft top when no device is mounted atop the pole. The pole shall be fabricated to deflect a maximum of 1.5 inches (30 mm) at a wind speed of 30 mph (13 m/sec). The pole shall also be fabricated to deflect a maximum of 1 foot (300 mm) at a wind speed of 90 mph (40 m/sec). The application of the wind load shall reflect the device(s) to be mounted atop the pole (e.g., CCTV camera assembly, lowering arm, lightning collector, etc). The overall design of the pole shall conform to the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals (latest edition), including all Interim releases published by AASHTO. The pole shaft shall be suitable for wireways throughout its length.

907-639.03.2—Handholes. Each pole shall be provided with a handhole located approximately 48 inches (1.22 m) above the base with approximate dimensions of 27 inches x 6-1/2 inches (686 mm x 165 mm). The handhole shall be provided with a cover that is restrained to the pole with a 15 inch (375 mm)- #35 stainless steel chain fastened to both the cover and to the inside of the handhole in a fashion such that the chain shall be inside the pole. Also a 4 inch x 6 inch (102 mm x 152 mm), inside dimension, handhold shall be located adjacent to any lowering device(s) mounted mid-span on the pole (180 degrees for a single lowering arm at a specified height and 90 degrees for dual lowering arms at the same height). The manufacturer's name and pole height shall be stenciled on the cover and be legible on the outside of the pole after galvanizing. The handhole strain bar shall be formed to provide a mechanical lock against the handhole in order to prevent turning. No obstructions shall be in the handhole with the cover removed. A grounding nut (1/2 inch – 13NC) shall be welded to the inside of the shaft 90 degrees left and horizontal from every handhole. A grounding lug shall be provided with each pole.

907-639.03.3—Bosses. Poles shall have a 1 inch (25 mm) and a 3 inch (75 mm) boss centered on a horizontal line 18 inches (450 mm) from the base. When facing the bosses, the 1 inch (25 mm) boss shall be a maximum of 350 degrees to the right of the 3 inch (75 mm) boss. A wireway shall be provided through one 3 inch (75 mm) and one 1 inch (25 mm) boss provided in the shaft 18 inches (450 mm) below the top of the shaft. The 3 inch (75 mm) bosses shall be located 180 degrees from the handhole. At 36 inches from the base, two 3 inch bosses shall be provided for connectivity to the pole mounted cabinet. Two 2 inch bosses for connection to the main power panel shall be provided 90 degrees to the cabinet at 36 inch from the base. The poles shall be shipped with all bosses plugged by using galvanized steel conduit plugs installed to full thread depth. The handhole and the 3 inch (75 mm) boss shall be centered on one edge of the base plate. All exposed threads shall be galvanized. Plugs shall be greased before installation. Bosses required for pole mounted cabinet, not specified above, shall be included per plan details.

907-639.03.4--Base Plate and Hardware. All pole hardware, including leveling and cap nuts, shall be packaged together on a per pole basis. Dimensions of pole base plates, anchor bolts, hex

nuts, and washers shall be determined by pole manufacturer. Both hex and cap nuts shall be 2-5/8 inches (66 mm) across the flats. Cap nuts shall have a maximum dome height of 1-3/4 inches (44 mm) with an inside clearance of 1/2 inch (13 mm) between the threads and the top of the dome. All anchor bolts, with hex nuts and washers, shall be banded in bundles of four (4) and supplied with each pole. The handhole cover shall be securely fastened to the pole for shipment. One additional anchor bolt shall be supplied with each order.

907-639.03.5—Materials.

- CCTV camera pole shaft: tapered steel octagonal shaft ASTM A1011 Grade 50
- Base plate: ASTM A-709 Grade 50; anchor base shall be welded to the pole shaft prior to galvanizing
- Anchor bolts: AASHTO M314 90 (ASTM F1554) Grade 55 UNC Series or accepted equal
- Anchor Nuts: Nuts shall conform to ASTM A563 Grade A heavy hex and flat washer to ASTM F436. Nuts shall be tightened to 1/6 turn beyond snug tight.
- Concrete: Class “S”
- Reinforcing steel: Grade 60
- Grout: Nonshrink grout; free of chlorides or other harmful additives that could cause corrosion of the anchor bolts.

907-639.03.6—Welding. Welding and fabrication shall be in accordance with Section 815. All welded joints shall develop the full-required strength of the member. Circumferential welds, other than at the ends of the shafts, are not permitted. The exterior of longitudinal seam welds shall be ground or otherwise smoothed to the same appearance as other shaft surfaces. Longitudinal seam welds for pole sections shall have 60 percent minimum penetration except longitudinal seam welds shall be complete penetration when within 6 inches (150 mm) of circumferential base welds. If necessary, a maximum of two longitudinal seam welds may be made in pole sections. Low hydrogen electrodes or the equivalent in wire and flux for automatic welding, shall be required for all welds. Preheat shall be required for welding pole to base plate in accordance with ANSI/AWS D1.1 structural welding code.

907-639.03.7—Finish. All sheared or cut edges and all other exposed edges to be painted or galvanized shall be rounded or chamfered to approximately 1/16 inch (1.5 mm). Galvanizing shall be done in accordance with Section 811.12 of the standard specifications.

907-639.03.8--Pier Cap Pedestal Foundation for 35' Pole.

907-639-.03.8.1--General Requirements. A pedestal foundation on the bridge pier cap shall be provided for each 35' pole in accordance with the details provided on the plans. Design of each pedestal foundation shall be provided by the contractor.

The Contractor shall submit to Engineer a pedestal foundation design. The design shall be inclusive of cement design strength, resteel, noninvasive resteel testing approach, and conduit into the pole for wiring and grounding. As built plans for design reference may be obtained from DOTD General Files. Design drawings, calculations and other necessary supporting data shall be submitted as soon as possible after the Pre-Construction Conference. The design shall be

prepared and stamped/signed by a registered Louisiana Professional Civil Engineer proficient in the design of drilled shaft foundation structures.

907-639.03.8.2--Pre Installation Testing. Prior to drilling or removing any concrete from the bridge pier cap, the contract shall conduct a noninvasive test to determine exact locations of the pier cap resteel. Contractor shall submit in writing to DOTD Bridge Maintenance Section the test type and plan for review and acceptance. Pre installation testing shall be paid for as part of the pole pay item.

907.639.03.9--Drilled Shaft Foundation for 60' Pole.

907-639.03.9.1--General Requirements. A drilled shaft foundation shall be provided for each 60' pole in accordance with Section 814 of the standard specifications and the details provided on the plans. Design of each drilled shaft foundation shall be provided by the contractor.

The Contractor shall submit to the EEngineer a drilled shaft foundation design. The design shall be inclusive of cement design strength, resteel, cross hole sonic logging, and conduit into the pole for wiring and grounding. Soil characteristics to be used for design may be obtained through field testing or from plans from other projects in the vicinity. Plans may be obtained from DOTD General Files. Design drawings, calculations and other necessary supporting data shall be submitted as soon as possible after the Pre-Construction Conference. The design shall be prepared and stamped/signed by a registered Louisiana Professional Civil Engineer proficient in the design of drilled shaft foundation structures.

907-639.03.9.2--Drilled Shaft Testing. Each drilled shaft foundation shall have preformed test holes in the pole foundation. Sonic logging and tests shall be conducted in accordance with Section 814 of the standard specifications and paid for as part of the pole pay item.

907-639.03.10--Pole Location and Base Plate Orientation Plan Submittal. All pole sites shall be in constricted areas, bounded by roadways, structures, or other obstacles. Prior to constructing the foundations, the contractor shall survey the site and determine the exact location of the installation in relation to the surrounding structures and roadways. A plan showing all location information shall be prepared and submitted to the Engineer for review and acceptance prior to construction.

907-639.03.11--Lowering Device.

907-639.03.11.1--General Requirements. The camera lowering system shall be designed to support and lower a standard closed circuit television camera, lens, housing, pan/tilt/zoom (PTZ) mechanism, cabling, connectors and other supporting field components without damage or causing degradation of camera operations. The lowering system shall consist of a pole, suspension contact unit, divided support arm, and a pole adapter for attachment to a pole top tenon, pole top junction box, and camera connection box. The lowering system shall be attached at the top of the pole or at a height from the base of the pole indicated on the plans.

The divided support arm and receiver brackets shall be designed to self-align the contact unit with the pole center line during installation and insure the contact unit cannot twist under high wind conditions (round support arms are not acceptable). The camera-lowering device shall

withstand wind forces of 100mph with a 30 percent gust factor using a 1.65 safety factor. Information supporting such shall be included with the equipment submittals for the pole and lowering device. Calculations shall include as a minimum the effective projected area, the actual EPA or an EPA greater than that of the camera system to be attached. Refer to plan details for additional lowering device specifications and requirements.

Upon completion of the lowering device installation, the manufacturer shall provide a letter to the Project Engineer certifying that the assemblies have been inspected and that all lowering devices have been installed properly and are operating properly. An operation and maintenance manual shall be provided in each pole. The manual shall be in a weatherproof plastic case, located so as to be readily accessible.

907-639.03.11.2--Suspension Contact Unit. The suspension contact unit shall have a load capacity 200 lbs. with a 4 to 1 safety factor. There shall be a locking mechanism between the fixed and moveable components of the lowering device. The movable assembly shall have a minimum of 2 latches. This latching mechanism shall securely hold the device and its mounted equipment. The latching mechanism shall operate by alternately raising and lowering the assembly using the winch and lowering cable. When latched, all weight shall be removed from the lowering cable. The fixed unit shall have a heavy duty cast tracking guide and means to allow latching in the same position each time. The contact unit housing shall be weatherproof with a gasket provided to seal the interior from dust and moisture.

The prefabricated components of the lift unit support system shall be designed to preclude the lifting cable from contacting the power or video cabling. Internal wireways are as described above. The only cable permitted to move within the pole or lowering device during lowering or raising shall be the stainless steel lowering cable. All other cables must remain stable and secure during lowering and raising operations.

The female and male socket contact halves of the connector block shall be permanently molded in a thermoset, weather-resistant, synthetic rubber. The female brass socket contacts and the male high conductivity brass pin contacts shall be permanently molded into the thermoset, weather-resistant, synthetic rubber body.

The current carrying male contacts shall be 1/8 inches in diameter. There shall be two male contacts that are longer than the rest which shall mate first and break last providing optimum grounding performance. The number of contacts shall be 14 and the camera mounted thereto, shall be capable of performing all of its necessary functions on 14 contacts or less.

The current carrying female contacts shall be 1/8 inches I.D. All of the contacts shall be recessed 0.125" from the face of the connector. Cored holes in the rubber measuring 0.25" in diameter and 0.125" deep molded into the connector body are centered on each contact on the face of the connector to create rain-tight seals when mated with the male connector.

The wire leads from both the male and female contacts shall be permanently and integrally molded in the thermoset, weather-resistant, synthetic rubber body. The current carrying and signal wires shall be constructed of #18/1 AWG synthetic rubber jacketed wire.

The contacts shall be self-wiping with a shoulder at the base of each male contact so that it shall recess into the female block, thereby giving a rain-tight seal when mated. The electrical contact connector must meet Mil Spec Q-9858 and Mil Spec I-45208.

907-639.03.11.3--Lowering Tool. The camera-lowering device shall be operated by use of a portable lowering tool. The tool shall consist of a lightweight metal frame and winch assembly with cable as described herein, 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 support cable through the handhole of the pole, shall support itself and the load assuring lowering operations, and shall provide a means to prevent freewheeling when loaded. The lowering tool shall have a reduction gear to reduce the manual effort required to operate the lifting handle to raise and lower a capacity load. The lowering tool shall be provided with an adapter for operating the lowering device by a portable drill using a clutch mechanism. The lowering tool shall accommodate a minimum of 110' of cable. A variable speed, heavy-duty reversible drill motor and a minimum of one lowering tool plus any additional tools required shall be provided to the LADOTD as directed by the Project Engineer.

Individual lowering tools provided shall be able to operate the lowering system regardless of CCTV camera pole height interchangeably.

907-639.03.11.4—Materials. All pulleys for the camera lowering device and portable lowering tool 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 with a minimum breaking strength of 1740 pounds with (7) strands of 19 wire each.

All electrical and video coaxial connections between the fixed and lowering portion of the contact block shall be protected from exposure to the weather by a waterproof seal to prevent degradation of the electrical contacts. The electrical connections between the fixed and movable lowering device components shall be designed to conduct high frequency data bits and one (1) volt peak-to-peak video signals as well as the power requirements for operation of dome environmental controls.

The interface and locking components shall be made of stainless steel and or aluminum. All external components of the lowering device shall be made of corrosion resistant materials, powder coated, galvanized, or otherwise protected from the environment by industry-accepted coatings to withstand exposure to a corrosive environment.

The camera junction box shall be cast ZA-12 (12% aluminum and 88% zinc) and weigh a minimum of 50 pounds to insure stability of the camera during the raising and lowering operation. The camera junction box shall have 2 fully gasketed doors to prevent water intrusion. The bottom of the camera junction box shall be equipped with a condensation/moisture exit system.

Weights and /or counterweights shall be provided as necessary to assure that the alignment of pins and connectors are proper for the camera support to be raised into position without binding. The lowering unit shall have sufficient weight to disengage the camera and its control components in order that it can be lowered properly.

Power and data connectors with surge protection (included under separate pay items) shall be provided for attachment to the bare leads in the camera junction boxes.

A mounting flange sufficient for mounting the camera assembly to the bottom of the camera connection box shall be provided.

907-639.03.11.5--Pole Top Tenon and Cable Supports. The pole shall have a custom plate mounted tenon that allows the field modification of the arm/camera orientation up to 360 degrees. The tenon shall have mounting holes and slot as required for the mounting of the camera-lowering system. The tenon shall be of dimensions necessary to facilitate camera lowering device component installation. Each slot shall be parallel to the pole centerline for mounting the lowering device.

Top and bottom electrical cable guides shall be located within the pole aligned with each other. One cable guide shall be positioned 2 inches below the handhole and the other shall be positioned 1 inch directly below the top of tenon. A parking stand shall be positioned 2.75 inches below the top of the handhole.

907-639.03.11.6—Training. Contractor shall train department personnel in the operation and maintenance of the lowering system. Training shall occur upon Partial Acceptance and again upon Final Acceptance.

907-639.03.12—Grounding. Support cable, metallic cable sheaths, conduit, transformer cases, metal poles, pedestals, and other devices and appurtenance as directed by the Engineer shall be made mechanically and electrically secure and grounded. Bonding and grounding jumpers shall be properly sized according to the NEC and in no case shall they be smaller than #6 AWG copper wire. A grounding ring shall be installed beneath each pole and foundation. No exposed grounding wire shall be permitted. All grounding wire shall be internal to the pole and run through conduit to the ground ring.

The only grounding methods and techniques that are allowed on this project are exothermic welds, with proper molds and metals, and compression crimp connections.

The grounding conductor shall be continuous and of the type and size shown on the plans. The grounding conductor shall be connected to the ground system at all supporting structures, power meter racks, transformer, sign support assembly, and to each grounding conductor in a multi-conductor cable assembly as applicable for the site. All connections shall be made in accordance with the manufacturer's specifications and as specified in splicing. Grounding splices shall not be insulated.

Ground rods shall be installed according to plan details. A length of copper conductor shall be attached to the ground rod, utilizing the specified grounding methods, and connected to the grounding system.

Metal raceways, metal enclosures of electrical devices, lighting fixtures, panelboards, and other non-current carrying metallic parts of equipment shall be securely grounded.

907-639.03.13--Restoration of Site. The contractor shall repair concrete slab, reshape, reseed, and apply vegetative mulch to areas disturbed during the performance of work. The costs incurred in concrete repair, reseeding, resodding, and otherwise restoring areas to their original condition or better will be considered incidental to the work and will not be measured for payment.

907-639.03.14--Cutting and Patching. Should any cutting of walls, floors, ceilings, partitions, paving, sidewalks, driveways, curb and gutters, or paved shoulders be required for proper installation of electrical work, such cutting and restoring of the work to its original condition or better shall be done by the contractor in a manner acceptable to the Engineer. The costs incurred for cutting and restoring will be considered incidental to the work and will not be measured for payment.

907-639.03.15--Site Clean Up. During the progress of the work, the contractor shall keep the premises free from accumulations of waste materials, rubbish and other debris resulting from the work. At the completion of the work the contractor shall remove all waste materials, rubbish and debris from and about the premises as well as all tools, appliances, construction equipment and machinery and surplus materials. The contractor shall leave the site clean and ready for occupancy by the Department at partial acceptance of the work. The contractor shall restore to original condition all property not designated for alteration by the contract documents.

907-639.04--Method of Measurement. Camera Pole of the type specified will be measured per each pole.

907-639.05--Basis of Payment. Camera Pole, measured as prescribed above, will be paid for at the contract unit price per each, which price shall be full compensation for all labor, materials, equipment, tools, pole, sonic logging, foundation, each lowering device and lowering tool, , lightning arrestor, grounding, conduit within the foundation, mounting brackets and hardware, lowering device, lowering tool, factory and manufacturing inspection, testing, storage, packaging, shipping, warranty, and incidentals necessary to complete the work.

Payment will be made under:

907-639-E	Camera Pole with Pier Cap Mod & Lowering Device, __' Pole, LADOTD	- per each
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MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SUPPLEMENT TO SPECIAL PROVISION NO. 907-641-4

DATE: 03/12/2013

SUBJECT: Radar Detection System (RDS)

PROJECT: ITS-9999-09(028) / 106397301 & 302 -- Warren & Adams Counties

Delete the second paragraph of Subsection 907-641.04 on page 7, and substitute the following.

Unless shown as a separate pay item in the proposal, RDS Comm Cable will not be measured for direct payment, but shall be considered a necessary part of the construction involved, and the cost thereof shall be included in the contract unit prices of other items bid.

When shown as a separate pay item, RDS Comm Cable, where specified in the plans, will be measured by the linear foot, measured horizontally along the conduit. This shall be inclusive of furnishing, installing, system integration and testing of the RDS Comm Cable. It shall also include all connections and terminations. Note that the RDS Comm Cable between the actual RDS unit and the cabinet on the same pole is NOT measured or paid separately and shall be included in the cost of the RDS.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-641-4

CODE: (SP)

DATE: 01/09/2012

SUBJECT: Radar Detection System (RDS)

Section 907-641, Radar Detection System (RDS), is hereby added to and becomes a part of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction as follows:

SECTION 907-641--RADAR DETECTION SYSTEM (RDS)

907-641.01--Description. This special provision specifies the minimum requirements for Radar Detection Systems (RDS) furnished and installed on this project. The work shall consist of providing all labor, materials, equipment, and incidentals necessary to furnish, install, test, train and operate the RDS.

The RDS will provide roadway monitoring capabilities via microwave radar detectors. The data provided includes, but is not limited to, speeds, volume, lane occupancy and classification.

907-641.02--Materials.

907-641.02.1--Microwave Transmission. The microwave radar detector shall transmit in the 24 GHz frequency band. The RDS shall not interfere with any known equipment.

907-641.02.2--Area of Coverage. The RDS's field of view shall cover an area with a minimum detection range of six feet (6') from the RDS and a maximum detection range of 250 feet from the RDS.

907-641.02.3--Detection Zones. The minimum number of detection zones defined shall be no less than ten (10) for simultaneous detection. The range resolution of each zone shall be no greater than 1.3 feet, and the zone width shall be user defined within a range of 6 – 20 feet for the area of coverage limits described above.

907-641.02.4--Capabilities. The RDS shall be a true presence detector. It shall be suitable for mounting on roadside poles or on overhead structure and provide the following:

- 1) Presence indication of moving or stopped vehicles in its detection zones, provided by contact closure to existing controllers.
- 2) Traffic data, periodically accumulated over user defined time intervals in a 10 to 600 sec range, shall be transmitted to the TMC via the communications network.
- 3) Traffic data shall be available simultaneously with detection zone contact closures and serial communications.

- 4) Side-fired configuration data shall include the following in each of up to ten (10) detection zones (lanes): Volume, lane occupancy, and average speed, as well as vehicle classification by length in up to six (6) user-defined classes.
- 5) RDS 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.
- 6) Furnish the unit with the required software for data collection, processing, configuration and set-up and data logging and retrieval. An operator shall be able to use the software to set detector count periods, sensitivities and other operational features and parameters. The software must be capable of providing both manual and automatic setup and calibration.

907-641.02.5--Measurement Accuracy. The following error levels shall be achievable and demonstrated during testing:

<u>Parameter</u>	<u>Error Percentage</u>
Volume	±8%
Average Speed	±10% or ±5 mph
Lane Occupancy	±20%

907-641.02.6--Environmental Conditions and Protection. Except as stated otherwise herein, the equipment shall meet all its specified requirements during and after subjecting to any combination of the following:

- 1) Ambient temperature range of -37° to +74°C
- 2) Relative humidity from 5 to 95 percent, non-condensing
- 3) Winds up to 90 mph (sustained) with a 30% gust factor
- 4) Rain and other precipitation up to 3.5 inches/hour
- 5) Power surge that meets the EN 61000-4-5 standards shall be included.

907-641.02.7--Mechanical. The microwave radar detector shall be enclosed in a rugged weatherproof box and sealed to protect the unit from wind up to 90 mph, dust and airborne particles and exposure to moisture).

The mounting assembly shall have all coated steel, stainless steel, or aluminium construction and shall support a load of 20 pounds. The mounting assembly shall be constructed in a manner to provide the necessary degrees of rotation to ensure proper installation.

907-641.02.8--Electrical. The RDS unit and power supply shall operate on 12–24 V DC or 115-220 VAC input voltage with power converter provided. The AC to DC power converter shall be provided in the cabinet. The actual RDS shall consume less than eight (8) Watts with a DC input between 12VDC and 28VDC.

Surge Suppression shall be provided to protect the equipment from surges on the RDS power supply and the RDS communications wiring. Surge suppression shall meet all manufacturer recommendations.

907-641.02.9--RDS Comm Cables. The RDS Comm Cable shall be a composite cable for power and communications. RDS Comm Cable shall be provided between the RDS and the cabinet located on the same pole as the RDS. This length of RDS Comm cable shall be included in the cost of the RDS and is not called out separately on the plans.

The plans also identify additional locations where RDS Comm Cable is measured and paid separately. These longer runs are between the standalone RDS and the closest Type B cabinet. These longer runs of RDS Comm Cable shall provide power and communications to the RDS. The size and design of this RDS Comm Cable shall meet manufacturers recommendations based on a maximum length of 4,000 feet from the RDS to the Type B cabinet. The same cable type shall be used at all locations.

Cable connectors and termination pin-out on all cables shall be in accordance with the manufacturer's recommendations.

Connection between the RDS and the cabinet equipment shall be provided by a single RDS Comm Cable using a single MS crimp multi-pin connector providing multiple options of power and output signals meeting all manufacturer's recommendations.

At a minimum, the RDS Comm Cable shall be outdoor wet/dry rated UV-resistant and provide multiple twisted pairs of stranded AWG wire size and materials as recommended by manufacturer based on specific field conditions.

The MS connector pins must be crimped to the cable conductors and assembled and tested by the manufacturer prior to installation and pulling of cable on site.

907-641.02.10--Electrical Isolation and Surge Protection. All communication and power lines, contact closures and the serial port shall be surge protected within the unit. Contact closures and the serial port shall be isolated. When RDS Comm cable lengths exceed 40 feet, surge suppression shall also be provided on each end of the RDS Comm Cable. All surge suppression shall meet RDS manufacturers recommendations for the specific field conditions present and shall be included in the cost of the RDS. Surge protection shall be provided in a cabinet mounted on the same pole as the RDS. If the RDS is mounted on a CCTV pole, the surge protection shall be provided inside the Type B cabinet. If the RDS is mounted on a standalone pole, a separate fiberglass enclosure cabinet shall be provided. This cabinet size and design shall meet manufacturer recommendations and shall be included in the cost of the RDS.

Surge suppressor for the RS485 data signal, wired between the terminal server and the RDS units shall be provided. The surge suppressor shall protect the 4-wire RS485 data signal with hybrid multi-stage suppression components including gas tube and silicon avalanche diode. The surge suppressor shall have a response time no greater than one (1) nanosecond. The surge suppressor shall provide terminal facilities for a minimum of four two-pair cables of #22 AWG conductors.

907-641.02.11--Data Interface. Data communications shall be full duplex asynchronous, configurable as:

- 1) The RDS shall include isolated Serial ports programmable to RS-232 and/or RS-485.
- 2) Both point-to-point and multi-dropped configurations shall be supported.
- 3) The RDS shall be upgradable (optional) to include integral 10/100 Base-T Ethernet supporting TCP, UDP, IP, ARP, ICMP.

907-641.03--Installation Requirements. All equipment shall be installed according to the manufacturer's recommendations, the Plans and as follows:

- 1) The RDS 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 manufacture'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.
- 3) When installing a detector near metal structures, such as building, bridges, or sign supports, the sensor shall be mounted and aimed so that the detection zone is not under and does not pass through any structure to avoid distortion and reflection.
- 4) The RDS 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 RDS Comm Cable shall be grounded or terminated in the cabinet in accordance with the manufacture's recommendations. Terminated conductors shall be individually doubled back and taped, then loosely bundled and secured.
- 6) 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.
- 7) Any new, additional or updated drivers required for the existing ATMS software to communicate and control new RDS installed by Contractor shall be the responsibility of the Contractor.

907-641.03.1--Testing. The Contractor shall conduct a Project Testing Program as required below. All costs associated with the Project Testing Program shall be included in 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 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 is required to perform the Conditional 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.

- 3) 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 definitively in full compliance with all project requirements. Test procedures shall cross-reference to these specifications or the project plans. Test procedures shall contain documentation regarding the equipment configurations and programming.
- 4) No testing shall be scheduled until approval of all project submittals and approval of the test procedures for the given test.
- 5) The Contractor shall provide all ancillary equipment and materials as required in the approved test procedures.
- 6) 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.
- 7) 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.
- 8) 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 his designee.
- 9) 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.

907-641.03.2--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.

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.

907-641.03.3--Warranty. The Radar Detection System shall be warranted to be free of manufacturer defects in materials and workmanship for a period of one year from the date of Final Acceptance. Equipment covered by the manufacturer's warranties shall have the registration of that component placed in MDOT's name prior to Final Inspection. The Contractor is responsible for ensuring that the vendors and/or manufacturers supplying the

components and providing the equipment warranties recognize MDOT as the original purchaser and owner/end user of the components from new. During the warranty period, the supplier 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 supplier's factory or authorized warranty site. Products repaired or replaced under warranty by the supplier shall be returned prepaid by the supplier.

During the warranty period, technical support shall be available from the supplier via telephone within four 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 control unit software shall be made available to the Department by the supplier at no additional cost.

907-641.03.4--MDOT Employee Training. The supplier of the Radar Detection System shall, at a minimum, provide a 4-hour operations and maintenance training class with suitable documentation for up to eight (8) persons selected by the Department. The training must include both classroom style training and hands-on training in the field of the maintenance and troubleshooting procedures required for the system. The training should also consist of a hands-on demonstration of all software configuration and functionality where applicable. The operations and maintenance class shall be scheduled at a mutually acceptable time and location.

907-641.03.5--Maintenance and Technical Support. The supplier shall maintain an adequate inventory of parts to support maintenance and repair of the Radar Detection System. The manufacturer of the Radar Detection System must provide, and have a parts support system capable of providing parts for a period of five (5) years from the date of system acceptance. Spare parts shall be available for delivery within 30 days of placement of an acceptable order at the supplier's then current pricing and terms of sale of said spare parts.

The suppliers shall maintain an ongoing program of technical support for the Radar Detection System. This technical support shall be available via telephone or via personnel sent to the installation site upon placement of an acceptable order at the supplier's then current pricing and terms of sale of said technical support services.

907-641.04--Method of Measurement. The Radar Detection System provided will be measured per each RDS installation. Such installation shall be inclusive of furnishing, installing, system integration and testing and training of a complete RDS including the unit, the RDS Comm Cable between the unit and the cabinet, pole mounted cabinet (except where Type B cabinet is required), surge suppressions, Communication Protocol Converters (if required), all conduit, risers and weatherhead between the RDS and the cabinet, interconnection wiring, power supply, surge suppression, connections to support structures (includes all incidental components, attachment hardware, mounting brackets, mounting arms, bolts, or any other items to mount the RDS 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 RDS site complete in place and ready for 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 RDS.

RDS Comm Cable, where specified in the plans, will be measured by the linear foot, measured horizontally along the conduit. This shall be inclusive of furnishing, installing, system integration and testing of the RDS Comm Cable. It shall also include all connections and terminations. Note that the RDS Comm Cable between the actual RDS unit and the cabinet on the same pole is NOT measured or paid separately and shall be included in the cost of the RDS.

907-641.05--Basis of Payment. Radar Detection System, measured and 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.

Progress payments for the Radar Detection System may be paid in accordance with the following:

- 1) 30% of the contract unit price upon delivery to the site. Delivery cannot be more than 60 days before anticipated installation;
- 2) An additional 40% of the contract unit price upon complete installation and Stand Alone testing of the Radar Detection System;
- 3) An additional 20% of the contract upon Conditional System acceptance; and
- 4) Final 10% of the contract unit price upon Final System Acceptance.

RDS Comm Cable, measured and 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, construction installation, connecting, testing, for all equipment, tools, labor and incidentals required to complete the work.

Progress payments for RDS Comm Cable may be paid in accordance with the following:

- 1) 30% of the contract unit price upon delivery to the site. Delivery cannot be more than 60 days before anticipated installation; and
- 2) Final 70% of the contract unit price upon complete installation and Stand Alone testing of the Radar Detection System connected to the RDS Comm Cable.

Payment will be made under:

- 907-641-A: Radar Detection System - per each
- 907-641-B: RDS Comm Cable - per linear foot

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-647-1

CODE: (SP)

DATE: 3/01/2013

SUBJECT: Pull Box - LADOTD

PROJECT: ITS-9999-09(028) / 106397301 & 302 -- Warren and Adams Counties

Section 647, Pull Boxes, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-647.01--Description. In-ground pull box shall be manufactured and constructed in accordance with plan details, the 2006 Louisiana Standard Specifications for Roads and Bridges, these specifications, and as directed by the Engineer.

This work also consists of furnishing and installing necessary materials and equipment to complete new traffic signal systems or modify existing systems in accordance with plan details and these specifications. When existing systems are to be modified, the existing material shall be incorporated in the revised system, salvaged or abandoned, as specified. Incidental parts which are not shown on the plans, specified herein or in the project specifications, and which are necessary to complete the traffic signal or other electrical systems or required for modifying existing systems, shall be furnished and installed as though such parts were shown on the plans or specified herein. All systems shall be complete and in operation to the satisfaction of the engineer at the time of final acceptance.

907-647.02—Materials.

- Pull Box
- Ground Rod
- Ground Clamp
- Pea Gravel
- Cathodic Test Station
- Concrete Pad
- Junction Box

Unless otherwise specified, all materials shall be new.

907-647.03--Construction Requirements.

907-647.03.1--In-Ground Pull Box. Shop drawings detailing the pull box and appurtenances as well as independent test results for cover and box load rating stamped by a licensed professional Engineer shall be submitted to the Engineer for review and acceptance.

At every pull box the contractor shall label every cable entering and leaving the pull box. Labels shall be permanent, plastic, wrap-around type that contains a minimum of 20 characters. Specific label content shall be determined with the Engineer using designations as detailed on the plans.

Underground pull box shall have the following characteristics.

- 1) Box shall be heavy duty fabricated from fiberglass reinforced polymer concrete, service style box, bottomless, divider in center, dimensions of 3 feet (width) x 5 feet (length) x 2 feet (depth), and concrete gray in color. Box shall be stackable for extra depth.
- 2) Heavy duty two piece cover fabricated from fiberglass reinforced polymer concrete. Each side of the lid shall be labeled with the appropriate logo (See **Figure 1**). The "ITS FIBER OPTIC CABLE" logo shall be used for the side containing fiber optic cable. Likewise, the "ITS Electric" logo shall be used on the side housing electric cables. The same logo shall be used on both sides if only fiber or electric is contained within the pull box.
- 3) An electronic marker for detecting the pull box shall be included. The electronic marker shall use the Telephone dedicated frequency (101.4 kHz).
- 4) Box and cover shall comply with all test provisions of ANSI/SCTE 77 (Specification for Underground Enclosure Integrity) for Tier 22 applications.
- 5) A cover and box design load rating of at least 22,000 lbs (Tier 22).
- 6) Box and cover shall be manufactured using matched surface tooling.
- 7) Cover shall be manufactured using DOTD logo as shown in these specifications.
- 8) Cover is required to have a minimum coefficient of friction of 0.50 in accordance with ASTM C 1028.
- 9) Self-hole cleaning penta head bolts shall be stainless steel and shall be an integrated/fixed component of the lid. Penta head tool shall be provided to the Department in the quantity of ten (10).
- 10) A 12 inch x 6 inch thick concrete mowing pad shall be installed around each pull box.

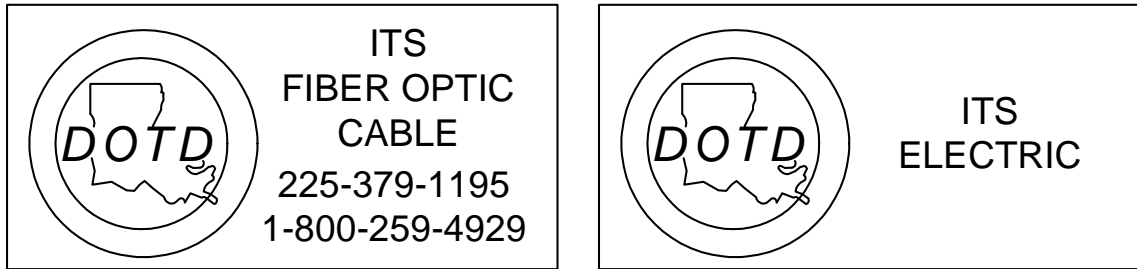
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Certification that all test provisions of this specification have been met shall be stamped by a registered Professional Engineer and submitted.

Underground pull boxes shall be installed as required on plans along conduit runs, at sharp turns, and on both sides of a crossing that requires a permit.

A ¾ inch x 10 foot stainless steel ground rod shall be installed within the power section of the underground pull box enclosure according to plan details. Contractor shall connect the exposed ends of the detectable pull rope to the ground rod utilizing a suitable grounding clamp.

Contractor shall install an in-ground a cathodic protection test station at pull box locations indicated in the plans. Test station and installation shall have the following characteristics: locking, 4 point block, 3 inch internal diameter, 18 inch in length, heavy duty cast iron cover and collar, ABS plastic shaft, PVC terminal board, stainless steel terminals and hardware, and concrete mounting pad.

Figure 1: Pull box Labels



Upon request by the Department, the contractor shall arrange for the manufacturer to grant access to the manufacturing facility for all products specified herein.

907-647.03.2--Underground Junction Box. The Contractor shall provide drawings and equipment submittals for Engineer review. See traffic signal detail (TSD) for additional details

Junction boxes, when shown on the plans, are required a minimum of every 150 feet in a conduit run. Backfilling shall be with usable soil, shall conform to Subsection 701.08, and shall be placed and compacted to the density of the surrounding ground at no direct pay. All metal covers and conduits shall be bonded together. Electrical conductors shall be installed clear of the metal frames and covers.

Pull box fittings shall be used on conduit longer than 180 feet. Pull box fittings shall be installed at a minimum spacing of 90 feet.

Underground pull box shall have the appropriate logo (See Figure 1). The “ITS FIBER OPTIC CABLE” logo shall be used for fiber optic cable. Likewise, the “ITS Electric” logo shall be used for housing electric cables.

Cover is required to have a minimum coefficient of friction of 0.50 in accordance with ASTM C 1028.

A 12 inch x 6 inch thick concrete mowing pad shall be installed around each pullbox.

Upon request by the Department, the Contractor shall arrange for the manufacturer to grant access to the manufacturing facility for all products specified herein.

907-647.04--Method of Measurement. Pull box of the type specified will be measured per each.

Underground junction boxes of the type specified will be measured per each

907-647.05--Basis of Payment. Pull box, measured as prescribed above, will be paid for at the contract unit price per each, which price shall be full compensation for furnishing and installing the pull box with mowing pad, all labor, excavation, backfill, materials including cover, equipment, tools and incidentals necessary to complete the work.

Payment will be made under:

907-647-A: Pull Box, Type ____, LADOTD - per each

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-648-4

CODE: (SP)

DATE: 03/04/2013

SUBJECT: Wireless Communications

PROJECT: ITS-9999-09(028) / 106397301 & 302 -- Warren and Adams Counties

Section 648, Radio Interconnect, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby deleted and replaced as follows.

SECTION 907-648 -- WIRELESS COMMUNICATIONS, MICROWAVE

907-648.01--Description. These specifications set forth the minimum technical requirements for wireless communications, microwave capabilities to provide communication between devices and communication collection points as shown on the plans.

907-648.02--Materials. The Contractor shall provide a functional non-licensed wireless system in accordance with any applicable FCC rules and regulations. The Contractor shall be responsible for supplying all equipment needed for a 100% functional wireless system capable of providing video and data to each of the sites encompassed in the project. The Contractor shall ensure that each site location's wireless link has sufficient bandwidth for all devices to communicate properly across the network. The wireless link shall support the min bandwidth requirements with a 99% reliability factor. The minimum bandwidth provided per each individual link shall be the cumulative minimum bandwidth of each device type and number of each per device utilizing that link according to the following table of min bandwidth requirements.

Device Type	Min Bandwidth per Device
CCTV PTZ	512 kbps
CCTV Fixed	256 kbps
DMS	128 kbps
Detection	256 kbps

The wireless system shall include Microwave wireless communications devices that are inclusive of two types: Wireless communications microwave Type Short Range, and Wireless communications microwave Type Long Range. Each Type shall be capable of meeting all requirements as identified in this specification except Type Long Range shall be capable of meeting all performance requirements for wireless link distances of 10 miles or greater. Type Short Range shall be capable of meeting all performance requirements for wireless link up to distances of 10 miles. The Contractor shall provide all elements necessary to provide a functional system including radios, antennas, coaxial cable and connectors, lightning suppressors, mounting and grounding hardware, and any other equipment, hardware, enclosures and cabling required to make a complete operational system.

907-648.03--Construction Requirements. All equipment shall be installed according to the manufacturer's recommendations, the Plans and as follows.

907-648.03.1--Installation Services. The Contractor must prepare a comprehensive Network Design and Installation Plan for the wireless network, and shall ensure sites are in accordance with FCC rules, and that additional FCC license applications are not required. Contractor shall submit a copy of the Network Design, Installation Plan, to the MDOT Project Engineer. MDOT reserves the right to reject any network designs and installation plans submitted. If rejected, the Contractor will be responsible for submitting revised network design and/or installation plan.

The Contractor shall ensure that the newly installed equipment is not interfering with or being interfered by any existing equipment that is installed in the local project area. If such interference is detected the Contractor shall take measures to correct the situation at the sole expense of the Contractor.

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.

907-648.03.2--Testing. The Contractor shall conduct a Project Testing Program as required below. All costs associated with the Project Testing Program shall be included in overall contract prices; no separate payment will be made for any testing.

907-648.03.2.1--General Requirements. 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 Project Engineer, ITS Engineer, and/or their designee(s) reserve the right to attend and observe all tests. The Contractor is required to perform the Standalone Acceptance Test (SAT) with the MDOT ITS Engineer or his designee present.

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 Specifications or the Project Plans. Test procedures shall contain documentation regarding the equipment configurations and programming.

No testing shall be scheduled until approval of all project submittals and approval of the test procedures for the given test.

The Contractor shall provide all ancillary equipment and materials as required in the approved test procedures.

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.

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.

All tests deemed by the Project Engineer to be unsatisfactorily complete shall be repeated by the Contractor. When the Contractor requests a 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 Manager or his 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.

907-648.03.2.2--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, control cables, poles, etc. An SAT shall be conducted at every field device site.

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.

The SAT at each site for this project shall include testing from each device location to demonstrate that the video and data is being transmitted to and from each site as shown on the plans.

907-648.03.2.3--Local Ethernet System Testing. Successful communications are defined as the ability of a wireless transceiver to send video and an error-free data message and view the video and data from the receiving station. A minimum of 30 test transmissions shall be attempted at each test site. If a failure occurs at the locations selected, it will be the responsibility of the Contractor to re-check the test area to determine if a problem exists. If there is a problem, it will be the Contractor's responsibility to run additional tests as required to define the cause of the problem. If areas of non-performance represent more than the Contractor's predicted link reliability, it will be the Contractor's responsibility to correct such problems as the sole expense of the Contractor. Any additional costs associated with further testing will be solely borne by the Contractor.

Contractor must prepare and execute a detailed system acceptance test plan, including detailed system acceptance test procedures. Contractor shall give the Project Engineer a two week notice of when the Contractor plans to perform the Local Ethernet System Tests and allow the Project Engineer or his representative to be present during the testing. Contractor shall submit a copy of all System Acceptance plans to the MDOT Project Engineer through the standard MDOT submittal process.

907-648.03.3--Warranty. The wireless system and all included wireless communications microwave devices shall be warranted to be free of manufacturer defects in materials and workmanship for a period of one year from the date of Final Acceptance. Equipment covered by the manufacturer's warranties shall have the registration of that component placed in MDOT's name prior to Final Inspection. The Contractor is responsible for ensuring that the vendors and/or manufacturers supplying the components and providing the equipment warranties recognize MDOT as the original purchaser and owner/end user of the components from new. During the warranty period, the supplier 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 supplier's factory or authorized warranty site. Products repaired or replaced under warranty by the supplier shall be returned prepaid by the supplier.

During the warranty period, technical support shall be available from the supplier via telephone within four 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 control unit software shall be made available to the Department by the supplier at no additional cost.

907-648.03.4--Maintenance and Technical Support. The supplier shall maintain an adequate inventory of parts to support maintenance and repair of the wireless microwave system components. The manufacturer of the wireless equipment must provide, and have a parts support system capable of providing parts for a period of five (5) years from the date of system acceptance. Spare parts shall be available for delivery within 30 days of placement of an acceptable order at the supplier's then current pricing and terms of sale of said spare parts.

The suppliers shall maintain an ongoing program of technical support for the wireless microwave communication system. This technical support shall be available via telephone or via personnel sent to the installation site upon placement of an acceptable order at the supplier's then current pricing and terms of sale of said technical support services.

907-648.04--Method of Measurement. Wireless Communications, Microwave of the type specified will be measured per each installation. Such measurement shall be inclusive of radio, software, base stations, power supply, antennas, cables and connectors, lightning suppressors, mounting and grounding hardware, enclosures, receivers, transceivers, and all other items necessary to complete the installation to provide appropriate RF Data Link between sites. Measurement 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 Wireless Microwave Communications System..

907-648.05--Basis of Payment. Wireless Communications, Microwave, 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 all installing, connecting and testing; and for all equipment, labor, tools, and incidentals necessary to complete the work.

Progress payments for wireless communications, microwave will be paid per each as follows.

- 1) 30% of the contract unit price upon delivery to the site. Delivery cannot be more than 60 days before anticipated installation;
- 2) An additional 40% of the contract unit price upon complete installation and Stand Alone testing of the wireless network;
- 3) An Additional 20% of the contract upon conditional system acceptance; and
- 4) Final 10% of the contract unit price upon Final System Acceptance.

Payment will be made under:

907-648-H: Wireless Communications, Microwave, * - per each

* Type – Long Range or Short Range

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-650-7

CODE: (SP)

DATE: 03/01/2013

SUBJECT: On-Street Video Equipment

PROJECT: ITS-9999-09(028) / 106397301 & 302 -- Warren and Adams Counties

Section 650, On-Street Video Equipment, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby deleted and replaced as follows.

907-650.01--Description. This Section specifies the minimum requirements for CCTV Camera Systems furnished and installed on this project. The CCTV Camera System will provide TMC personnel with live streaming video of the roadway network via CCTV Camera Systems installed at locations shown in the Plans. The CCTV Camera System will include both fixed and PTZ cameras as called for on the Plans.

907-650.02--Materials. All materials furnished, assembled, fabricated or installed shall be new, corrosion resistant and in strict accordance with all of the details shown in the Plans and described in this Special Provision.

Support equipment for the CCTV Camera Systems shall be provided in a Type B ITS Equipment Cabinet as described in Section 637 of these specifications and as shown on the plans.

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 at fixed locations as shown on the Plans to provide full coverage within the project limits including mainline travel lanes and shoulders.
- 2) CCTV Fixed Cameras shall be placed at fixed locations as shown on the Plans 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 additional fixed cameras shall be adjusted to the desired view of the surface streets. The Contractor shall record the adjusted views for five minutes 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 the configuration as specified in this Special Provision and the Plans.

- 4) The PTZ and the Fixed cameras shall be either Analog or Ethernet IP-based as indicated in either project plan sheets or Notice to Bidders or should be assumed analog if description isn't provided.
- 5) The CCTV Camera System shall be capable of attended and unattended, continuous 24 hours per day operation at the sites as shown on the Plans.
- 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 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: 1/4 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) Shall be capable of 2 simultaneous H.264 video streams.
 - a. The primary stream shall provide 720p 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) Shall be capable to take video snapshots in JPEG format and transfer image via FTP.
- 6) IP encoded streams and Video Compression Technology shall be compatible with the existing video streaming servers and decoders for the MDOTTraffic.com WEB site or as approved by the Intelligent Transportation Systems Program Manager.
- 7) Internet Protocols: TCP, UDP (Unicast, Multicast IGMP V2), UPnP, DNS, DHCP, RTP, NTP
- 8) Support Real Time Streaming Protocol (RTSP) and MPEG2-TS
- 9) Multilevel Password Protection.
- 10) EDR (Extended Dynamic Range).
- 11) C/CS Lens Mount.
- 12) Backlight Compensation.
- 13) Low Profile Top/Bottom Mount.
- 14) 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 2X for IP dome 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 PTZ 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 for enclosure including camera head electronics.
- 3) The PTZ Dome type enclosure shall be constructed in such a way that unrestricted camera views can be obtained at all camera and lens positions.
- 4) PTZ 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 type 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 PTZ 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: -34°C to +74°C (-30°F to +122°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 PTZ enclosure. The unit shall be integrated with the CCTV control system.
The Dome type camera 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 30 degrees per second, minimum, and the pan speed shall be variable from zero up to 80 degrees per second, minimum.
- 2) External positioner type cameras shall meet the requirements of 907-650.02.7-1 including tilt (vertical) movement of +90 degrees above the horizontal to -90 degrees below the horizontal.

- 3) The unit shall be capable of simultaneous pan, tilt movements and zoom on one camera
- 4) Drive motors shall be capable of instantaneous reversing, be corrosion resistant, not require lubrication, and have overload protection.
- 5) Braking shall be provided in both pan and tilt movements to enable fast stop and reversal and to prevent drifting.
- 6) The viewing limits shall be set by a minimum of 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-422 and/or 485 (user selectable). If the camera is an IP camera, controls shall also be accessible via IP communications.
- 11) The communications interface shall be compatible with the Video Encoder serial port as defined in Section 907-662 of these Specifications.
- 12) Standard interface connectors shall be provided.
- 13) The video input and output connections shall be the BNC type.
- 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 minimum fixed camera requirements include:

- 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 minimum fixed camera enclosure requirements include:

- 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 PTZ 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 and, if applicable, PoE power supply..

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 Belden 8281 or approved equivalent.
- 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 (Ω), 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 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 under the contract.
- 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. Such measurement shall be inclusive of camera unit, housing, pan/tilt drive, receiver/driver, software driver, mounting hardware and any enclosures necessary. It shall also include any items necessary to mount the camera unit from a mast arm pole, steel strain pole,

pole extension pipe, etc. Required cabinet facilities, including transformer and/or disconnects, will not be measured for separate payment.

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, for all installing, connecting, cutting, pulling and testing and for all equipment, tools, labor and incidentals necessary to complete the work.

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. 907-655-2

CODE: (SP)

DATE: 03/12/2013

SUBJECT: Highway Advisory Radio

PROJECT: ITS-9999-09(028) / 106397301 & 302 -- Warren and Adams Counties

Section 907-655, Highway Advisory Radio, is hereby added to and made a part of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction as follows.

SECTION 907-655--HIGHWAY ADVISORY RADIO

907-655.01--Description. This Special provision describes furnishing, installing and integrating a Highway Advisory Radio (HAR) System. The work consists of providing all labor, materials, equipment, and incidentals necessary to furnish, install, test, and make functional the HAR System. The work includes complete Federal Communications Commission (FCC) licensing services and all documentation necessary to operate and maintain the equipment.

The HAR System will provide broadcast up-to-the-minute AM radio traffic advisories and be equipped to allow messages to be changed or transmitted via the communications system.

907-655.02--Materials.

907-655.02.1--General. A HAR system shall consist of but is not limited to the following components and materials:

1. AM radio transmitter,
2. Digital recorder/player,
3. Global Positioning System (GPS) synchronizer,
4. National Oceanic and Atmospheric Administration (NOAA) weather receiver,
5. HAR cabinet,
6. Antenna mounting pole,
7. Antenna and grounding,
8. Power distribution / supply,
9. Battery backup system with recharging subsystem,
10. Surge protection,
11. HAR flashing beacons and remote control, and
12. Communications and control center (hardware and software) equipment.

907-655.02.2--System Capabilities and Performance Requirements. Overall system capabilities and performance requirements include the following:

1. Each HAR subsystem shall have a minimum coverage radius of 4 miles for broadcasting messages to motorists.
2. The network of HAR subsystems shall be synchronized to provide seamless message receptions from one transmission area (zone) to another.
3. System shall provide digital message recording and storage capabilities.
4. Provide National Weather Service (NWS) transmission/broadcast capabilities.
5. Each HAR transmitter shall be capable of being controlled through both a dial-up phone line and through an Ethernet port.
6. Messages to each HAR transmitter shall be through an Ethernet port.
7. Provide battery back-up power for a minimum of 72 hours without primary power source.
8. Provide HAR advisory static signs, flashing beacon lights, solar power subsystem, and pager-based and cellular-based control of the flashing beacon lights.
9. All HAR structures, including the antenna, shall be able to withstand a steady-state 90-mile per hour (mph) wind and ½-inch ice buildup at a minimum. For projects that are in areas with higher wind standards, the higher standard is required.
10. All HAR systems shall use the same frequency throughout the state unless otherwise approved by the Department.

907-655.02.3--General Requirements. General HAR system requirements include the following:

1. The Contractor is responsible for determining and providing any other equipment that is needed for safe and reliable operation of the HAR system.
2. Prototype equipment will not be acceptable.
3. HAR electronics shall be of solid-state design and modular construction.
4. The HAR system consisting of transmitters, digital recorder players, digital communications controllers, GPS synchronizers, power supplies, and NOAA receiver shall be provided, integrated, and warranted by a single HAR vendor.

907-655.02.4--Frequency Selection and FCC Licensing Services. The Contractor shall determine optimal HAR operational frequency and provide complete and comprehensive FCC licensing services which includes the following:

1. The Contractor is responsible for obtaining all required licenses on behalf of the Department, for the Department to operate the HAR stations.
2. The Contractor shall also perform all necessary testing to select the clearest and most appropriate operating frequency for all HAR transmitters at the proposed locations.
3. All transmitters shall operate at the same frequency throughout the state unless otherwise approved by the ITS Engineer. Frequency selection shall be submitted to the Department for approval prior to application for FCC licenses.
4. The Contractor shall provide all location maps, field strength contour maps, engineering drawings (identifying adjacent commercial stations and other possible HAR system using FCC data bases), and paperwork necessary as part of the FCC licensing process.
5. All FCC licensing effort shall be coordinated with MDOT.

907-655.02.5—Standards. All materials, equipment, supplies, installations and testing shall comply with the project requirements, the latest editions of the following standards and industry practices, as applicable, and all other standards and requirements, industry practices, and any state and local codes or ordinances that may apply.

1. Standards and industry practices shall include, but not be limited to, the following:
 - a. Federal Communications Commission (FCC) regulations
 - b. National Electric Code (NEC)
 - c. Underwriters' Laboratories Inc. (UL)
 - d. National Electrical Manufacturer Association (NEMA)
 - e. Institute of Electrical and Electronic Engineers (IEEE)
 - f. American Society of Testing and Materials (ASTM)
 - g. American National Standards Institute (ANSI)
 - h. Lightning Protection Institute (LPI)
 - i. National Electrical Safety Code (NESC)
 - j. Occupational, Safety, and Health Act (OSHA)
2. All materials, equipment, accessories and components that are not in accordance with the specific standards and requirements shall require approval by the Department. The Contractor shall bring any conflicts between referenced industry specifications and this Special Provision to the attention of the Department.
3. The Contractor shall use the latest version of referenced industry specifications, standards, and practices in force and in existence as of this project's advertisement date unless otherwise noted.
4. The Contractor shall acquire and use all applicable manuals, guidelines, and standards and practices that apply to the design, construction, and testing activities required to complete this project.

907-655.02.6--AM Transmitter. The transmitter subsystem shall meet the following minimum specifications:

1. The transmitter shall be FCC certified under CFR Title 47, Section 90.242 and conform to the Traveler Information Service (TIS) requirements in the United States.
2. Capability for adjustment of RF output power and audio input levels through easily accessible controls.
3. A provision for automatic station identification (Automatic ID) shall be included.
4. The HAR AM transmitter unit shall meet the following minimum requirements:
 - a. Operational Frequency Range: 530 kHz to 1700 kHz inclusive
 - b. Modulation Type: Amplitude Modulation (6A3)
 - c. Transmitter Amplifier Type: High Efficiency Class D (80% or Better)
 - d. Radio Frequency Output Power: Adjustable up to 10 Watts
 - e. RF Output Impedance: 50 Ohms (50Ω)
 - f. Frequency Stability: ± 0.002 % (20 PPM) from 32° to 95°F (0° to 35°C) or provided by phase locking to GPS.
 - g. AF Input Impedance: Both, 600Ω and Hi "Z" (Match Digital Recorder)
 - h. Audio Frequency Response: 20 Hz to 15 kHz ± 1.0 dB maximum
 - i. Audio Distortion: Less than 1.5% from 200 Hz to 3.5 kHz

- j. Modulation Limiter: Built-in 100% peak modulation limiter
- k. Audio Filter: Built-in FCC compliance audio filter (-3dB at 3kHz, 18dB/octave roll-off)
- l. Audio Noise Level: At least 70 dB below 80 percent modulation level
- m. Operational Temperature Range: -30° to +74°C (-22° to +165°F)
- n. Operational Humidity: 0% to 95% non-condensing

907-655.02.7--Digital Recorder / Player. A Digital Recording Unit shall be provided with the following minimum features/functions and specifications:

- 1. Digitally record and store messages, or audio files.
- 2. Provide direct, local and remote control of all functions.
- 3. Provide security access codes for local and remote operations.
- 4. Interface: Provide capability for interfacing with a dial-up phone line and an 10/100 Base-T Ethernet network supporting TCP/IP.
- 5. Provide capability for scheduling of automated broadcasts by day, week, month, year, and time.
- 6. Store a minimum of 250 distinct digital messages or audio files, with variable length messages, which can be recorded, stored, or deleted independently.
- 7. Provide a minimum of 80 minutes of total recording time.
- 8. Sequences of up to 100 messages shall be possible
- 9. Up to 20 message sequences that can be stored and selected.
- 10. Allow the recording of a message while another message is being recorded. (Simultaneous record/playback).
- 11. Allow for multiple modes of operation including:
 - a. Transmitter on or off
 - b. Record a message and monitor the recorded message
 - c. Play pre-recorded message(s) by inputting codes
 - d. Emergency broadcast mode (Live messages)
 - e. NOAA Weather Radio broadcast when emergency alert system event code is activated
- 12. Provide capability for message retention (indefinitely) without the use of a battery, in the event main site power is lost.
- 13. Provide the capability for automatic call-sign announcement.
- 14. The Digital Recorder/Player shall be capable of providing Standard DTMF tones as applicable
- 15. AF Input Impedance: both, 600Ω and Hi “Z” (Contractor shall provide a compatible microphone)
- 16. Audio Frequency Response: 20 Hz to 15 kHz \pm 1.0 dB maximum
- 17. Audio Distortion: Less than 5% @ from 200 Hz to 3.5 kHz
- 18. Modulation Limiter: Built-in 100% peak modulation limiter
- 19. Temperature: -30° to +74°C (-22° to +165°F); Humidity: 95% non-condensing

907-655.02.8--Simulcast Synchronization. The HAR synchronization subsystem shall meet the following minimum requirements:

1. The system shall be prepared to be part of a wide area broadcasting system with other HAR transmitters as shown in the Plans of the same type for simultaneous broadcast of messages in a synchronized system.
2. This feature shall avoid interference or audio distortion within possible overlapped areas.
3. Each synchronized HAR system shall be equipped with a GPS synchronizer, which shall provide the capability to phase-lock the transmitters to a common reference carrier to minimize heterodyne.
4. The GPS Synchronizer subsystem shall have been successfully tested in conjunction with the transmitter and certified by the FCC in accordance with the provisions of FCC Section No. 90.242.

907-655.02.9--NOAA Weather Receiver. The Contractor shall provide a weather receiver unit meeting the following requirements:

1. Shall receive up-to-the-minute information directly from the National Weather Service (NWS).
2. The unit shall work in conjunction with the HAR digital recorder/player to automatically interrupt the current message being broadcast upon receipt the Emergency Alert System (EAS) event codes from NOAA.
 - a. The system shall have fully programmable EAS entry capability allowing the Department to select only the alerts they specifically need for this specific area and application.
3. The Alert feature (on/off) as well as the feature to set the duration for broadcasting the alert, shall be selectable from within the digital recorder/player's voice prompts
4. The NOAA Weather Receiver module shall comply with the following functionality and requirements:
 - a. Component shall provide selectable frequencies that are selectable through a series of dip switches or push-buttons
 - b. The weather receiver shall provide internal speaker and headphone jack
 - c. Weather alert shall detect 1050 Hz alert tones
 - d. Component shall provide antenna and required cabling
5. The system shall also automatically activate all flashing beacons whenever a NOAA weather message has been broadcast.

907-655.02.10 HAR Transmitter Cabinet. All HAR shall be designed to operate inside the cabinet described herein. The Contractor shall provide a ground-mounted cabinet for each HAR station. The HAR cabinet shall be included in the cost of the HAR system and shall meet the following minimum specifications:

1. The HAR cabinet shall be approximately the same size as a Type C cabinet as indicated in the Plans.
2. The HAR electronic components shall be housed in a locking, weather resistant, aluminum cabinet that shall completely protect the equipment.

3. The HAR cabinet shall be a NEMA 3R rated aluminum enclosure. It shall provide protection from falling dirt, rain, sleet, snow, windblown dust, splashing water, vandalism and will be undamaged by the external formation of ice on the enclosure.
4. The complete cabinet / enclosure shall be constructed from 0.125" thick aluminum alloy type 5052-H32 to provide strong and rigid construction. All exterior seams shall be ground smooth or sealed weather-tight.
5. The door frame/opening shall be designed to help prevent dust and liquids from dropping in the cabinet when the door is opened.
6. The cabinet shall be equipped with adjustable mounting channels to provide versatile positioning of shelves or optional panels or rack mounting angles.
7. The cabinet / enclosure door shall be lockable and provisions for cabinet door handle padlocks shall be included.
8. Provide with an AC power service panel and ground bus.
9. The cabinet shall include a thermostatically controlled ventilation fan to adequately remove heat within the cabinet to prevent performance degradation and reduced reliability. Ventilation fan and filter louver shall be screened against the entrance of dust and foreign matter. A replaceable filter for incoming air shall be provided. The fan shall include a resistor-capacitor network noise suppressor installed across the fan motor power terminals.
10. The cabinet shall include a fluorescent lighting fixture, minimum 15 watt, mounted on the inside top front portion of the cabinet, with a cool white lamp with shatter-proof cover and operated by a normal power factor UL listed ballast. The light shall be door switch controlled. The light shall include a resistor-capacitor network noise suppressor installed across the light fixture power terminals.
11. Provide sunshields and mounting fasteners on all HAR transmitter cabinets. Sunshields and fasteners shall meet the following minimum requirements:
 - a. Sunshields shall be 0.125-inch aluminum with smoothed, deburred edges and rounded corners. Provide cutouts for door handles and/or locks as required.
 - b. Cabinets shall be equipped with press-in threaded inserts on the cabinet interior. Sunshields shall be mounted by fasteners and aluminum or stainless steel standoffs tightened into the threaded inserts. Provide a minimum of four inserts/fasteners for top face sunshields.
 - c. Provide a minimum of six inserts/fasteners for any door or side sunshield.
 - d. For doors or sides greater than 54 inches tall, provide inserts and fasteners sufficient for a maximum vertical or horizontal distance of 27 inches between any fasteners.
 - e. Furnish and install a top face sunshield on all cabinets.
 - f. Furnish and install door or side sunshields on any cabinet face that is within 60 degrees in either direction of due south. A minimum of two door or side faces shall have sunshields on any cabinet. A cabinet with a face exactly perpendicular to the south shall have three shields.
12. Provide agency name, device name and ID labels on all cabinets. Labels shall meet the following minimum requirements:
 - a. Labels shall be flat black lettering on a reflective white background. Lettering shall be a minimum of 1 inch in height.

- b. Labels shall be manufactured from pre-coated adhesive backed reflective sheeting material meeting the minimum requirements of AASHTO M268 Type 1.
 - c. The agency name labels shall be "MDOT ITS" in one continuous adhesive sheet.
 - d. The device ID labels shall include the device name as an acronym and a hyphen, and shall be one continuous adhesive sheet.
 - e. The device ID shall be numerals corresponding to the location and shall be installed adjacent to the acronym sheet.
 - f. The device ID labels shall also include large 3" letters on the side of the cabinet that the ground plane is located that states "WARNING: GROUND PLANE LOCATED XXX' FROM CABINET. NO DIGGING"
 - g. Labels shall be installed along the top of the cabinet door , with MDOT ITS label at the top and the device ID labels immediately underneath.
13. Provide a voltage label on all HAR transmitter cabinets in accordance with the NEC labeling requirements. Voltage labels shall meet the following minimum requirements:
- a. Labels shall be flat black lettering on a reflective yellow background. Lettering shall be a minimum of 1 inch in height.
 - b. Labels shall be manufactured from pre-coated adhesive backed reflective sheeting material meeting the minimum requirements of AASHTO M268 Type 1.
 - c. Labels shall include the voltages entering the cabinet and shall be one continuous adhesive sheet. Examples are "120VAC" or "120/240VAC".
 - d. Labels shall be installed on all cabinet doors.
14. Provide door locks for all HAR transmitter, controller and solar power/battery cabinet doors all keyed to the same master. Provide one key with each cabinet.

907-655.02.11--Mounting Pole. The mounting pole shall meet the following minimum requirements:

- 1. The antenna shall be mounted on a freestanding, vertical pole support utilizing adequate antenna mounting hardware.
- 2. All mounting hardware used shall be stainless steel except for the anchor bolts, which shall comply with the Plans.
- 3. The combined height between the pole support and the tip of the antenna element shall not exceed 49.2 feet in height from ground level in order to comply with FCC regulations.
- 4. The antenna pole support shall have the following physical characteristics:
 - a. Structurally constructed in one continuous piece
 - b. Standard 30 to 35 foot wooden or fiberglass utility pole
 - c. Withstand severe weather and heavy winds of 90 mph at a minimum. For projects that are in areas with higher wind standards, the higher standard is required.
- 5. Foundation of the antenna pole shall conform to the detail requirements in the Plans.

907-655.02.12--Antenna Subsystem. The antenna subsystem consists of an antenna and its grounding components and shall meet the following minimum requirements and features:

1. Omni-directional, vertically polarized antenna providing high efficiency with low radiation angle performance.
2. Manufactured for and tuned to the same frequency as the transmitter.
3. Provide an Effective Isotropic Radiated Pattern (EIRP) of 2.0 mV/m @ 1.5Km (0.93 miles) per FCC regulations.
4. Provide an overall Voltage Standing Wave Ratio (VSWR) 1:4 or better with direct feed (without antenna tuner).
5. Provide direct base feed, Center coil loaded.
6. Antenna height will depend on final selected frequency – approximately 15ft will be required for 1700 kHz and 25ft for 530 kHz. The total antenna height (tip) above ground including the mounting pole shall not exceed 49.2 feet as per FCC regulations.
7. Antenna shall be constructed from anodized aluminum with adjustable tip to minimize the standing waves.
8. Antenna subsystem shall be self-supporting and capable of withstanding severe weather conditions with winds of up to 90 miles per hour (steady state) with ½-inch of ice build-up.
9. Antenna subsystem shall include all hardware, mounts, surge protectors, and ground terminals in cabinet/enclosure for a complete subsystem.

907-655.02.13--Grounding. The Contractor shall document and submit to the Department for review and approval, an antenna/grounding subsystem design for this project that meets the following minimum grounding requirements:

1. The antenna/grounding design shall be provided for each proposed HAR site taking into account local site conditions, soil conditions, antenna type and exact location, along with the ground plane designed.
2. The HAR antenna/grounding design and design submittal shall be either conducted by or signed off by the HAR equipment manufacturer. The submittal shall include antenna and grounding details showing design configuration and proposed equipment and materials, supporting design calculations, recommended installation methods/procedures to be utilized, and equipment and proposed material specifications / cut-sheets.
3. The HAR antenna subsystem shall be provided with an efficient ground plane properly tuned to the operational frequency and ground/soil type and conditions.
4. The Contractor shall be responsible to provide a grounding system that provides the overall HAR system performance as described herein.
5. The grounding subsystem shall consist of a set of horizontal radials of heavy gauge wire or radial loops extending outward from the base of the antenna to ensure proper grounding and performance requirements.
6. An alternate ground system method and configuration may be designed and submitted as part the HAR grounding subsystem design submittal depending on site conditions to the Department for review and approval prior to construction.
7. Regardless of the grounding type; the Contractor shall be responsible for providing a complete grounding subsystem that supports the minimum 4-mile transmission radius system performance as described herein.

8. Care shall be taken to minimize disruption to the existing landscape and to avoid possible underground utilities or conduits. After installation the landscape of the site shall be restored to the state that it was in prior to installation of the ground system.

907-655.02.14--Power Supply / Regulation. The power supply subsystem shall meet the following minimum specifications:

1. The equipment proposed shall be capable of operating from a primary power (115-volt, 60 Hz.) source.
2. The equipment shall have fuse protection against internal short circuit and power surges.
3. The electrical power distribution and regulation/conditioning shall be supplied with a power subsystem equipped with an automatic power transfer switch to the battery back-up system for power failure management or equivalent method. The subsystem shall have no interruptions of power or spikes.
4. Provide low voltage battery protection capability.
5. Provide power regulation/conditioning: $\pm 3\%$ output voltage regulation with input voltage variations $\pm 15\%$. Provide noise attenuation and harmonic filtering
6. The subsystem is responsible for distribution of the power required to all components of the HAR system. It shall have built-in visual indicators to show power and alarm status at a minimum.

907-655.02.15--HAR Back-up Battery System. The battery backup system shall meet the following minimum specifications:

1. The Contractor shall provide a battery backup system that will provide sufficient battery power to operate all components of the HAR subsystem, including the AM transmitter operating at 10 watts full power output, for minimum of 72 hours (3 days) without normal 115-volt primary power or other external service.
2. The current draw of each component of the HAR subsystem including the AM transmitter, digital recorder/player, communications equipment and any other electrical loads present during operation shall be measured and provided by the Contractor to the Department for verification of proper sizing of the back-up battery system.
3. The back-up system shall have an automatic charging unit and power changeover with no interruption to HAR transmissions. The system shall also include automatic charging circuitry to prevent overcharging and thermal (overheat) protection.
4. The battery back-up system chargers shall meet all specified requirements while operating between $-40\text{ }^{\circ}\text{C}$ to $+74\text{ }^{\circ}\text{C}$ ($-40\text{ }^{\circ}\text{F}$ to $+165\text{ }^{\circ}\text{F}$), and 95% relative humidity.
5. Batteries shall be maintenance free, industrial, deep-cycle gel cell or absorbed glass mat (AGM) type.
6. The battery charger shall trickle charge the batteries from the normal 115-volt primary power.
7. The back-up system shall not overcharge the batteries and shall include a load controller and a charge regulator in addition to automatic battery temperature compensation. Provide a method (voltmeters, ammeters) to indicate the current state and rate of charge of the batteries.

8. One set of rechargeable batteries shall be furnished for each local transmitter included in this project.
9. A separate NEMA 3R aluminum, weather resistant cabinet/enclosure, located adjacent to the HAR cabinet, shall be included for housing the battery back-up system components. Cabinet shall be lockable.

907-655.02.16--Antenna Cabling. The antenna cabling shall meet the following minimum specifications:

1. The Contractor shall use high quality, low-loss transmission cable to connect the antenna, inline lightning suppressor, and transmitter. Belden 9913 or Times LMR-400 low-loss coaxial cable or equivalent.
2. The coax cable shall be recently manufactured and certified for having factory testing performed to verify the cable design characteristics.
3. The Contractor shall provide weatherproofing for the transmission cable/connector ends, suitable for direct environmental exposure.

907-655.02.17--Surge Protection. The HAR system shall be provided with surge protection on all input and output audio lines, antenna lines and power feeds, in order to protect the equipment during inclement weather conditions and common transients (transient voltage surges and induced current) along the primary power source.

The surge protection equipment shall meet the following minimum requirements:

- 1) The surge protectors shall include but are not limited to the following types and requirements:
 - a. Power Line Surge Protector Response: Surge suppression in cabinet shall meet all equipment manufacturers' recommendations.
 - b. Antenna Surge Projector Response: < 4.0 ns @ 18,000 Amp
- 2) All surge protection devices shall be UL listed.
- 3) Radio surge protectors shall introduce low insertion losses (≤ 0.1 dB)

907-655.02.18--HAR System Software Application. If called for in the plans, the Contractor shall provide a network-ready, client-server HAR control and monitoring application software package that operates over the network the existing TMC Network. In areas were HAR systems exist the Contractor shall integrate new HAR stations with existing HAR server software and hardware.

907-655.02.18.1--HAR Client Software Requirements. The HAR software application shall provide centralized operator control and monitoring of dispersed HAR and flashing beacon subsystems with the following minimum features and capabilities:

1. Shall be responsible for serving as the user interface to view and control the HARs.
2. Shall be installed on each of the existing TMC workstations.
3. Shall allow the TMC Operator to select, display, schedule, and modify messages, transmit messages, list diagnostic information, and control of HAR field stations via the network.

4. Shall support message recording through external audio sources and by a microphone via audio line inputs in the workstations.
5. Shall support review, selection, scheduling and playback of recorded messages from a HAR message library.
6. Shall support control of flashing beacons over a pager subsystem or cellular subsystem.
7. Shall provide for multiple modes of operation as follows:
 - a. Transmitter control
 - b. Record and monitoring of messages
 - c. Playing of pre-recorded messages
 - d. Emergency broadcast mode (live)
 - e. NOAA weather radio broadcast when alert is activated.
8. Shall provide the capability for user-definable HAR groups and HAR Sign groups that will allow the user to execute commands on the entire Group with a single command.
9. Shall provide status information based on control commands sent to indicate which HAR Signs with Flashing Beacons are currently activated.
10. Shall be capable of importing audio files created externally and log updates
11. Shall be capable to convert typed text into voice that can be used for a clear understandable message.
12. Provide the capability to group signs and then click an icon to issue an on or off command to the group.
13. The HAR system operators shall be able to toggle the beacon state within the client software, turning the devices off or on.

907-655.02.18.2--HAR Server Software Requirements. The HAR Server is responsible for management of all HAR device configuration and communications. The HAR Server Software shall meet the following minimum requirements:

1. Shall support control of flashing beacon controllers over a pager subsystem and cellular-based subsystem.
2. Shall support and be licensed for a minimum of fifteen (15) HAR clients.
3. Shall support up to 40 HAR stations on a single server without additional software or upgrades. The Contractor shall provide a current HAR Server software license for a minimum of 10 HARs.
4. Shall allow devices to be added, removed or modified any time after the initial software installation and configuration.
5. Shall generate a dynamic geographic map viewable from the HAR Clients. The map shall include the following features:
 - a. Displays icons for HARs and HAR Signs with Flashing Beacon locations.
 - b. Capability to zoom in or out.
 - c. When a HAR location is selected, associated HAR Sign with Flashing Beacons shall be highlighted.
 - d. Shall allow the capability for placing dynamic icons representing installed HARs and Flashing Beacons in their appropriate locations.
 - e. Other ITS device icons shall be statically placed on the same site map for TMC Operator reference.
6. All software configurations shall be through a graphical user interface.

7. Shall prevent more than one user to simultaneously control the same HAR or HAR groups.
8. Shall support communication to HAR transmitters through dial-up lines and through the IP/ Ethernet network.

907-655.02.18.3--HAR Software System Configuration. The Contractor shall fully configure the HAR Control System for operation. At a minimum, this shall include:

1. Install and configure map of the project area with HAR locations and HAR Sign locations. The map image must be approved by the Engineer prior to installation and configuration.
2. Configure the HAR Server communications and establish and test service to all HAR and HAR signs.
3. Install and configure all HAR stations and flashing beacon controllers.
4. Configure a minimum of fifteen (15) users (provide capability to support local and remote users).
5. Duplicate configurations shall be made at both the Regional TMC location and the Statewide TMC location in Jackson, MS.

907-655.02.18.4--Hardware Requirements. When called for in the plans or a Notice to Bidder, the Contractor shall provide and configure one server at the Regional TMC and another server at the Statewide TMC in Jackson, MS. The server shall meet or exceed the minimum server requirements specified by the HAR software vendor.

907-655.02.19--HAR Flashing Beacons and Control Subsystems. The flashing beacon shall meet the following minimum requirements:

1. Static signs will be used with stationary HAR systems as shown in the Plans. The bottom of the sign will notify motorists that information is on a specific AM RF. The top of the sign will have a yellow background and the words "URGENT MESSAGE WHEN FLASHING" in black letters. This message refers to the two flashing beacons that will be located on top of the sign.
2. The two beacons shall require their own power, control and cabinet components. All beacons shall be DC-powered. The DC-powered beacons shall have PV solar arrays and a battery subsystem as described in Section 907-655.02.20.
3. The beacons shall be turned on or off remotely with pager-based and cellular-based controller components. A control cabinet shall house the beacon control and power components.
4. HAR flashing beacons shall be constructed in accordance with the Plans for HAR static signs and flashing beacons.
5. The beacon component shall include two (2) beacon housings of polycarbonate construction.
6. The LED beacon lens/heads located on highways/freeways shall be one (1) foot in diameter.
7. The beacons shall have a flash rate as specified in the Federal Highway Administration (FHWA) Manual on Uniform Traffic Control Devices (MUTCD).

8. The flashing beacon shall be activated via PC dial-out (TAP) over pager network and via TCP/ IP over cellular network. The controller shall be used to remotely control the flashing beacons.
9. The flashing beacon system shall include an adjustable automatic shutoff timer that will automatically turn off the flashers in a predetermined amount of time if when done through the paging system.
10. All beacon control and power components (except batteries) shall be housed in a minimum NEMA 3R type aluminum cabinet/enclosure. The cabinet/enclosure shall be constructed from 0.125" thick aluminum alloy type 5052-H32. The cabinet/enclosure door shall be lockable and provisions for cabinet door handle padlocks shall be included.

907-655.02.19.1--Pager Control Subsystem. The pager-based control subsystem shall meet the following minimum requirements:

1. The Contractor shall be responsible for establishing and setting up an account with a local Service Provider providing paging services as required for the HAR subsystem operations. All activation and operational / monthly billing costs shall be paid by the Contractor during the test phases. Upon Final Acceptance the account will be transferred to the MDOT.
2. The Contractor shall verify pager service is available and FCC license is approved for that particular site prior to construction.
3. HAR system operators shall be able to simply call a designated pager number and enter touch-tone control functions, turning the device off or on.
4. The flashing beacon, pager-based controller shall provide the following capabilities:
 - a. Pager based controller shall operate at the 900 MHz frequency range.
 - b. Support minimum baud rate of 1200.
 - c. Support Post Office Code Standardization Advisory Group (POCSAG) line (numeric service).
 - d. Single pager number shall control multiple devices, if supported by local paging service.
 - e. Operate with a solar power subsystem described herein.
 - f. Internal relay shall provide contact closure for control of flashing beacons.
 - g. The pager controller shall be housed in the beacon control and power cabinet.
 - h. The flashing beacon controller shall be compatible with and controlled by the HAR central control software.
5. The Contractor may propose an alternative pager based control system for review and approval by the Department.

907-655.02.19.2--Cellular Control Subsystem. The cellular-based control subsystem shall meet the following minimum requirements:

1. The Cellular Control Subsystem shall include cellular modem, TCP/ IP controlled relay, and all associated parts and equipment for fully functional installation.
2. The Contractor shall be responsible for establishing and setting up an account with the DOT Service Provider facilitating cellular services as required for the HAR control subsystem operations. All activation and operational / monthly billing costs shall be paid

- by the Contractor during the test phases. Upon Final Acceptance the account will be transferred to the MDOT.
3. The Contractor shall verify cellular service is available and approved for that particular site prior to construction.
 4. The cellular-based controller, cellular modem shall adhere to the following:
 - a. The cellular modem shall utilize wireless TCP/ IP
 - b. The cellular mdoem shall support networking protocols: TCP, UDP, DNS, DHCP, HTTP, SNMP, and Modbus.
 - c. It shall be provided with a built-in web user interface providing remote configuration and control.
 - d. The cellular modem shall provide the following interfaces:
 - i. 10/100 Base-T Ethernet port connection
 - ii. RJ-45/ DB9 Serial port connection.
 - iii. RS-232 Serial port connections. Baud rates up to 230 Kbps.
 - e. The cellular modem shall be capable of supporting connection, remote communication, programming, and diagnostics via the Internet.
 - f. The controller subsystem shall have all necessary hardware such as communications cables, and controller interface.
 5. The cellular-based controller, TCP/ IP controlled relay shall adhere to the following:
 - a. It shall be IP addressable and configurable via built-in web user interface.
 - b. Shall provide 12 Amp/ 120VAC relay to be connected to the contact closure of the flashing beacons.
 - c. Network Interface: RJ45 10/100 Base-T Ethernet port connection.
 - d. Shall be controllable by simple text commands or XML.
 6. The cellular-based control subsystem components shall be compatible with and controlled by the HAR beacon client and server software.
 7. The cellular modem and IP controlled relay shall be housed in the beacon control and power cabinet.

907-655.02.20--Solar Power for Flashing Beacons. The Contractor shall provide required solar power equipment to provide power to the flashing beacons as per the following guidelines. The photovoltaic power supply shall include but is limited to the battery, photovoltaic modules and all required peripherals. A performance design study shall be conducted and submitted for approval for the proposed solar power system. The solar power generated should be able to optimally operate the Flashing Beacons as intended. The solar power system shall meet the following minimum requirements:

1. The solar power system shall be designed based on the performance design study described above. However, the solar system shall, at a minimum, operate the flashing beacons continuously at full power for at least 3 days with no sunlight. This must be accomplished without an auxiliary generator or AC power connection.
2. The performance design study shall include, but is not limited to:
 - a. The daily Solar Insulation data averaged on a monthly basis.
 - b. The correct Tilt Angle for the solar array.
 - c. The daily Array Output, in Amp-Hours, averaged on a monthly basis.
 - d. The total Daily Load requirement, in Amp Hours, averaged on a monthly basis.

- e. A monthly Loss of Load Probability (LOLP) of the designed power supply.
 - f. The number of Battery Reserve Days, averaged on a monthly basis.
 - g. The monthly Average Battery State of Charge.
 - h. The statistical Interval to Loss of Load, in years.
3. Shall include a solar controller with automatic battery temperature compensation and automatic charging circuitry to prevent overcharging.
 4. The battery back-up system chargers shall meet all specified requirements while operating between -40 °C to +74 °C (-40 °F to +165 °F), and 95% relative humidity.
 5. Shall include metering for voltage and charging current.
 6. Solar panels shall be Jet Propulsion Laboratory Block-5 tested and approved.
 7. Solar panels shall be compliant with IEC 61215 and IEEE 1262.
 8. Solar panels shall be break-resistant and sealed, with a power rating of 80-watts.
 9. Battery shall be maintenance-free, sealed, gel-cell.
 10. The solar power system shall include a separate aluminum NEMA 3R enclosure to house the battery. This enclosure shall be designed to provide protection from rain, sleet, snow and corrosion.
 - a. The enclosure shall be constructed from 0.125" thick aluminum alloy type 5052-H32.
 - b. The enclosure shall be lockable.
 - c. The enclosure door shall include an EDPM rubber or equivalent closed-cell gasket.

907-655.02.21—HAR Sign Materials and Sign Supports. The HAR Sign layout (size, font, lettering, etc.) shall be as shown in the plans. All sign materials and sign supports shall conform to the requirements of Subsection 630.02 and Section 721 of these specifications. Sign locations shown on the plans are approximate and may need to be adjusted at the direction of the Engineer. The Contractor will be required to stake out proposed HAR sign locations and gain approval from the Project Engineer prior to proceeding with installation. Beam lengths shown on the plans are estimated only and shall be field verified by the Contractor. The Contractor shall submit shop drawings with the proposed sign layout and final beam lengths to the Engineer for approval.

907-655.03--Construction Requirements. All equipment shall be installed according to the manufacturer's recommendations, the Plans, and as follows.

1. Materials and associated accessories/adapters shall not be applied contrary to the manufacturer's recommendations and standard practices.
2. The equipment shall be designed to prevent reversed assembly or improper installation of connectors, fasteners, etc. Each item of equipment shall be designed and installed to protect personnel from exposure to high voltage during equipment operation, adjustments, and maintenance.
3. The Contractor shall furnish and install all supports, clamps, cables, connections and other materials to secure the HAR transmitter and antenna at the selected locations. The type of mounting poles to be supplied and the location of their installation shall be as specified herein and depicted in the Plans.

4. The Contractor shall be responsible for locating possible utility conflicts prior to excavating and installing the ground-plane system. In case of space limitations or structural modification constraints, the Department shall be informed prior to site construction.
5. The Contractor shall perform detailed pre-installation site surveys and frequency tests to determine the adequacy of each HAR transmitter site (e.g., power, grounding, communications, etc.) for the intended purpose and performance criteria and shall submit recommendations to the Department for alternative site(s) if a selected site is unsuitable. The Contractor shall locate and configure the HAR System to maximize the broadcast and overall performance for each HAR location.
6. Do not install electrical service or electronic devices in the HAR transmitter cabinet or connect to the cabinet until cabinet and antenna grounding systems have been successfully completed and accepted, and the cabinet ground connection has been installed.
7. Do not install electronic devices in the cabinet until electrical service has been installed and activated, and the cabinet ventilation fan is operational.
8. Installation of HAR signs shall conform to construction requirements set forth in Subsection 630.03 of these specifications.
9. The solar power panels for the flashing beacons shall be properly oriented to maximize exposure to the sun during the shortest days of the year at the latitude and longitude of the site.
10. The HAR Signs shall be covered at all times until the HAR system begins full operation from the TMC. The covering shall be a rugged, non-transparent material that is attached to the sign in a secure manner. The material and attachment methods shall be submitted to MDOT for approval prior to purchase and use.
11. 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.
12. Any new, additional or updated drivers required for the existing ATMS software to communicate and control new HAR installed by contractor shall be the responsibility of the contractor.

907-655.03.1--Conformance / Testing. Each HAR component shall undergo testing to verify conformance to special provision as follows. The Contractor shall conduct a Project Testing Program as required below. All costs associated with the Project Testing Program shall be included in overall contract prices; no separate payment will be made for any testing. The Contractor is required to perform the Pre-installation test, Stand Alone Acceptance test and the Conditional System Acceptance Test with the MDOT ITS Engineer or his designee present.

907-655.03.1.1--General Requirements. The Contractor is responsible for planning, coordinating, conducting and documenting all aspects of the Project Testing Program. 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.

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 specifications or the project plans. Test procedures shall contain documentation regarding the equipment configurations and programming.

No testing shall be scheduled until approval of all project submittals and approval of the test procedures for the given test.

The Contractor shall provide all ancillary equipment and materials as required in the approved test procedures.

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.

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.

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 his 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.

907-655.03.1.2--HAR Pre-Installation Test (PIT). The Contractor shall perform PIT on the HAR as they arrive from the factory. The goal of the HAR PIT is to verify that the HAR were not damaged during shipping and that all components are working.

907-655.03.1.3--HAR Stand Alone Test (SAT). The Contractor's comprehensive SATs for the HAR System shall be sufficient to demonstrate compliance with all requirements specified herein and include the following minimum test requirements:

1. The test equipment should include a power/VSWR meter suitable for AM broadcast band (530 ~ 1,700 kHz), a fifty ohms (50Ω) dummy load and a Hi-Z hand held frequency counter with telescopic antenna.
2. The Contractor must demonstrate full coverage clear reception throughout the project limits as shown on the Plans. The testing process shall include, but not be limited to, the following types of tests:
 - a. Remote HAR field tests,
 - b. Remote flashing beacon field tests,
 - c. Central HAR control tests including GPS synchronization tests for frequency and audio,
 - d. Central flashing beacon remote control tests,
 - e. Remote HAR to central communications tests, and
 - f. Signal strength at the HAR beacon signs
3. The Contractor shall verify that the transmitter operates at 10 watts or less and that the field strength does not exceed the 2mV/m at 0.93 miles.
4. Verify that the HAR transmitter RF power output, as well as VSWR; are within acceptable specified limits as specified herein.
5. Verify proper non-modulated Carrier frequency alignment.
6. Verify modulated carrier does not exceed 6k Hz. Bandwidth (with Side Bands) as per FCC Part 97.
7. Verify proper audio level adjustment as per manufacturer recommendations when performing local recordings with provided microphone via XLR, ¼” Phono jack or mini-plug as well as remote recordings dial-upbased network.

907-655.03.1.4--Conditional System Acceptance Test (CSAT). The Contractor shall perform a complete conditional system acceptance test on all equipment and materials in the project. The Contractor shall not request the conditional system acceptance test for a phase until the SATs have been satisfactorily completed, all as-built documentation has been submitted and approved, and all other project work has been completed to the satisfaction of the Engineer. Prior to a Conditional System Acceptance Test, the Contractor shall provide advance notice of and written test results documentation that the Contractor has performed a dry-run of the conditional system acceptance test, and the Engineer reserves the right to require attendance of a dry-run test session.

The Contractor shall test all project systems simultaneously from the TMC in a manner equivalent to the normal day-to-day operations of the system. The Conditional System Acceptance Test shall demonstrate that all equipment and materials in the network are in full compliance with all project requirements and fully functional as installed and in final configuration, communicating with and being controlled through the control center at the TMC. Upon completion and full approval of the Conditional System Acceptance Test for all equipment, Conditional System Acceptance will be given and the Burn-in Period will begin.

907-655.03.1.6--HAR Final Inspection. Upon successful completion of the burn-in period, the project shall be eligible for the final inspection. The HAR final inspection will be conducted provided the burn-in period has demonstrated the entire system is operating successfully. The HAR final inspection shall include but is not limited to:

- monitoring of all system functions at the TMC to demonstrate the overall system is operational
- a field visit to each site to ensure all field components are in their correct final configuration
- verification that all burn-in punch list items have been completed
- verification that all final cleanup requirements have been completed
- approval of final as-built documentation

Prior to conducting the HAR final inspection, the burn-in period shall demonstrate that all requirements defined in this Special Provision have been met.

The Contractor shall request in writing the Engineer's approval to start the HAR final inspection a minimum of 14 days prior to the requested start date. The Engineer reserves the right to reschedule the start date if needed. The start date for the HAR final inspection cannot be prior to the successful completion of the overall burn-in period.

An unsuccessful or incomplete HAR final inspection shall require a new HAR final inspection after the Contractor has made the necessary corrections. Up to 14 days shall be allowed for the Engineer to conduct a HAR final inspection.

The Engineer reserves the right to require, at no additional expense to the State, the attendance of a qualified technical representative of the equipment and/or software manufacturers to attend a portion of a HAR final inspection.

The Contractor shall be responsible for the full maintenance of all project equipment and materials during the entire time period from the successful completion of the burn-in period until Final System Acceptance is granted.

The presence of the MDOT ITS Engineer or his designee is required during the final inspection.

907-655.03.1.7--Final System Acceptance. Upon successful completion of the HAR final inspection, the Engineer will conduct a project final inspection in accordance with Subsection 105.16.2 of the Standard Specifications.

907-655.03.2--Warranty. The HAR shall be warranted to be free of manufacturer defects in materials and workmanship for a period of one year from the date of Final Acceptance. Equipment covered by the manufacturer's warranties shall have the registration of that component placed in MDOT's name prior to Final Inspection. The Contractor is responsible for ensuring that the vendors and/or manufacturers supplying the components and providing the equipment warranties recognize MDOT as the original purchaser and owner/end user of the components from new. During the warranty period, the supplier 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 supplier's factory or authorized warranty site. Products repaired or replaced under warranty by the supplier shall be returned prepaid by the supplier. During the warranty period, technical support shall be

available from the supplier via telephone within four 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 control unit software shall be made available to the Department by the supplier at no additional cost.

907-655.03.3--MDOT Employee Training. The Contractor shall submit to the Project Engineer for approval a detailed Training Plan including course agendas, detailed description of functions to be demonstrated and a schedule. The Contractor must also submit the Trainer's qualifications to the Project Engineer for approval prior to scheduling any training. The training must include both classroom style training and hands-on training in the field of the maintenance and troubleshooting procedures required for each component. The training should also consist of a hands-on demonstration of all software configuration and functionality where applicable.

The supplier of the HAR shall, at a minimum, provide a sixteen-hour operations and maintenance training class with suitable documentation for up to eight (10) persons selected by the Department. The training shall include one (1) day of on site device operation, maintenance and configuration training for up to 10 individuals and one (1) day of on site system training at the TMC for up to 10 people, that is separate from the above training and specifically for software control of integrated devices. The operations and maintenance class shall be scheduled at a mutually acceptable time and location. The training shall be approved two (2) weeks ahead of the scheduled date.

907-655.03.4--Maintenance and Technical Support. The supplier shall maintain an adequate inventory of parts to support maintenance and repair of the HAR. Spare parts shall be available for delivery within 30 days of placement of an acceptable order at the supplier's then current pricing and terms of sale of said spare parts.

The suppliers shall maintain an ongoing program of technical support for the HAR system. This technical support shall be available via telephone or via personnel sent to the installation site upon placement of an acceptable order at the supplier's then current pricing and terms of sale of said technical support services.

907-655.04--Method of Measurement. The Highway Advisory Radio System will be measured in units of each. Such installation shall be inclusive of furnishing, installing, FCC licensing application, coordination and acquisition, pager and cellular service activation and monthly billing costs (only during testing), HAR antenna/grounding design submittal, system integration, and testing of a complete HAR Subsystem and software including the HAR equipment/components as specified herein including the AM radio transmitter, digital recorder/player, global positioning system synchronizer, NOAA weather receiver, antenna mounting pole, antenna and grounding, power distribution/supply, battery backup system with recharging subsystem, surge protection, the cabinet, all cabling, connections to support structures (includes all incidental components, attachment hardware, mounting brackets, bolts, straps, or any other items to mount the HAR equipment / components as intended), all required software, 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 HAR sites complete in place and ready to use. It shall also include system documentation including:

shop drawings, operations and maintenance manuals, wiring diagrams, block diagrams and other materials necessary to document the operation of the HAR System.

The HAR Sign with Flashing Beacons of the type specified will be measured per each installation. Such installation shall be inclusive of designing, furnishing, installing, system integration, and testing of a complete HAR Sign with Flashing Beacons including the sign materials, sign supports, support foundations, flashing beacons, solar power system, controller, pager controller, cellular controller, and battery cabinets, cabling, connections and 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 HAR Sign with Flashing Beacons sites complete in place and ready to use. The price bid shall also include system documentation including: shop drawings, operations and maintenance manuals, wiring diagrams, block diagrams and other materials necessary to document the operation of the HAR with Flashing Beacons.

The HAR System Software and Servers will be measured as a lump sum item. This shall include furnishing, installing, system integration and testing of the software and servers, including all required client and server licenses to provide duplicate configurations at both the Regional TMC and the Statewide TMC. The price bid shall also include the servers at both locations.

907-655.05--Basis of Payment. Highway Advisory Radio System, measured as prescribed above, will be paid for at the contract unit price bid per each. This price shall be full compensation for all labor, tools, materials, equipment and incidentals necessary to complete the work.

Progress payments for Highway Advisory Radio System shall be paid as follows:

- 1) 30% of the contract unit price upon approval of Pre-Installation test results;
- 2) An additional 40% of the contract unit price upon approval of Stand Alone Site Test results;
- 3) An additional 20% of the contract unit price upon approval of Conditional System Acceptance test results; and
- 4) Final 10% of the contract unit price upon Final System Acceptance.

HAR Sign with Flashing Beacons, measured as prescribed above, will be paid for at the contract unit price bid per each. This price shall be full compensation for all labor, tools, materials, equipment and incidentals necessary to complete the work.

Progress payments for the HAR Sign with Flashing Beacons shall be paid as follows:

- 1) 30% of the contract unit price upon approval of the Pre-Installation test results;
- 2) An additional 40% of the contract unit price upon approval of Stand Alone Site Test results;
- 3) An additional 20% of the contract unit price upon approval of Conditional System Acceptance test results; and

- 4) Final 10% of the contract unit price upon Final System Acceptance.

The HAR System Software and Servers, measured as prescribed above, will be paid at the contract unit price as a lump sum item. This price shall be full compensation for all labor, tools, materials, equipment and incidentals necessary to complete the work.

Progress payments for the HAR Software and Servers shall be paid as follows:

- 1) 30% of the contract unit price upon approval of Stand Alone Test;
- 2) An additional 60% of the contract unit price upon approval of Conditional System Acceptance test results; and
- 3) Final 10% of the contract unit price upon Final System Acceptance.

Payment will be made under:

907-655-A: Highway Advisory Radio System	- per each
907-655-B: HAR Sign with Flashing Beacons *	- per each
907-655-C: HAR System Software and Servers	- lump sum

* Additional description may be added

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-656-6

CODE: (SP)

DATE: 03/01/2013

SUBJECT: Dynamic Message Sign, Cellular Modem - LADOTD

PROJECT: ITS-9999-09(028) / 106397301 & 302 -- Warren and Adams Counties

Section 907-656, Dynamic Message Sign, is hereby added to and made a part of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction as follows:

SECTION 907-656--DYNAMIC MESSAGE SIGN

907-656.01--Description. This work consists of providing a cellular modem for ITS field equipment sites to accommodate a fully functional ITS System in accordance with the plan details, the 2006 Louisiana Standard Specifications for Roads and Bridges, these specifications and as directed by the engineer.

907-656.02--Materials. All equipment shall be new and constructed using the highest quality, commercially available components and techniques to assure high reliability and minimum maintenance. The contractor shall submit, prior to installation, a complete set of shop drawings of all the equipment and components listed below and included as part of the installation.

The wireless communications system shall consist of the following major components:

- Cellular modem

907-656.03--Construction Requirements. The contractor shall assemble and install all necessary material and equipment and furnish a working CDMA cellular wireless communication connection in accordance with these plans and specifications and compatible with the requirements of the ITS.

Unless otherwise indicated on the plans, all items that are required to complete the installation and ensure an operational ITS 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 DOTD ITS Section. Warranty, service and cellular carrier account shall be transferred into DOTD's name upon acceptance of the project.

When indicated DOTD to provide CDMA cellular modem and appurtenances (i.e., modem, antenna, reset timers and cabling), the contractor shall provide all labor and any incidentals to install and integrate the cellular modem.

Unless indicated otherwise on the plans, the antenna shall be mounted within or on the cabinet in accordance with the manufacturer's requirements and as accepted by the Engineer. For exterior mounting, a watertight seal shall be incorporated into the cabinet wall penetration. Antenna shall not be mounted on top of the controller cabinet.

When necessary to accommodate multiple Ethernet devices at the site with the cellular modem, a 4-port (RJ 45) field hardened Ethernet switch shall be included as an incidental part of the cell modem.

907-656.04--Method of Measurement. Dynamic Message Sign, Cellular Modem will be measured per each and will include the modem, service, 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.

907-656.05--Basis of Payment. Dynamic Message Sign, Cellular Modem, measured as prescribed above, will be measured for payment per each, which price shall be full compensation for the modem, service, 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.

Payment will be made under:

907-656-D: Dynamic Message Sign, Cellular Modem, LADOTD - per each

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-656-7

CODE: (SP)

DATE: 03/05/13

SUBJECT: Dynamic Message Sign, LED, Walk-in Enclosure, LADOTD

PROJECT: ITS-9999-09(028) / 106397301 & 302 -- Warren and Adams Counties

Section 907-656, Dynamic Message Sign, is hereby added to and made a part of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction as follows.

SECTION 907-656--DYNAMIC MESSAGE SIGN

907-656.01--Description. This Item consists of furnishing and installing a Dynamic Message Sign (DMS) enclosure and all appurtenances required for the ITS in accordance with plan details, the 2006 Louisiana Standard Specifications for Roads and Bridges, NEMA TS 4 Hardware Standards for Dynamic Message Signs (DMS) with NTCIP Requirements, these specifications, and as directed by the engineer. During DMS installation, the time between field installation of the sign enclosure and DMS functionality shall be no more than ten (10) calendar days. Subsequent to this ten (10) day time period and prior to final acceptance, contractor shall post messages on the sign face as directed by Engineer.

All equipment shall be new and constructed using the highest quality, commercially available components and techniques to assure high reliability and minimum maintenance. The contractor shall submit, prior to installation, a complete set of shop drawings of the DMS System and a list of equipment included as part of the installation. Each DMS site shall utilize a new pedestal for mounting and shall consist of the following major components:

- DMS walk-in enclosure and display
- DMS controller
- Conduit, cabling and connections
- Mounting brackets and hardware
- Items noted herein and in the plans.

907-656.02--Materials. The plans shall be considered as diagrammatic and do not show the exact locations and size of equipment. They do however show the general arrangement and locations of cables, foundations, etc. Final locations may be adjusted in the field after prior approval, in writing, is obtained from the project engineer. The final locations of the DMS Sites shall be approved by the project engineer.

Items shall be installed in their proper locations as shown on the plans, rigid and secure, plumb and level where appropriate, and in true alignment with related and adjoining work. Electrical

materials shall not be welded for attachment or support.

Equipment and materials shall be suitable for the intended use and shall be furnished with all necessary hardware and components.

All specified products shall be manufactured by companies that are regularly engaged in the production of the specified products.

The products specified shall be specifically designed, tested and manufactured for the purpose for which they will be used. Modification of equipment for other than design purposes will be permitted only when no currently manufactured products meet the specifications.

All equipment and materials shall be new. Like equipment and materials shall be made by the same manufacturer. The item descriptions and specifications do not necessarily include or define everything necessary for a complete and operational item.

Materials shall conform to the following Sections and Subsections of the Louisiana Standard Specifications for Roads and Bridges:

- Temporary Erosion Control 204
- Concrete Walks, Drives, and Incidental Paving 706
- Structural Metals 807
- Painting and Protective Coatings 811
- Welding 815
- Portland Cement Concrete 901
- Reinforcing Steel 1009
- Metals 1013 & 1015
- Anchor Bolts, Nuts & Washers 1015.02(c)(1)
- Stainless Steel Hardware 1018.08(c)
- Conduit 1018.09
- Electrical Conductors 1018.10

This specification sets the minimum requirements for a Dynamic Message Sign suitable for freeway installations.

The design of the displays shall be modular in construction to facilitate easy field replacement of component parts. Access to all serviceable components shall be within seven (7) feet vertically of the sign enclosure floor. All routinely serviced components shall weigh 50 pounds or less.

The design life of the sign, including all sign components, operating 24 hours a day shall be at least 10 years in the environment of Louisiana. The DMS shall have a standard one (1) year warranty covering all facets of the System and no deductible shall be required. Mounting equipment to the DMS enclosure, whether CCTV cameras, wireless antennas, cellular antennas, or other indicated penetrations, shall not void the DMS's warranty.

The performance of all equipment and materials, during delivery from the factory shall not be impaired due to vibration caused by wind, traffic, or normal transportation.

The presence of ambient radio frequency, magnetic or electromagnetic interference, including that from Department and other mobile radios, power lines, transformers, and motors within the proximity of any components of the System, shall not affect the operation or impair the performance of the System. The System shall not conduct or radiate signals that will adversely affect other electrical or electronic equipment.

907-656.02.1--Enclosure Requirements. The DMS walk-in enclosure is the weatherproof housing, which encloses, or has attached, all other DMS components. The enclosure shall be provided with two access doors located on opposite sides. The doorways shall be designed so they do not stick.

Walk-in enclosure dimensions shall be as follows:

- Approximate Height: 8'
- Approximate Width: 22'
- Approximate Depth: 4'
- Approximate Weight: 3000 lbs

The enclosure and structural connection shall be designed in accordance with the American Association of State Highway and Transportation Officials (AASHTO) standard "Standard Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signals, current issue with interims. The Dynamic Message Signs are considered essential facilities and are to be designed with a Recurrence Interval of 100 years. Wind load is to be based on Exposure Category C and a basic wind speed of 130 miles per hour from any direction. Enclosure is to be designed for a minimum uniformly distributed live load of 100 psf.

The contractor shall submit a copy of the calculations and shop drawings for the enclosure and its connection to the support to the Department for review prior to manufacture. All calculations and shop drawings shall be stamped by a licensed professional civil engineer. Submittals shall be in writing on company letterhead. All drawings shall be original tracings conforming to Section 801.03 of the Louisiana Standard Specifications for Roads and Bridges.

The completeness and correctness of the design calculations is solely the responsibility of the DMS Manufacturer, and the Engineer of Record who sealed the calculations. Furthermore, this review is not an approval for the structural integrity of the DMS Enclosure or its connection to the DMS support structure.

All welds shall be continuous. Weld sizes indicated shall be equal to the thickness of the least of the jointed plates unless otherwise noted.

Locks for all DMS enclosures shall be a #2 Corbin lock.

The DMS enclosure shall be equipped with an OSHA compliant safety rail which prevents a person from falling out of the enclosure when in place across an open access door. The safety rail shall be provided for both doors on the enclosure.

The DMS enclosure shall have an OSHA compliant anchor point located inside each access door within easy reach from outside for connection of a personal fall arrest system. These anchors shall be able to withstand a force of 5,000 lbs. The anchors shall be located for easy access from outside the enclosure door and to allow for no more than a 6 foot free-fall when connected with a 6 foot lifeline.

The DMS enclosure and integral DMS display cover shall be designed and constructed:

- To meet prime commercial standards for structure, painting, and related requirements.
- To present a clean, unbroken, and neat appearance.
- To be weatherproof and protect the interior from moisture, dust, dirt, and corrosion.
- Corrosion protection shall be provided between dissimilar metals.
- Of 6063-T5, 5052-H32, or T6061-T6 aluminum alloy. Exterior wall skin on walk-in enclosures shall not be less than 1/8" in thickness.
- So that all visible surfaces have a maintenance free protective treatment and/or coating which is non-reflective and is gray, silver, or aluminum in color. The protective treatment and/or coating shall have a design life of at least 10 years in the environment of south Louisiana. The contractor shall provide proof of compliance with sign submittal.
- So that all maintenance will be performed within the sign enclosure.
- So that each access shall be vandal proof and sized for the convenient access of all internal sign components of the character module served.
- So that the removal of any combination of sign face windows shall not alter the structural integrity of the sign display cover nor the sign.
- So that the attachment of all sign face windows utilizes a reusable gasket for weatherproofing. The design life of all gaskets shall be at least ten (10) years and supporting documentation should be provided to the Department with the shop drawing.
- So that the attachment mechanism for all sign face windows allows the window material to expand and contract (due to temperature fluctuations) yet retain a weatherproof seal.
- To have a border on all four edges that is within the range of 12 to 18 inches.

All components of the DMS (internal sign components, controller, communications equipment, etc.) shall operate effectively in all weather conditions. All electronics, electric, mechanical, and all other parts and accessories of the DMS shall operate effectively within the following limits:

- Ambient temperature: -30°F to +165°F during all levels of sunlight.
- Humidity: 0% - 100%

Any lighting or illumination equipment external to the sign is unacceptable.

The DMS shall contain a forced air ventilation system with a minimum of two intake ports and a minimum of one exhaust port for each intake port. All intake ports shall have a filter, all exhaust ports shall be screened such to prevent access by insects and small animals. Filters shall be clearly marked with airflow direction. All ports shall be hooded. All ports and hoods shall be sealed to prevent moisture from entering the enclosure.

An internal temperature sensor shall be installed to monitor the enclosure temperature. The sensor output shall be continuously monitored by the sign controller. A manual override timer-switch shall be provided to manually activate the air venting system. The timer-switch shall have an adjustable minimum time range of 1 hour and shall turn off the fans when time expires. The timer-switch shall be located within reach of the DMS entrance doors. All fans shall be maintenance free. An internal humidity sensor shall be installed to monitor relative humidity of the air within the enclosure. The sensor output shall be continuously monitored by the sign controller.

Temperature sensors shall be installed to monitor each LED display module. The sensor output shall be continuously monitored by the sign controller. Temperature threshold shall be configurable. The sign controller shall automatically shut down the LED modules if the module temperature exceeds the set threshold.

The DMS enclosure shall contain at least one (1) 60 W fluorescent light, 150 W incandescent light, or equivalent LED lighting (preferred) for every 8 feet of housing length. Light assemblies shall be covered with a protective wire cage. The light circuit shall be controlled by a manual timer switch having an adjustable ON time. The maximum ON time shall be at least 2 hours. A switch shall be located just inside each door and shall control all light assemblies.

907-656.02.2--Display Requirements. The DMS shall be full matrix display, utilizing LED technology, which shall provide uniform lighting over the entire face of the matrix.

Character height shall be approximately 18". The display face shall be sized to consist of three (3) lines containing fifteen (15) characters each using a 7x5 standard font.

The DMS display and vendor software shall provide variable letter and symbol sizes dependent upon matrix height. The matrix must be capable of displaying double stroke characters and characters two or three lines high. These two line high and three line high characters may be double or triple stroke characters, and proportionally wider. Custom graphics shall be available when programming or creating messages in the software.

All plastic materials and the sign face shall be made of UV stabilized materials.

The DMS display shall allow the unobstructed and convenient access to all serviceable components of the DMS display cover as well as any components between the DMS display and the DMS display cover.

All serviceable components shall be modular, interchangeable, and removable from within the sign enclosure. The entire face of the sign display shall be composed of identical and easily interchangeable display modules.

All components (except the sign controller and interconnecting wiring) required for producing a display shall be mounted on or within their respective sign display module. The replacement of any display module shall not require the use of any tools. All wiring interconnecting individual display modules shall be made into modular harness assemblies with latching industry standard connectors not requiring special tools.

The removal of any combination of display modules shall not alter the structural integrity of the sign display assembly or the sign enclosure.

All visible metallic surfaces on the face of the sign shall be protected with a black non-reflective, non-fading, and maintenance free finish.

Whenever a pixel is not emitting light it shall blend in with the surface finish and appear to be nonexistent.

The sign display shall not transmit light other than the light emitted by a pixel.

The sign display character to character spacing shall be user selectable (e.g. single or double spacing).

The display shall be legible for a viewing distance of at least 800 feet with a 30-degree viewing angle.

The DMS shall be able to display a message composed of any combination of the following characters and shapes:

- All upper case alphabetic letters "A" through "Z".
- All numeric digits "0" through "9".
- A "blank".
- All punctuation marks.
- Special characters: . , / ? ; : < > & * - ~ - ~ T
- An unlimited number of graphic shapes, each of which can be designed by the user (i.e. M U TCD standard traffic sign symbols).

All upper case alphanumeric characters shall be displayed over the entire height of the character matrix. The DMS shall be able to display messages containing graphic images of any size that will fit on its display matrix.

Messages displayed on the sign shall be operator selectable to be either static or flashing. A static message shall be displayed for some duration of time. The duration of time shall be operator selectable from 1 minute to an unlimited time span.

The sign shall be capable of displaying a scheduled message. A scheduled message shall be displayed for the duration between a selectable start time and a selectable end time. The start and end times shall be operator selectable for up to one month in advance and be designated by: month, day, year, hour, and minute.

The sign shall be capable of displaying an alternating sequence of six messages made up of any combination of static messages. The message of the sequence shall have a selectable display time and a selectable blank time. These times shall be operator selectable for the following:

- Display time - 0 to 25 seconds at 1 second increments.

- Blank time - 0 to 9 seconds at 0.1 second increments.

All messages displayed on the sign shall be automatically centered on each line. However, the operator shall be able to override this centering feature on a line-by-line basis to allow left or right justification, or any orientation that is desirable.

The display shall have sensors that monitor the ambient lighting conditions. The intensity of the LED's shall be automatically controlled using a pulse width modulation board that provides a broad range of dimming.

Sensors that measure the outdoor ambient light level at the DMS site shall be mounted in-line with the DMS housing walls. This ambient light and temperature measurement system shall consist of three (3) electronic light sensors. Two of the light sensors shall be placed such that they measure the ambient light levels striking the front and rear of the DMS (upstream and downstream traffic). The third light sensor shall be mounted to the floor of the DMS housing and shall face the ground. The DMS sign controller shall continuously monitor the light sensors and adjust the LED display matrix intensity to a level that creates a legible message on the DMS face

The DMS display face window shall have the following characteristics:

- Be optically clear, high impact; scratch resistant and ultraviolet stabilized sheets of polycarbonate plastic. Windows containing recycled materials are unacceptable.
- Have sufficient thickness and strength to withstand cleaning, installation, removal, sign vibration, and negative/positive pressure loading due to atmospheric wind as well as pressures created by the passage of large trucks.

907-656.02.3--Pixel Requirements. Pixels shall be sized at approximately 2" x 2", square or round. The DMS shall be 27 pixels high by 90 pixels wide. The pixel spacing shall be 2.6" (66mm).

Each pixel shall contain the quantity of discrete amber LEDs needed to output a minimum luminous intensity of 9,200 candelas per square meter (9,200 nit) when measured using a photometric meter through the DMS front face panel assembly.

All pixels shall contain an equal quantity of discrete LEDs and LED strings. If a pixel contains four (4) or more discrete LEDs, then each pixel shall contain a minimum of two (2) independent and parallel strings of LEDs.

Each pixel shall utilize high output AlInGaP LEDs.

- The LEDs shall have a wavelength of 590 (+/- 5) nanometers and shall be amber in color.
- The LEDs shall have a nominal viewing cone of 30 degrees
- The lighting system shall be both manually controlled and automatically controlled by a photocell utilizing Pulse Width Modulation for 12-step range of light intensity.
- The LED's shall have a rated life of 100,000 hours. This rating is at 25 mA forward current and shall be calculated when the T.F.D obtains half-brightness from its original

manufacture.

- All LED's shall be from the same manufacturer.
- All LED's shall be of the same part number.
- All LED's shall come from no more than two luminous intensity bins.
- LED's shall be non-timed, non-diffused, high-intensity solid-state lamps.

907-656.02.4--Pixel Assembly. The electronic panels that make-up the DMS display are herein referred to as pixel assemblies. The pixel assembly shall contain 45 pixels in a matrix, nine (9) rows high and five (5) columns wide. All pixel assemblies shall be identical to one another.

The pixel assembly shall be attached to an aluminum-mounting grid, which forms the display face. The pixel assembly shall be easily removed for maintenance from the inside of the display without the use of special tools. All pixel assemblies shall be labeled for positive identification.

Pixel columns and rows shall be perpendicular. The horizontal and vertical spacing between pixels, pixel center to center distance, and character spacing shall be designed and constructed to achieve optimum legibility within the legibility range specified herein.

All pixel assemblies shall be wired so that the failure of any one-pixel assembly will not affect the operation of any other. The sign controller shall control the pixel assembly separately so that the removal of a particular pixel assembly does not affect the operation of any other. Pixel assemblies shall not be daisy chained or wired in series.

907-656.02.5--Display Performance. During ambient outdoor light conditions ranging from maximum sunlight to total darkness, any displayed character or message shall be clearly legible by all motorists from any point on the approach roadway within 800 feet of the sign. This requirement shall be in effect for a minimum period of ten years.

Time required to execute a worst-case message change shall not exceed two (2) seconds. That is, from the time the command is received by the sign controller to the instant the message is displayed.

The display of the blanking of a message as well as the changing of one message to another shall be accomplished with an effort to minimize visual disturbance.

For all ambient outdoor light conditions and luminance levels displayed by the sign, the following shall apply:

- Pixel to pixel, the luminous area for each pixel shall not vary by more than 5 percent.
- Luminous intensity variation shall be less than 15 percent when measured over the entire luminous area of each pixel.
- Pixel to pixel luminous intensity variation shall be less than 15 percent.
- The optical axis of all pixels shall be perpendicular to the face of the sign display.
- Pixel luminance level shall be set by sensing outdoor ambient light levels and shall be automatically performed by the sign controller. The System operator shall be able to override the automatic setting of pixel luminance and shall have the ability to manually select any one of the levels.

- In case of luminance control system failure, the luminance level shall be designed to default to the night level and shall automatically be reported to the control computer.

907-656.02.6--Sign Controller. The sign controller shall have the capability to provide sensor measured data or messages such as internal temperature, control cabinet intrusion, photocell control, pixel burn out detection, etc., shall be provided.

The controller shall be a self-contained, compact, solid state, modular unit. The computer section of the unit shall contain all programming instructions to operate the System, and contains all preprogrammed PROM messages and nonvolatile RAM or EE PROM space for storing the keyboard-generated messages for at least ten (10) years.

The DMS controller shall have a minimum of three NTCIP serial ports. Each port will support multiple communications interfaces including direct null-modem, dial-up modem, leased line modem, cellular modem, microwave radio and fiber optics. The serial ports shall support RS232 and RS422 communications.

The DMS controller shall have one 10/100 Ethernet communications RJ45 port.

The sign controller shall have the multi-tasking capability of receiving typed keyboard characters while the signboard continues to display a previous message. Once the new message is verified as the one desired, the new message shall replace the previous sign message within the time frame specified herein.

The sign controller shall perform the following general functions.

- Interpret commands and parameters sent by the control computer and cause the immediate or scheduled display (or blanking) of messages upon the sign display. Message display commands shall identify a library message (stored in the controller's memory) or contain the text of the message. The sign controller shall report, to the control computer, its success or failure in carrying out said commands.
- Continually monitor the operational status of hardware and software and report said status upon being polled by the control computer. When the control computer fails to poll on a regular basis, the sign controller shall either blank the display or continue a display as pre-arranged by the System user.
- Maintain a (nonvolatile) library of display messages as well as any parameters required. The control computer shall keep the libraries and parameters up to date by sending either updates or complete libraries.

At minimum, each sign controller shall have:

- A software oriented microprocessor.
- Control program software resident in (nonvolatile) EEPROM or in (nonvolatile) BYROM.
- RAM storage for a message library and any parameter table(s). The message library shall be sized to accommodate at least 64 messages. The slot (entry) of the message library shall be sized to contain all text and all parameters required for the display of any

message that the sign is capable of displaying.

- Battery backup of RAM allowing power outages of 30+ days.
- Real time clock for time of day and annual calendar date determination with battery backup allowing power outages of 30+ days.
- Interface equipment for communicating with the control computer and the field test computer.
- Ability to set a unique sign controller address as required for communications with the control computer either through software or a dip switch.
- A manual (momentary) switch for initiating a sign controller reset.
- A manual switch for selecting sign controller mode of operation from remote to local (see modes of operation) if required.
- Circuitry and interface for driving the sign display. Circuitry and interface for determining outdoor light levels. Circuitry and interface for controlling pixel luminance.
- A hardware watchdog timer to check its own operation. While the sign controller program is running, the hardware watchdog shall be set every few seconds. If the watchdog timer is not set for a period, there shall be a prompt for System reset to be performed.
- Circuitry to determine the number of pixels that are inoperative.
- Visual indicators to show the existence of operational faults.
- Circuitry to determine the temperature within the sign enclosure for automatic shutdown of internal pixel illumination if temperature exceeds limits.
- A manual switch for initiating a sign test procedure, which includes displaying a sequence of test patterns.

The sign controller shall continually monitor the operational status of the sign including all sensors. The sign controller shall accumulate and save this status data until a request for status is received from the control computer. After reporting the sign status, the sign controller shall begin accumulating data for the next status request.

At a minimum, the following information shall be provided by the sign controller upon request for status:

- Occurrence of power failure.
- Occurrence of hardware failure in the communication equipment.
- Communication watchdog timer expired (control computer has failed to poll the sign recently)
- Sensor readings.
- Photo sensor equipment failure with current reading.
- Number of pixels that are inoperative (failed).
- The number (or ID) of the message previously displayed.
- The number (or ID) of the message currently display.
- The number (or ID) of the next message scheduled for display.
- Current value of the comm-fail-continue parameter for this sign.
- Mode of operation (local or remote)
- Time and/or date out of synchronization with time and date at the control computer.
- Status of ancillary components activated by the sign controller.

The sign shall continue any current display or display schedule and shall be blanked when the message display duration or schedule has expired or the number of hours contained in the comm-fail-continue parameter has elapsed, whichever is less.

The comm-fail-continue parameter shall be user selectable to a range of 0 to 8 hours in one minute increments for each sign. The value contained in the comm-fail-continue parameter shall be the number of hours that sign may continue displaying messages while the above conditions are met

907-656.02.7--Support and Mounting Requirements. The DMS support(s), including pedestal, brackets, footings, hardware, etc, shall be designed by the contractor in accordance with the plan details and pedestal sign support special provisions.

907-656.03—Construction Requirements. The DMS enclosure shall be mounted to a new support structure according to plan details.

907-656.03.1—Testing. Each DMS shall undergo testing to verify conformance to special provision as follows. The Contractor shall conduct a Project Testing Program as required below. All costs associated with the Project Testing Program shall be included in overall contract prices; no separate payment will be made for any testing.

907-656.03.1.1--General Requirements.

- 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 Project Engineer, ITS Engineer, and/or their designee(s) reserve the right to attend and observe all tests. The Contractor is required to perform the DMS Sub-System test and the Conditional Acceptance test with the 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.
- 3) 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 definitively in full compliance with all project requirements. Test procedures shall cross-reference to these specifications or the project plans. Test procedures shall contain documentation regarding the equipment configurations and programming.
- 4) No testing shall be scheduled until approval of all project submittals and approval of the test procedures for the given test.
- 5) The Contractor shall provide all ancillary equipment and materials as required in the approved test procedures.
- 6) 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.

- 7) 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.
- 8) 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.
- 9) 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.

907-656.03.1.2--DMS Factory Acceptance Test (FAT). The Contractor shall perform FAT on the DMS prior to shipping from the factory. The goal of the DMS FAT is to verify that the DMS meets the requirements of this special provision.

Factory Acceptance Tests shall be conducted at the Manufacturer or Contractor facility or at a facility acceptable to all parties. All equipment to be utilized for this project shall be subject to tests that demonstrate the suitability of the design and compliance with the contract requirements, unless an exception for an equipment item is granted by the Project Engineer. The tests shall be performed on production units identified to be delivered under this contract.

The FAT procedure shall demonstrate all requirements defined in these specifications are met, including, but not limited to: functional/system performance requirements, electrical requirements, data transmission/communication requirements, safety/password requirements, environmental requirements, and interface requirements with other components of the project system.

The Project Engineer reserves the right to waive FATs which are deemed to be unnecessary and reserves the right to witness all FATs that are determined to be critical to the project. At a minimum, the Project Engineer and/or the Project Engineer's representative, will be in attendance at the FAT for the first three (3) units tested. The FAT for the first three (3) units shall be conducted during the same period. The Project Engineer shall be notified a minimum of forty-five (45) calendar days in advance of such tests. Salary and travel expenses of the Project Engineer and the Project Engineer representatives will be the responsibility of MDOT. In case of equipment or other failures that make a retest necessary, travel expenses of the Project Engineer and the Project Engineer's representatives shall be the responsibility of the Contractor. This shall include all costs including, but not limited to, airfare, automobile rental, lodging, and per diem. These costs, excluding airfare shall not exceed \$500.00, per representative, per day. These costs shall be deducted from payment due or charged to the withholding account of the Contractor when the project is terminated.

The vendor must complete the FAT on all remaining units on their own and submit

documentation to the Project Engineer that the FATs were completed. The Project Engineer reserves the right to randomly attend those FAT tests.

No equipment for which a FAT is required shall be shipped to the project site without successful completion of factory acceptance testing as approved by the Project Engineer and the Engineer's approval to ship.

907-656.03.1.2--DMS Pre-Installation Test (PIT). The Contractor shall perform PIT on the DMS as they arrive from the factory. The goal of the DMS PIT is to verify that the DMS were not damaged during shipping. The PIT shall test or inspect the following DMS components:

- 1) External or internal visible damage
- 2) DMS display damage
- 3) Verify all pixels are operational
- 4) Verify the ventilation system works
- 5) Verify all equipment is secured
- 6) Verify sign configurations

907-656.03.1.3--DMS Stand Alone Test (SAT). The Contractor shall perform SAT on the DMS as they arrive from the factory. The goal of the SAT is to verify that the DMS has been properly installed and commissioned according to the manufacturer requirements. The SAT shall include at minimum the following tests and inspections:

- 1) Verify the signs have been attached properly to the structure.
- 2) Verify the sign case and roadside cabinet have been grounded.
- 3) Verify the sign has been properly connected to the power.
- 4) Verify the sign case has no structural damage or deformities.
- 5) Verify all pixels are operational
- 6) Verify local sign control through the serial port
- 7) Verify local sign control through the Ethernet port.

907-656.03.1.4--DMS Sub-System Test (SST). The Contractor shall perform SST on the DMS to verify that the sign is operational from central. The goal of the SST is to verify that all remote DMS functions and alarms are operational. The Contractor shall coordinate the SST with the Engineer. The Contractor shall provide a SST plan to the Engineer and be approved a minimum of two week in advance of tests being performed.

907-656.03.1.5--Conditional System Acceptance Test (CSAT). The Contractor shall perform a complete conditional system acceptance test on all equipment and materials in the project. The Contractor shall not request the conditional system acceptance test for a phase until the SATs have been satisfactorily completed, all as-built documentation has been submitted and approved, and all other project work has been completed to the satisfaction of the Engineer. Prior to a Conditional System Acceptance Test, the Contractor shall provide advance notice of and written test results documentation that the Contractor has performed a dry-run of the conditional system acceptance test, and the Engineer reserves the right to require attendance of a dry-run test session.

The Contractor shall test all project systems simultaneously from the TMC in a manner equivalent to the normal day-to-day operations of the system. The Conditional System Acceptance Test shall demonstrate that all equipment and materials in the network are in full compliance with all project requirements and fully functional as installed and in final configuration, communicating with and being controlled through the control center at the TMC. Upon completion and full approval of the Conditional System Acceptance Test for all equipment, Conditional System Acceptance will be given and the Burn-in Period will begin. The Contractor shall coordinate the CSAT with the Engineer. The Contractor shall provide a CSAT plan to the Engineer and be approved a minimum of thirty (30) calendar days in advance of tests being performed. The CSAT plan shall be inclusive of steps and procedures to be performed and scheduled times to perform test procedures.

907-656.03.2--Burn-In Period. Following the Engineer's written notice of successful completion of the Conditional System Acceptance Test, the entire newly installed system must operate successfully for a six (6) month burn-in period. During this burn-in period the Contractor shall be responsible for the full maintenance of the newly installed equipment. However, no separate payment will be made for the burn-in period activities and shall be included in the cost of other items. Successful completion of the burn-in period will occur at the end of six complete months of operation without a major system failure attributable to hardware, software or communications components. Each system failure during the burn-in period will require an additional month of successful operation prior to being eligible for Final Acceptance. (i.e., if there are two system failures during the initial six month period, the burn-in period would be increased to 8 months.)

907-656.03.2.1--Burn-In General Requirements.

- Determination of a system failure shall be at the sole discretion of the Engineer. System failure is defined as a condition under which the system is unable to function as a whole or in significant part to provide the services as designed. While a single component failure will not constitute a system failure, chronic failure of that component or component type may be sufficient to be considered a system failure. Chronic failure of a component or component type is defined as 3 or more failures for the same component during the burn-in period.
- Components are defined as contract items or major material elements in a contract item. For electrical and electronic contract items, components are defined as the complete assembly of materials that makes up the contract item.
- Specifically exempted as system failures are failures caused by accident, acts of God, or other external forces that are beyond the control of the Contractor. However, failure of the contractor to respond to the repair request for that failure within 24 hours may be considered a system failure.
- The Department will advise the Contractor in writing when it considers that a system failure has occurred or chronic failure exists.
- If multiple system and/or chronic failures continue to occur throughout the burn-in period due to a single component type, the Contractor may be required to replace all units of that component type with a different model or manufacturer.

- The Contractor shall document all failures and subsequent diagnosis and repair. The repair documentation shall include as a minimum:
 - Description of the problem
 - Troubleshooting and diagnosis steps
 - Repairs made
 - List of all equipment and materials changed including serial numbers.
 - Update of the equipment inventory where needed.
- The Contractor shall provide the repair documentation to the Engineer within 2 days of completing the repair; failure to provide acceptable documentation as required shall be reason to not approve the repair as complete. The Engineer will provide acceptance or rejection of the repair and documentation within seven (7) days.
- The Engineer reserves the right to require, at no additional expense to the State, the presence of a qualified technical representative of the equipment and/or software manufacturers as related to the diagnosis and/or repair of any system failure.
- During the burn-in period the Contractor shall perform incidental work such as touching up, cleaning of exposed surfaces, leveling and repair of sites, sodding/grassing and other maintenance work as may be deemed necessary by the Engineer to insure the effectiveness and neat appearance of the work sites.
- During the burn-in period the Engineer shall maintain a “burn-in period punch list” that contains required Contractor actions but that the Engineer does not define as a system failure. Each burn-in period punch list action item shall be completed by the Contractor to the Engineer’s satisfaction within seven (7) days of Contractor notification of the action item.
- During the burn-in period the Contractor is required to meet the following response times once notified there is a problem. A response is defined as being on-site to begin diagnosing the problem.
 - Monday thru Friday: The Contractor shall respond no later than 9:00 a.m. the following morning after being notified.
 - Weekends: If the Contractor is notified on Friday afternoon or during the weekend, the Contractor shall respond by 9:00 a.m. on Monday morning.
- During the burn-in period the Contractor shall provide all labor, materials, equipment and replacement parts to completely maintain, troubleshoot and repair all items installed under this contract. No separate payment will be made for any labor, materials, equipment or replacement parts needed during the burn-in period.

The overall burn-in period will be considered complete upon the successful completion of the burn-in time periods, the Engineer’s acceptance of all repairs and repair documentation, completion of all burn-in period punch list actions and a final inspection as described below.

907-656.03.3--DMS Final Inspection. Upon successful completion of the burn-in period, the project shall be eligible for the DMS final inspection. The DMS final inspection will be

conducted provided the burn-in period has demonstrated the entire system is operating successfully. The DMS final inspection shall include but is not limited to;

- monitoring of all system functions at the TMC to demonstrate the overall system is operational
- a field visit to each site to ensure all field components are in their correct final configuration
- verification that all burn-in punch list items have been completed
- verification that all final cleanup requirements have been completed
- approval of final as-built documentation

Prior to conducting the DMS final inspection, the burn-in period shall demonstrate that all requirements defined in this Special Provision have been met.

The Contractor shall request in writing the Engineer's approval to start the DMS final inspection a minimum of 14 days prior to the requested start date. The Engineer reserves the right to reschedule the start date if needed. The start date for the DMS final inspection cannot be prior to the successful completion of the overall burn-in period.

An unsuccessful or incomplete DMS final inspection shall require a new DMS final inspection after the Contractor has made the necessary corrections. Up to 14 days shall be allowed for the Engineer to conduct a DMS final inspection.

The Engineer reserves the right to require, at no additional expense to the State, the attendance of a qualified technical representative of the equipment and/or software manufacturers to attend a portion of a DMS final inspection. The presence of the Engineer or his designee is required during the final inspection.

The Contractor shall be responsible for the full maintenance of all project equipment and materials during the entire time period from the successful completion of the burn-in period until Final System Acceptance is granted.

907-656.03.4--Final System Acceptance. Upon successful completion of the DMS final inspection, the Engineer will conduct a project final inspection

907-656.04—Method of Measurement. Dynamic Message Sign will be measured per each DMS installation. Such installation shall be inclusive of furnishing, installing, system integration and testing of the complete dynamic message sign including the sign case, light sources, display apparatus, wiring, controller, roadside DMS cabinet, communications interface, wiring between the sign case and DMS cabinet, structure mounted conduit, fittings, and junction boxes, sign case support connections to the sign support structure, 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 sign complete in place and ready for use. 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 DMS.

907-656.05—Basis of Payment. Dynamic Message Sign, measured as prescribed above, will be paid for at the contract unit price per each, which price shall be full compensation for all labor, tools, materials, equipment, and incidentals necessary to complete the work for a complete and functional DMS.

This work does not include the sign support structure.

Progress payments for Dynamic message signs shall be paid as follows:

- 1) 20% of the contract unit price upon completion of the Factory Acceptance Test and Pre-Installation Test.
- 2) Additional 20% of the contract price upon delivery to the site. Delivery cannot be more than 60 days before anticipated installations.
- 3) Additional 50% of the contract unit price upon complete installation and stand alone testing of the dynamic message sign.
- 4) Final 10% of the contract unit price upon Final System Acceptance.

Payment will be made under:

907-656-A: Dynamic Message Sign, Type 1, LADOTD -per each

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-656-8

CODE: (SP)

DATE: 02/28/13

SUBJECT: Dynamic Message Sign, LED, Front Access Enclosure, LADOTD

PROJECT: ITS-9999-09(028) / 106397301 & 302 -- Warren and Adams Counties

Section 907-656, Dynamic Message Sign, is hereby added to and made a part of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction as follows.

SECTION 907-656--DYNAMIC MESSAGE SIGN

907-656.01--Description. This Item consists of furnishing and installing a Dynamic Message Sign (DMS) housing and all appurtenances required for the ITS in accordance with plan details, the 2006 Louisiana Standard Specifications for Roads and Bridges, NEMA TS 4 Hardware Standards for Dynamic Message Signs (DMS) with NTCIP Requirements, these specifications, and as directed by the engineer. During DMS installation, the time between field installation of the sign housing and DMS functionality shall be no more than ten (10) calendar days. Subsequent to this ten (10) day time period and prior to final acceptance, contractor shall post messages on the sign face as directed by Engineer.

All equipment shall be new and constructed using the highest quality, commercially available components and techniques to assure high reliability and minimum maintenance. The contractor shall submit, prior to installation, a complete set of shop drawings of the DMS System and a list of equipment included as part of the installation. Each DMS site shall utilize a new pedestal for mounting and shall consist of the following major components:

- DMS front access housing and display
- DMS controller
- Conduit, cabling and connections
- Mounting brackets and hardware

Items noted herein and in the plans.

907-656.02--Materials. The plans shall be considered as diagrammatic and do not show the exact locations and size of equipment. They do however show the general arrangement and locations of cables, foundations, etc. Final locations may be adjusted in the field after prior approval, in writing, is obtained from the project engineer. The final locations of the DMS Sites shall be approved by the project engineer.

Items shall be installed in their proper locations as shown on the plans, rigid and secure, plumb and level where appropriate, and in true alignment with related and adjoining work. Electrical materials shall not be welded for attachment or support.

Equipment and materials shall be suitable for the intended use and shall be furnished with all necessary hardware and components.

All specified products shall be manufactured by companies that are regularly engaged in the production of the specified products.

The products specified shall be specifically designed, tested and manufactured for the purpose for which they will be used. Modification of equipment for other than design purposes will be permitted only when no currently manufactured products meet the specifications.

All equipment and materials shall be new. Like equipment and materials shall be made by the same manufacturer. The item descriptions and specifications do not necessarily include or define everything necessary for a complete and operational item.

Materials shall conform to the following Sections and Subsections of the Louisiana Standard Specifications for Roads and Bridges:

- Temporary Erosion Control204
- Concrete Walks, Drives, and Incidental Paving706
- Structural Metals.....807
- Painting and Protective Coatings811
- Welding.....815
- Portland Cement Concrete901
- Reinforcing Steel1009
- Metals.....1013 & 1015
- Anchor Bolts, Nuts & Washers.....1015.02(c)(1)
- Stainless Steel Hardware.....1018.08(c)
- Conduit.....1018.09
- Electrical Conductors.....1018.10

This specification sets the minimum requirements for a Dynamic Message Sign suitable for arterial installations.

The design of the displays shall be modular in construction to facilitate easy field replacement of component parts. All routinely serviced components shall weigh 50 pounds or less.

The design life of the sign, including all sign components, operating 24 hours a day shall be at least 10 years in the environment of Louisiana. The DMS shall have a standard one (1) year warranty covering all facets of the System and no deductible shall be required. Mounting equipment to the DMS housing, whether CCTV cameras, wireless antennas, cellular antennas, or other indicated penetrations, shall not void the DMS's warranty.

The performance of all equipment and materials, during delivery from the factory shall not be impaired due to vibration caused by wind, traffic, or normal transportation.

The presence of ambient radio frequency, magnetic or electromagnetic interference, including

that from Department and other mobile radios, power lines, transformers, and motors within the proximity of any components of the System, shall not affect the operation or impair the performance of the System. The System shall not conduct or radiate signals that will adversely affect other electrical or electronic equipment.

907-657.02.1--Housing Requirements. The DMS front access housing is the weatherproof housing, which encloses, or has attached, all other DMS components. The housing shall be provided with front access doors, opening horizontally by dividing the display area. The doors shall be designed so they do not stick.

Front access housing dimensions shall be as follows:

- Approximate Height: 5.5'
- Approximate Width: 17.5'
- Approximate Depth:..... 1.5'
- Approximate Weight:..... 1050 lbs

The housing and structural connection shall be designed in accordance with the American Association of State Highway and Transportation Officials (AASHTO) standard "Standard Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signals, current issue with interims. The Dynamic Message Signs are considered essential facilities and are to be designed with a Recurrence Interval of 100 years. Wind load is to be based on Exposure Category C and a basic wind speed of 130 miles per hour from any direction. Housing is to be designed for a minimum uniformly distributed live load of 100 psf.

The contractor shall submit a copy of the calculations and shop drawings for the housing and its connection to the support to the Department for review prior to manufacture. All calculations and shop drawings shall be stamped by a licensed professional civil engineer. Submittals shall be in writing on company letterhead. All drawings shall be original tracings conforming to Section 801.03 of the Louisiana Standard Specifications for Roads and Bridges.

The completeness and correctness of the design calculations is solely the responsibility of the DMS Manufacturer, and the Engineer of Record who sealed the calculations. Furthermore, this review is not an approval for the structural integrity of the DMS housing or its connection to the DMS support structure.

All welds shall be continuous. Weld sizes indicated shall be equal to the thickness of the least of the jointed plates unless otherwise noted.

Locks for all DMS shall be a #2 Corbin lock.

The DMS housing and integral DMS display cover shall be designed and constructed:

- To meet prime commercial standards for structure, painting, and related requirements.
- To present a clean, unbroken, and neat appearance.
- To be weatherproof and protect the interior from moisture, dust, dirt, and corrosion.

- Corrosion protection shall be provided between dissimilar metals.
- Of 6063-T5, 5052-H32, or T6061-T6 aluminum alloy. Exterior wall skin on housings shall not be less than 1/8" in thickness.
- So that all visible surfaces have a maintenance free protective treatment and/or coating which is non-reflective and is gray, silver, or aluminum in color. The protective treatment and/or coating shall have a design life of at least 10 years in the environment of south Louisiana. The contractor shall provide proof of compliance with sign submittal.
- So that all maintenance will be performed within the sign housing.
- So that each access shall be vandal proof and sized for the convenient access of all internal sign components of the character module served.
- So that the removal of any combination of sign face windows shall not alter the structural integrity of the sign display cover nor the sign.
- So that the attachment of all sign face windows utilizes a reusable gasket for weatherproofing. The design life of all gaskets shall be at least ten (10) years and supporting documentation should be provided to the Department with the shop drawing.
- So that the attachment mechanism for all sign face windows allows the window material to expand and contract (due to temperature fluctuations) yet retain a weatherproof seal.
- So that the surrounding borders shall be a minimum of 2/3 of the character height on the display according to NEMA TS4's standard font set (7) pixels high by (5) pixels wide font).

All components of the DMS (internal sign components, controller, communications equipment, etc.) shall operate effectively in all weather conditions. All electronics, electric, mechanical, and all other parts and accessories of the DMS shall operate effectively within the following limits:

- Ambient temperature: -30°F to +165°F during all levels of sunlight.
- Humidity: 0% - 99%

Any lighting or illumination equipment external to the sign is unacceptable.

The DMS shall contain a forced air ventilation system with a minimum of two intake ports and a minimum of one exhaust port for each intake port. All intake ports shall have a filter, all exhaust ports shall be screened such to prevent access by insects and small animals. Filters shall be clearly marked with airflow direction. All ports shall be hooded. All ports and hoods shall be sealed to prevent moisture from entering the housing.

An internal temperature sensor shall be installed to monitor the DMS temperature. The sensor output shall be continuously monitored by the sign controller. All fans shall be maintenance free. An internal humidity sensor shall be installed to monitor relative humidity of the air within the DMS. The sensor output shall be continuously monitored by the sign controller.

Temperature sensors shall be installed to monitor each LED display module. The sensor output shall be continuously monitored by the sign controller. Temperature threshold shall be configurable. The sign controller shall automatically shut down the LED modules if the module temperature exceeds the set threshold.

The DMS housing shall contain at least one (1) 60 W fluorescent light, 150 W incandescent light, or equivalent LED lighting (preferred) for every 8 feet of housing length. Light assemblies shall be covered with a protective wire cage. The light circuit shall be controlled by a switch mounted near the front doors which shall automatically turn on the light when any door is opened.

907-656.02.2--Display Requirements. The DMS shall be full matrix display, utilizing LED technology, which shall provide uniform lighting over the entire face of the matrix.

Character height shall be approximately 12". The display face shall be sized to consist of three (3) lines containing eighteen (18) characters each using a 7x5 standard font.

The DMS display and vendor software shall provide variable letter and symbol sizes dependent upon matrix height. The matrix must be capable of displaying double stroke characters and characters two or three lines high. These two line high and three line high characters may be double or triple stroke characters, and proportionally wider. Custom graphics shall be available when programming or creating messages in the software.

All plastic materials and the sign face shall be made of UV stabilized materials.

The DMS display shall allow the unobstructed and convenient access to all serviceable components of the DMS display cover as well as any components between the DMS display and the DMS display cover.

All serviceable components shall be modular, interchangeable, and removable from within the sign housing. The entire face of the sign display shall be composed of identical and easily interchangeable display modules.

All components (except the sign controller and interconnecting wiring) required for producing a display shall be mounted on or within their respective sign display module. The replacement of any display module shall not require the use of any tools. All wiring interconnecting individual display modules shall be made into modular harness assemblies with latching industry standard connectors not requiring special tools.

The removal of any combination of display modules shall not alter the structural integrity of the sign display assembly or the sign housing.

All visible metallic surfaces on the face of the sign shall be protected with a black non-reflective, non-fading, and maintenance free finish.

Whenever a pixel is not emitting light it shall blend in with the surface finish and appear to be nonexistent.

The sign display shall not transmit light other than the light emitted by a pixel.

The sign display character to character spacing shall be user selectable (e.g. single or double

spacing).

The display shall be legible for a viewing distance of at least 600 feet with a 30-degree viewing angle (cones).

The DMS shall be able to display a message composed of any combination of the following characters and shapes:

- All upper case alphabetic letters "A" through "Z".
- All numeric digits "0" through "9".
- A "blank".
- All punctuation marks.
- Special characters: . , / ? ; : < > & * - ~ - ~ T
- An unlimited number of graphic shapes, each of which can be designed by the user (i.e. M U TCD standard traffic sign symbols).

All upper case alphanumeric characters shall be displayed over the entire height of the character matrix. The DMS shall be able to display messages containing graphic images of any size that will fit on its display matrix.

Messages displayed on the sign shall be operator selectable to be either static or flashing. A static message shall be displayed for some duration of time. The duration of time shall be operator selectable from 1 minute to an unlimited time span.

The sign shall be capable of displaying a scheduled message. A scheduled message shall be displayed for the duration between a selectable start time and a selectable end time. The start and end times shall be operator selectable for up to one month in advance and be designated by: month, day, year, hour, and minute.

The sign shall be capable of displaying an alternating sequence of six messages made up of any combination of static messages. The message of the sequence shall have a selectable display time and a selectable blank time. These times shall be operator selectable for the following:

- Display time - 0 to 25 seconds at 1 second increments.
- Blank time - 0 to 9 seconds at 0.1 second increments.

All messages displayed on the sign shall be automatically centered on each line. However, the operator shall be able to override this centering feature on a line-by-line basis to allow left or right justification, or any orientation that is desirable.

The display shall have sensors that monitor the ambient lighting conditions. The intensity of the LEDs shall be automatically controlled using a pulse width modulation board that provides a broad range of dimming.

Sensors that measure the outdoor ambient light level at the DMS site shall be mounted in-line with the DMS housing walls. This ambient light and temperature measurement system shall

consist of three (3) electronic light sensors. Two of the light sensors shall be placed such that they measure the ambient light levels striking the front and rear of the DMS (upstream and downstream traffic). The third light sensor shall be mounted to the floor of the DMS housing and shall face the ground. The DMS sign controller shall continuously monitor the light sensors and adjust the LED display matrix intensity to a level that creates a legible message on the DMS face

The DMS display face window shall have the following characteristics:

- Be optically clear, high impact; scratch resistant and ultraviolet stabilized sheets of polycarbonate plastic. Windows containing recycled materials are unacceptable.
- Have sufficient thickness and strength to withstand cleaning, installation, removal, sign vibration, and negative/positive pressure loading due to atmospheric wind as well as pressures created by the passage of large trucks.

907-656.02.3--Pixel Requirements. Pixels shall be sized at approximately 2" x 2", square or round. The DMS shall be 27 pixels high by 110 pixels wide. The pixel spacing shall be 1.75" (44mm).

Each pixel shall contain the quantity of discrete amber LEDs needed to output a minimum luminous intensity of 9,200 candelas per square meter (9,200 nit) when measured using a photometric meter through the DMS front face panel assembly.

All pixels shall contain an equal quantity of discrete LEDs and LED strings. If a pixel contains four (4) or more discrete LEDs, then each pixel shall contain a minimum of two (2) independent and parallel strings of LEDs.

Each pixel shall utilize high output AlInGaP LEDs.

- The LEDs shall have a wavelength of 590 (+/- 5) nanometers and shall be amber in color.
- The LEDs shall have a nominal viewing cone of 30 degrees
- The lighting system shall be both manually controlled and automatically controlled by a photocell utilizing Pulse Width Modulation for 12-step range of light intensity.
- The LED's shall have a rated life of 100,000 hours. This rating is at 25 mA forward current and shall be calculated when the T.F.D obtains half-brightness from its original manufacture.
- All LED's shall be from the same manufacturer.
- All LED's shall be of the same part number.
- All LED's shall come from no more than two luminous intensity bins.
- LED's shall be non-timed, non-diffused, high-intensity solid-state lamps.

907-656.02.4--Pixel Assembly. The electronic panels that make-up the DMS display are herein referred to as pixel assemblies. The pixel assembly shall contain 45 pixels in a matrix, nine (9) rows high and five (5) columns wide. All pixel assemblies shall be identical to one another.

The pixel assembly shall be attached to an aluminum-mounting grid, which forms the display face. The pixel assembly shall be easily removed for maintenance from the inside of the display without

the use of special tools. All pixel assemblies shall be labeled for positive identification.

Pixel columns and rows shall be perpendicular. The horizontal and vertical spacing between pixels, pixel center to center distance, and character spacing shall be designed and constructed to achieve optimum legibility within the legibility range specified herein.

All pixel assemblies shall be wired so that the failure of any one-pixel assembly will not affect the operation of any other. The sign controller shall control the pixel assembly separately so that the removal of a particular pixel assembly does not affect the operation of any other. Pixel assemblies shall not be daisy chained or wired in series.

907-656.02.5--Display Performance. During ambient outdoor light conditions ranging from maximum sunlight to total darkness, any displayed character or message shall be clearly legible by all motorists from any point on the approach roadway within 600 feet of the sign. This requirement shall be in effect for a minimum period of ten years.

Time required to execute a worst-case message change shall not exceed two (2) seconds. That is, from the time the command is received by the sign controller to the instant the message is displayed.

The display of the blanking of a message as well as the changing of one message to another shall be accomplished with an effort to minimize visual disturbance.

For all ambient outdoor light conditions and luminance levels displayed by the sign, the following shall apply:

- Pixel to pixel, the luminous area for each pixel shall not vary by more than 5 percent.
- Luminous intensity variation shall be less than 15 percent when measured over the entire luminous area of each pixel.
- Pixel to pixel luminous intensity variation shall be less than 15 percent.
- The optical axis of all pixels shall be perpendicular to the face of the sign display.
- Pixel luminance level shall be set by sensing outdoor ambient light levels and shall be automatically performed by the sign controller. The System operator shall be able to override the automatic setting of pixel luminance and shall have the ability to manually select any one of the levels.
- In case of luminance control system failure, the luminance level shall be designed to default to the night level and shall automatically be reported to the control computer.

907-656.02.6--Sign Controller. The sign controller shall have the capability to provide sensor measured data or messages such as internal temperature, control cabinet intrusion, photocell control, pixel burn out detection, etc., shall be provided.

The controller shall be a self-contained, compact, solid state, modular unit. The computer section of the unit shall contain all programming instructions to operate the System, and contains all preprogrammed PROM messages and nonvolatile RAM or EE PROM space for storing the keyboard-generated messages for at least ten (10) years.

The DMS controller shall have a minimum of three NTCIP serial ports. Each port will support multiple communications interfaces including direct null-modem, dial-up modem, leased line modem, cellular modem, microwave radio and fiber optics. The serial ports shall support RS232 and RS422 communications.

The DMS controller shall have one 10/100 Ethernet communications RJ45 port.

The sign controller shall have the multi-tasking capability of receiving typed keyboard characters while the signboard continues to display a previous message. Once the new message is verified as the one desired, the new message shall replace the previous sign message within the time frame specified herein.

The sign controller shall perform the following general functions.

- Interpret commands and parameters sent by the control computer and cause the immediate or scheduled display (or blanking) of messages upon the sign display. Message display commands shall identify a library message (stored in the controller's memory) or contain the text of the message. The sign controller shall report, to the control computer, its success or failure in carrying out said commands.
- Continually monitor the operational status of hardware and software and report said status upon being polled by the control computer. When the control computer fails to poll on a regular basis, the sign controller shall either blank the display or continue a display as pre-arranged by the System user.
- Maintain a (nonvolatile) library of display messages as well as any parameters required. The control computer shall keep the libraries and parameters up to date by sending either updates or complete libraries.

At minimum, each sign controller shall have:

- A software oriented microprocessor.
- Control program software resident in (nonvolatile) EEPROM or in (nonvolatile) BYROM.
- RAM storage for a message library and any parameter table(s). The message library shall be sized to accommodate at least 64 messages. The slot (entry) of the message library shall be sized to contain all text and all parameters required for the display of any message that the sign is capable of displaying.
- Battery backup of RAM allowing power outages of 30+ days.
- Real time clock for time of day and annual calendar date determination with battery backup allowing power outages of 30+ days.
- Interface equipment for communicating with the control computer and the field test computer.
- Ability to set a unique sign controller address as required for communications with the control computer either through software or a dip switch.
- A manual (momentary) switch for initiating a sign controller reset.
- A manual switch for selecting sign controller mode of operation from remote to local (see modes of operation) if required.
- Circuitry and interface for driving the sign display. Circuitry and interface for

- determining outdoor light levels. Circuitry and interface for controlling pixel luminance.
- A hardware watchdog timer to check its own operation. While the sign controller program is running, the hardware watchdog shall be set every few seconds. If the watchdog timer is not set for a period, there shall be a prompt for System reset to be performed.
- Circuitry to determine the number of pixels that are inoperative.
- Visual indicators to show the existence of operational faults.
- Circuitry to determine the temperature within the sign housing for automatic shutdown of internal pixel illumination if temperature exceeds limits.
- A manual switch for initiating a sign test procedure, which includes displaying a sequence of test patterns.

The sign controller shall continually monitor the operational status of the sign including all sensors. The sign controller shall accumulate and save this status data until a request for status is received from the control computer. After reporting the sign status, the sign controller shall begin accumulating data for the next status request.

At a minimum, the following information shall be provided by the sign controller upon request for status:

- Occurrence of power failure.
- Occurrence of hardware failure in the communication equipment.
- Communication watchdog timer expired (control computer has failed to poll the sign recently)
- Sensor readings.
- Photo sensor equipment failure with current reading.
- Number of pixels that are inoperative (failed).
- The number (or ID) of the message previously displayed.
- The number (or ID) of the message currently display.
- The number (or ID) of the next message scheduled for display.
- Current value of the comm-fail-continue parameter for this sign.
- Mode of operation (local or remote)
- Time and/or date out of synchronization with time and date at the control computer.
- Status of ancillary components activated by the sign controller.

The sign shall continue any current display or display schedule and shall be blanked when the message display duration or schedule has expired or the number of hours contained in the comm-fail-continue parameter has elapsed, whichever is less.

The comm-fail-continue parameter shall be user selectable to a range of 0 to 8 hours in one minute increments for each sign. The value contained in the comm-fail-continue parameter shall be the number of hours that sign may continue displaying messages while the above conditions are met

907-656.02.7--Support and Mounting Requirements. The DMS support(s), including

pedestal, brackets, footings, hardware, etc, shall be designed by the contractor in accordance with the plan details and pedestal sign support special provisions.

907-656.03--Construction Requirements. The DMS housing shall be mounted to a new support structure according to plan details.

907-656.03.1--Testing. Each DMS shall undergo testing to verify conformance to special provision as follows. The Contractor shall conduct a Project Testing Program as required below. All costs associated with the Project Testing Program shall be included in overall contract prices; no separate payment will be made for any testing.

907-656.03.1.2--General Requirements. 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 Project Engineer, ITS Engineer, and/or their designee(s) reserve the right to attend and observe all tests. The Contractor is required to perform the DMS Sub-System test and the Conditional Acceptance test with the Engineer or his designee present.

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 specifications or the project plans. Test procedures shall contain documentation regarding the equipment configurations and programming.

No testing shall be scheduled until approval of all project submittals and approval of the test procedures for the given test.

The Contractor shall provide all ancillary equipment and materials as required in the approved test procedures.

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.

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.

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.

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.

907-656.03.1.3--DMS Factory Acceptance Test (FAT). The Contractor shall perform FAT on the DMS prior to shipping from the factory. The goal of the DMS FAT is to verify that the DMS meets the requirements of this special provision.

Factory Acceptance Tests shall be conducted at the Manufacturer or Contractor facility or at a facility acceptable to all parties. All equipment to be utilized for this project shall be subject to tests that demonstrate the suitability of the design and compliance with the contract requirements, unless an exception for an equipment item is granted by the Project Engineer. The tests shall be performed on production units identified to be delivered under this contract.

The FAT procedure shall demonstrate all requirements defined in these specifications are met, including, but not limited to: functional/system performance requirements, electrical requirements, data transmission/communication requirements, safety/password requirements, environmental requirements, and interface requirements with other components of the project system.

The Project Engineer reserves the right to waive FATs which are deemed to be unnecessary and reserves the right to witness all FATs that are determined to be critical to the project. At a minimum, the Project Engineer and/or the Project Engineer's representative, will be in attendance at the FAT for the first three (3) units tested. The FAT for the first three (3) units shall be conducted during the same period. The Project Engineer shall be notified a minimum of forty- five (45) calendar days in advance of such tests. Salary and travel expenses of the Project Engineer and the Project Engineer representatives will be the responsibility of MDOT. In case of equipment or other failures that make a retest necessary, travel expenses of the Project Engineer and the Project Engineer's representatives shall be the responsibility of the Contractor. This shall include all costs including, but not limited to, airfare, automobile rental, lodging, and per diem. These costs, excluding airfare shall not exceed \$500.00, per representative, per day. These costs shall be deducted from payment due or charged to the withholding account of the Contractor when the project is terminated.

The vendor must complete the FAT on all remaining units on their own and submit documentation to the Project Engineer that the FATs were completed. The Project Engineer reserves the right to randomly attend those FAT tests.

No equipment for which a FAT is required shall be shipped to the project site without successful completion of factory acceptance testing as approved by the Project Engineer and the Engineer's approval to ship.

907-656.03.1.4--DMS Pre-Installation Test (PIT). The Contractor shall perform PIT on the DMS as they arrive from the factory. The goal of the DMS PIT is to verify that the DMS were not damaged during shipping. The PIT shall test or inspect the following DMS components:

- 1) External or internal visible damage
- 2) DMS display damage
- 3) Verify all pixels are operational
- 4) Verify the ventilation system works
- 5) Verify all equipment is secured
- 6) Verify sign configurations

907-656.03.1.5--DMS Stand Alone Test (SAT). The Contractor shall perform SAT on the DMS as they arrive from the factory. The goal of the SAT is to verify that the DMS has been properly installed and commissioned according to the manufacturer requirements. The SAT shall include at minimum the following tests and inspections:

- 1) Verify the signs have been attached properly to the structure.
- 2) Verify the sign case and roadside cabinet have been grounded.
- 3) Verify the sign has been properly connected to the power.
- 4) Verify the sign case has no structural damage or deformities.
- 5) Verify all pixels are operational
- 6) Verify local sign control through the serial port
- 7) Verify local sign control through the Ethernet port.

907-656.03.1.6--DMS Sub-System Test (SST). The Contractor shall perform SST on the DMS to verify that the sign is operational from central. The goal of the SST is to verify that all remote DMS functions and alarms are operational. The Contractor shall coordinate the SST with the MDOT ITS Engineer. The Contractor shall provide a SST plan to the Engineer and be approved a minimum of two week in advance of tests being performed.

907-656.03.1.7--Conditional System Acceptance Test (CSAT). The Contractor shall perform a complete conditional system acceptance test on all equipment and materials in the project. The Contractor shall not request the conditional system acceptance test for a phase until the SATs have been satisfactorily completed, all as-built documentation has been submitted and approved, and all other project work has been completed to the satisfaction of the Engineer. Prior to a Conditional System Acceptance Test, the Contractor shall provide advance notice of and written test results documentation that the Contractor has performed a dry-run of the conditional system acceptance test, and the Engineer reserves the right to require attendance of a dry-run test session.

The Contractor shall test all project systems simultaneously from the TMC in a manner equivalent to the normal day-to-day operations of the system. The Conditional System Acceptance Test shall demonstrate that all equipment and materials in the network are in full compliance with all project requirements and fully functional as installed and in final configuration, communicating with and being controlled through the control center at the TMC.

Upon completion and full approval of the Conditional System Acceptance Test for all equipment, Conditional System Acceptance will be given and the Burn-in Period will begin. The Contractor shall coordinate the CSAT with the Engineer. The Contractor shall provide a CSAT plan to the Engineer and be approved a minimum of thirty (30) calendar days in advance of tests being performed. The CSAT plan shall be inclusive of steps and procedures to be performed and scheduled times to perform test procedures.

907-656.03.2--Burn-In Period. Following the Engineer's written notice of successful completion of the Conditional System Acceptance Test, the entire newly installed system must operate successfully for a six (6) month burn-in period. During this burn-in period the Contractor shall be responsible for the full maintenance of the newly installed equipment. However, no separate payment will be made for the burn-in period activities and shall be included in the cost of other items. Successful completion of the burn-in period will occur at the end of six complete months of operation without a major system failure attributable to hardware, software or communications components. Each system failure during the burn-in period will require an additional month of successful operation prior to being eligible for Final Acceptance. (i.e., if there are two system failures during the initial six month period, the burn-in period would be increased to 8 months.)

907-656.03.2.1--Burn-In Requirements. General burn-in requirements are as follows.

- Determination of a system failure shall be at the sole discretion of the Engineer. System failure is defined as a condition under which the system is unable to function as a whole or in significant part to provide the services as designed. While a single component failure will not constitute a system failure, chronic failure of that component or component type may be sufficient to be considered a system failure. Chronic failure of a component or component type is defined as 3 or more failures for the same component during the burn-in period.
- Components are defined as contract items or major material elements in a contract item. For electrical and electronic contract items, components are defined as the complete assembly of materials that makes up the contract item.
- Specifically exempted as system failures are failures caused by accident, acts of God, or other external forces that are beyond the control of the Contractor. However, failure of the contractor to respond to the repair request for that failure within 24 hours may be considered a system failure.
- The Department will advise the Contractor in writing when it considers that a system failure has occurred or chronic failure exists.
- If multiple system and/or chronic failures continue to occur throughout the burn-in period due to a single component type, the Contractor may be required to replace all units of that component type with a different model or manufacturer.
- The Contractor shall document all failures and subsequent diagnosis and repair. The repair documentation shall include as a minimum:
 - Description of the problem
 - Troubleshooting and diagnosis steps
 - Repairs made
 - List of all equipment and materials changed including serial numbers.

- Update of the equipment inventory where needed.
- The Contractor shall provide the repair documentation to the Engineer within 2 days of completing the repair; failure to provide acceptable documentation as required shall be reason to not approve the repair as complete. The Engineer will provide acceptance or rejection of the repair and documentation within seven (7) days.
- The Engineer reserves the right to require, at no additional expense to the State, the presence of a qualified technical representative of the equipment and/or software manufacturers as related to the diagnosis and/or repair of any system failure.
- During the burn-in period the Contractor shall perform incidental work such as touching up, cleaning of exposed surfaces, leveling and repair of sites, sodding/grassing and other maintenance work as may be deemed necessary by the Engineer to insure the effectiveness and neat appearance of the work sites.
- During the burn-in period the Engineer shall maintain a “burn-in period punch list” that contains required Contractor actions but that the Engineer does not define as a system failure. Each burn-in period punch list action item shall be completed by the Contractor to the Engineer’s satisfaction within seven (7) days of Contractor notification of the action item.
- During the burn-in period the Contractor is required to meet the following response times once notified there is a problem. A response is defined as being on-site to begin diagnosing the problem.
 - Monday thru Friday: The Contractor shall respond no later than 9:00 a.m. the following morning after being notified.
 - Weekends: If the Contractor is notified on Friday afternoon or during the weekend, the Contractor shall respond by 9:00 a.m. on Monday morning.
- During the burn-in period the Contractor shall provide all labor, materials, equipment and replacement parts to completely maintain, troubleshoot and repair all items installed under this contract. No separate payment will be made for any labor, materials, equipment or replacement parts needed during the burn-in period.

The overall burn-in period will be considered complete upon the successful completion of the burn-in time periods, the Engineer’s acceptance of all repairs and repair documentation, completion of all burn-in period punch list actions and a final inspection as described below.

907-656.03.3--DMS Final Inspection. Upon successful completion of the burn-in period, the project shall be eligible for the DMS final inspection. The DMS final inspection will be conducted provided the burn-in period has demonstrated the entire system is operating successfully. The DMS final inspection shall include but is not limited to:

- monitoring of all system functions at the TMC to demonstrate the overall system is operational
- a field visit to each site to ensure all field components are in their correct final configuration
- verification that all burn-in punch list items have been completed
- verification that all final cleanup requirements have been completed
- approval of final as-built documentation

Prior to conducting the DMS final inspection, the burn-in period shall demonstrate that all requirements defined in this Special Provision have been met.

The Contractor shall request in writing the Engineer's approval to start the DMS final inspection a minimum of 14 days prior to the requested start date. The Engineer reserves the right to reschedule the start date if needed. The start date for the DMS final inspection cannot be prior to the successful completion of the overall burn-in period.

An unsuccessful or incomplete DMS final inspection shall require a new DMS final inspection after the Contractor has made the necessary corrections. Up to 14 days shall be allowed for the Engineer to conduct a DMS final inspection.

The Engineer reserves the right to require, at no additional expense to the State, the attendance of a qualified technical representative of the equipment and/or software manufacturers to attend a portion of a DMS final inspection. The presence of the Engineer or his designee is required during the final inspection.

The Contractor shall be responsible for the full maintenance of all project equipment and materials during the entire time period from the successful completion of the burn-in period until Final System Acceptance is granted.

907-656.03.4--Final System Acceptance. Upon successful completion of the DMS final inspection, the Engineer will conduct a project final inspection

907-656.04—Method of Measurement. Dynamic Message Sign will be measured per each DMS installation. Such installation shall be inclusive of furnishing, installing, system integration and testing of the complete dynamic message sign including the sign case, light sources, display apparatus, wiring, controller, roadside DMS cabinet, communications interface, wiring between the sign case and DMS cabinet, structure mounted conduit, fittings, and junction boxes, sign case support connections to the sign support structure, 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 sign complete in place and ready for use. 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 DMS.

907-656.04—Basis of Payment. Dynamic Message Sign, measured as prescribed above, will be paid for at the contract unit price per each, which price shall be full compensation for all labor, tools, materials, equipment, and incidentals necessary to complete the work for a complete and functional DMS.

This work does not include the sign support structure.

Progress payments for Dynamic message signs shall be paid as follows:

- 1) 20% of the contract unit price upon completion of the Factory Acceptance Test and Pre-

Installation Test.

- 2) Additional 20% of the contract price upon delivery to the site. Delivery cannot be more than 60 days before anticipated installations.
- 3) Additional 50% of the contract unit price upon complete installation and stand alone testing of the dynamic message sign.
- 4) Final 10% of the contract unit price upon Final System Acceptance.

Payment will be made under:

907-656-A: Dynamic Message Sign, Type 2, LADOTD

- per each

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-657-7

CODE: (SP)

DATE: 03/01/2013

SUBJECT: Fiber Optic Cable – LADOTD

PROJECT: ITS-9999-09(028) / 106397301 & 302 -- Warren and Adams Counties

Section 657, Fiber Optic Cable (OSP), of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows for Fiber Optic Cable – LADOTD only.

907-657.01--Description. This Item consists of furnishing and installing fiber optic cable and all appurtenances required for the ITS in accordance with plan details, the 2006 Louisiana Standard Specifications for Roads and Bridges, this specification, and as directed by the engineer.

907-657.02--Materials. All equipment shall be new and constructed using the highest quality, commercially available components and techniques to assure high reliability and minimum maintenance. The contractor shall submit, prior to installation, a complete set of shop drawings of all the equipment and components listed below and included as part of the installation.

The component of the fiber optic communications system described by this specification shall consist of the following.

- Fiber optic cable

907-657.03--Construction Requirements. The Contractor shall assemble and install all necessary material and equipment and furnish a working fiber optic cable in accordance with these plans and specifications and compatible with the requirements of the ITS. All items that are required to complete the installation and ensure an operational ITS 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.

The Contractor shall field verify final equipment locations with the engineer. Plans are diagrammatic and indicate the general arrangement of devices and work included in these documents. Final placement and arrangement are the responsibility of the Contractor.

During the installation of the underground systems, removal of brush, trees, fencing, and other obstructions within the right-of-way shall comply with Section 202 of the standard specifications and shall not be paid separately. Landscaping shall be restored to original or better condition if disturbed.

Upon request by the Department, the Contractor shall arrange for the manufacturer to grant access to the manufacturing facility for all products specified herein.

907-657.03.1--Strand Single Mode Cable.

907-657.03.1.1--General Requirements. Contractor shall provide strand optical fiber cable with the fiber count as indicated on the plans and with characteristics as specified herein. All fiber strands shall conform to the requirements detailed herein.

The maximum attenuation for each cabled single mode fiber shall be 0.36 dB/km at 1310 nm and 0.22 dB/km at 1550nm. The attenuation at the water peak (1383 nm) shall not exceed 0.36 dB/km. The maximum dispersion shall be less than 3.5 ps/(nm•km) from 1285nm to 1330nm and less than 18 ps/(nm•km) at 1550 nm.

All optical fibers shall be proof tested by the fiber manufacturer to a minimum load of .07 GN/m² (100 kpsi).

Each fiber shall be distinguishable by means of color coding in accordance with TIA/EIA-598-A, "Optical Fiber Cable Color Coding."

The cabled fiber shall support Gigabit Ethernet (GbE) operation according to the 1000Base-LX (1310 nm region) specifications up to 5000 meters in accordance with the GbE standard. The cable fiber shall support laser-based 10 Gigabit Ethernet (10 GbE) operation according to the 10GBase-L (1310 nm) and 10GBase-E (1550 nm) specifications for distances of 10 km, 25 km, and 40 km respectively.

907-657.03.1.2--Cable Construction. Cable characteristics are single mode, jacket, rated for installation in conduit, shall be suitable for direct burial, and shall be an accepted product of the United States Department of Agriculture Rural Utilities Service (RUS) 7 CFR 1755.900 and meet the requirements of ANSI/ICEA Standard for Fiber Optic Outside Plant Communications Cable, ANSI/ICEA S-87-640-1992.

Fiber optic cable provided under this specification shall be of a totally dielectric construction. Optical fibers shall be arranged in a loose tube configuration. Fibers must be matched clad.

The fiber strands shall not be colored with solvent-based inks.

All cables shall have a central strength member that shall consist of a dielectric, glass reinforced plastic rod. All cables shall also contain either one or two ripcords. Buffer tubes shall be reverse oscillate stranded along the central strength member.

The dielectric strength member shall be non-nutritive to fungus, electrically nonconductive, and free from dirt and foreign matter. Water blocking yarn(s) shall be applied longitudinally along the central member during stranding.

All materials used in the fiber cable shall be non-reclaimed, free from foreign matter consistent with good manufacturing practices, and shall not degrade cable components or accepted connectors, closures, tapes and other materials used with the fiber cable. All fibers, coatings, plastic tubes and jackets shall be continuous and free from roughness, porosity, bubbles, splits, blisters, voids and inclusions, consistent with good manufacturing practices.

Cable jackets shall be marked with manufacturer's name, sequential meter or foot markings, month and year, or quarter and year of manufacture, and a telecommunication handset symbol, as required by Section 350G of the National Electrical Safety Code (NESC). The actual length of the cable shall be within 0+/-1% of the length markings. The print color shall be white; with the exception that cable jackets containing one or more coextruded white stripes shall be printed in light blue. The height of the marking shall be approximately 2.5 mm.

If the initial marking fails to meet the specified requirements (i.e., improper text statement, color, legibility, or print interval), the cable may be re-marked using a contrasting alternate color. The numbering sequence shall differ from the previous numbering sequence, and a tag shall be attached to both the outside end of the cable and to the reel to indicate the sequence of re-marking. The preferred re-marking color will be yellow, with the secondary choice being blue.

Each fiber or group of fibers shall be free-floating within the tubes such that all mechanically or environmentally induced stress placed upon the cable is de-coupled from the fibers. The buffer tubes shall contain a water-swallowable yarn for water blocking protection or embedded water blocking material (preferred). The water blocking material shall be non-nutritive to fungus, electrically non-conductive, and homogeneous. The buffer tube shall be gel-free. The optical fiber shall not require cleaning before placement into a splice tray or fan out kit. The nominal outer diameter of the buffer tube shall be 2.5 mm. The buffer tube shall be polypropylene.

All cables must be able to withstand a minimum bending radius of 10 times cable diameter under no load and 20 times cable diameter under load, without affecting performance characteristics of the cable.

The shipping, storage, and operating temperature range of the cable shall be -40 °C to +70 °C. The installation temperature range of the cable shall be -10 °C to +60 °C.

The fiber installer shall be certified in fiber installation by Corning Cable Systems or accepted equal.

907-657.03.1.3--Backbone Cable Construction. All cables shall be sheathed with a circular extrusion of medium density polyethylene (MDPE) and shall be suitable for direct burial. The minimum nominal jacket thickness shall be approximately 1.3 mm. Jacketing material shall be applied directly over the tensile strength members and water blocking tape. The fiber cable shall have a tensile rating of 600-lb.

The cable shall be of gel-free, loose tube construction with up to 12 buffer tubes wrapped around a dielectric central strength member. All fiber(s) shall be contained within buffer tubes, and each

buffer tube shall have an inside diameter much greater than the total diameter(s) of the fiber(s) it supports.

The maximum pulling tension shall be 2700 N (600 lbf) during installation (short term) and 890 N (200 lbf) long term installed.

907-657.03.1.4--Quality Control Provision. All cabled optical fibers shall be 100% attenuation tested using an optical source-power meter test set (i.e., power meter test). The attenuation of each fiber shall be provided with each cable reel and shall meet the requirements of the fiber specification parameters as specified herein.

All cable once on the reel shall have Optical Time Domain Reflector (OTDR) reports generated at the factory prior to shipment, at the delivery location prior to installation, and on-site after installation. Cable provided under this specification must produce equivalent OTDR reports at each test point.

907-657.03.1.5--References, Standards, Listing, and Codes. For the equipment specified herein, the manufacturer shall be ISO 9000, 9001 or 9002 certified.

The cable manufacturer shall support industry standards such as Bell Communications Research (Bellcore), Electronic Industries Association (EIA), Telecommunications Industry Association (TIA), International Telecommunications Union (ITU), International Electromechanical Commission (IEC), Rural Utilities Service (RSU, formerly-REA), American Society for Testing and Material (ASTM) and the Building Industry Consultant Services (BICSI) Telecommunications Distribution Methods Manual. In addition, product supplied by the cable manufacturer shall meet all applicable standards of the above organizations and well as the reference standards listed in (Table 1).

Materials provided under this specification must be new and must be provided by manufacturers regularly engaged in the production of such products.

It is required that the cable manufacturer shall provide installation procedures and technical support concerning the items contained in this specification.

All work and equipment shall be designed, manufactured, and tested in accordance with the latest applicable standards for the equipment specified. In some instances, these specifications go beyond the requirements of the stated standards. Where these specifications differ from the requirements of the stated standards, these specifications shall govern.

In addition to the requirements of these specifications, material and workmanship shall meet or exceed all requirements of the applicable portions of the latest editions of the standards and codes listed below. The fiber optic cable shall further meet or exceed those applicable standards not stated herein but referenced by the below standards or their applicable sections. The standards list includes, but is not limited to, the following:

Table 1: Fiber Optic Industry Standards

Industry Standard / Code	Description
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Industry Standard / Code	Description
ASTM D 1248 (2005)	Standard Specification for Polyethylene Plastics Molding and Extrusion Materials
ASTM D 1603 (2006)	Standard Test Method for Carbon Black in Olefin Plastics
ASTM D 1765 (2010)	Standard Classification System for Carbon Blacks Used in Rubber Products
ASTM D 3349 (2006)	Standard Test Method for Absorption Coefficient of Carbon Black Pigmented Ethylene Plastic
ASTM E 29 (2009)	Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications
BELLCORE	Issue 1, September 1994
GR-20-CORE (2010)	Generic Requirements for Optical Fiber and Fiber Optic Cable
EIA/TIA-455-3 (2009)	Procedure to Measure Temperature Cycling Effects on as Optical Fiber, Optical Cable, and Other Passive Fiber Optic Components
EIA/TIA-455-24 (2000)	Water Peak Attenuation Measurement of Single Mode Fibers
EIA/TIA-455-25 (2002)	Impact Testing of Fiber Optic Cables and Cable Assemblies
EIA/TIA-455-28 (2005)	Method for Measuring Dynamic Tensile Strength of Optical Fibers
EIA/TIA-455-29 (1999, w/d superseded by TIA-455-176-A)	Refractive Index Profile Transverse Interference Method
EIA/TIA-455-31 (2005)	Fiber Tensile Proof Test Method
EIA/TIA-455-33 (2005)	Fiber Optic Cable Tensile Loading and Bending Test
EIA/TIA-455-37 (2005)	Low or High Temperature Bend Test for Fiber Optic Cable
EIA/TIA-455-41 (2001)	Compressive Loading Resistance of Fiber Optic Cable
EIA/TIA-455-46 (1990, w/d in 2003)	Spectral Attenuation Measurement for Long-Length, Graded-Index Optical Fibers
EIA/TIA-455-47 (1990, w/d superseded by TIA-455-177, 2003)	Output Far-Field Radiation Pattern Measurement
EIA/TIA-455-51 (w/d superseded by TIA-455-204, 2000)	Pulse Distortion Measurement of Multimode Glass Optical Fibers Information Transmission Capacity
EIA/TIA-455-58 (2001)	Core Diameter Measurement of Graded-index Optical Fibers Information Transmission Capacity
EIA/TIA-455-59 (superseded by TIA-455-78, 2002)	Measurement of Fiber Point Discontinuities Using an OTDR
EIA/TIA-455-61 (superseded by TIA-455-78, 2002)	Measurement of Fiber or Cable Attenuation Using an OTDR
EIA/TIA-455-62 (2003)	Measurement of Optical Fiber Macrobend Attenuation
EIA/TIA-455-76 (1993, w/d with no superseded doc)	Method for Measuring Dynamic Fatigue of Optical Fibers by Tension
EIA/TIA-455-78 (2002)	Spectral Attenuation Cutback Measurement for Single-Mode

Industry Standard / Code	Description
	Optical Fibers
EIA/TIA-455-80 (2003)	Measuring Cutoff Wavelength of Uncabled Single-Mode Fiber by Transmitted Power
EIA/TIA-455-82 (1992)	Fluid Penetration Test for Fluid-Blocked Fiber Optic Cable
EIA/TIA-455-85 (2005)	Fiber Optic Cable Twist Test
EIA/TIA-455-86 (2005)	Fiber Optic Cable Jacket Shrinkage
EIA/TIA-455-89 (1998)	Fiber Optic Cable Jacket Elongation and Tensile Strength
EIA/TIA-455-97 (Draft)	Procedure for Measuring Static Fatigue of Optical Fibers in Two-Point Bending
EIA/TIA-455-98 (2000)	Fiber Optic Cable External Freezing Test
EIA/TIA-455-104 (2005)	Fiber Optic Cable Cyclic Flexing Test
EIA/TIA-455-111 (2003)	Procedure for the Measurement of Optical Fiber Curl
EIA/TIA-455-113 (1997, R2001)	Polarization-Mode Dispersion Measurement for Single-Mode Optical Fibers by Wavelength Scanning
EIA/TIA-455-164 (1991, w/d no superseding doc)	Single-Mode Fiber, Measurement of Mode Field Diameter by Far-Field Scanning
EIA/TIA-455-167 (1992, w/d no superseding doc)	Mode Field Diameter Measurement-Variable Aperture Method in the Far-Field
EIA/TIA-455-168 (1999, w/d superseded by TIA-455-175, 2003)	Chromatic Dispersion Measurement of Multimode Graded-Index and Single-Mode Optical Fibers by Spectral Group Delay Measurement in the Time Domain
EIA/TIA-455-170 (1998, w/d no superseding doc)	Cable Cutoff Wavelength of Single-Mode Fiber by Transmitted Power
EIA/TIA-455-173 (1990)	Coating Geometry Measurements, Side View
EIA/TIA-455-175 (2003)	Chromatic Dispersion Measurement of Single-mode Optical Fibers by the Differential Phase Shift Method
EIA/TIA-455-176 (2003)	Method for Measuring Optical Fiber Cross-Sectional Geometry by Automated Grey-Scale Analysis
EIA/TIA-455-177 (2003)	Numerical Aperture Measurement of Graded-Index Optical Fibers
EIA/TIA-455-178 (2003)	Measurement of Strip Force Required for Mechanically Removing Coatings from Optical Fibers
EIA/TIA-455-181 (2001)	Lightning Damage Susceptibility Test for Fiber Optic Cables with Metallic Components
IEC 60793-1 (1992, superseded by IEC 60793-1-1, -2, -3, -4, -5)	International Standard (Optical Fibers) – Part1: Generic Specification
-A1A	Refractive Index Profile
-A3	Near Field Light Distribution
-B1	Optical Fiber Proof Test
-C1A	Cut-back Technique
-C1C	Insertion Loss Technique
-C2A	Impulse Response
-C5C	Chromatic Dispersion Measurement of Optical Fibers by the

Industry Standard / Code	Description
	Differential Phase Shift Method
-C7B	Cable Cut-off Wavelength Measurement of Single Mode Fiber
-C9A	Mode Field Diameter Measurement Direct Far-Field Scanning Method
-C9B	Mode Field Diameter Measurement – Variable Aperture Method in the Far-Field
-C11	Macrobending Sensitivity
IEC 60794-1 (1996, w/d superseded by IEC 60794-1-1, 1-2, 2001)	International Standard (Fiber Optic Cables) – Part1: Generic Specification

907-657.03.2--Production Tests and Technical Requirements.

907-657.03.2.1--General Requirements. Engineer shall have accessibility to the manufacturing plant to witness manufacture and testing of fiber optic cable.

The manufacturer shall provide a representative to witness field-testing of installed fiber optic cable.

Final inspection and acceptance of the multiple fiber optic cable installations shall be at the discretion of the Engineer. The Contractor shall complete testing as described below, and provide Engineer with documentation related to such testing. Testing shall be in accordance with the standards and regulations previously referenced by these specifications.

The Contractor shall prepare a statement of methodology for all testing procedures that shall be used for this installation. This statement shall be provided in advance to the Engineer for review and acceptance by the Engineer. In addition to accepting procedures, the Engineer must also accept all data forms that shall be used to record results of pre and post installation testing as well as link loss budget calculations. Once testing is complete, all test results recorded on accepted data forms, and signed by the Contractor, shall be provided to the Engineer in 3-ring binder(s) labeled and tabbed for each test segments for review and acceptance.

In addition to the guidance provided above, all testing shall be performed in accordance with industry standards bodies and generally accepted methods that were previously documented. Testing shall also comply with the specific industry standards provided by the fiber optic cable specification.

907-657.03.2.2--Tests Reports. All fiber test reports shall be printed from the testing unit interface and management software. Original data files (a CD with the electronic files pulled from the testing unit and PDF files of the printed reports) shall be supplied with each report submittal. Proof of the latest certification of the test unit shall be included in all reports. All test units to be used on this project shall have been certified by the manufacturer within 12 months prior to the date the test is performed. Reports shall be properly labeled (i.e., cable segment,

buffer tube, fiber, and Tx & Rx locations) and organized for review. All test shall be performed in both 1310nm and 1550nm wavelengths.

Each report printout shall contain the following information:

- Software name and version
- Date and time stamp of when the test was taken
- Date and time stamp of when the report was printed
- OTDR reports
 - Graph of dB versus linear feet (i.e., signature trace) with events identified on the graph. View shall be zoomed to clearly show the beginning and end of the fiber segment.
 - Summary of events by:
 - Type
 - Location
 - Event - event (dB & bB/km, respectively)
 - Loss (dB)
 - Reflectance (dB)
 - Overall (ene-to-end) loss (note this is theoretical loss)
- Power meter test report
 - Link loss budget calculation (note hand/program calculations are required as this is not typically a print out from the test unit software. If test unit is programmed to perform budget calculation, a screen capture of attenuation settings shall be submitted with results)
 - System loss from Tx to Rx (note this is actual attenuation, loss)
 - Wavelength

907-657.03.2.3--Tests Performed at Manufacturing Facility. Certified test reports shall be provided for each shipping reel of cable. The manufacturer shall document and certify the results of all factory tests and compliance with the performance requirements. Certified test reports shall include but not be limited to the power meter test reports for maximum attenuation for each cabled fiber, bandwidth, maximum billable length, actual shipped length, ordered length and OTDR test reports. Certificates of compliance are not acceptable. A written quality assurance/quality control manual shall be implemented and maintained to ensure full compliance with all requirements of this specification.

Testing shall be performed in accordance with the procedures outlined in the previously mentioned standards. These tests shall be performed at the factory and certified test results shall be provided to the DOTD in accordance with those standards.

907-657.03.2.4--Tests Performed Immediately Upon Delivery. At the time of delivery, fiber optic cable tests as outlined shall be performed in the presence of the Contractor, a DOTD representative, and the manufacturer's representative. Once the tests are complete, and the results are satisfactory to all representatives present, the equipment and materials shall then become the responsibility of the Contractor for installation.

Once off-loaded from the delivery vehicle, each reel of fiber optic cable shall be subjected to an OTDR test. Every fiber strand in each cable shall be tested end to end with an OTDR which is compatible with wavelength and fiber type. Testing shall measure attenuation and length, verify continuity, and discover anomalies. Should an accurate measurement not be obtained from one end of a cable strand, the test shall be run from the opposite end. Tested loss per kilometer shall not exceed the loss provided in the manufacturer's certification data and as required by these specifications. In the event that loss per kilometer does exceed that of the manufacturer's certification data and these specifications, the cable reel shall be rejected and returned to the manufacturer.

Test reports shall be submitted to the engineer within 48 hours after test completion. Failure to submit test reports before the prescribed deadline may require that the test be re-administered or cable rejected.

907-657.03.2.5--Tests Performed Subsequent to Installation. Following installation as directed per the plans but prior to splicing and permanent termination, each fiber optic cable strand shall be subjected to OTDR tests and one pair of fibers from each buffer tube shall be power meter tested to confirm that the system's actual performance meets the requirements of the system's link loss budget. Should an accurate measurement not be obtained from one end of a cable strand, the OTDR test shall be run from the opposite end. The Contractor shall follow manufacturer's loss guidelines for connectors, splices, and single mode fibers. Cables failing to meet specifications for all fiber strands once installed will be rejected and replaced.

Test reports shall be submitted to the Engineer within 5 business days after test completion. Failure to submit test reports before the prescribed deadline may require that the test be re-administered or cable rejected.

907-657.03.2.6--Tests Performed Subsequent to Splicing and Termination

Following splicing and termination of fiber optic cable, both power meter and OTDR tests shall be repeated for each strand dedicated for project communications (i.e., lit fibers). Tests shall be performed for the full length of the installation from Hub/TMC terminations to field cabinet terminations. OTDR test shall be run for both directions.

Tested loss per kilometer shall not exceed the link loss budget calculations accepted by the Engineer. In the event that link loss (per power meter test results) does exceed that of the link loss budget calculations, the Contractor shall replace cable, splices, and/or terminations as required to bring the test results within the calculated budget. Testing shall be rerun as required to prove the link loss is within the calculated budget.

Test reports shall be submitted to the Engineer within 5 business days after test completion. Failure to submit test reports before the prescribed deadline may require that the test be re-administered.

907-657.03.3--Storage, Packaging, and Shipping. The Contractor shall provide a secure indoor storage facility for the duration of the storage period

Cables shall be shipped on heavy-duty reels. The distance between the cable and the outer edge of the reel flange shall not be less than 2 inches.

Cable ends shall be sealed with heat shrink end caps and both ends of the cable shall be exposed to facilitate testing on the reel.

Reels shall be shipped in upright position on edges of flanges. Any reels laid on flanges shall be returned. Reels shall not be stored on sides of flanges (laying flat) or stored stacked on each other.

All reels shall be wrapped with a protective paper or cardboard wrap to expose any damage that may have occurred during transportation.

Standard industry practices for storage, handling, and shipping shall be adhered to when not covered in these specifications.

Due to long fiber pulls, it may be necessary for the Contractor to supply multiple fiber reels to complete a run. When connecting multiple reels to complete a run, reel-to-reel butt splices shall be provided at locations already identified in the plans as requiring a splice closure and as approved by the engineer.

The reel tag shall include the following information:

- Cable number
- Gross weight
- Shipped cable length in feet
- Project name and number
- Manufacturers product number
- Date cable was tested
- Manufacturers order number
- Cable length markings - Top (inside end of cable) and Bottom (outside end of cable)
- Item number
- Loss budget for each fiber strand w/in each fiber optic cable

The reel (one flange) marking shall include:

- “Manufacturer”
- An arrow indicating proper direction of roll when handling
- Ship to address
- Manufacturer cable number

- Cable length in feet
- Gross package weight inclusive of cable, reel and protective covering
- Project name and number
- Fork lift handling illustration
- The text “DO NOT SHIP REEL ON SIDE”

Each cable shall be accompanied by a cable data sheet. The cable data sheet shall include the following information:

- Manufacturer Cable Number
- Manufacturer Product Number
- Manufacturer Factory Order Number
- Customer Name
- Customer Cable Number
- Mark for Information
- Ordered Length
- Actual Shipped Length
- Loss budget for each fiber strand within each fiber optic cable segment
- Bandwidth Specification

907-657.03.4—Warranty. The manufacturer of the specified fiber optic cable shall provide a written and documented ten (10) year warranty on materials and workmanship to the DOTD effective from the date of commission of said fiber optic cable.

In the event that the fiber optic cable, or any portion thereof, should fail due to workmanship or materials within the ten (10) year warranty period, the warranty shall provide that the manufacturer shall supply the DOTD with new replacement fiber optic cable of equal or greater kind and quality and meeting all of the applicable specifications herein, at no charge to the DOTD.

Cable manufacturer must provide recommended Splicing and Termination Instructions and procedures as part of the warranty.

907-657.03.5--Installation Guidelines and Requirements.

907-657.03.5.1--General Requirements. The purpose of this specification section is to provide guidelines for installing the fiber optic cable. This document provides generic guidance according to generally accepted installation procedures. This document relies on manufacturer provided specific instructions for installation of fiber optic fusion splices, fiber terminations, selective splicing, and other items for which manufacturer specific instructions exist. These procedures are dependent upon the manufacturer of the fiber cable and the cable splicing and termination equipment.

Shop drawings showing the details for each component shall be submitted for review and acceptance prior to construction.

Before beginning any excavation, the Contractor shall determine the location of any electrical lines, drainage, utility, and other underground facilities in the vicinity and shall conduct his work in such a manner as to avoid damage to it. Precautions shall be taken to ensure that the conduit is located to avoid conflict with proposed guard rail, sign posts, or any other miscellaneous structures.

Contractor shall repair any broken or damaged underground facilities.

Backfilling of trenches shall be with usable soil in accordance with Subsection 736.17 of the standard specifications, placed and compacted to at least the density of the surrounding ground at no direct pay.

All publications or standards referenced herein, along with all manufacturers' specifications, directions, and testing procedures, are hereby incorporated into the installation guidelines. In addition to the standards, publications, directions, and other specifications appearing here, specifications and standards provided in the cable manufacturer specification are also incorporated. The sum of the previously mentioned sources comprises the complete installation guidelines.

It is the intent of the design to hold to an absolute minimum the number of total fiber optic cable fusion splices. Locations of allowed fusion splices are as indicated on the plans or at the location accepted by the Engineer. The Contractor shall ensure that a sufficient amount of fiber optic cable is included per run in order to avoid unnecessary splices.

The Contractor shall install pull rope in every spare or vacant conduit installed as part of this project.

907-657.03.5.2--Fiber Optic Cable Installation. Generally accepted practices and standards for installing fiber optic cable and electrical conductors shall be followed during the installation. All appropriate precautions to prevent cable kinks and breaks shall be followed. The cable manufacturer's specifications regarding tensile strength, pulling capacity, and bending radius, etc. shall not be violated. Plan details provide a diagram illustrating the route that each cable will take from origin to destination.

All specifications provided by the cable manufacturer along with all procedures and standards provided in this document must be followed. Appropriate standards for buried installation of cable shall be followed in laying-in and routing the fiber cable. Documents such as Lucent Technologies, Outside Plant Systems, and Outside Plant Engineering Handbook provide guidance on proper installation procedures. Plan details provide a typical illustration of how the fiber is routed. During installation of the fiber optic cable, care must be taken so that the cables do not kink or bend excessively in a manner that diminishes the cable transmission capability. Note that the cable is to be terminated, spliced, or both at specific locations. Maximum pulling tensions of all cables and conductors shall not exceed manufacturer's recommendations. Manufacture pulling lubricants or friction reducing pulling sleeves shall be provided and used when necessary to install cable.

During installation of the optical fiber cable, a minimum of 50 feet-0 inches of slack shall be coiled within each underground pullbox. Drop locations for future connectivity shall have a minimum of 200 feet-0 inches of slack coiled within each underground pullbox or as noted in the plans.

At each underground pullbox the Contractor shall label every cable entering and leaving. Labels shall be permanent, plastic, wrap-around type that contains a minimum of 20 typed characters. Specific label content shall be determined with the Engineer using designations as detailed on the plans and shall be typed.

907-657.03.5.3--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 Engineer 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 Engineer. The Contractor shall provide a site location inventory of all ITS devices and related equipment to include manufacturer model, serial numbers, and quantity.

907-657.04--Method of Measurement. Fiber optic cable of the type specified will be measured by the linear foot, measured horizontally along the conduit.

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.

907-657.05--Basis of Payment. Fiber optic cable, measured as prescribed above, will be paid for at the contract unit price per linear foot, which price shall be full compensation for furnishing and installing fiber optic cable and for all labor, equipment, testing, tools and incidentals necessary to complete the work.

Payment will be made under:

907-657-A: Fiber Optic Cable, 96 SM, LADOTD - per linear foot

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-657-8

CODE: (SP)

DATE: 03/04/2013

SUBJECT: Fiber Optic Drop Cable – LADOTD

PROJECT: ITS-9999-09(028) / 106397301 & 302 -- Warren and Adams Counties

Section 657, Fiber Optic Cable (OSP), of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows for Fiber Optic Drop Cable – LADOTD only.

907-657.01--Description. This Item consists of furnishing and installing fiber optic drop cable and all appurtenances required for the ITS in accordance with plan details, the 2006 Louisiana Standard Specifications for Roads and Bridges, this specification, and as directed by the engineer.

907-657.02--Materials. All equipment shall be new and constructed using the highest quality, commercially available components and techniques to assure high reliability and minimum maintenance. The contractor shall submit, prior to installation, a complete set of shop drawings of all the equipment and components listed below and included as part of the installation.

The component of the fiber optic communications system described by this specification shall consist of the following:

- Fiber optic drop cable
- Fiber optic splice closure
- Fiber optic splice
- Fiber optic splice tray
- Fiber optic patch panel
- Fiber optic patch cord
- Fiber optic termination

907-657.03--Construction Requirements. The Contractor shall assemble and install all necessary material and equipment and furnish a working fiber optic cable in accordance with these plans and specifications and compatible with the requirements of the ITS. All items that are required to complete the installation and ensure an operational ITS 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.

The Contractor shall field verify final equipment locations with the engineer. Plans are diagrammatic and indicate the general arrangement of devices and work included in these documents. Final placement and arrangement are the responsibility of the Contractor.

During the installation of the underground systems, removal of brush, trees, fencing, and other obstructions within the right-of-way shall comply with Section 202 of the standard specifications and shall not be paid for separately. Landscaping shall be restored to original or better condition if disturbed.

Upon request by the Department, the Contractor shall arrange for the manufacturer to grant access to the manufacturing facility for all products specified herein.

907-657.03.1--Strand Single Mode Cable.

907-657.03.1.2--General Requirements. Contractor shall provide strand optical fiber cable with the fiber count as indicated on the plans and with characteristics as specified herein. All fiber strands shall conform to the requirements detailed herein.

The maximum attenuation for each cabled single mode fiber shall be 0.36 dB/km at 1310 nm and 0.22 dB/km at 1550nm. The attenuation at the water peak (1383 nm) shall not exceed 0.36 dB/km. The maximum dispersion shall be less than 3.5 ps/(nm•km) from 1285nm to 1330nm and less than 18 ps/(nm•km) at 1550 nm.

All optical fibers shall be proof tested by the fiber manufacturer to a minimum load of .07 GN/m² (100 kpsi).

Each fiber shall be distinguishable by means of color coding in accordance with TIA/EIA-598-A, "Optical Fiber Cable Color Coding."

The cabled fiber shall support Gigabit Ethernet (GbE) operation according to the 1000Base-LX (1310 nm region) specifications up to 5000 meters in accordance with the GbE standard. The cable fiber shall support laser-based 10 Gigabit Ethernet (10 GbE) operation according to the 10GBase-L (1310 nm) and 10GBase-E (1550 nm) specifications for distances of 10 km, 25 km, and 40 km respectively.

907-657.03.1.3--Cable Construction. Cable characteristics are single mode, jacket, rated for installation in conduit, shall be suitable for direct burial, and shall be an accepted product of the United States Department of Agriculture Rural Utilities Service (RUS) 7 CFR 1755.900 and meet the requirements of ANSI/ICEA Standard for Fiber Optic Outside Plant Communications Cable, ANSI/ICEA S-87-640-1992.

Fiber optic cable provided under this specification shall be of a totally dielectric construction. Optical fibers shall be arranged in a loose tube configuration. Fibers must be matched clad. The fiber strands shall not be colored with solvent-based inks.

All cables shall have a central strength member that shall consist of a dielectric, glass reinforced plastic rod. All cables shall also contain either one or two ripcords. Buffer tubes shall be reverse oscillate stranded along the central strength member.

The dielectric strength member shall be non-nutritive to fungus, electrically nonconductive, and free from dirt and foreign matter. Water blocking yarn(s) shall be applied longitudinally along the central member during stranding.

All materials used in the fiber cable shall be non-reclaimed, free from foreign matter consistent with good manufacturing practices, and shall not degrade cable components or accepted connectors, closures, tapes and other materials used with the fiber cable. All fibers, coatings, plastic tubes and jackets shall be continuous and free from roughness, porosity, bubbles, splits, blisters, voids and inclusions, consistent with good manufacturing practices.

Cable jackets shall be marked with manufacturer's name, sequential meter or foot markings, month and year, or quarter and year of manufacture, and a telecommunication handset symbol, as required by Section 350G of the National Electrical Safety Code (NEC). The actual length of the cable shall be within 0+/-1% of the length markings. The print color shall be white; with the exception that cable jackets containing one or more coextruded white stripes shall be printed in light blue. The height of the marking shall be approximately 2.5 mm.

If the initial marking fails to meet the specified requirements (i.e., improper text statement, color, legibility, or print interval), the cable may be re-marked using a contrasting alternate color. The numbering sequence shall differ from the previous numbering sequence, and a tag shall be attached to both the outside end of the cable and to the reel to indicate the sequence of re-marking. The preferred re-marking color will be yellow, with the secondary choice being blue.

Each fiber or group of fibers shall be free-floating within the tubes such that all mechanically or environmentally induced stress placed upon the cable is de-coupled from the fibers. The buffer tubes shall contain a water-swallowable yarn for water blocking protection or embedded water blocking material (preferred). The water blocking material shall be non-nutritive to fungus, electrically non-conductive, and homogeneous. The buffer tube shall be gel-free. The optical fiber shall not require cleaning before placement into a splice tray or fan out kit. The nominal outer diameter of the buffer tube shall be 2.5 mm. The buffer tube shall be polypropylene.

All cables must be able to withstand a minimum bending radius of 10 times cable diameter under no load and 20 times cable diameter under load, without affecting performance characteristics of the cable.

The shipping, storage, and operating temperature range of the cable shall be -40 °C to +70 °C. The installation temperature range of the cable shall be -10 °C to +60 °C.

The fiber installer shall be certified in fiber installation by Corning Cable Systems or accepted equal.

907-657.03.1.4--Drop Cable Construction. The fiber optic drop cable shall be installed from the main trunk to a termination point within the controller cabinet associated with the particular field device.

Cables shall be sheathed with flame retardant polyvinyl chloride (PVC) and shall be an all dielectric construction. The nominal jacket thickness shall be 1.4mm and shall be applied directly over the tensile strength members. The PVC jacket shall contain carbon black to provide UV protection and shall not promote the growth of fungus. The cable shall meet the requirements of the National Electrical Code Section 770 for Non-Plenum Applications – Applicable Flame Tests: ANSI/UL 1666 and shall be rated OFNR.

The cable shall be of gel-free, loose tube construction with up to 12 buffer tubes wrapped around a dielectric central strength member. All fiber(s) shall be contained within buffer tubes, and each buffer tube shall have an insides diameter much greater than the total diameter(s) of the fiber(s) it supports.

The maximum pulling tension shall be 2700 N (600 lbf) during installation (short term) and 800 N (180 lbf) long term installed.

907-657.03.1.5--Quality Control Provision. All cabled optical fibers shall be 100% attenuation tested using an optical source-power meter test set (i.e., power meter test). The attenuation of each fiber shall be provided with each cable reel and shall meet the requirements of the fiber specification parameters as specified herein.

All cable once on the reel shall have Optical Time Domain Reflector (OTDR) reports generated at the factory prior to shipment, at the delivery location prior to installation, and on-site after installation. Cable provided under this specification must produce equivalent OTDR reports at each test point.

907-657.03.1.6--References, Standards, Listing, and Codes. For the equipment specified herein, the manufacturer shall be ISO 9000, 9001 or 9002 certified.

The cable manufacturer shall support industry standards such as Bell Communications Research (Bellcore), Electronic Industries Association (EIA), Telecommunications Industry Association (TIA), International Telecommunications Union (ITU), International Electromechanical Commission (IEC), Rural Utilities Service (RSU, formerly-REA), American Society for Testing and Material (ASTM) and the Building Industry Consultant Services (BICSI) Telecommunications Distribution Methods Manual. In addition, product supplied by the cable manufacturer shall meet all applicable standards of the above organizations and well as the reference standards listed in (Table 1).

Materials provided under this specification must be new and must be provided by manufacturers regularly engaged in the production of such products.

It is required that the cable manufacturer shall provide installation procedures and technical support concerning the items contained in this specification.

All work and equipment shall be designed, manufactured, and tested in accordance with the latest applicable standards for the equipment specified. In some instances, these specifications go

beyond the requirements of the stated standards. Where these specifications differ from the requirements of the stated standards, these specifications shall govern.

In addition to the requirements of these specifications, material and workmanship shall meet or exceed all requirements of the applicable portions of the latest editions of the standards and codes listed below. The fiber optic cable shall further meet or exceed those applicable standards not stated herein but referenced by the below standards or their applicable sections. The standards list includes, but is not limited to, the following:

Table 1: Fiber Optic Industry Standards

Industry Standard / Code	Description
ASTM D 1248 (2005)	Standard Specification for Polyethylene Plastics Molding and Extrusion Materials
ASTM D 1603 (2006)	Standard Test Method for Carbon Black in Olefin Plastics
ASTM D 1765 (2010)	Standard Classification System for Carbon Blacks Used in Rubber Products
ASTM D 3349 (2006)	Standard Test Method for Absorption Coefficient of Carbon Black Pigmented Ethylene Plastic
ASTM E 29 (2009)	Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications
BELLCORE	Issue 1, September 1994
GR-20-CORE (2010)	Generic Requirements for Optical Fiber and Fiber Optic Cable
EIA/TIA-455-3 (2009)	Procedure to Measure Temperature Cycling Effects on as Optical Fiber, Optical Cable, and Other Passive Fiber Optic Components
EIA/TIA-455-24 (2000)	Water Peak Attenuation Measurement of Single Mode Fibers
EIA/TIA-455-25 (2002)	Impact Testing of Fiber Optic Cables and Cable Assemblies
EIA/TIA-455-28 (2005)	Method for Measuring Dynamic Tensile Strength of Optical Fibers
EIA/TIA-455-29 (1999, w/d superseded by TIA-455-176-A)	Refractive Index Profile Transverse Interference Method
EIA/TIA-455-31 (2005)	Fiber Tensile Proof Test Method
EIA/TIA-455-33 (2005)	Fiber Optic Cable Tensile Loading and Bending Test
EIA/TIA-455-37 (2005)	Low or High Temperature Bend Test for Fiber Optic Cable
EIA/TIA-455-41 (2001)	Compressive Loading Resistance of Fiber Optic Cable
EIA/TIA-455-46 (1990, w/d in 2003)	Spectral Attenuation Measurement for Long-Length, Graded-Index Optical Fibers
EIA/TIA-455-47 (1990, w/d superseded by TIA-455-177, 2003)	Output Far-Field Radiation Pattern Measurement
EIA/TIA-455-51 (w/d superseded by TIA-455-204, 2000)	Pulse Distortion Measurement of Multimode Glass Optical Fibers Information Transmission Capacity

Industry Standard / Code	Description
EIA/TIA-455-58 (2001)	Core Diameter Measurement of Graded-index Optical Fibers Information Transmission Capacity
EIA/TIA-455-59 (superseded by TIA-455-78, 2002)	Measurement of Fiber Point Discontinuities Using an OTDR
EIA/TIA-455-61 (superseded by TIA-455-78, 2002)	Measurement of Fiber or Cable Attenuation Using an OTDR
EIA/TIA-455-62 (2003)	Measurement of Optical Fiber Macrobend Attenuation
EIA/TIA-455-76 (1993, w/d with no superseded doc)	Method for Measuring Dynamic Fatigue of Optical Fibers by Tension
EIA/TIA-455-78 (2002)	Spectral Attenuation Cutback Measurement for Single-Mode Optical Fibers
EIA/TIA-455-80 (2003)	Measuring Cutoff Wavelength of Uncabled Single-Mode Fiber by Transmitted Power
EIA/TIA-455-82 (1992)	Fluid Penetration Test for Fluid-Blocked Fiber Optic Cable
EIA/TIA-455-85 (2005)	Fiber Optic Cable Twist Test
EIA/TIA-455-86 (2005)	Fiber Optic Cable Jacket Shrinkage
EIA/TIA-455-89 (1998)	Fiber Optic Cable Jacket Elongation and Tensile Strength
EIA/TIA-455-97 (Draft)	Procedure for Measuring Static Fatigue of Optical Fibers in Two-Point Bending
EIA/TIA-455-98 (2000)	Fiber Optic Cable External Freezing Test
EIA/TIA-455-104 (2005)	Fiber Optic Cable Cyclic Flexing Test
EIA/TIA-455-111 (2003)	Procedure for the Measurement of Optical Fiber Curl
EIA/TIA-455-113 (1997, R2001)	Polarization-Mode Dispersion Measurement for Single-Mode Optical Fibers by Wavelength Scanning
EIA/TIA-455-164 (1991, w/d no superseding doc)	Single-Mode Fiber, Measurement of Mode Field Diameter by Far-Field Scanning
EIA/TIA-455-167 (1992, w/d no superseding doc)	Mode Field Diameter Measurement-Variable Aperture Method in the Far-Field
EIA/TIA-455-168 (1999, w/d superseded by TIA-455-175, 2003)	Chromatic Dispersion Measurement of Multimode Graded- Index and Single-Mode Optical Fibers by Spectral Group Delay Measurement in the Time Domain
EIA/TIA-455-170 (1998, w/d no superseding doc)	Cable Cutoff Wavelength of Single-Mode Fiber by Transmitted Power
EIA/TIA-455-173 (1990)	Coating Geometry Measurements, Side View
EIA/TIA-455-175 (2003)	Chromatic Dispersion Measurement of Single-mode Optical Fibers by the Differential Phase Shift Method
EIA/TIA-455-176 (2003)	Method for Measuring Optical Fiber Cross-Sectional Geometry by Automated Grey-Scale Analysis
EIA/TIA-455-177 (2003)	Numerical Aperture Measurement of Graded-Index Optical Fibers
EIA/TIA-455-178 (2003)	Measurement of Strip Force Required for Mechanically Removing Coatings from Optical Fibers
EIA/TIA-455-181 (2001)	Lightning Damage Susceptibility Test for Fiber Optic Cables with Metallic Components

Industry Standard / Code	Description
IEC 60793-1 (1992, superseded by IEC 60793-1-1, -2, -3, -4, -5)	International Standard (Optical Fibers) – Part1: Generic Specification
-A1A	Refractive Index Profile
-A3	Near Field Light Distribution
-B1	Optical Fiber Proof Test
-C1A	Cut-back Technique
-C1C	Insertion Loss Technique
-C2A	Impulse Response
-C5C	Chromatic Dispersion Measurement of Optical Fibers by the Differential Phase Shift Method
-C7B	Cable Cut-off Wavelength Measurement of Single Mode Fiber
-C9A	Mode Field Diameter Measurement Direct Far-Field Scanning Method
-C9B	Mode Field Diameter Measurement – Variable Aperture Method in the Far-Field
-C11	Macrobending Sensitivity
IEC 60794-1 (1996, w/d superseded by IEC 60794-1-1, 1-2, 2001)	International Standard (Fiber Optic Cables) – Part1: Generic Specification

907-657.03.2--Production Tests and Technical Requirements.

907-657.03.2.1--General Requirements. Engineer shall have accessibility to the manufacturing plant to witness manufacture and testing of fiber optic cable.

The manufacturer shall provide a representative to witness field-testing of installed fiber optic cable.

Final inspection and acceptance of the multiple fiber optic cable installations shall be at the discretion of the Engineer. The Contractor shall complete testing as described below, and provide Engineer with documentation related to such testing. Testing shall be in accordance with the standards and regulations previously referenced by these specifications.

The Contractor shall prepare a statement of methodology for all testing procedures that shall be used for this installation. This statement shall be provided in advance to the Engineer for review and acceptance by the Engineer. In addition to accepting procedures, the Engineer must also accept all data forms that shall be used to record results of pre and post installation testing as well as link loss budget calculations. Once testing is complete, all test results recorded on accepted data forms, and signed by the Contractor, shall be provided to the Engineer in 3-ring binder(s) labeled and tabbed for each test segments for review and acceptance.

In addition to the guidance provided above, all testing shall be performed in accordance with industry standards bodies and generally accepted methods that were previously documented.

Testing shall also comply with the specific industry standards provided by the fiber optic cable specification.

907-657.03.2.2--Tests Reports. All fiber test reports shall be printed from the testing unit interface and management software. Original data files (a CD with the electronic files pulled from the testing unit and PDF files of the printed reports) shall be supplied with each report submittal. Proof of the latest certification of the test unit shall be included in all reports. All test units to be used on this project shall have been certified by the manufacturer within 12 months prior to the date the test is performed. Reports shall be properly labeled (i.e., cable segment, buffer tube, fiber, and Tx & Rx locations) and organized for review. All test shall be performed in both 1310nm and 1550nm wavelengths.

Each report printout shall contain the following information:

- Software name and version
- Date and time stamp of when the test was taken
- Date and time stamp of when the report was printed
- OTDR reports
 - Graph of dB versus linear feet (i.e., signature trace) with events identified on the graph. View shall be zoomed to clearly show the beginning and end of the fiber segment.
 - Summary of events by:
 - Type
 - Location
 - Event - event (dB & bB/km, respectively)
 - Loss (dB)
 - Reflectance (dB)
 - Overall (ene-to-end) loss (note this is theoretical loss)
 - Power meter test report
 - Link loss budget calculation (note hand/program calculations are required as this is not typically a print out from the test unit software. If test unit is programmed to perform budget calculation, a screen capture of attenuation settings shall be submitted with results)
 - System loss from Tx to Rx (note this is actual attenuation, loss)
 - Wavelength

907-657.03.2.3--Tests Performed at Manufacturing Facility. Certified test reports shall be provided for each shipping reel of cable. The manufacturer shall document and certify the results of all factory tests and compliance with the performance requirements. Certified test reports shall include but not be limited to the power meter test reports for maximum attenuation for each cabled fiber, bandwidth, maximum billable length, actual shipped length, ordered length and OTDR test reports. Certificates of compliance are not acceptable. A written quality assurance/quality control manual shall be implemented and maintained to ensure full compliance with all requirements of this specification.

Testing shall be performed in accordance with the procedures outlined in the previously mentioned standards. These tests shall be performed at the factory and certified test results shall be provided to the DOTD in accordance with those standards.

907-657.03.2.4--Tests Performed Immediately Upon Delivery. At the time of delivery, fiber optic cable tests as outlined shall be performed in the presence of the Contractor, an Engineer representative, and the manufacturer's representative. Once the tests are complete, and the results are satisfactory to all representatives present, the equipment and materials shall then become the responsibility of the Contractor for installation.

Once off-loaded from the delivery vehicle, each reel of fiber optic cable shall be subjected to an OTDR test. Every fiber strand in each cable shall be tested end to end with an OTDR which is compatible with wavelength and fiber type. Testing shall measure attenuation and length, verify continuity, and discover anomalies. Should an accurate measurement not be obtained from one end of a cable strand, the test shall be run from the opposite end. Tested loss per kilometer shall not exceed the loss provided in the manufacturer's certification data and as required by these specifications. In the event that loss per kilometer does exceed that of the manufacturer's certification data and these specifications, the cable reel shall be rejected and returned to the manufacturer.

Test reports shall be submitted to the engineer within 48 hours after test completion. Failure to submit test reports before the prescribed deadline may require that the test be re-administered or cable rejected.

907-657.03.2.5--Tests Performed Subsequent to Installation. Following installation as directed per the plans but prior to splicing and permanent termination, each fiber optic cable strand shall be subjected to OTDR tests and one pair of fibers from each buffer tube shall be power meter tested to confirm that the system's actual performance meets the requirements of the system's link loss budget. Should an accurate measurement not be obtained from one end of a cable strand, the OTDR test shall be run from the opposite end. The Contractor shall follow manufacturer's loss guidelines for connectors, splices, and single mode fibers. Cables failing to meet specifications for all fiber strands once installed will be rejected and replaced.

Test reports shall be submitted to the Engineer within 5 business days after test completion. Failure to submit test reports before the prescribed deadline may require that the test be re-administered or cable rejected.

907-657.03.2.6--Tests Performed Subsequent to Splicing and Termination. Following splicing and termination of fiber optic cable, both power meter and OTDR tests shall be repeated for each strand dedicated for project communications (i.e., lit fibers). Tests shall be performed for the full length of the installation from Hub/TMC terminations to field cabinet terminations. OTDR test shall be run for both directions.

Tested loss per kilometer shall not exceed the link loss budget calculations accepted by the Engineer. In the event that link loss (per power meter test results) does exceed that of the link loss budget calculations, the Contractor shall replace cable, splices, and/or terminations as

required to bring the test results within the calculated budget. Testing shall be rerun as required to prove the link loss is within the calculated budget.

Test reports shall be submitted to the Engineer within 5 business days after test completion. Failure to submit test reports before the prescribed deadline may require that the test be re-administered.

907-657.03.3--Storage, Packaging, and Shipping. The Contractor shall provide a secure indoor storage facility for the duration of the storage period.

Cables shall be shipped on heavy-duty reels. The distance between the cable and the outer edge of the reel flange shall not be less than 2 inches.

Cable ends shall be sealed with heat shrink end caps and both ends of the cable shall be exposed to facilitate testing on the reel.

Reels shall be shipped in upright position on edges of flanges. Any reels laid on flanges shall be returned. Reels shall not be stored on sides of flanges (laying flat) or stored stacked on each other.

All reels shall be wrapped with a protective paper or cardboard wrap to expose any damage that may have occurred during transportation.

Standard industry practices for storage, handling, and shipping shall be adhered to when not covered in these specifications.

Due to long fiber pulls, it may be necessary for the Contractor to supply multiple fiber reels to complete a run. When connecting multiple reels to complete a run, reel-to-reel butt splices shall be provided at locations already identified in the plans as requiring a splice closure and as approved by the engineer.

The reel tag shall include the following information:

- Cable number
- Gross weight
- Shipped cable length in feet
- Project name and number
- Manufacturers product number
- Date cable was tested
- Manufacturers order number
- Cable length markings - Top (inside end of cable) and Bottom (outside end of cable)
- Item number
- Loss budget for each fiber strand w/in each fiber optic cable

The reel (one flange) marking shall include:

- “Manufacturer”
- An arrow indicating proper direction of roll when handling
- Ship to address

- Manufacturer cable number
- Cable length in feet
- Gross package weight inclusive of cable, reel and protective covering
- Project name and number
- Fork lift handling illustration
- The text “DO NOT SHIP REEL ON SIDE”

Each cable shall be accompanied by a cable data sheet. The cable data sheet shall include the following information:

- Manufacturer Cable Number
- Manufacturer Product Number
- Manufacturer Factory Order Number
- Customer Name
- Customer Cable Number
- Mark for Information
- Ordered Length
- Actual Shipped Length
- Loss budget for each fiber strand within each fiber optic cable segment
- Bandwidth Specification

907-657.03.4—Warranty. The manufacturer of the specified fiber optic cable shall provide a written and documented ten (10) year warranty on materials and workmanship to the DOTD effective from the date of commission of said fiber optic cable.

In the event that the fiber optic cable, or any portion thereof, should fail due to workmanship or materials within the ten (10) year warranty period, the warranty shall provide that the manufacturer shall supply the DOTD with new replacement fiber optic cable of equal or greater kind and quality and meeting all of the applicable specifications herein, at no charge to the DOTD.

Cable manufacturer must provide recommended Splicing and Termination Instructions and procedures as part of the warranty.

907-657.03.5--Installation Guidelines and Requirements.

907-657.03.5.1--General Requirements. The purpose of this specification section is to provide guidelines for installing the fiber optic cable. This document provides generic guidance according to generally accepted installation procedures. This document relies on manufacturer provided specific instructions for installation of fiber optic fusion splices, fiber terminations, selective splicing, and other items for which manufacturer specific instructions exist. These procedures are dependent upon the manufacturer of the fiber cable and the cable splicing and termination equipment.

Shop drawings showing the details for each component shall be submitted for review and acceptance prior to construction.

Before beginning any excavation, the Contractor shall determine the location of any electrical lines, drainage, utility, and other underground facilities in the vicinity and shall conduct his work in such a manner as to avoid damage to it. Precautions shall be taken to ensure that the conduit is located to avoid conflict with proposed guard rail, sign posts, or any other miscellaneous structures.

Contractor shall repair any broken or damaged underground facilities.

Backfilling of trenches shall be with usable soil in accordance with Subsection 736.17 of the standard specifications, placed and compacted to at least the density of the surrounding ground at no direct pay.

All publications or standards referenced herein, along with all manufacturers' specifications, directions, and testing procedures, are hereby incorporated into the installation guidelines. In addition to the standards, publications, directions, and other specifications appearing here, specifications and standards provided in the cable manufacturer specification are also incorporated. The sum of the previously mentioned sources comprises the complete installation guidelines.

It is the intent of the design to hold to an absolute minimum the number of total fiber optic cable fusion splices. Locations of allowed fusion splices are as indicated on the plans or at the location accepted by the Engineer. The Contractor shall ensure that a sufficient amount of fiber optic cable is included per run in order to avoid unnecessary splices.

The Contractor shall install pull rope in every spare or vacant conduit installed as part of this project.

907-657.03.5.2--Fiber Optic Cable Installation. Generally accepted practices and standards for installing fiber optic cable and electrical conductors shall be followed during the installation. All appropriate precautions to prevent cable kinks and breaks shall be followed. The cable manufacturer's specifications regarding tensile strength, pulling capacity, and bending radius, etc. shall not be violated. Plan details provide a diagram illustrating the route that each cable will take from origin to destination.

All specifications provided by the cable manufacturer along with all procedures and standards provided in this document must be followed. Appropriate standards for buried installation of cable shall be followed in laying-in and routing the fiber cable. Documents such as Lucent Technologies, Outside Plant Systems, and Outside Plant Engineering Handbook provide guidance on proper installation procedures. Plan details provide a typical illustration of how the fiber is routed. During installation of the fiber optic cable, care must be taken so that the cables do not kink or bend excessively in a manner that diminishes the cable transmission capability. Note that the cable is to be terminated, spliced, or both at specific locations. Maximum pulling tensions of all cables and conductors shall not exceed manufacturer's recommendations. Manufacture pulling lubricants or friction reducing pulling sleeves shall be provided and used when necessary to install cable.

During installation of the optical fiber cable, a minimum of 50 feet-0 inches of slack shall be coiled within each underground pullbox. Drop locations for future connectivity shall have a minimum of 200 feet-0 inches of slack coiled within each underground pullbox or as noted in the plans.

At each underground pullbox the Contractor shall label every cable entering and leaving. Labels shall be permanent, plastic, wrap-around type that contains a minimum of 20 typed characters. Specific label content shall be determined with the Engineer using designations as detailed on the plans and shall be typed.

907-657.03.6--Splice Closure. The splice closure housing shall be non-metallic. It shall be resistant to solvents, stress cracking, and creep. The housing materials shall also be compatible with chemicals and other materials to which they might be exposed in normal applications.

The optical fiber closure shall be capable of accepting any optical fiber cable used in interoffice, outside plant, and building entrance facilities.

The optical fiber closure shall accommodate up to four cable entries (1.1 inch max cable diameter).

The splice closure shall be re-enterable by use of multiple clamps; no tools required. The water tight seal shall allow re-entry without replacement.

The splice closure shall have appropriate hardware and installation procedures to facilitate the bonding and grounding of metal components in the closure and the armored cable sheath. The cable bonding hardware shall be able to accommodate a copper conductor equal to or larger than a #6 AWG.

The closure shall accommodate splice trays suitable for single fiber, single fiber heat shrink, mechanical, or ribbon heat shrink splices. The required splice closure shall accommodate up to 60 single fiber splices and up to five splice trays.

The installation of the splice closure shall not require specialized tools or equipment, other than those normally carried by installation crews. The enclosure shall be wall and or pole mountable.

Dimensions (approximate):

- Height: 5-inches
- Width: 6-inches
- Depth: 15-inches

907-657.03.7--Splice Tray. Splice trays shall be provided by the same manufacturer as the splice closure for new splice closure installations. When identified in the plans that new splice trays are required for an existing splice closure, the contractor shall provide splice trays that shall work within the existing splice closure using the same methodology, connections, firmness, and supports as existing splice trays. New splice trays for existing splice closures shall be of same manufacturer of the splice closure when available.

Splice trays shall contain strain relief for the buffer tube and adequate area for bare fiber slack storage and management. Splice trays shall accommodate the use of single fiber heat shrink, mechanical, or ribbon heat shrink splices.

Spliced fibers shall not be subjected to a bend radius smaller than 30 mm (1.2 inches). Buffer tubes shall not be subjected to a bend radius smaller than 38 mm (1.5 inches).

907-657.03.8--Fiber Optic Cable Fusion Splice and Selective Splice Points.

907-657.03.8.1--General Requirements. Prior to any fiber splicing, the fiber optic splicing and termination diagrams for the backbone, subtending and drops shall be submitted and accepted.

Refer to plan details for specific fibers being spliced and those being expressed.

The loss through any one fusion splice shall be 0.07 dB or less.

The complete fusion splice points for the fiber optic cable shall occur only within pullboxes as designated by the engineer. At each of these points, a submersible splice enclosure suitable for a minimum of 72 fusion splices shall be utilized. This enclosure shall allow for installation of a fiber optic drop cable that shall be routed to the termination point. Industry accepted standards and manufacturer's specifications shall be followed for installation of splice enclosures and fusion splices.

Fusion splicing shall be utilized for all splices and manufacturer's specifications for equipment and fiber cable shall be followed.

907-657.08.2--Total Cable Fusion Splice Points. All fiber optic cables shall be continuous with no total cable splices. Full butt splices are allowed only due to the physical limitations of the length of fiber that can be placed on the reel. Payment for butt splices due to the physical limitation of the reel, are included as part of the backbone fiber.

The electrically conductive path used for continuity and grounding of the splice closure metallic components shall be capable of withstanding an AC current of 1000 Amperes for 20 seconds.

The closure shall show no evidence of water intrusion into the compartment containing fiber splices after it is immersed in water and subjected to 10 freeze/thaw cycles. The splice closure shall show no evidence of water penetration following exposure to a 20-foot water head for a period of 7 days. The splice closure shall show no evidence of corrosion following exposure to acidified saltwater for a period of 90 days.

907-657.03.9--Fiber Optic Connection Patch Panel, Outdoor. Shop drawings detailing the patch panel and appurtenances shall be submitted to the engineer for review and acceptance. The patch panel in conjunction with a drop cable serves as the attachment point from the Ethernet switch to the fiber optic trunk cable.

The patch panel shall be comprised of a closet connector housing and panel for terminating the fiber. The closet connector housing shall accept the fiber drop cable, allow for tie downs, fiber break outs, splicing, fanouts, cross connects, and patching panel for terminations for a minimum of 12 fibers per panel. The housing shall be wall or rack mountable. The housing shall be constructed of a black metal housing.

The panel shall be of the same manufacturer as the connector housing. The panel shall connect to the housing using two simple snap connectors. The panel shall be type SC or LC based on the communications equipment to be connected. The panel shall be free from debris, dust, or any material that could interfere with the fiber connection. Each connection point on the panel shall be sealed using a dust cap.

Upon request by the Department, the contractor shall arrange for the manufacturer to grant access to the manufacturing facility for all products specified herein.

907-657.03.10--Fiber Optic Cable Termination Points.

907-657.03.10.1--General Requirements. The loss through any terminus connector pair shall be 0.5 dB or less. Reflectance shall be below -45 db.

Acceptable fiber optic connectors shall be SC or LC and are referenced in this specification as connectors. The contractor shall verify that connector type is compatible with hardware fiber ports. Industry standards related to fiber termination shall be followed. Connectors shall have pre-radiused zirconia ceramic ferrule, connector body, blue shroud, black or blue 3.0 mm and a 900° boots. Connectors shall be compatible with mechanical, two part heat cure epoxy and anaerobic adhesive assembly methods.

Connectors shall be used throughout the fiber optic system installation for terminating fibers and for jumping between termination points, unless otherwise required by a network device. Fusion splicing shall be utilized for all splices and manufacturer's specifications for equipment and fiber cable shall be followed.

Manufacturer's specifications for terminating the fiber cable and for utilization of the termination device shall be followed. In addition, industry standard practices for fiber termination shall also be followed. Plan details provide termination diagrams for each termination point and a numbering scheme for the fiber cables that will be followed throughout the layout of the network.

Each strand of each cable being terminated shall be appropriately labeled with origination and destination information, when defined.

907-657.03.10.2--Installation Description and Locations. See plan sheets and general notes for site or project specific information regarding installation of this item.

907-657.03.11--Optical Fiber Fan Out Kit.

907-657.03.11.1--General Requirements. Buffer tube fan outs shall be used when fiber optic drop cable is required to be connectorized as indicated on the plans. Whip style fan outs for loose tube cable shall be provided in either a six or twelve fiber configuration. The 900 um fan out assembly shall be color coded to match the fiber color scheme. The fan out shall be a minimum of 25 inches in length. The fan out shall consist of a two piece snap together body which locks the fan out to the buffer tube. Fan outs shall be rated for outdoor use within a temperature range of -40 F to +158 F.

No epoxy, heat shrink tubing, glue, or field sub-assembly shall be necessary to install the fan out. Buffer tube fan outs shall be used where fiber is terminated inside a fiber distribution panel. Fan out kits shall be from the same manufacturer as the fiber cable.

907-657.03.11.2--Installation Description and Locations. See plan sheets and general notes for site or project specific information regarding installation of this item.

907-657.03.12--Strand Single Mode Cable – Patch Cord (2, 4, or 8 Count).

907-657.03.12.1--General Requirements. Contractor shall provide strand optical fiber cables (patch cords) with the fiber count as indicated on the plans (2, 4, or 8) and with characteristics as specified herein. All fiber strands shall conform to the requirements detailed herein.

The maximum attenuation for each single mode fiber shall be 0.65 dB/km at 1310 nm and 0.50 dB/km at 1550 nm. The attenuation at the water peak (1383 nm) shall not exceed 0.65 dB/km. The maximum dispersion shall be less than 3.5 ps/(nm•km) from 1285nm to 1330nm and less than 18 ps/(nm•km) at 1550nm.

All optical fibers shall be proof tested by the fiber manufacturer to a minimum load of 0.07 GN/m² (100 kpsi).

907-657.03.12.2--Cable Construction. Standard single mode patch cord shall be installed from the termination point patch panel to the edge device (e.g., Ethernet switch, video encoder, contact closure transceiver, etc).

All patch cords used for system configuration shall be compatible with fiber types and connectors specified herein. Patch cords shall be yellow in color (single mode) and shall incorporate buffered fiber, aramid yarn strength members, and an outer jacket. Part number, manufacturer, and lot number shall be imprinted on the jacket.

All fiber optic patch cords provided under this contract shall be of a totally dielectric construction. Patch cords shall be arranged in a tight-buffer configuration.

The fiber strands shall not be colored with solvent-based inks.

Patch cords in a duplex configuration, 2 fibers, shall be have an outer polyvinylidene fluoride (PVDF) jacket and manufactured together with a heat-shrink prior to the fan out. Patch cords configurations containing more than 2 fibers may be sheathed with a flame retardant polyvinyl chloride (PVC) jacket.

907-657.03.12.3--Quality Control Provision. All cabled optical fibers shall be 100 percent attenuation tested. The attenuation of each fiber shall be provided with each cable reel and shall meet the requirements of the fiber specification parameters as specified herein.

All cable once on the reel shall have Optical Time Domain Reflector (OTDR) reports generated at the factory prior to shipment, at the delivery location prior to installation, and on-site after installation. Cable provided under this specification must produce equivalent OTDR reports at each test point.

907-657.03.12.4--Installation Description and Locations. See plan sheets and general notes for site or project specific information regarding installation of this item.

907-657.03.13--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 Engineer 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 Engineer. The Contractor shall provide a site location inventory of all ITS devices and related equipment to include manufacturer model, serial numbers, and quantity.

907-657.04—Method of Measurement. Fiber optic drop cable of the type specified will be measured for payment per linear foot.

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

907-657.05—Basis of Payment. Fiber optic drop cable, measured as prescribed above, will be paid for at the contract price per linear foot, which price shall be full compensation for furnishing and installing fiber optic drop cable, and for all labor, equipment, testing, tools and incidentals necessary to complete the work.

Payment will be made under:

907-657-B: Fiber Optic Drop Cable, 12 SM, LADOTD

- per linear foot

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SUPPLEMENT TO SPECIAL PROVISION NO. 907-658-7

DATE: 03/12/2013

SUBJECT: Networking Equipment

PROJECT: ITS-9999-09(028) / 106397301 & 302 -- Warren & Adams Counties

Delete the third paragraph of Subsection 907-658.04 on page 9, and substitute the following.

Unless shown as a separate pay item in the proposal, Category 6 Cable, Installed in Conduit, will not be measured for direct payment, but shall be considered a necessary part of the construction involved, and the cost thereof shall be included in the contract unit prices of other items bid.

When shown as a separate pay item, Category 6 Cable, Installed in Conduit, will be measured for payment by the linear foot, horizontally.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-658-7

CODE: (SP)

DATE: 03/12/2013

SUBJECT: Networking Equipment

PROJECT: ITS-9999-09(028) / 106397301 & 302 -- Warren and Adams Counties

Section 907-658, Network Switch, is hereby added to and becomes part of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction as follows.

SECTION 907-658 -- NETWORKING EQUIPMENT

907-658.01--Description. This section specifies the minimum requirements for network switches furnished and installed. Type A, Type B, and Type D shall be hardened. 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 Terminal Servers and Category 6 cable furnished and installed on this project. The Terminal Servers shall be hardened. The work shall consist of providing all labor, materials, equipment and incidentals necessary to furnish, install and test Terminal Servers. 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. The Category 6 cable will be installed in conduit between elements that are within 300 feet of each other to eliminate the need for two hardened switches.

907-658.02--Materials. Network Switches Type A, Type B, Type C, Type D, Terminal Servers and associated cabling will be placed in the field device cabinets and shall meet the following requirements:

907-658.02.1--Network Switch Requirements. The Type A, Type B, Type C, and Type D 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 19dB.
 - 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 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.

- 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 shall operate between -34 to +74 degree Celsius, including power supply.
 - 4) The field switches 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.

907-658.02.2--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.

907-658.02.3--Type B Network Switch. Type B network switches shall adhere to the following minimum requirements.

- 1) Minimum of twelve 10/100 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.
- 4) 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.

907-658.02.4--Type C Network Switch Requirements. The Type C Network Switch will be installed in the Communication Hubs and shall meet the following requirements:

- 1) Each switch shall be populated with the following modules:
 - a. Two redundant switch fabric modules that meet the following minimum requirements:
 - i. Layer 2/3/4 switching and routing services
 - ii. 64Gbps/48Mpps module Bandwidth
 - iii. Min of 2-GE uplinks available per card. The Contractor shall provide an uplink SFP optical module compatible with the interface for the uplink as indicated in the Comm Node notice to bidders for each uplink
 - b. In one (or more) SFP-based module(s): a minimum of 48 ports of 1000Base-X (SFP-based) compatible. 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 19dB
 - ii. Hot-swappable
 - 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 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 degree Celsius.

- 6) NEBS Level 3 compliant.
- 7) Operate from 5 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 802.3ah
 - 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:
 - a. SSHv2 (Secure Shell)
- 18) Full implementation of GMRP (Generic Multicast Registration Protocol).
- 19) Full implementation of IGMPv2.
- 20) Full implementation of PIM-SM and PIM-DM.
- 21) Full implementation of DVMRPv3.
- 22) Full implementation of VRRP.
- 23) Comply with FCC 47 CRF Part 15 Class A emissions.
- 24) Bandwidth flow rate limiting policing support per port.
- 25) Full security implementation of
 - a. Support SSH2, 802.1x (rel 2)
 - b. Access Control Lists (ACL's)
 - c. RADIUS
 - d. TACACS
- 26) Have redundant power supplies installed.
- 27) The power supply units shall be hot swappable.
- 28) Switch chassis shall have a minimum of 6 module slots.
- 29) Blank covers for all remaining slots.

907-658.02.5--Type D Network Switch Requirements. The Type D Network Switch shall be of chassis design. The switch shall be able to accept a minimum of 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 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 Iterface
 - 1) Contractor shall provide information to the Project Engineer to enable activation of the modem.
 - 2) Contractor shall get prior approval from the Projcet Engineer on selection of cellular radio type (HSPA/EVDO)
- d. 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 swich 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:
 - a. SSHv2 (Secure Shell)
- 9) .
- 10) Full implementation of VRRP.
- 11) Comply with FCC 47 CRF Part 15 Class A emissions.
- 12) Bandwidth flow rate limiting policing support per port.
- 13) Full security implementation of
 - a. Support SSH2, 802.1x (rel 2)
 - b. Access Control Lists (ACL's)
 - c. RADIUS
- 14) Blank covers for all remaining slots.
- 15) Electronic surfaces shall be covered with conformal coating for additional environmental protection.

907-658.02.6--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).

907-658.02.7--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.

907-658.02.8--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.

907-658.02.9--Project Submittal Program Requirements. The Contractor shall provide project submittals for network switches including scheduling requirements. The project submittals for network switches and terminal servers 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.

907-658.03--Installation 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. Five feet of spare slack shall be provided in the pull boxes nearest each Type B or Type C cabinet.

- 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 658.03.3 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.

907-658.03.1--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 of video.
- 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.

907-658.03.2--Documentation. The Contractor shall submit documentation and proof of manufacturer-recommended training and certification for the installation and configuration of network switches.

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.

907-658.03.3--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.

907-658.04--Method of Measurement. Network Switches of the type specified will be measured per each installation as specified in the Project plans. Such measurement 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 D 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 will be measured per each installation. Such measurement 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.

Category 6 Cable, Installed in Conduit, will be measured for payment by the linear foot, horizontally.

907-658.05--Basis of Payment. Network Switches, measured as prescribed above, will be paid for at the contract unit price bid per each. The price shall be full compensation for all labor, tools, materials, equipment and incidentals necessary to complete the work.

Terminal Servers, measured as prescribed above, will be paid for at the contract unit price bid per each. The price shall be full compensation for all labor, tools, materials, equipment and incidentals necessary to complete the work.

Category 6 cable installed between cabinets will be paid for by linear foot measured horizontally.

Payment will be made under:

- 907-658-A: Network Switch, Type ___ -per each
- 907-658-B: Terminal Server - per each
- 907-658-C Category 6 Cable, Installed in Conduit per linear foot

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-659-3

CODE: (SP)

DATE: 01/09/2012

SUBJECT: Traffic Management Center (TMC) Modifications

Section 907-659, Traffic Management Center (TMC) Modifications, is hereby added to and becomes part of the 2004 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 Advanced Central Traffic Response Algorithm (ACTRA) signal system, or upgrading existing signal systems, 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 MDOTs 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, Traffic Management Center Modifications – Monitor Systems, and Traffic Management Center Modifications – Training, complete in place, tested and accepted, 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 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 - lump sum
- 907-659-B: Traffic Management Center Modifications – Monitor Systems - lump sum
- 907-659-C: Traffic Management Center Modifications – Training - lump sum

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-662-5

CODE: (SP)

DATE: 01/09/2012

SUBJECT: Video Communication Equipment

Section 907-662, Video Communication Equipment, is hereby added to and made a part of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction as follows:

SECTION 907-662 -- VIDEO COMMUNICATION EQUIPMENT

907-662.01--Description. This Section specifies the minimum requirements for video communications equipment furnished and installed to support CCTV camera equipment. The work shall consist of providing all labor, materials, equipment, and incidentals necessary to furnish, install, and test a fully operational video communications system.

The video communication equipment will transport digitized video signals and data communications for the CCTV camera system over the IP-based Ethernet network utilizing video encoders, video decoders, and video fiber codex.

The Contractor shall supply, install, test and integrate the video equipment as indicated in the Contract Documents and Plans, and as further specified in this section.

907-662.02--Materials. All proposed encoding and decoding equipment and software shall comply with the following minimum requirements:

907-662.02.1--General Requirements. All digital Video Encoders (VE) and Video Decoders (VD) shall support the following general requirements:

- 1) All VE and VD provided by the Contractor shall be new and shall be from the same manufacturer and be fully compatible and interoperable with each type provided.
- 2) All VE and VD types provided by the Contractor shall be fully compatible and interoperable with the network equipment and the MDOT MStTraffic WEB servers video streaming format and MDOT video wall IP video streaming systems.
- 3) Interoperability: The VE shall fully interoperate with the VD (hardware and/or software) as defined in these Special Provisions.
- 4) Mean Time Between Failures (MTBF): The VE shall have a minimum MTBF of 20,000 hours.
- 5) Latency: The end-to-end system latency between the VE appliance and the VD appliance shall be no more than 300 msec, not including network delays. The VE shall support various frame adjustments to minimize latency.
- 6) Remote Control: VE shall be remotely adjustable via a video management system or command set so that a technician can adjust image quality controls for contrast, brightness, hue and color levels.

- 7) Decoding: The Contractor shall provide decoders that are capable of auto-detecting the corresponding encoder's streaming parameters such as compression, resolution and bit rate, and appropriately decode the encoded digitized video signal.
- 8) Video equipment shall support the NTSC signal format.

907-662.02.2--Video Encoder/Decoder Requirements. The Video Encoder (VE) and Video Decoder (VD) shall be of the type defined by the Video Compression Technology and the minimum requirements are as follows:

907-662.02.2.1--Video and Data Requirements. The VE/VD shall meet the following minimum video and data requirements:

- 1) The VE /VD shall be capable of decoding or streaming a minimum of the following Video Compression Technology types:
 - a. H.264 (Video Coding Experts Group (VCEG)/Moving Picture Experts Group).
 - b. MPEG -4 (Moving Picture Experts Group).
 - c. MJPEG Motion JPEG(Moving Picture Experts Group).
- 2) VE shall be capable of streaming multiple bandwidth and compression types simultaneously per video input channel.
- 3) VE shall support streaming multicast and unicast streams simultaneously.
- 4) VE shall have the ability to automatically initiate and stream a multicast stream upon starting without any remote request to join the multicast group.
- 5) VE shall support multiple simultaneous Real Time Streaming Protocol (RTSP) requests.
- 6) VE shall be able to supply multiple unique and independent video streams with frame rate, bit rate, and image size settings adjustable through an RTSP request.
- 7) VE shall support a minimum of two (2) simultaneous unique and independent H.264 video streams with frame rate, bit rate, and image size settings adjustable per video input channel.
- 8) The VE shall support capturing of snapshot images of the video stream.
- 9) VE shall be a hardware-based network device able to accept a minimum of one analog National Television System Committee (NTSC) video input and encode for transport across IP networks.
- 10) VE and VD shall be specifically designed for network operation, and adhere to ISO standards.
- 11) VE video encoded streams shall be compatible with the existing video wall server decoders, MSTraffic, and streaming web servers or as approved by the Intelligent Transportation Systems Program Manager.
- 12) Support the following minimum encoded resolutions:
 - a. NTSC - Full D1
 - b. CIF/SIF
 - c. QCIF/QSIF
- 13) Dynamic bandwidth control: Provide up to 3 Mbps or greater rates (The data rate shall be defined as the maximum committed bandwidth to be utilized, which includes data bursting.).
- 14) Bandwidth increments shall be user configurable via the network. The minimum bandwidth setting shall be 56Kbs or less.
- 15) VE streams shall be capable of being set to variable or constant bit rates.

- 16) The default bandwidth for the VE as furnished shall be set to 2Mbps when communicating over fiber and 56kbs when communicating otherwise.
- 17) Provide on-board buffered video memory for protection against potential network disruptions.
- 18) VE shall be capable of providing JPEG snapshots and transfer image via FTP.
- 19) There shall be available standard software decoders that are compatible with the provided hardware VE.

907-662.02.2.2--Serial Data Interface Requirements. The VE/VD shall meet the following minimum serial data interface requirements:

- 1) The VE/VD shall provide bi-directional serial communications over Ethernet 10/100 Base-TX via the following methods:
 - a. VE serial port to VD serial port data stream.
 - b. IP socket to VE/VD serial port by TCP protocol.
 - c. The serial interface shall be transparent to the device (i.e. no additional or special protocols shall be used to communicate between the VE/VD and the CCTV control interface).
- 2) Each serial port shall provide full-duplex serial interface and data rates up to 115.2 Kbps (minimum).
- 3) Serial port shall be software configurable, locally 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., baud rate, the number of bits, parity, stop bits, flow control, etc.) via the management software provided.
- 4) No serial adaptors or interface converters shall be permitted.
- 5) Each VE shall use the serial interface port to support PTZ camera control functions.
- 6) VE serial port shall provide IP addressing and socket number selection and provide the capability to establish an IP connection directly from an operator workstation to any VE IP address and socket number to transport serial data, independent of whether or not the video stream for that VE is being viewed.

907-662.02.2.3--Network Requirements. The VE/VD shall meet the following minimum network requirements:

- 1) 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) Each VE shall provide encapsulation of the video streams in a UDP packet for network transmission.
- 3) The VE/VD shall connect to a network device (i.e., media converter, Ethernet switch/router, IP wireless device, etc.) via a RJ-45 connector through Category 6 or higher quality stranded patch cords.
- 4) All network RJ-45 ports shall be standard EIA/TIA-568-A pin-outs and shall be rated at 10/100Mbps or greater.
- 5) All VE and VD provided by the Contractor shall be fully interoperable without customization or the addition of appliances within either the remote or primary communications network. All devices shall be fully interoperable with the backbone communications network.

- 6) Static IP Addressing (class A, B, and C).
- 7) RTP, UDP, Unicast and IP Multicast (Internet Group Multicast Protocol / IGMP V2) features for digital video transmission.
- 8) All VE shall support Real Time Streaming Protocol (RTSP) over RTP.
- 9) All VE shall support multiple stream requests.

907-662.02.2.4--Physical and Environmental Requirements. The VE/VD shall meet the following minimum physical and environmental requirements:

- 1) The Video Encoder/Decoder shall have the following ports as a minimum:
 - a. Network: 10/100 Mbps RJ-45 or as directed by MDOT.
 - b. Video Connector: BNC
 - c. Serial Data Interface: One (1) minimum RJ-45 port/connector. Serial port may utilize D-sub connectors or thumb screw terminals as approved by the MDOT.
 - d. In locations where there are more than one video source, and VE with multiple video ports are used, each video input port shall meet all the video and data requirements of section 907-662.02.2.1 independently.
- 2) The video input performance measures shall comply with NTSC and EIA requirements, including the EIA-170 standard, with a nominal composite video of 1 volt peak-to-peak (Vp-p). The equipment shall have an electrical impedance of 75 ohms
- 3) The VE at field locations shall operate in outdoor weatherproof field cabinets where the inside cabinet temperature range is -20°C to +70°C (-4°F to +158°F), and the relative humidity is between 10% and 90% non-condensing.
- 4) VE shall be installed in a field cabinet with protection from moisture and airborne contaminants, blowing rain, wind, blowing sand, blowing dust, humidity, roadside pollutants, vandalism, and theft.
- 5) The VE shall be resistant to vibration and shock, and conform to Sections 2.1.9 and 2.1.10, respectively, of the NEMA TS 2 standard.
- 6) The VD shall operate in the following minimum environment: Temperature ranging from 0°C to +50°C (+32°F to +122°F), and the relative humidity is between 10% to 90% non-condensing.
- 7) VE/VD for field site locations shall be PCB conformal coated to provide a level of protection from humidity, contaminants, dust, pollution, etc.
- 8) VE/VD shall provide a local status display capability for video, data, network interfaces and power. Status indicators shall be LED.
- 9) Cable connections (data/video/power) shall require no tools for installation or removal and be designed with positive locking devices such that they will not vibrate loose.
- 10) Provide external markings for all connectors and indicators. Replaceable components shall be permanently marked and traceable to the supplied documentation, including schematics and parts list. The external markings shall include the product function name, model number, serial number, and manufacturer's name.
- 11) All parts required for a completed video system shall be made of corrosion-resistant materials, such as stainless steel, anodized aluminum, brass, or gold-plated metal.
- 12) All individual VE shall be shelf, rack/module, or DIN rail mountable. Other mounting options may be submitted for review and approval by the Engineer.

907-662.02.2.5--Chassis Based VE and VD. In environmentally controlled locations where more than 2 encoders or decoders are needed, Chassis based encoders and decoders should be supplied and in full compliance with these special provisions.

VE/VD Chassis and Cards:

- 1) Chassis shall support a minimum of 12 VE or VD cards.
- 2) Chassis shall be 7U or less and be 19" rack mountable.
- 3) Each VE card shall include a minimum of four (4) encoders per card with a corresponding number of BNC ports per encoder.
- 4) Each VD card shall include a minimum of four (4) decoders per card with a corresponding number of BNC ports per decoder.
- 5) VE and VD cards shall be fully contained and obtain power from the chassis.
- 6) All Contractor provided VE and VD cards shall be compatible with, and of the same make as standalone VE and VD provided by the Contractor

907-662.02.2.6--On-Screen Display (OSD) Requirements. Where OSD functionality is not supplied by cameras the minimum on-screen text insertion and display requirements include:

- 1) VE / VD shall support a static text insertion capability and shall be capable of inserting a minimum of one (1) user configurable text messages of up to 20 characters in length.
- 2) VE / VD shall be able to generate a date and time stamp in the video stream and shall be synchronized to a time-server on the network.
- 3) VE / VD shall be able to display camera title in the video stream.
- 4) VE / VD shall have the option to display or not display the on-screen text.

907-662.02.2.7--Management Requirements. The minimum management system requirements shall include:

- 1) The VE/VD shall be manageable through SNMP (v2), HTTP, FTP/TFTP, and/or Telnet/CLI.
- 2) The management system shall be provided to remotely configure and diagnose the VE/VD.
- 3) Have capability to reset/reboot and firmware upload via the methods listed above.
- 4) Have the capability to remotely change any of the device configuration settings including bit rates, image resolution and compression settings and serial interface type.
- 5) Provide pre-defined optimized video compression and streaming settings for various bit rates.
- 6) Provide update capability for the firmware in the VE from the central site. Ability to access the serial number, firmware number, IP address and equipment configuration. Have the capability to upload firmware to multiple units automatically.
- 7) Provide ability for remote firmware upgrades.

907-662.02.2.8--Electrical Requirements. The minimum electrical/power requirements include:

- 1) Power: nominal input voltage of 120 VAC, 60 Hz. ± 3 Hz

- 2) If the device requires operating voltages of less than 120 VAC, the appropriate voltage converter shall be supplied. All voltage conversion devices shall also be temperature hardened as specified herein for location (field or central).
- 3) The equipment or it's voltage converter shall operate within a voltage range of 90 VAC to 135 VAC.
- 4) Power Consumption for a single VE or VD shall not exceed 30 Watts per video device.
- 5) The VE/VD shall provide for automatic recovery from an over or under voltage condition when prime power has returned to the tolerance values specified herein. All configuration parameters shall be stored in non-volatile memory and no reprogramming or manual adjustments shall be required upon power recovery.
- 6) Plug type transformer/power supplies shall be provided with a fastening device that shall securely attach the unit to the power outlet. No plug-in types will be accepted without a fastening mechanism. All corded transformers shall be mountable with the ability to neatly secure power cords.
- 7) Include UL listing.

907-662.02.3--Fiber Video Codex. Fiber Video Codex will be used where video will be transported in a non IP and/or ETHERNET communication system. This unit will be used when interfacing with current sites or when expanding existing sites or links that require the use of traditional video communication means. All Fiber Video Codex will be completely compatible and of same make and type as with existing Fiber Video Codex in the system unless approved otherwise by the Intelligent Transportation Systems Program Manager.

907-662.03--Installation Requirements. All video equipment shall be installed according to the manufacturer's recommendations, the Plans and as follows:

- 1) The Contractor shall furnish and install auxiliary video equipment in support of a communications network that will transport video as specified in these Special Provisions.
- 2) Materials and associated accessories/adapters shall not be applied contrary to the manufacturer's recommendations and standard practices.
- 3) The Contractor shall furnish all tools, equipment, materials, supplies, and manufactured hardware, and shall perform all operations and equipment integration necessary to provide complete, fully operational video equipment as specified herein, within the Plan set, and/or in the Contract Documents.
- 4) 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.
- 5) Any new, additional or updated drivers required for the existing ATMS software to communicate and control new video communication equipment installed by Contractor shall be the responsibility of the Contractor.

907-662.03.1--Testing. The Contractor shall conduct a Project Testing Program as required below. All costs associated with the Project Testing Program shall be included in overall contract prices; no separate payment will be made for any testing.

907-662.03.1.1--Testing General Requirements. The Contractor shall conduct a project testing program for all VE and VD provided. The project testing program for VE/VD shall include but is not limited to the specific requirements in this subsection.

1. All test results shall confirm physical and performance compliance with these Special Provisions.
2. Contractor shall submit all test results documentation to the Engineer for review within 14 calendar days of completion of the tests.
3. All test results shall be reviewed and approved by the Department prior to continuing with further tests and deployment activities. The Contractor is responsible for planning, coordinating, conducting and documenting all aspects of the Project Testing Program. 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 is required to perform the Stand Alone Acceptance Test (SAT) and the Integration Test with the MDOT ITS Engineer or his designee present.

907-662.03.1.2--Stand Alone Acceptance Test (SAT). The Contractor shall perform a complete SAT on all video 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 video equipment.

The SAT shall demonstrate that all video equipment and materials are in full compliance with all MDOT 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 Special Provisions. 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) Verify proper voltages for all power supplies and related power circuits.
- 4) Connect devices to the power sources.
- 5) Verify all connections, including correct installation of communication and power cables.
- 6) Verify video image is present and free from over-saturation and any other image defect in both color and monochrome mode.
- 7) Verify network connection to the VE through ping and telnet session from a remote PC.
- 8) Verify serial data transmission through the VE serial ports.

907-662.03.1.3--Integration Test. The Contractor shall be responsible for a Integration Test on all provided video communications equipment with MDOTs existing Traffic Management control software and with the existing video wall control. The Contractor shall be responsible to

provide equipment that meets all requirements and is compatible with existing systems, TMC software, software drivers, and video wall systems or the Contractor shall provide new or updated software, software drivers, and system upgrades necessary to meet requirements at no additional cost to the State.

The Integration Test shall demonstrate full compliance with all operational and performance requirements of the project requirements including communications and control from the TMC. Integration Test shall include but are not limited to:

- 1) Verify VE supports unicast, multicast and network management features.
- 2) Video Switching through existing Traffic Management control software.
- 3) Verify integration with CCTV video and controls.
- 4) Compatibility with Existing Video Wall display formats.
- 5) Compatibility with MSTraffic web servers.
- 6) Verify RTSP functionality.

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 VE and VD and all other installed and/or attached appurtenances.
- 3) The 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 training shall be approved two (2) week ahead of the scheduled date.
- 2) For provided devices that MDOT already has the same make and model existing in the system:
 - a. One (1) day of **on site** device operation, maintenance, and configuration training for up to 10 individuals.
 - b. 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.
- 3) For provided devices that MDOT does not have the same make and model existing in the system:
 - a. Three (3) days of **on site** device operation, maintenance, and configuration training for up to 10 individuals.

- b. 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.

907-662.04--Method of Measurement. Video Communication Equipment will be measured per each Video Encoder, Decoder, Chassis, Software Decoder, and Fiber Video Codex installation. Such measurement shall be inclusive of furnishing, installing, warranties, full operation and configuring the equipment in accordance with applicable Standards, Specifications, and requirements. It shall also include the mounting hardware (including any required VE/VD rack and power supplies), Cat-6 patch cords, power cable, user manuals, testing, warranties, serial cable as necessary, and any and all other equipment required to complete installation of the unit.

907-662.05--Basis of Payment. Video Communication Equipment will be paid for at the contract unit price bid per each, which price shall be full compensation for all labor, tools, materials, equipment and incidentals necessary to complete the work.

Progress payment for Video Communication Equipment may 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:

907-662:	Video Encoder	- per each
907-662:	Video Decoder	- per each
907-662:	Video Encoder/Decoder Chassis	- per each
907-662:	Video Encoder Card	- per each
907-662:	Video Decoder Card	- per each
907-662:	Fiber Video Codex	- per each

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-664-2

CODE: (SP)

DATE: 03/01/2013

SUBJECT: Roadway Weather Information System

PROJECT: ITS-9999-09(028) / 106397301 & 302 -- Warren and Adams Counties

Section 907-664, Roadway Weather Information System, is hereby added to and made a part of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction as follows.

SECTION 907-664 - ROADWAY WEATHER INFORMATION SYSTEM

907-664.01--Description. Roadway Weather Information System consists of furnishing, installing and integrating a Roadway Weather Information System (RWIS). The work will be at the locations shown on the plans and will consist of providing all labor, materials, equipment and incidentals necessary to furnish, install, test, and make functional the RWIS. The sites for these systems will be at locations with known adverse weather conditions such as freezing, fog, flooding, high winds, etc., but may be placed at any location where system deployment for roadway weather information monitoring is deemed desirable by the Mississippi Department of Transportation.

The RWIS installations shall include all site preparation necessary for installation of the base station, communications/surveillance tower(s), cabinet bases, roadway sensors, temperature sensors atmospheric sensors, battery back-up equipment, wind speed sensors, conduit and cable for remote sensor equipment, advance warning signs with flashers, system software installed at the TMC and all other equipment and related appurtenances to accomplish a complete and fully operational RWIS as described in this special provision and the details and plans developed for the specific sites.

907-664.02--Materials.

907-664.02.1--General. The Roadway Weather Information System (RWIS) shall include, but is not limited to, the equipment and materials included in this Special Provision. The Contractor is responsible for determining and providing any other equipment that is needed for a safe and reliable operation of an RWIS.

In general, the system shall include a base station and a bridge mounted remote sensor unit. The base station will include an appropriate Remote Processing Unit (RPU) for communications to a central processing server site, communications/networking equipment, atmospheric weather sensors, power supplies, surge protection, power distribution, cabinets, tower(s), base(s) and mounting structures. The remote processing unit for the bridge mounted sensors will include pole mounted non-invasive pavement condition sensors, an equipment cabinet, antenna solar power

panel, batteries and wireless communications to the base unit. Except where noted on the plans, the remote sensor units shall be solar powered and communicate with the base station via a wireless communications system. The wireless communications subsystem shall utilize serial spread spectrum technology from the bridge remote site to the master base unit site.

The RWIS Controller with cabinet and atmospheric sensors will be mounted on a prepared foundation/base and include a free standing, non-climbable, corrosion resistant aluminum or steel tower of a height specified for the site. If appropriate, the cabinet may be mounted on the tower structure. The tower will be installed on a concrete footing/foundation designed by the manufacturer/supplier. The tower and foundation will be designed to sustain wind speeds of up to one hundred (100) miles per hour. The tower will include grounding rods and lightning protection. A concrete service pad shall be provided.

907-664.02.2--Remote Processing Unit (RPU). The master Roadway Weather Information System (RWIS) RPU shall include a CPU, with flash memory, expansion slots, and interface ports including Ethernet, RS-232 serial, and RS-485 serial. These ports are for system maintenance and device interfaces. All RPU electronics shall provide stable operation over a temperature range of -40°C to 60°C and 0-90% RH non-condensing. The RPU will be capable of multi-tasking operations to optimize the data acquisition from all connected devices. RPU software configuration shall be performed by PC computer connected to the RPU Ethernet port or serial port.

907-664.02.3--Communications Equipment. The RWIS RPU shall communicate Ethernet with a central server via a provided communications network connection and shall utilize Federal Standard NTCIP-ESS protocol, with some manufacturer-specific objects allowed. The server shall poll the RPU and shall be able to gather information and provide a communications interface via an Ethernet network connection to monitor weather conditions, traffic parameters and accommodate video surveillance as described in this specification and on the detailed plans prepared for the sites included in this project.

The Contractor will provide an interface and utilize the communications equipment and services specified for the site as indicated on the plans during the construction, testing, and burn in periods to final acceptance..

907-664.02.4--RWIS Data. The data collected by the RWIS will be processed and temporarily stored in the RPU until transmitted to a central processing server site. Updates shall be completed on intervals not longer than every two minutes. The RWIS data shall be stored and displayed on a central processing server site, and available for access by agency users and designated information users on any PC connected to the Internet running Internet Explorer web browser software. The RWIS user displays shall include all sensor and video data in a browser-based display format.

907-664.02.5--Cabinet. The RPU shall be enclosed inside a NEMA 4 lockable aluminum enclosure that is resistant to damage by weather and vandals. The cabinet shall be mounted on a freestanding, non-climbable, corrosion resistant tower or pad mounted as appropriate for the site and as specified in the plans. All equipment, connectors, cables, power supplies, surge protection, grounding, power distribution, mountings, shelves, racks, fasteners, mounting, and

base necessary to accommodate a fully operational RWIS shall be included as incidental to the cabinet and its installation.

The cabinet shall include a thermostatically controlled ventilation fan to adequately remove heat within the cabinet to prevent performance degradation and reduced reliability. Ventilation fan and filter louver shall be screened against the entrance of dust and foreign matter. A replaceable filter for incoming air shall be provided. The fan shall include a resistor-capacitor network noise suppressor installed across the fan motor power terminals.

All cabinets shall be provided with agency name, device name and ID labels. Labels shall meet the following minimum requirements.

1. Labels shall be flat black lettering on a reflective white background. Lettering shall be a minimum of one inch (1”) in height.
2. Labels shall be manufactured from pre-coated adhesive backed reflective sheeting material meeting the minimum requirements of AASHTO Designation: M268, Type 1.
3. The agency name labels shall be "MDOT ITS" in one continuous adhesive sheet.
4. The device ID labels shall include the device name as an acronym and a hyphen, and shall be one continuous adhesive sheet.
5. The device ID shall be numerals corresponding to the location and shall be installed adjacent to the acronym sheet.
6. The device ID labels shall also include large 3-inch letters on the side of the cabinet that the ground plane is located that states "WARNING: UNDERGROUND WIRING - NO DIGGING"
7. Labels shall be installed along the top of the cabinet door, with MDOT ITS label at the top and the device ID labels immediately underneath.

A voltage label shall be provided on all RWIS transmitter cabinets in accordance with the NEC labeling requirements. Voltage labels shall meet the following minimum requirements.

1. Labels shall be flat black lettering on a reflective yellow background. Lettering shall be a minimum of one inch (1”) in height.
2. Labels shall be manufactured from pre-coated adhesive backed reflective sheeting material meeting the minimum requirements of AASHTO Designation: M268, Type 1.
3. Labels shall include the voltages entering the cabinet and shall be one continuous adhesive sheet. Examples are "120VAC" or "120/240VAC".
4. Labels shall be installed on all cabinet doors.

Door locks shall be provided for all RWIS base, remote slave units and solar power/battery cabinet doors all keyed to the same master. One key shall be provided with each cabinet.

All cabinets shall include a lighting fixture appropriate for the power source used. 120 Volt, fluorescent fixtures will be a minimum 15 watts. The fixture will be mounted on the inside top portion of the cabinet. The light shall be door switch controlled.

907-664.02.6--Sensors. The Roadway Weather Information System shall include sensors which

provide the following information.

Atmospheric Conditions. Sensors for the following conditions shall be provided and installed at the master RWIS site.

1. Air temperature
2. Relative humidity
3. Dew point
4. Precipitation rate
5. Barometric pressure
6. Wind speed and direction

Pavement Conditions. Sensors providing pavement conditions shall be installed at the bridge location shown on the plans. It is the intent that the bridge pavement sensors be positioned to measure data on a clear bridge span where the roadway surface conditions are representative of the bridge surface. Bridge pavement sensors mounted on the bridge (not at the base station/tower) will be solar powered and communicate via wireless with the RPU at the base station unless otherwise specified in the plans.

1. Pavement temperature
2. Precipitation classification
3. Pavement water/snow depth

Radar Traffic Sensors. Radar (Microwave) traffic sensors shall be mounted on the tower at the master RWIS station and provide data for each travel lane in both directions of travel. The sensors shall comply with the most current MDOT Special Provision for Radar Detector Sensors. Data provided shall include the following.

1. Traffic volume
2. Traffic speed

907-664.02.7--Video Surveillance. The RWIS system shall provide two fixed video cameras to provide color video images of the roadway approach and bridge from the tower. The camera shall be mounted on the RWIS tower. These cameras will comply with the latest version MDOT Special Provision for video cameras.

907-664.02.8--Battery Back-up System. The RWIS base station shall include a battery back-up system that meets the following minimum specifications.

The Contractor shall provide a battery back-up system that will provide sufficient battery power to operate all components of the RWIS base subsystem for minimum of 96 hours (4 days) without normal 115-volt primary power or other external service.

The current draw of each component of the RWIS subsystem including communications equipment and any other electrical loads present during operation shall be measured and provided by the Contractor to the Department for verification of proper sizing of the back-up battery system.

The back-up system shall have an automatic charging unit and power changeover with no interruption to RWIS operation. The system shall also include automatic charging circuitry to prevent overcharging and thermal (overheat) protection.

Batteries shall be maintenance free, industrial, deep-cycle gel cell or absorbed glass mat (AGM) type.

The battery charger shall trickle charge the batteries from the normal 115-volt primary power.

The back-up system shall not overcharge the batteries and shall include a load controller and a charge regulator in addition to automatic battery temperature compensation. The system shall provide a method (voltsmeters, ammeters) to indicate the current state and rate of charge of the batteries.

The batteries shall not be installed in the same cabinet as the electronic equipment for the Master RWIS base station. A separate NEMA 3R aluminum, weather resistant cabinet/enclosure, located adjacent to the RWIS RPU cabinet shall be included for housing the battery back-up system components. Cabinet shall be lockable as described previously in this special provision.

907-664.02.9--Power. The Contractor shall be responsible for locating power service points. Locations shown on the plans as service points are shown for information only.

If designated as solar power in the plans, the RPU/base station shall be equipped to utilize solar power and an appropriately sized battery back-up system as described above. Solar powered RPU sites shall provide batteries and panels scaled to operate the system continuously, with a reserve power sufficient to provide continuous operation of all devices at the site for a minimum of 96 hours (4 days). The supplier shall provide calculation documentation for the power consumption, storage capacity, power generation and charge rates clearly showing the power reserves to the satisfaction and approval of the MDOT project manager. This information shall be provided during the equipment approval process.

A separate NEMA 3R aluminum, weather resistant cabinet/enclosure, located adjacent to the RWIS RPU cabinet, shall be included for housing the battery back-up system components. Cabinet shall be lockable.

907-664.02.10--RWIS Flashing Beacons and BRIDGE ICES BEFORE ROAD Sign. The RWIS installation shall include the furnishing and installation of new advance warning signs for each bridge approach at the location shown on the plans. Mounting of the signs will conform to the design as shown in the plans and will be a breakaway type mounting structure. The standard MDOT sign as shown in the Manual on Uniform Traffic Control Devices (MUTCD), W8-13 (BRIDGE ICES BEFORE ROAD) will be provided. The sign will meet all MDOT standards for reflectivity and be 48" X 48" as described in the MUTCD Table 2C-2 and Section 2C.32.

The sign shall be supplemented with a single 12-inch flashing warning beacon which is solar powered. The warning beacon shall be an LED. The solar panel and battery storage system shall

provide continuous operation of the flashers, timers, communications, etc. for a minimum of four (4) days. The supplier shall provide calculation documentation for the power consumption, storage capacity, power generation, and charge rates clearly showing the power system capabilities to the satisfaction and for the approval of the MDOT representative. This information shall be provided during the equipment approval process.

The beacons shall have a flash rate as specified in the Federal Highway Administration (FHWA) Manual on Uniform Traffic Control Devices (MUTCD).

The supplemental flashing beacon shall be activated and deactivated from the Master RWIS base site based on settable temperature thresholds set at the RWIS base and via wireless communications. The wireless communications subsystem shall utilize serial spread spectrum technology from the master site to the remote warning sign sites. The remote sign sites shall include an adjustable automatic shutoff timer that will automatically turn off the flasher in a predetermined amount of time if activation is not renewed.

The Contractor may propose an alternative activation system for review and consideration by the Department.

All beacon control and power components shall be housed in a minimum NEMA 3R type aluminum cabinet/enclosure. The cabinet/enclosure shall be constructed from 0.125" thick Aluminum Alloy, Type 5052-1132. The cabinet/enclosure door shall be lockable in accordance with previous sections in this Special Provision.

907-664.02.11--Standards. All materials, equipment, supplies, installations and testing shall comply with the project requirements, the latest editions of the following standards and industry practices as applicable, and all other standards, requirements and standard industry practices, and any state and local codes or ordinances that may apply.

Standards and industry practices shall include, but not be limited to the following.

1. Federal Communications Commission (FCC) regulations
2. National Electric Code (NEC)
3. Underwriters' Laboratories Inc. (UL)
4. National Electrical Manufacturer Association (NEMA)
5. Institute of Electrical and Electronic Engineers (IEEE)
6. American Society of Testing and Materials (ASTM)
7. American National Standards Institute (ANSI)
8. Lightning Protection Institute (LPI)
9. National Electrical Safety Code (NESC)
10. Occupational, Safety, and Health Act (OSHA)

All materials, equipment accessories and components that are not in accordance with the specific standards and requirements shall require approval by the Department. The Contractor shall bring any conflicts between referenced industry specifications and this Special Provision to the attention of the Department.

The Contractor shall use the latest version of referenced industry specifications, standards, and practices in force and in existence as of this project's advertisement date unless otherwise noted.

The Contractor shall acquire and use all applicable manuals, guidelines, and standards and practices that apply to the design, construction, and testing activities required to complete this project.

907-664.02.12--Submittals. The following submittals shall be required.

1. Product Data - For each component of the RWIS system including cabinet RPU, sensors, conduit, pull boxes, tower, or other part of the system selected for installation, submit nine (9) sets of manufactures' product data. The product data shall be provided in binders. Each binder shall contain the following.
 - a. Specification/cut sheets for equipment provided
 - b. Design guides
 - c. Installation and operating instructions
2. Shop Drawings - Nine (9) copies shall be submitted of each submittal.
3. Cabinet wiring diagrams with system labeling schedule.
4. Site wiring/connection drawings.
5. Rack diagrams showing rack mounted equipment.
6. Quality control test reports showing all modules and devices are installed/ tested and are functioning correctly.
7. Testing documentation.
8. Project Record Drawings:
 - a. The purpose of Project Record Drawings is to provide factual information regarding all aspects of the Work, to enable future service, modifications, and additions to the Work.
 - b. Project Record Drawings are an important element of this Work. Contractor shall accurately maintain Project Record Drawings throughout the course of this project.
 - c. Project Record Drawings shall include documentation of all Work, including the conduit locations, pull box locations, equipment locations, foundation details, setup perimeters, and wiring diagrams.
9. Project Record Drawings shall accurately show the physical placement of the following:
 - a. Cabinets, sensors, towers, pull boxes, and other materials installed at the RWIS site.
 - b. Conduit runs and splicing information.
10. Project Record Drawings shall show the physical placement of each system component installed during the project at each site. Where the plan details do not depict actual field conditions, the Contractor shall amend the construction plan as required.
11. Upon completion of Work, and prior to Final Acceptance, the Contractor shall prepare and submit final record set of Project Record Drawings. This set shall reflect the installed Work.
12. Closeout Submittals - A set Project Record Drawings shall be provided to the Project Engineer and ITS Engineer including:
 - a. Project Record Drawings
 - b. Product Data

- c. Installation Manuals
- d. Operating Manuals
- e. Maintenance/Service Manuals

907-664.02.13--Quality Assurance. The RWIS shall be installed in such a manner as to comply with environmental regulations and erosion control as specified in the plans and elsewhere in MDOT standard specifications.

At the completion of the Work, the site shall be cleaned, restored, grassed and otherwise stabilized to a condition consistent with conditions before work began. All disturbed signs, guardrail, markers, fencing, and other roadway appurtenances shall be restored, or improved to current MDOT standards.

The Contractor shall clean-up, on a daily basis as the Work progresses, debris caused by Contractor's activities.

Construction Aids are equipment and materials required by the Contractor to facilitate the execution of the Work. Construction Aids include scaffolds, staging, ladders, platforms, hoists, cranes, lifts, drills, tools, test equipment, protective equipment, and other such facilities and equipment. Contractor shall provide all Construction Aids required in the execution of the Work. Construction Aids that are the property of MDOT or other Contractors shall not be used without permission. Storage of Construction Aids shall be coordinated with MDOT or MDOT's representative.

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Contractor shall comply with all local, state, and federal regulations and laws for the safety of the work place.

All work related accidents shall be reported immediately by telephone to the MDOT or MDOT's representative.

907-664.03--Construction Requirements. The Contractor shall be responsible for locating power and communications service points. Locations shown on the plans as service points are shown for information only.

The Contractor shall be responsible for providing all hardware, software and licenses to operate a complete system.

The Contractor will be responsible for all integration of the data and information into the Mississippi DOT communications network and MSTRaffic.com web site as described in the this special provision.

All equipment shall be installed according to the manufacturer's recommendations, the Plans, and as follows:

- Materials and associated accessories/adapters shall not be applied contrary to the

manufacturer's recommendations and standard practices.

- The equipment shall be designed to prevent reversed assembly or improper installation of connectors, fasteners, etc. Each item of equipment shall be designed and installed to protect personnel from exposure to high voltage during equipment operation, adjustments, and maintenance.

The Contractor shall furnish and install all supports, clamps, cables, connections and other materials to secure the RWIS at the selected locations. The type of mounting poles to be supplied and the location of their installation shall be as specified herein and depicted in the Plans.

The Contractor shall be responsible for locating possible utility conflicts prior to excavating and installing the ground-plane system. In case of space limitations or structural modification constraints, the Department shall be informed prior to site construction.

The Contractor shall perform detailed pre-installation site surveys to determine the conditions at each site (e.g., power, grounding, communications, etc.) for the intended purpose and performance criteria.

Do not install electrical service or electronic devices in the RWIS cabinet or connect to the cabinet until the cabinet grounding systems have been successfully completed and accepted, and the cabinet ground connection has been installed.

Do not install electronic devices in the cabinet until electrical service or solar power has been installed and activated, and the cabinet ventilation fan is operational.

The solar power panels for the RWIS and flashing beacons shall be properly oriented to maximize exposure to the sun during the shortest days of the year at the latitude and longitude of the site.

907-664.03.1--Conformance Testing. Each RWIS component shall undergo testing to verify conformance to special provision as follows. The Contractor shall conduct a Project Testing Program as required below. All costs associated with the Project Testing Program shall be included in overall contract prices. No separate payment will be made for any testing.

907-664.03.1.1--General Requirements. The Contractor is responsible for planning, coordinating, conducting and documenting all aspects of the Project Testing Program. 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.

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 specifications or the project plans. Test procedures shall contain documentation regarding the equipment configurations and programming.

No testing shall be scheduled until approval of all project submittals and approval of the test procedures for the given test.

The Contractor shall provide all ancillary equipment and materials as required in the approved test procedures.

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.

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.

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 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.

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.

907-664.03.1.2--RWIS Pre-Installation Test (PIT). The Contractor shall perform PIT on the RWIS units as they arrive from the factory. The goal of the RWIS PIT is to verify that the RWIS were not damaged during shipping and that all components are working.

907-664.03.1.3--RWIS Stand Alone Test (SAT). The Contractor's comprehensive SATs for the RWIS shall be sufficient to demonstrate compliance with all requirements specified herein and include the following minimum test requirements.

1. The Contractor must demonstrate full sensor capabilities.
2. The Contractor shall verify that the remote flashing beacons on the warning signs are activated properly as specified and will de-activate automatically without renewal at preset intervals.

907-664.03.1.4--Conditional System Acceptance Test (CSAT). The Contractor shall perform a complete conditional system acceptance test on all equipment and materials in the project. The Contractor shall not request the conditional system acceptance test for a phase until the SATs have been satisfactorily completed, all as-built documentation has been submitted and approved, and all other project work has been completed to the satisfaction of the Engineer. Prior to a Conditional

System Acceptance Test, the Contractor shall provide advance notice of and written test results documentation that the Contractor has performed a dry-run of the conditional system acceptance test, and the Engineer reserves the right to require attendance of a dry-run test session.

The Contractor shall test all project systems simultaneously from the TMC in a manner equivalent to the normal day-to-day operations of the system. The Conditional System Acceptance Test shall demonstrate that all equipment and materials in the network are in full compliance with all project requirements and fully functional as installed and in final configuration, communicating with and being controlled through the control center at the TMC. Upon completion and full approval of the Conditional System Acceptance Test for all equipment, Conditional System Acceptance will be given and the Burn-in Period will begin.

907-664.03.1.5--Burn-In Period. Following the Engineer's written notice of successful completion of the Conditional System Acceptance Test, the entire newly installed system must operate successfully for a three (3) month burn-in period. During this burn-in period, the Contractor shall be responsible for the full maintenance of the newly installed equipment. However, no separate payment will be made for the burn-in period activities and shall be included in the cost of other items. Successful completion of the burn-in period will occur at the end of three complete months of operation without a major system failure attributable to hardware, software or communications components. Each system failure during the burn-in period will require an additional month of successful operation prior to being eligible for Final Acceptance. (i.e., if there are two system failures during the initial three month period, the burn-in period would be increased to four (4) months.)

Determination of a system failure shall be at the sole discretion of the Engineer. System failure is defined as a condition under which the system is unable to function as a whole or in significant part to provide the services as designed. While a single component failure will not constitute a system failure, chronic failure of that component or component type may be sufficient to be considered a system failure. Chronic failure of a component or component type is defined as three (3) or more failures for the same component during the burn-in period.

Components are defined as contract items or major material elements in a contract item. For electrical and electronic contract items, components are defined as the complete assembly of materials that makes up the contract item.

Specifically exempted as system failures are failures caused by accident, acts of God, or other external forces that are beyond the control of the Contractor. However, failure of the Contractor to respond to the repair request for that failure within 24 hours may be considered a system failure.

The Department will advise the Contractor in writing when it considers that a system failure has occurred or chronic failure exists.

If multiple system and/or chronic failures continue to occur throughout the burn-in period due to a single component type, the Contractor may be required to replace all units of that component type with a different model or manufacturer.

The Contractor shall document all failures and subsequent diagnosis and repair. The repair documentation shall include as a minimum.

1. Description of the problem
2. Troubleshooting and diagnosis steps
3. Repairs made
4. List of all equipment and materials changed including serial numbers
5. Update of the equipment inventory where needed

The Contractor shall provide the repair documentation to the Engineer within two (2) days of completing the repair; failure to provide acceptable documentation as required shall be reason to not approve the repair as complete. The Engineer will provide acceptance or rejection of the repair and documentation within seven (7) days.

The Engineer reserves the right to require, at no additional expense to the State, the presence of a qualified technical representative of the equipment and/or software manufacturers as related to the diagnosis and/or repair of any system failure.

During the burn-in period, the Contractor shall perform incidental work such as touching up, cleaning of exposed surfaces, leveling and repair of sites, sodding/grassing and other maintenance work as may be deemed necessary by the Engineer to insure the effectiveness and neat appearance of the work sites.

During the burn-in period, the Engineer shall maintain a "burn-in period punch list" that contains required Contractor actions but that the Engineer does not define as a system failure. Each burn-in period punch list action item shall be completed by the Contractor to the Engineer's satisfaction within seven (7) days of Contractor notification of the action item.

During the burn-in period the Contractor is required to meet the following response times once notified there is a problem. A response is defined as being on-site to begin diagnosing the problem.

1. Monday thru Friday: The Contractor shall respond no later than 9:00 a.m. the following morning after being notified.
2. Weekends: If the Contractor is notified on Friday afternoon or during the weekend, the Contractor shall response by 9:00 a.m. on Monday morning.

During the burn-in period, the Contractor shall provide all labor, materials, equipment and replacement parts to completely maintain, troubleshoot and repair all items installed under this contract. No separate payment will be made for any labor, materials, equipment or replacement parts needed during the burn-in period.

The overall burn-in period will be considered complete upon the successful completion of the burn-in time- periods; the Engineer's acceptance of all repairs and repair documentation, completion of all burn-in period punch list actions and a final inspection as described below.

Contract time will not cease during the burn-in period(s). Contract time for the burn-in period was considered when determining the original contract time.

907-656.03.1.6--RWIS Final Inspection. Upon successful completion of the burn-in period, the project shall be eligible for the final inspection. The RWIS final inspection will be conducted provided the burn-in period has demonstrated the entire system is operating successfully. The RWIS final inspection shall include but is not limited to:

1. Monitoring of all system functions at the TMC to demonstrate the overall system is operational
2. A field visit to each site to ensure all field components are in their correct final configuration
3. Verification that all burn-in punch list items have been completed
4. Verification that all final cleanup requirements have been complete
5. Approval of final as-built documentation

Prior to conducting the RWIS final inspection, the burn-in period shall demonstrate that all requirements defined in this Special Provision have been met.

The Contractor shall request in writing the Engineer's approval to start the RWIS final inspection a minimum of 14 days prior to the requested start date. The Engineer reserves the right to reschedule the start date if needed. The start date for the RWIS final inspection cannot be prior to the successful completion of the overall burn-in period.

An unsuccessful or incomplete RWIS final inspection shall require a new RWIS final inspection after the Contractor has made the necessary corrections. Up to 14-days shall be allowed for the Engineer to conduct a RWIS final inspection.

The Engineer reserves the right to require, at no additional expense to the State, the attendance of a qualified technical representative of the equipment and/or software manufacturers to attend a portion of a RWIS final inspection.

The Contractor shall be responsible for the full maintenance of all project equipment and materials during the entire time period from the successful completion of the burn-in period until Final System Acceptance is granted.

907-664.03.1.7--Final System Acceptance. Upon successful completion of the RWIS final inspection, the Engineer will conduct a project final inspection in accordance with Subsection 105.16.2 of the Standard Specifications.

907-664.03.2--Warranty. The RWIS shall be warranted to be free of manufacturer defects in materials and workmanship for a period of one year from the date of Final Acceptance. Equipment covered by the manufacturer's warranties shall have the registration of that component placed in MDOT's name prior to Final inspection. The Contractor is responsible for ensuring that the vendors and/or manufacturers supplying the components and providing the equipment warranties recognize MDOT as the original purchaser and owner/end user of the components from new. During the warranty period, the supplier 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 supplier's factory or authorized warranty site. Products repaired or replaced under warranty by the supplier shall be returned prepaid by the supplier. During the warranty period, technical support shall be available from the supplier via telephone within four 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 control unit software shall be made available to the Department by the supplier at no additional cost.

907-664.03.3--MDOT Employee Training. The Contractor shall submit to the Project Engineer for approval a detailed Training Plan including course agendas, detailed description of functions to be demonstrated and a schedule. The Contractor must also submit the Trainer's qualifications to the Project Engineer for approval prior to scheduling any training. The training must include both classroom style training and hands-on training in the field of the maintenance and troubleshooting procedures required for each component. The training should also consist of a hands-on demonstration of all software configuration and functionality where applicable.

The supplier of the RWIS shall, at a minimum, provide an eight-hour operations and maintenance training class with suitable documentation for up to twelve (12) persons selected by the Department. The operations and maintenance class shall be scheduled at a mutually acceptable time and location.

907-664.03.4--Maintenance and Technical Support. The supplier shall maintain an adequate inventory of parts to support maintenance and repair of the RWIS. Spare parts shall be available for delivery within 30 days of placement of an acceptable order at the supplier's then current pricing and terms of sale of said spare parts.

The suppliers shall maintain an ongoing program of technical support for the RWIS. This technical support shall be available via telephone or via personnel sent to the installation site upon placement of an acceptable order at the supplier's then current pricing and terms of sale of said technical support services.

907-664.04--Method of Measurement. Roadway Weather Information System will be measured per each system used. Roadway Weather Information System shall be measured for payment as follows:

- 30% of the contract unit price upon approval of and Pre-Installation test results.
- 70% of the contract unit price upon approval of Stand Alone Site Test results.
- 90% of the contract unit price upon completion of the three (3) month burn-in period.
- 100% of the contract unit price upon Final System Acceptance.

BRIDGE ICES BEFORE ROAD Signs with Flashing Beacons will be measured per each upon demonstration of successful activation, de-activation, and automatic turn-off.

907-656.05--Basis of Payment. Roadway Weather Information System, measured as prescribed above, will be paid for at the contract unit price per each, which price shall include furnishing,

installing, licensing application, coordination and acquisition, communications activation and monthly billing costs, RWIS grounding design submittal, system integration, and testing of a complete RWIS and software including the RWIS equipment/components as specified herein including grounding, power distribution/supply, battery back-up system with recharging subsystem, surge protection, the cabinet, all cabling, connections to support structures (includes all incidental components, attachment hardware, mounting brackets, bolts, straps, or any other items to mount the RWIS equipment / components as intended), all required software, 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 RWIS sites complete in place and ready to use, system documentation (including shop drawings, operations and maintenance manuals, wiring diagrams, block diagrams and other materials necessary to document the operation -of the RWIS), all labor, tools, materials, equipment and incidentals necessary to complete the work.

The BRIDGE ICES BEFORE ROAD Signs with Flashing Beacons, measured as prescribed above, will be paid for at the contract unit price per each, which price includes furnishing, installing, system integration, and testing of a complete warning sign with flashing beacons including the sign materials, sign supports, support foundations, flashing beacon, solar power system, controller, communications equipment, battery cabinet, cabling, connections, satisfactory completion of testing and training requirements, all work, equipment and appurtenances as required to effect the full operation including remote and local control of warning sign assembly with Flashing Beacons sites complete in place and ready to use, system documentation (including: shop drawings, operations and maintenance manuals, wiring diagrams, block diagrams and other materials necessary to document the operation of the warning signs with flashing beacons), and all labor, tools, materials, equipment and incidentals necessary to complete the work.

Payment will be made under:

- 907-664-A: Roadway Weather Information System - per each
- 907-664-B: BRIDGE ICES BEFORE ROAD Sign with Flashing Beacons - per each

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-668-1

CODE: (SP)

DATE: 04/01/2009

SUBJECT: Traffic Signal Conduit

Section 668, Traffic Signal Conduit, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows:

907-668.03--Construction Requirements. After the last paragraph of Subsection 668.03.1 on page 556, add the following:

- (i) Where indicated on the plans, individual conduits shall be configured into a continuous duct bank from terminal to terminal.

907-668.04--Method of Measurement. Delete Subsection 668.04 on page 559 and substitute the following:

Traffic signal conduit or conduit bank will be measured by the linear foot computed horizontally along the signal conduit or conduit bank, such measurement being made from the point of beginning to the point of termination of all sections of conduit or conduit bank, in trench, under roadways, or supported on structures.

Jacking, drilling, excavating, backfilling and replacement of sod will not be measured for separate payment, but shall be incidental to and included in the contract unit prices for Direct Burial and Jacked or Drilled underground installations as applicable.

Messenger cable and other supporting devices for aerial supported signal conduit or conduit bank will not be measured for separate payment but shall be incidental to and included in the contract unit price for traffic signal conduit, aerial supported.

When a "conduit bank" is specified, the per linear foot price of the conduit bank shall include the total number of conduits specified. Each conduit is NOT paid for separately.

The bid price for underground conduit shall be the same regardless of whether it is installed by trenching, plowing or boring, except for locations specifically identified as "Bored" in the contract plans and those items shall be paid for under the drilled or jacked pay item.

907-668.05--Basis of Payment. Delete the first paragraph of Subsection 668.05 on page 559, and substitute the following:

Traffic signal conduit or conduit bank, measured as prescribed above, will be paid for at the contract unit price per linear foot, which price shall be full compensation for furnishing, laying,

placing, forming, curing, connecting, supporting aerially, cleaning and testing all conduit, pull boxes, junction boxes not specified on plans or ordered, and incidental materials; for all excavating, backfilling, boring, drilling and/or jacking necessary for subsurface installations; for replacing sod; encasement in concrete; final cleaning up; and for all labor, equipment, tools and incidentals necessary to complete the work.

After the last Pay Item on page 560, add the following Pay Items:

- 907-668-E: Traffic Signal Conduit Bank, Underground, Type,
Size and Number - per linear foot
- 907-668-F: Traffic Signal Conduit Bank, Underground Drilled or Jacked,
Type, Size and Number - per linear foot
- 907-668-G: Traffic Signal Conduit Bank, Aerial Supported, Type,
Size and Number - per linear foot
- 907-668-H: Traffic Signal Conduit Bank, Underground Encased in Concrete,
Type, Size and Number - per linear foot

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-668-2

CODE: (SP)

DATE: 3/01/2013

SUBJECT: Traffic Signal Conduit Bank, Aerial Support, Type FRP

PROJECT: ITS-9999-09(028) / 106397301 & 302 -- Warren and Adams Counties

907-668.01--Description. This item shall consist of aerial fiber optic conduit bank (single or multiple conduits) accommodate a fully functional ITS System in accordance with the plan details, the 2006 Louisiana Standard Specifications for Roads and Bridges, these specifications and as directed by the Engineer.

Aerial fiber optic conduit bank shall be installed in accordance with this specification and in accordance with the dimensions, designs, locations, and details shown on the plans. This item shall include furnishing and installing of all aerial fiber optic conduit banks and all hardware for transitioning from underground to aerial service when applicable.

907-668.02--Materials. All equipment shall be new and meet the latest adopted National Electric Code (NEC). Shop drawings detailing the Fiber Reinforced Polypolyepoxy (FRP) conduit, conduit fittings, elbows, polyepoxy (i.e., epoxy) adhesives, expansions fitting/joint, conduit support system, and appurtenances shall be submitted to the Engineer for review and acceptance.

907-668.02.01--General Requirements. Aerial fiber optic conduit bank shall meet the following requirements.

1. Equipment and materials covered by referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when so requested by the Engineer.
2. Manufacturer's certifications shall not relieve the Contractor of the Contractor's responsibility to provide materials in accordance with these specifications and acceptable to the Engineer. Materials supplied and/or installed that do not materially comply with these specifications shall be removed, when directed by the Engineer and replaced with materials, which do comply with these specifications, at the sole cost of the Contractor.
3. Materials and equipment used to construct this item shall be submitted to the Engineer for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify pertinent products or models applicable to this project. Indicate all optional equipment and delete non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment for which they apply on each submittal sheet. Markings shall be boldly and clearly made with arrows or circles

(highlighting is not acceptable). Contractor is solely responsible for delays in project accruing directly or indirectly from late submissions or resubmissions of submittals.

4. The data submitted shall be sufficient, in the opinion of the Engineer, to determine compliance with the plans and specifications. The Engineer reserves the right to reject any and all equipment, materials or procedures, which, in the Engineer's opinion, does not meet the system design and the standards and codes, specified herein.
5. Non-system materials, such as backfill, tools, supplies, equipment, etc. required to properly complete the work will be furnished by the Contractor, except as otherwise noted.
6. Equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for a period of at least twelve (12) months from final acceptance by the state. The defective materials and/or equipment shall be repaired or replaced, at the Engineer's discretion, with no additional cost to the state

907-668.02.02--Conduit. The Contractor shall meet the following conduit requirements.

1. The conduit shall be of Epoxy Fiberglass material with 2" outer diameter.
2. The conduit design shall support above ground aerial installations such as on a bridge structure.
3. The outer conduit, joints, and any spare used internally, shall be all dielectric.
4. The construction and testing of the conduit shall comply with all applicable Electronic Standards (EIA/TIA), National Electrical Manufacturers Association, International Telegraph and Telephone Consultative Committee (CCITT), ANSI, UL, ASTM standards, National and State Electric Codes, and FDDI specifications.
5. The joint assembly shall be tested in accordance with ASTM D 2105. There should be no water leakage through the joint when tested in accordance to UL 2515 and CSA C22.2. No.2515.
6. Conduit joints shall consist of an integral bell and spigot. The spigot end shall have a buttress type, male thread for easy installation. The belled end shall contain the mating female threads. The conduit joint shall be made in such a manner as to form a watertight seal.
7. Conduit connections for FRP conduit shall be sealed with epoxy adhesive. Joints for fiberglass conduit shall be joined until the conduit ends are together.
8. Once connected the joint pullout rating shall be equal to the tensile strength of the conduit.
9. The conduit shall be UV Stable (Sunlight Resistant) per UL 2515
10. No reducing couplings will be permitted in a conduit run.
11. Each conduit shall include a pull rope for future cable installations.
12. The Conduit shall be pre-lubricated or include fabric mesh inner-duct to lower the coefficient of friction inside the conduit to allow ease in installation of cabling.
13. The conduit system shall include mechanisms such as expansion fittings or joints to ensure that the expansion and contraction stresses are normalized. Spacing or expansion fitting shall be based upon manufacturer standards for the location conditions/environment of the installation.
14. The couplings shall be manufactured from a high impact thermoplastic material and shall be supplied with lead-ins to facilitate assembly.

15. The couplings shall be designed and factory certified to handle expected expansion and contractions on a bridge application.
16. Appropriate termination kits shall be provided by the conduit manufacturer for terminating the conduit in manholes and junction boxes.
17. The conduit shall be packaged for shipment at the factory. The conduit shall be assembled into manageable bundles. Each section of conduit shall be shipped with protective caps over each end of the section. Conduit that arrives at the job site without the protective cover in place over both ends will be rejected by the Engineer.
18. The installer shall be fully responsible for the installation of defect FRP conduit and for replacement of any conduit found to be defective due to improper construction or improper installation for two years after the State's acceptance of the project.

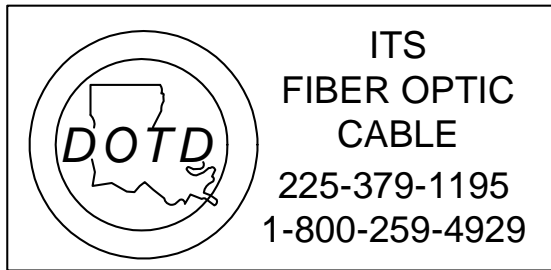
907-668.02.03--Conduit Hangers. The Contractor shall meet the following hanger requirements.

1. Conduits forming the duct bank shall be installed using the conduit hanger assemblies for conduit spacing and support.
2. The conduit hangers shall utilize brackets or clamps to provide attachment to the bridge structure. Drilling into bridge steel structure is not allowed except written approval by the Engineer is granted in advance.
3. Each conduit hanger shall be one complete assembly with a roller for each conduit installed. Each roller shall be grooved or curved for better conduit support.
4. The conduit hanger shall be aligned in all directions from one to another to keep the conduit run in a straight path whenever possible.
5. The conduit hangers shall be installed in intervals that is recommended or required by the conduit manufacturer.
6. The conduit hanger system shall be securely and adequately installed to preclude movement of conduit during cable pulling operations.
7. The conduit hanger shall be capable of supporting a load equal to the weights of the conduits, cables, the weight of the hanger itself, plus 200 pounds.

907-668.01.04--Surface Mount Pull Box. Shop drawings detailing the pullbox and appurtenances shall be submitted to the Engineer for review and acceptance. The Contractor shall meet the following pull box requirements.

1. At every pullbox the contractor shall label every cable entering and leaving the pullbox. Labels shall be permanent, plastic, wrap-around type that contains a minimum of 20 characters. Specific label content shall be determined with the Engineer using designations as detailed on the plans.
2. Structure mounted pullbox shall have the following characteristics:
 - a) Box shall have the following minimum dimensions: 24"(H) x 24"(L) x 8"(D)
 - b) Rated NEMA 4X
 - c) Constructed of 316 stainless steel
 - d) Stainless steel continuous piano hinge
 - e) Drain and breather
 - f) One tamper resistance single point lock

- g) One door support
- h) Conduit penetrations shall be watertight through hubs
- i) Conduit penetrations shall be installed to require no fiber bends on entry or exiting pullbox
- j) When used for fiber optic cable, a 25 ft slack loop is required within pullbox
- k) Door shall be labeled with the "ITS FIBER OPTIC CABLE" logo on a stainless steel nameplate riveted with stainless steel rivets (See Figure 1)
- l) Figure 1: Pullbox Labels



- 3. Upon request by the Department, the contractor shall arrange for the manufacturer to grant access to the manufacturing facility for all products specified herein.

907-668.03--Construction Requirements.

907-668.03.1--General. The Contractor shall install aerial duct banks and conduits at the approximate locations indicated on the plans. The Engineer shall indicate specific locations as the work progresses, if required to differ from the plans. Duct banks and conduits shall be of the size, material, and type indicated on the plans or specifications. Where no size is indicated on the plans or in the specifications, conduits shall be not less than 2 inches outside diameter or comply with the National Electrical Code based on cable to be installed, whichever is larger. All duct bank and conduit lines shall be installed so as to maintain elevation with the bridge structure. On runs where it is not practicable to maintain the elevation and change in direction is required, the duct bank and conduit lines shall include installation of elbows or expansion fittings/joints that is greater than the turning radius of the fiber optic cable to be installed. Vertical installations along bridge bents shall include any fasteners such as straps, clamps, or brackets approved by the Engineer.

The Contractor shall maintain cleanliness of materials prior to pulling cable. Cleaning of ducts, hangers, etc. is incidental to the pay item. Accessible points of entry to the conduit system shall be kept closed except when installing cables.

Conduits shall be securely fastened in place during construction and shall be plugged to prevent contaminate from entering the conduits. Spare conduits shall be water tight capped or plugged with pull rope tied to the cap or plug. Any conduit section having a defective joint shall not be installed. Conduits shall be supported and spaced apart using approved spacers/hangers assembly at intervals not to exceed manufacturer's guidelines.

907-668.04--Method of Measurement. Traffic Signal Conduit of the type specified will be measured per linear foot computed horizontally along the signal conduit or conduit bank.

907-668.05--Basis of Payment. Traffic Signal Conduit, measured as prescribed above, will be paid for at the contract price per linear foot, which price shall be full compensation for all labor, equipment, tools, materials include the conduit(s), hangers, fittings, expansions joints, factory and manufacturing inspection, testing, storage, packaging, shipping, warranty, and all work, equipment, and appurtenances, and all incidentals necessary to complete the work.

Payment will be made under:

907-668-C: Traffic Signal Conduit, Aerial Supported, Type, Size and Number - per linear foot

907-668-G: Traffic Signal Conduit Bank, Aerial Supported, Type, Size and Number - per linear foot

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-669-2

CODE: (SP)

DATE: 03/27/2013

SUBJECT: Real Time River Current (RTRC) System

PROJECT: ITS-9999-09(028) / 106397301 & 302 -- Warren and Adams Counties

Section 907-669, Real-Time River Current (RTRC) System, is hereby added to and made a part of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction as follows.

SECTION 907-669 -- REAL-TIME RIVER CURRENT (RTRC) SYSTEM

907-669.01--Description. This work shall consist of furnishing and installing all components associated with the RTRC system as shown on the plans and as specified herein. This work shall include the following two main components:

- RTRC access and servicing platform
- RTRC measurement system

Included in this pay item shall be all the components necessary to provide a complete and functional RTRC system as shown on the plans and as specified herein. This overall work shall include but not be limited to the material, labor, equipment, and supplies.

907-669.02--Materials. All electrical construction and materials shall be in accordance with the applicable requirements of Sections 682 of the Standard Specifications and the following.

907-669.02.1--Access and Service Platform. The RTRC access and service platform consist of the access walkway to the RTRC system, the platform providing access to the top of the RTRC track, the support brackets for the walkway and platform, and the horizontal bracing components for attaching the upper portion of the RTRC track system to the pier. All components to the access and service platform shall be made of galvanized steel.

907-669.02.2--Data Processing and Transmission Model. The Data Processing and Transmission (DPAT) module shall consist of the following components mounted inside a stainless steel or aluminum NEMA 4X box measuring a nominal size of 36" high by 24" wide by 14" deep suitable for wall or rail mounting.

- Data collection hardware: A central processing unit capable of recording data on 7 serial channels running software capable of:
 - performing real-time quality assurance, using correlation magnitude and echo intensity data available from the instrument, and quality control of the data.
 - provide system storage capable of storing two gigabytes (2 GB) of current data

and log files concurrently for at least six months (6) of on-site storage. creating data packages compatible with the Automated Identification System (AIS)

- controlling the transfer of the data packages to the AIS and confirming the transmission of the data via AIS

Functionality of software over a 6 month period shall have to be demonstrated in an inland waterway application.

- AIS transmitter: A US Coast Guard approved Class A, Type 3 Aid To Navigation Transponder (AToN)
- Cellular modem interfaced with the data collection hardware which supports TCP-IP and UDP, configured to provide 2-way communication with the DPAT.
- Redundant Regulated power supplies for the DPAT in order to minimize downtime from a resulting power supply failure.
- Fuses, surge arrestors and lightning suppressors for all power and communication cables entering or exiting the DPAT to protect against transient electrical spikes.

All cable penetrations through the box shall be via water-tight glands (IP-67).

Accompanying the DPAT, there shall be the following three antennas:

- A GPS antenna and associated cable. The GPS is required to provide a synchronized time stamp and not a position. Consequently, the antenna can be mounted in most locations with at least a partial view of the sky.
- A cellular antenna: An external cellular antenna shall be mounted on, or near, the DPAT box.
- A marine VHF antenna for the AIS transmitter and associated cable. The marine VHF antenna requires a clear exposure upstream and downstream of the river.

The DPAT shall be configured to be powered via 110 VAC power capable of a 6-amp continuous draw to be accessed from breakout box in close proximity to DPAT. A temporary backup power supply consisting of two 12V DC 100-amp hour batteries shall be installed in the DPAT.

907-669.02.3--Current Meter. The current meter for the system shall be capable of measuring current velocity and direction at a minimum of three (3) points equally spaced over a range of 485 feet from the current meter or to the point where an adjacent pier interferes with the current measurements. The measurement points should be as close to parallel to the existing bridge orientation as possible. The meter shall not affect existing bridge clearances or interfere with river traffic. The meter shall be a 3-beam horizontal acoustic Doppler current profiler (Horizontal ADCP) with a 485-foot profiling range and a velocity accuracy of +/-0.5% and a beam angle of 25 degrees or less. The current meter will provide three (3) independent indicators of measurement quality for velocity measurement. The current meter shall have a pressure sensor suitable for a depth range of 0 - 66 feet.

907-669.02.4--Cables. The cabling required for the RTRC shall consist of the following.

Two cables shall be run in conduit from DPAT module to water tight junction box mounted near the top of the track mount. One cable shall be a 2-conductor 14-gauge shielded cable for providing power to the current meter. The second cable shall be cable 6-conductor 18-gauge shielded cable for data communications.

A jacketed power/communication cable shall run from the water tight junction box mounted near the top of the track to the current meter. The cable shall be of sufficient length to reach the current meter at its lowest position on the track with an additional 10 feet of slack. This cable shall have the following specifications.

(4A-1810)18-10C portable cable: type S00W; 600V 90C

Outer layer shall be WTX; tubing, cfm, extrusion; encapsulate - overall jacket of .040" thick polyurethane, black or equivalent.

Power cable shall be sized so that there is less than a 1v drop from DPAT module to the current meter (assume nominal voltage of 48 VDC to power the current meter)

Surge suppressor and lightning arrestors shall be installed with the water-tight junction box at the top of the rail.

907-669.02.5--Track Mount for Current Meter. The track mounting system for the current meter shall have an W-Beam configuration with a minimum beam depth of eight inches (8") and should be constructed of one continuous piece of steel that has been zinc coated or galvanized by the hot dipped process in accordance with the ASTM A123 and/or A153 as applicable. If it is necessary to join two pieces of steel to achieve necessary length it should be done in such a way as to provide a smooth transition for the carriage. The carriage on to which the current meter will be mounted shall be configured to match the current meter to be used and shall allow for the current meter to be oriented such that the centerline of the current meter center beam can be oriented from perpendicular to current flow to 45 degrees downcurrent. When mounted in the carriage, the center of the middle current meter beam shall be at least 25 inches from the vertical surface to which the track is mounted. The carriage shall permit adjustment of pitch and roll of current meter over a range of $\pm 7^\circ$ in 1° increments from Horizontal. The carriage shall be configured to be raised and lowered using a cable, chain or non-stretch rope attached to a battery-powered electric winch system. The winch shall be located in a lockable box installed at the top of the track and will be manually controlled. A solar panel mounted to the top of the box shall provide charging for the battery.

907-669.03--Construction Requirements. All components of the RTRC shall be installed in accordance with the plans and specifications. Specific construction requirements for the two components of the RTRC are outlined below:

The installation requirements associated with the RTRC Access and Service Platform shall be installing the support bracing, framing, decking and railing for the access and service platform and also installing the horizontal bracing components for supporting the upper portion of the RTRC track. All conduit required for the RTRC system shall be installed as part of this effort.

The installation requirements associated with the RTRC measurement system shall include installing the DPAT and associated antennas, installing the appropriate power supply for the DPAT, installing the cable in the conduit, installing the RTRC track and carriage and integration of all system components.

The track system shall be installed in a manner to account for thermal expansion of the track over a range of 20°F to 120°F.

At the completion of the construction, the operation of the system shall be confirmed to ensure the following.

- current meter is oriented properly and the data is of good quality, sufficient to meet requirements of Subsection 907-669.02.2
- The CPU is receiving the current data and processing it
- The AIS data packages are being assembled and transmitted at regular 5-minute intervals
- The AIS data can be received by vessels at a minimum of 10 miles upstream and downstream of the RTRC location
- MDOT's Statewide TMC in Jackson can access and download the data from the RTRC.

907-669.04--Method of Measurement. The Real Time Current Sensor of the type specified shall be measured as a unit per each, which includes all items necessary to complete the installation.

907-669.05--Basis of Payment. The Real Time Current Sensor, measured as prescribed above, shall be paid for at the contract unit price per each, which price shall be full compensation for furnishing and installing the access and service platform, DPAT, current meter, track mount, cables, and conduit and for all labor, tools, equipment, and incidentals necessary to complete the work.

Payment will be made under the following pay item:

907-669-A: Real Time River Current System, * - per each

* Additional information may be added

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

| SPECIAL PROVISION NO. 907-701-4

CODE: (IS)

| DATE: 11/09/2010

SUBJECT: Hydraulic Cement

Section 701, Hydraulic Cement, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows:

Delete Subsection 701.01 on pages 595 & 596, and substitute the following:

907-701.01--General. The following requirements shall be applicable to hydraulic cement:

Only hydraulic cements conforming to Section 701 shall be used. Hydraulic cements shall not be listed or designated as meeting more than one AASHTO or Department type.

Different brands of hydraulic cement, or the same brand of hydraulic cement from different mills, shall not be mixed or used alternately in any one class of construction or structure, without written permission from the Engineer; except that this requirement will not be applicable to hydraulic cement treatment of design soils, or bases.

The Contractor shall provide suitable means for storing and protecting the hydraulic cement against dampness. Hydraulic cement, which for any reason, has become partially set or which contains lumps of caked hydraulic cement will be rejected. Hydraulic cement salvaged from discarded or used bags shall not be used.

The temperature of bulk hydraulic cement shall not be greater than 165°F at the time of incorporation in the mix.

Acceptance of hydraulic cement will be based on the certification program as described in the Department's Materials Division Inspection, Testing, and Certification Manual and job control sampling and testing as established by Department SOP.

Retests of hydraulic cement may be made for soundness and expansion within 28 days of test failure and, if the hydraulic cement passes, it may be accepted. Hydraulic cement shall not be rejected due to failure to meet the fineness requirements if upon retests after drying at 212°F for one hour, it meets such requirements.

Delete Subsection 701.02 on page 596, and substitute the following:

907-701.02--Portland Cement.

907-701.02.1--General.

907-701.02.1.1--Types of Portland Cement. Portland cement (cement) shall be either Type I or Type II conforming to AASHTO Designation: M85 or Type I(MS), as defined by the description below Table 1. Type III cement conforming to AASHTO Designation: M85 or Type III(MS), as defined by the description below Table 1, may be used for the production of precast or precast-prestressed concrete members.

907-701.02.1.2--Alkali Content. All cement types in this Subsection shall meet the Equivalent alkali content requirement for low-alkali cements listed in AASHTO Designation: M85, Table 2.

907-701.02.2--Replacement by Other Cementitious Materials. The maximum replacement of cement by weight is 25% for fly ash or 50% for ground granulated blast furnace slag (GGBFS). The minimum tolerance for replacement shall be 5% below the maximum replacement content. Replacement contents below this minimum tolerance by fly ash or GGBFS may be used, but shall not be given any special considerations, like the maximum acceptance temperature for Portland cement concrete containing pozzolans. Special considerations shall only apply for replacement of cement by fly ash or GGBFS.

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, GGBFS, or silica fume shall be as follows in Table 1.

Table 1- Cementitious Materials for Soluble Sulfate Conditions

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 II **, ***, **** cement, or Type I cement with one of the following replacements of cement by weight: 25% Class F fly ash, 50% GGBFS, or 8% silica fume
Severe	0.20 - 2.00	1,500 - 10,000	Type I cement with a replacement by weight of 50% GGBFS, or Type II ** cement with one of the following replacements of cement by weight: 25% Class F fly ash, 50% GGBFS, or 8% silica fume

- * The values listed in this table for replacement of Portland cement by the cementitious materials listed are maximums and shall not be exceeded. The minimum tolerance for replacement shall be 0.5% below the maximum replacement content. Replacement contents below this minimum tolerance by the cementitious materials listed in this table do not meet the requirements for the exposure conditions listed and shall not be allowed.
- ** Type I cement conforming to AASHTO Designation: M85 with a maximum 8% tricalcium aluminate (C₃A) may be used in lieu of Type II cement; this cement is given the designation "Type I(MS)". Type III cement conforming to AASHTO Designation: M85 with a maximum 8% tricalcium aluminate (C₃A) may be used in lieu of Type II cement as allowed in Subsection 907-701.02.1; this cement is given the designation "Type III(MS)".
- *** Blended cement meeting the sulfate resistance requirements of Subsection 907-701.04 may be used in lieu of Type II as allowed in Subsection 907-701.04. No additional cementitious materials shall be added to or as a replacement for blended cement.
- **** Class F fly ash or GGBFS may be added as a replacement for cement as allowed in Subsection 907-701.02.2.

Class C fly ash shall not be used as a replacement for cement in any of the sulfate exposure conditions listed above.

907-701.02.2.2--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 907-701.02.2.1. Neither metakaolin nor silica fume shall be used to bring the cementitious materials into compliance with the requirements of Table 1.

Delete Subsection 701.03 on page 596, and substitute the following:

907-701.03--Masonry Cement. Masonry cement shall conform to ASTM Designation: C 91 and shall only be used in masonry applications.

Delete Subsection 701.04 on page 596, and substitute the following:

907-701.04--Blended Hydraulic Cement.

907-701.04.1--General.

907-701.04.1.1--Types of Blended Cement. Blended hydraulic cements (blended cements) shall be of the following types and conform to AASHTO Designation: M 240:

- Type I(SM) – Slag-modified Portland cement
- Type IS – Portland blast-furnace slag cement
- Type I(PM) – Pozzolan-modified Portland cement
- Type IP – Portland-pozzolan cement

Blended cement for use in Portland cement concrete or soil stabilization exposed to the moderate soluble sulfate condition or exposure to seawater as defined in Table 1 shall meet the Sulfate resistance requirement listed in AASHTO Designation: M 240, Table 2 and the "(MS)" suffix shall be added to the type designation.

907-701.04.1.2--Alkali Content. All blended cement types in this Subsection shall meet the Mortar expansion requirements listed in AASHTO Designation: M 240, Table 2.

907-701.04.2--Replacement by Other Cementitious Materials. No additional cementitious materials, such as Portland cement, performance hydraulic cement, fly ash, GGBFS, metakaolin, or others, shall be added to or as a replacement for blended cement.

907-701.04.3--Exposure to Soluble Sulfate Conditions or Seawater. When Portland cement concrete or blended cement for soil stabilization is exposed to moderate soluble sulfate conditions or to seawater, where the moderate soluble sulfate condition is defined in Table 1, the blended cement shall meet the sulfate resistance requirement listed in AASHTO Designation: M 240, Table 2.

When Portland cement concrete or blended cement for soil stabilization is exposed to severe soluble sulfate conditions, where the severe soluble sulfate condition is defined in Table 1, blended cements shall not be used.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-702-3

CODE: (SP)

DATE: 05/08/2012

SUBJECT: Polyphosphoric Acid (PPA) Modification of Petroleum Asphalt Cement

Section 702.05, Petroleum Asphalt Cement, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows:

907-702.05--Petroleum Asphalt Cement. Delete the third paragraph of Subsection 702.05 on page 598, and substitute the following.

The bituminous material used in all types of asphalt mixtures shall conform to AASHTO Designation: M 320, Performance Grade PG 67-22, as modified in the table below, except that Polyphosphoric Acid (PPA) may be used at low dosage rates as a modifier to enhance the physical properties of a base binder to meet the requirements for Performance Grade PG 67-22. In addition, PPA may be used as a catalyst or mixing agent at low dosage rates in the production of Polymer Modified, Performance Grade PG 76-22.

When PPA is used as a modifier, in no case shall the PPA modifier be used to adjust the physical properties of the binder a full binder grade. For example: the base binder (unmodified) is graded as a PG 64-22 and should only be modified by the addition of PPA to a modified binder grade of PG 67-22.

When petroleum asphalt cement is modified by PPA, the following dosage limits shall be applied.

Grade	Dosage Limit
PG 67-22	0.75% by weight of binder
PG 76-22	0.50% by weight of binder

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SUPPLEMENT TO SPECIAL PROVISION NO. 907-703-10

DATE: 1/08/2013

SUBJECT: Aggregates

Before Subsection 907-703.06.1.2 on page 1, add the following.

907-703.06.1--Coarse Aggregates. Delete the third paragraph of Subsection 703.06.1 on page 613, and substitute the following.

When tested in accordance with AASHTO Designation: T 19, the dry rodded unit weight of all aggregates except expanded clay and shale shall not be less than 70 pounds per cubic foot.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

| SPECIAL PROVISION NO. 907-703-10

CODE: (SP)

| DATE: 06/06/2012

SUBJECT: Aggregates

Section 703, Aggregates, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows.

907-703.03.2.4--Gradation. Delete the last sentence of the last paragraph of Subsection 703.03.2.4 on page 611.

907-703.04--Aggregate for Crushed Stone Courses.

907-703.04.1--Coarse Aggregate. Delete the first paragraph of Subsection 703.04.1 on page 611, and substitute the following.

Coarse aggregate, defined as material retained on No. 8 sieve, shall be either crushed limestone, steel slag, granite, concrete, or combination thereof. Crushed concrete is defined as recycled concrete pavement, structural concrete, or other concrete sources that can be crushed to meet the gradation requirements for Size No. 825 B as modified below. In no case shall waste from concrete production (wash-out) be used as a crushed stone base.

907-703.04.2--Fine Aggregate. Delete the first sentence of the first paragraph of Subsection 703.04.2 on page 612, and substitute the following.

Fine aggregate, defined as material passing No. 8 sieve, shall be material resulting from the crushing of limestone, steel slag, granite, concrete, or combination thereof.

Delete the third paragraph of Subsection 703.04.2 on page 612.

907-703.04.3--Gradation. After the table in Subsection 703.04.3 on page 613, add the following.

If crushed concrete is used, the crushed material shall meet the gradation requirements of Size No. 825 B with the exception that the percent passing by weight of the No. 200 sieve shall be 2 – 18.

907-703.06--Aggregates for Hot Mix Asphalt.

907-703.06.1.2--Fine Aggregates. Delete the last sentence of Subsection 703.06.1.2 on page 614.

907-703.20.3--Gradation. Delete the table and notes in Subsection 703.20.3 at the top of page 626, and substitute the following.

PERCENT PASSING BY WEIGHT

Square Mesh Sieves	Shell	Coarse			Medium	Fine
		Size I	Size II Note (1)	Size III Note (3)		
3 inch	90-100			100		
2 1/2 inch				90-100		
2 inch		100				
1 1/2 inch		90-100	100	25-60		
1 inch		80-100	97-100			
3/4 inch		55-100	55-100	0-10		
1/2 inch		35-85	35-85	0-5	100	
3/8 inch	12-65	12-65		97-100		
No. 4, Note (2)	0-30	0-30		92-100		
No. 10	0-8	0-8		80-100	100	
No. 40				10-40	80-100	
No. 60				0-20	30-100	
No. 100					15-80	
No. 200	0-5	0-4	0-4	0-5	0-30	
PI Material Passing No. 40				6 or less	0	

Note (1): Size II is intended for use in bases in which portland cement is used.

Note (2): Ground shell shall contain at least 97% passing the No. 4 sieve.

Note (3): Size III is intended for use in stabilized construction entrances.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-711-4

CODE: (IS)

DATE: 06/26/2009

SUBJECT: Synthetic Structural Fiber Reinforcement

Section 711, Reinforcement and Wire Rope, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows:

After Subsection 711.03.4.3 on page 665, add the following:

907-711.04--Synthetic Structural Fiber. The synthetic structural fibers shall be approved for listing in the Department's "Approved Sources of Materials" prior to use. The synthetic structural fibers shall be added to the concrete and mixed in accordance with the manufacturer's recommended methods.

907-711.04.1--Material Properties. The fibers shall meet the requirements of ASTM Designation: C 1116, Section 4.1.3. The fibers shall be made of polypropylene, polypropylene/polyethylene blend, nylon, or polyvinyl alcohol (PVA).

907-711.04.2--Minimum Dosage Rate. The dosage rate shall be such that the average residual strength ratio ($R_{150,3.0}$) of fiber reinforced concrete beams is a minimum of 20.0 percent when the beams are tested in accordance with ASTM Designation: C 1609. The dosage rate for fibers shall be determined by the following.

The fiber manufacturer shall have the fibers tested by an acceptable, independent laboratory acceptable to the Department and regularly inspected by the Cement and Concrete Reference Laboratory of the National Institutes of Standards and Technology and approved to perform ASTM Designations: C 39, C 78, and C192.

The laboratory shall test the fibers following the requirements of ASTM Designation: C 1609 in a minimum of three (3) test specimens cast from the same batch of concrete, molded in 6 x 6 x 20-inch standard beam molds meeting the requirements of ASTM Designation: C 31. The beams shall be tested on an 18-inch span. The tests for $R_{150,3.0}$ shall be performed when the average compressive strength of concrete used to cast the beams is between 3500 and 4500 psi. The tests for compressive strength shall follow the requirements of ASTM Designation: C 39. The average compressive strength shall be determined from a minimum of two (2) compressive strength cylinders.

The value for $R_{150,3}$ shall be determined using the following equation:

$$R_{150,3.0} = \frac{f_{150,3.0}}{f_1} \times 100$$

The residual flexural strength ($f_{150,3.0}$) shall be determined using the following equation:

$$f_{150,3.0} = \frac{P_{150,3.0} \times L}{b \times d^2}$$

where:

$f_{150,3.0}$ is the residual flexural strength at the midspan deflection of $L/150$, (psi),

$P_{150,3.0}$ is the residual load capacity at the midspan deflection of $L/150$, (lbf),

L is the span, (in),

b is the width of the specimen at the fracture, (in), and

d is the depth of the specimen at the fracture, (in).

For a 6 x 6 x 20-inch beam, the $P_{150,3.0}$ shall be measured at a midspan deflection of 0.12 inch.

Additionally, $R_{150,3.0}$, $f_{150,3.0}$, and $P_{150,3.0}$ may also be referred to as R_{150}^{150} , f_{150}^{150} , and P_{150}^{150} respectively.

At the dosage rate required to achieve the minimum $R_{150,3}$, the mixture shall both be workable and the fibers shall not form clumps.

The manufacturer shall submit to the State Materials Engineer certified test reports from the independent laboratory showing the test results of each test specimen.

907-711.04.3--Job Control Requirements. The synthetic structural fibers shall be one from the Department's "Approved Sources of Materials."

At the required dosage rate, the mixture shall both be workable and the fibers shall not form clumps to the satisfaction of the Engineer. If the mixture is determined by the Engineer to not be workable or have clumps of fibers, the mixture may be rejected.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SUPPLEMENT TO SPECIAL PROVISION NO. 907-713-2

DATE: 04/04/2012

SUBJECT: Admixtures for Concrete

After the last sentence of the first paragraph of Subsection 907-713.02 on page 1, add the following.

Admixtures providing a specific performance characteristic(s) other than those of water reduction or set retardation shall meet the minimum requirements for Type S. For admixtures meeting the requirements for Type S, the manufacturer shall provide data to substantiate the specific performance characteristic(s) to the satisfaction of the State Materials Engineer.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

| SPECIAL PROVISION NO. 907-713-2

CODE: (IS)

| DATE: 11/09/2010

SUBJECT: Admixtures for Concrete

Section 713, Concrete Curing Materials and Admixtures, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows:

After the second paragraph of Subsection 713.01.2 on page 676, add the following.

Type 1-D compound may be used on bridge rails, median barriers, and other structures requiring a spray finish. When Type 1-D compound is used, it will be the Contractor's responsibility to assure that the compound has dissipated from the structure prior to applying the spray finish and that the spray finish adheres soundly to the structure.

Delete Subsection 713.02 on pages 676 & 677, and substitute the following:

907-713.02--Admixtures for Concrete. Air-entraining admixtures used in Portland cement concrete shall comply with AASHTO Designation: M 154. Set-retarding, accelerating, and/or water-reducing admixtures shall comply with AASHTO Designation: M 194. Water-reducing admixture shall meet the minimum requirements for Type A. Set-retarding admixtures shall meet the minimum requirements for Type D.

In order to obtain approval of an admixture, the State Materials Engineer shall have been furnished certified test reports, made by an acceptable independent laboratory regularly inspected by the Cement and Concrete Reference Laboratory of the National Institutes of Standards and Technology, which show that the admixture meets all the requirements of the applicable AASHTO Standard Specification.

The Department reserves the right to sample, for check tests, any shipment or lot of admixture delivered to a project.

The Department reserves the right to require tests of the material to be furnished, using the specific cement and aggregates proposed for use on the project, as suggested in AASHTO Designation: M 154 and outlined in AASHTO Designation: M 194.

After an admixture has been approved, the Contractor shall submit to the State Materials Engineer, with each new lot of material shipped, a certification from the manufacturer in accordance with the requirements of Subsection 700.05.1 and stating the material is of the same composition as originally approved and has not been changed or altered in any way. The requirement in Subsection 700.05.1(b) is not required on the certification from the manufacturer.

Admixtures containing chlorides will not be permitted.

Failure to maintain compliance with any requirement of these specifications shall be cause for rejection of any previously approved source or brand of admixture.

Admixtures shall only be used in accordance with the manufacturer's recommended dosage range as set forth in the manufacturer's approval request correspondence. When an admixture is used in Portland cement concrete, it shall be the responsibility of the Contractor to produce satisfactory results.

907-713.02.1--Source Approval. In order to obtain approval of an admixture, the Producer/Suppliers shall submit to the State Materials Engineer the following for review: certified test reports, made by an acceptable independent laboratory regularly inspected by the Cement and Concrete Reference Laboratory of the National Institutes of Standards and Technology, which show that the admixture meets all the requirements of the applicable AASHTO or Department Specification for the specific type and the dosage range for the specific type of admixture.

907-713.02.2--Specific Requirements. Admixtures containing chlorides will not be permitted.

907-713.02.3--Acceptance. The Department reserves the right to sample, for check tests, any shipment or lot of admixture delivered to a project.

The Department reserves the right to require tests of the material to be furnished, using the specific cement and aggregates proposed for use on the project, as suggested in AASHTO Designation: M 154 and outlined in AASHTO Designation: M 194.

Failure to maintain compliance with any requirement of these specifications shall be cause for rejection of any previously approved source or brand of admixture.

With each new lot of material shipped the Contractor shall submit to the State Materials Engineer, a notarized certification from the manufacturer showing that the material complies with the requirements of the applicable AASHTO or Department Specification.

When an admixture is used, it shall be the responsibility of the Contractor to produce satisfactory results.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

| SPECIAL PROVISION NO. 907-714-6

CODE: (IS)

| DATE: 11/09/2010

SUBJECT: Miscellaneous Materials

Section 714, Miscellaneous Materials, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows:

907-714.05--Fly Ash. Delete Subsections 714.05.1 & 714.05.2 on pages 680 & 681, and substitute the following:

907-714.05.1--General. The fly ash source must be approved for listing in the Department's "Approved Sources of Materials" prior to use. The acceptance of fly ash shall be based on certified test reports, certification of shipment from the supplier, and tests performed on samples obtained after delivery in accordance with the Department's Materials Division Inspection, Testing, and Certification Manual and Department SOP.

Different classes of fly ash or different sources of the same class shall not be mixed or used in the construction of a structure or unit of a structure without written permission from the Engineer.

The Contractor shall provide suitable means for storing and protecting the fly ash from dampness. Separate storage silos, bins, or containers shall be provided for fly ash. Fly ash which has become partially set or contains lumps of caked fly ash shall not be used.

The temperature of the bulk fly ash shall not be greater than 165°F at the time of incorporation into the work.

All classes of fly ash shall meet the supplementary option chemical requirement for available alkalis listed in AASHTO Designation: M 295, Table 2. Class F fly ash shall have a calcium oxide (CaO) content of less than 6.0%. Class C fly ash shall have a CaO content of greater than or equal to 6.0%.

The replacement of Portland cement with fly ash shall be in accordance with the applicable replacement content specified in Subsection 907-701.02.2.

In addition to these requirements, fly ash shall meet the following specific requirements for the intended use.

907-714.05.2--Fly Ash for Use in Concrete. When used with Portland cement in the production of concrete or grout, the fly ash shall meet the requirements of AASHTO Designation: M 295, Class C or F, with the following exception:

| The loss on ignition shall not exceed 6.0 percent.

No additional cementitious materials, such as blended hydraulic cement, GGBFS, metakaolin, or others, shall be added to or as a replacement for Portland cement when used with fly ash.

907-714.06--Ground Granulated Blast Furnace Slag (GGBFS). Delete Subsection 714.06.1 on page 681, and substitute the following:

907-714.06.1--General. The GGBFS source must be approved for listing in the Department's "Approved Sources of Materials" prior to use. The acceptance of GGBFS shall be based on certified test reports, certification of shipment from the supplier, and tests performed on samples obtained after delivery in accordance with the Department's Materials Division Inspection, Testing, and Certification Manual and Department SOP.

The Contractor shall provide suitable means for storing and protecting the GGBFS against dampness and contamination. Separate storage silos, bins, or containers shall be provided for GGBFS. GGBFS which has become partially set, caked or contains lumps shall not be used.

The State Materials Engineer shall be notified in writing of the nature, amount and identity of any processing or other additions made to the GGBFS during production.

GGBFS from different mills shall not be mixed or used alternately in any one class of construction or structure without written permission from the Engineer; except that this requirement will not be applicable to cement treatment of design soils or bases.

No additional cementitious materials, such as blended hydraulic cement, fly ash, metakaolin, or others, shall be added to or as a replacement for Portland cement when used with GGBFS in the production of concrete. The replacement of Portland cement with GGBFS shall be in accordance with the applicable replacement content specified in Subsection 907-701.02.2.

Delete Subsection 714.07 on page 682, and substitute the following:

907-714.07--Additional Cementitious Materials.

907-714.07.1--Metakaolin.

907-714.07.1.1--General. Metakaolin shall only be used as a supplementary cementitious material in Portland cement concrete for compliance with the requirements for cementitious materials exposed to soluble sulfate conditions. Metakaolin from different sources shall not be mixed or used alternately in any one class of construction or structure without written permission from the Engineer. No additional cementitious materials, such as blended hydraulic cement, fly ash, GGBFS, or others, shall be added to or as a replacement for Portland cement when used with metakaolin in the production of concrete.

The State Materials Engineer shall be notified in writing of the nature, amount and identity of any processing, or other additions made to the metakaolin during production.

907-714.07.1.2--Source Approval. The approval of each metakaolin source shall be on a case by case basis as determined by the State Materials Engineer. In order to obtain approval of a metakaolin source, the Producer/Suppliers shall submit to the State Materials Engineer the

following for review: certified test reports, made by an acceptable, independent laboratory regularly inspected by the Cement and Concrete Reference Laboratory of the National Institutes of Standards and Technology, which show that the metakaolin meets all the requirements of AASHTO Designation: M295, including the Effectiveness in contributing to sulfate resistance, Procedure A, listed in AASHTO Designation: M295, Table 4 for Supplementary Optional Physical Requirements, and other requirements listed herein.

In order to demonstrate effectiveness in contributing to sulfate resistance, included in this test data shall be results of metakaolin from the proposed source tested in accordance with ASTM Designation: C 1012. There shall be two sets of test specimens per the following:

- a. One set of test specimens shall be prepared using a Type I Portland cement meeting the requirements of AASHTO Designation: M85 and having a tricalcium aluminate (C_3A) content of more than 8.0%,
- b. One set of test specimens shall be prepared using a Type II Portland cement meeting the requirements of AASHTO Designation: M85.
- c. The proposed metakaolin shall be incorporated at the rate of 10% cement replacement in each set of test specimens and shall meet both of the acceptance criteria listed below for source approval.

The requirement for acceptance of the test sample using Type I Portland cement is an expansion of 0.10% or less at the end of six months. The requirement for acceptance of the test sample using Type II Portland cement is an expansion of 0.05% or less at the end of six months.

907-714.07.1.3--Storage. The Contractor shall provide suitable means for storing and protecting the metakaolin against dampness and contamination. Metakaolin which has become partially set, caked, or contains lumps shall not be used.

907-714.07.1.4--Specific Requirements. Metakaolin shall meet the requirements of AASHTO Designation: M 295, Class N with the following modifications:

1. The sum of $SiO_2 + Al_2O_3 + Fe_2O_3$ shall be at least 85%. The Material Safety Data Sheet shall indicate that the amount of crystalline silica, as measured by National Institute of Occupation Safety and Health (NIOSH) 7500 method, after removal of the mica interference, is less than 1.0%.
2. The loss on ignition shall be less than 3.0%.
3. The available alkalies, as equivalent Na_2O , shall not exceed 1.0%.
4. The amount of material retained on a No. 325 mesh sieve shall not exceed 1.0%.
5. The strength activity index at seven (7) days shall be at least 85%.

907-714.07.1.5--Acceptance. With each new lot of material shipped the Contractor shall submit to the State Materials Engineer a certified test report from the manufacturer showing that the material meets the requirements AASHTO Designation: M295, Class N and the requirements of this Subsection.

The Department reserves the right to sample, for check tests, any shipment or lot of metakaolin delivered to a project.

907-714.07.2--Silica Fume.

907-714.07.2.1--General. Silica fume shall only be used as a supplementary cementitious material in Portland cement concrete for compliance with the requirements for cementitious materials exposed to soluble sulfate conditions. Silica fume from different sources shall not be mixed or used alternately in any one class of construction or structure without written permission from the Engineer. No additional cementitious materials, such as blended hydraulic cement, performance hydraulic cement, fly ash, GGBFS, or others, shall be added to or as a replacement for Portland cement when used with silica fume in the production of concrete.

The State Materials Engineer shall be notified in writing of the nature, amount and identity of any processing, or other additions made to the silica fume during production.

907-714.07.2.2--Source Approval. The approval of each silica fume source shall be on a case by case basis as determined by the State Materials Engineer. In order to obtain approval of a silica fume source, the Producer/Suppliers shall submit to the State Materials Engineer the following for review: certified test reports, made by an acceptable, independent laboratory regularly inspected by the Cement and Concrete Reference Laboratory of the National Institutes of Standards and Technology, which show that the silica fume meets all the requirements of AASHTO Designation: M307, Table 3, including the Sulfate resistance expansion, listed in the table for Optional Physical Requirements, and other requirements listed herein.

In order to demonstrate effectiveness in contributing to sulfate resistance, included in this test data shall be results of silica fume from the proposed source tested in accordance with ASTM Designation: C 1012. There shall be two sets of test specimens per the following:

- a. One set of test specimens shall be prepared using a Type I Portland cement meeting the requirements of AASHTO Designation: M85 and having a tricalcium aluminate (C_3A) content of more than 8.0%,
- b. One set of test specimens shall be prepared using a Type II Portland cement meeting the requirements of AASHTO Designation: M85.
- c. The proposed silica fume shall be incorporated at the rate of 8% cement replacement in each set of test specimens and shall meet both of the acceptance criteria listed below for source approval.

The requirement for acceptance of the test sample using Type I Portland cement is an expansion of 0.10% or less at the end of six months. The requirement for acceptance of the test sample using Type II Portland cement is an expansion of 0.05% or less at the end of six months.

907-714.07.2.3--Storage. The Contractor shall provide suitable means for storing and protecting the silica fume against dampness and contamination. Silica fume which has become partially set, caked, or contains lumps shall not be used.

907-714.07.2.4--Acceptance. With each new lot of material shipped, the Contractor shall submit to the State Materials Engineer a certified test report from the manufacturer showing that the material meets the Chemical and Physical Requirements of AASHTO Designation: M307.

The Department reserves the right to sample, for check tests, any shipment or lot of silica fume

delivered to a project.

Delete Subsection 714.11.6 on pages 690 and 691, and substitute the following:

907-714.11.6--Rapid Setting Cementitious Patching Compounds for Concrete Repair.

Rapid setting concrete patching compounds must be approved for listing in the Department's "Approved Sources of Materials" prior to use. Upon approval, a product must be recertified every four (4) years to remain on the "Approved Sources of Materials" list. Each product shall be pre-measured and packaged dry by the manufacturer. All liquid solutions included by the manufacturer as components of the packaged material shall be packaged in a watertight container. The manufacturer may include aggregates in the packaged material or recommend the addition of Contractor furnished aggregates.

The type, size and quantity of aggregates, if any, to be added at the job site shall be in accordance with the manufacturer's recommendations and shall meet the requirements of Subsection 703.02 for fine aggregate and Subsection 703.03 for coarse aggregate. Required mixing water to be added at the job site shall meet the requirements of Subsection 714.01.2.

Only those bonding agents, if any, recommended by the manufacturer of the grout or patching compounds may be used for increasing the bond to old concrete or mortar surfaces.

Patching compounds containing soluble chlorides will not be permitted when in contact with steel.

Site preparation, proportioning of materials, mixing, placing and curing shall be performed in accordance with the manufacturer's recommendation for the specific type of application, and the Contractor shall furnish a copy of these recommendations to the Engineer.

Rapid setting cementitious concrete patching compounds, including components to be added at the job site, shall conform to the following physical requirements:

Non-shrink cementitious grouts shall not be permitted for use.

Compressive strength shall equal or exceed 3000 psi in 24 hours in accordance with ASTM C 928 for Type R2 concrete or mortar.

Bond strength shall equal or exceed 1000 psi in 24 hours in accordance with ASTM C 928 for Type R2 concrete or mortar.

The material shall have a maximum length change of $\pm 0.15\%$ in accordance with ASTM C 928 for Type R2 concrete or mortar.

The Contractor shall furnish to the Engineer three copies of the manufacturer's certified test report(s) showing results of all required tests and certification that the material meets the specifications when mixed and placed in accordance with the manufacturer's instructions. When the mixture is to be placed in contact with steel, the certification shall further state that the packaged material contains no chlorides. Certified test report(s) and certification shall be furnished for each lot in a shipment.

The proportioning of materials must be approved by the State Materials Engineer and any subsequent change in proportioning must also be approved. A sample of each component shall be submitted to the Engineer along with the quantity or percentage of each to be blended. At least 45 days must be allowed for initial approval.

The proportioning of materials for subsequent lots may be approved by the State Materials Engineer upon receipt of certification from the manufacturer that the new lot of material is the same composition as that originally approved by the Department and that the material has not been changed or altered in any way.

907-714.11.7--Commercial Grout for Anchoring Doweled Tie Bars in Concrete. Before Subsection 714.11.7.1 on page 691, add the following:

Approved Non-“Fast Set” Epoxy anchor systems as specified below may be used for the repair of concrete pavements that do not involve permanent sustained tension applications or overhead applications.

“*Fast Set Epoxy*” may not be used for any Adhesive Anchor Applications. Adhesive Anchor Systems (Fast Set epoxy or otherwise) shall not be used for permanent sustained tension applications or overhead applications. “Fast Set Epoxy” refers to an epoxy produced by the Sika Corporation called Sikadur AnchorFix-3 and repackaged for sale under a variety of names/companies listed at the Federal Highway Administration web site at the following link:

<http://www.fhwa.dot.gov/Bridge/adhesives.cfm>

907-714.11.7.4--Acceptance Procedure. After the last sentence of the first paragraph of Subsection 714.11.4 on page 691, add the following:

Upon approval, a product must be recertified every four (4) years to remain on the “Approved Sources of Materials” list.

907-714.11.8--Epoxy Joint Repair System.

907-714.11.8.1--General. After the last sentence of the first paragraph of Subsection 714.11.8.1 on page 692, add the following:

Upon approval, a product must be recertified every four (4) years to remain on the “Approved Sources of Materials” list.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SUPPLEMENT TO SPECIAL PROVISION NO. 907-804-13

| **DATE:** **02/14/2013**

SUBJECT: **Concrete Bridges And Structures**

After the second paragraph of Subsection 907-804.02.10 on page 2, add the following.

After the first paragraph of Subsection 804.02.10 on page 850, add the following.

If the Contractor chooses to cure the concrete in accordance with the requirements listed under **Length of Time Defined by Development of Compressive Strength** in Subsection 907-804.03.17, the compressive strength/maturity relationship shall be developed for the mixture design for a minimum of 28 days following the requirements of Subsection 907-804.03.15. The compressive strength/maturity relationship information shall be submitted with the mixture design information.

In the ** Note of Subsection 907-804.02.10 on page 2, delete “metakaolin” from the list of other cementitious materials.

After the first sentence of the last paragraph of Subsection 907-804.02.10 on page 3, add the following.

Mixture designs containing accelerating admixtures will not be approved. Admixtures providing a specific performance characteristic other than those of water reduction or set retardation may be used in accordance with the manufacturer’s recommended dosage range.

After Subsection 907-804.02.10.1.1 on page 3, add the following.

907-804.02.10.1.2--Proportioning on the Basis of Laboratory Trial Mixtures. Delete subparagraph d) of Subsection 804.02.10.1.2 on pages 852 & 853, and substitute the following.

- d) For each proposed mixture, at least three compressive test cylinders shall be made and cured in accordance with AASHTO Designation: T 126. Each change of water-cementitious ratio shall be considered a new mixture. The cylinders shall be tested for strength in accordance with AASHTO Designation: T 22 and shall be tested at 28 days.

After Subsection 907-804.02.10.3 on page 4, add the following.

After Subsection 804.02.10.3 on page 853, add the following.

907-804.02.10.3.1--Slump Retention of Class DS Concrete Mixture Designs. Prior to concrete placement, the Contractor shall provide test results of a slump loss test using approved methods to demonstrate that the mixture meets the four hour requirement in Subsection 907-803.02.7.1. These tests shall be conducted successfully by an approved testing laboratory within

30 days prior to installation of the trial shaft, with personnel from the Department's Central Laboratory present. The slump loss test shall be conducted at temperatures and conditions similar to those expected at the job site at the time of the installation of the trial shaft. The sample for the slump loss test shall be from a minimum batch size of four cubic yards of concrete. If the time between the previous successful slump loss test and the installation of the trial shaft exceeds 30 days, another successful slump loss test shall be performed on the first truckload of concrete as part of the installation of the trial shaft. This requirement limiting the time between the previous slump loss test and an installation of the trial shaft also applies to Class DS concrete mixture designs being transferred from another project. During any shaft installation a slump loss test shall be conducted by the Contractor at the direction of the Engineer from the concrete at the site for verification of slump loss requirements using a sample from a minimum batch size of four cubic yards of concrete.

Before Subsection 907-804.02.12.3 on page 5, add the following.

907-804.02.12.1.1--Elements of Plan. After item 3) in Subsection 804.02.12.1.1 on page 855, add the following.

4) Job Site Batch Adjustments by Addition of Chemical Admixtures:

The Plan shall address if the Contractor intends to adjust either the slump and/or total air content of a batch on the job site by adding chemical admixture(s) to a batch. The Contractor shall include the names of the personnel designated to perform this batch adjustment, the equipment used to add the chemical admixture(s), and the procedure by which the batch adjustment will be accomplished. Only the Contractor's designated personnel shall adjust a batch. Only calibrated dispensing equipment shall be used to add chemical admixture(s) to a batch. Only the procedure described in section of the Plan shall be utilized.

If the maximum permitted slump or total air content is exceeded after the addition of admixtures at the job site, the concrete shall be rejected.

If the Contractor elects to utilize Job Site Batch Adjustments by Addition of Chemical Admixture within Item 2, Procedures for Corrective Actions for Non Compliance of Specifications, to adjust batches which do not meet the minimum specification requirements for slump and/or total air content, no more than three batches on any one project shall be allowed to be adjusted.

5) Construction of Concrete Bridge Decks, including the following:

- the description of the equipment used for placing concrete on the bridge deck in accordance with Subsection 907-804.03.6 and, as applicable, Subsections 907-804.03.7 and 907-804.03.8 including any accessories added to the pump to ensure the entrained air in the concrete mixture remains entrained during pumping and depositing of the concrete mixture,
- the description of and the number of pieces of equipment used to consolidate the concrete in accordance with Subsection 907-804.03.6.2,

- the description of the equipment used to finish the bridge deck in accordance with Subsection 907-804.03.19.7,
- the plan for ensuring a continuous rate of finishing the bridge deck without delaying the application of curing materials within the time specified in Subsection 907-804.03.17, including ensuring a continuous supply of concrete throughout the placement with an adequate quantity of concrete to complete the deck and filling diaphragms and end walls in advance of deck placement,
- the plan for applying the curing materials within the time specified in Subsection 907-804.03.17,
- the description of the powered fogging equipment in accordance with Subsection 907-804.03.17,
- a sample of the documentation used as the daily inspection report for ensuring maintenance of the continuous wet curing in accordance with Subsection 907-804.03.17, as required,
- the description of the equipment used to apply the liquid membrane, including but not limited to, the nozzles, pumping/pressurization equipment, and liquid membrane tanks, in accordance with Subsection 907-804.03.17,
- the method for determining the rate of applied liquid membrane meets the application rate requirements in accordance with Subsection 907-804.03.17,
- a sample of the documentation used for the application rate verification of the liquid membrane in accordance with Subsection 907-804.03.17.

After Subsection 907-804.03.6.2 on page 7, add the following.

907-804.03.8--Pumping Concrete. Delete the second paragraph of Subsection 804.03.8 on page 866, and substitute the following.

Where concrete mixture is conveyed and placed by mechanically applied pressure (pumping), the equipment shall be suitable in kind and adequate in capacity for the work. The Contractor shall select concrete mixture proportions such that the concrete mixture is pumpable and placeable with the selected equipment.

The pumping equipment shall be thoroughly cleaned prior to concrete placement. Excess form release agent shall be removed from the concrete pump hopper. The Contractor shall prime the pump at no additional cost to the Department by pumping and discarding enough concrete mixture to produce a uniform mixture exiting the pump. At least 0.25 cubic yard of concrete mixture shall be pumped and discarded to prime the pump. This shall be accomplished by using the pump to fill a commercially-available six (6) cubic foot wheelbarrow to overflowing or filling a commercially-available eight (8) cubic foot wheel barrow to level. Only concrete mixture shall be added directly into the concrete pump hopper after placement has commenced. If anything other than concrete mixture is added to the concrete pump hopper, all concrete mixture in the concrete pump hopper and pump line shall be discarded and the pump re-primed at no additional cost to the Department.

The discharge end of the pump shall be of such a configuration that the concrete does not move in the pump line under its own weight. The intent of this requirement is to ensure that entrained air in the concrete mixture remains entrained during pumping and depositing the concrete mixture. This shall be accomplished with one or both of the following:

- a minimum 10-foot flexible hose attached to the discharge end of a steel reducer having a minimum length of three (3) feet and a minimum reduction in area of 20% which is attached to the discharge end of the pump line, or
- a flexible reducing hose to the discharge end of the pumpline with a minimum reduction in area of 20% over a minimum 10-foot hose length.

Regardless of the configuration chosen, the Contractor shall ensure that the concrete is pumped and does not free-fall more than five (5) feet within the entire length of pump line and after discharge from the end of pump line.

The Contractor shall not have any type of metal elbow, metal pipe, or other metal fitting within five (5) feet of any person during discharge of concrete mixture.

Boom pumps shall have a current Concrete Pump Manufacturers Association's ASME/ANSI B30.27 certification. Equipment added to the boom and pump line shall meet the pump manufacturer's specifications and shall not exceed the manufacturer's maximum recommended weight limit for equipment added to the boom and pump line.

The operation of the pump shall be such that a continuous stream of concrete without air pockets is produced. When pumping is completed, the concrete remaining in the pipe line, if it is to be used, shall be ejected in such a manner that there will be no contamination of the concrete or separation of the ingredients. After this operation, the entire equipment shall be thoroughly cleaned.

Before Subsection 907-804.03.15 on page 7, add the following.

907-804.03.14.2--Stay-In-Place Metal Forms. Delete the sentence in Subsection 804.03.14.2 on page 871 and substitute the following.

Stay-in-place (SIP) metal forms are corrugated metal sheets permanently installed between the supporting superstructure members. After the concrete has cured, these forms shall remain in place as permanent, non-structural members of the bridge.

Pay quantities for bridge deck concrete will be computed from the dimensions shown in the Contract Plans with no allowance for changes in deflection and /or changes in dimensions necessary to accommodate the SIP metal forms.

There will be no direct payment for the cost of the forms and form supports, or any material, tools, equipment, or labor incidental thereto, but the cost shall be considered absorbed in the contract unit price for bridge deck concrete.

Before fabricating any material, three (3) complete sets of SIP metal form shop drawings and design calculations, bearing the Design Engineer's Seal, shall be submitted to the Director of Structures, State Bridge Engineer, through the Project Engineer, for review. The Contractor's SIP metal form Design Engineer shall be a MS Registered Professional Engineer who is knowledgeable in the field of structural design.

In no case shall additional dead load produced by the use of SIP metal forms overstress any bridge component. Design calculations shall indicate any additional dead load from SIP metal form self-weight, form support hangers, concrete in flutes, concrete due to form deflection, etc. not included in the Contract Plans. The additional dead loads shall be clearly labeled and tabulated on the shop drawings. Bridge Division will evaluate the additional load for overstress of the bridge components. In the event that the additional dead load produces an overstress in any bridge component, Bridge Division will reject the Contractor's design. Deflection and loads produced by deflection of the SIP metal forms shall be considered and indicated in the design calculations.

The cambers and deflections provided in the Contract Plans do not consider the effects of SIP metal forms. The Contractor's Engineer shall take into account the weight of the forms and any additional dead load when developing the "Bridge Superstructure Construction Plan".

For the purpose of reducing any additional dead load produced by the SIP metal forms, the flutes of SIP metal forms may be filled with polystyrene foam. When polystyrene foam is used to fill the forms, the form flutes shall be filled completely; no portion of the polystyrene foam shall extend beyond the limits of the flutes. The Contractor shall ensure that the polystyrene foam remains in its required position within flutes during the entire concrete placement process. The Contractor shall not use reinforcing steel supports or other accessories in such a manner as to cause damage to the polystyrene foam. All damaged polystyrene foam shall be replaced to the satisfaction of the Project Engineer. All welding of formwork shall be completed prior to placement of polystyrene foam.

For bridges not located in horizontal curves, the Contractor may reduce the additional dead load by matching the flute spacing with the transverse steel spacing of the bottom layer. The bottom longitudinal layer of steel shall have one (1) inch of minimum concrete cover measured from the bottom of the reinforcing to the top of the flute. The Contractor will not be allowed to vary the reinforcing steel spacing or size from the Contract Plans for the purpose of matching flute spacing.

907-804.03.14.2.1--Materials. SIP metal forms and supports shall meet the requirements of ASTM Designation: A653 having a coating designation G165. Form materials that are less than 0.03-inch uncoated thickness shall not be allowed.

907-804.03.14.2.2--Certification. The Contractor shall provide written certification from the manufacturer stating the product meets the requirements of this specification to the Project Engineer along with the delivery of the coated forms to the job site.

All welds shall be performed by certified welders meeting the requirements of the approved shop drawings.

907-804.03.14.2.3--Polystyrene Foam. The polystyrene foam shall be comprised of expanded polystyrene manufactured from virgin resin of sufficient density to support the weight of concrete without deformation. The polystyrene foam shall be extruded to match the geometry of the flutes and provide a snug fit. The polystyrene foam shall have a density of not less than 0.8 pounds per cubic foot. The polystyrene foam shall have water absorption of less than 2.6% when tested according to ASTM Designation: C272. The Contractor shall provide written certification

from the manufacturer stating the polystyrene foam product meets the requirements of this specification to the Project Engineer along with the delivery of the coated forms to the job site.

907-804.03.14.2.4--Design. The design of the SIP metal forms shall meet the following criteria.

1. The maximum self-weight of the stay in place metal forms, plus the weight of the concrete or expanded polystyrene required to fill the form flutes (where used), shall not exceed 20 psf.
2. The forms shall be designed on the basis of dead load of form, reinforcement, and plastic concrete plus 50 pounds per square foot for construction loads. The design shall use a unit working stress in the steel sheet of not more than 0.725 of the specified minimum yield strength of the material furnished, but not to exceed 36,000 psi.
3. Deflection under the weight of the forms, reinforcement, and plastic concrete shall not exceed 1/180 of the form span or 1/2 inch, whichever is less, for form spans of 10 feet or less, or 1/240 of the form span or 3/4 inch, whichever is less, for form spans greater than 10 feet.
4. The design span of the form shall equal the clear span of the form plus two (2) inches. The span shall be measure parallel to the form flutes.
5. Physical design properties shall be computed in accordance with requirements of the AISI Specifications for the Design of Cold Formed Steel Structural Members, latest published edition.
6. The design concrete cover required by the plans shall be maintained for all reinforcement.
7. The plan dimensions of both layers of primary deck reinforcement from the top surface of the concrete deck shall be maintained.
8. The SIP metal form shall not be considered as lateral bracing for compression flanges of supporting structural members.
9. SIP metal forms shall not be used under closure pours or in bays where longitudinal slab construction joints are located. SIP metal forms shall not be used under cantilevered slabs such as the overhang outside of fascia members.
10. Forms shall be secured to the supporting members by means other than welding directly to the member. Welding to the top flanges of steel stringers and/or girders shall not be allowed. Alternate installation procedures shall be submitted addressing this condition.

907-804.03.14.2.5--Construction. SIP metal form sheets shall not rest directly on the top of the stringer or floor beam flanges. Sheets shall be fastened securely to form supports, and maintain a minimum bearing length of one (1) inch at each end for metal forms. Form supports shall be placed in direct contact with the flange of the stringer or floor beam. All attachments for coated metal forms shall be made by bolts, clips, screws, or other approved means.

907-804.03.14.2.6--Form Galvanizing Repairs. Where forms or their installation are unsatisfactory in the opinion of the Project Engineer, either before or during placement of the concrete, the Contractor shall correct the defects before proceeding with the construction work. The cost of such corrective work shall be at the sole expense of the Contractor. Minor heat discoloration in areas of welds shall not be touched up.

907-804.03.14.2.7--Placing of Concrete. The Contractor shall insure that concrete placement does not damage the SIP metal forms. The concrete shall be vibrated to avoid honeycomb and voids, especially at construction joints, expansion joints, valleys and ends of form sheets. Approved pouring sequences shall be used. Calcium chloride or any other admixture containing chloride salts shall not be used in the concrete. The completed SIP metal form system shall be sufficiently tight to prevent leakage of mortar or concrete.

907-804.03.14.2.8--Inspection. The Project Engineer will observe the Contractor's method of construction during all phases of the construction of the bridge deck slab, including the installation of the SIP metal form system; location and fastening of the reinforcement; composition of concrete items; mixing procedures, concrete placement, and vibration; and finishing of the bridge deck. Should the Project Engineer determine that the procedures used during the placement of the concrete warrant inspection of the underside of the deck, at least one section of the metal forms shall be removed in each span for this purpose. This shall be done as soon after placing the concrete as practical in order to provide visual evidence that the concrete mix and the procedures are obtaining the desired results. An additional section shall be removed in any span if the Project Engineer determines that there has been any change in the concrete mix or in the procedures warranting additional inspection.

If, in the Project Engineer's judgment, inspection is needed to check for defects in the bottom of the deck or to verify soundness, the SIP metal forms shall be sounded with a hammer after the deck concrete has been in place a minimum of two days. If sounding discloses areas of doubtful soundness to the Project Engineer, the SIP metal forms shall be removed from such areas for visual inspection after the concrete has attained adequate strength. The SIP metal bridge deck forms shall be removed at no expense to the State.

At locations where sections of the metal forms have been removed, the Project Engineer will not require the Contractor to replace the metal forms. The adjacent metal forms and supports shall be repaired to present a neat appearance and to ensure their satisfactory retention. As soon as the form is removed, the Project Engineer will examine the concrete surfaces for cavities, honeycombing, and other defects. If irregularities are found and the Project Engineer determines that these irregularities do not justify rejection of the work, the concrete shall be repaired as directed by the Project Engineer. If the Project Engineer determines that the concrete where the form is removed is unsatisfactory, additional metal forms as necessary shall be removed to inspect and repair the slab, and the Contractor's method of construction shall be modified as required to obtain satisfactory concrete in the slab. All unsatisfactory concrete shall be removed and replaced as directed at no expense to the State.

If the method of construction and the results of the inspections as outlined above indicate that sound concrete has been obtained throughout the slabs, the amount of sounding and form removal may be reduced when approved by the Project Engineer.

The Contractor shall provide a safe and convenient means of conducting of the inspection.

Delete Table 6 of Subsection 907-804.03.15 on page 8, and substitute the following.

Table 6
Minimum Compressive Strength Requirements for Form Removal

Forms:

Columns	1000 psi
Side of Beams	1000 psi
Walls not under pressure	1000 psi
Other Parts	1000 psi

Centering:

Under Beams	2400 psi
Under Bent Caps	2000 psi

Limitation for Placing Beams on:

Pile Bents, pile under beam	2000 psi
Frame Bents, two or more columns	2200 psi
Frame Bents, single column	2400 psi

Forms for bridge deck slabs overhead and bridge deck slabs between beams shall be removed with the approval of the Engineer, between two weeks and four weeks after the removal of the wet burlap applied in accordance with Subsection 907-804.03.17.1, or application of liquid membrane applied in accordance with Subsection 907-804.03.17.2.

Delete the second paragraph of Subsection 907-804.03.16.1 on page 9, and substitute the following.

At the option of the Contractor with the approval of the Engineer, when concrete is placed during cold weather and there is a probability that the ambient temperatures will be lower than 40°F, an approved maturity meter may be used to determine concrete strengths by inserting probes into concrete placed in a structure. The minimum number of maturity meter probes required for each structural component shall be in accordance with Table 7. An approved insulating blanketing material shall be used to protect the work when ambient temperatures are less than 40°F and shall remain in place until the required concrete strength in Table 6 is achieved. Within 30 minutes of removal of the insulating blanketing material in any area, the Contractor shall have curing of the concrete established in accordance with the requirements in Subsection 907-804.03.17. Procedures for using the maturity meter and developing the strength/maturity relationship shall follow the requirements of AASHTO Designation: T 325 and ASTM Designation: C 1074 specifications. Technicians using the maturity meter or calculating strength/maturity graphs shall be required to have at least two hours of training prior to using the maturity equipment.

Before Subsection 907-804.03.19 on page 9, add the following.

907-804.03.17--Curing Concrete. Delete Subsection 804.03.17 on pages 874 & 875, and substitute the following.

Curing is defined as all actions taken to ensure the moisture and temperature conditions of freshly placed concrete exist so the concrete may develop its potential properties. Curing shall take place from the time of placement until its potential properties have developed. The Contractor shall use the guidance in ACI 308R-01 to:

- a) cure the concrete in such a manner as to prevent premature moisture loss from the concrete,
- b) supply additional moisture to the concrete as required in order to ensure sufficient moisture within the concrete, and
- c) maintain a concrete temperature beneficial to the concrete.

Curing in accordance with the requirements in either Subsection 907-804.03.17.1 or Subsection 907-804.03.17.2 shall be completely established within 20 minutes after finishing, except as noted for bridge decks. Finishing is complete when the pan drag, burlap drag, or other is complete.

The length of time for curing shall be maintained in accordance with either of the following:

1. Prescribed Length of Time:

- a) Curing following the requirements of Subsection 804.03.17.1 shall continue uninterrupted for at least 14 days.
- b) Curing following the requirements of Subsection 804.03.17.2 shall continue uninterrupted for at least 10 days.

OR

2. Length of Time Defined by Development of Compressive Strength:

Curing following the application requirements of Subsection 907-804.03.17.1 or Subsection 907-804.03.17.2 shall continue uninterrupted for each day's production until the compressive strength of the concrete exceeds 75% of the 28-day compressive strength submitted as the Basis of Proportioning per Subsection 907-804.02.10.1. Therefore, if an area is being cured in accordance with Subsection 907-804.03.17.1, the curing by wet burlap shall continue until the concrete in that area has attained a minimum of 75% of the 28-day compressive strength submitted as the Basis of Proportioning per Subsection 907-804.02.10.1. Likewise, if an area is being cured in accordance with Subsection 907-804.03.17.2, the curing by liquid membrane shall continue until the concrete in that area has attained a minimum of 75% of the 28-day compressive strength submitted as the Basis of Proportioning per Subsection 907-804.02.10.1.

The compressive strength of the concrete may be determined by the use of maturity meter in accordance with Subsection 907-804.03.15.

907-804.03.17.1--Water With Waterproof Cover. All burlap shall be completely saturated and wet prior to placing it on the concrete. The burlap shall have been fully soaked in water for a minimum of 12 hours prior to placement on the concrete.

For bridge decks, the Contractor shall apply one (1) layer of saturated burlap within 20 minutes of the initial strike-off for bridges without a skew and 25 minutes of the initial strike-off for bridges with a skew. For all other concrete, the Contractor shall apply one (1) layer of saturated burlap within 20 minutes of completing finishing.

Following the first layer of burlap, the Contractor shall apply a second layer of saturated burlap within five (5) minutes of applying the first layer. The concrete surface shall not be allowed to dry after strike-off or at any time during the curing period.

The Contractor shall maintain the burlap in a fully wet condition using powered fogging equipment capable of producing a fog spray of atomized droplets of water until the concrete has gained sufficient strength to allow foot traffic without the foot traffic marring the surface of the concrete. Burlap shall not be maintained in the fully wet condition using equipment which does not produce a fog spray of atomized droplets of water or by use of manually pressurized sprayers. For bridge decks, once the concrete has gained sufficient strength to allow foot traffic which does not mar the surface of the concrete, soaker hoses shall be placed on the burlap. The soaker hoses shall then be supplied with running water continuously to maintain continuous saturation of all burlap and the entire concrete surface.

If there is a delay in the placement of the first layer of saturated burlap outside the time limit, the struck-off and finished concrete shall be kept wet by use of the powered fogging equipment used to keep the burlap wet.

White polyethylene sheets shall be placed on top of the wet burlap and, as applicable, soaker hoses covering the entire concrete surface as soon as practical and not more than 12 hours after the placement of the concrete. White polyethylene sheets of the widest practical width shall be used, overlapping adjacent sheets a minimum of six inches (6") and tightly sealed with an adhesive like pressure sensitive tape, mastic, glue, or other approved methods to form a complete waterproof cover of the entire concrete surface. White polyethylene sheets which overlap a minimum of two feet (2') may be held in place using means other than an adhesive. The white polyethylene sheets shall be secured so that wind will not displace them. The Contractor shall immediately repair the broken or damaged portions or replace sections that have lost their waterproof qualities.

If burlap and/or white polyethylene sheets are temporarily removed for any reason during the curing period, the Contractor shall keep the entire exposed area continuously wet. The saturated burlap and white polyethylene sheets shall be replaced, resuming the specified curing conditions, as soon as possible.

The Contractor shall inspect the concrete surface once every 8 hours for the entirety of the curing period, so that all areas remain wet for the entire curing period and all curing requirements are satisfied and document the inspection in accordance with Subsection 907-804.03.17.1.1.

At the end of the curing period, one coating of liquid membrane shall be applied following the requirements of Subsection 907-804.03.17.1.2. The purpose of the coating of liquid membrane is

to allow for slow drying of the concrete. The application of liquid membrane to any area shall be complete within 30 minutes of the beginning of removal of the white polyethylene sheets, soaker hoses, and burlap from this area.

907-804.03.17.1.1--Documentation. The Contractor shall provide the Engineer with a daily inspection report that includes:

- documentation that identifies any deficiencies found (including location of deficiency);
- documentation of corrective measures taken;
- a statement of certification that all areas are wet and all curing material is in place on the entire bridge deck;
- documentation showing the time and date of all inspections and the inspector's signature;
- documentation of any temporary removal of curing materials including location, date and time, length of time curing was removed, and means taken to ensure exposed area was kept continuously wet.

907-804.03.17.1.2--Liquid Membrane. At the end of the 14-day wet curing period the wet burlap and polyethylene sheets shall be removed and within 30 minutes, the Contractor shall apply white liquid membrane to the deck. The liquid membrane shall be thoroughly mixed within the time recommended by the liquid membrane producer but no more than an hour before use. If the use of liquid membrane results in a streaked or blotched appearance, the method shall be stopped and water curing applied until the cause of defective appearance is corrected.

The liquid membrane shall be applied when no free water remains on the surface but while the surface is still wet. The liquid membrane shall be applied according to the manufacturer's instructions with a minimum spreading rate per coat of one (1) gallon per 200 square feet of concrete surface. If the concrete is dry or becomes dry, the Contractor shall thoroughly wet it with water applied as a fog spray by means of approved equipment.

The application of liquid membrane shall be accomplished by the use of power applied spray equipment using nozzles and other equipment recommended by the liquid membrane producer. Manually pressurized or manual pump-up type sprayers shall not be used to apply the first application of liquid membrane.

As a visual guide, the color of concrete covered with the required amount of liquid membrane should be indistinguishable from a sheet of commercially available standard "letter" size white copier paper placed on top of it when viewed from a distance of about five feet (5') away horizontally if standing on the same grade as the concrete. The appearance of the concrete does not supersede applying the minimum spreading rate.

The coating shall be protected against marring for at least seven (7) days after the application of the curing compound. The coating on bridge decks shall receive extra attention and may require additional protection as required by the Engineer. All membrane marred or otherwise disturbed shall be given an additional coating. Manually pressurized or manual pump-up type sprayers may be used for giving marred areas the required additional application of liquid membrane. Should the surface coating be subjected repeatedly to injury, the Engineer may require that the water curing method be applied at once.

The 7-day period during which the liquid membrane is applied and protected shall not be reduced even if the period of wet curing is extended past the required 14 days.

907-804.03.17.1.2.1--Liquid Membrane Documentation. The Contractor shall make available to the Engineer an application rate verification method and any information necessary during application of the liquid membrane to verify that the rate of application meets the prescribed rate for the various surfaces of the concrete, including, but not limited to, the top surface of the bridge deck and exposed sides of the bridge deck after any forms are removed. The Contractor shall submit this application verification method to the Engineer in accordance with Subsection 907-804.02.12.1.1.

One method of verifying the rate of application is as follows:

1. Determine the volume of liquid membrane in the container. For a container with a uniform cross-sectional area, for example a 55-gallon drum, determine the area of the cross-section. Determine the height of the surface of the liquid membrane from the bottom of the container. This may be accomplished by inserting a sufficiently long, clean dip-stick parallel with the axis of the container into the liquid membrane until the inserted end of the dip-stick contacts the bottom of the container. On removing the dip-stick, measure the length from the end which was inserted to the point on the dip-stick where the liquid membrane ceases to coat the dip-stick. Multiply the area of the cross-section by the height of the level of liquid membrane, maintaining consistent units, to determine the volume.
2. Perform step 1 prior to beginning applying the liquid membrane to establish the initial volume.
3. During the period of application, perform step 1 each 100 square feet of bridge deck.
4. In order to meet the required application rate of one (1) gallon per 200 square feet, the amount in the container shall be at least 0.5 gallon less than the previous volume in the previous 100 square feet. Other changes in volume may apply depending on the manufacturer's recommended application rate.
5. Additional applications to an area shall be applied until the required rate is satisfied. Areas which are not visually satisfactory to the Engineer shall have additional liquid membrane applied as directed by the Engineer.

The amount of liquid membrane applied shall be determined each day using the application verification method. This information shall be submitted to the Engineer within 24 hours of applying the liquid membrane.

907-804.03.17.2--Liquid Membrane Method. Surfaces on which curing is to be by liquid membrane shall be given the required surface finish prior to the application of liquid membrane. Concrete surfaces cured by liquid membrane shall receive two applications of white liquid membrane. Neither application shall be made from a position supported by or in contact with the freshly placed concrete. Both applications shall be applied perpendicularly to the surface of the concrete.

When using liquid membrane, the liquid membrane shall be thoroughly mixed within the time recommended by the liquid membrane producer but no more than an hour before use. If the use of liquid membrane results in a streaked or blotched appearance, the method shall be stopped and water curing applied until the cause of defective appearance is corrected.

The application of liquid membrane shall be accomplished by the use of power applied spray equipment using nozzles and other equipment recommended by the liquid membrane producer. Manually pressurized or manual pump-up type sprayers shall not be used to apply the first two applications of liquid membrane.

The liquid membrane shall be applied when no free water remains on the surface but while the surface is still wet. The liquid membrane shall be applied according to the manufacturer's instructions with a minimum spreading rate per coat of one (1) gallon per 200 square feet of concrete surface. If the concrete is dry or becomes dry, the Contractor shall thoroughly wet it with water applied as a fog spray by means of approved equipment.

The first application of the liquid membrane shall be made as the work progresses. For bridge decks, the first application shall be completed in each area of the deck within 20 minutes of initial strike-off for bridges with no skew and within 25 minutes of initial strike-off for bridges with skew. For all other concrete, the first application of the liquid membrane shall be completed within 20 minutes of finishing.

The second application shall be applied within 30 minutes after the first application. The liquid membrane shall be uniformly applied to all exposed concrete surfaces.

As a visual guide, the color of concrete covered with the required amount of liquid membrane should be indistinguishable from a sheet of commercially available standard "letter" size white copier paper placed on top of it when viewed from a distance of about five feet (5') away horizontally if standing on the same grade as the concrete. The appearance of the concrete does not supersede applying the minimum spreading rate.

The Contractor shall make available to the Engineer an application rate verification in accordance with Subsection 907-804.03.17.1.2.1.

The coating shall be protected against marring for at least 10 days after the application of the curing compound. The coating on bridge decks shall receive extra attention and may require additional protection as required by the Engineer. All membrane marred or otherwise disturbed shall be given an additional coating. Manually pressurized or manual pump-up type sprayers may be used for giving marred areas the required additional application of liquid membrane. Should the surface coating be subjected repeatedly to injury, the Engineer may require that the water curing method be applied at once.

Delete Subsection 907-804.19.7 on page 9, and substitute the following.

907-804.03.19.7--Finishing Bridge Decks.

907-804.03.19.7.1--General. Delete the third paragraph of Subsection 804.03.19.7.1 on page 884, and substitute the following.

Except when indicated otherwise on the plans, the finish of the bridge deck shall be either a belt finish, a broom finish, or one of the following drag methods: pan, double pan, burlap, or pan and burlap. Manual finishing of the bridge deck shall be performed only in areas inaccessible by the

finishing equipment mounted to the strike-off screed, but shall not hinder the requirements for curing in accordance with Subsection 907-804.03.17.1. The surface texture specified and surface requirements shall be in accordance with the applicable requirements of Subsections 501.03.17 and 501.03.18 modified only as the Engineer deems necessary for bridge deck construction operations.

At no time shall water on the surface of the concrete from bleeding, fogging, curing, or other sources be worked into the concrete or used as an aid for finishing.

Regardless of the method of finishing selected, requirements for curing per Subsection 907-804.03.17 shall be completed within the specified time limits. If the requirements in Subsection 907-804.03.17 are not completed within the specific time limits, the Contractor shall cease operations, revise his operations up to and including acquiring new or additional equipment or additional personnel in order to satisfy the requirements in Subsection 907-804.03.17, and, on approval from the Engineer, resume operations

907-804.03.19.7.2--Longitudinal Method. Before the first paragraph of Subsection 804.03.19.7.2 on page 884, add the following.

The longitudinal method may be used for repairs to bridge decks or bridge widening projects. For bridge widening projects, the time for establishing curing in accordance with Subsections 907-804.03.17 shall be increased to within 30 minutes for bridges without skew and within 35 minutes for bridges with skew.

907-804.03.19.7.3--Transverse Method. Delete the first sentence of the second paragraph of Subsection 804.03.19.7.3 on page 885, and substitute the following.

The machine shall be so constructed and operated as to produce a bridge deck of uniform density with minimum manipulation of the fresh concrete and achieved in the shortest possible time.

Delete the fourth paragraph of Subsection 804.03.19.7.3 on page 885, and substitute the following.

At least one dry run shall be made the length of each pour with a "tell-tale" device attached to the screed carriage to assure the specified clearance to the reinforcing steel.

Delete the last sentence of the fifth paragraph of Subsection 804.03.19.7.3 on page 885, and substitute the following.

The screed shall be mechanically actuated to deliver the screeding action and for travel in a longitudinal direction at a uniform rate along the bridge deck.

Delete the last paragraph of Subsection 804.03.19.7.3 on page 886, and substitute the following.

Other finishing requirements shall be in accordance with the general requirements in Subsection 907-804.03.19.7.1 and as specified on the plans.

Regardless of the finish, the requirements for curing per Subsection 907-804.03.17 shall be completed within the specified time limits.

After Subsection 907-804.03.19.7.4 on page 9, add the following.

Delete the title of Subsection 804.03.19.7.4.1.3 on page 888, and substitute the following.

907-804.03.19.7.4.1.3--Final Surface Texture.

907-804.03.20--Opening Bridges.

907-804.03.20.2--Construction Traffic. Delete the paragraph in Subsection 804.03.20.2 on page 889, and substitute the following:

Unless otherwise specified, the concrete bridge decks shall be closed to construction traffic for the time required for curing in Subsection 907-804.03.17 and until the required compressive strength for the concrete is obtained.

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION NO. 907-804-13

CODE: (IS)

DATE: 11/09/2010

SUBJECT: Concrete Bridges And Structures

Section 804, Concrete Bridges And Structures, of the 2004 Edition of the Mississippi Standard Specifications for Road and Bridge Construction is hereby amended as follows:

907-804.02-- Materials.

907-804.02.1--General. Delete the third and fourth sentences of the first paragraph of Subsection 804.02.1 on page 846, and substitute the following:

For projects with 1000 cubic yards and more, quality control and acceptance shall be achieved through statistical evaluation of test results. For projects of more than 200 but less than 1000 cubic yards, quality control and acceptance shall be achieved by individual test results.

Add the following materials to the list of materials in Subsection 804.02.1 on page 847.

Blended Cement..... 907-701.01 and 907-701.04
 Ground Granulated Blast Furnace Slag (GGBFS)..... 907-714.06
 Silica Fume 907-714.07.2

907-804.02.8--Laboratory Accreditation. In Table 1 of Subsection 804.02.8 on page 849, substitute AASHTO: R 39 - Making and Curing Concrete Test Specimens in the Laboratory for AASHTO: T 126 - Making and Curing Concrete Test Specimens in the Laboratory.

907-804.02.9--Testing Personnel. Delete Table 2 in this subsection and replace it with the following.

Table 2

Concrete Technician's Tasks	Test Method Required	Certification Required**
Sampling or Testing of Plastic Concrete	AASHTO Designation:T 23, T 119, T 121, T 141, T 152, T 196, and ASTM Designation: C 1064	MDOT Class I certification
Compressive Strength Testing of Concrete Cylinders	AASHTO Designation: T 22 and T 231	MDOT Concrete Strength Testing Technician certification
Sampling of Aggregates	AASHTO Designation: T 2	Work under the supervision of an MDOT Class II certified technician

Testing of Aggregates	AASHTO Designation: T 19, T 27, T 84, T 85, T 248, and T 255	MDOT Class II certification
Proportioning of Concrete Mixtures*	AASHTO Designation: M 157 and R 39	MDOT Class III
Interpretation and Application of Maturity Meter Readings	AASHTO Designation: T 325 and ASTM Designation: C 1074	MDOT Class III or Two hours maturity method training

- * Technicians making concrete test specimens for meeting the requirements of Subsection 804.02.10.1.2 shall be MDOT Class I certified and under the direct supervision of an MDOT Class III certified technician.
- ** MDOT Class I certification encompasses the same test procedures and specifications as ACI Concrete Field Testing Technician Grade I. MDOT Class II certification encompasses the same test procedures and specifications as ACI Aggregate Testing Technician - Level 1. MDOT Concrete Strength Testing Technician encompasses the same test procedures and specifications as ACI Concrete Strength Testing certification.

For specifics about the requirements for each level of certification, please refer to the latest edition of the Department’s *Concrete Field Manual*. Technicians holding current MDOT Class I, MDOT Class II and/or MDOT Class III certifications shall be acceptable until those certifications expire. Upon a current certification expiration, recertification with the certifications listed in Table 2 shall be required. Technicians currently performing either specific gravity testing of aggregates or compressive strength tests shall be required to either:

- have the required MDOT certification listed in Table 2, or
- have a current MDOT Class III certification or work under the direct supervision of current MDOT Class III technician, and have demonstrated the specific gravity and/or compressive strength test during the inspection of laboratory equipment by the Materials Division, Concrete Section.

907-804.02.10--Portland Cement Concrete Mix Design. Delete the first sentence of the first paragraph of Subsection 804.02.10 on page 850 and substitute the following:

At least 30 days prior to production of concrete, the Contractor shall submit to the Engineer proposed concrete mixture designs complying with the Department’s *Concrete Field Manual*.

Delete the Notes under Table 3 of Subsection 804.02.10 on pages 850 & 851, and substitute the following:

- * Maximum size aggregate shall conform to the concrete mix design for the specified aggregate.
- ** The replacement limits of Portland cement by weight by other cementitious materials (such as fly ash, GGBFS, metakaolin, silica fume, or others) shall be in accordance with the values in Subsection 907-701.02. Other hydraulic cements may be used in accordance with the specifications listed in Section 701.

*** The slump may be increased up to eight (8) inches with :

- an approved water-reducing admixture,
- an approved water-reducing/set-retarding admixture, or
- a combination of an approved water-reducing admixture and an approved set-retarding admixture, in accordance with 907-713.02. Minus slump requirements shall meet those set forth in Table 3 of AASHTO Designation: M157.

**** Entrained air is not required except for concrete exposed to seawater. For concrete exposed to seawater, the total air content shall be 3.0 % to 6.0%. For concrete not exposed to seawater, the total air content shall not exceed 6.0%.

***** Class DS Concrete for drilled shafts shall have an 8±1-inch slump.

Delete the last paragraph of Subsection 804.02.10 on page 851 and substitute the following:

At least one water-reducing admixture shall be used in all classes of concrete in accordance with the manufacturer's recommended dosage range. Any combinations of admixtures shall be approved by the Engineer before their use.

907-804.02.10.1.1--Proportioning on the Basis of Previous Field Experience of Trial Mixtures. Delete the first sentence of the first paragraph of Subsection 804.02.10.1.1 on page 851, and substitute the following:

Where a concrete production facility has a record, based on at least 10 consecutive strength tests from at least 10 different batches within the past 12 months from a mixture not previously used on Department projects, the standard deviation shall be calculated.

907-804.02.10.3--Field Verification of Concrete Mix Design. Delete the first sentence of the third paragraph of Subsection 804.02.10.3 on page 853 and substitute the following:

For all Classes of concrete, the mixture shall be verified to yield within 2.0% of the correct volume when all the mix water is added to the batch.

For all Classes of concrete other than DS, F, and FX, the mixture shall produce a slump within a minus 1½-inch tolerance of the maximum permitted for mixtures with a maximum permitted slump of three inches (3") or less or within a minus 2½-inch tolerance of the maximum permitted for mixtures with a maximum permitted slump of greater than three inches (3"), and producing a total air content within a minus 1½ percent tolerance of the maximum allowable air content in Table 3.

For Class DS, the slump shall be within the requirements in Note ***** below Table 3. For Class DS exposed to seawater, the total air content shall be within a minus 1½ percent tolerance of the maximum allowable air content in Note **** below Table 3. For Class DS not exposed to seawater the total air content shall be within the requirements in Note **** below Table 3.

For Classes F and FX, the slump shall be within a minus 1½-inch tolerance of the maximum permitted for mixtures with a maximum permitted slump of three inches (3") or less or within a minus 2½-inch tolerance of the maximum permitted for mixtures with a maximum permitted

slump of greater than three inches (3"). For Classes F and FX exposed to seawater, the total air content shall be within a minus 1½ percent tolerance of the maximum allowable air content in Note **** below Table 3. For Classes F and FX not exposed to seawater the total air content shall be within the requirements in Note **** below Table 3.

Delete the third sentence of the third paragraph of Subsection 804.02.10.3 on page 853, and substitute the following:

If the requirements of yield, slump, or total air content are not met within three (3) production days after the first placement, subsequent field verification testing shall not be permitted on department projects, and the mix design shall not be used until the requirements listed above are met

907-804.02.10.4--Adjustments of Mixture Proportions. Delete the paragraph in Subsection 804.02.10.4 on page 854, and substitute the following:

The mixture may be adjusted by the Class III Certified Technician representing the Contractor in accordance with the allowable revisions listed in the Department's Concrete Field Manual, paragraph 5.7. Written notification shall be submitted to the Engineer a minimum of seven (7) days prior to any source or brand of material change, aggregate size change, allowable material type change, or decrease in any cementitious material content. Any adjustments of the concrete mixture design shall necessitate repeat of field verification procedure as described in Subsection 804.02.10.3 and approval by the Engineer.

907-804.02.11--Concrete Batch Plants. Delete the first three paragraphs of Subsection 804.02.11 on page 854, and substitute the following:

The concrete batch plant shall meet the requirements of the National Ready Mixed Concrete Association *Quality Control Manual, Section 3, Plant Certification Checklist* as outlined in the latest edition of the Department's *Concrete Field Manual*. The Contractor shall submit a copy of the approved checklist along with proof of calibration of batching equipment, i.e., scales, water meter, and admixture dispenser, to the Engineer 30 days prior to the production of concrete.

For projects with 1000 cubic yards and more, the concrete batch plant shall meet the requirements for an automatic system capable of recording batch weights. It shall also have automatic moisture compensation for the fine aggregate. For projects of more than 200 but less than 1000 cubic yards the plant can be equipped for manual batching with a fine aggregate moisture meter visible to the plant operator.

The concrete batch plant shall have available adequate facilities to cool concrete during hot weather.

Mixer trucks to be used on the project are to be listed in the checklist and shall meet the requirements of the checklist.

907-804.02.12--Contractor's Quality Control. Delete the fourth paragraph of Subsection 804.02.12 on page 854 & 855, and substitute the following:

The Contractor's Quality Control program shall encompass the requirements of AASHTO Designation: M 157 into concrete production and control, equipment requirements, testing, and batch ticket information. The requirement of AASHTO Designation: M 157, Section 11.7 shall be followed except, on arrival to the job site, a maximum of 1½ gallons per cubic yard is allowed to be added. Water shall not be added at a later time. If the maximum permitted slump is exceeded after the addition of water at the job site, the concrete shall be rejected.

907-804.02.12.3--Documentation. After the second sentence of the second paragraph of Subsection 804.02.12.3 on page 856, add the following:

Batch tickets and gradation data shall be documented in accordance with Department requirements. Batch tickets shall contain all the information in AASHTO Designation: M157, Section 16 including the additional information in Subsection 16.2 with the following exception: the information listed in paragraphs 16.2.7 and 16.2.8 is not required. Batch tickets shall also contain the concrete producer's permanent unique mix number assigned to the concrete mix design.

907-804.02.12.5--Non-Conforming Materials. In Table 4 of Subsection 804.02.12.5 on page 857, delete “/ FM” from the requirements on line B.3.a.

In Table 4 of Subsection 804.02.12.5 on page 857, replace “One set (two cylinders) for 0-100 yd³ inclusive” with “A minimum of one set (two cylinders) for each 100 yd³,”

907-804.02.13--Quality Assurance Sampling and Testing. Delete subparagraph c) in Subsection 804.02.13 on page 858 and substitute the following:

- c) For concrete, the Contractor's QC and Department's QA testing of concrete compressive strengths compare when using the data comparison computer program with an alpha value of 0.01 for projects with 1000 cubic yards and more; or, strength comparisons are within 990 psi for projects of more than 200 but less than 1000 cubic yards.

In Table 5 of Subsection 804.02.13 on page 858, delete “and FM” from the requirements on line A.3.

Delete Subsection 907-804.02.13.1 beginning on page 859 and substitute the following:

907-804.02.13.1--Basis of Acceptance.

907-804.02.13.1.1--Sampling. Sampling of concrete mixture shall be performed in accordance with the latest edition of the Department's *Concrete Field Manual*.

907-804.02.13.1.2--Slump. Slump of plastic concrete shall meet the requirements of Table 3: MASTER PROPORTION TABLE FOR STRUCTURAL CONCRETE DESIGN. A check test shall be made on another portion of the sample before rejection of any load.

907-804.02.13.1.3--Air. Total air content of concrete shall be within the specified range for the class of concrete listed in Table 3: MASTER PROPORTION TABLE FOR STRUCTURAL CONCRETE DESIGN. A check test shall be made on another portion of the sample before rejection of any load.

907-804.02.13.1.4--Yield. If the yield of the concrete mix design is more than plus or minus 3% of the designed volume, the mix shall be adjusted by a Class III Certified Technician representing the Contractor to yield the correct volume plus or minus three percent (±3%). If batching of the proportions of the mix design varies outside the batching tolerance range of the originally approved proportions by more than the tolerances allowed in Subsection 804.02.12.1, the new proportions shall be field verified per Subsection 804.02.10.3.

907-804.02.13.1.5--Temperature. Cold weather concreting shall follow the requirements of Subsection 907-804.03.16.1. Hot weather concreting shall follow the requirements of Subsection 804.03.16.2 with a maximum temperature of 95°F for Class DS concrete or for concrete mixes containing cementitious materials meeting the requirements of Subsection 907-701.02.2 as a replacement of Portland cement. For other concrete mixes, the maximum concrete temperature shall be 90°F. Concrete with a temperature more than the maximum allowable temperature shall be rejected and not used in Department work.

907-804.02.13.1.6--Compressive Strength. Laboratory cured concrete compressive strength tests shall conform to the specified strength (f'_c) listed in the specifications. Concrete represented by compressive strength test below the specified strength (f'_c) may be removed and replaced by the Contractor. If the Contractor elects not to remove the material, it will be evaluated by the Department as to the adequacy for the use intended. All concrete evaluated as unsatisfactory for the intended use shall be removed and replaced by the Contractor at no additional cost to the Department. For concrete allowed to remain in place, reduction in payment will be as follows:

Projects with 1000 Cubic Yards and More. When the evaluation indicates that the work may remain in place, a statistical analysis will be made of the QC and QA concrete test results. If this statistical analysis indicates at least 93% of the material would be expected to have a compressive strength equal to or greater than the specified strength (f'_c) and 99.87% of the material would be expected to have a compressive strength at least one standard deviation above the allowable design stress (f_c), the work will be accepted. If the statistical analysis indicates that either of the two criteria are not met, the Engineer will provide for an adjustment in pay as follows for the material represented by the test result.

Total Pay on Material in Question = Unit Price - (Unit Price x % Reduction)

$$\% \text{ Reduction} = \frac{(f'_c - X)}{f'_c - (f_c + s)} \times 100$$

where:

f'_c = Specified 28-day compressive strength, psi

- X = Individual compressive strength below f'_c , psi
- s = standard deviation, psi*
- f_c = allowable design stress, psi

* Standard deviation used in the above reduction of pay formula shall be calculated from the applicable preceding compressive strengths test results plus the individual compressive strength below f'_c . If below f'_c strengths occur during the project's first ten compressive strength tests, the standard deviation shall be calculated from the first ten compressive strength tests results.

Projects of More Than 200 but Less Than 1000 Cubic Yards. When the evaluation indicates that the work may remain in place, a percent reduction in pay will be assessed based on a comparison of the deficient 28-day test result to the specified strength. The Engineer will provide for an adjustment in pay as follows for the material represented by the test result.

Total Pay on Material in Question = Unit Price - (Unit Price x % Reduction)

$$\% \text{ Reduction} = \frac{(f'_c - X)}{f'_c} \times 100$$

where:

- f'_c = Specified 28-day compressive strength, psi
- X = Individual compressive strength below f'_c , psi

907-804.03--Construction Requirements.

907-804.03.6--Handling and Placing Concrete.

907-804.03.6.2--Consolidation. After the last sentence of Subsection 804.03.6.2 on page 864, add the following:

If the Department determines that there is an excessive number of projections, swells, ridges, depressions, waves, voids, holes, honeycombs or other defects in the completed structure, removal of the entire structure may be required as set out in Subsection 105.12.

907-804.03.15--Removal of Falsework, Forms, and Housing. Delete the first sentence of the second paragraph of Subsection 804.03.15 on page 871, and substitute the following:

Concrete in the last pour of a continuous superstructure shall have attained a compressive strength of 2,400 psi, as determined by cylinder tests or maturity meter probe, prior to striking any falsework.

Delete the first sentence of the third paragraph of Subsection 804.03.15 on page 871, and substitute the following:

At the Contractor's option and with the approval of the Engineer, the time for removal of forms may be determined by cylinder tests, in accordance with the requirements listed in Table 6, in which case the Contractor shall furnish facilities for testing the cylinders.

Delete the fourth and fifth paragraphs of Subsection 804.03.15 on pages 871 & 872, and substitute the following:

The cylinders shall be cured under conditions which are not more favorable than those existing for the portions of the structure which they represent.

Delete the table in Subsection 804.03.15 on page 872, and substitute the following:

Table 6
Minimum Compressive Strength Requirements for Form Removal

Forms:

Columns	1000 psi
Side of Beams	1000 psi
Walls not under pressure	1000 psi
Floor Slabs, overhead	2000 psi
Floor Slabs, between beams	2000 psi
Slab Spans	2400 psi
Other Parts	1000 psi

Centering:

Under Beams	2400 psi
Under Bent Caps	2000 psi

Limitation for Placing Beams on:

Pile Bents, pile under beam	2000 psi
Frame Bents, two or more columns	2200 psi
Frame Bents, single column	2400 psi

In lieu of using concrete strength cylinders to determine when falsework, forms, and housings can be removed, an approved maturity meter may be used to determine concrete strengths by inserting probes into concrete placed in a structure. The minimum number of maturity meter probes required for each structural component shall be in accordance with Table 7. Falsework, forms, and housings may be removed when maturity meter readings indicate that the required concrete strength is achieved. Procedures for using the maturity meter and developing the strength/maturity relationship shall follow the requirements of AASHTO Designation: T 325 and ASTM Designation: C 1074 specifications. Technicians using the maturity meter or calculating strength/maturity graphs shall be required to have at least two hours of training prior to using the maturity equipment.

**Table 7
Requirements for use of Maturity Meter Probes**

Structure Component	Quantity of Concrete	No. of Probes
Slabs, beams, walls, & miscellaneous items	0 - 30 yd ³	2
	> 30 to 60 yd ³	3
	> 60 to 90 yd ³	4
	> 90 yd ³	5
Footings, Columns & Caps	0 - 13 yd ³	2
	> 13 yd ³	3
Pavement, Pavement Overlays	1200 yd ²	2
Pavement Repairs	Per repair or 900 yd ² Whichever is smaller	2

907-804.03.16--Cold or Hot Weather Concreting.

907-804.03.16.1--Cold Weather Concreting. After the third paragraph of Subsection 804.03.16.1 on page 873, add the following:

In lieu of the protection and curing of concrete in cold weather, at the option of the Contractor with the approval of the Engineer, when concrete is placed during cold weather and there is a probability of ambient temperatures lower than 40°F, an approved maturity meter may be used to determine concrete strengths by inserting probes into concrete placed in a structure. The minimum number of maturity meter probes required for each structural component shall be in accordance with Table 7. An approved insulating blanketing material shall be used to protect the work when ambient temperatures are less than 40°F and shall remain in place until the required concrete strength in Table 6 is achieved. Procedures for using the maturity meter and developing the strength/maturity relationship shall follow the requirements of AASHTO Designation: T 325 and ASTM Designation: C 1074 specifications. Technicians using the maturity meter or calculating strength/maturity graphs shall be required to have at least two hours of training prior to using the maturity equipment.

Rename the Table in Subsection 804.03.16.1 on page 874 from “Table 6” to “Table 8”.

907-804.03.19--Finishing Concrete Surfaces.

907-804.03.19.7--Finishing Bridge Floors.

907-804.03.19.7.4--Acceptance Procedure for Bridge Deck Smoothness. After the first sentence of the second paragraph of Subsection 804.03.19.7.4 on page 886, add the following:

Auxiliary lanes, tapers, shoulders and other areas that are not checked with the profilograph, shall meet a 1/8 inch in 10-foot straightedge check made transversely and longitudinally across the deck or slab.

907-804.05--Basis of Payment. Add the "907" prefix to the pay items listed on page 898.

S E C T I O N 9 0 5 - P R O P O S A L

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 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.

Attached hereto is a certified check, cashier's check or Proposal Guaranty Bond in the amount as required in the Advertisement (or, by law).

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.

SECTION 905 -- PROPOSAL (CONTINUED)

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) enclose 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.

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.

Installing ITS equipment on Interstate 20 and U.S. Highway 84 at the Mississippi River Bridges, known as Federal Aid Project No. ITS-9999-09(028) / 106397301 & 106397302, in Warren and Adams Counties of Mississippi & Madison and Concordia Parishes of Louisiana.

Line No.	Item Code	Adj Code	Quantity	Units	Description [Fixed Unit Price]
					Roadway Items
0010	234-A001		1,590	Linear Feet	Temporary Silt Fence
0020	606-B001		1,376	Linear Feet	Guard Rail, Class A, Type 1
0030	606-C003		4	Each	Guard Rail, Cable Anchor, Type 1
0040	606-E003		4	Each	Guard Rail, Terminal End Section, Non-Flared
0050	618-A001		1	Lump Sum	Maintenance of Traffic
0060	618-B001		2	Square Feet	Additional Construction Signs [\$10.00]
0070	619-E1001		4	Each	Flashing Arrow Panel, Type C
0080	620-A001		1	Lump Sum	Mobilization
0090	630-F001		38	Each	Delineators, Guard Rail, White
0100	647-A003		4	Each	Pullbox, Type 4
0110	647-A004		3	Each	Pullbox, Type 5
0120	647-A005		14	Each	Pullbox, Type 2
0130	666-B027		465	Linear Feet	Electric Cable, Underground in Conduit, THHN, AWG #2, 3 Conductor
0140	666-B028		1,071	Linear Feet	Electric Cable, Underground in Conduit, THHN, AWG #6, 3 Conductor
0150	666-B038		855	Linear Feet	Electric Cable, Underground in Conduit, THHN, AWG #4, 3 Conductor
0160	666-D019		165	Linear Feet	Electric Cable, Aerial Supported in Conduit, THHN, AWG #6, 3 Conductor
0170	668-B024		1,961	Linear Feet	Traffic Signal Conduit, Underground Drilled or Jacked, Rolled Pipe, 2"
0180	668-C005		180	Linear Feet	Traffic Signal Conduit, Aerial Supported, Type 1, 2"
0190	907-237-A003		160	Linear Feet	Wattles, 20"
0200	907-304-F002	(GT)	343	Ton	Size 610 Crushed Stone Base
0210	907-619-E3001		6	Each	Changeable Message Sign
0220	907-630-M001		1	Lump Sum	Pedestal Sign Support, Assembly No 1, Contractor Designed, LADOTD
0230	907-630-M002		1	Lump Sum	Pedestal Sign Support, Assembly No 2, Contractor Designed
0240	907-630-M006		1	Lump Sum	Pedestal Sign Support, Assembly No 3, Contractor Designed, LADOTD
0250	907-630-M007		1	Lump Sum	Pedestal Sign Support, Assembly No 4, Contractor Designed
0260	907-637-A001		1	Each	Equipment Cabinet, Type B
0270	907-637-A002		1	Each	Equipment Cabinet, Type C
0280	907-639-E001		2	Each	Camera Pole with Foundation, 50' Pole
0290	907-639-E005		1	Each	Camera Pole With Pier Cap Mod. & Lowering Device, 35' Pole, LADOTD
0300	907-641-A001		7	Each	Radar Detection System
0310	907-647-A001		4	Each	Pullbox, Type F, LADOTD
0320	907-647-A001		2	Each	Pullbox, Type LA, LADOTD

Line No.	Item Code	Adj Code	Quantity	Units	Description [Fixed Unit Price]
0330	907-650-A003		5	Each	On Street Video Equipment, PTZ Type
0340	907-655-A001		4	Each	Highway Advisory Radio System
0350	907-655-B001		6	Each	Highway Advisory Radio Flashing Beacon
0360	907-655-B001		6	Each	Highway Advisory Radio Flashing Beacon , LADOTD
0370	907-655-C001		1	Lump Sum	Highway Advisory Radio System Software and Server
0380	907-656-A001		1	Each	Dynamic Message Sign, Type 1 , LADOTD
0390	907-656-A002		2	Each	Dynamic Message Sign, Type 2
0400	907-656-A002		1	Each	Dynamic Message Sign, Type 2 , LADOTD
0410	907-656-B001		1	Lump Sum	Dynamic Message Sign Training
0420	907-656-D001		2	Each	Dynamic Message Sign, Cellular Modem , LADOTD
0430	907-657-A004		2,287	Linear Feet	Fiber Optic Cable, 96 SM , LADOTD
0440	907-657-B001		90	Linear Feet	Fiber Optic Drop Cable, 12 SM , LADOTD
0450	907-658-A001		1	Each	Hardened Network Switch, Type A
0460	907-658-A004		3	Each	Hardened Network Switch, Type D
0470	907-658-B001		6	Each	Terminal Server
0480	907-659-A001		1	Lump Sum	Traffic Management Center Modifications
0490	907-659-C001		1	Lump Sum	Traffic Management Center Modifications - Training
0500	907-662-A001		3	Each	Video Encoder, Type A
0510	907-664-A002		2	Each	Roadway Weather Information System
0520	907-668-F002		915	Linear Feet	Traffic Signal Conduit Bank, Underground, Drilled or Jacked,Rolled Pipe, 2 @ 2"
0530	907-668-G003		1,942	Linear Feet	Traffic Signal Conduit Bank, Aerial Supported, Type FRP, 2@ 2"
0540	907-668-G004		75	Linear Feet	Traffic Signal Conduit Bank, Aerial Supported, Type FRP, 3@ 2"
0550	907-669-A001		1	Each	Real-Time River Current System , Natchez Bridge
0560	907-669-A001		1	Each	Real-Time River Current System , Vicksburg Bridge
ALTERNATE GROUP AA NUMBER 1					
0570	907-403-A015	(BA1)	153	Ton	Hot Mix Asphalt, ST, 9.5-mm mixture
ALTERNATE GROUP AA NUMBER 2					
0580	907-403-M001	(BA1)	153	Ton	Warm Mix Asphalt, ST, 9.5-mm mixture
Add Option 1 Items					
0590	618-A001		1	Lump Sum	Maintenance of Traffic
0600	620-A001		1	Lump Sum	Mobilization
0610	907-657-A004		1,480	Linear Feet	Fiber Optic Cable, 96 SM , LADOTD
0620	907-668-G003		1,480	Linear Feet	Traffic Signal Conduit Bank, Aerial Supported, Type FRP, 2@ 2"
Add Option 2 Items					
0630	618-A001		1	Lump Sum	Maintenance of Traffic

Line No.	Item Code	Adj Code	Quantity	Units	Description [Fixed Unit Price]
0640	620-A001		1	Lump Sum	Mobilization
0650	907-647-A001		1	Each	Pullbox, Type LA, LADOTD
0660	907-657-A004		7,290	Linear Feet	Fiber Optic Cable, 96 SM , LADOTD
0670	907-668-G003		7,290	Linear Feet	Traffic Signal Conduit Bank, Aerial Supported, Type FRP, 2@ 2"
Add Option 3 Items					
0680	618-A001		1	Lump Sum	Maintenance of Traffic
0690	620-A001		1	Lump Sum	Mobilization
0700	666-B038		300	Linear Feet	Electric Cable, Underground in Conduit, THHN, AWG #4, 3 Conductor
0710	668-B024		795	Linear Feet	Traffic Signal Conduit, Underground Drilled or Jacked, Rolled Pipe, 2"
0720	907-637-A001		1	Each	Equipment Cabinet, Type B
0730	907-639-E005		1	Each	Camera Pole With Foundation & Lowering Device, 60' Pole, LADOTD
0740	907-647-A001		1	Each	Pullbox, Type F, LADOTD
0750	907-647-A001		2	Each	Pullbox, Type LA, LADOTD
0760	907-650-A003		1	Each	On Street Video Equipment, PTZ Type
0770	907-656-D001		1	Each	Dynamic Message Sign, Cellular Modem , LADOTD
0780	907-657-B001		495	Linear Feet	Fiber Optic Drop Cable, 12 SM , LADOTD
0790	907-658-A001		1	Each	Hardened Network Switch, Type A
0800	907-662-A001		1	Each	Video Encoder, Type A

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.

COMBINATION BID PROPOSAL

I. 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 option (a) has been selected, then go to II, and sign Combination Bid Proposal.

B. If option (b) has been selected, then complete the following, go to II, and sign Combination Bid Proposal.

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. _____	_____ _____	_____ _____	_____ _____	_____ _____	

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 option (c) has been selected, then initial and complete one of the following, go to II. and sign Combination Bid Proposal.

_____ 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.

II. 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), the undersigned, agree to complete each contract on or before its specified completion date.

SIGNED _____

**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 _____, proposed Subcontractor _____, 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)

BY _____

(TITLE)

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
(Execute in duplicate)

I, _____,
(Name of person signing certification)

individually, and in my capacity as _____ of
(Title)

_____ 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. **ITS-9999-09(028) / 106397301 & 106397302**,

in **Warren and Adams Counties of Mississippi & Madison and Concordia Parishes of Louisiana** 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.

Initial here "_____" if exceptions are attached and made a part thereof. 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 and attachments (when indicated) is true and correct.

Executed on _____
Signature

MISSISSIPPI DEPARTMENT OF TRANSPORTATION

CERTIFICATION (Execute in duplicate)

I, _____,
(Name of person signing certification)

individually, and in my capacity as _____ of
(Title)

_____ 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. **ITS-9999-09(028) / 106397301 & 106397302**,

in **Warren and Adams Counties of Mississippi & Madison and Concordia Parishes of Louisiana** 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.

Initial here "_____" if exceptions are attached and made a part thereof. 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 and attachments (when indicated) is true and correct.

Executed on _____
Signature

SECTION 902

CONTRACT FOR ITS-9999-09(028) / 106397301 & 106397302

LOCATED IN THE COUNTY(IES) OF Warren and Adams Counties of Mississippi & Madison and Concordia Parishes of Louisiana

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. _____.

S E C T I O N 9 0 3
PERFORMANCE AND PAYMENT BOND

CONTRACT BOND FOR: ITS-9999-09(028) / 106397301 & 106397302

LOCATED IN THE COUNTY(IES) OF: Warren and Adams Counties of Mississippi & Madison and Concordia Parishes of Louisiana

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, 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.

Signed and sealed this the ____ day of _____ A.D. _____.

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,

SECTION 903 - CONTINUED

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.

Witness our signatures and seals this the _____ day of _____ A.D. _____.

_____	_____
(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 **Installing ITS equipment on Interstate 20 and U.S. Highway 84 at the Mississippi River Bridges, known as Federal Aid Project No. ITS-9999-09(028) / 106397301 & 106397302, in Warren and Adams Counties of Mississippi & Madison and Concordia Parishes of Louisiana**

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 Project No: _____
County: _____

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

SUBMITTED BY (Signature)

FIRM NAME

Submit this form to **Contract Administration as a part of your bid package**. If at least one copy of this form is not **signed** and included as part of the bid packet, your bid will be deemed irregular. Question regarding this form shall be directed to www.gomdot.com under the current letting webpage. Please make and add copies of this form when needed or attach additional sheets containing the information required by this form and add these sheets to the bid package.