

Control	6428-18-001
Project	RMC - 642818001
Highway	IH0010
County	EL PASO

## ADDENDUM ACKNOWLEDGMENT

**Each bidder is required to acknowledge receipt of an addendum issued for a specific project. This page is provided for the purpose of acknowledging an addendum.**

FAILURE TO ACKNOWLEDGE RECEIPT OF AN ADDENDUM WILL RESULT IN THE BID NOT BEING READ.

In order to properly acknowledge an addendum place a mark in the box next to the respective addendum.

- ADDENDUM NO. 1
- ADDENDUM NO. 2
- ADDENDUM NO. 3
- ADDENDUM NO. 4
- ADDENDUM NO. 5

In addition, the bidder by affixing their signature to the signature page of the proposal is acknowledging that they have taken the addendum(s) into consideration when preparing their bid and that the information contained in the addendum will be included in the contract, if awarded by the Commission or other designees.

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# PROPOSAL TO THE TEXAS TRANSPORTATION COMMISSION

## 2014 SPECIFICATIONS

### WORK CONSISTING OF TRAFFIC MANAGEMENT SYSTEMS, ILLUMINATION MAINT EL PASO COUNTY, TEXAS

The quantities in the proposal are approximate. The quantities of work and materials may be increased or decreased as considered necessary to complete the work as planned and contemplated.

This project is to be completed in 730 calendar days and will be accepted when fully completed and finished to the satisfaction of the Executive Director or designee.

Provide a proposal guaranty in the form of a Cashier's Check, Teller's Check (including an Official Check) or Bank Money Order on a State or National Bank or Savings and Loan Association, or State or Federally chartered Credit Union made payable to the Texas Transportation Commission in the following amount:

THIRTY-SIX THOUSAND (Dollars) ( \$36,000 )

A bid bond may be used as the required proposal guaranty. The bond form may be detached from the proposal for completion. The proposal may not be disassembled to remove the bond form. The bond must be in accordance with Item 2 of the specifications.

Any addenda issued amending this proposal and/or the plans that have been acknowledged by the bidder, become part of this proposal.

By signing the proposal the bidder certifies:

1. the only persons or parties interested in this proposal are those named and the bidder has not directly or indirectly participated in collusion, entered into an agreement or otherwise taken any action in restraint of free competitive bidding in connection with the above captioned project.
2. in the event of the award of a contract, the organization represented will secure bonds for the full amount of the contract.
3. the signatory represents and warrants that they are an authorized signatory for the organization for which the bid is submitted and they have full and complete authority to submit this bid on behalf of their firm.
4. that the certifications and representations contained in the proposal are true and accurate and the bidder intends the proposal to be taken as a genuine government record.

• **Signed: \*\***

(1) \_\_\_\_\_ (2) \_\_\_\_\_ (3) \_\_\_\_\_

**Print Name:**

(1) \_\_\_\_\_ (2) \_\_\_\_\_ (3) \_\_\_\_\_

**Title:**

(1) \_\_\_\_\_ (2) \_\_\_\_\_ (3) \_\_\_\_\_

**Company:**

(1) \_\_\_\_\_ (2) \_\_\_\_\_ (3) \_\_\_\_\_

- Signatures to comply with Item 2 of the specifications.

\*\*Note: Complete (1) for single venture, through (2) for joint venture and through (3) for triple venture.

\* **When the calendar days field contains an asterisk (\*) refer to the Special Provisions and General Notes.**

## **NOTICE TO CONTRACTORS**

**ANY CONTRACTORS INTENDING TO BID ON ANY WORK TO BE AWARDED BY THIS DEPARTMENT MUST SUBMIT A SATISFACTORY “AUDITED FINANCIAL STATEMENT” AND “EXPERIENCE QUESTIONNAIRE” AT LEAST TEN DAYS PRIOR TO THE LETTING DATE.**

**UNIT PRICES MUST BE SUBMITTED IN ACCORDANCE WITH ITEM 2 OF THE STANDARD SPECIFICATIONS OR SPECIAL PROVISION TO ITEM 2 FOR EACH ITEM LISTED IN THIS PROPOSAL.**

# TEXAS DEPARTMENT OF TRANSPORTATION

## BID BOND

KNOW ALL PERSONS BY THESE PRESENTS,

That we, (Contractor Name) \_\_\_\_\_  
\_\_\_\_\_

Hereinafter called the Principal, and (Surety Name) \_\_\_\_\_  
\_\_\_\_\_

a corporation or firm duly authorized to transact surety business in the State of Texas, hereinafter called the Surety, are held and firmly bound unto the Texas Department of Transportation, hereinafter called the Oblige, in the sum of not less than two percent (2%) of the department's engineer's estimate, rounded to the nearest one thousand dollars, not to exceed one hundred thousand dollars (\$100,000) as a proposal guaranty (amount displayed on the cover of the proposal), the payment of which sum will and truly be made, the said Principal and the 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 the following project identified as:

<b>Control</b>	<b>6428-18-001</b>
<b>Project</b>	<b>RMC - 642818001</b>
<b>Highway</b>	<b>IH0010</b>
<b>County</b>	<b>EL PASO</b>

NOW, THEREFORE, if the Oblige shall award the Contract to the Principal and the Principal shall enter into the Contract in writing with the Oblige in accordance with the terms of such bid, then this bond shall be null and void. If in the event of failure of the Principal to execute such Contract in accordance with the terms of such bid, this bond shall become the property of the Oblige, without recourse of the Principal and/or Surety, not as a penalty but as liquidated damages.

Signed this \_\_\_\_\_ Day of \_\_\_\_\_ 20\_\_\_\_\_

By: \_\_\_\_\_  
(Contractor/Principal Name)

\_\_\_\_\_  
(Signature and Title of Authorized Signatory for Contractor/Principal)

\*By: \_\_\_\_\_  
(Surety Name)

\_\_\_\_\_  
(Signature of Attorney-in-Fact)

Impressed  
Surety Seal  
Only

\*Attach Power of attorney (Surety) for Attorney-in-Fact

**This form may be removed from the proposal.**

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# BIDDER'S CHECK RETURN

## IMPORTANT

The space provided for the return address must be completed to facilitate the return of your bidder's check. Care must be taken to provide a legible, accurate, and complete return address, including zip code. A copy of this sheet should be used for each different return address.

## NOTE

Successful bidders will receive their guaranty checks with the executed contract.

RETURN BIDDERS CHECK TO (PLEASE PRINT):


<b>Control</b>	<b>6428-18-001</b>
<b>Project</b>	<b>RMC - 642818001</b>
<b>Highway</b>	<b>IH0010</b>
<b>County</b>	<b>EL PASO</b>

## IMPORTANT

### PLEASE RETURN THIS SHEET IN ITS ENTIRETY

Please acknowledge receipt of this check(s) at your earliest convenience by signing below in longhand, in ink, and returning this acknowledgement in the enclosed self addressed envelope.

Check Received By: \_\_\_\_\_ Date: \_\_\_\_\_

Title: \_\_\_\_\_

For (Contractor's Name): \_\_\_\_\_

Project \_\_\_\_\_ County \_\_\_\_\_

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## NOTICE TO THE BIDDER

In the space provided below, please enter your total bid amount for this project. Only this figure will be read publicly by the Department at the public bid opening.

It is understood and agreed by the bidder in signing this proposal that the total bid amount entered below is not binding on either the bidder or the Department. It is further agreed that **the official total bid amount for this proposal will be determined by multiplying the unit bid prices for each pay item by the respective estimated quantities shown in this proposal and then totaling all of the extended amounts.**

\$ \_\_\_\_\_  
**Total Bid Amount**

Control 0001-03-030  
 Project STP 2000(938)HES  
 Highway SH 20  
 County EL PASO

ALT	ITEM	DESC	SP	Bid Item Description	Unit	Quantity	Bid Price	Amount	Seq
	I04	509	X	REMOV CONC (SDWLK)	MSY	266.400	\$10.000	\$2,664.00	1
						Total Bid Amount	\$2,664.00		

Signed \_\_\_\_\_  
 Title \_\_\_\_\_  
 Date \_\_\_\_\_

Additional Signature for Joint Venture:

Signed \_\_\_\_\_  
 Title \_\_\_\_\_  
 Date \_\_\_\_\_

**EXAMPLE OF BID PRICES SUBMITTED BY COMPUTER PRINTOUT**

EXAMPLE

EXAMPLE

EXAMPLE

EXAMPLE

# EXAMPLES

## BID PRICES SUBMITTED BY HAND WRITTEN FORMAT

ALT	ITEM-CODE			UNIT BID PRICE <u>ONLY</u> WRITTEN IN WORDS	UNIT	APPROX QUANTITIES	DEPT USE ONLY
	ITEM NO	DESC NO	S.P. NO.				
	190	026		RED OAK 1 1/2 - 1 3/4 GAL BB  	EA	9.000	1

**Unit price for each plant in place**

	249	014		FLEX BASE(DEL)(DENSOT)(TY A GR4 CL2)  	TON	56,787.00	14
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**Unit price for each ton of Flexible Base**

	430	001	001	CL A CONC FOR EXT STR (CULV)  	CY	45.000	27
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**Unit price for each cubic yard of Concrete**

	610	007	001	RDWY ILL ASSEM(TY ST 50T-8-8)(.4 KW)S  	EA	13.000	7
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**Unit price of each Roadway Illumination Assembly**

EXAMPLE

EXAMPLE

EXAMPLE

EXAMPLE

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ALT	ITEM-CODE			UNIT BID PRICE ONLY. WRITTEN IN WORDS	UNIT	APPROX QUANTITIES	DEPT USE ONLY
	ITEM NO	DESC CODE	S.P. NO.				
	110	6003		EXCAVATION (SPECIAL)  DOLLARS and CENTS	CY	100.000	1
	416	6005		DRILL SHAFT (42 IN)  DOLLARS and CENTS	LF	60.000	2
	416	6006		DRILL SHAFT (48 IN)  DOLLARS and CENTS	LF	60.000	3
	416	6015		DRILL SHAFT (NON - REINFORCED) (12 IN)  DOLLARS and CENTS	LF	35.000	4
	416	6018		DRILL SHAFT (SIGN MTS) (24 IN)  DOLLARS and CENTS	LF	50.000	5
	420	6074		CL C CONC (MISC)  DOLLARS and CENTS	CY	30.000	6
	500	6001		MOBILIZATION  DOLLARS and CENTS	LS	1.000	7
	500	6003		MOBILIZATION (CALLOUT 1)  DOLLARS and CENTS	EA	6.000	8
	500	6034		MOBILIZATION (EMERGENCY)  DOLLARS and CENTS	EA	12.000	9
	502	6001	008	BARRICADES, SIGNS AND TRAFFIC HAN- DLING  DOLLARS and CENTS	MO	4.000	10
	620	6002		ELEC CONDR (NO.14) INSULATED  DOLLARS and CENTS	LF	100.000	11

ALT	ITEM-CODE			UNIT BID PRICE ONLY. WRITTEN IN WORDS	UNIT	APPROX QUANTITIES	DEPT USE ONLY
	ITEM NO	DESC CODE	S.P. NO.				
	620	6004		ELEC CONDR (NO.12) INSULATED DOLLARS and CENTS	LF	100.000	12
	620	6006		ELEC CONDR (NO.10) INSULATED DOLLARS and CENTS	LF	100.000	13
	620	6008		ELEC CONDR (NO.8) INSULATED DOLLARS and CENTS	LF	150.000	14
	620	6010		ELEC CONDR (NO.6) INSULATED DOLLARS and CENTS	LF	1,500.000	15
	620	6012		ELEC CONDR (NO.4) INSULATED DOLLARS and CENTS	LF	100.000	16
	620	6016		ELEC CONDR (NO.2) INSULATED DOLLARS and CENTS	LF	100.000	17
	624	6002		GROUND BOX TY A (122311)W/APRON DOLLARS and CENTS	EA	5.000	18
	624	6016		GROUND BOX TY 1 (304848)W/APRON DOLLARS and CENTS	EA	5.000	19
	624	6021		GROUND BOX TY 2 (243636)W/APRON DOLLARS and CENTS	EA	5.000	20
	636	6002	001	ALUMINUM SIGNS (TY G) DOLLARS and CENTS	SF	500.000	21
	636	6007	001	REPLACE EXISTING ALUMINUM SIGNS(TY A) DOLLARS and CENTS	SF	675.000	22
	636	6009	001	REPLACE EXISTING ALUMINUM SIGNS(TY O) DOLLARS and CENTS	SF	675.000	23

ALT	ITEM-CODE			UNIT BID PRICE ONLY. WRITTEN IN WORDS	UNIT	APPROX QUANTITIES	DEPT USE ONLY
	ITEM NO	DESC CODE	S.P. NO.				
	644	6001		IN SM RD SN SUP&AM TY10BWG(1)SA(P) DOLLARS and CENTS	EA	5.000	24
	644	6004		IN SM RD SN SUP&AM TY10BWG(1)SA(T) DOLLARS and CENTS	EA	5.000	25
	644	6007		IN SM RD SN SUP&AM TY10BWG(1)SA(U) DOLLARS and CENTS	EA	5.000	26
	644	6027		IN SM RD SN SUP&AM TYS80(1)SA(P) DOLLARS and CENTS	EA	3.000	27
	644	6030		IN SM RD SN SUP&AM TYS80(1)SA(T) DOLLARS and CENTS	EA	3.000	28
	644	6033		IN SM RD SN SUP&AM TYS80(1)SA(U) DOLLARS and CENTS	EA	3.000	29
	644	6076		REMOVE SM RD SN SUP&AM DOLLARS and CENTS	EA	8.000	30
	647	6001		INSTALL LRSS (STRUCT STEEL) DOLLARS and CENTS	LB	500.000	31
	647	6002		RELOCATE LRSA DOLLARS and CENTS	EA	4.000	32
	647	6003		REMOVE LRSA DOLLARS and CENTS	EA	4.000	33
	650	6028		INS OH SN SUP(30 FT BAL TEE) DOLLARS and CENTS	EA	2.000	34
	684	6012		TRF SIG CBL (TY A)(12 AWG)(7 CONDR) DOLLARS and CENTS	LF	500.000	35

ALT	ITEM-CODE			UNIT BID PRICE ONLY. WRITTEN IN WORDS	UNIT	APPROX QUANTITIES	DEPT USE ONLY
	ITEM NO	DESC CODE	S.P. NO.				
	684	6017		TRF SIG CBL (TY A)(12 AWG)(12 CONDR) DOLLARS and CENTS	LF	500.000	36
	690	6051		REMOVAL OF SIGNAL POLE ASSM DOLLARS and CENTS	EA	2.000	37
	690	6053		INSTALL OF SIGNAL POLE ASSM DOLLARS and CENTS	EA	2.000	38
	6000	6001		INSTALL ABOVE-GROUND CONDUIT DOLLARS and CENTS	LF	200.000	39
	6000	6004		INSTALL UNDERGROUND CONDUIT DOLLARS and CENTS	LF	1,500.000	40
	6000	6007		INSTALL CONDUCTOR DOLLARS and CENTS	LF	10,000.000	41
	6000	6020		ROAD BORE DOLLARS and CENTS	LF	500.000	42
	6000	6042		REPLACE HIGH MAST LUMINAIRES DOLLARS and CENTS	EA	10.000	43
	6000	6043		REPLACE LUMINAIRE POLE DOLLARS and CENTS	EA	50.000	44
	6000	6052		REPLACE ELECTRICAL SERVICE DOLLARS and CENTS	EA	5.000	45
	6000	6058		REMOVE GROUND BOX DOLLARS and CENTS	EA	10.000	46
	6000	6059		INSTALL FOUNDATION DOLLARS and CENTS	EA	10.000	47



ALT	ITEM-CODE			UNIT BID PRICE ONLY. WRITTEN IN WORDS	UNIT	APPROX QUANTITIES	DEPT USE ONLY
	ITEM NO	DESC CODE	S.P. NO.				
	6000	6060		REMOVE FOUNDATION  DOLLARS and CENTS	EA	10.000	48
	6000	6075		REPLACE LAMP (HIGH MAST LIGHTING)  DOLLARS and CENTS	EA	10.000	49
	6000	6082		REPLACE FUSE  DOLLARS and CENTS	EA	75.000	50
	6000	6086		REPLACE PHOTOCCELL AND BRACKET  DOLLARS and CENTS	EA	20.000	51
	6000	6090		REPLACE CONTROL CIRCUIT (ELECT SER- VICE)  DOLLARS and CENTS	EA	10.000	52
	6000	6104		RE-STRAP EXISTING CONDUIT  DOLLARS and CENTS	EA	10.000	53
	6000	6106		TROUBLESHOOT FOR REPAIRS  DOLLARS and CENTS	HR	100.000	54
	6000	6108		REPLACE LUMINAIRES  DOLLARS and CENTS	EA	200.000	55
	6000	6138		REPLACE LAMP FOR POLE MNT FIXTURE  DOLLARS and CENTS	EA	20.000	56
	6001	6001		PORTABLE CHANGEABLE MESSAGE SIGN  DOLLARS and CENTS	DAY	10.000	57
	6010	6011		CCTV FIELD EQUIP (DIGITAL) (INSTL ONLY)  DOLLARS and CENTS	EA	4.000	58
	6062	6041		ITS RADIO (INSTALL ONLY)  DOLLARS and CENTS	EA	3.000	59

ALT	ITEM-CODE			UNIT BID PRICE ONLY. WRITTEN IN WORDS	UNIT	APPROX QUANTITIES	DEPT USE ONLY
	ITEM NO	DESC CODE	S.P. NO.				
	6064	6046	001	ITS POLE (55 FT)(90 MPH)  DOLLARS and CENTS	EA	4.000	60
	6093	6007		REMOVE EXIST COMMUN CAB FOUNDA- TION  DOLLARS and CENTS	EA	4.000	61
	6185	6002	002	TMA (STATIONARY)  DOLLARS and CENTS	DAY	500.000	62
	6305	6007		LCS SYSTEM (REMOVE)  DOLLARS and CENTS	EA	20.000	63
	6305	6008		LCS SIGNAL UNIT (REMOVE)  DOLLARS and CENTS	EA	30.000	64
	6322	6001		COLOR DMS (POLE MNT CABINET)  DOLLARS and CENTS	EA	1.000	65
	6350	6002		LED CHEVRON  DOLLARS and CENTS	EA	5.000	66
	6368	6001		SOLAR POWERED LED SIGN  DOLLARS and CENTS	EA	5.000	67
	6386	6001		INSTALLATION OF CELLULAR MODEM  DOLLARS and CENTS	EA	6.000	68
	7045	6042		REPLACE RADIO ANTENNA WIRE  DOLLARS and CENTS	LF	100.000	69
	7148	6001		1 LN CLOSURE 2 LN RD NO SHOULDERS  DOLLARS and CENTS	HR	200.000	70
	7148	6002		1 LN CLOSURE 2 LN RD PAVED SHOULDERS  DOLLARS and CENTS	HR	10.000	71

ALT	ITEM-CODE			UNIT BID PRICE ONLY. WRITTEN IN WORDS	UNIT	APPROX QUANTITIES	DEPT USE ONLY
	ITEM NO	DESC CODE	S.P. NO.				
	7148	6003		1 LN CLOSURE 4 LN RD DOLLARS and CENTS	HR	100.000	72
	7148	6004		2 LN CLOSURE 4 LN RD DOLLARS and CENTS	HR	20.000	73
	7148	6005		FREEWAY 1 LANE CLOSURE DOLLARS and CENTS	HR	100.000	74
	7148	6006		FREEWAY 2 LANE CLOSURE DOLLARS and CENTS	HR	10.000	75
	7148	6007		FREEWAY 3 LANE CLOSURE DOLLARS and CENTS	HR	5.000	76
	7148	6008		FREEWAY 4 LANE CLOSURE DOLLARS and CENTS	HR	5.000	77
	7148	6009		EXIT OR ENTRANCE RAMP CLOSURE DOLLARS and CENTS	HR	75.000	78
	7148	6010		FREEWAY CLOSURE SEQUENCE DAYTIME ONLY DOLLARS and CENTS	HR	5.000	79
	7148	6011		COMPLETE FREEWAY CLOSURE DOLLARS and CENTS	HR	10.000	80
	7148	6012		ONE LANE FRONTAGE ROAD CLOSURE DOLLARS and CENTS	HR	50.000	81
	7148	6013		TWO LANE FRONTAGE ROAD CLOSURE DOLLARS and CENTS	HR	10.000	82
	7148	6014		ONE LANE CONNECTING RAMP CLOSURE DOLLARS and CENTS	HR	15.000	83

ALT	ITEM-CODE			UNIT BID PRICE ONLY. WRITTEN IN WORDS	UNIT	APPROX QUANTITIES	DEPT USE ONLY
	ITEM NO	DESC CODE	S.P. NO.				
	7148	6015		TWO LANE CONNECTING RAMP CLOSURE DOLLARS and CENTS	HR	10.000	84
	7148	6016		WORK AREA ON SHOULDER DOLLARS and CENTS	HR	500.000	85
	7148	6017		TURN AROUND CLOSURE DOLLARS and CENTS	HR	15.000	86
	7148	6019		FURNISH ADDITIONAL FLAGGER DOLLARS and CENTS	HR	20.000	87
	7148	6020		PILOT VEHICLE AND OPERATOR DOLLARS and CENTS	HR	10.000	88
	7193	6003		TROUBLESHOOT EQUIPMENT DOLLARS and CENTS	HR	50.000	89
	7193	6005		TROUBLESHOOT PWR,SIG,INTER & COM DOLLARS and CENTS	HR	10.000	90
	7193	6006		GRAFFITI REMOVAL DOLLARS and CENTS	SF	5.000	91
	7193	6008		CCTV CAMERA (INCL PAN,TILT AND LENS) DOLLARS and CENTS	EA	5.000	92
	7193	6009		CCTV CAMERA CONTROLLER DOLLARS and CENTS	EA	5.000	93
	7193	6011		CCTV CONTROLLER CABINET (POLE MNT) DOLLARS and CENTS	EA	10.000	94
	7193	6012		CCTV CAMERA POLE DOLLARS and CENTS	EA	4.000	95

ALT	ITEM-CODE			UNIT BID PRICE ONLY. WRITTEN IN WORDS	UNIT	APPROX QUANTITIES	DEPT USE ONLY
	ITEM NO	DESC CODE	S.P. NO.				
	7193	6013		PREVENT MAINT OF CCTV CAMERA SYS DOLLARS and CENTS	EA	50.000	96
	7193	6020		BATTERIES DOLLARS and CENTS	EA	2.000	97
	7193	6021		AMBER OR COLOR DMS CONTROLLER DOLLARS and CENTS	EA	2.000	98
	7193	6022		EQUIPMENT CABINET DOLLARS and CENTS	EA	2.000	99
	7193	6024		TROUBLESHOOT FIBER OPT CBL(SINGLE- MODE) DOLLARS and CENTS	HR	5.000	100
	7193	6026		FIBER OPTIC CABLE (SINGLE-MODE) DOLLARS and CENTS	LF	1,000.000	101
	7193	6028		SPLICE FIBER OPT CABLE (SINGLE-MODE) DOLLARS and CENTS	EA	2.000	102
	7193	6029		SPLICE INDIVIDUAL FIBER DOLLARS and CENTS	EA	150.000	103
	7193	6031		HUB BUILDING DOLLARS and CENTS	EA	2.000	104
	7193	6032		HUB BUILDING PREVENTIVE MAINTENANCE DOLLARS and CENTS	EA	2.000	105
	7193	6033		HUB CABINET PREVENTIVE MAINTENANCE DOLLARS and CENTS	EA	5.000	106

ALT	ITEM-CODE			UNIT BID PRICE ONLY. WRITTEN IN WORDS	UNIT	APPROX QUANTITIES	DEPT USE ONLY
	ITEM NO	DESC CODE	S.P. NO.				
	7193	6036		ELECTRICAL SERVICE  DOLLARS and CENTS	EA	2.000	107
	7193	6037		ELECTRICAL SERVICE ENCLOSURE  DOLLARS and CENTS	EA	2.000	108
	7193	6038		BORE CONDUIT (2")  DOLLARS and CENTS	LF	150.000	109
	7193	6039		BORE CONDUIT (3")  DOLLARS and CENTS	LF	150.000	110
	7193	6040		TRENCH CONDUIT (2")  DOLLARS and CENTS	LF	1,000.000	111
	7193	6041		TRENCH CONDUIT (3")  DOLLARS and CENTS	LF	150.000	112
	7193	6042		ABOVE GROUND CONDUIT (2")  DOLLARS and CENTS	LF	40.000	113
	7193	6043		ABOVE GROUND CONDUIT (3")  DOLLARS and CENTS	LF	40.000	114
	7193	6045		VIVDS DETECTOR CAMERA  DOLLARS and CENTS	EA	4.000	115
	7193	6050		PED POLE FOUNDATION  DOLLARS and CENTS	EA	5.000	116
	7193	6052		EQUIPMENT CABINET FOUNDATION  DOLLARS and CENTS	EA	2.000	117
	7193	6053		SIGNAL POLE FOUNDATION  DOLLARS and CENTS	EA	2.000	118

ALT	ITEM-CODE			UNIT BID PRICE ONLY. WRITTEN IN WORDS	UNIT	APPROX QUANTITIES	DEPT USE ONLY
	ITEM NO	DESC CODE	S.P. NO.				
	7193	6054		OPEN TRANSPORTATION NETWORK (OTN) DOLLARS and CENTS	LS	2.000	119
	7193	6056		BLUETOOTH DETECTOR DOLLARS and CENTS	EA	2.000	120
	7193	6060		DMS (AMBER) DOLLARS and CENTS	EA	2.000	121
	7193	6061		DMS (COLOR) DOLLARS and CENTS	EA	2.000	122
	7193	6064		FIELD ETHERNET SWITCH DOLLARS and CENTS	EA	5.000	123
	7193	6065		VIDEO ENCODER DOLLARS and CENTS	EA	5.000	124
	7193	6068		CELLULAR MODEM DOLLARS and CENTS	EA	5.000	125
	7193	6069		TRAFFIC SIGNAL LAMP (12")LED DOLLARS and CENTS	EA	20.000	126

## **CERTIFICATION OF INTEREST IN OTHER BID PROPOSALS FOR THIS WORK**

By signing this proposal, the bidding firm and the signer certify that the following information, as indicated by checking "Yes" or "No" below, is true, accurate, and complete.

- A. Quotation(s) have been issued in this firm's name to other firm(s) interested in this work for consideration for performing a portion of this work.

\_\_\_\_\_ YES

\_\_\_\_\_ NO

- B. If this proposal is the low bid, the bidder agrees to provide the following information prior to award of the contract.

1. Identify firms which bid as a prime contractor and from which the bidder received quotations for work on this project.
2. Identify all the firms which bid as a prime contractor to which the bidder gave quotations for work on this project.





## **INSTRUCTIONS FOR COMPLETION OF SF-LLL, DISCLOSURE OF LOBBYING ACTIVITIES**

This disclosure form shall be completed by the reporting entity, whether subawardee or prime Federal recipient, at the initiation or receipt of a covered Federal action, or a material change to a previous filing, pursuant to title 31 U.S.C section 1352. The filing of a form is required for each payment or agreement to make payment to any lobbying entity for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with a covered Federal action. Use the SF-LLL-A Continuation Sheet for additional information if the space on the form is inadequate. Complete all items that apply for both the initial filing and material change report. Refer to the implementing guidance published by the Office of Management and Budget for additional information.

1. Identify the type of covered Federal action for which lobbying activity is and/or has been secured to influence the outcome of a covered Federal action.
2. Identify the status of the covered Federal action.
3. Identify the appropriate classification of this report. If this is a follow-up report caused by a material change to the information previously reported, enter the year and quarter in which the change occurred. Enter the date of the last previously submitted report by this reporting entity or this covered Federal action.
4. Enter the full name, address, city, state and zip code of the reporting entity. Include Congressional District, if known. Check the appropriate classification of the reporting entity that designates if it is, or expects to be, a prime or subaward recipient. Identify the tier of the subawardee, e.g., the first subawardee of the prime is the 1st tier. Subawards include but are not limited to subcontracts, subgrants and contract awards under grants.
5. If the organization filing the report in item 4 checks "Subawardee", then enter the full name, address, city, state and zip code of the prime Federal recipient. Include Congressional District, if known.
6. Enter the name of the Federal agency making the award or loan commitment. Include at least one organizational level below agency name, if known. For example, Department of Transportation, United States Coast Guard.
7. Enter the Federal program name or description for the covered Federal action (item 1). If known, enter the full Catalog of Federal Domestic Assistance (CFDA) number for grants, cooperative agreements, loans, and loan commitments.
8. Enter the most appropriate Federal identifying number available for the Federal action identified in item 1 (e.g., Request for Proposal (RFP) number; Invitation for Bid (IFB) number; grant announcement number, the contract, grant, or loan award number; the application/proposal control number assigned by the Federal agency). Include prefixes, e.g., "RFP-DE-90-001."
9. For a covered Federal action where there has been an award or loan commitment by the Federal agency, enter the Federal amount of the award/loan commitment for the prime entity identified in item 4 or 5.
10. (a) Enter the full name, address, city, state and zip code of the lobbying entity engaged by the reporting entity identified in item 4 to influence the covered Federal action.  
(b) Enter the full names of the individual(s) performing services, and include full address if different from 10(a). Enter Last Name, First Name, and Middle Initial (MI).
11. Enter the amount of compensation paid or reasonably expected to be paid by the reporting entity (item 4) to the lobbying entity (item 10). Indicate whether the payment has been made (actual) or will be made (planned). Check all boxes that apply. If this is a material change report, enter the cumulative amount of payment made or planned to be made.
12. Check the appropriate box(es). Check all boxes that apply. If payment is made through an in-kind contribution, specify the nature and value of the in-kind payment.
13. Check the appropriate box(es). Check all boxes that apply. If other, specify nature.
14. Provide a specific and detailed description of the services that the lobbyist has performed, or will be expected to perform, and the date(s) of any services rendered. Include all preparatory and related activity, not just time spent in actual contact with Federal officials. Identify the Federal official(s) or employee(s) contacted or the officer(s), employee(s), or Member(s) of Congress that were contacted.
15. Check whether or not a SF-LLL-A Continuation Sheet(s) is attached.
16. The certifying official shall sign and date the form, print his/her name, title, and telephone number.

Public reporting burden for this collection of information is estimated to average 30 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (0348-0046), Washington, D.C. 20503.

# DISCLOSURE OF LOBBYING ACTIVITIES

Approved by OMB

0348-0046

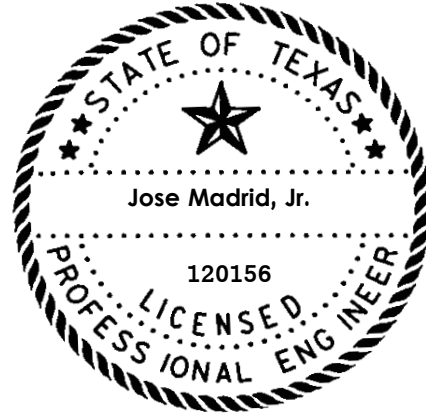
## CONTINUATION SHEET

Reporting Entity: \_\_\_\_\_ Page \_\_\_\_\_ of \_\_\_\_\_

# ENGINEER SEAL

Control 6428-18-001  
Project RMC - 642818001  
Highway IH0010  
County EL PASO

The enclosed Texas Department of Transportation Specifications, Special Specifications, Special Provisions, General Notes and Specification Data in this document have been selected by me, or under my responsible supervision as being applicable to this project. Alteration of a sealed document without proper notification to the responsible engineer is an offense under the Texas Engineering Practice Act.



The seal appearing on this document was authorized by  
*Jose Madrid, Jr., P.E.*  
JANUARY 31, 2023

**COUNTY: EI PASO, ETC.**

**HIGHWAY: IH 10, ETC.**

**GENERAL NOTES:**

**GENERAL PROJECT DESCRIPTION** – This routine maintenance contract is for traffic management, traffic signal maintenance, illumination, and aesthetic lightening system maintenance repair in the El Paso District in various highways.

The Contract will be managed by the **El Paso District Office** with participating District Traffic Engineer and Signal Shop Supervisor listed below:

**Eduardo Perales, PE.,**  
**District Traffic Engineer Supervisor**  
13301 Gateway Blvd. West  
El Paso, Texas 79928  
(915) 790-4488

**Jose Mendez**  
**Signal Shop Supervisor**  
13301 Gateway Blvd. West  
El Paso, Texas 79928  
(915) 790-4245

Each Contract awarded by the Department stands on its own and as such, is separate from other contracts. A Contractor awarded multiple contracts, must be capable and sufficiently staffed to concurrently process all contracts at the same time.

**GENERAL REQUIREMENTS**

Various bid items and their associated quantities have been provided within this Contract to establish unit bid prices for the proposed work. The bid items and quantities provided are based on historical data and are not guaranteed. Actual quantities of work to be performed and paid will be determined in the field by the Engineer and will be paid utilizing these unit bid prices with no further compensation made regardless of the final quantities.

The Department reserves the right to reduce or increase all quantities within guidelines provided in the Standard Specifications.

Where nighttime work is approved, provide adequate lighting for the entire work site, as directed. This will be subsidiary to the various bid items.

Obtain Engineer approval for all equipment and vehicles prior to use.

Maintain the entire project area in a neat and orderly manner throughout the duration of the work. This work will be subsidiary to the various bid items.

**ITEM 2 – INSTRUCTIONS TO BIDDERS**

This Contract includes plan sheets that are not part of the bid proposal.

View plans on-line or download from the web at:  
<https://www.txdot.gov/business/letting-bids/plans-online.html>

Order plans from any of the plan reproduction companies shown on the web at:

COUNTY: EI PASO, ETC.

HIGHWAY: IH 10, ETC.

[http://www.dot.state.tx.us/business/contractors\\_consultants/repro\\_companies.htm](http://www.dot.state.tx.us/business/contractors_consultants/repro_companies.htm)

Contractor questions on this project are to be addressed to the following individual(s):

Monica Dubrule [Monica.Dubrule@txdot.gov](mailto:Monica.Dubrule@txdot.gov)

Questions may be submitted via the Letting Pre-Bid Q&A web page. This webpage can be accessed from the Notice to Contractors dashboard located at the following Address:

<https://tableau.txdot.gov/views/ProjectInformationDashboard/NoticetoContractors>

All contractor questions will be reviewed by the Engineer. All questions and any corresponding responses that are generated will be posted through the same Letting Pre-Bid Q&A web page.

The Letting Pre-Bid Q&A web page for each project can be accessed by using the dashboard to navigate to the project you are interested in by scrolling or filtering the dashboard using the controls on the left. Hover over the blue hyperlink for the project you want to view the Q&A for and click on the link in the window that pops up.

Request a proposal electronically from the Department's website:

<http://www.txdot.gov/business-cq/pr.htm>

Or use the electronic bidding site:

<http://www.txdot.gov/business/letting-bids/ebs.html>

A bid summation will be available on-line at:

<http://www.txdot.gov/business/bt.html>

### **ITEM 3 – AWARD AND EXECUTION**

This Contract includes non-site-specific work and as-needed work. The type of work identified in the Contract is for locations that have not yet been determined.

The Contract duration is for 24 months. Time charges and work will start on the day stated on the Work Authorization letter. The Contract will be in effect until the work on the last callout is completed.

### **ITEM 4- SCOPE OF WORK**

The new installation items such as Item 7193 will be used at locations at the discretion of the Engineer. The use of these items is not guaranteed.

Provide vehicular and pedestrian access at all times, including Saturdays, Sunday, and holiday. This access includes, but not limited to, driveways, streets, parking areas, and walkways. This will be considered subsidiary to the various bid items.

**COUNTY: EI PASO, ETC.**

**HIGHWAY: IH 10, ETC.**

Clear and remove from all work sites, surplus and waste materials and leave the site in a neat and aesthetically pleasing condition.

Schedule and perform all work to ensure proper drainage during the course of construction or maintenance operations. All labor, tools, equipment and supervision required, to ensure drainage, removal, and handling of water shall be considered incidental work.

Repair any existing pavement, utilities, structures, etc., damaged as a result of construction operations, at no additional cost to the Department.

### **ITEM 5 – CONTROL OF WORK**

Inform the Engineer and the respective utility companies, when it becomes apparent that the utility lines will interfere with the work in progress.

Arrange the operations so that no consecutive exit or entrance ramps will be closed at the same time, unless directed.

### **ITEM 6 – CONTROL OF MATERIALS**

Furnish all materials on this Contract except for the following that the Department will provide:

- Radios
- Starting Aids
- High Pressure Sodium Lamps
- Mercury Lamps, Fluorescent Tubes, or Metal Halide Ramps
- Transformer Bases
- Luminaires
- Poles/Mast Arms
- Anchor Bolts (installation of foundations)
- Shorting Cap or Photocell
- Antenna
- Ballasts
- Brackets
- POE
- CCTV (Camera)
- I-Controller for CCTV
- CCTV Military Cable
- Field Ethernet Switch (teleste, Cisco, IFS)
- Cell Modem
- SFP's
- Video Encoder
- Video Decoder

**COUNTY: EI PASO, ETC.**

**HIGHWAY: IH 10, ETC.**

- Votar VT/VR (For CCTV)
- Self-Healing Ring (Equipment)
- LDM
- DMS Controller (Display Board)
- Bluetooth
- RVSD (RTMS)
- Bluetooth/RTMS Cable
- Anchor Bolts (installation of Ped foundations)
- Signal LED's

Materials to be furnished by the Department can be picked up at the Traffic Signal Shop designated below. Contact the supervisor twenty-four (24) hours in advance of picking up materials.

**Jose Mendez, Signal Shop Supervisor**

13301 Gateway Blvd. West

El Paso, TX 79928

(915) 790-4245

**ITEM 7 – LEGAL RELATIONS AND RESPONSIBILITIES**

No significant traffic generator events identified.

The Contractor will abide by Section 7.2.5. Use of Blue Warning Lights related to vehicle lighting. Vehicles equipped with unauthorized lighting will not be permitted to operate on Department highways.

Comply with all OSHA and EPA regulations as well as all local laws, ordinances, federal and state requirements.

OSHA regulations prohibit operations that bring people or equipment within 10 feet of an energized electrical line. Where workers and/or equipment may be close to an energized electrical line, notify the electrical power company and make all necessary adjustments to ensure the safety of workers near the energized line.

Do not discharge any liquid pollutant from vehicles onto the roadside. Immediately clean spills and dispose in compliance with local, state, and federal regulations to the satisfaction of the Engineer at no additional cost to the Department.

**ITEM 8 – PROSECUTION AND PROGRESS**

This project is to be completed in **730** calendar days in accordance with **Section 8.3.1.5, "Calendar Day."** Weekend work activities can be directed by the Engineer when the location



**COUNTY: EI PASO, ETC.**

**HIGHWAY: IH 10, ETC.**

dictates immediate corrective action governed by the 24-hour notification requirement for emergency repairs only.

The Contractor must provide enough manpower and equipment to accomplish the required work under this contract during the hours agreed upon by the Contractor and Engineer. Failure to do so will constitute grounds for a Noncompliance Penalty.

Work must start within 72 hours of notification or by the time agreed upon with the Engineer.

A Noncompliance Penalty will be assessed for each instance the Contractor is in noncompliance. A noncompliance instance is defined by any of the following:

1. Contractor fails to begin work at the specified time or location(s).
2. Contractor fails to complete work by the time agreed upon with the Engineer.
3. Contractor does not have all the necessary resources (i.e. personnel, equipment, and material) to fulfill the requirement of the Item(s) called out at the specified time or location(s).
4. Contractor fails to submit proper material documentation for material sources by the time agreed upon with the Engineer.

The Noncompliance Penalty will be deducted from any money due or to become due for any completed Item(s) or work. The Noncompliance Penalty will be assessed as follows: \$1,000 per instance, per location.

Contractor work activities will be limited to the allowed lane closure times defined as daytime hours of 9 A.M. to 4 P.M. Monday through Friday or nighttime hours of 9 P.M. to 6 A.M. Sunday through Thursday, unless otherwise directed by the Engineer.

US54, SL375, SS601 and, IH10 work activities are required to be performed during nighttime hours or as directed by the Engineer.

### **ITEM 9 – MEASUREMENT AND PAYMENT**

If requested, the Contractor will be aware that the Department will pay for any material on hand (MOH) in accordance with established policies and procedures. If MOH is authorized for payment, the Contractor will be required to stock all material at an approved site, inventory, and submit MOH adjustments on a monthly basis.

The Contractor must submit Material on Hand (MOH) payment requests at least 3 working days before the end of the month for payment on that month's estimate.

### **ITEM 110 – EXCAVATION (SPECIAL)**

The contractor shall use this pay item to pothole and identify possible utility conflicts along proposed conduit installation and proposed drill shaft foundations.

The contractor shall pothole as directed to the proposed ground boxes, foundations, and conduit

**COUNTY: EI PASO, ETC.**

**HIGHWAY: IH 10, ETC.**

locations. This work shall be accomplished prior to commencement of the installation/construction of the above-mentioned facilities.

The intent is to determine if any conflicts with other buried utilities or structures exist. When a conflict exists, the engineer shall be notified to determine if additional exposure of the conflict is required.

The contractor shall fill the potholes up to the bottom of the pavement surface after excavating with material from the hole and compact to 95% density. The holes shall then be patched with a suitable hot mix asphalt concrete material or earthen material as directed by the engineer. The contractor shall then maintain these patches in good repair until the completion of work. All equipment, labor, and materials associated with this work shall be considered subsidiary to the various bid items.

The contractor shall inform the engineer and the respective utility companies when it becomes apparent that utility lines shall interfere with work in progress.

#### **ITEM 416 – DRILLED SHAFT FOUNDATIONS**

Construct drilled shaft at all abutments as per the approved method.

Stake all foundations and locations prior to commencement of drilling operations for verification to ensure no conflicts with utility lines. Approval by Engineer will be required for all non-bridge foundations.

Cover drilled shafts with plywood and delineate with pedestrian fence, to the satisfaction of the Engineer, when no work is being performed and after working hours. This work will be considered subsidiary to this item.

#### **ITEM 420 – CONCRETE SUBSTRUCTURES**

Concrete trucks will be allowed to wash out or discharge surplus concrete or drum-wash water at designated areas approved.

Personnel will be certified by the El Paso District Laboratory in the handling, transporting, and curing of all concrete test specimens. In addition, all equipment will be certified prior to being used. Only Department personnel will perform all concrete quality tests and molding of all test specimens. Use approved concrete mix designs and concrete aggregate sources.

Remove spoils, daily, out of the drainage areas or as directed.

#### **ITEM 500 – MOBILIZATION**

For Contracts with callout or emergency work, "Mobilization" will be paid as follows:

COUNTY: EI PASO, ETC.

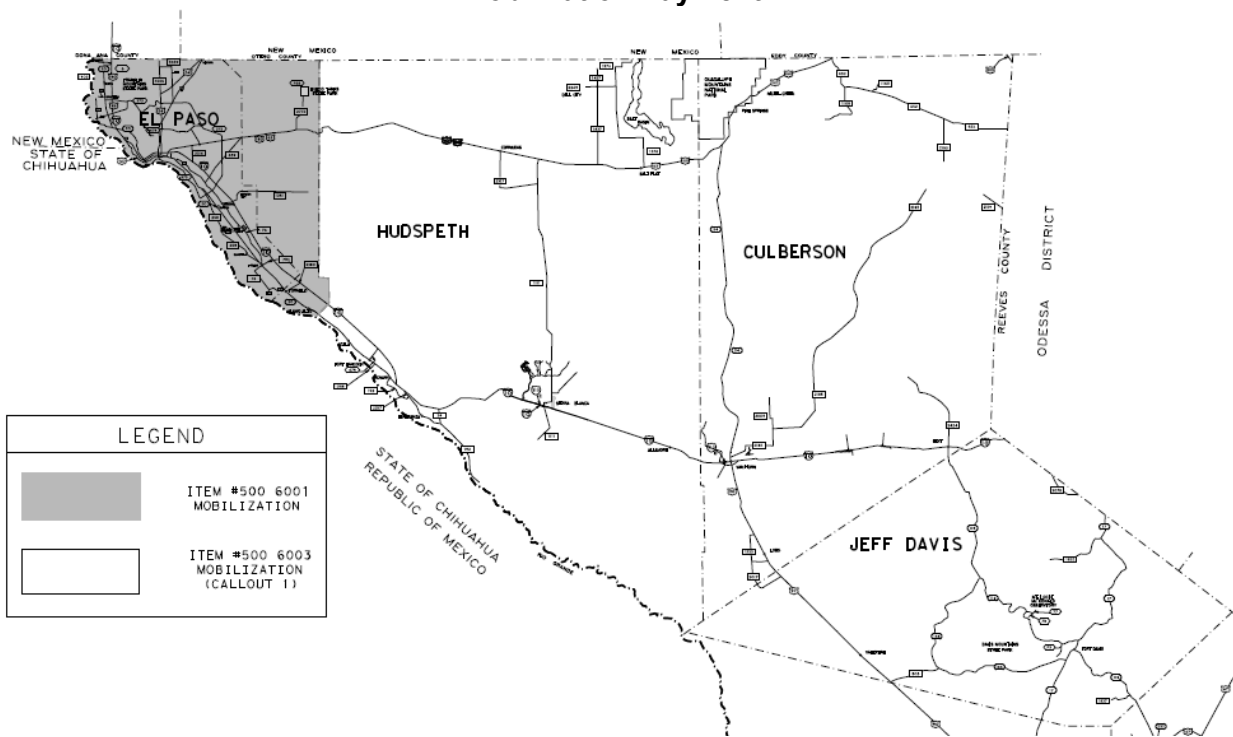
HIGHWAY: IH 10, ETC.

Emergency Mobilization will be paid for emergency work performed as directed by the Engineer and a contact person shall be available to respond within 1 hour of the time of notice for all emergency work.

Mobilization will be paid in accordance with the associated Item based on work performed. This will fully compensate for all associated activities.

Mobilization will be paid as shown on Figure 1 below:

**Figure 1  
Mobilization Payment**



Item 500-6001 MOBILIZATION will be paid by lump sum within the designated zone in Figure 1. The remaining zone shown will be paid under item 500-6003 MOBILIZATION (CALLOUT 1) by each callout work requested.

**ITEM 502 – BARRICADES, SIGNS AND TRAFFIC HANDLING**

The Contractor and his employees will wear fluorescent orange safety vests, safety shoes/boots, eye protection and hard hats while outside vehicles within the Department’s right of way and will comply with Item 7.2.4. Public Safety and Convenience, and Item 7.2.6. Barricades, Signs, and Traffic Handling.

The Contractor must have enough manpower and equipment to perform any revised traffic control as directed by the Engineer.

**COUNTY: EI PASO, ETC.**

**HIGHWAY: IH 10, ETC.**

Use flashing arrow boards on all tapers for each lane closure, as shown on TxDOT standards.

The Installation of temporary stop signs shall be considered subsidiary to this item.

The Contractor may be required to furnish and place additional TMAs, Flaggers, Pilot Cars, or Truck Mounted forward facing arrow boards, not shown on the TCP plan sheets, as directed by the Engineer.

In addition to providing a Contractor's Responsible Person and a phone number for emergency contact, have an employee(s) available to respond to emergencies on the project and for taking corrective measures within 30 minutes.

Notify and coordinate with the Department's officials when major traffic changes are to be made. Advance notification for the following week's work must be made by 5 P.M. on Wednesdays.

Contractor assumes the responsibility for any additional barricade signs and devices of any approved contractor-initiated changes to the sequence of work or Traffic Control Plans.

Some signs, barricades, and channelization devices may not be shown at the precise or measured position. Place the barricades, devices, or signs, with approval, in positions to meet field conditions. Installation of temporary stop signs will be placed as directed by the engineer and will be subsidiary to item 502.

Remove signs that do not apply to current conditions at the end of each day's work (do not lay down signs within clear zone).

In accordance with Section 7.2.6.1 of the 2014 Texas Department of Transportation Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges, the Contractor will designate, in writing, a Contractor Responsible Person (CRP) and a CRP alternate to take full responsibility for the set-up, maintenance, and necessary corrective measures of the traffic control plan. The CRP or CRP alternate must be present at site and implement the initial set up of every traffic control phase/stage, at each location, and/or each call out, for the entire duration of the project.

At the written request of the Engineer, immediately remove the CRP or CRP alternate from the project if, in the opinion of the Engineer, is not competent, not present at initial TCP set-ups, or does not perform in a proper, skillful, or safe manner. These individuals shall not be reinstated without written consent of the Engineer.

CRP and CRP alternate must be trained using Department approved training. Provide a copy of the certificate of completion to the Engineer for project records. Refer to Table 1 for Department approved Training.

COUNTY: EI PASO, ETC.

HIGHWAY: IH 10, ETC.

**Table 1: Contractor Responsible Person and Alternate**

Provider	Course Number	Course Title	Duration	Notes
American Traffic Safety Services Association	TCS	Traffic Control Supervisor	2 Days	
National Highway Institute	133112 133113	1. Design and Operation of Work Zone Traffic Control 2. Work Zone Traffic Control for Maintenance Operations	1 Day 1 Day	Both classes are required to meet minimum required training.
National Highway Institute	133112A	Design and Operation of Work Zone Traffic Control	3 Days	
Texas Engineering Extension Service	HWS410	Contractor's Responsible Person for Temporary Traffic Control	16 Hours	Please note the name has changed.
University of Texas Arlington Division for Enterprise Development	WKZ421	Traffic Control Supervisor	16 Hours	Contact UTA for training needs.

All contractor workers involved with the traffic control implementation and maintenance must participate and complete a Department approved training course. Provide a copy of the certificate of completion to the Engineer for project records. Refer to Table 2 for Department approved Training.

**Table 2: Other Work Zone Personnel**

Provider	Course Number	Course Title	Duration	Notes
American Traffic Safety Services Association	TCT	Traffic Control Technician	1 Day	
Texas Engineering Extension Service	HWS002	Work Zone Traffic Control	16 Hours	Identical to HWS-410. Counts for 3 year CRP requirement.
National Highway Institute	133116	Maintenance of Traffic for Technicians	5 Hours	Web based
National Highway Institute	134109-I	Maintenance Training Series: Basics of Work Zone Traffic Control	1 Hour	Free, Web Based
University of Texas at Arlington, Division for Enterprise Development	WKZ 100	Work Zone Safety: Temporary Traffic Control	4 Hour	Please note the name has changed. Free Web based.
TxDOT/AGC Joint Development	N/A N/A	Safe Workers Awareness Highway Construction Work Zone Hazards	16 Minutes 18 Minutes	Videos available through the AGC of Texas Offices. English and Spanish.
AGC America	N/A	Highway Work Zone Safety Training	1 Day	
Texas Engineering Extension Service	HWS400	Temporary Traffic Control Worker	4 Hour	Contact TEEX if interested in class.
TxDOT/AGC Joint Development	N/A	Work Zone Fundamentals	10 Minutes Approx.	Videos available through the AGC of Texas Offices. English and Spanish.

**COUNTY: EI PASO, ETC.**

**HIGHWAY: IH 10, ETC.**

Contractor may choose to train workers involved with the traffic control implementation and maintenance with a contractor developed training in lieu of Department approved training. Contractor-developed training must be equivalent to the Department approved training shown in Table 2. Provide the Engineer a copy of the course curriculum for pre-approval, prior to conducting the contractor developed training. Provide the Engineer a copy of the log of attendees after training completion for project records.

### **ITEM 618 – CONDUIT**

The location of conduit is diagrammatic and may be varied to meet local conditions upon approval of the Engineer.

When shown on the plans, use underground warning tape in the trench installation of conduit (PVC).

For conduit placement in pavement, an earth-saw may be used provided the cut does not exceed 6 in. Backfill as shown on the trench details in the plans.

For all underground conduit bends of 45°, provide rigid metal conduit. Where the rigid metal conduit is exposed at any point and where rigid metal extends into ground boxes, bond the metal conduit to the grounding conductor with grounding type bushings or by other UL-listed grounding connectors, approved by the Engineer. Rigid metal bends will not be paid for directly but will be considered incidental to the PVC conduit system.

Use rigid metal conduit when crossing bridges or culverts. All clamps, expansion joints, bolts and accessories necessary to install the rigid metal will be subsidiary to this Item.

Backfill roadway and driveway trench with cement-stabilized backfill at the end of each working day. Place an ACP patch at the end of the week or as directed by the Engineer.

All conduit elbows and rigid metal extensions required to be installed on PVC conduit systems will not be paid for separately but will be considered subsidiary to the various bid items.

All bore items shall be directional and shall be paid for under this item. Bore quantities include the distance beneath the roadway plus an additional 2 ft. on either side of the curb, sidewalk, or edge of pavement.

For conduits install by open trench method, backfill the trench as shown on the plans.

Place conduit for fiber optic cable at a minimum of 48 in. below pavement surface. Place all other conduit at a minimum depth of 18 in. below the pavement surface. Place conduit prior to the new pavement construction.

**COUNTY: EI PASO, ETC.**

**HIGHWAY: IH 10, ETC.**

Fit both ends of each raceway with a temporary cap to prevent dirt and debris from entering during construction.

Install a continuous green insulated copper wire No. 8 AWG or larger in every conduit throughout the electrical system in accordance with the electrical detail sheets, and the latest edition of the National Electrical Code.

When conduit is to be installed where riprap presently exists, take care in breaking the existing riprap for placement of the conduit. Do not break out a greater area that is required for placement of the conduit. Replace broken riprap with Class "C" concrete to the exact slope, pattern, color and thickness of the existing riprap. Replacement of riprap will be subsidiary to this Item.

### **ITEM 620 ELECTRICAL CONDUCTORS**

Use NEC type XHHW for all conductors.

Insulate grounding conductors with a green jacket and neutral conductors with a white jacket.

At every accessible point, bond together the grounding conductors which share the same conduit, junction box, ground box or structure in accordance with the electrical detail sheets and the latest edition of the National Electrical Code.

For both transformer and shoe-base type illumination poles, provide double-pole breakaway fuse holder as shown on the Department's Materials Producers List under "Roadway Illumination and Electrical Supplies." category. Fuse holder is shown on the list under Item 610, "Roadway Illumination Assemblies," and Item 620, "Electrical Conductors." Provide 10-amp time delay fuses.

Include extra cable length in each ground box or foundation for each run, to provide adequate slack, as provided in the plans or as directed.

Ensure a properly bonded electrical system by running one No. 8 wire between foundations and grounding it at each foundation ground-rod.

Bond metal junction boxes and metal conduit to the circuit grounding conductors in accordance with the National Electrical Code.

Refer to Article 7.18, "Electrical Requirements," for electrical certification and electrical licensing requirements

The required electrical certifications course is available and is scheduled periodically by Texas Engineering Extension Service (TEEX). Alternatively, Contractors may purchase an entire course for their personnel to be held at a time and location of their choice as negotiated through TEEX. For more information contact:

COUNTY: EI PASO, ETC.

HIGHWAY: IH 10, ETC.

Texas Engineering Extension Service (TEEX)  
TxDOT Electrical System Course  
(979) 845-6563

### **ITEM 624 – GROUND BOXES**

Remove all conductors in ground boxes as shown on the plans to be abandoned. Payment for removal of conductors will be subsidiary to this Item.

### **ITEM 628 – ELECTRICAL SERVICES**

Meet at the service locations with representatives of the Department, electrical utility company, and City of El Paso (Traffic Section) at least four weeks before electric power is needed to finalize exact service pole placement and resolve any issues.

Any electrical costs for connection, test, and operation will be the responsibility of the government agency that will have the final operational control of the items built.

Remove the existing service enclosure and conduit on service poles that are to be reused or abandoned. Payment for removal will be considered subsidiary to this Item.

### **ITEM 644 – SMALL ROADSIDE SIGN ASSEMBLIES**

Stake all sign locations and receive approval prior to sign placement.

The 2-1/2-inch, Schedule 10 post will meet the following requirements:

- 0.120 in. nominal wall thickness
- Seamless or electric resistance welded steel tubing or pipe
- Steel will be HSLAS Grade 55 per ASTM A1011 or ASTM A1008

Other steel may be used, if it meets the following:

- 55,000 psi minimum yield strength
- 70,000 psi minimum tensile strength
- 20% minimum elongation in 2 in.
- Wall thickness (uncoated) to be within the range of 0.108 in. to 0.132 in. galvanization per ASTM A123 or ASTM A653 G90

For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metalizing with zinc wire per ASTM B833.

Verify all post lengths to ensure the proper sign height. Remove and replace any sign installed incorrectly. This work will be done at no expense to the Department.



**COUNTY: EI PASO, ETC.**

**HIGHWAY: IH 10, ETC.**

Provide Texas Universal Triangular Slip Base Bolt clamp type for all signs as shown on SMD (Slip-1)-08.

As directed, some regulatory and guide signs will be relocated before construction begins. Mark and locate each reference marker perpendicular to the road and along the right of way, or as directed, prior to removal. Re-erect reference markers at their original location upon completion of construction. Coordinate with the Signal Shop listed below:

All signs removed will remain property of the Department.

### **ITEM 680 – INSTALLATION OF HIGHWAY TRAFFIC SIGNALS**

Transformer bases or shoe bases for steel mast arm pole assemblies capable of a minimum 15-degree rotation will be acceptable.

Use metallic material for traffic signal heads and mounting hardware. Do not use polycarbonate material.

Cover signal heads when not in operation.

Data needed prior to final acceptance during construction of traffic signals of:

1. Freeway Management System Geographic Information System-FMSGIS data by providing survey information (NAD 83 State Plane) on all poles, controller cabinets, and signal heads.
2. Digital photos and serials on all poles, controller cabinets, and signal heads.

Final acceptance of traffic signals will be determined by the City of El Paso and/or the Department and will require coordination with the Contractor for interim and final inspections.

Ensure that the Emergency Vehicle Traffic Signal Priority Control Systems is compatible with what is currently being used by the City of El Paso.

### **ITEM 6185 – TRUCK MOUNTED ATTENUATOR (TMA) AND TRAILER ATTENUATOR (TA)**

The contractor will be responsible for determining if one or more operations will be ongoing at the same time to determine the total number of TMAs needed for the project. TMAs will be used and positioned per the applicable Traffic Control Plan standard or as directed by the Engineer. Additional TMAs required by the Engineer will be provided by the contractor.

All Truck Mounted Attenuator (TMA) Operators must participate in a TMA workshop to be conducted by the El Paso District Safety Office, on the proper use of TMAs, prior to working on Department Right of Way (ROW). A certificate of completion will be issued to TMA Operators that

**COUNTY: EI PASO, ETC.**

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successfully complete the TMA workshop. The certificate of completion must be carried by TMA Operators at all times while working on Department ROW.

It is the responsibility of the Contractor to acquire the TCP and TMA Operator's certificates of completion prior to the authorization to begin work. No time suspension will be granted and no traffic control work will be allowed without certificates of completion.

The supporting vehicle for the TMA shall have a minimum gross (i.e. ballasted) vehicular weight of 19,000 pounds.

Truck-Mounted Attenuators (TMA) must be NCHRP 350 or MASH compliant and will require pre-approval by the Department. Attachment of TMA will be in accordance with manufacturer's recommendations.

NCHRP 350 **Level 3** compliant TMAs may be used on any Department facility.

### **ITEM 7148 – LANE CLOSURES**

Time charges begin when the contractor arrives at the location and time as directed by the Engineer. Time charges end when the last traffic control device is removed from the roadway.

Rumble Strips will not be paid for directly but shall be subsidiary to Item 7148, as shown on standard sheet WZ (RS)-22.

The Contractor must have enough manpower and equipment to perform any revised traffic control as directed by the Engineer.

Use flashing arrow boards on all tapers for each lane closure, as shown on TxDOT standards.

The Contractor may be required to furnish and place additional TMAs, Flaggers, Pilot Cars, Truck Mounted forward facing arrow boards, or Work Zone Rumble Strips not shown on the TCP plan sheets, as directed by the Engineer.

The Department will notify the Contractor in advance of any conflicting scheduled lane closures for roadway routine maintenance or repair. Lane closures identified by the Department as emergencies shall be accomplished within one hour from verbal notification.

### **ITEM 7193 – TRAFFIC MANAGEMENT MAINTENANCE**

It is the responsibility of the contractor to become familiar with and understand the TxDOT Special Specification for Item 7193.

The contractor shall be responsible for furnishing all materials as described in the Item 7193 Special Specification on the contract **except** for the following that will be provided by the State:

**COUNTY: EI PASO, ETC.**

**HIGHWAY: IH 10, ETC.**

- Coast Comm Channel Bank Cards
- D/I Rack AC Power Supply
- ITS Building Hub
- All Hub Cabinets
- CCTV Camera
- CCTV Camera Controller
- CCTV Camera Pan/Tilt Unit
- CCTV Camera Pole
- Interface Cabinet
- Fiber Optic Data Transceiver (Single mode)
- Fiber Optic Data Transmitter (Single mode)
- Fiber Optic Data Receiver (Single mode)
- Video Multiplexer Unit
- OTN Cards, Cages, and Chassis
- Anchor Bolts (for all foundations)
- DMS Character Modules, Circuit Cards, and Power Supplies
- Splice Case for Fiber Optics
- Mast-Arms and Poles
- Microwave Vehicle Detectors
- Lane Control Signal Heads and Brackets
- Pole-mounted Cabinets
- Bluetooth Detectors
- DMS (Color or Amber)
- DMS Controller (Color or Amber)
- Field Ethernet Switch
- Video Encoder
- Video Decoder
- Cellular Modem
- Traffic Signal Lamp 12" LED
- VIVDS Camera

All ground boxes shall be installed with apron in accordance with ED (4)-14

Batteries will be replaced as sets or groups. If one battery tests bad or needs replacing, then the complete battery set, or group shall be replaced.

Camera lenses will be cleaned to remove dirt, spots, and streaks as frequently as required to keep the camera lenses clean, or as directed by the Engineer.

Safely remove graffiti and dirt from equipment. Pressure and soda blast may be used if equipment and motorist safely will not be negatively impacted by this activity. As a last resort, the Contractor may repaint equipment as necessary in a color matching the original color in a manner meeting professional quality standards, or as directed by the Engineer.

**COUNTY: EI PASO, ETC.**

**HIGHWAY: IH 10, ETC.**

The State will provide Open Transport Network (OTN) chassis and cards. The Contractor will remove, replace, install and test the chassis and cards, in accordance with Item 5.45.

The Contractor will **not** be required to perform the following tasks listed under Item 7193.5.27:

- Dispense pesticides.
- The Contractor must check the Uninterruptable Power Supply (UPS) by performing the following functions:
  - The by-pass switch must be checked for dynamic operations.
  - The Contractor will check the UPS controller diagnostics.
  - Contractor must check the sealed batteries for leaks or out-gassing.
  - The Contractor will remove the primary power to confirm UPS back-up operations for 30 minutes and restore power. Coordinate primary power disconnect with Engineer.
  - Test pump system as per manufacturers' specifications.
  - Test De-Humidifier and air exchangers as per manufacturers' specs.

The Contractor will **not** be required to perform the following tasks listed under Item 7193.5.28:

- Dispense pesticides.

CONTROL : 6428-18-001  
PROJECT : RMC - 642818001  
HIGHWAY : IH0010  
COUNTY : EL PASO

TEXAS DEPARTMENT OF TRANSPORTATION

**GOVERNING SPECIFICATIONS AND SPECIAL PROVISIONS**

ALL SPECIFICATIONS AND SPECIAL PROVISIONS APPLICABLE TO THIS PROJECT ARE IDENTIFIED AS FOLLOWS:

STANDARD SPECIFICATIONS: ADOPTED BY THE TEXAS DEPARTMENT OF  
----- TRANSPORTATION NOVEMBER 1, 2014.  
STANDARD SPECIFICATIONS ARE INCORPORATED  
INTO THE CONTRACT BY REFERENCE.

ITEMS 1 TO 9 INCL., GENERAL REQUIREMENTS AND COVENANTS  
ITEM 110 EXCAVATION (132)  
ITEM 416 DRILLED SHAFT FOUNDATIONS (405) (420) (421) (423) (440) (448)  
ITEM 420 CONCRETE SUBSTRUCTURES (400) (404) (421) (422) (426) (427)  
(440) (441) (448)  
ITEM 500 MOBILIZATION  
ITEM 502 BARRICADES, SIGNS, AND TRAFFIC HANDLING  
ITEM 620 ELECTRICAL CONDUCTORS (610) (628)  
ITEM 624 GROUND BOXES <302> (420) (421) (432) (440) (618) (620)  
ITEM 636 SIGNS (643)  
ITEM 644 SMALL ROADSIDE SIGN ASSEMBLIES (421) (440) (441) (442) (445)  
(636) (643) (656)  
ITEM 647 LARGE ROADSIDE SIGN SUPPORTS AND ASSEMBLIES (416) (421)  
(440) (441) (442) (445) (636)  
ITEM 650 OVERHEAD SIGN SUPPORTS <1> (416) (420) (421) (441) (442)  
(445) (449) (618) (636) (654)  
ITEM 684 TRAFFIC SIGNAL CABLES  
ITEM 690 MAINTENANCE OF TRAFFIC SIGNALS (416) (421) (476) (610) (618)  
(620) (622) (624) (625) (627) (628) (636) (656) (680) (682) (684)  
(685) (686) (687) (688)

SPECIAL PROVISIONS: SPECIAL PROVISIONS WILL GOVERN AND TAKE  
----- PRECEDENCE OVER THE SPECIFICATIONS ENUMERATED  
HEREON WHEREVER IN CONFLICT THEREWITH.

REQUIRED CONTRACT PROVISIONS, FEDERAL-AID CONSTRUCTION CONTRACTS  
(FORM FHWA 1273)

WAGE RATES

DISCLOSURE OF LOBBYING ACTIVITIES

SPECIAL PROVISION "NONDISCRIMINATION" (000---002)  
SPECIAL PROVISION "CERTIFICATION OF NONDISCRIMINATION IN EMPLOYMENT"  
(000---003)  
SPECIAL PROVISION "NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO  
ENSURE EQUAL EMPLOYMENT OPPORTUNITY (EXECUTIVE  
ORDER 11246" (000---004)  
SPECIAL PROVISION "STANDARD FEDERAL EQUAL EMPLOYMENT OPPORTUNITY  
CONSTRUCTION CONTRACT SPECIFICATIONS" (000---005)  
SPECIAL PROVISION "ONTHEJOB TRAINING PROGRAM" (000---006)  
SPECIAL PROVISION "CERTIFICATE OF INTERESTED PARTIES (FORM 1295)"  
(000--1019)  
SPECIAL PROVISION "SCHEDULE OF LIQUIDATED DAMAGES" (000--1243)  
SPECIAL PROVISION "CARGO PREFERENCE ACT REQUIREMENTS IN FEDERAL AID  
CONTRACTS" (000---241)  
SPECIAL PROVISION "DISADVANTAGED BUSINESS ENTERPRISE IN FEDERAL AID  
CONTRACTS" (000---394)  
SPECIAL PROVISION "IMPORTANT NOTICE TO CONTRACTORS" (000---395)  
SPECIAL PROVISION "ACTIVATION OF FEDERAL CONTRACT PROVISIONS"  
(000---457)  
SPECIAL PROVISION "NOTICE OF CONTRACTOR PERFORMANCE EVALUATIONS"  
(000---659)  
SPECIAL PROVISIONS TO ITEM 2 (002---007) (002---009) (002---011)  
(002---013)  
SPECIAL PROVISIONS TO ITEM 3 (003---011) (003---013)  
SPECIAL PROVISIONS TO ITEM 5 (005---002) (005---003)  
SPECIAL PROVISIONS TO ITEM 6 (006---012) (006---030)  
SPECIAL PROVISIONS TO ITEM 7 (007---004) (007---010) (007---011)  
SPECIAL PROVISIONS TO ITEM 8 (008---030) (008---033)  
SPECIAL PROVISIONS TO ITEM 9 (009---010) (009---011)  
SPECIAL PROVISION TO ITEM 302 (302---003)  
SPECIAL PROVISION TO ITEM 421 (421---010)  
SPECIAL PROVISION TO ITEM 426 (426---005)  
SPECIAL PROVISION TO ITEM 427 (427---003)  
SPECIAL PROVISION TO ITEM 440 (440---004)  
SPECIAL PROVISION TO ITEM 441 (441---004)  
SPECIAL PROVISION TO ITEM 442 (442---001)  
SPECIAL PROVISION TO ITEM 448 (448---001)  
SPECIAL PROVISION TO ITEM 449 (449---002)  
SPECIAL PROVISION TO ITEM 502 (502---008)  
SPECIAL PROVISION TO ITEM 636 (636---001)  
SPECIAL PROVISION TO ITEM 643 (643---001)  
SPECIAL PROVISION TO ITEM 654 (654---001)  
SPECIAL PROVISION TO ITEM 656 (656---001)  
SPECIAL PROVISION TO ITEM 680 (680---006)  
SPECIAL PROVISION TO SPECIAL SPECIFICATION ITEM 6064 (6064--001)  
SPECIAL PROVISION TO SPECIAL SPECIFICATION ITEM 6185 (6185--002)

SPECIAL SPECIFICATIONS:

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ITEM 6000 ILLUMINATION MAINTENANCE  
ITEM 6001 PORTABLE CHANGEABLE MESSAGE SIGN

- ITEM 6005 TESTING, TRAINING, DOCUMENTATION, FINAL ACCEPTANCE, AND WARRANTY
- ITEM 6006 ELECTRONIC COMPONENTS
- ITEM 6010 CCTV FIELD EQUIPMENT (6005) (6006)
- ITEM 6062 INTELLIGENT TRANSPORTATION SYSTEM (ITS) RADIO
- ITEM 6064 INTELLIGENT TRANSPORTATION SY STEM (ITS) POLE WITH CABINET (416) (421) (440) (441) (442) (445) (449) (496) (618) (620) (740)
- ITEM 6093 EXISTING TRAFFIC MANAGEMENT EQUIPMENT
- ITEM 6185 TRUCK MOUNTED ATTENUATOR (TMA) AND TRAILER ATTENUATOR (TA)
- ITEM 6305 LANE-USE CONTROL SIGNAL SYSTEMEQUIPMENT
- ITEM 6322 FULL COLOR LED DYNAMIC MESSAGESIGN SYSTEM
- ITEM 6350 DYNAMIC LED CURVE WARNING SYSTEM
- ITEM 6368 SOLAR POWERED VEHICLE DETECTION ACTIVATED LED EMBEDDED SIGN
- ITEM 6386 INSTALLATION OF CELLULAR MODE M
- ITEM 7045 DRY DOCKING 28-CAR FERRYBOAT
- ITEM 7148 LANE CLOSURES (HOURLY)
- ITEM 7193 TRAFFIC MANAGEMENT MAINTENANCE

GENERAL: THE ABOVE-LISTED SPECIFICATION ITEMS ARE THOSE UNDER WHICH  
 ----- PAYMENT IS TO BE MADE. THESE, TOGETHER WITH SUCH OTHER  
 PERTINENT ITEMS, IF ANY, AS MAY BE REFERRED TO IN THE ABOVE-  
 LISTED SPECIFICATION ITEMS, AND INCLUDING THE SPECIAL  
 PROVISIONS LISTED ABOVE, CONSTITUTE THE COMPLETE SPECIFI-  
 CATIONS FOR THIS PROJECT.

## **CHILD SUPPORT STATEMENT**

**Under Section 231.006, Family Code, the vendor or applicant certifies that the individual or business entity named in this contract, bid, or application is not ineligible to receive the specified grant, loan, or payment and acknowledges that this contract may be terminated and payment may be withheld if this certification is inaccurate.**



## CONFLICT OF INTEREST CERTIFICATION

Pursuant to Texas Government Code Section 2261.252(b), the Department is prohibited from entering into contracts in which Department officers and employees have a financial interest.

By signing the Contract, the Contractor certifies that it is not prohibited from entering into a Contract with the Department as a result of a financial interest as defined under Texas Government Code Section 2261.252(b), and that it will exercise reasonable care and diligence to prevent any actions or conditions that could result in a conflict of interest with the Department.

The Contractor also certifies that none of the following individuals, nor any of their family members within the second degree of affinity or consanguinity, owns 1% or more interest or has a financial interest as defined under Texas Government Code Section 2261.252(b) in the Contractor:

- Any member of the Texas Transportation Commission; and
- The Department's Executive Director, General Counsel, Chief of Procurement and Field Support Operations, Director of Procurement, and Director of Contract Services.

Violation of this certification may result in action by the Department.

## E-VERIFY CERTIFICATION

Pursuant to Texas Transportation Code §223.051, all TxDOT contracts for construction, maintenance, or improvement of a highway must include a provision requiring Contractors and subcontractors to use the U.S. Department of Homeland Security's E-Verify system to determine employment eligibility. By signing the contract, the Contractor certifies that prior to the award of the Contract:

- the Contractor has registered with and will, to the extent permitted by law, utilize the United States Department of Homeland Security's E-Verify system during the term of the Contract to determine the eligibility of all persons hired to perform duties within Texas during the term of the agreement; and
- the Contractor will require that all subcontractors also register with and, to the extent permitted by law, utilize the United States Department of Homeland Security's E-Verify system during the term of the subcontract to determine the eligibility of all persons hired to perform duties within Texas during the term of the agreement.

Violation of this requirement constitutes a material breach of the Contract, subjects a subcontractor to removal from the Contract, and subjects the Contractor or subcontractors to possible sanctions in accordance with Title 43, Texas Administrative Code, Chapter 10, Subchapter F, "Sanctions and Suspension for Ethical Violations by Entities Doing Business with the Department."

## Certification Regarding Disclosure of Public Information

Pursuant to Subchapter J, Chapter 552, Texas Government Code, contractors executing a contract with a governmental body that results in the expenditure of at least \$1 million in public funds must:

- 1) preserve all contracting information\* as provided by the records retention requirements applicable to Texas Department of Transportation (TxDOT) for the duration of the contract,
- 2) on request of TxDOT, promptly provide any contracting information related to the contract that is in the custody or possession of the entity, and
- 3) on completion of the contract, either:
  - A. provide, at no cost to TxDOT, all contracting information related to the contract that is in the custody or possession of the entity, or
  - B. preserve the contracting information related to the contract as provided by the records retention requirements applicable to TxDOT

The requirements of Subchapter J, Chapter 552, Government Code, may apply to this contract, and the contractor or vendor agrees that the contract can be terminated if the contractor or vendor knowingly or intentionally fails to comply with a requirement of that subchapter.

By entering into Contract, the Contractor agrees to:

- provide, or make available, to TxDOT and any authorized governmental investigating or auditing agency all records, including electronic and payment records related to the contract, for the same period provided by the records retention schedule applicable to TxDOT, and
- ensure that all subcontracts include a clause requiring the same.

\* As defined in Government Code §552.003, “Contracting information” means the following information maintained by a governmental body or sent between a governmental body and a vendor, contractor, potential vendor, or potential contractor:

- 1) information in a voucher or contract relating to the receipt or expenditure of public funds by a governmental body;
- 2) solicitation or bid documents relating to a contract with a governmental body;
- 3) communications sent between a governmental body and a vendor, contractor, potential vendor, or potential contractor during the solicitation, evaluation, or negotiation of a contract;
- 4) documents, including bid tabulations, showing the criteria by which a governmental body evaluates each vendor, contractor, potential vendor, or potential contractor responding to a solicitation and, if applicable, an explanation of why the vendor or contractor was selected; and
- 5) communications and other information sent between a governmental body and a vendor or contractor related to the performance of a final contract with the governmental body or work performed on behalf of the governmental body.

## CERTIFICATION TO NOT BOYCOTT ISRAEL

Pursuant to Texas Government Code §2271.002, the Department must include a provision requiring a written verification affirming that the Contractor does not boycott Israel, as defined in Government Code §808.001, and will not boycott Israel during the term of the contract. This provision applies to a contract that:

- 1) is with a Contractor that is not a sole proprietorship,
- 2) is with a Contractor with 10 or more full-time employees, and
- 3) has a value of \$100,000 or more.

By signing the contract, the Contractor certifies that it does not boycott Israel and will not boycott Israel during the term of this contract. "Boycott" means refusing to deal with, terminating business activities with, or otherwise taking any action that is intended to penalize, inflict economic harm on, or limit commercial relations specifically with Israel, or with a person or entity doing business in Israel or in an Israeli-controlled territory, but does not include an action made for ordinary business purposes.

Violation of this certification may result in action by the Department.

## CERTIFICATION TO NOT BOYCOTT ENERGY COMPANIES

Pursuant to Texas Government Code §2274.002, the Department must include a provision requiring a written verification affirming that the Contractor does not boycott energy companies, as defined in Government Code §809.001, and will not boycott energy companies during the term of the contract. This provision applies to a contract that:

- 1) is with a Contractor that is not a sole proprietorship,
- 2) is with a Contractor with 10 or more full-time employees, and
- 3) has a value of \$100,000 or more.

By signing the contract, the Contractor certifies that it does not boycott energy companies and will not boycott energy companies during the term of this contract. "Boycott" means taking any action that is intended to penalize, inflict economic harm on, or limit commercial relations with a company because the company: (1) engages in the exploration, production, utilization, transportation, sale, or manufacturing of fossil fuel-based energy and does not commit or pledge to meet environmental standards beyond applicable federal and state law; or (2) does business with a company described by (1).

Violation of this certification may result in action by the Department.

## CERTIFICATION TO NOT DISCRIMINATE AGAINST FIREARM ENTITIES OR FIREARM TRADE ASSOCIATIONS

Pursuant to Texas Government Code §2274.002, the Department must include a provision requiring a written verification affirming that the Contractor:

- 1) does not have a practice, policy, guidance, or directive that discriminates against a firearm entity or firearm trade association, as defined in Government Code §2274.001, and
- 2) will not discriminate against a firearm entity or firearm trade association during the term of the contract.

This provision applies to a contract that:

- 1) is with a Contractor that is not a sole proprietorship,
- 2) is with a Contractor with 10 or more full-time employees, and
- 3) has a value of \$100,000 or more.

By signing the contract, the Contractor certifies that it does not discriminate against a firearm entity or firearm trade association as described and will not do so during the term of this contract. "Discriminate against a firearm entity or firearm trade association" means, with respect to the entity or association, to: (1) refuse to engage in the trade of any goods or services with the entity or association based solely on its status as a firearm entity or firearm trade association; (2) refrain from continuing an existing business relationship with the entity or association based solely on its status as a firearm entity or firearm trade association; or (3) terminate an existing business relationship with the entity or association based solely on its status as a firearm entity or firearm trade association. "Discriminate against a firearm entity or firearm trade association" does not include: (1) the established policies of a merchant, retail seller, or platform that restrict or prohibit the listing or selling of ammunition, firearms, or firearm accessories; (2) a company's refusal to engage in the trade of any goods or services, decision to refrain from continuing an existing business relationship, or decision to terminate an existing business relationship to comply with federal, state, or local law, policy, or regulations or a directive by a regulatory agency, or for any traditional business reason that is specific to the customer or potential customer and not based solely on an entity's or association's status as a firearm entity or firearm trade association.

Violation of this certification may result in action by the Department.

# PROHIBITION ON CERTAIN TELECOMMUNICATIONS EQUIPMENT OR SERVICES

The Federal Register Notice issued the Final Rule and states that the amendment to 2 CFR 200.216 is effective on August 13, 2020. The new 2 CFR 200.471 regulation provides clarity that the telecommunications and video surveillance costs associated with 2 CFR 200.216 are unallowable for services and equipment from these specific providers. OMB's Federal Register Notice includes the new 2 CFR 200.216 and 2 CFR 200.471 regulations.

<https://www.federalregister.gov/documents/2020/08/13/2020-17468/guidance-for-grants-and-agreements>

Per the Federal Law referenced above, use of services, systems, or services or systems that contain components produced by any of the following manufacturers is strictly prohibited for use on this project. Therefore, for any telecommunications, CCTV, or video surveillance equipment, services or systems cannot be manufactured by, or have components manufactured by:

- Huawei Technologies Company,
- ZTE Corporation (any subsidiary and affiliate of such entities),
- Hyatera Communications Corporation,
- Hangzhou Hikvision Digital Technology Company,
- Dahua Technology Company (any subsidiary and affiliate of such entities).

Violation of this prohibition will require replacement of the equipment at the contractor's expense.

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

- I. General
- II. Nondiscrimination
- III. Non-segregated 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. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion
- XI. Certification Regarding Use of Contract Funds for Lobbying
- XII. Use of United States-Flag Vessels:

**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, United States Code, as required in 23 CFR 633.102(b) (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). 23 CFR 633.102(e).

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. 23 CFR 633.102(e).

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) in accordance with 23 CFR 633.102. 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 solicitation-for-bids or request-for-proposals 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). 23 CFR 633.102(b).

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. 23 CFR 633.102(d).

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. 23 U.S.C. 114(b). The term Federal-aid highway does not include roadways functionally classified as local roads or rural minor collectors. 23 U.S.C. 101(a).

**II. NONDISCRIMINATION** (23 CFR 230.107(a); 23 CFR Part 230, Subpart A, Appendix A; EO 11246)

The provisions of this section related to 23 CFR Part 230, Subpart A, Appendix A 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 Part 60, 29 CFR Parts 1625-1627, 23 U.S.C. 140, Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794), Title VI of the Civil Rights Act of 1964, as amended (42 U.S.C. 2000d et seq.), 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 Part 60, and 29 CFR Parts 1625-1627. The contracting agency and the FHWA have the authority and the responsibility to ensure compliance with 23 U.S.C. 140, Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794), and Title VI of the Civil Rights Act of 1964, as amended (42 U.S.C. 2000d et seq.), 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 Part 230, Subpart A, 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 (see 28 CFR Part 35, 29 CFR Part 1630, 29 CFR Parts 1625-1627, 41 CFR Part 60 and 49 CFR Part 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 Part 35 and 29 CFR Part 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. 23 CFR 230.409 (g)(4) & (5).

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, sexual orientation, gender identity, 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 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 or other knowledgeable company official.

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, sexual orientation, gender identity, national origin, age or disability. The following procedures shall be followed:

a. The contractor will conduct periodic inspections of project sites to ensure 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. 23 CFR 230.409. 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, sexual orientation, gender identity, 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, sexual orientation, gender identity, 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 thereunder. 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, sexual orientation, gender identity, 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, 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. Assurances Required:**

a. The requirements of 49 CFR Part 26 and the State DOT's FHWA-approved Disadvantaged Business Enterprise (DBE) program are incorporated by reference.

b. 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 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 recipient deems appropriate, which may include, but is not limited to:

- (1) Withholding monthly progress payments;
- (2) Assessing sanctions;
- (3) Liquidated damages; and/or
- (4) Disqualifying the contractor from future bidding as non-responsible.

c. The Title VI and nondiscrimination provisions of U.S. DOT Order 1050.2A at Appendixes A and E are incorporated by reference. 49 CFR Part 21.

**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 more than \$10,000. 41 CFR 60-1.5.

As prescribed by 41 CFR 60-1.8, 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, sexual orientation, gender identity, 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), in accordance with 29 CFR 5.5. The requirements apply to all projects located within the right-of-way of a roadway that is functionally classified as Federal-aid highway. 23 U.S.C. 113. This excludes roadways functionally classified as local roads or rural minor collectors, which are exempt. 23 U.S.C. 101. Where applicable law requires that projects be treated as a project on a Federal-aid highway, the provisions of this subpart will apply regardless of the location of the project. Examples include: Surface Transportation Block Grant Program projects funded under 23 U.S.C. 133 [excluding recreational trails projects], the Nationally Significant Freight and Highway

Projects funded under 23 U.S.C. 117, and National Highway Freight Program projects funded under 23 U.S.C. 167.

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 (29 CFR 5.5)

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, 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 Administrator for determination. The 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 (29 CFR 5.5)**

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 (29 CFR 5.5)**

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. 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 29 CFR 5.5(a)(3)(ii), the appropriate information is being maintained under 29 CFR 5.5(a)(3)(i), 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 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 18 U.S.C. 1001 and 31 U.S.C. 231.

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 (29 CFR 5.5)

##### 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. 23 CFR 230.111(e)(2). 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 as provided in 29 CFR 5.5.

**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 as provided in 29 CFR 5.5.

**9. Disputes concerning labor standards.** As provided in 29 CFR 5.5, 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 (29 CFR 5.5)**

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**

Pursuant to 29 CFR 5.5(b), 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. 29 CFR 5.5.

**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 currently provided in 29 CFR 5.5(b)(2)\* 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. 29 CFR 5.5.

\* \$27 as of January 23, 2019 (See 84 FR 213-01, 218) as may be adjusted annually by the Department of Labor; pursuant to the Federal Civil Penalties Inflation Adjustment Act of 1990).

### **3. Withholding for unpaid wages and liquidated damages.**

The FHWA or 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 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. 29 CFR 5.5.

**4. Subcontracts.** The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraphs 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. 29 CFR 5.5.

## **VI. SUBLETTING OR ASSIGNING THE CONTRACT**

This provision is applicable to all Federal-aid construction contracts on the National Highway System pursuant to 23 CFR 635.116.

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" in paragraph 1 of Section VI 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: (based on longstanding interpretation)

- (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. 23 CFR 635.102.

2. Pursuant to 23 CFR 635.116(a), 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. Pursuant to 23 CFR 635.116(c), 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. (based on long-standing interpretation of 23 CFR 635.116).

5. The 30-percent self-performance requirement of paragraph (1) is not applicable to design-build contracts; however, contracting agencies may establish their own self-performance requirements. 23 CFR 635.116(d).

## **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 Part 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. 23 CFR 635.108.

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 Part 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). 29 CFR 1926.10.

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 Part 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 11, 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 (42 U.S.C. 7606; 2 CFR 200.88; EO 11738)**

This provision is applicable to all Federal-aid construction contracts in excess of \$150,000 and to all related subcontracts. 48 CFR 2.101; 2 CFR 200.326.

By submission of this bid/proposal or the execution of this contract or subcontract, as appropriate, the bidder, proposer, Federal-aid construction contractor, subcontractor, supplier, or vendor agrees to comply with all applicable standards, orders

or regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401-7671q) and the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251-1387). Violations must be reported to the Federal Highway Administration and the Regional Office of the Environmental Protection Agency. 2 CFR Part 200, Appendix II.

The contractor agrees to include or cause to be included the requirements of this Section in every subcontract, and further agrees to take such action as the contracting agency may direct as a means of enforcing such requirements. 2 CFR 200.326.

### **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. 2 CFR 180.220 and 1200.220.

#### **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. 2 CFR 180.320.

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. 2 CFR 180.325.

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. 2 CFR 180.345 and 180.350.

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, Subpart I, 180.900-180.1020, and 1200. "First Tier Covered Transactions" refers to any covered transaction between a recipient or subrecipient 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 recipient or subrecipient 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. 2 CFR 180.330.

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. 2 CFR 180.220 and 180.300.

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. 2 CFR 180.300; 180.320, and 180.325. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. 2 CFR 180.335. 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 System for Award Management website (<https://www.sam.gov/>). 2 CFR 180.300, 180.320, and 180.325.

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 CFR 180.325.

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## **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 CFR 180.335;.

(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, 2 CFR 180.800;

(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, 2 CFR 180.700 and 180.800; 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. 2 CFR 180.335(d).

(5) Are not a corporation that has been convicted of a felony violation under any Federal law within the two-year period preceding this proposal (USDOT Order 4200.6 implementing appropriations act requirements); and

(6) Are not a corporation with any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted, or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability (USDOT Order 4200.6 implementing appropriations act requirements).

b. Where the prospective participant is unable to certify to any of the statements in this certification, such prospective participant should attach an explanation to this proposal. 2 CFR 180.335 and 180.340.

## **3. 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). 2 CFR 180.220 and 1200.220.

a. By signing and submitting this proposal, the prospective lower tier participant 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. 2 CFR 180.365.

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, Subpart I, 180.900 – 180.1020, 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 recipient or subrecipient 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 recipient or subrecipient 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. 2 CFR 1200.220 and 1200.332.

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. 2 CFR 180.220 and 1200.220.

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 System for Award Management website (<https://www.sam.gov/>), which is compiled by the General Services Administration. 2 CFR 180.300, 180.320, 180.330, and 180.335.

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. 2 CFR 180.325.

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**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:

(a) is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency, 2 CFR 180.355;

(b) is a corporation that has been convicted of a felony violation under any Federal law within the two-year period preceding this proposal (USDOT Order 4200.6 implementing appropriations act requirements); and

(c) is a corporation with any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted, or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability. (USDOT Order 4200.6 implementing appropriations act requirements)

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

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**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 Part 20, App. A.

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.

## **XII. USE OF UNITED STATES-FLAG VESSELS:**

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, or any other covered transaction. 46 CFR Part 381.

This requirement applies to material or equipment that is acquired for a specific Federal-aid highway project. 46 CFR 381.7. It is not applicable to goods or materials that come into inventories independent of an FHWA funded-contract.

When oceanic shipments (or shipments across the Great Lakes) are necessary for materials or equipment acquired for a specific Federal-aid construction project, the bidder, proposer, contractor, subcontractor, or vendor agrees:

1. To utilize privately owned United States-flag commercial vessels to ship at least 50 percent of the gross tonnage (computed separately for dry bulk carriers, dry cargo liners, and tankers) involved, whenever shipping any equipment, material, or commodities pursuant to this contract, to the extent such vessels are available at fair and reasonable rates for United States-flag commercial vessels. 46 CFR 381.7.

2. To furnish within 20 days following the date of loading for shipments originating within the United States or within 30 working days following the date of loading for shipments originating outside the United States, a legible copy of a rated, 'on-board' commercial ocean bill-of-lading in English for each shipment of cargo described in paragraph (b)(1) of this section to both the Contracting Officer (through the prime contractor in the case of subcontractor bills-of-lading) and to the Office of Cargo and Commercial Sealift (MAR-620), Maritime Administration, Washington, DC 20590. (MARAD requires copies of the ocean carrier's (master) bills of lading, certified onboard, dated, with rates and charges. These bills of lading may contain business sensitive information and therefore may be submitted directly to MARAD by the Ocean Transportation Intermediary on behalf of the contractor). 46 CFR 381.7.

**ATTACHMENT A - EMPLOYMENT AND MATERIALS  
PREFERENCE FOR APPALACHIAN DEVELOPMENT  
HIGHWAY SYSTEM OR APPALACHIAN LOCAL ACCESS  
ROAD CONTRACTS** (23 CFR 633, Subpart B, Appendix B)

This provision is applicable to all Federal-aid projects funded under the Appalachian Regional Development Act of 1965.

1. During the performance of this contract, the contractor undertaking to do work which is, or reasonably may be, done as on-site work, shall give preference to qualified persons who regularly reside in the labor area as designated by the DOL wherein the contract work is situated, or the subregion, or the Appalachian counties of the State wherein the contract work is situated, except:

a. To the extent that qualified persons regularly residing in the area are not available.

b. For the reasonable needs of the contractor to employ supervisory or specially experienced personnel necessary to assure an efficient execution of the contract work.

c. For the obligation of the contractor to offer employment to present or former employees as the result of a lawful collective bargaining contract, provided that the number of nonresident persons employed under this subparagraph (1c) shall not exceed 20 percent of the total number of employees employed by the contractor on the contract work, except as provided in subparagraph (4) below.

2. The contractor shall place a job order with the State Employment Service indicating (a) the classifications of the laborers, mechanics and other employees required to perform the contract work, (b) the number of employees required in each classification, (c) the date on which the participant estimates such employees will be required, and (d) any other pertinent information required by the State Employment Service to complete the job order form. The job order may be placed with the State Employment Service in writing or by telephone. If during the course of the contract work, the information submitted by the contractor in the original job order is substantially modified, the participant shall promptly notify the State Employment Service.

3. The contractor shall give full consideration to all qualified job applicants referred to him by the State Employment Service. The contractor is not required to grant employment to any job applicants who, in his opinion, are not qualified to perform the classification of work required.

4. If, within one week following the placing of a job order by the contractor with the State Employment Service, the State Employment Service is unable to refer any qualified job applicants to the contractor, or less than the number requested, the State Employment Service will forward a certificate to the contractor indicating the unavailability of applicants. Such certificate shall be made a part of the contractor's permanent project records. Upon receipt of this certificate, the contractor may employ persons who do not normally reside in the labor area to fill positions covered by the certificate, notwithstanding the provisions of subparagraph (1c) above.

5. The provisions of 23 CFR 633.207(e) allow the contracting agency to provide a contractual preference for the use of mineral resource materials native to the Appalachian region.

6. The contractor shall include the provisions of Sections 1 through 4 of this Attachment A in every subcontract for work which is, or reasonably may be, done as on-site work.

The wage rates listed herein are those predetermined by the Secretary of Labor and State Statute and listed in the United States Department of Labor's (USDOL) General Decisions dated **01-06-2023** and are the minimum wages to be paid accordingly for each specified classification. To determine the applicable wage rate zone, a list entitled "TEXAS COUNTIES IDENTIFIED BY WAGE RATE ZONES" is provided in the contract. Any wage rate that is not listed herein and not in the USDOL's general decision, must be submitted to the Engineer for approval. **IMPORTANT NOTICE FOR STATE PROJECTS:** only the controlling wage rate zone applies to the contract. Effective 01-06-2023.

CLASS. #	CLASSIFICATION DESCRIPTION	ZONE TX02 *(TX20230002)	ZONE TX03 *(TX20230003)	ZONE TX04 *(TX20230004)	ZONE TX05 *(TX20230005)	ZONE TX06 *(TX20230006)	ZONE TX07 *(TX20230007)	ZONE TX08 *(TX20230008)	ZONE TX24 *(TX20230024)	ZONE TX25 *(TX20230025)	ZONE TX27 *(TX20230027)	ZONE TX28 *(TX20230028)	ZONE TX29 *(TX20230029)	ZONE TX30 *(TX20230030)	ZONE TX37 *(TX20230037)	ZONE TX38 *(TX20230038)	ZONE TX42 *(TX20230042)
1428	Agricultural Tractor Operator						\$12.69					\$12.35			\$11.75		
1300	Asphalt Distributor Operator	\$14.87	\$13.48	\$13.88	\$15.72	\$15.58	\$15.55	\$15.72	\$13.28	\$15.32	\$15.62	\$14.36	\$14.25	\$14.03	\$13.75	\$14.06	\$14.40
1303	Asphalt Paving Machine Operator	\$13.40	\$12.25	\$12.35	\$13.87	\$14.05	\$14.36	\$14.20	\$13.26	\$13.99	\$14.68	\$12.92	\$13.44	\$12.53	\$14.00	\$14.32	\$12.99
1106	Asphalt Raker	\$12.28	\$10.61	\$12.02	\$14.21	\$11.65	\$12.12	\$11.64	\$11.44	\$12.69	\$12.05	\$11.34	\$11.67	\$11.40	\$12.59	\$12.36	\$11.78
1112	Batching Plant Operator, Asphalt																
1115	Batching Plant Operator, Concrete																
1214	Blaster																
1615	Boom Truck Operator						\$18.36										
1444	Boring Machine Operator																
1305	Broom or Sweeper Operator	\$11.21	\$10.33	\$10.08	\$11.99		\$11.04	\$11.62		\$11.74	\$11.41	\$10.30		\$10.23	\$10.60	\$12.68	\$11.05
1144	Communications Cable Installer																
1124	Concrete Finisher, Paving and Structures	\$13.55	\$12.46	\$13.16	\$12.85	\$12.64	\$12.56	\$12.77	\$12.44	\$14.12	\$13.04	\$13.38	\$12.64	\$12.80	\$12.79	\$12.98	\$13.32
1318	Concrete Pavement Finishing Machine Operator				\$16.05			\$15.48		\$16.05		\$19.31				\$13.07	
1315	Concrete Paving, Curing, Float, Texturing Machine Operator											\$16.34					\$11.71
1333	Concrete Saw Operator				\$14.67					\$14.48	\$17.33						\$13.99
1399	Concrete/Gunite Pump Operator																
1344	Crane Operator, Hydraulic 80 tons or less				\$18.22		\$18.36			\$18.12	\$18.04	\$20.21			\$18.63	\$13.86	
1345	Crane Operator, Hydraulic Over 80 Tons																
1342	Crane Operator, Lattice Boom 80 Tons or Less	\$16.82	\$14.39	\$13.85	\$17.27		\$15.87			\$17.27		\$14.67			\$16.42	\$14.97	\$13.87
1343	Crane Operator, Lattice Boom Over 80 Tons				\$20.52		\$19.38			\$20.52		\$17.49			\$25.13	\$15.80	
1306	Crawler Tractor Operator	\$13.96	\$16.63	\$13.62	\$14.26		\$15.67			\$14.07	\$13.15	\$13.38			\$14.60	\$13.68	\$13.50
1351	Crusher or Screen Plant Operator																
1446	Directional Drilling Locator						\$11.67										
1445	Directional Drilling Operator				\$20.32		\$17.24										
1139	Electrician	\$20.96		\$19.87	\$19.80		\$26.35		\$20.27	\$19.80		\$20.92				\$27.11	\$19.87
1347	Excavator Operator, 50,000 pounds or less	\$13.46	\$12.56	\$13.67	\$17.19		\$12.88	\$14.38	\$13.49	\$17.19		\$13.88			\$14.09	\$12.71	\$14.42
1348	Excavator Operator, Over 50,000 pounds		\$15.23	\$13.52	\$17.04		\$17.71			\$16.99	\$18.80	\$16.22				\$14.53	\$13.52
1150	Flagger	\$9.30	\$9.10	\$8.50	\$10.28	\$8.81	\$9.45	\$8.70		\$10.06	\$9.71	\$9.03	\$8.81	\$9.08	\$9.90	\$10.33	\$8.10
1151	Form Builder/Setter, Structures	\$13.52	\$12.30	\$13.38	\$12.91	\$12.71	\$12.87	\$12.38	\$12.26	\$13.84	\$12.98	\$13.07	\$13.61	\$12.82	\$14.73	\$12.23	\$12.25
1160	Form Setter, Paving & Curb	\$12.36	\$12.16	\$13.93	\$11.83	\$10.71	\$12.94			\$13.16	\$12.54	\$11.33	\$10.69		\$13.33	\$12.34	\$13.93
1360	Foundation Drill Operator, Crawler Mounted				\$17.99					\$17.99							\$17.43
1363	Foundation Drill Operator, Truck Mounted		\$16.86	\$22.05	\$21.51		\$16.93			\$21.07	\$20.20	\$20.76		\$17.54	\$21.39	\$15.89	\$22.05
1369	Front End Loader Operator, 3 CY or Less	\$12.28	\$13.49	\$13.40	\$13.85		\$13.04	\$13.15	\$13.29	\$13.69	\$12.64	\$12.89			\$13.51	\$13.32	\$12.17
1372	Front End Loader Operator, Over 3 CY	\$12.77	\$13.69	\$12.33	\$14.96		\$13.21	\$12.86	\$13.57	\$14.72	\$13.75	\$12.32			\$13.19	\$13.17	\$13.02
1329	Joint Sealer																
1172	Laborer, Common	\$10.30	\$9.86	\$10.08	\$10.51	\$10.71	\$10.50	\$10.24	\$10.58	\$10.72	\$10.45	\$10.30	\$10.25	\$10.03	\$10.54	\$11.02	\$10.15
1175	Laborer, Utility	\$11.80	\$11.53	\$12.70	\$12.17	\$11.81	\$12.27	\$12.11	\$11.33	\$12.32	\$11.80	\$11.53	\$11.23	\$11.50	\$11.95	\$11.73	\$12.37
1346	Loader/Backhoe Operator	\$14.18	\$12.77	\$12.97	\$15.68		\$14.12			\$15.18	\$13.58	\$12.87		\$13.21	\$14.13	\$14.29	\$12.90
1187	Mechanic	\$20.14	\$15.47	\$17.47	\$17.74	\$17.00	\$17.10			\$17.68	\$18.94	\$18.58	\$17.00	\$16.61	\$18.46	\$16.96	\$17.47
1380	Milling Machine Operator	\$15.54	\$14.64	\$12.22	\$14.29		\$14.18			\$14.32	\$14.35	\$12.86			\$14.75	\$13.53	\$12.80

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1390	Motor Grader Operator, Fine Grade	\$17.49	\$16.52	\$16.88	\$17.12	\$18.37	\$18.51	\$16.69	\$16.13	\$17.19	\$18.35	\$17.07	\$17.74	\$17.47	\$17.08	\$15.69	\$20.01
1393	Motor Grader Operator, Rough	\$16.15	\$14.62	\$15.83	\$16.20	\$17.07	\$14.63	\$18.50		\$16.02	\$16.44	\$15.12	\$16.85	\$14.47	\$17.39	\$14.23	\$15.53
1413	Off Road Hauler			\$10.08	\$12.26		\$11.88			\$12.25		\$12.23			\$13.00	\$14.60	
1196	Painter, Structures Pavement Marking Machine Operator	\$16.42		\$13.10	\$13.55		\$19.17	\$12.01		\$13.63	\$14.60	\$13.17		\$16.65	\$10.54	\$11.18	\$13.10
1443	Percussion or Rotary Drill Operator																
1202	Piledriver															\$14.95	
1205	Pipelayer		\$11.87	\$14.64	\$13.17	\$11.17	\$12.79		\$11.37	\$13.24	\$12.66	\$13.24	\$11.17	\$11.67		\$12.12	\$14.64
1384	Reclaimer/Pulverizer Operator	\$12.85			\$11.90		\$12.88			\$11.01		\$10.46					
1500	Reinforcing Steel Worker	\$13.50	\$14.07	\$17.53	\$16.17		\$14.00			\$16.18	\$12.74	\$15.83		\$17.10		\$15.15	\$17.72
1402	Roller Operator, Asphalt	\$10.95		\$11.96	\$13.29		\$12.78	\$11.61		\$13.08	\$12.36	\$11.68			\$11.71	\$11.95	\$11.50
1405	Roller Operator, Other	\$10.36		\$10.44	\$11.82		\$10.50	\$11.64		\$11.51	\$10.59	\$10.30		\$12.04	\$12.85	\$11.57	\$10.66
1411	Scraper Operator	\$10.61	\$11.07	\$10.85	\$12.88		\$12.27		\$11.12	\$12.96	\$11.88	\$12.43		\$11.22	\$13.95	\$13.47	\$10.89
1417	Self-Propelled Hammer Operator																
1194	Servicer	\$13.98	\$12.34	\$14.11	\$14.74		\$14.51	\$15.56	\$13.44	\$14.58	\$14.31	\$13.83		\$12.43	\$13.72	\$13.97	\$14.11
1513	Sign Erector																
1708	Slurry Seal or Micro-Surfacing Machine Operator									\$15.96							
1341	Small Slipform Machine Operator									\$14.73	\$13.84	\$13.68		\$13.45	\$11.83	\$13.58	\$14.05
1515	Spreader Box Operator	\$12.60		\$13.12	\$14.71		\$14.04										
1705	Structural Steel Welder															\$12.85	
1509	Structural Steel Worker						\$19.29									\$14.39	
1339	Subgrade Trimmer																
1143	Telecommunication Technician																
1145	Traffic Signal/Light Pole Worker						\$16.00										
1440	Trenching Machine Operator, Heavy						\$18.48										
1437	Trenching Machine Operator, Light																
1609	Truck Driver Lowboy-Float	\$14.46	\$13.63	\$13.41	\$15.00	\$15.93	\$15.66			\$16.24	\$16.39	\$14.30	\$16.62	\$15.63	\$14.28	\$16.03	\$13.41
1612	Truck Driver Transit-Mix				\$14.14					\$14.14							
1600	Truck Driver, Single Axle	\$12.74	\$10.82	\$10.75	\$13.04	\$11.61	\$11.79	\$13.53	\$13.16	\$12.31	\$13.40	\$10.30	\$11.61		\$11.97	\$11.46	\$10.75
1606	Truck Driver, Single or Tandem Axle Dump Truck	\$11.33	\$14.53	\$11.95	\$12.95		\$11.68		\$14.06	\$12.62	\$11.45	\$12.28		\$13.08	\$11.68	\$11.48	\$11.10
1607	Truck Driver, Tandem Axle Tractor with Semi Trailer	\$12.49	\$12.12	\$12.50	\$13.42		\$12.81	\$13.16		\$12.86	\$16.22	\$12.50			\$13.80	\$12.27	\$12.50
1441	Tunneling Machine Operator, Heavy																
1442	Tunneling Machine Operator, Light																
1706	Welder		\$14.02		\$14.86		\$15.97		\$13.74	\$14.84					\$13.78		
1520	Work Zone Barricade Servicer	\$10.30	\$12.88	\$11.46	\$11.70	\$11.57	\$11.85	\$10.77		\$11.68	\$12.20	\$11.22	\$11.51	\$12.96	\$10.54	\$11.67	\$11.76

Notes:

\*Represents the USDOL wage decision.

Any worker employed on this project shall be paid at the rate of one and one half (1-1/2) times the regular rate for every hour worked in excess of forty (40) hours per week.

For reference, the titles and descriptions for the classifications listed here are detailed further in the AGC of Texas' *Standard Job Classifications and Descriptions for Highway, Heavy, Utilities, and Industrial Construction in Texas* posted on the AGC's Web site for any contractor.

**TEXAS COUNTIES IDENTIFIED BY  
WAGE RATE ZONES: 2, 3, 4, 5, 6, 7, 8, 24, 25, 27, 28, 29, 30, 37, 38, 42**

County Name	Zone	County Name	Zone	County Name	Zone	County Name	Zone
Anderson	28	Donley	37	Karnes	27	Reagan	37
Andrews	37	Duval	30	Kaufman	25	Real	37
Angelina	28	Eastland	37	Kendall	7	Red River	28
Aransas	29	Ector	2	Kenedy	30	Reeves	8
Archer	25	Edwards	8	Kent	37	Refugio	27
Armstrong	2	El Paso	24	Kerr	27	Roberts	37
Atascosa	7	Ellis	25	Kimble	37	Robertson	7
Austin	38	Erath	28	King	37	Rockwall	25
Bailey	37	Falls	28	Kinney	8	Runnels	37
Bandera	7	Fannin	28	Kleberg	27	Rusk	4
Bastrop	7	Fayette	27	Knox	37	Sabine	28
Baylor	37	Fisher	37	Lamar	28	San Augustine	28
Bee	27	Floyd	37	Lamb	37	San Jacinto	38
Bell	7	Foard	37	Lampasas	7	San Patricio	29
Bexar	7	Fort Bend	38	LaSalle	30	San Saba	37
Blanco	27	Franklin	28	Lavaca	27	Schleicher	37
Borden	37	Freestone	28	Lee	27	Scurry	37
Bosque	28	Frio	27	Leon	28	Shackelford	37
Bowie	4	Gaines	37	Liberty	38	Shelby	28
Brazoria	38	Galveston	38	Limestone	28	Sherman	37
Brazos	7	Garza	37	Lipscomb	37	Smith	4
Brewster	8	Gillespie	27	Live Oak	27	Somervell	28
Briscoe	37	Glasscock	37	Llano	27	Starr	30
Brooks	30	Goliad	29	Loving	37	Stephens	37
Brown	37	Gonzales	27	Lubbock	2	Sterling	37
Burleson	7	Gray	37	Lynn	37	Stonewall	37
Burnet	27	Grayson	25	Madison	28	Sutton	8
Caldwell	7	Gregg	4	Marion	28	Swisher	37
Calhoun	29	Grimes	28	Martin	37	Tarrant	25
Callahan	25	Guadalupe	7	Mason	27	Taylor	2
Cameron	3	Hale	37	Matagorda	27	Terrell	8
Camp	28	Hall	37	Maverick	30	Terry	37
Carson	2	Hamilton	28	McCulloch	37	Throckmorton	37
Cass	28	Hansford	37	McLennan	7	Titus	28
Castro	37	Hardeman	37	McMullen	30	Tom Green	2
Chambers	38	Hardin	38	Medina	7	Travis	7
Cherokee	28	Harris	38	Menard	37	Trinity	28
Childress	37	Harrison	42	Midland	2	Tyler	28
Clay	25	Hartley	37	Milam	28	Upshur	4
Cochran	37	Haskell	37	Mills	37	Upton	37
Coke	37	Hays	7	Mitchell	37	Uvalde	30
Coleman	37	Hemphill	37	Montague	37	Val Verde	8
Collin	25	Henderson	28	Montgomery	38	Van Zandt	28
Collingsworth	37	Hidalgo	3	Moore	37	Victoria	6
Colorado	27	Hill	28	Morris	28	Walker	28
Comal	7	Hockley	37	Motley	37	Waller	38
Comanche	37	Hood	28	Nacogdoches	28	Ward	37
Concho	37	Hopkins	28	Navarro	28	Washington	28
Cooke	37	Houston	28	Newton	28	Webb	3
Coryell	7	Howard	37	Nolan	37	Wharton	27
Cottle	37	Hudspeth	8	Nueces	29	Wheeler	37
Crane	37	Hunt	25	Ochiltree	37	Wichita	5
Crockett	8	Hutchinson	37	Oldham	37	Wilbarger	37
Crosby	2	Irion	2	Orange	38	Willacy	30
Culberson	8	Jack	28	Palo Pinto	28	Williamson	7
Dallam	37	Jackson	27	Panola	28	Wilson	7
Dallas	25	Jasper	28	Parker	25	Winkler	37
Dawson	37	Jeff Davis	8	Parmer	37	Wise	25
Deaf Smith	37	Jefferson	38	Pecos	8	Wood	28
Delta	25	Jim Hogg	30	Polk	28	Yoakum	37
Denton	25	Jim Wells	27	Potter	2	Young	37
DeWitt	27	Johnson	25	Presidio	8	Zapata	30
Dickens	37	Jones	25	Rains	28	Zavala	30
Dimmit	30			Randall	2		

# Special Provision to Item 000

## Nondiscrimination



### 1. DESCRIPTION

All recipients of federal financial assistance are required to comply with various nondiscrimination laws including Title VI of the Civil Rights Act of 1964, as amended, (Title VI). Title VI forbids discrimination against anyone in the United States on the grounds of race, color, or national origin by any agency receiving federal funds.

Texas Department of Transportation, as a recipient of Federal financial assistance, and under Title VI and related statutes, ensures that no person shall on the grounds of race, religion (where the primary objective of the financial assistance is to provide employment per 42 U.S.C. § 2000d-3), color, national origin, sex, age or disability be excluded from participation in, be denied the benefits of, or otherwise be subjected to discrimination under any Department programs or activities.

### 2. DEFINITION OF TERMS

Where the term “contractor” appears in the following six nondiscrimination clauses, the term “contractor” is understood to include all parties to contracts or agreements with the Texas Department of Transportation.

### 3. NONDISCRIMINATION PROVISIONS

During the performance of this contract, the contractor agrees as follows:

- 3.1. **Compliance with Regulations.** The Contractor shall comply with the Regulations relative to nondiscrimination in Federally-assisted programs of the Department of Transportation (hereinafter, “DOT”) Title 49, Code of Federal Regulations, Part 21, as they may be amended from time to time, (hereinafter referred to as the Regulations), which are herein incorporated by reference and made a part of this contract.
- 3.2. **Nondiscrimination.** The contractor, with regard to the work performed by it during the contract, shall not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor shall not participate either directly or indirectly in the discrimination prohibited by section 21.5 of the Regulations, including employment practices when the contract covers a program set forth in Appendix B of the Regulations.
- 3.3. **Solicitations for Subcontracts, Including Procurements of Materials and Equipment:** In all solicitations either by competitive bidding or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials or leases of equipment, each potential subcontractor or supplier shall be notified by the contractor of the contractor's obligations under this contract and the Regulations relative to nondiscrimination on the grounds of race, color, or national origin.
- 3.4. **Information and Reports:** The contractor shall provide all information and reports required by the Regulations or directives issued pursuant thereto, and shall permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Recipient or the Texas Department of Transportation to be pertinent to ascertain compliance with such Regulations, orders and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish this information the contractor shall so certify to the Recipient, or the Texas Department of Transportation as appropriate, and shall set forth what efforts it has made to obtain the information.



- 3.5. **Sanctions for Noncompliance.** In the event of the contractor's noncompliance with the nondiscrimination provisions of this contract, the Recipient shall impose such contract sanctions as it or the Texas Department of Transportation may determine to be appropriate, including, but not limited to:
- withholding of payments to the contractor under the contract until the contractor complies, and/or
  - cancellation, termination or suspension of the contract, in whole or in part.
- 3.6. **Incorporation of Provisions.** The contractor shall include the provisions of paragraphs (1) through (6) in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Regulations, or directives issued pursuant thereto. The contractor shall take such action with respect to any subcontract or procurement as the Recipient or the Texas Department of Transportation may direct as a means of enforcing such provisions including sanctions for non-compliance: Provided, however, that, in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or supplier as a result of such direction, the contractor may request the Recipient to enter into such litigation to protect the interests of the Recipient, and, in addition, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

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# Special Provision to Item 000

## Certification of Nondiscrimination in Employment

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### 1. GENERAL

By signing this proposal, the Bidder certifies that he has participated in a previous contract or subcontract subject to the equal opportunity clause, as required by Executive Orders 10925, 11114, or 11246, or if he has not participated in a previous contract of this type, or if he has had previous contract or subcontracts and has not filed, he will file 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.

**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 contractor submits 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.

## Special Provision to Item 000

# Notice of Requirement for Affirmative Action to Ensure Equal Employment Opportunity (Executive Order 11246)



### 1. GENERAL

In addition to the affirmative action requirements of the Special Provision titled "Standard Federal Equal Employment Opportunity Construction Contract Specifications" as set forth elsewhere in this proposal, the Bidder's attention is directed to the specific requirements for utilization of minorities and females as set forth below.

### 2. GOALS

2.1. Goals for minority and female participation are hereby established in accordance with 41 CFR 60-4.

2.2. The goals for minority and female participation expressed in percentage terms for the Contractor's aggregate work force in each trade on all construction work in the covered area are as follows:

Goals for minority participation in each trade, %	Goals for female participation in each trade, %
See Table 1	6.9

2.3. 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 will 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 non-federally involved construction. The Contractor's compliance with the Executive Order and the regulations in 41 CFR Part 60-4 will be based on its implementation of the Standard Federal Equal Employment Opportunity Construction Contract Specifications Special Provision 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 must make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority and female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals will be a violation of the Contract, the Executive Order and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

2.4. A Contractor or subcontractor will be considered in compliance with these provisions by participation in the Texas Highway-Heavy Branch, AGC, Statewide Training and Affirmative Action Plan. Provided that each Contractor or subcontractor participating in this plan must individually comply with the equal opportunity clause set forth in 41 CFR 60-1.4 and must make a good faith effort to achieve the goals set forth for each participating trade in the plan in which it has employees. The overall good performance of other Contractors and subcontractors toward a goal in an approved plan does not excuse any covered Contractor's or subcontractor's failure to make good faith efforts to achieve the goals contained in these provisions. Contractors or subcontractors participating in the plan must be able to demonstrate their participation and document their compliance with the provisions of this Plan.

### 3. SUBCONTRACTING

The Contractor must provide written notification to the Department 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 pending concurrence of the Department in the award. The notification will list the names,

address and telephone number of the subcontractor; employer identification number; estimated dollar amount of the subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the Contract is to be performed.

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#### 4. COVERED AREA

As used in this special provision, and in the Contract resulting from this solicitation, the geographical area covered by these goals for female participation is the State of Texas. The geographical area covered by these goals for other minorities are the counties in the State of Texas as indicated in Table 1.

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#### 5. REPORTS

The Contractor is hereby notified that he may be subject to the Office of Federal Contract Compliance Programs (OFCCP) reporting and record keeping requirements as provided for under Executive Order 11246 as amended. OFCCP will provide direct notice to the Contractor as to the specific reporting requirements that he will be expected to fulfill.

**Table 1**  
**Goals for Minority Participation**

County	Participation, %	County	Participation, %
Anderson	22.5	Chambers	27.4
Andrews	18.9	Cherokee	22.5
Angelina	22.5	Childress	11.0
Aransas	44.2	Clay	12.4
Archer	11.0	Cochran	19.5
Armstrong	11.0	Coke	20.0
Atascosa	49.4	Coleman	10.9
Austin	27.4	Collin	18.2
Bailey	19.5	Collingsworth	11.0
Bandera	49.4	Colorado	27.4
Bastrop	24.2	Comal	47.8
Baylor	11.0	Comanche	10.9
Bee	44.2	Concho	20.0
Bell	16.4	Cooke	17.2
Bexar	47.8	Coryell	16.4
Blanco	24.2	Cottle	11.0
Borden	19.5	Crane	18.9
Bosque	18.6	Crockett	20.0
Bowie	19.7	Crosby	19.5
Brazoria	27.3	Culberson	49.0
Brazos	23.7	Dallam	11.0
Brewster	49.0	Dallas	18.2
Briscoe	11.0	Dawson	19.5
Brooks	44.2	Deaf Smith	11.0
Brown	10.9	Delta	17.2
Burleson	27.4	Denton	18.2
Burnet	24.2	DeWitt	27.4
Caldwell	24.2	Dickens	19.5
Calhoun	27.4	Dimmit	49.4
Callahan	11.6	Donley	11.0
Cameron	71.0	Duval	44.2
Camp	20.2	Eastland	10.9
Carson	11.0	Ector	15.1
Cass	20.2	Edwards	49.4
Castro	11.0	Ellis	18.2

County	Participation, %	County	Participation, %
El Paso	57.8	Kenedy	44.2
Erath	17.2	Kent	10.9
Falls	18.6	Kerr	49.4
Fannin	17.2	Kimble	20.0
Fayette	27.4	King	19.5
Fisher	10.9	Kinney	49.4
Floyd	19.5	Kleberg	44.2
Foard	11.0	Knox	10.9
Fort Bend	27.3	Lamar	20.2
Franklin	17.2	Lamb	19.5
Freestone	18.6	Lampasas	18.6
Frio	49.4	LaSalle	49.4
Gaines	19.5	Lavaca	27.4
Galveston	28.9	Lee	24.2
Garza	19.5	Leon	27.4
Gillespie	49.4	Liberty	27.3
Glasscock	18.9	Limestone	18.6
Goliad	27.4	Lipscomb	11.0
Gonzales	49.4	Live Oak	44.2
Gray	11.0	Llano	24.2
Grayson	9.4	Loving	18.9
Gregg	22.8	Lubbock	19.6
Grimes	27.4	Lynn	19.5
Guadalupe	47.8	Madison	27.4
Hale	19.5	Marion	22.5
Hall	11.0	Martin	18.9
Hamilton	18.6	Mason	20.0
Hansford	11.0	Matagorda	27.4
Hardeman	11.0	Maverick	49.4
Hardin	22.6	McCulloch	20.0
Harris	27.3	McLennan	20.7
Harrison	22.8	McMullen	49.4
Hartley	11.0	Medina	49.4
Haskell	10.9	Menard	20.0
Hays	24.1	Midland	19.1
Hemphill	11.0	Milam	18.6
Henderson	22.5	Mills	18.6
Hidalgo	72.8	Mitchell	10.9
Hill	18.6	Montague	17.2
Hockley	19.5	Montgomery	27.3
Hood	18.2	Moore	11.0
Hopkins	17.2	Morris	20.2
Houston	22.5	Motley	19.5
Howard	18.9	Nacogdoches	22.5
Hudspeth	49.0	Navarro	17.2
Hunt	17.2	Newton	22.6
Hutchinson	11.0	Nolan	10.9
Irion	20.0	Nueces	41.7
Jack	17.2	Ochiltree	11.0
Jackson	27.4	Oldham	11.0
Jasper	22.6	Orange	22.6
Jeff Davis	49.0	Palo Pinto	17.2
Jefferson	22.6	Panola	22.5
Jim Hogg	49.4	Parker	18.2
Jim Wells	44.2	Parmer	11.0
Johnson	18.2	Pecos	18.9
Jones	11.6	Polk	27.4
Karnes	49.4	Potter	9.3
Kaufman	18.2	Presidio	49.0
Kendall	49.4	Randall	9.3

<b>County</b>	<b>Participation, %</b>	<b>County</b>	<b>Participation, %</b>
Rains	17.2	Reagan	20.0
Real	49.4	Throckmorton	10.9
Red River	20.2	Titus	20.2
Reeves	18.9	Tom Green	19.2
Refugio	44.2	Travis	24.1
Roberts	11.0	Trinity	27.4
Robertson	27.4	Tyler	22.6
Rockwall	18.2	Upshur	22.5
Runnels	20.0	Upton	18.9
Rusk	22.5	Uvalde	49.4
Sabine	22.6	Val Verde	49.4
San Augustine	22.5	Van Zandt	17.2
San Jacinto	27.4	Victoria	27.4
San Patricio	41.7	Walker	27.4
San Saba	20.0	Waller	27.3
Schleicher	20.0	Ward	18.9
Scurry	10.9	Washington	27.4
Shackelford	10.9	Webb	87.3
Shelby	22.5	Wharton	27.4
Sherman	11.0	Wheeler	11.0
Smith	23.5	Wichita	12.4
Somervell	17.2	Wilbarger	11.0
Starr	72.9	Willacy	72.9
Stephens	10.9	Williamson	24.1
Sterling	20.0	Wilson	49.4
Stonewall	10.9	Winkler	18.9
Sutton	20.0	Wise	18.2
Swisher	11.0	Wood	22.5
Tarrant	18.2	Yoakum	19.5
Taylor	11.6	Young	11.0
Terrell	20.0	Zapata	49.4
Terry	19.5	Zavala	49.4

# Special Provision to Item 000

## Standard Federal Equal Employment Opportunity Construction Contract Specifications (Executive Order 11246)



### 1. GENERAL

1.1. As used in these specifications:

- "Covered area" means the geographical area described in the solicitation from which this Contract resulted;
- "Director" means Director, Office of Federal Contract Compliance Programs, United States Department of Labor, or any person to whom the Director delegates authority;
- "Employer identification number" means the Federal Social Security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941.
- "Minority" includes:
  - Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);
  - Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish Culture or origin, regardless of race);
  - Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and
  - American Indian or Alaskan Native (all persons having origins in any of the original peoples of North American and maintaining identifiable tribal affiliations through membership and participation or community identification).

1.2. Whenever the Contractor, or any Subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it will physically include in each subcontract in excess of \$10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this Contract resulted.

1.3. If the Contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U. S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) will be in accordance with that plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor or Subcontractor participating in an approved Plan is individually required to comply with its obligations under the equal employment opportunity (EEO) clause, and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other Contractors or Subcontractors toward a goal in an approved Plan does not excuse any covered Contractor's or Subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.

1.4. The Contractor will implement the specific affirmative action standards provided in Section 1.7.1. through Section 1.7.16. of these specifications. The goals set forth in the solicitation from which this Contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered construction Contractors performing Contracts in geographical areas where they do not have a Federal or federally assisted construction Contract will apply the minority and female goals established for the geographical area where the Contract is being performed. Goals are published periodically in the Federal Register in notice form and such notices may be obtained from any Office of Federal Contract Compliance Programs office or any Federal procurement contracting officer. The

Contractor is expected to make substantially uniform progress toward its goals in each craft during the period specified.

- 1.5. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women will excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.
- 1.6. In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U. S. Department of Labor.
- 1.7. The Contractor will take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications will be based upon its effort to achieve maximum results from its actions. The Contractor will document these efforts fully, and will implement affirmative action steps at least as extensive as the following:
  - 1.7.1. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor will specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.
  - 1.7.2. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.
  - 1.7.3. Maintain a current file of the names, addresses and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this will be documented in the file with the reason therefor, along with whatever additional actions the Contractor may have taken.
  - 1.7.4. Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral Process has impeded the Contractor's efforts to meet its obligations.
  - 1.7.5. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor will provide notice of these programs to the sources compiled under 7b above.
  - 1.7.6. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and Collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.
  - 1.7.7. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination or other



employment decisions including specific review of these items with on-site supervisory personnel such as Superintendents, General Foremen, etc., before the initiation of construction work at any job site. A written record must be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

- 1.7.8. Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other Contractors and Subcontractors with whom the Contractor does or anticipates doing business.
- 1.7.9. Direct its recruitment efforts, both oral and written, to minority, female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month before the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor will send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.
- 1.7.10. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and female youth both on the site and in other areas of a Contractor's workforce.
- 1.7.11. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.
- 1.7.12. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.
- 1.7.13. Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment-related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.
- 1.7.14. Ensure that all facilities and company activities are non-segregated except that separate or single-user toilet and necessary changing facilities will be provided to assure privacy between the sexes.
- 1.7.15. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.
- 1.7.16. Conduct a review, at least annually, of all supervisors' adherence to and performance under the Contractor's EEO policies and affirmative action obligations.
- 1.8. Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (Section 7.1. through Section 7.16.). The efforts of a contractor association, joint contractor-union, contractor-community, or other similar group of which the Contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under Section 7.1. through Section 7.16. of these Specifications provided that the Contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation will not be a defense for the Contractor's noncompliance.
- 1.9. A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor

may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is underutilized).

- 1.10. The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.
- 1.11. The Contractor will not enter into any Subcontract with any person or firm debarred from Government Contracts pursuant to Executive Order 11246.
- 1.12. The Contractor will carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any Contractor who fails to carry out such sanctions and penalties will be in violation of these specifications and Executive Order 11246, as amended.
- 1.13. The Contractor, in fulfilling its obligations under these specifications, will implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director will proceed in accordance with 41 CFR 60-4.8.
- 1.14. The Contractor will designate a responsible official to monitor all employment-related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government and to keep records. Records must at least include for each employee the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records must be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, Contractors shall not be required to maintain separate records.
- 1.15. Nothing herein provided will be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).
- 1.16. In addition to the reporting requirements set forth elsewhere in this Contract, the Contractor and the subcontractors holding subcontracts, not including material suppliers, of \$10,000 or more, will submit for every month of July during which work is performed, employment data as contained under Form PR 1391 (Appendix C to 23 CFR, Part 230), and in accordance with the included instructions.

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# Special Provision to Item 000

## On-the-Job Training Program

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### 1. DESCRIPTION

The primary objective of this Special Provision is the training and advancement of minorities, women and economically disadvantaged persons toward journeyworker status. Accordingly, make every effort to enroll minority, women and economically disadvantaged persons to the extent that such persons are available within a reasonable area of recruitment. This training commitment is not intended, and will not be used to discriminate against any applicant for training, whether or not he/she is a member of a minority group.

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### 2. TRAINEE ASSIGNMENT

Training assignments are based on the past volume of state-let highway construction contracts awarded with the Department. Contractors meeting the selection criteria will be notified of their training assignment at the beginning of the reporting year by the Department's Office of Civil Rights.

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### 3. PROGRAM REQUIREMENTS

Fulfill all of the requirements of the On-the-Job Training Program including the maintenance of records and submittal of periodic reports documenting program performance. Trainees will be paid at least 60% of the appropriate minimum journeyworker's rate specified in the Contract for the first half of the training period, 75% for the third quarter, and 90% for the last quarter, respectively.

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### 4. REIMBURSEMENT

If requested, Contractors may be reimbursed \$0.80 per training hour at no additional cost to the Department. Training may occur on this project, all other Department contracts, or local-administered federal-aid projects with concurrence of the local government entity. However, reimbursement for training is not available on projects to the extent that such projects that do not contain federal funds.

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### 5. COMPLIANCE

The Contractor will have fulfilled the contractual responsibilities by having provided acceptable training to the number of trainees specified in their goal assignment. Noncompliance may be cause for corrective and appropriate measures pursuant to Article 8.7., "Abandonment of Work or Default of Contract," which may be used to comply with the sanctions for noncompliance pursuant to 23 CFR Part 230.

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## Special Provision 000

### Certificate of Interested Parties (Form 1295)

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Submit a notarized Form 1295, "Certificate of Interested Parties," in the following instances:

- at Contract execution for Contracts awarded by the Commission;
- at Contract execution for Contracts awarded by the District Engineer or Chief Engineer with an award amount of \$1,000,000 or more; at any time an existing Contract awarded by the District Engineer or Chief Engineer increases in value to \$1,000,000 or more due to changes in the Contract; at any time there is an increase of \$1,000,000 or more to an existing Contract (change orders, extensions, and renewals); or
- at any time there is a change to the information in Form 1295, when the form was filed for an existing Contract.

Form 1295 and instructions on completing and filing the form are available on the Texas Ethics Commission website.

# Special Provision 000

## Important Notice to Contractors



For Dollar Amount of Original Contract		Dollar Amount of Daily Contract Administration Liquidated Damages per Working Day
From More Than	To and including	
0	1,000,000	618
1,000,000	3,000,000	832
3,000,000	5,000,000	940
5,000,000	15,000,000	1317
15,000,000	25,000,000	1718
25,000,000	50,000,000	2411
50,000,000	Over 50,000,000	4265

In addition to the amount shown in Table 1, the Liquidated Damages will be increased by the amount shown in Item 8 of the General Notes for Road User Cost (RUC), when applicable.

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# Special Provision 000

## Cargo Preference Act Requirements in Federal Aid Contracts

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### 1. DESCRIPTION

All recipients of federal financial assistance are required to comply with the U.S. Department of Transportation's (DOT) Cargo Preference Act Requirements, 46 CFR Part 381, Use of United States-Flag Vessels.

This requirement applies to material or equipment that is acquired specifically for a Federal-aid highway project. It is not applicable to goods or materials that come into inventories independent of a Federal Highway Administration (FHWA) funded contract.

When oceanic shipments are necessary for materials or equipment acquired for a specific Federal-aid construction project, the contractor agrees to:

- Utilize privately owned United States-flag commercial vessels to ship at least 50 percent of the gross tonnage (computed separately for dry bulk carriers, dry cargo liners, and tankers) involved, whenever shipping any equipment, material, or commodities pursuant to this contract, to the extent such vessels are available at fair and reasonable rates for United States-flag commercial vessels.
- Furnish a legible copy of a rated, on-board commercial ocean bill-of-lading in English for each shipment of cargo described in paragraph (b) (1) of 46 CFR Part 381 Section 7, "Federal Grant, Guaranty, Loan and Advance of Funds Agreements," within 20 days following the date of loading for shipments originating within the United States or within 30 working days following the date of loading for shipments originating outside the United States, to both the Engineer (through the prime contractor in the case of subcontractor bills-of-lading) and to the Division of National Cargo, Office of Market Development, Maritime Administration, Washington, DC 20590.
- Insert the substance of the provisions of this clause in all subcontracts issued pursuant to this contract.

# Special Provision to Item 000

## Disadvantaged Business Enterprise in Federal-Aid Contracts



### 1. DESCRIPTION

The purpose of this Special Provision is to carry out the U.S. Department of Transportation's (DOT) policy of ensuring nondiscrimination in the award and administration of DOT-assisted Contracts and creating a level playing field on which firms owned and controlled by individuals who are determined to be socially and economically disadvantaged can compete fairly for DOT-assisted Contracts.

### 2. DISADVANTAGED BUSINESS ENTERPRISE IN FEDERAL-AID CONTRACTS

2.1. **Policy.** It is the policy of the DOT and the Texas Department of Transportation (Department) that DBEs, as defined in 49 CFR Part 26, Subpart A, and the Department's DBE Program, will have the opportunity to participate in the performance of Contracts financed in whole or in part with federal funds. The DBE requirements of 49 CFR Part 26, and the Department's DBE Program, apply to this Contract as follows.

The Contractor will solicit DBEs through reasonable and available means, as defined in 49 CFR Part 26, Appendix A, and the Department's DBE Program, or show a good faith effort to meet the DBE goal for this Contract.

The Contractor, subrecipient, or subcontractor will not discriminate on the basis of race, color, national origin, or sex in the performance of this Contract. Carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT-assisted Contracts. Failure 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 Department deems appropriate.

The requirements of this Special Provision must be physically included in any subcontract.

By signing the Contract proposal, the Bidder is certifying that the DBE goal as stated in the proposal will be met by obtaining commitments from eligible DBEs or that the Bidder will provide acceptable evidence of good faith effort to meet the commitment.

#### 2.2. Definitions.

2.2.1. **Administrative Reconsideration.** A process by which the low bidder may request reconsideration when the Department determines the good faith effort (GFE) requirements have not been met.

2.2.2. **Commercially Useful Function (CUF).** A CUF occurs when a DBE has the responsibility for the execution of the work and carrying out such responsibilities by actually performing, managing, and supervising the work.

2.2.3. **Disadvantaged Business Enterprise (DBE).** A for-profit small business certified through the Texas Unified Certification Program in accordance with 49 CFR Part 26, that is at least 51% owned by one or more socially and economically disadvantaged individuals, or in the case of a publicly owned business, in which is at least 51% of the stock is owned by one or more socially and economically disadvantaged individuals, and whose management and daily business operations are controlled by one or more of the individuals who own it.

2.2.4. **DBE Joint Venture.** An association of a DBE firm and one or more other firms to carry out a single business enterprise for profit for which purpose they combine their property, capital, efforts, skills, and knowledge, and

in which the DBE is responsible for a distinct, clearly defined portion of the work of the Contract and whose share in the capital contribution, control, management, risks, and profits of the joint venture are commensurate with its ownership interest.

- 2.2.5. **DOT.** The U.S. Department of Transportation, including the Office of the Secretary, the Federal Highway Administration (FHWA), the Federal Transit Administration (FTA), and the Federal Aviation Administration (FAA).
- 2.2.6. **Federal-Aid Contract.** Any Contract between the Department and a Contractor that is paid for in whole or in part with DOT financial assistance.
- 2.2.7. **Good Faith Effort.** All necessary and reasonable steps to achieve the contract goal which, by their scope, intensity, and appropriateness to the objective, could reasonably be expected to obtain sufficient DBE participation, even if not fully successful. Good faith efforts are evaluated prior to award and throughout performance of the Contract. For guidance on good faith efforts, see 49 CFR Part 26, Appendix A.
- 2.2.8. **North American Industry Classification System (NAICS).** A designation that best describes the primary business of a firm. The NAICS is described in the North American Industry Classification Manual—United States, which is available on the Internet at the U.S. Census Bureau website: <http://www.census.gov/eos/www/naics/>.
- 2.2.9. **Race-Conscious.** A measure or program that is focused specifically on assisting only DBEs, including women-owned businesses.
- 2.2.10. **Race-Neutral DBE Participation.** Any participation by a DBE through customary competitive procurement procedures.
- 2.2.11. **Texas Unified Certification Program (TUCP) Directory.** An online directory listing all DBEs currently certified by the TUCP. The Directory identifies DBE firms whose participation on a Contract may be counted toward achievement of the assigned DBE Contract goal.
- 2.3. **Contractor's Responsibilities.**
- 2.3.1. **DBE Liaison Officer.** Designate a DBE liaison officer who will administer the Contractor's DBE program and who will be responsible for maintenance of records of efforts and contacts made to subcontract with DBEs.
- 2.3.2. **Compliance Tracking System (CTS).** This Contract is subject to electronic Contract compliance tracking. Contractors and DBEs are required to provide any noted and requested Contract compliance-related data electronically in the Department's tracking system. This includes commitments, payments, substitutions, and good faith efforts. Contractors and DBEs are responsible for responding by any noted response date or due date to any instructions or request for information, and to check the system on a regular basis. A Contractor is responsible for ensuring all DBEs have completed all requested items and that their contact information is accurate and up-to-date. The Department may require additional information related to the Contract to be provided electronically through the system at any time before, during, or after contract award. The system is web-based and can be accessed at the following Internet address: <https://txdot.txdotcms.com/>.
- In its sole discretion, the Department may require that contract compliance tracking data be submitted by Contractors and DBEs in an alternative format prescribed by the Department.
- 2.3.3. **Apparent Low Bidder.** The apparent low bidder must submit DBE commitments to satisfy the DBE goal or submit good faith effort Form 2603 and supporting documentation demonstrating why the goal could not be achieved, in whole or part, no later than 5 calendar days after bid opening. The means of transmittal and the risk of timely receipt of the information will be the bidder's responsibility and no extension of the 5-calendar-day timeframe will be allowed for any reason.



2.3.4. **DBE Contractor.** A DBE Contractor may receive credit toward the DBE goal for work performed by its own forces and work subcontracted to DBEs. In the event a DBE subcontracts to a non-DBE, that information must be reported monthly.

2.3.5. **DBE Committal.** Only those DBEs certified by the TUCP are eligible to be used for goal attainment. The Department maintains the TUCP DBE Directory. The Directory can be accessed at the following Internet address: <https://txdot.txdotcms.com/FrontEnd/VendorSearchPublic.asp?TN=txdot&XID=2340>.

A DBE must be certified on the day the commitment is considered and at time of subcontract execution. It is the Contractor's responsibility to ensure firms identified for participation are approved certified DBE firms.

The Bidder is responsible to ensure that all submittals are checked for accuracy. Any and all omissions, deletions, and/or errors that may affect the end result of the commitment package are the sole liabilities of the bidder.

Commitments in excess of the goal are considered race-neutral commitments.

2.3.6. **Good Faith Effort Requirements.** A Contractor who cannot meet the Contract goal, in whole or in part, must make adequate good faith efforts to obtain DBE participation as so stated and defined in 49 CFR Part 26, Appendix A.

2.3.6.1. **Administrative Reconsideration.** If the Department determines that the apparent low bidder has failed to satisfy the good faith efforts requirement, the Department will notify the Bidder of the failure and will give the Bidder an opportunity to provide written documentation or argument concerning the issue of whether it met the goal or made adequate good faith efforts to do so..

The Bidder must request an administrative reconsideration of that determination within 3 days of the date of receipt of the notice. The request must be submitted directly to the Texas Department of Transportation, Civil Rights Division, 125 East 11th Street, Austin, Texas 78701-2483.

If a request for administrative reconsideration is not filed within the period specified the determination made is final and further administrative appeal is barred.

If a reconsideration request is timely received, the reconsideration decision will be made by the Department's DBE liaison officer or, if the DBE liaison officer took part in the original determination, the Department's executive director will appoint a department employee to perform the administrative reconsideration. The employee will hold a senior leadership position and will report directly to the executive director.

The meeting or written documentation must be provided or held within 7 days of the date the request was submitted.

The Department will provide to the Bidder a written decision if the Bidder did or did not make adequate good faith efforts to meet the Contract goal. The reconsideration decision is final and is not administratively appealed to DOT.

2.3.7. **Determination of DBE Participation.** The work performed by the DBE must be reasonably construed to be included in the work area and NAICS work code identified by the Contractor in the approved commitment.

Participation by a DBE on a Contract will not be counted toward DBE goals until the amount of the participation has been paid to the DBE.

Payments made to a DBE that was not on the original commitment may be counted toward the Contract goal if that DBE was certified as a DBE before the execution of the subcontract and has performed a Commercially Useful Function.

The total amount paid to the DBE for work performed with its own forces is counted toward the DBE goal. When a DBE subcontracts part of the work of its Contract to another firm, the value of the subcontracted work may be counted toward DBE goals only if the subcontractor is itself a DBE.

DBE Goal credit for the DBE subcontractors leasing of equipment or purchasing of supplies from the Contractor or its affiliates is not allowed. Project materials or supplies acquired from an affiliate of the Contractor cannot directly or indirectly (second or lower tier subcontractor) be used for DBE goal credit.

If a DBE firm is declared ineligible due to DBE decertification after the execution of the DBE's subcontract, the DBE firm may complete the work and the DBE firm's participation will be counted toward the Contract goal. If the DBE firm is decertified before the DBE firm has signed a subcontract, the Contractor is obligated to replace the ineligible DBE firm or demonstrate that it has made good faith efforts to do so.

The Contractor may count 100% of its expenditure to a DBE manufacturer. According to 49 CFR 26.55(e)(1)(i), a DBE manufacturer is a firm that operates or maintains a factory or establishment that produces, on the premises, the materials, supplies, articles, or equipment required under the Contract and of the general character described by the specifications.

The Contractor may count only 60% of its expenditure to a DBE regular dealer. According to 49 CFR 26.55(e)(2)(i), a DBE regular dealer is a firm that owns, operates, or maintains a store, warehouse, or other establishment in which the materials, supplies, articles, or equipment of the general character described by the specifications and required under the Contract are bought, kept in stock, and regularly sold or leased to the public in the usual course of business. A firm may be a regular dealer in such bulk items as petroleum products, steel, cement, gravel, stone, or asphalt without owning, operating, or maintaining a place of business if the firm both owns and operates distribution equipment for the products. Any supplementing of regular dealers' own distribution equipment must be by a long-term lease agreement and not on an ad hoc or contract-by-contract basis. A long-term lease with a third-party transportation company is not eligible for 60% goal credit.

With respect to materials or supplies purchased from a DBE that is neither a manufacturer nor a regular dealer, the Contractor may count the entire amount of fees or commissions charged for assistance in the procurement of the materials and supplies, or fees or transportation charges for the delivery of materials or supplies required on a job site.

A Contractor may count toward its DBE goal a portion of the total value of the Contract amount paid to a DBE joint venture equal to the distinct, clearly defined portion of the work of the Contract performed by the DBE.

2.3.8. **Commercially Useful Function.** It is the Contractor's obligation to ensure that each DBE used on federal-assisted contracts performs a commercially useful function on the Contract.

The Department will monitor performance during the Contract to ensure each DBE is performing a CUF.

Under the terms established in 49 CFR 26.55, a DBE performs a CUF when it is responsible for execution of the work of the Contract and is carrying out its responsibilities by actually performing, managing, and supervising the work involved.

With respect to material and supplies used on the Contract, a DBE must be responsible for negotiating price, determining quality and quantity, ordering the material, installing the material, if applicable, and paying for the material itself.

With respect to trucking, the DBE trucking firm must own and operate at least one fully licensed, insured, and operational truck used on the Contract. The DBE may lease trucks from another DBE firm, including an owner-operator who is certified as a DBE. The DBE who leases trucks from another DBE receives credit for the total value of the transportation services the lessee DBE provides on the Contract. The DBE may also lease trucks from a non-DBE firm, including from an owner-operator. The DBE that leases trucks equipped with drivers from a non-DBE is entitled to credit for the total value of transportation services provided by non-DBE leased trucks equipped with drivers not to exceed the value of transportation services on the Contract.

provided by DBE-owned trucks or leased trucks with DBE employee drivers. Additional participation by non-DBE owned trucks equipped with drivers receives credit only for the fee or commission it receives as a result of the lease arrangement.

A DBE does not perform a CUF when its role is limited to that of an extra participant in a transaction, Contract, or project through which funds are passed in order to obtain the appearance of DBE participation. The Department will evaluate similar transactions involving non-DBEs in order to determine whether a DBE is an extra participant.

If a DBE does not perform or exercise responsibility for at least 30% of the total cost of its Contract with its own work force, or the DBE subcontracts a greater portion of the work than would be expected on the basis of normal industry practice for the type of work involved, the Department will presume that the DBE is not performing a CUF.

If the Department determines that a DBE is not performing a CUF, no work performed by such DBE will count as eligible participation. The denial period of time may occur before or after a determination has been made by the Department.

In case of the denial of credit for non-performance of a CUF, the Contractor will be required to provide a substitute DBE to meet the Contract goal or provide an adequate good faith effort when applicable.

- 2.3.8.1. **Rebuttal of a Finding of No Commercially Useful Function.** Consistent with the provisions of 49 CFR 26.55(c)(4)&(5), before the Department makes a final finding that no CUF has been performed by a DBE, the Department will notify the DBE and provide the DBE the opportunity to provide rebuttal information.

CUF determinations are not subject to administrative appeal to DOT.

- 2.3.9. **Joint Check.** The use of joint checks between a Contractor and a DBE is allowed with Department approval. To obtain approval, the Contractor must submit a completed Form 2178, "DBE Joint Check Approval," to the Department.

The Department will closely monitor the use of joint checks to ensure that such a practice does not erode the independence of the DBE nor inhibit the DBE's ability to perform a CUF. When joint checks are utilized, DBE credit toward the Contract goal will be allowed only when the subcontractor is performing a CUF in accordance with 49 CFR 26.55(c)(1).

Long-term or open-ended joint checking arrangements may be a basis for further scrutiny and may result in the lack of participation towards the Contract goal requirement if DBE independence cannot be established.

Joint checks will not be allowed simply for the convenience of the Contractor.

If the proper procedures are not followed or the Department determines that the arrangements result in a lack of independence for the DBE involved, no credit for the DBE's participation as it relates to the material cost will be used toward the Contract goal requirement, and the Contractor will need to make up the difference elsewhere on the project.

- 2.3.10. **DBE Termination and Substitution.** No DBE named in the commitment submitted under Section 2.3.5. will be terminated for convenience, in whole or part, without the Department's approval. This includes, but is not limited to, instances in which a Contractor seeks to perform work originally designated for a DBE subcontractor with its own forces or those of an affiliate, a non-DBE firm, or with another DBE firm.

Unless consent is provided, the Contractor will not be entitled to any payment for work or material unless it is performed or supplied by the listed DBE.

The Contractor, prior to submitting its request to terminate, must first give written notice to the DBE of its intent to terminate and the reason for the termination. The Contractor will copy the Department on the Notice of Intent to terminate.

The DBE has 5 calendar days to respond to the Contractor's notice and will advise the Contractor and the Department of the reasons, if any, why it objects to the proposed termination of its subcontract and why the Department should not approve the prime Contractor's request for termination.

The Department may provide a shorter response time if required in a particular case as a matter of public necessity.

The Department will consider both the Contractor's request and DBE's stated position prior to approving the request. The Department may provide a written approval only if it agrees, for reasons stated in its concurrence document, that the Contractor has good cause to terminate the DBE. If the Department does not approve the request, the Contractor must continue to use the committed DBE firm in accordance with the Contract. For guidance on what good cause includes, see 49 CFR 26.53.

Good cause does not exist if the Contractor seeks to terminate, reduce, or substitute a DBE it relied upon to obtain the Contract so that the Contractor can self-perform the work for which the DBE firm was engaged.

When a DBE subcontractor is terminated, make good faith efforts to find, as a substitute for the original DBE, another DBE to perform, at least to the extent needed to meet the established Contract goal, the work that the original DBE was to have performed under the Contract.

Submit the completed Form 2228, "DBE Termination Substitution Request," within seven (7) days, which may be extended for an additional 7 days if necessary at the request of the Contractor. The Department will provide a written determination to the Contractor stating whether or not good faith efforts have been demonstrated. If the Department determines that good faith efforts were not demonstrated, the Contractor will have the opportunity to appeal the determination to the Civil Rights Division.

- 2.3.11. **Reports and Records.** By the 15th of each month and after work begins, report payments to meet the DBE goal and for DBE race-neutral participation on projects with or without goals. These payment reports will be required until all DBE subcontracting or material supply activity is completed. Negative payment reports are required when no activity has occurred in a monthly period.

Notify the Area Engineer if payment to any DBE subcontractor is withheld or reduced.

Before receiving final payment from the Department, the Contractor must indicate a final payment on the compliance tracking system. The final payment is a summary of all payments made to the DBEs on the project.

All records must be retained for a period of 3 years following completion of the Contract work, and must be available at reasonable times and places for inspection by authorized representatives of the Department or the DOT. Provide copies of subcontracts or agreements and other documentation upon request.

- 2.3.12. **Failure to Comply.** If the Department determines the Contractor has failed to demonstrate good faith efforts to meet the assigned goal, the Contractor will be given an opportunity for reconsideration by the Department.

A Contractor's failure to comply with the requirements of this Special Provision will constitute a material breach of this Contract. In such a case, the Department reserves the right to terminate the Contract; to deduct the amount of DBE goal not accomplished by DBEs from the money due or to become due the Contractor; or to secure a refund, not as a penalty but as liquidated damages, to the Department or such other remedy or remedies as the Department deems appropriate.

- 2.3.13. **Investigations.** The Department may conduct reviews or investigations of participants as necessary. All participants, including, but not limited to, DBEs and complainants using DBE Subcontractors to meet the

Contract goal, are required to cooperate fully and promptly with compliance reviews, investigations, and other requests for information.

2.3.14.

**Falsification and Misrepresentation.** If the Department determines that a Contractor or subcontractor was a knowing and willing participant in any intended or actual subcontracting arrangement contrived to artificially inflate DBE participation or any other business arrangement determined by the Department to be unallowable, or if the Contractor engages in repeated violations, falsification, or misrepresentation, the Department may:

- refuse to count any fraudulent or misrepresented DBE participation;
- withhold progress payments to the Contractor commensurate with the violation;
- reduce the Contractor's prequalification status;
- refer the matter to the Office of Inspector General of the US Department of Transportation for investigation; and/or
- seek any other available contractual remedy.

# Special Provision Item 000

## Important Notice to Contractors



The contractor's attention is directed to the fact that there are experience requirements associated with the Intelligent Transportation Systems (ITS) items contained on this project. The contractor or its subcontractor must provide information to the Engineer that they meet these requirements with the initial submittals for the associated bid items and before installing or testing ITS items. Following are the ITS items and requirements that must be met if the item is on this project.

### Category A. Pulling Fiber Optic Cable.

Contractor or subcontractor must meet the following experience requirements:

- Three years continuous existence offering services in the installation of fiber optic cable through an outdoor conduit system and terminating in ground boxes, field cabinets or enclosures, or buildings; and
- Three completed projects where the personnel pulled fiber optic cable, minimum 5-mile in length, through an outdoor conduit system for each project. The completed fiber optic cable systems must have been in continuous satisfactory operation for a minimum of 1 year.

### Category B. Splicing and Testing of Fiber Optic Cable.

Contractor or subcontractor must meet the following experience requirements:

- Three years continuous existence offering services in the fields of fusion splicing and testing of fiber optic cable installed through a conduit system and terminating in ground boxes, field cabinets or enclosures, or buildings. Experience must include the following:
  - termination of a minimum of 48 fibers within a fiber distribution frame,
  - optical time-domain reflectometer (OTDR) testing and measurement of end to end attenuation of single mode and multimode fibers,
  - system troubleshooting and maintenance,
  - training of personnel in system maintenance,
  - use of water-tight splice enclosures, and
  - fusion splicing of fiber optic cable which meet the tolerable dB losses listed in Table 1 below; and

**Table 1**  
**Sample Table**

Mode	dB Loss Range
Single mode	0.05–0.10
Multimode	0.20–0.30

- Three completed projects where the personnel performed fiber optic cable splicing and terminations, system testing, system troubleshooting and maintenance during the course of the project and provided training on system maintenance. Each project must have consisted of a minimum 5-mile length of fiber optic cable. The completed fiber optic cable systems must have been in continuous satisfactory operation for a minimum of 1 year.

### Category C. System Integration.

Contractor or subcontractor must meet the following experience requirements:

- Three years of providing system integration on wire line and wireless projects including, but not limited to, programming of layer-2 Ethernet switches, integrating into existing systems and coordination with traffic management centers; and
- Three completed projects requiring system integration and configuration of hardware including but not limited to Ethernet switches, video encoders and decoders, and radios.

#### **Category D. Dynamic Message Sign (DMS) Installation.**

Contractor or subcontractor must meet the following experience requirements:

- Three years continuous existence offering services in the installation of DMS signs; and
- Three completed projects consisting of a minimum of 2 signs in each project where the personnel installed, integrated, and tested DMS on outdoor, permanently mounted overhead structure(s) and related sign control equipment. The completed sign system installations must have been in continuous satisfactory operation for a minimum of 1 year; and
- One project (may be 1 of the 3 projects in the preceding paragraph) in which the personnel worked in cooperation with technical representatives of the equipment supplier to perform the installation, integration, or acceptance testing of the work. The Contractor will not be required to furnish equipment on this project from the same supplier who was referenced in the qualification documentation.

#### **Category E. Closed Circuit Television (CCTV) Equipment Installation.**

Contractor or subcontractor must meet the following experience requirements:

- Three years continuous existence offering services in the installation of CCTV camera systems;
- Three completed projects consisting of a minimum of 5 cameras in each project where the personnel installed, tested, and integrated CCTV cameras on outdoor, permanently mounted structure(s) and related camera control and transmission equipment. The completed CCTV camera system installations must have been in continuous satisfactory operation for a minimum of 1 year; and
- One project (may be 1 of the 3 projects in the preceding paragraph) in which the personnel worked in cooperation with technical representatives of the equipment supplier to perform installation, integration, or acceptance testing of the work. The Contractor will not be required to furnish equipment on this project from the same supplier who was referenced in the qualification documentation.

#### **Category F. Wireless Communications.**

Contractor or subcontractor must meet the following experience requirements:

- Three years continuous existence offering services in the installation of wireless communications. Experience must include the following:
  - Conducting radio installation studies, which include signal noise studies, spectrum analysis, antenna gain and radio power calculations, system attenuation, and measurement of standing wave ratios;
  - Installation, troubleshooting, and repair of broadband radio systems, which include equipment installation, configuration of radios, antenna calibration, and cabling; and
  - Installation, troubleshooting, and repair of interconnected Ethernet networks (LAN and WAN), which include cabling, switch or router configuration, and network analysis; and
- Three projects consisting of wireless communications installation, troubleshooting, and repair. Each project must include transmitting signals over a minimum of 1-mile distance and installation of a minimum of 3 devices; and
- One project (may be 1 of the 3 projects in the preceding paragraph) in which the personnel worked in cooperation with technical representatives of the equipment supplier to perform installation, integration, or acceptance testing of the work. The Contractor will not be required to furnish equipment on this project from the same supplier who was referenced in the qualification documentation.

**Category G. Radar Detection Systems.**

Contractor or subcontractor must meet the following experience requirements:

- Three years continuous existence offering services in the installation of radar detection systems. Experience must include the following:
  - freeway and arterial management,
  - forward fire and side fire applications,
  - single zone and dual beam detection, and
  - equipment setup, testing, and troubleshooting; and
- Three projects consisting of installation, configuration, and setup of radar detection systems; and
- One project (may be 1 of the 3 projects in the preceding paragraph) in which the personnel worked in cooperation with technical representatives of the equipment supplier to perform installation, integration, or acceptance testing of the work. The Contractor will not be required to furnish equipment on this project from the same supplier who was referenced in the qualification documentation.

Should the contractor have subcontractors which meet the above requirements, and should these subcontractors be unable to complete the ITS items contained within the project, the contractor must resubmit qualification material on alternate subcontractors for approval before the applicable category of work can be continued.



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# Special Provision to Item 000

## Activation of Federal Contract Provisions

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The following contract provisions are not applicable unless work performed under this contract is for emergency repair work associated with an emergency event:

- Form FHWA-1273,
- Wage Rate Schedule,
- SP000-003 Certification of Nondiscrimination in Employment,
- SP000-004 Notice of Requirement for Affirmative Action to Ensure Equal Employment Opportunity (Executive Order 11246),
- SP000-005 Standard Federal Equal Employment Opportunity Construction Contract Specifications,
- SP000-006 On-the-Job Training Program,
- SP000-241 Cargo Preference Act Requirements in Federal Aid Contracts,
- SP000-394 Disadvantaged Business Enterprise in Federal Aid Contracts,
- SP002-009 Instructions to Bidders, and
- Disclosure of Lobbying Activities.

At the time of activation of these Federal Contract Provisions, the contract will be amended to include the most current Department of Labor (DOL) prevailing wage rate schedule. The DOL prevailing wage rates will only apply to emergency repair work performed under this contract at the time Federal Contract Provisions are activated. The Disclosure of Lobbying Activities form included in the proposal must also be completed and submitted when Federal Contract Provisions are activated. Added bid items and existing items' unit prices used for emergency repair work will be negotiated with considerations for the effect of requiring prevailing wage rates. Upon completion of emergency repair work as determined by the Engineer, the Federal Contract Provisions will be deactivated and the original contract wage rates and existing bid items' unit prices will resume.

The Engineer will notify the Contractor in writing of the effective date for compliance with the above requirements.

# Special Provision 000

## Notice of Contractor Performance Evaluations



### 1. GENERAL

In accordance with Texas Transportation Code §223.012, the Engineer will evaluate Contractor performance based on quality, safety, and timeliness of the project.

### 2. DEFINITIONS

- 2.1. **Project Recovery Plan (PRP)**—a formal, enforceable plan developed by the Contractor, in consultation with the District, that documents the cause of noted quality, safety, and timeliness issues and specifies how the Contractor proposes to correct project-specific performance deficiencies.

In accordance with Title 43, Texas Administrative Code (TAC), §9.23, the District will request a PRP if the Contractor's performance on a project is below the Department's acceptable standards and will monitor the Contractor's compliance with the established plan.

- 2.2. **Corrective Action Plan (CAP)**—a formal, enforceable plan developed by the Contractor, and proposed for adoption by the Construction or Maintenance Division, that documents the cause of noted quality, safety, and timeliness issues and specifies how the Contractor proposes to correct statewide performance deficiencies.

In accordance with 43 TAC §9.23, the Division will request a CAP if the average of the Contractor's statewide final evaluation scores falls below the Department's acceptable standards for the review period and will monitor the Contractor's compliance with the established plan.

### 3. CONTRACTOR EVALUATIONS

In accordance with Title 43, Texas Administrative Code (TAC) §9.23, the Engineer will schedule evaluations at the following intervals, at minimum:

- Interim evaluations—at or within 30 days after the anniversary of the notice to proceed, for Contracts extending beyond 1 yr., and
- Final evaluation—upon project closeout.

In case of a takeover agreement, neither the Surety nor its performing Contractor will be evaluated.

In addition to regularly scheduled evaluations, the Engineer may schedule an interim evaluation at any time to formally communicate issues with quality, safety, or timeliness. Upon request, work with the Engineer to develop a PRP to document expectations for correcting deficiencies.

Comply with the PRP as directed. Failure to comply with the PRP may result in additional remedial actions available to the Engineer under Item 5, "Control of the Work." Failure to meet a PRP to the Engineer's satisfaction may result in immediate referral to the Performance Review Committee for consideration of further action against the Contractor.

The Engineer will consider and document any events outside the Contractor's control that contributed to the failure to meet performance standards or comply with a PRP, including consideration of sufficient time.

Follow the escalation ladder if there is a disagreement regarding an evaluation or disposition of a PRP. The Contractor may submit additional documentation pertaining to the dispute. The District Engineer's decision

on a Contractor's evaluation score and recommendation of action required in a PRP or follow up for non-compliance is final.

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#### **4. DIVISION OVERSIGHT**

Upon request of the Construction or Maintenance Division, develop and submit for Division approval a proposed CAP to document expectations for correcting deficiencies in the performance of projects statewide.

Comply with the CAP as directed. The CAP may be modified at any time up to completion or resolution after written approval of the premise of change from the Division. Failure to meet an adopted or revised adopted CAP to the Division's satisfaction within 120 days will result in immediate referral to the Performance Review Committee for consideration of further action against the Contractor.

The Division will consider and document any events outside the Contractor's control that contributed to the failure to meet performance standards or comply with a CAP, including consideration of sufficient time and associated costs as appropriate.

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#### **5. PERFORMANCE REVIEW COMMITTEE**

The Performance Review Committee, in accordance with 43 TAC §9.24, will review at minimum all final evaluations, history of compliance with PRPs, any adopted CAPs including agreed modifications, any information about events outside a Contractor's control contributing to the Contractor's performance, and any documentation submitted by the Contractor and may recommend one or more of the following actions:

- take no action,
- reduce the Contractor's bidding capacity,
- prohibit the Contractor from bidding on one or more projects,
- immediately suspend the Contractor from bidding for a specified period of time, by reducing the Contractor's bidding capacity to zero, or
- prohibit the Contractor from being awarded a Contract on which they are the apparent low bidder.

The Deputy Executive Director will determine any further action against the Contractor.

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#### **6. APPEALS PROCESS**

In accordance with 43 TAC §9.25, the Contractor may appeal remedial actions determined by the Deputy Executive Director.

## Special Provision to Item 2

### Instructions to Bidders



Item 2, "Instructions to Bidders," of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

**Article 2.2., "Eligibility of Bidders,"** is supplemented by the following:

- 2.3. **Technical Qualification.** The Department will not accept bids from Bidders that have not met the technical qualifications established by the Traffic Operations Division. Technical qualification is required for certain categories of Intelligent Transportation Systems (ITS) work. This technical qualification is in addition to all other Bidder qualifications required by the Department.

Electronically submit ITS Technical Qualification Forms and supporting documentation demonstrating the capability of the Bidder or the Bidder's proposed subcontractors to successfully perform the categories of work described in Articles 2.3.1. through 2.3.7. Utilize the ITS Technical Qualification Form applicable to each work category. Submit the forms and supporting documentation by 12:00 P.M. (CST), 10 calendar days prior to bid opening to [ITS\\_Tech\\_Qual@txdot.gov](mailto:ITS_Tech_Qual@txdot.gov). Incomplete submittals or submittals that do not meet the technical qualifications will be rejected and additional information will be required. Failure to submit the qualification forms and supporting documentation by the deadline will be sufficient reason for declaring the bid nonresponsive in accordance with Article 2.7., "Nonresponsive Bid." The categories of work that apply to this contract are listed in "Important Notice to Contractors" Special Provisions in the contract.

ITS Technical Qualification Forms and additional information on becoming a qualified Bidder may be found on the Department's website or by contacting the Traffic Operations Division by email at [ITS\\_Tech\\_Qual@txdot.gov](mailto:ITS_Tech_Qual@txdot.gov) or by calling 512/416-3118.

Once a Bidder or the Bidder's proposed subcontractor has been approved as having met the requirements of this provision, any substitutions or replacement contractors must be submitted to the Traffic Operations Division for approval prior to performing work on the applicable work category.

A Bidder or the Bidder's proposed subcontractor must have the level of expertise needed to successfully complete the work. The experience requirements for each work category listed below include 3 completed projects, 1 of which must have been completed within the past 5 years. Vendor reference statements for equipment experience are required under certain work categories, but may be waived if the Bidder has acceptable documentation from a vendor demonstrating their experience installing the particular equipment without on-site assistance.

- 2.3.1. **Category A. Pulling Fiber Optic Cable.** Meet the following experience requirements:
- **Minimum Experience.** Three years continuous existence offering services in the installation of fiber optic cable through an outdoor conduit system and terminating in ground boxes, field cabinets or enclosures, or buildings; and
  - **Completed Projects.** Three completed projects where the personnel pulled fiber optic cable, minimum 5-mile in length, through an outdoor conduit system for each project. The completed fiber optic cable systems must have been in continuous satisfactory operation for a minimum of 1 year.
- 2.3.2. **Category B. Splicing and Testing of Fiber Optic Cable.** Meet the following experience requirements:

- Minimum Experience. Three years continuous existence offering services in the fields of fusion splicing and testing of fiber optic cable installed through a conduit system and terminating in ground boxes, field cabinets or enclosures, or buildings. Experience must include the following:
  - termination of a minimum of 48 fibers within a fiber distribution frame,
  - optical time-domain reflectometer (OTDR) testing and measurement of end to end attenuation of single mode and multimode fibers,
  - system troubleshooting and maintenance,
  - training of personnel in system maintenance,
  - use of water-tight splice enclosures, and
  - fusion splicing of fiber optic cable which meet the tolerable dB losses listed in Table 1 below; and

**Table 1**  
**Sample Table**

Mode	dB Loss Range
Single mode	0.05–0.10
Multimode	0.20–0.30

- Completed Projects. Three completed projects where the personnel performed fiber optic cable splicing and terminations, system testing, system troubleshooting and maintenance during the course of the project and provided training on system maintenance. Each project must have consisted of a minimum 5-mile length of fiber optic cable. The completed fiber optic cable systems must have been in continuous satisfactory operation for a minimum of 1 year.

2.3.3. **Category C. System Integration.** Meet the following experience requirements:

- Minimum Experience. Three years of providing system integration on wire line and wireless projects including, but not limited to, programming of layer-2 Ethernet switches, integrating into existing systems and coordination with traffic management centers; and
- Completed Projects. Three completed projects requiring system integration and configuration of hardware including but not limited to Ethernet switches, video encoders and decoders, and radios.

2.3.4. **Category D. Dynamic Message Sign (DMS) Installation.** Meet the following experience requirements:

- Minimum Experience. Three years continuous existence offering services in the installation of DMS signs; and
- Completed Projects. Three completed projects consisting of a minimum of 2 signs in each project where the personnel installed, integrated, and tested DMS on outdoor, permanently mounted overhead structure(s) and related sign control equipment. The completed sign system installations must have been in continuous satisfactory operation for a minimum of 1 year; and
- Equipment Experience. One project (may be 1 of the 3 projects in the preceding paragraph) in which the personnel worked in cooperation with technical representatives of the equipment supplier to perform the installation, integration, or acceptance testing of the work. The Contractor will not be required to furnish equipment on this project from the same supplier who was referenced in the qualification documentation.

2.3.5. **Category E. Closed Circuit Television (CCTV) Equipment Installation.** Meet the following experience requirements:

- Minimum Experience. Three years continuous existence offering services in the installation of CCTV camera systems;
- Completed Projects. Three completed projects consisting of a minimum of 5 cameras in each project where the personnel installed, tested, and integrated CCTV cameras on outdoor, permanently mounted

structure(s) and related camera control and transmission equipment. The completed CCTV camera system installations must have been in continuous satisfactory operation for a minimum of 1 year; and

- Equipment Experience. One project (may be 1 of the 3 projects in the preceding paragraph) in which the personnel worked in cooperation with technical representatives of the equipment supplier to perform installation, integration, or acceptance testing of the work. The Contractor will not be required to furnish equipment on this project from the same supplier who was referenced in the qualification documentation.

2.3.6.

**Category F. Wireless Communications.** Meet the following experience requirements:

- Minimum Experience. Three years continuous existence offering services in the installation of wireless communications. Experience must include the following:
  - Conducting radio installation studies, which include signal noise studies, spectrum analysis, antenna gain and radio power calculations, system attenuation, and measurement of standing wave ratios;
  - Installation, troubleshooting, and repair of broadband radio systems, which include equipment installation, configuration of radios, antenna calibration, and cabling; and
  - Installation, troubleshooting, and repair of interconnected Ethernet networks (LAN and WAN), which include cabling, switch or router configuration, and network analysis; and
- Completed Projects. Three projects consisting of wireless communications installation, troubleshooting, and repair. Each project must include transmitting signals over a minimum of 1-mile distance and installation of a minimum of 3 devices; and
- Equipment Experience. One project (may be 1 of the 3 projects in the preceding paragraph) in which the personnel worked in cooperation with technical representatives of the equipment supplier to perform installation, integration, or acceptance testing of the work. The Contractor will not be required to furnish equipment on this project from the same supplier who was referenced in the qualification documentation.

2.3.7.

**Category G. Radar Detection Systems.** Meet the following experience requirements:

- Minimum Experience. Three years continuous existence offering services in the installation of radar detection systems. Experience must include the following:
  - freeway and arterial management,
  - forward fire and side fire applications,
  - single zone and dual beam detection, and
  - equipment setup, testing, and troubleshooting; and
- Completed Projects. Three projects consisting of installation, configuration, and setup of radar detection systems; and
- Equipment Experience. One project (may be 1 of the 3 projects in the preceding paragraph) in which the personnel worked in cooperation with technical representatives of the equipment supplier to perform installation, integration, or acceptance testing of the work. The Contractor will not be required to furnish equipment on this project from the same supplier who was referenced in the qualification documentation.

## Special Provision to Item 2

### Instructions to Bidders



Item 2, "Instructions to Bidders," of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

**Article 2.3., "Issuing Proposal Forms,"** second paragraph, is supplemented by the following.

The Department will not issue a proposal form if one or more of the following apply:

- the Bidder or affiliate of the Bidder that was originally determined as the apparent low Bidder on a project, but was deemed nonresponsive for failure to submit a DBE commitment as specified in Article 2.14., "Disadvantaged Business Enterprise (DBE)," is prohibited from rebidding that specific project.

**Article 2.7., "Nonresponsive Bid,"** is supplemented by the following:

The Department will not accept a nonresponsive bid. A bid that has one or more of the deficiencies listed below is considered nonresponsive:

- the Bidder failed to submit a DBE commitment as specified in Article 2.14., "Disadvantaged Business Enterprise (DBE)."

**Article 2.14., "Disadvantaged Business Enterprise (DBE),"** is added.

The apparent low bidder must submit DBE commitment information on federally funded projects with DBE goals within 5 calendar days (as defined in 49 CFR Part 26, Subpart A) of bid opening. For a submission that meets the 5-day requirement, administrative corrections will be allowed.

If the apparent low Bidder fails to submit their DBE information within the specified timeframe, they will be deemed nonresponsive and the proposal guaranty will become the property of the State, not as a penalty, but as liquidated damages. The Bidder forfeiting the proposal guaranty will not be considered in future proposals for the same work unless there has been a substantial change in the design of the work. The Department may recommend that the Commission:

- reject all bids, or
- award the Contract to the new apparent low Bidder, if the new apparent low Bidder submits DBE information within one calendar day of notification by the Department.

If the new apparent low Bidder is unable to submit the required DBE information within one calendar day:

- the new apparent low Bidder will not be deemed nonresponsive,
- the new apparent low Bidder's guaranty will not be forfeited,
- the Department will reject all bids, and
- the new apparent low Bidder will remain eligible to receive future proposals for the same project.

## Special Provision to Item 2

### Instructions to Bidders



Item 2, "Instructions to Bidders," of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

**Article 2.3., "Issuing Proposal Forms,"** is supplemented by the following:

- the Bidder or affiliate of the Bidder that was originally determined as the apparent low Bidder on a project, but was deemed nonresponsive for failure to register or participate in the Department of Homeland Security's (DHS) E-Verify system as specified in Article 2.15., "Department of Homeland Security (DHS) E-Verify System," is prohibited from rebidding that specific project.

**Article 2.7., "Nonresponsive Bid,"** is supplemented by the following:

- the Bidder failed to participate in the Department of Homeland Security's (DHS) as specified in Article 2.15., "Department of Homeland Security (DHS) E-Verify System."

**Article 2.15., "Department of Homeland Security (DHS) E-Verify System,"** is added.

The Department will not award a Contract to a Contractor that is not registered in the DHS E-Verify system. Remain active in E-Verify throughout the life of the contract. In addition, in accordance with paragraph six of Article 8.2, "Subcontracting," include this requirement in all subcontracts and require that subcontractors remain active in E-Verify until their work is completed.

If the apparent low Bidder does not appear on the DHS E-Verify system prior to award, the Department will notify the Contractor that they must submit documentation showing that they are compliant within 5-business days after the date the notification was sent. A Contractor who fails to comply or respond within the deadline will be declared non-responsive and the Department will execute the proposal guaranty. The proposal guaranty will become the property of the State, not as a penalty, but as liquidated damages. The Bidder forfeiting the proposal guaranty will not be considered in future proposals for the same work unless there has been a substantial change in the scope of the work.

The Department may recommend that the Commission:

- reject all bids, or
- award the Contract to the new apparent low Bidder, if the Department is able to verify the Bidder's participation in the DHS E-verify system. For the Bidder who is not registered in E-Verify, the Department will allow for one business day after notification to provide proof of registration.

If the Department is unable to verify the new apparent low Bidder's participation in the DHS E-Verify system within one calendar day:

- the new apparent low Bidder will not be deemed nonresponsive,
- the new apparent low Bidder's guaranty will not be forfeited,
- the Department will reject all bids, and
- the new apparent low Bidder will remain eligible to receive future proposals for the same project.



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## Special Provision to Item 2

### Instructions to Bidders

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Item 2, "Instructions to Bidders" of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

**Article 3., "Issuing Proposal Forms,"** is supplemented by the following:

The Electronic State Business Daily (ESBD), the Integrated Contractor Exchange (iCX) system, and the project proposal are the official sources of advertisement and bidding information for the State and Local Lettings. Bidders should bid the project using the information found therein, including any addenda. These sources take precedence over information from other sources, including TxDOT webpages, which are unofficial and intended for informational purposes only.

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## Special Provision to Item 3 Award and Execution Contract

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Item 3, Award and Execution of Contract," of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

**Section 4.3, "Insurance."** The first sentence is voided and replaced by the following:

For construction and building Contracts, submit a certificate of insurance showing coverages in accordance with Contract requirements. For routine maintenance Contracts, refer to Article 8, "Beginning of Work."

**Article 8, "Beginning of Work."** The first sentence is supplemented by the following:

For a routine maintenance Contract, do not begin work until a certificate of insurance showing coverages in accordance with the Contract requirements is provided and accepted.

## Special Provision to Item 3

### Award and Execution of Contract



Item 3, "Award and Execution of Contract" of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

**Section 4.3 "Insurance" is being amended by the following:**

**Table 2**  
**Insurance Requirements**

<b>Type of Insurance</b>	<b>Amount of Coverage</b>
Commercial General Liability Insurance	Not Less Than: \$600,000 each occurrence
Business Automobile Policy	Not Less Than: \$600,000 combined single limit
Workers' Compensation	Not Less Than: Statutory
All Risk Builder's Risk Insurance (For building-facilities contracts only)	100% of Contract Price

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## Special Provision to Item 5

### Control of the Work

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Item 5, "Control of the Work," of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

**Article 5.1, "Authority of Engineer,"** is voided and replaced by the following.

The Engineer has the authority to observe, test, inspect, approve, and accept the work. The Engineer decides all questions about the quality and acceptability of materials, work performed, work progress, Contract interpretations, and acceptable Contract fulfillment. The Engineer has the authority to enforce and make effective these decisions.

The Engineer acts as a referee in all questions arising under the terms of the Contract. The Engineer's decisions will be final and binding.

The Engineer will pursue and document actions against the Contractor as warranted to address Contract performance issues. Contract remedies include, but are not limited to, the following:

- conducting interim performance evaluations requiring a Project Recovery Plan, in accordance with Title 43, Texas Administrative Code (TAC) §9.23,
- requiring the Contractor to remove and replace defective work, or reducing payment for defective work,
- removing an individual from the project,
- suspending the work without suspending working day charges,
- assessing standard liquidated damages to recover the Department's administrative costs, including additional project-specific liquidated damages when specified in the Contract in accordance with 43 TAC §9.22,
- withholding estimates,
- declaring the Contractor to be in default of the Contract, and
- in case of a Contractor's failure to meet a Project Recovery Plan, referring the issue directly to the Performance Review Committee for consideration of further action against the Contractor in accordance with 43 TAC §9.24.

The Engineer will consider and document any events outside the Contractor's control that contributed to the failure to meet performance standards, including consideration of sufficient time.

Follow the issue escalation ladder if there is disagreement regarding the application of Contract remedies.

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## Special Provision to Item 5

### Control of the Work

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Item 5, "Control of the Work" of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

**Article 5.4, "Coordination of Plans, Specifications, and Special Provisions," the last sentence of the last paragraph is replaced by the following:**

Failure to promptly notify the Engineer will constitute a waiver of all contract claims against the Department for misunderstandings or ambiguities that result from the errors, omissions, or discrepancies.

# Special Provision to Item 6

## Control of Materials



Item 6, "Control of Materials" of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

**Article 6.10., "Hazardous Materials,"** is voided and replaced by the following:

Comply with the requirements of Article 7.12., "Responsibility for Hazardous Materials."

Notify the Engineer immediately when a visual observation or odor indicates that materials on sites owned or controlled by the Department may contain hazardous materials. Except as noted herein, the Department is responsible for testing, removing, and disposing of hazardous materials not introduced by the Contractor. The Engineer may suspend work wholly or in part during the testing, removing, or disposing of hazardous materials, except in the case where hazardous materials are introduced by the Contractor.

Use materials that are free of hazardous materials. Notify the Engineer immediately if materials are suspected to contain hazardous materials. If materials delivered to the project by the Contractor are suspected to contain hazardous materials, have an approved commercial laboratory test the materials for the presence of hazardous materials as approved. Remove, remediate, and dispose of any of these materials found to contain hazardous materials. The work required to comply with this section will be at the Contractor's expense if materials are found to contain hazardous materials. Working day charges will not be suspended and extensions of working days will not be granted for activities related to handling hazardous material introduced by the Contractor. If suspected materials are not found to contain hazardous materials, the Department will reimburse the Contractor for hazardous materials testing and will adjust working day charges if the Contractor can show that this work impacted the critical path.

**10.1. Painted Steel Requirements.** Coatings on existing steel contain hazardous materials unless otherwise shown on the plans. Remove paint and dispose of steel coated with paint containing hazardous materials in accordance with the following:

**10.1.1. Removing Paint From Steel** For contracts that are specifically for painting steel, Item 446, "Field Cleaning and Painting Steel" will be included as a pay item. Perform work in accordance with that item.

For projects where paint must be removed to allow for the dismantling of steel or to perform other work, the Department will provide for a separate contractor (third party) to remove paint containing hazardous materials prior to or during the Contract. Remove paint covering existing steel shown not to contain hazardous materials in accordance with Item 446, "Field Cleaning and Painting Steel."

**10.1.2. Removal and Disposal of Painted Steel.** For steel able to be dismantled by unbolting, paint removal will not be performed by the Department. The Department will remove paint, at locations shown on the plans or as agreed, for the Contractor's cutting and dismantling purposes. Utilize Department cleaned locations for dismantling when provided or provide own means of dismantling at other locations.

Painted steel to be retained by the Department will be shown on the plans. For painted steel that contains hazardous materials, dispose of the painted steel at a steel recycling or smelting facility unless otherwise shown on the plans. Maintain and make available to the Engineer invoices and other records obtained from the facility showing the received weight of the steel and the facility name. Dispose of steel that does not contain hazardous material coatings in accordance with federal, state and local regulations.

**10.2. Asbestos Requirements.** The plans will indicate locations or elements where asbestos containing materials (ACM) are known to be present. Where ACM is known to exist or where previously unknown ACM has been found, the Department will arrange for abatement by a separate contractor prior to or during the Contract. Notify the Engineer of proposed dates of demolition or removal of structural elements with ACM at least 60 days before beginning work to allow the Department sufficient time for abatement.

The Department of State Health Services (DSHS), Asbestos Programs Branch, is responsible for administering the requirements of the National Emissions Standards for Hazardous Air Pollutants, 40 CFR Part 61, Subpart M and the Texas Asbestos Health Protection Rules (TAHPR). Based on EPA guidance and regulatory background information, bridges are considered to be a regulated "facility" under NESHAP. Therefore, federal standards for demolition and renovation apply.

The Department is required to notify the DSHS at least 10 working days (by postmarked date) before initiating demolition or renovation of each structure or load bearing member shown on the plans. If the actual demolition or renovation date is changed or delayed, notify the Engineer in writing of the revised dates in sufficient time to allow for the Department's notification to DSHS to be postmarked at least 10 days in advance of the actual work.

Failure to provide the above information may require the temporary suspension of work under Article 8.4., "Temporary Suspension of Work or Working Day Charges," due to reasons under the control of the Contractor. The Department retains the right to determine the actual advance notice needed for the change in date to address post office business days and staff availability.

**10.3. Lead Abatement.** Provide traffic control as shown on the plans, and coordinate and cooperate with the third party and the Department for managing or removing hazardous materials. Work for the traffic control shown on the plans and coordination work will not be paid for directly but will be subsidiary to pertinent Items.

# Special Provision to Item 006

## Control of Materials



Item 6, “Control of Materials” of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

**Section 1.1, “Buy America,”** The section is removed and replaced by the following:

Comply with the latest provisions of Build America, Buy America Act (BABA Act) of the Bipartisan Infrastructure Law which restricts funds being made available from Federal financial assistance programs unless all the iron products, steel products, manufactured products, and construction materials used in the project are produced in the United States. Use steel or iron products, manufactured products, or construction materials produced in the United States except when:

- a waiver exists exempting the material from Buy America compliance
- the cost of materials, including delivery, does not exceed 0.1% of the total Contract cost or \$2,500, whichever is greater,
- the Contract contains an alternate item for a foreign source product and the Contract is awarded based on the alternate item, or
- the materials are temporarily installed.

For construction materials submit a notarized original of TxDOT Construction Material Buy America Certification Form (Department Form 2806) with the proper attachments for verification of compliance.

Construction Materials are classified as an article, material, or supply—other than an item of primarily iron or steel; a manufactured product; cement and cementitious materials; aggregates such as stone, sand, or gravel; or aggregate binding agents or additives—that is or consists primarily of:

- Non-ferrous metals,
- plastic and polymer-based products (including polyvinylchloride, composite building materials, and polymers used in fiber optic cables),
- Glass (including optic glass)
- Lumber, or
- Drywall.

Details shown on the plans provide additional clarification on Buy America requirements for this project.

For steel or Iron materials submit a notarized original of the FORM D-9-USA-1 (Department Form 1818) with the proper attachments for verification of compliance. For Steel or Iron materials the manufacturing process includes any process that modifies the chemical content, physical shape or size, or final finish of a product. The manufacturing process begins with initial melting and mixing and continues through fabrication (cutting, drilling, welding, bending, etc.) and coating (paint, galvanizing, epoxy, etc.).

**Article 4., “Sampling, Testing, and Inspection,”** is supplemented by the following:

Meet with the Engineer and choose either the Department or a Department-selected Commercial Lab (CL) for conducting the subset of project-level sampling and testing shown in Table 1, “Select Guide Schedule Sampling and Testing.” Selection may be made on a test by test basis. CLs will meet the testing turnaround times shown (includes test time and time for travel and sampling and reporting) and in all cases issue test reports as soon as possible.

If the Contractor chooses a Department-selected CL for any Table 1 sampling and testing:



- notify the Engineer, District Lab, and the CL of project scheduling that may require CL testing;
- provide the Engineer, District Lab, and CL at least 24 hours' notice by phone or e-mail;
- reimburse the Department for CL Table 1 testing using the contract fee schedule for the CL (including mileage, travel, and stand time) at the minimum guide schedule testing frequencies;
- reimburse the Department for CL Table 1 testing above the minimum guide schedule frequencies for retesting when minimum frequency testing results in failures to meet specification limits;
- agree with the Engineer and CL upon a policy regarding notification for testing services;
- give any cancellation notice to the Engineer, District Lab, and CL by phone or e-mail;
- reimburse the Department a \$150 cancellation fee to cover technician time and mileage charges for previously scheduled work cancelled without adequate notice, which resulted in mobilization of technician and/or equipment by the CL; and
- all CL charges will be reimbursed to the Department by a deduction from the Contractor's monthly pay estimate.

If the CL does not meet the Table 1 turnaround times, testing charge to the Contractor will be reduced by 50% for the first late day and an additional 5% for each succeeding late day.

Approved CL project testing above the minimum testing frequencies in the Guide Schedule of Sampling and Testing, and not as the result of failing tests, will be paid by the Department.

Other project-level Guide Schedule sampling and testing not shown on Table 1 will be the responsibility of the Department.

**Table 1**  
**Select Guide Schedule Sampling and Testing (Note 1)**

TxDOT Test	Test Description	Turn-Around Time (Calendar days)
<b>SOILS/BASE</b>		
<a href="#">Tex-101-E</a>	Preparation of Soil and Flexible Base Materials for Testing (included in other tests)	
<a href="#">Tex-104-E</a>	Liquid Limit of Soils (included in 106-E)	
<a href="#">Tex-105-E</a>	Plastic Limit of Soils (included in 106-E)	
<a href="#">Tex-106-E</a>	Calculating the Plasticity Index of Soils	7
<a href="#">Tex-110-E</a>	Particle Size Analysis of Soils	6
<a href="#">Tex-113-E</a>	Moisture-Density Relationship of Base Materials	7
<a href="#">Tex-114-E</a>	Moisture-Density Relationship of Subgrade and Embankment Soil	7
<a href="#">Tex-115-E</a>	Field Method for In-Place Density of Soils and Base Materials	2
<a href="#">Tex-116-E</a>	Ball Mill Method for the Disintegration of Flexible Base Material	5
<a href="#">Tex-117-E, Part II</a>	Triaxial Compression Tests For Disturbed Soils and Base Materials (Part II)	6
<a href="#">Tex-113-E</a> w/ <a href="#">Tex-117-E</a>	Moisture-Density Relationship of Base Materials <b>with</b> Triaxial Compression Tests For Disturbed Soils and Base Materials (Part II)	10
<a href="#">Tex-140-E</a>	Measuring Thickness of Pavement Layer	2
<a href="#">Tex-145-E</a>	Determining Sulfate Content in Soils - Colorimetric Method	4
<b>HOT MIX ASPHALT</b>		
<a href="#">Tex-200-F</a>	Sieve Analysis of Fine and Coarse Aggregate (dry, from ignition oven with known correction factors)	1 (Note 2)
<a href="#">Tex-203-F</a>	Sand Equivalent Test	3
<a href="#">Tex-206-F</a> , w/ <a href="#">Tex-207-F</a> , Part I, w/ <a href="#">Tex-227-F</a>	<b>(Lab-Molded Density of Production Mixture – Texas Gyrotory)</b> Method of Compacting Test Specimens of Bituminous Mixtures <b>with</b> Density of Compacted Bituminous Mixtures, Part I - Bulk Specific Gravity of Compacted Bituminous Mixtures, <b>with</b> Theoretical Maximum Specific Gravity of Bituminous Mixtures	1 (Note 2)
<a href="#">Tex-207-F</a> , Part I &/or Part VI	<b>(In-Place Air Voids of Roadway Cores)</b> Density of Compacted Bituminous Mixtures, Part I - Bulk Specific Gravity of Compacted Bituminous Mixtures <b>&amp;/or</b> Part VI - Bulk Specific Gravity of Compacted Bituminous Mixtures Using the Vacuum Method	1 (Note 2)

<a href="#">Tex-207-F</a> , Part V	Density of Compacted Bituminous Mixtures, Part V - Determining Mat Segregation using a Density-Testing Gauge	3
<a href="#">Tex-207-F</a> , Part VII	Density of Compacted Bituminous Mixtures, Part VII - Determining Longitudinal Joint Density using a Density-Testing Gauge	4
<a href="#">Tex-212-F</a>	Moisture Content of Bituminous Mixtures	3
<a href="#">Tex-217-F</a>	Deleterious Material and Decantation Test for Coarse Aggregate	4
<a href="#">Tex-221-F</a>	Sampling Aggregate for Bituminous Mixtures, Surface Treatments, and LRA (included in other tests)	
<a href="#">Tex-222-F</a>	Sampling Bituminous Mixtures (included in other tests)	
<a href="#">Tex-224-F</a>	Determination of Flakiness Index	3
<a href="#">Tex-226-F</a>	Indirect Tensile Strength Test (production mix)	4
<a href="#">Tex-235-F</a>	Determining Draindown Characteristics in Bituminous Materials	3
<a href="#">Tex-236-F</a> (Correction Factors)	Asphalt Content from Asphalt Paving Mixtures by the Ignition Method (Determining Correction Factors)	4
<a href="#">Tex-236-F</a>	Asphalt Content from Asphalt Paving Mixtures by the Ignition Method (Production Mixture)	1 (Note 2)
<a href="#">Tex-241-F</a> w/ <a href="#">Tex-207-F</a> , Part I, w/ <a href="#">Tex-227-F</a>	<b>(Lab-Molded Density of Production Mixture – Superpave Gyrotory)</b> Superpave Gyrotory Compacting of Specimens of Bituminous Mixtures (production mixture) <b>with</b> Density of Compacted Bituminous Mixtures, Part I- Part I - Bulk Specific Gravity of Compacted Bituminous Mixtures, <b>with</b> Theoretical Maximum Specific Gravity of Bituminous Mixtures	1 (Note 2)
<a href="#">Tex-242-F</a>	Hamburg Wheel-Tracking Test (production mix, molded samples)	3
<a href="#">Tex-244-F</a>	Thermal Profile of Hot Mix Asphalt	1
<a href="#">Tex-246-F</a>	Permeability of Water Flow of Hot Mix Asphalt	3
<a href="#">Tex-280-F</a>	Flat and Elongated Particles	3
<a href="#">Tex-530-C</a>	Effect of Water on Bituminous Paving Mixtures (production mix)	4
<b>AGGREGATES</b>		
<a href="#">Tex-400-A</a>	Sampling Flexible Base, Stone, Gravel, Sand, and Mineral Aggregates	3
<a href="#">Tex-410-A</a>	Abrasion of Coarse Aggregate Using the Los Angeles Machine	5
<a href="#">Tex-411-A</a>	Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate	12
<a href="#">Tex-461-A</a>	Degradation of Coarse Aggregate by Micro-Deval Abrasion	5
<b>CHEMICAL</b>		
<a href="#">Tex-612-J</a>	Acid Insoluble Residue for Fine Aggregate	4
<b>GENERAL</b>		
HMA Production Specialist [TxAPA – Level 1-A] (\$/hr)		
HMA Roadway Specialist [TxAPA – Level 1-B] (\$/hr)		
Technician Travel/Standby Time (\$/hr)		
Per Diem (\$/day – meals and lodging)		
Mileage Rate (\$/mile from closest CL location)		
<b>Note 1– Turn-Around Time includes test time and time for travel/sampling and reporting.</b>		
<b>Note 2 – These tests require turn-around times meeting the governing specifications. Provide test results within the stated turn-around time. CL is allowed one additional day to provide the signed and sealed report.</b>		

# Special Provision to Item 7

## Legal Relations and Responsibilities



Item 7, "Legal Relations and Responsibilities," of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

**Section 7.7.2., "Texas Pollutant Discharge Elimination System (TPDES) Permits and Storm Water Pollution Prevention Plans (SWP3)," is voided and replaced by the following:**

**7.2. Texas Pollution Discharge Elimination System (TPDES) Permits and Storm Water Pollution Prevention Plans (SWP3).**

**7.2.1. Projects with less than one acre of soil disturbance including required associated project specific locations (PSL's) per TPDES GP TXR 150000.**

No posting or filing will be required for soil disturbances within the right of way. Adhere to the requirements of the SWP3.

**7.2.2. Projects with one acre but less than five acres of soil disturbance including required associated PSL's per TPDES GP TXR 150000.**

The Department will be considered a primary operator for Operational Control Over Plans and Specifications as defined in TPDES GP TXR 150000 for construction activity in the right of way. The Department will post a small site notice along with other requirements as defined in TPDES GP TXR 150000 as the entity of having operational control over plans and specifications for work shown on the plans in the right of way.

The Contractor will be considered a Primary Operator for Day-to-Day Operational Control as defined in TPDES GP TXR 150000 for construction activity in the right of way. In addition to the Department's actions, the Contractor will post a small site notice along with other requirements as defined in TPDES GP TXR 150000 as the entity of having day-to-day operational control of the work shown on the plans in the right of way. This is in addition to the Contractor being responsible for TPDES GP TXR 150000 requirements for on- right of way and off- right of way PSL's. Adhere to all requirements of the SWP3 as shown on the plans. The Contractor will be responsible for Implement the SWP3 for the project site in accordance with the plans and specifications, TPDES General Permit TXR150000, and as directed.

**7.2.3. Projects with 5 acres or more of soil disturbance including required associated PSL's per TPDES GP TXR 150000.**

The Department will be considered a primary operator for Operational Control Over Plans and Specifications as defined in TPDES GP TXR 150000 for construction activities in the right of way. The Department will post a large site notice, file a notice of intent (NOI), notice of change (NOC), if applicable, and a notice of termination (NOT) along with other requirements per TPDES GP TXR 150000 as the entity having operational control over plans and specifications for work shown on the plans in the right of way.

The Contractor will be considered a primary operator for Day-to-Day Operational Control as defined in TPDES GP TXR 150000 for construction activities in the right of way. In addition to the Department's actions, the Contractor shall file a NOI, NOC, if applicable, and NOT and post a large site notice along with other requirements as the entity of having day-to-day operational control of the work shown on the plans in the right of way. This is in addition to the Contractor

being responsible for TPDES GP TXR 150000 requirements for on- right of way and off- right of way PSL's. Adhere to all requirements of the SWP3 as shown on the plans.

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## Special Provision to Item 7

# Legal Relations and Responsibilities

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Item 7, "Legal Relations and Responsibilities," of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

**Section 7.2.4., "Public Safety and Convenience."** The first paragraph is deleted and replaced by the following.

Ensure the safety and convenience of the public and property as provided in the Contract and as directed. Keep existing roadways open to traffic or construct and maintain detours and temporary structures for safe public travel. Manage construction to minimize disruption to traffic. Maintain the roadway in a good and passable condition, including proper drainage and provide for ingress and egress to adjacent property.

If the construction of the project requires the closing of a highway, as directed, coordinate the closure with the Engineer and work to ensure all lanes and ramps possible are available during peak traffic periods before, during, and after significant traffic generator events to avoid any adverse economic impact on the municipalities during:

- dates or events as shown on the plans, and
- other dates as directed.

# Special Provision to Item 007

## Legal Relations and Responsibilities



Item 7, "Legal Relations and Responsibilities," of the Standard Specifications is amended with respect to the clauses cited below.

**Section 2.6., "Barricades, Signs, and Traffic Handling,"** the first paragraph is voided and replaced by the following:

- 2.6. **Barricades, Signs, and Traffic Handling.** Comply with the requirements of Item 502 "Barricades, Signs, and Traffic Handling," and as directed. Provide traffic control devices that conform to the details shown on the plans, the TMUTCD, and the Department's Compliant Work Zone Traffic Control Device List maintained by the Traffic Safety Division. When authorized or directed, provide additional signs or traffic control devices not required by the plans.

**Section 2.6.1., "Contractor Responsible Person and Alternative,"** is voided and replaced by the following:

- 2.6.1. **Contractor Responsible Person and Alternative.** Designate in writing, a Contractor's Responsible Person (CRP) and an alternate to be the representative of the Contractor who is responsible for taking or directing corrective measures regarding the traffic control. The CRP or alternate must be accessible by phone 24 hr. per day and able to respond when notified. The CRP and alternate must comply with the requirements of Section 2.6.5., "Training."

**Section 2.6.2, "Flaggers,"** the first paragraph is voided and replaced by the following:

- 2.6.2. **Flaggers.** Designate in writing, a flagger instructor who will serve as a flagging supervisor and is responsible for training and assuring that all flaggers are qualified to perform flagging duties. Certify to the Engineer that all flaggers will be trained and make available upon request a list of flaggers trained to perform flagging duties.

**Section 2.6.5, "Training,"** is voided and replaced by the following:

- 2.6.5. **Training.** Train workers involved with the traffic control using Department-approved training as shown on the "Traffic Control Training" Material Producer List.

Coordinate enrollment, pay associated fees, and successfully complete Department-approved training or Contractor-developed training. Training is valid for the period prescribed by the provider. Except for law enforcement personnel training, refresher training is required every 4 yr. from the date of completion unless otherwise specified by the course provider. The Engineer may require training at a frequency instead of the period prescribed based on the Department's needs. Training and associated fees will not be measured or paid for directly but are considered subsidiary to pertinent Items.

Certify to the Engineer that workers involved in traffic control and other work zone personnel have been trained and make available upon request a copy of the certification of completion to the Engineer. Ensure the following is included in the certification of completion:

- name of provider and course title,
- name of participant,
- date of completion, and
- date of expiration.

Where Contractor-developed training or a Department-approved training course does not produce a certification, maintain a log of attendees. Make the log available upon request. Ensure the log is legible and includes the following:

- printed name and signature of participant,
- name and title of trainer, and
- date of training.

2.6.5.1. **Contractor-developed Training.** Develop and deliver Contractor-developed training meeting the minimum requirements established by the Department. The outline for this training must be submitted to the Engineer for approval at the preconstruction meeting. The CRP or designated alternate may deliver the training instead of the Department-approved training. The work performed and materials furnished to develop and deliver the training will not be measured or paid for directly but will be considered subsidiary to pertinent Items.

2.6.5.1.1. **Flagger Training Minimum Requirements.** A Contractor's certified flagging instructor is permitted to train other flaggers.

2.6.5.1.2. **Optional Contractor-developed Training for Other Work Zone Personnel.** For other work zone personnel, the Contractor may provide training meeting the curriculum shown below instead of Department-approved training.

Minimum curriculum for Contractor-provided training is as follows:

Contractor-developed training must provide information on the use of personnel protection equipment, occupational hazards and health risks, and other pertinent topics related to traffic management. The type and amount of training will depend on the job duties and responsibilities. Develop training applicable to the work being performed. Develop training to include the following topics.

- The Life You Save May Be Your Own (or other similar company safety motto).
- Purpose of the training.
  - It's the Law.
  - To make work zones safer for workers and motorist.
  - To understand what is needed for traffic control.
  - To save lives including your own.
- Personal and Co-Worker Safety.
  - **High Visibility Safety Apparel.** Discuss compliant requirements; inspect regularly for fading and reduced reflective properties; if night operations are required, discuss the additional and appropriate required apparel in addition to special night work risks; if moving operations are underway, discuss appropriate safety measures specific to the situation and traffic control plan.
  - **Blind Areas.** A blind area is the area around a vehicle or piece of construction equipment not visible to the operators, either by line of sight or indirectly by mirrors. Discuss the "Circle of Safety" around equipment and vehicles; use of spotters; maintain eye contact with equipment operators; and use of hand signals.
  - **Runovers and Backovers.** Remain alert at all times; keep a safe distance from traffic; avoid turning your back to traffic and if you must then use a spotter; and stay behind protective barriers, whenever possible. Note: It is not safe to sit on or lean against a concrete barrier, these barriers can deflect four plus feet when struck by a vehicle.
  - Look out for each other, warn co-workers.
  - Be courteous to motorists.
  - Do not run across active roadways.
  - Workers must obey traffic laws and drive courteously while operating vehicles in the work zones.
  - Workers must be made aware of company distracted driving policies.
- **Night Time Operations.** Focus should be placed on projects with a nighttime element.

- **Traffic Control Training.** Basics of Traffic Control.
  - Identify work zone traffic control supervisor and other appropriate persons to report issues to when they arise.
  - Emphasize that work zone traffic control devices must be in clean and in undamaged condition. If devices have been hit but not damaged, put back in their correct place and report to traffic control supervisor. If devices have been damaged, replace with new one and report to traffic control supervisor. If devices are dirty, faded or have missing or damaged reflective tape clean or replace and report to traffic control supervisor. Show examples of non-acceptable device conditions. Discuss various types of traffic control devices to be used and where spacing requirements can be found.
  - **Channelizing Devices and Barricades with Slanted Stripes.** Stripes are to slant in the direction you want traffic to stay or move to; demonstrate this with a device.
  - **Traffic Queuing.** Workers must be made aware of traffic queuing and the dangers created by it. Workers must be instructed to immediately notify the traffic control supervisor and other supervisory personnel if traffic is queuing beyond advance warning sign and devices or construction limits.
  - **Signs.** Signs must be straight and not leaning. Report problems to the traffic control supervisor or other as designated for immediate repair. Covered signs must be fully covered. If covers are damaged or out of place, report to traffic control supervisor or other as designated.



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## Special Provision to Item 8 Prosecution and Progress

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Item 8, "Prosecution and Progress" of the Standard Specification is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

**Article 8.2., "Subcontracting,"** is supplemented by the following paragraph, which is added as paragraph six to this article:

The Contractor certifies by signing the Contract that the Contractor will not enter into any subcontract with a subcontractor that is not registered in the Department of Homeland Security's (DHS) E-Verify system. Require that all subcontractors working on the project register and require that all subcontractors remain active in the DHS E-Verify system until their work is complete on the project.

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## Special Provision to Item 8 Prosecution and Progress

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Item 8, "Prosecution and Progress" of the Standard Specifications is amended with respect to the clause cited below. No other clauses or requirements of this Item are waived or changed.

**Article 8.7.2., "Wrongful Default,"** is revised and replaced by the following:

If it is determined after the Contractor is declared in default, that the Contractor was not in default, the rights and obligations of all parties will be the same as if termination had been issued for the convenience of the public as provided in Article 8.8 "Termination of Contract."

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## Special Provision to Item 009

### Measurement and Payment

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Item 009 "Measurement and Payment" of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

**Article 9.5., "PROGRESS PAYMENTS" is supplemented with the following:**

It is the Department's desire to pay a Contractor for work through the last working day of the month; however, the use of early cut-off dates for monthly estimates and MOH is a project management practice to manage workload at the Area Office level. Approval for using early cut-off dates is at the District's discretion. The earliest cut-off date for estimates is the 25<sup>th</sup> of the month.

**Article 9.6., "PAYMENT FOR MATERIAL ON HAND (MOH)" first paragraph is amended as follows:**

If payment for MOH is desired, request compensation for the invoice cost of acceptable nonperishable materials that have not been used in the work before the request, and that have been delivered to the work location or are in acceptable storage places. Nonperishable materials are those that do not have a shelf life or whose characteristics do not materially change when exposed to the elements. Include only materials that have been sampled, tested, approved, or certified, and are ready for incorporation into the work. Only materials which are completely constructed or fabricated on the Contractor's order for a specific Contract and are so marked and on which an approved test report has been issued are eligible. Payment for MOH may include the following types of items: concrete traffic barrier, precast concrete box culverts, concrete piling, reinforced concrete pipe, and illumination poles. Any repairs required after fabricated materials have been approved for storage will require approval of the Engineer before being made and will be made at the Contractor's expense. Include only those materials and products, when cumulated under an individual item or similar bid items, that have an invoice cost of at least \$1,000 in the request for MOH payment (e.g. For MOH eligibility, various sizes of conductor are considered similar bid items and may be cumulated to meet the threshold; for small roadside signs, the sign supports, mounting bolts, and the sign face is considered one bid item or similar bid items for more than one pay item for sign supports.) Requests for MOH are to be submitted at least two days before but not later than the estimate cutoff date unless otherwise agreed. If there is a need to request MOH after the established cut-off date, the district can make accommodation as the need arises. This needed accommodation is to be the exception, though, and not the rule.

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## Special Provision to Item 9 Measurement and Payment

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Item 9, "Measurement and Payment" of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

**Section 9.7.1.4.3., "Standby Equipment Costs,"** is voided and replaced by the following:

7.1.4.3. **Standby Equipment Costs.** Payment for standby equipment will be made in accordance with Section 9.7.1.4., "Equipment," except that the 15% markup will not be allowed and that:

**Section 7.1.4.3.1., "Contractor-Owned Equipment,"** is voided and replaced by the following:

7.1.4.3.1. **Contractor-Owned Equipment.** For Contractor-owned equipment:

- Standby will be paid at 50% of the monthly Equipment Watch rate after the regional and age adjustment factors have been applied. Operating costs will not be allowed. Calculate the standby rate as follows.

$$\text{Standby rate} = (\text{FHWA hourly rate} - \text{operating costs}) \times 50\%$$

- If an hourly rate is needed, divide the monthly *Equipment Watch* rate by 176.
- No more than 8 hr. of standby will be paid during a 24-hr. day period, nor more than 40 hr. per week.
- Standby costs will not be allowed during periods when the equipment would have otherwise been idle.

# Special Provision to Item 302

## Aggregates for Surface Treatments



Item 302, "Aggregates for Seal Coats," of the Standard Specifications, is hereby amended with respect to the clauses cited below, and no other clauses or requirements of this Item are waived or changed hereby.

Section 2.1., "Aggregate." Tables 2 and 3 are voided and replaced by the following.

**Table 2**  
**Aggregate Gradation Requirements (Cumulative % Retained<sup>1</sup>)**

Sieve	Grade								
	1	2	3S <sup>2</sup>	3		4S <sup>2</sup>	4	5S <sup>2</sup>	5
				Non-Lightweight	Lightweight				
1"	-	-	-	-	-	-	-	-	-
7/8"	0-2	0	-	-	-	-	-	-	-
3/4"	20-35	0-2	0	0	0	-	-	-	-
5/8"	85-100	20-40	0-5	0-5	0-2	0	0	-	-
1/2"	-	80-100	55-85	20-40	10-25	0-5	0-5	0	0
3/8"	95-100	95-100	95-100	80-100	60-80	60-85	20-40	0-5	0-5
1/4"	-	-	-	95-100	95-100	-	-	65-85	-
#4	-	-	-	-	-	95-100	95-100	95-100	50-80
#8	99-100	99-100	99-100	98-100	98-100	98-100	98-100	98-100	98-100

1. Round test results to the nearest whole number.
2. Single-size gradation.

**Table 3**  
**Aggregate Quality Requirements**

Property	Test Method	Requirement <sup>1</sup>	
		Minimum	Maximum
SAC	<a href="#">AQMP</a>	As shown on the plans	
Deleterious Material <sup>2</sup> , %	<a href="#">Tex-217-F</a> , Part I	-	2.0
Decantation, %	<a href="#">Tex-406-A</a>	-	1.5
Flakiness Index, %	<a href="#">Tex-224-F</a>	-	17
Gradation	<a href="#">Tex-200-F</a> , Part I	Table 2 Requirements	
Los Angeles Abrasion, %	<a href="#">Tex-410-A</a>	-	35
Magnesium Sulfate Soundness, 5 Cycle, %	<a href="#">Tex-411-A</a>	-	25
Micro-Deval Abrasion, %	<a href="#">Tex-461-A</a>	Note 3	
Coarse Aggregate Angularity <sup>4</sup> , 2 Crushed Faces, %	<a href="#">Tex-460-A</a> , Part I	85	-
Additional Requirements for Lightweight Aggregate			
Dry Loose Unit Wt., lb./cu. ft.	<a href="#">Tex-404-A</a>	35	60
Pressure Slaking, %	<a href="#">Tex-431-A</a>	-	6.0
Freeze-Thaw Loss, %	<a href="#">Tex-432-A</a>	-	10.0
Water Absorption, 24hr., %	<a href="#">Tex-433-A</a>	-	12.0

1. Material requirements are listed below, unless otherwise shown on the plans.
2. Not required for lightweight aggregate.
3. Used to estimate the magnesium sulfate soundness loss in accordance with Section 2.1.1.
4. Only required for crushed gravel.

**Section 2.1.1., “Micro-Deval Abrasion,”** is added.

The Engineer will perform a minimum of one Micro-Deval abrasion test in accordance with [Tex-461-A](#) for each coarse aggregate source per project that has a Rated Source Soundness Magnesium (RSSM) loss value greater than 15 as listed in the BRSQC. The Engineer may waive all Micro-Deval testing based on a satisfactory test history of the same aggregate source.

The Engineer will estimate the magnesium sulfate soundness loss for each coarse aggregate source, when tested, using the following formula.

$$Mg_{est.} = (RSSM)(MD_{act.}/RSMD)$$

where:

$Mg_{est.}$  = magnesium sulfate soundness loss

$MD_{act.}$  = actual Micro-Deval percent loss

$RSMD$  = Rated Source Micro-Deval

When the estimated magnesium sulfate soundness loss is greater than the maximum magnesium sulfate soundness loss specified, the coarse aggregate source will not be allowed for use unless otherwise approved by the Engineer. The Engineer may require additional testing before granting approval.

**Section 2.2., “Precoating.”** The third paragraph is voided and replaced by the following.

The Engineer retains the right to remove precoat material from aggregate samples in accordance with [Tex-210-F](#), or as recommended by the Construction Division, and test the aggregate to verify compliance with Table 2 and Table 3 requirements. Gradation testing may be performed with precoat intact.

**Section 2.3., “Sampling,”** is added.

Personnel who conduct sampling and witnessing of sampling must be certified by the Department-approved certification program. Supply the Engineer with a list of certified personnel and copies of their current certificates before beginning construction and when personnel changes are made. At any time during the project, the Engineer may perform production tests as deemed necessary in accordance with Item 5, “Control of the Work.”

The Engineer will sample aggregate from stockpiles located at the production site, intermediate distribution site, or project location in accordance with [Tex-221-F](#), Section 3.2.3. The Engineer will split each sample into 2 equal portions in accordance with [Tex-200-F](#), Section 3.3, and label these portions “Engineer” and “Contractor” or “Supplier.” Witness the sampling and splitting, and take immediate possession of the samples labeled “Contractor” or “Supplier”.

**Section 2.4., “Reporting and Responsibilities,”** is added.

The Engineer will provide test results to the Contractor and Supplier within 10 working days from the date the stockpile was sampled for sources listed on the Department’s Bituminous Rated Source Quality Catalog (BRSQC), unless otherwise directed. The Engineer will provide test results for the LA Abrasion ([Tex-410-A](#)) and Magnesium Sulfate Soundness ([Tex-411-A](#)) tests within 30 calendar days for sources not listed on the BRSQC, or for sources not meeting the requirements of Section 2.1.1., “Micro-Deval Abrasion.” The Engineer will report to the other party within 24 hours when any test result does not meet the requirements listed in Table 2 or Table 3.

# Special Provision to Item 421

## Hydraulic Cement Concrete



Item 421, "Hydraulic Cement Concrete" of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

**Article 421.2., "Materials,"** the second sentence of the first paragraph is voided and replaced by the following.

Provide aggregates from sources listed in the Department's Concrete Rated Source Quality Catalog (CRSQC).

**Article 421.2.2., Supplementary Cementing Materials (SCM),** is voided and replaced with the following.

Supplementary Cementing Materials (SCM).

- **Fly Ash.** Furnish fly ash, Modified fly ash (MFA), and Ground Bottom Ash (GBA) conforming to [DMS-4610](#), "Fly Ash."
- **Slag Cement.** Furnish Slag Cement conforming to [DMS-4620](#), "Slag Cement."
- **Silica Fume.** Furnish silica fume conforming to [DMS-4630](#), "Silica Fume."
- **Metakaolin.** Furnish metakaolin conforming to [DMS-4635](#), "Metakaolin."

**Article 421.3.1.3., "Agitators and Truck and Stationary Mixers,"** the first paragraph is voided and replaced by the following.

Provide stationary and truck mixers capable of combining the ingredients of the concrete into a thoroughly mixed and uniform mass and capable of discharging the concrete so that the requirements of [Tex-472-A](#) are met.

**Article 421.3.1.3., "Agitators and Truck and Stationary Mixers,"** is supplemented with the following.

Truck mixers with automated water and chemical admixture measurement and slump and slump flow monitoring equipment meeting the requirement of ASTM C 94 will be allowed. Provide data every 6 mo. substantiating the accuracy of slump, slump flow, temperature, water, and chemical admixture measurements. The slump measured by the automated system must be within 1 in. of the slump measured in accordance with [Tex-415-A](#). The concrete temperature measured by the automated system must be within 1°F of concrete temperature measured in accordance with [Tex-422-A](#). The Engineer will not use the automated measurements for acceptance.

Article 421.4.2, "Mix Design Proportioning," Table 8 is voided and replaced by the following.

**Table 8**  
**Concrete Classes**

Class of Concrete	Design Strength, <sup>1</sup> Min $f'_c$ (psi)	Max w/cm Ratio	Coarse Aggregate Grades <sup>2,3,4</sup>	Cement Types	Mix Design Options	Exceptions to Mix Design Options	General Usage <sup>5</sup>
A	3,000	0.60	1-4, 8	I, II, I/II, IL, IP, IS, IT, V	1, 2, 4, & 7	When the cementitious material content does not exceed 520 lb./cu. yd., any fly ash listed in the MPL may be used at a cement replacement of 20% to 50%.	Curb, gutter, curb & gutter, conc. retards, sidewalks, driveways, back-up walls, anchors, non-reinforced drilled shafts
B	2,000	0.60	2-7				Riprap, traffic signal controller foundations, small roadside signs, and anchors
C <sup>6</sup>	3,600	0.45	1-6	I, II, I/II, IP, IL, IS, IT, V	1-8		Drilled shafts, bridge substructure, traffic rail, culverts except top slab of direct traffic culverts, headwalls, wing walls, inlets, manholes, traffic barrier
E	3,000	0.50	2-5	I, II, I/II, IL, IP, IS, IT, V	1-8	When the cementitious material content does not exceed 520 lb./cu. yd., any fly ash listed in the MPL may be used at a cement replacement of 20% to 50%.	Seal concrete
F <sup>6</sup>	Note <sup>7</sup>	0.45	2-5	I, II, I/II, IP, IL, IS, IT, V			Railroad structures; occasionally for bridge piers, columns, bents, post-tension members
H <sup>6</sup>	Note <sup>7</sup>	0.45	3-6	I, II, I/II, III, IP, IL, IS, IT, V	1-4, 8	Mix design options 1-8 allowed for cast-in-place concrete and the following precast elements unless otherwise stated in the plans: <ul style="list-style-type: none"> <li>■ Bridge Deck Panels,</li> <li>■ Retaining Wall Systems,</li> <li>■ Coping,</li> <li>■ Sound Walls,</li> <li>■ Wall Columns,</li> <li>■ Traffic Rail,</li> <li>■ Traffic Barrier,</li> <li>■ Long/Arch Span Culverts, and</li> <li>■ precast concrete products included in Items 462, 464, and 465.</li> </ul> Do not use Type III cement in mass placement concrete. Up to 20% of blended cement may be replaced with listed SCMs when Option 4 is used for precast concrete. Options 6, & 7 allowed for cast-in-place Class H concrete.	Precast concrete, post-tension members
S <sup>6</sup>	4,000	0.45	2-5	I, II, I/II, IP, IL, IS, IT, V	1-8		Bridge slabs, top slabs of direct traffic culverts, approach slabs
P	See Item 360, "Concrete Pavement."	0.50	2-3	I, II, I/II, IL, IP, IS, IT, V	1-8	When the cementitious material content does not exceed 520 lb./cu. yd., any fly ash listed in the MPL may be used at a cement replacement of 20% to 50%.	Concrete pavement



Class of Concrete	Design Strength, <sup>1</sup> Min $f_c$ (psi)	Max w/cm Ratio	Coarse Aggregate Grades <sup>2,3,4</sup>	Cement Types	Mix Design Options	Exceptions to Mix Design Options	General Usage <sup>5</sup>
CO <sup>6</sup>	4,600	0.40	6		1-8		Bridge deck concrete overlay
LMC <sup>6</sup>	4,000	0.40	6-8				Latex-modified concrete overlay
SS <sup>6</sup>	3,600	0.45	4-6	I, II, I/II, IP, IL, IS, IT, V	1-8	Use a minimum cementitious material content of 658 lb./cu. yd. of concrete. Limit the alkali loading to 4.0 lbs./cu. yd. or less when using option 7.	Slurry displacement shafts, underwater drilled shafts
K <sup>6</sup>	Note <sup>7</sup>	0.40	Note <sup>7</sup>	I, II, I/II, III, IP, IL, IS, IT, V	1-8		Note <sup>7</sup>
HES	Note <sup>7</sup>	0.45	Note <sup>7</sup>	I, IL, II, I/II, III		Mix design options do not apply. 700 lb. of cementitious material per cubic yard limit does not apply.	Concrete pavement, concrete pavement repair
"X" (HPC) <sub>6,8,9</sub>	Note <sup>10</sup>	0.45	Note <sup>10</sup>	I, II, I/II, III, IP, IL, IS, IT, V	1-4, & 8	Maximum fly ash replacement for Option 3 may be increased to 50%. Up to 20% of a blended cement may be replaced with listed SCMs for Option 4. Do not use Option 8 for precast concrete.	
"X" (SRC) <sub>6,8,9</sub>	Note <sup>10</sup>	0.45	Note <sup>10</sup>	I/II, II, IP, IL, IS, IT, V	1-4, & 7	When using fly ash, only use fly ashes allowed for SRC as listed in the Fly Ash MPL. Type III-MS may be used where allowed. Type I and Type III cements may be use when fly ashes allowed for SRC as listed in the Fly Ash MPL are used, and with a maximum w/cm of 0.40. Up to 20% of blended cement may be replaced with listed SCMs when Option 4 is used for precast concrete. Use Option 7 for precast concrete where allowed.	

- Design strength must be attained within 56 days.
- Do not use Grade 1 coarse aggregate except in massive foundations with 4 in. minimum clear spacing between reinforcing steel bars, unless otherwise permitted. Do not use Grade 1 aggregate in drilled shafts.
- Use Grade 8 aggregate in extruded curbs unless otherwise approved.
- Other grades of coarse aggregate maybe used in non-structural concrete classes when allowed by the Engineer.
- For information only.
- Structural concrete classes.
- As shown on the plans or specified.
- "X" denotes class of concrete shown on the plans or specified.
- (HPC): High Performance Concrete, (SRC): Sulfate Resistant Concrete.
- Same as class of concrete shown on the plans.

**Article 421.4.2.2., "Aggregates,"** is supplemented by the following.

Use the following equation to determine if the aggregate combination meets the sand equivalency requirement when blending fine aggregate or using an intermediate aggregate:

$$\frac{(SE_1 \times P_1) + (SE_2 \times P_2) + (SE_{ia} \times P_{ia})}{100} \geq 80\%$$

where:

$SE_1$  = sand equivalency (%) of fine aggregate 1

$SE_2$  = sand equivalency (%) of fine aggregate 2

$SE_{ia}$  = sand equivalency (%) of intermediate aggregate passing the 3/8 in. sieve

$P_1$  = percent by weight of fine aggregate 1 of the fine aggregate blend

$P_2$  = percent by weight of fine aggregate 2 of the fine aggregate blend

$P_{ia}$  = percent by weight of intermediate aggregate passing the 3/8 in. sieve

**Article 421.4.2.3., “Chemical Admixtures,”** the second paragraph is voided and replaced with the following.

Use a 30% calcium nitrite solution when a corrosion-inhibiting admixture is required. Dose the admixture at the rate of gallons of admixture per cubic yard of concrete shown on the plans. Use set retarding admixtures, as needed, to control setting time to ensure concrete containing corrosion inhibiting admixtures remain workable for the entire duration of the concrete placement. Perform setting time testing and slump loss testing during trial batch testing.

**Article 421.4.2.5., “Slump,”** the second paragraph is voided and not replaced. Table 9 is voided and replaced with below:

**Table 9**  
**Placement Slump Requirements**

General Usage	Placement Slump Range, <sup>1,2</sup> in.
Walls (over 9 in. thick), caps, columns, piers	3 to 7
Bridge slabs, top slabs of direct traffic culverts, approach slabs, concrete overlays, latex-modified concrete for bridge deck overlays	3 to 6
Inlets, manholes, walls (less than 9 in. thick), bridge railing, culverts, concrete traffic barrier, concrete pavement (formed)	4 to 6
Precast concrete	4 to 9
Underwater concrete placements	6 to 8-1/2
Drilled shafts, slurry displaced and underwater drilled shafts	See Item 416, “Drilled Shaft Foundations.”
Curb, gutter, curb and gutter, concrete retards, sidewalk, driveways, seal concrete, anchors, riprap, small roadside sign foundations, concrete pavement repair, concrete repair	As approved

1. Maximum slump values may be increase above these values shown using chemical admixtures, provided the admixture treated concrete has the same or lower water-to-cementitious ratio and does not exhibit segregation or excessive bleeding. Request approval to increase slump limits in advance for proper evaluation by the Engineer.
2. For fiber reinforced concrete, perform slump before addition of fibers.

**Article 421.4.2.6., “Mix Design Options”**, is voided and replaced with the following.

**Option 1.** Replace cement with at least the minimum dosage listed in the Fly Ash MPL for the fly ash used in the mixture. Do not replace more than 50% of the cement with fly ash.

**Option 2.** Replace 35% to 50% of the cement with slag cement.

**Option 3.** Replace 35% to 50% of the cement with a combination of fly ash, slag cement, MFA, metakaolin, or at least 3% silica fume; however, no more than 35% may be fly ash, and no more than 10% may be silica fume.

**Option 4.** Use Type IP, Type IS, or Type IT cement as allowed in Table 8 for each class of concrete. Up to 10% of a Type IP, Type IS, or Type IT cement may be replaced with fly ash, slag cement, or silica fume. Use no more than 10% silica fume in the final cementitious material mixture if the Type IT cement contains silica fume, and silica fume is used to replace the cement.

**Option 5.** Option 5 is left intentionally blank.

**Option 6.** Use a lithium nitrate admixture at a minimum dosage determined by testing conducted in accordance with Tex-471-A. Before use of the mix, provide an annual certified test report signed and sealed by a licensed professional engineer, from a laboratory on the Department's MPL, certified by the Construction Division as being capable of testing according to Tex-471-A.

**Option 7.** Ensure the total alkali contribution from the cement in the concrete does not exceed 3.5 lb. per cubic yard of concrete when using hydraulic cement not containing SCMs calculated as follows:

$$\text{lb. alkali per cu. yd.} = \frac{(\text{lb. cement per cu. yd.}) \times (\% \text{ Na}_2\text{O equivalent in cement})}{100}$$

In the above calculation, use the maximum cement alkali content reported on the cement mill certificate.

**Option 8.** Use Table 10 when deviating from Options 1–3 or when required by the Fly Ash MPL. Perform required testing annually and submit results to the Engineer. Laboratories performing ASTM C1260, ASTM C1567, and ASTM C1293 testing must be listed on the Department's MPL. Before use of the mix, provide a certified test report signed and sealed by a licensed professional engineer demonstrating the proposed mixture conforms to the requirements of Table 10.

Provide a certified test report signed and sealed by a licensed professional engineer, when HPC is required, and less than 20% of the cement is replaced with SCMs, demonstrating ASTM C1202 test results indicate the permeability of the concrete is less than 1,500 coulombs tested immediately after either of the following curing schedules:

- Moisture cure specimens 56 days at 73°F.
- Moisture cure specimens 7 days at 73°F followed by 21 days at 100°F.

**Table 10**  
**Option 8 Testing and Mix Design Requirements**

Scenario	ASTM C1260 Result		Testing Requirements for Mix Design Materials or Prescriptive Mix Design Options
	Mix Design Fine Aggregate	Mix Design Coarse Aggregate	
<b>A</b>	> 0.10%	> 0.10%	Determine the dosage of SCMs needed to limit the 14-day expansion of each aggregate <sup>1</sup> to 0.10% when tested individually in accordance with ASTM C1567.
<b>B</b>	≤ 0.10%	≤ 0.10%	Use the minimum replacement listed in the Fly Ash MPL, or When Option 8 is listed on the MPL, use a minimum of 40% fly ash with a maximum CaO <sup>2</sup> content of 25%, or Use any ternary combination which replaces 35% to 50% of cement.
	≤ 0.10%	ASTM C1293 1 yr. Expansion ≤ 0.04%	Use a minimum of 20% of any fly ash; or Use any ternary combination which replaces 20% to 50% of cement.
<b>C</b>	≤ 0.10%	> 0.10%	Determine the dosage of SCMs needed to limit the 14-day expansion of coarse and intermediate <sup>1</sup> aggregate to 0.10% when tested individually in accordance with ASTM C1567.
<b>D</b>	> 0.10%	≤ 0.10%	Use the minimum replacement listed in the Fly Ash MPL, or When Option 8 is listed on the MPL, use a minimum of 40% fly ash with a maximum CaO <sup>2</sup> content of 25%, or Use any ternary combination which replaces 35% to 50% of cement.
	> 0.10%	ASTM C1293 1 yr. Expansion ≤ 0.04%	Determine the dosage of SCMs needed to limit the 14-day expansion of each fine aggregate to 0.10% when individually tested in accordance with ASTM C1567.

1. Intermediate size aggregates will fall under the requirements of mix design coarse aggregate.
2. Average the CaO content from the previous ten values as listed on the test certificate.

**Article 421.4.2.7., "Optimized Aggregate Gradation (OAG) Concrete,"** the first sentence of the first paragraph is voided and replaced by the following.

The gradations requirements in Table 4 and Table 6 do not apply when OAG concrete is specified or used by the Contractor unless otherwise shown on the plans.

The fineness modulus for fine aggregate listed in Table 5, does not apply when OAG Concrete is used,

**Article 421.4.6.2., “Delivering Concrete,”** the third paragraph is supplemented by the following.

When truck mixers are equipped with automated water or chemical admixture measurement and slump or slump flow monitoring equipment, the addition of water or chemical admixtures during transit is allowed. Reports generated by this equipment must be submitted to the Engineer daily.

**Article 421.4.6.2., “Delivering Concrete,”** the fifth paragraph is voided and replaced with the following. Begin the discharge of concrete delivered in truck mixers within the times listed in Table 14. Concrete delivered after these times, and concrete that has not begun to discharge within these times will be rejected

**Article 421.4.8.3., “Testing of Fresh Concrete,”** is voided and replaced with the following.

**Testing Concrete.** The Engineer, unless specified in other Items or shown on the plans, will test the fresh and hardened concrete in accordance with the following methods:

- Slump. [Tex-415-A](#);
- Air Content. [Tex-414-A](#) or [Tex-416-A](#);
- Temperature. [Tex-422-A](#);
- Making and Curing Strength Specimens. [Tex-447-A](#);
- Compressive Strength. [Tex-418-A](#);
- Flexural Strength. [Tex-448-A](#); and
- Maturity. [Tex-426-A](#).

Flexural strength and maturity specimens will not be made unless specified in other items or shown on the plans.

Concrete with slump less than minimum required after all addition of water withheld will be rejected, unless otherwise allowed by the Engineer. Concrete with slump exceeding maximum allowed may be used at the contractor’s option. If used, Engineer will make, test, and evaluate strength specimens as specified in Article 421.5., “Acceptance of Concrete.” Acceptance of concrete not meeting air content or temperature requirements will be determined by Engineer. Fresh concrete exhibiting segregation and excessive bleeding will be rejected.

**Article 421.4.8.3.1. “Job-Control Testing,”** is voided and not replaced.

# Special Provision to Item 426

## Post-Tensioning



Item 426, "Post-Tensioning" of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

**Section 2.1., "Prestressing Steel."** The first bullet is voided and replaced with the following.

- Seven-wire steel strand meeting [DMS-4500](#), "Steel Strand, Uncoated Seven-Wire Low Relaxation for Prestressed Concrete," or

**Section 2.2., "Post-Tensioning System."** The second bulleted item is voided and replaced with the following:

- Provide pre-packaged grouts in accordance with [DMS-4670](#), "Grouts for Post-Tensioning." Do not use grouts that exceed the manufacturers' recommended shelf life or 6 mo. after date of manufacture, whichever is less.

**Section 4.2., "Required Submittals."** The section is voided and replaced with the following.

4.2. **Required Submittals.** Submit information required in this Section for post-tensioned elements, in addition to forming and falsework plans required by Item 420, "Concrete Substructures," and Item 424, "Precast Concrete Structural Members (Fabrication)." Include all necessary construction information in these submittals for cast-in-place and precast construction including, but not limited to the information required in this Section.

4.2.1. **Design Calculations.** Provide design procedures, coefficients, allowable stresses, tendon spacing, and clearances in accordance with the AASHTO LRFD *Bridge Design Specifications* and PTI/ASBI M50 unless otherwise shown on the plans. Submit enough calculations to support the proposed system and method of post-tensioning including friction loss diagrams. When the required jacking force for a particular type of tendon, duct, and configuration is furnished on the plans, design calculations are not required except to adjust for conditions different from those shown on the plans.

4.2.2. **Post-Tensioning Details.** Provide drawings with details that meet the requirements of PTI/ASBI M50 and this Specification.

4.2.3. **Grouting Plan.** Submit for approval written grouting procedures at least four weeks before the start of the element's construction. Include items required by PTI M55.

Include the names of people responsible for PT installation and grouting operations, with the foreman of each grouting crew certified as a PTI Level 2 Bonded PT Field Specialist and ASBI Certified Grouting Technician.

4.2.4. **Stressing Safety Plan.** Provide a plan to protect the public, workers, and Department personnel on and around the vicinity where post-tensioning operations are occurring.

Submit for approval, a detailed safety plan which identifies potential risk associated with post-tensioning operations, including but not limited to:

- tendon alignment,
- temporary shoring,
- ram operations, and
- stand anchorage.

**Section 4.3., “Design Calculations.”** The section is voided and replaced with the following.

- 4.3. **Packaging, Storing, and Handling of Post-Tensioning Components.** Package, store, and handle post-tensioning steel, grout, duct, and other accessories in accordance with PTI/ASBI M50 and PTI M55 unless otherwise indicated. Acceptance and rejection criteria for strand will follow PTI/ASBI M50 and PTI M55.

The following exceptions apply:

- grout storage onsite will be limited to 30 days unless approval by the Engineer is given in advance of material delivery,
- install grout caps and ensure vents are closed at all times so that water and other contaminants cannot enter the duct before strand installation, and
- do not flush ducts at any time.

**Section 4.4., “Packaging, Storing, and Handling of Post-Tensioning Components.”** The section is voided and replaced with the following.

- 4.4. **Duct and Prestressing Steel Installation for Post-Tensioning.** Follow PTI/ASBI M50 for duct and prestressing steel installation procedures and requirements unless otherwise specified. Verify that concrete strength requirements on the plans are met for stressing and staged loading of post-tensioned structural elements.

Stress the tendons within seven days of installing the strand in the ducts unless otherwise approved in advance. Follow the tensioning procedure noted in the approved post-tensioning details.

**Section 4.5., “Duct and Prestressing Steel Installation for Post-Tensioning.”** The section is voided and replaced with the following.

- 4.5. **Grouting.** Grout in accordance with PTI M55.

Grout within 14 days of tendon stressing unless otherwise specified or approved. Obtain approval to extend the grouting time before stressing tendons.

Do not allow the grout temperature to exceed 85°F during mixing and pumping. Do not grout when the ambient temperature is below 35°F. Field-test the grout in accordance with Table 1 during grout installation. Perform field-testing by trained personnel at the Contractor’s expense while witnessed by the Engineer. Pump at the lowest pressure possible that will maintain a continuous flow of grout.

**Table1**  
**Requirements for Field-Testing of Grout**

Test	Frequency	Requirement
Schupak Pressure Bleed Test (ASTM C1741)	1 per day	Per <a href="#">DMS-4670</a>
Fluidity test ( <a href="#">Tex-437-A</a> , Method 2)	2 every 2 hr. 2 min. per day	per <a href="#">DMS-4670</a>
Compressive Strength test (3" × 6" cylinders)	1 per day	per <a href="#">DMS-4670</a>
Mud Balance test ( <a href="#">Tex-130-E</a> , Part II) <sup>1,2</sup>	2 per day	per <a href="#">PTI M55</a>

1. Take one sample from the mixer and one sample from the farthest duct outlet.
2. Verify wet density is within the range established by the department.

**Section 4.6., “Grouting.”** The section is voided and not replaced.

**Article 5., “MEASUREMENT AND PAYMENT.”** The section is voided and replaced with the following.

5. **MEASUREMENT**

This Item will be measured by the each PT element or member. An element or member is defined by one of the following individual components.

- PT Cap

- PT Column
- PT Bent
- Other elements shown in the plans.

The PT may extend into other elements which is subsidiary to the main element being post-tensioned.

6.

#### **PAYMENT**

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "PT" for the member type shown on the plans. This price is full compensation for submittals, mock-ups, prestressing steel, post-tensioning, ducts, grout fittings, grout, end anchorages, bearing plates, equipment, labor, materials, tools, and incidentals. Materials furnished for testing will not be paid for directly.

Post-tensioning of precast members, tensioned at a fabrication plant, will not be paid for directly but will be subsidiary to pertinent Items.

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## Special Provision to Item 427

### Surface Finishes for Concrete

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Item 427, "Surface Finishes for Concrete" of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

**Article 427.2.1 "Coatings,"** is supplemented with the following:

**Epoxy Waterproofing.** Provide Type X Epoxy per [DMS-6100](#) "Epoxies and Adhesives." Match color of coating with Federal Standard 595C color 35630, concrete gray, unless otherwise shown on the plans.

**Article 427.4.2.2 "Application,"** is supplemented with the following:

**Epoxy Waterproofing.** Mix epoxy per manufacturer's instructions. Apply the coating on a dry surface at a maximum application rate of 100 sq. ft per gallon. Apply a thin uniform film of mixed epoxy to the substrate by the use of a short nap roller or brush. The epoxy may be sprayed following the thinning requirements of the manufacturer. No more than 15% reduction is permitted.

Match the color of the applied coating with the color standard shown on the plans. Apply when ambient temperature is between 50°F and 100°F.

**Article 427.6 "Payment,"** the second paragraph is voided and replaced in its entirety with:

When a surface finish for concrete is specified as a pay item, the work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Adhesive Grout Finish," "Concrete Paint Finish," "Opaque Sealer Finish," "Silicone Resin Paint Finish," "Epoxy Waterproof Finish," or "Blast Finish." This price is full compensation for materials; cleaning and preparing surfaces; application of materials; and equipment, labor, tools, and incidentals.



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# Special Provision to Item 440

## Reinforcement for Concrete

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Item 440, "Standard Specification Title" of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

**Article 440.2., "Materials"** is supplemented with the following:

- 2.14. Provide zinc-coated, hot-dip galvanized Class I or II steel reinforcement conforming to ASTM A767, Grades 60 or 75 when shown on the plans and as allowed.
- 2.15. Provide continuously hot-dip galvanized reinforcement (CGR) conforming to ASTM A1094 steel reinforcement, Grades 60 or 75 when shown on the plans and as allowed.

**Article 440.2.5., "Weldable Reinforcing Steel"** is supplemented with the following:

All welding operations must be performed prior to hot-dip galvanizing.

**Article 440.2.8., "Mechanical Couplers"** is supplemented with the following:

Provide hot-dipped or mechanically galvanized couplers when splicing galvanized reinforcing or continuously galvanized reinforcing.

**Article 440.2.11., "Low-Carbon, Chromium Reinforcing Steel."** The first sentence is voided and replaced by the following:

Provide deformed steel bars conforming to ASTM A1035, Grade 100, Type CS when low-carbon, chromium reinforcing steel is required on the plans. Type CM will only be permitted if specified on the plans.

**Article 440.3.1., "Bending"** is supplemented with the following:

Do not bend hot-dip galvanized reinforcement. Only minor positioning adjustments are permitted.

Bending of continuously galvanized reinforcement is permitted after galvanizing.

**Article 440.3.5, "Placing"** the following will be added to paragraph four.

Use Class 1 or 1A supports with continuously galvanized reinforcing. Provide epoxy or plastic-coated tie wires and clips for use with epoxy coated reinforcing steel.

**Article 440.3.6.3., "Repairing Coating"** is supplemented with the following:

Repair damaged galvanized surfaces in accordance with Article 445.3.5.2. "Repair Processes."

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# Special Provision to Item 441

## Steel Structures

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Item 441, "Steel Structures" of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

**Section 441.2.2., "Approved Electrodes and Flux-Electrode Combinations,"** is voided and replaced with the following:

Use only electrodes and flux-electrode combinations conforming to AWS A5 specifications, and pertinent classifications for the applicable welding processes. When requested, submit a current Certificate of Conformance (COC) containing all test results as required by the applicable AWS A5 specification and welding code. Provide proof of Buy America compliance for welding consumables when requested. For bridge main member fabrication, submit the COC annually.

**Section 441.2.3., "High-Strength Bolts,"** is revised and replaced by the following:

Use fasteners that meet Item 447, "Structural Bolting." Use galvanized fasteners on field connections of bridge members when ASTM F3125-Grade A325 bolts are specified, and steel is painted.

**Section 441.3.1.5.1., "Plants,"** The second and third paragraphs are voided and replaced with the following:

Fabrication plants that produce the following non-bridge steel members must be approved in accordance with DMS-7380, "Steel Non-Bridge Member Fabrication Plant Qualification."

- Item 610, "Roadway Illumination Poles"
- Item 613, "High Mast Illumination Poles"
- Item 614, "High Mast Rings and Support Assemblies"
- Item 650, "Overhead Sign Support Structures"
- Item 654, "Sign Walkways"
- Item 686, "Traffic Signal Poles"
- Special Specification 6064, "Intelligent Transportation System (ITS) Poles."

The Materials and Tests Division (MTD) maintains a list of approved non-bridge fabrication plants on the Department MPL that produce these members.

**Section 441.3.1.6.1., "Erection Drawings,"** the third paragraph is voided and replaced with the following:

Perform erection engineering evaluation of the structural adequacy and stability of constructing the bridge system for each step of the steel erection.

**Section 441.3.1.5.3., "Nondestructive Testing (NDT),"** is voided and replaced with the following:

Personnel performing NDT must be qualified in accordance with the applicable AWS code and the employer's Written Practice. Level III personnel who qualifies Level I and Level II technicians must be certified by ASNT for which the NDT Level III is qualified. In addition, NDT technicians must pass hands-on tests that MTD administers. This will remain current provided they continue to perform testing on Department materials as evidenced by test reports requiring their signature. A technician who fails any of the hands-on tests must wait 3 mo. or as approved otherwise before retesting. Qualification to perform NDT will be revoked when the technician's employment is terminated or when the technician goes 6 mo. without performing a test on a Department project. The technician must pass a new hands-on test to be re-certified. Testing of similar weld joints for non-Department projects may be considered by the Engineer instead of re-testing provided enough documentation is submitted with the signature of the project's Engineer. These requirements also apply to testing agencies, and individual third-party contractors.

**Section 441.3.1.5.4., “Welding Procedure Specification Qualification Testing,”** is voided and replaced by the following:

For Fabricators qualified in accordance with DMS-7370, DMS-7380, or DMS-7395, laboratories performing procedure qualification testing for welding procedure specifications (WPSs) must be accredited by a nationally recognized agency that performs testing in accordance with ISO/International Electrotechnical Commission (IEC) 17025 in the mechanical field of testing.

**Section 441.3.1.9., “Material Identification,”** is amended to include the following paragraph:

Low-stress stencil marks must have a radius instead of a sharp point. Acceptable stencils include dot, vibration, and rounded-V stencils. Label these stencils so that they are easily distinguishable from other stencils that are not low-stress.

**Section 441.3.2.4.1., “Flange Tilt,”** the last sentence is voided and replaced with the following:

Minor jacking that does not deform the material will be permitted.

**Section 441.3.2.5.3., “Magnetic Particle Testing,”** is voided and replaced with the following:

Use alternating current (AC) when using the yoke method unless otherwise approved. Welds may be further evaluated with half-wave rectified DC for subsurface indications. Centerline cracking may be detected with aluminum prod method when approved.

**Section 441.3.5.8., “Hammering,”** is added to state the following:

Do not perform hammering on any portion of the member that causes the material to permanently deform. Avoid damage to the material by measures such as use of brass or aluminum hammers or by padding the area to be hammered.

**Section 441.3.8.1., “Shop Painting,”** is amended to include with the following paragraph:

Measure the anchor profile after blast cleaning at random locations along the thermal cut surfaces. If specified anchor profile is not achieved over the entire flame cut surface, grind the edges and re-blast to achieve the required anchor pattern.

**Section 441.3.9., “Handling and Storage of Materials,”** The second sentence of the second paragraph is replaced by the following:

Keep materials clean and avoid damaging of the applied coating.

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## Special Provision to Item 442

### Metal for Structures

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Item 442, "Metal for Structures" of the Standard Specifications is amended with respect to the clause cited below. No other clauses or requirements of this Item are waived or changed.

**Section 442.2.1.3.3., "Fasteners."** The first sentence of the first paragraph is replaced by the following:

**Fasteners.** Provide high-strength bolts that meet ASTM F3125-Grade A325 unless otherwise shown on the plans.

**Section 442.2.1.3.3., "Fasteners."** The third paragraph is deleted and not replaced.

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## Special Provision to Item 448

### Structural Field Welding

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Item 448, "Structural Field Welding" of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

**Article 448.2., "Materials,"** the third paragraph is voided and replaced with the following:

Use only electrodes and flux-electrode combinations conforming to AWS A5 specifications and pertinent classifications for the applicable welding processes. When requested, submit a current Certificate of Conformance (COC) containing acceptable wording indicating Buy America compliance and all tests required by the applicable AWS specifications and welding codes. Tests must be conducted on electrodes of the same class, size, and brand; and manufactured by the same process and with the same materials as the electrodes to be furnished.

# Special Provision to Item 449

## Anchor Bolts



Item 449, "Anchor Bolts" of the Standard Specifications is amended with respect to the clause cited below. No other clauses or requirements of this Item are waived or changed.

**Section 449.2.1., "Bolts and Nuts."** Table 1 is replaced by the following:

Table 1  
Bolt and Nut Standards

Specified Anchor Bolt Category	Bolt Standards	Nut Standards
Mild steel	ASTM A307 Gr. A, F1554 Gr. 36, or A36	ASTM A563
Medium-strength, mild steel	ASTM F1554 Gr. 55 with supplementary requirement S1	ASTM A194 Gr. 2 or A563 Gr. D or better
High-strength steel	ASTM F3125-Grade A325 or ASTM A449 <sup>1</sup>	ASTM A194 or A563, heavy hex
Alloy steel	ASTM A193 Gr. B7 or F1554 Gr. 105	ASTM A194 Gr. 2H or A563 Gr. DH, heavy hex

1. If headed bolts are specified, ASTM A449 bolts must be heavy hex head.

**Section 449.3.3.1, "Anchor Bolt Thread Lubricant Coating,"** The first sentence of the first paragraph is voided and replaced by the following.

Coat anchor bolt threads before installing nuts with an electrically conducting lubricant compound described in Section 449.3.3.2.1., "Definitions," for traffic signal poles, roadway illumination poles, high mast illumination poles, intelligent transportation system poles, overhead sign support structures, and steel electrical service supports.

**Section 449.3.3.2, "Anchor Bolt Tightening Procedure,"** The first sentence of the first paragraph is voided and replaced by the following.

Tighten anchor bolts for traffic signal poles, shoe base and concrete traffic barrier base roadway illumination poles, high mast illumination poles, intelligent transportation system poles, and overhead sign support structures in accordance with this Section.

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## Special Provision to Item 502

### Barricades, Signs and Traffic Handling

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Item 502, "Barricades, Signs and Traffic Handling" of the Standard Specifications, is hereby amended with respect to the clauses cited below, and no other clauses or requirements of this Item are waived or changed hereby.

**Article 502.1., "Description,"** is supplemented by the following:

Temporary work-zone (TWZ) traffic control devices manufactured after December 31, 2019, must have been successfully tested to the crashworthiness requirements of the 2016 edition of the Manual for Assessing Safety Hardware (MASH). Such devices manufactured on or before this date and successfully tested to NCHRP Report 350 or the 2009 edition of MASH may continue to be used throughout their normal service lives. An exception to the manufacture date applies when, based on the project's date of letting, a category of MASH-2016 compliant TWZ traffic control devices are not approved, or are not self-certified after the December 31, 2019, date. In such case, devices that meet NCHRP-350 or MASH-2009 may be used regardless of the manufacture date.

Such TWZ traffic control devices include: portable sign supports, barricades, portable traffic barriers designated exclusively for use in temporary work zones, crash cushions designated exclusively for use in temporary work zones, longitudinal channelizers, truck and trailer mounted attenuators. Category I Devices (i.e., lightweight devices) such as cones, tubular markers and drums without lights or signs attached however, may be self-certified by the vendor or provider, with documentation provided to Department or as are shown on Department's Compliant Work Zone Traffic Control Device List.

**Article 502.4., "Payment,"** is supplemented by the following:

Truck mounted attenuators and trailer attenuators will be paid for under Special Specification, "Truck Mounted Attenuator (TMA) and Trailer Attenuator (TA)." Portable Changeable Message Signs will be paid for under Special Specification, "Portable Changeable Message Sign." Portable Traffic Signals will be paid for under Special Specification, "Portable Traffic Signals."

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## Special Provision to Item 636 Signs

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Item 636, "Signs" of the Standard Specifications, is hereby amended with respect to the clauses cited below, and no other clauses or requirements of this Item are waived or changed hereby.

**Section 636.3.1, "Fabrication."** is deleted.

**Section 636.3.1.2, "Sheeting Application."** The last sentence of the fourth paragraph is voided and replaced by the following.

Do not splice sheeting or overlay films for signs fabricated with ink or with colored transparent films.



# Special Provision to Item 643

## Sign Identification Decals



Item 643, "Sign Identification Decals," of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

**Article 2. "Materials."** The sign identification decal design shown in Figure 1 and the description for each row in Table 1 are supplemented by the following.

<b>Texas Department of Transportation</b>													
<b>C</b>	<b>Fabrication Date</b>											<b>T</b>	1
J	F	M	A	M	J	J	A	S	O	N	D	D	2
	201		202		203		204		205				3
	0	1	2	3	4	5	6	7	8	9			4
<b>Sheeting MFR - Substrate</b>													
A	B	C	D	E	F	G	H	J	K	L	M		5
<b>Film MFR</b>													
A	B	C	D	E	F	G	H	J	K	L	M		6
<b>Sheeting MFR - Legend</b>													
A	B	C	D	E	F	G	H	J	K	L	M		7
<b>Installation Date</b>													
				0	1	2	3						8
	0	1	2	3	4	5	6	7	8	9			9
J	F	M	A	M	J	J	A	S	O	N	D		10
	201		202		203		204		205				11
	0	1	2	3	4	5	6	7	8	9			12
<b>Name of Sign Fabricator Physical Address City, State, Zip Code</b>													13

**Figure 1**  
**Decal Design (Row numbers explained in Table 1)**

**Table 1**  
**Decal Description**  
**Row Explanation**

<b>1</b>	Sign fabricator
<b>2</b>	Month fabricated
<b>3</b>	First 3 digits of year fabricated
<b>4</b>	Last digit of year fabricated
<b>5</b>	Manufacturer of the sheeting applied to the substrate
<b>6</b>	Film (colored transparent or non-reflective black) manufacturer
<b>7</b>	Manufacturer of the sheeting for the legend
<b>8</b>	Tens digit of date installed
<b>9</b>	Ones digit of date installed
<b>10</b>	Month installed
<b>11</b>	First 3 digits of year installed
<b>12</b>	Last digit of year installed
<b>13</b>	Name of sign fabricator and physical location of sign shop

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## Special Provision to Item 654

### Sign Walkways

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Item 654, "Sign Walkways" of the Standard Specifications, is hereby amended with respect to the clauses cited below, and no other clauses or requirements of this Item are waived or changed hereby.

**Section 654.3.2, "Fabrication."** The following language is added after the first paragraph.

Fabrication plants that produce sign walkways must be approved in accordance with DMS-7380, "Steel Non-Bridge Member Fabrication Plant Qualification." The Construction Division maintains a list of approved sign walkway fabrication plants on the Department's Material Producers List.

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## Special Provision to Item 656

### Foundations for Traffic Control Devices

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Item 656, "Foundations for Traffic Control Devices" of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

**Article 3. "Construction,"** the first paragraph is supplemented by the following:

Ensure the top of the foundation and anchor bolts meet specified requirements in relation to the final grade.

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## Special Provision to Item 680 Highway Traffic Signals

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Item 680, "Highway Traffic Signals" of the Standard Specifications is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

**Article 680.3.1.1.2,"Conduit,"** The fourth sentence of the first paragraph is voided and replaced by the following.

Seal the ends of each conduit with approved sealant, after all cables and conductors are installed.

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# Special Provision to Special Specification 6064 Intelligent Transportation System (ITS) Pole with Cabinet

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Special Specification 6064, "Intelligent Transportation System (ITS) Pole with Cabinet" is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

**Section 6064.3.1., "Anchor Bolts."** The second sentence is voided and replaced with the following:

Galvanize these items in accordance with Item 445, "Galvanizing."

**Section 6064.3.2., "ITS Poles."** Voided and replaced with the following:

**ITS Poles.** Fabricate ITS poles in accordance with the details shown on the plans, this Item, and Item 441, "Steel Structures." Alternate designs are not acceptable unless approved by the Department.

Provide properly fitting components. Provide round, octagonal (8-sided), or dodecagonal (12-sided) pole shafts tapered to the heights shown on the plans.

Permanently mark, at a visible location when erected, ITS pole base plates with the design wind speed. Locate the handholes, as shown on the plans, opposite of the direction of traffic flow.

Permanently mark, at a visible location when erected, ITS pole base plates with the fabrication plant's insignia. Place the mark on the pole base plate adjacent to the handhole access compartment.

Provide circumferential welds only at the ends of the shaft. Provide no more than two longitudinal seam welds in shaft sections. Provide 100% penetration within 6 in. of circumferential base welds and 60% minimum penetration at other locations along the longitudinal seam welds, unless otherwise specified. Use a welding technique that minimizes acid entrapment during later galvanizing. Hot-dip galvanize all fabricated parts in accordance with Item 445, "Galvanizing."

Perform at least 10% ultrasonic testing (UT) of longitudinal seam welds on the pole shafts. Use a Department approved UT procedure to ensure 60% or 85% minimum penetration where specified. Perform testing at a minimum of three locations on each shaft section (at both ends and middle). The minimum length of each test area must be 10 in. If minimum penetration is not achieved in any of the tested areas, test an additional 24 in. beyond the originally selected test areas requiring 60% or 85% penetration. Test the entire shaft seam weld if any locations within the additional 24 in. test areas does not achieve 60% or 85% penetration. Repair the deficient areas with a Department approved repair procedure and retest.

Fabricate air terminal and bracket assembly to serve as a lightning arrester in accordance with ITS pole air terminal details and IEEE standards for lightning protection. Bond air terminal with air terminal bracket via clad weld or other approved bolted connection.

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# Special Provision to Special Specification 6185

## Truck Mounted Attenuator (TMA) and Trailer Attenuator (TA)

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Item 6185, "Truck Mounted Attenuator (TMA) and Trailer Attenuator (TA)" of the Standard Specifications, is hereby amended with respect to the clauses cited below, and no other clauses or requirements of this Item are waived or changed hereby.

**Article 4. "Measurement"**, is voided and replaced by the following:

- 4.1. **Truck Mounted Attenuator/Trailer Attenuator (Stationary).** This Item will be measured by the day. TMA/TAs must be set up in a work area and operational before a calendar day can be considered measurable. A day will be measured for each TMA/TA set up and operational on the worksite.
- 4.2. **Truck Mounted Attenuator/Trailer Attenuator (Mobile Operation).** This Item will be measured by the hour or by the day. The time begins once the TMA/TA is ready for operation at the predetermined site and stops when notified by the Engineer. When measurement by the hour is specified, a minimum of 4 hr. will be paid each day for each operating TMA/TA used in a mobile operation. When measurement by the day is specified, a day will be measured for each TMA/TA set up and operational on the worksite.

# Special Specification 6000

## Illumination Maintenance




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### 1. DESCRIPTION

Maintain, install, repair, or replace the various appurtenances related to existing illumination systems.

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### 2. LICENSES AND CERTIFICATION

Provide personnel with electrical licensing and electrical certification in accordance with Item 7, "Legal Relations and Responsibilities," and all applicable Special Provisions to Item 7, "Legal Relations and Responsibilities."

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### 3. MATERIALS

Unless otherwise noted on the plans, the Department will furnish luminaires, luminaire poles, mast arms, anchor bolts, and transformer bases. Assume responsibility for all materials furnished by the Department. Use material furnished by the Department for this contract only.

Furnish all materials required to repair breaks or shorts in electrical conductors and cables, including, but not be limited to, all concrete, ground boxes, wire mesh, conduit, conductors, and pipe casing. Ensure materials furnished by the Contractor meet all Department standards and specification requirements.

Return unused or removed salvageable material to the Department upon completion of work and before final payment, at the location shown on the plans or as directed. Dispose of any unsalvageable material in accordance with federal, state, and local regulations.

When performing maintenance on luminaires, verify if fixtures are covered under the manufacturer's warranty. If warranty applies, coordinate with the Department and follow any necessary procedures to have the manufacturer replace or repair fixtures.

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### 4. EQUIPMENT

Furnish all equipment, tools and machinery necessary for the proper prosecution of the work. This will include, but is not limited to, an aerial device capable of reaching, installing and erecting all overhead lights and poles, trenching machine, boring machine, underground conductor detectors, underground fault detectors and splicing tools.

Ensure equipment, tools, and machinery is at the worksite and is in good repair and operating condition before beginning work. Immediately repair or replace any equipment that may affect the quality of the work, as directed.

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### 5. WORK METHODS

Conform to the latest edition of the National Electric Code (NEC) as adopted by the Texas Department of Licensing and Regulations, local utility requirements, the requirements of this Item, and the pertinent requirements of the following Items:

- Item 104, "Removing Concrete"
- Item 400, "Excavation and Backfill for Structures"
- Item 416, "Drilled Shaft Foundations"



- Item 421, "Hydraulic Cement Concrete"
- Item 431, "Pneumatically Placed Concrete"
- Item 432, "Riprap"
- Item 440, "Reinforcing Steel"
- Item 476, "Jacking, Boring or Tunneling Pipe or Box"
- Item 610, "Roadway Illumination Assemblies"
- Item 613, "High Mast Illumination Poles"
- Item 614, "High Mast Illumination Assemblies"
- Item 616, "Performance Testing of Lighting Systems"
- Item 618, "Conduit"
- Item 620, "Conductors"
- Item 621, "Tray Cable"
- Item 622, "Duct Cable"
- Item 624, "Ground Boxes"
- Item 627, "Treated Timber Poles"
- Item 628, "Electrical Services"
- Item 652, "Highway Sign Lighting Fixtures"

Perform work on this contract as directed. Maintain existing roadway illumination systems as directed. Perform a monthly inspection to determine if any maintenance of the illumination system are needed and provide a detailed report to the Engineer. Provide proper maintenance or repairs within 48 hr. of notification. Submit completed maintenance log as directed. Coordinate electric power issues with local utility company.

The term "duct cable" as used herein consists of a complete assembly of conductors enclosed in a high density polyethylene duct.

Perform maintenance, installation, removal, or replacement activities located near any overhead or underground utilities using established industry and utility safety practices. Consult with the appropriate utility company before beginning such work.

Maintain, install, repair or replace the following items in accordance with the details as shown on the plans, the NEC and as directed:

5.1. **Conduit.** Install, remove, or replace conduits in accordance with Item 618, "Conduit." Use 90° "sweep" type elbows on conduits entering a ground box or foundation.

5.2. **Electrical Conductors.** Install, remove, or replace electrical conductors in accordance with Item 620, "Electrical Conductors."

Strap cable as required when installing or replacing conductors in aerial runs. This work is subsidiary to this Item.

5.3. **Tray Cable.** Install, remove, or replace tray cable in accordance with Item 621, "Tray Cable."

5.4. **Duct Cable.** Install, remove, or replace duct cable in accordance with Item 622, "Duct Cable."

5.5. **Conduit or Duct Cable Repair and Conductor Splices.** Notify the Engineer when an underground break in duct cable or conduit must be located or if a short in a conductor must be located.

Expose the break or short, install the ground box, repair the conduit or duct cable, perform the electrical splices, and backfill. Backfill in accordance with the construction methods of Item 400, "Excavation and Backfill for Structures." New ground boxes will be paid for under, "Install Ground Box."

When a ground box is not needed, expose the break or short, repair conduit or duct cable, remove damaged conductors, and install new conductors. Replace up to 3 ft. of conduit when repairing duct cable, regardless of the number of conduits in trench. Only one repair will be considered for payment per trench. If more than 3 ft. of conduit or duct cable needs to be replaced the additional will be paid for under "Replace Underground Conduit" or "Replace Duct Cable." Replacement of conductors will be paid for under "Install or Replace Conductor." Backfill in accordance with the construction methods of Item 400, "Excavation and Backfill for Structures."

An electrical splice will include the replacement of up to 3 ft. of conductor, regardless of the number of conductors in the conduit. Only one splice will be considered for payment per conduit. If more than 3 ft. of conductor needs to be replaced the additional will be paid for under "Install or Replace Conductor."

Above-ground conduit repairs performed in conjunction with a bid item will be considered subsidiary to the pertinent bid item. Above-ground conduit repairs not performed in conjunction with a bid item will include the replacement of up to 3 ft. of conduit per repair. If more than 3 ft. of conduit must be replaced, the additional will be paid for under "Replace Above-Ground Conduit."

- 5.6. **Bore Operations.** Place underground wiring under roadways by boring in accordance with the construction methods for boring as outlined in Item 476, "Jacking, Boring or Tunneling Pipe or Box." Bore a minimum of 60 in. below the roadway surface (and a minimum of 36 in. below the ditch flow-line) and extend 10 ft. outside the edge of the roadway or as directed. Placement of conduit for the length of the bore will be considered subsidiary to this bid item. Electrical conductors will be paid for under the bid item "Install or Replace Conductor."
- 5.7. **Install, Remove, or Replace Roadway Illumination Assembly.** Install, remove, or replace roadway illumination assemblies. This will include the base, pole, luminaire arms, luminaire, and required wiring.
- 5.8. **Install, Remove, or Replace Underpass Luminaire.** Install, remove, or replace underpass luminaires. This will include the luminaire, junction box, mounting hardware, and required wiring.
- 5.9. **Install, Remove, or Replace Induction Fluorescent Fixture.** Install, remove, or replace induction fluorescent fixture.
- 5.10. **Install, Remove, or Replace Luminaire.** Install, remove, or replace luminaire.
- 5.11. **Replace High Mast Luminaires.** Replace high mast luminaires.
- 5.12. **Replace Luminaire Pole.** Replace luminaire pole. Removing and reinstalling existing luminaires and arms is subsidiary to this item.
- 5.13. **Replace Luminaire Arms.** Replace luminaire arms.
- 5.14. **Maintenance of Roadway Illumination.** Maintain roadway illumination assemblies including replacement of lamps, fuses, fuse holder, starting aid, photocells, ballasts, and other work required to keep lights operational. Relevel the fixture. Clean the reflector and inside and outside of lens with an approved cleaning solution.
- 5.15. **Maintenance of High Mast Illumination.** Maintain high mast illumination assemblies including lowering the ring assembly and the replacement of lamps, fuses, fuse holder, starting aid, photocells, ballasts, and other work required to keep lights operational. Re-aim the lights and clean the lenses and reflectors as directed. Clean the reflector and inside and outside of lens with an approved cleaning solution. Maintain mechanical and electrical equipment as directed.
- 5.16. **Maintenance of Overhead Sign Lighting.** Maintain overhead sign lighting for large signs mounted over the roadway including replacing the ballast, lamps, fuses and lamp sockets in order to properly restore the

lighting to satisfactory operation. Install in accordance with the details shown on the plans or as directed. Clean the reflector and inside and outside of lens with an approved cleaning solution.

- 5.17. **Maintenance of Underpass Fixtures.** Maintain HPS underpass fixtures including the replacement of lamps, fuses, fuse holder, starting aid, photocells, ballasts, and other work required to keep lights operational. Relevel the fixture. Clean the reflector and inside and outside of lens with an approved cleaning solution.
- 5.18. **Maintenance of Induction Fluorescent Fixtures.** Maintain induction fluorescent fixtures including the replacement of lamps, fuses, fuse holder, starting aid, photocells, ballasts, and other work required to keep lights operational. Relevel the fixture. Clean the reflector and inside and outside of lens with an approved cleaning solution.
- 5.19. **Scheduled Preventive Maintenance of Roadway Illumination Assembly.** Inspect and perform the following listed items according to the schedule provided by the Engineer:
- Inspect and maintain all foundation anchor bolts, nuts, and washers.
  - Prep and touch up rust spots with cold galvanizing spray.
  - Replace lamp and clean fixtures as directed.
  - Replace ballast as directed.
  - Level fixture.
  - Inspect electrical system.
  - Repair shorts or open circuits.
- 5.20. **Scheduled Preventive Maintenance of High Mast Assembly.** Complete and sign "Luminaire Preventive Maintenance for High Mast Lighting" reports. Fill out forms legibly and completely. List all materials used at each location.
- Inspect and perform the following listed items according to the schedule provided by the Engineer:
- Inspect and fill gearbox lubrication reservoir.
  - Lubricate grease fittings.
  - Adjust brake mechanism to proper torque.
  - Inspect cable drum.
  - Inspect all wire rope and cables for deterioration or wear.
  - Inspect safety lanyard.
  - Lower ring and inspect mechanism.
  - Inspect all foundation anchor bolts, nuts, and washers.
  - Inspect welds around baseplate and ground sleeve for visible cracks.
  - Prep and touch up rust spots with cold galvanizing spray.
  - Replace lamps and clean fixtures as directed.
  - Replace ballasts as directed.
  - Replace aviation warning (obstruction) lamps as directed.
  - Inspect electrical system.
  - Repair short or open circuits as directed.
  - Raise ring to proper position.
- 5.21. **Replace Electrical Services.** Replace electrical services in accordance with Item 628, "Electrical Services."
- 5.22. **Replace Service Pole.** Replace service poles by removing the existing service pole, installing the new pole and related electrical service equipment, installing conduit including the elbow below ground for underground service feed or the weatherhead for overhead service feed, and connecting and installing electrical service. Install in accordance with Item 628, "Electrical Services."
- 5.23. **Install Ground Box.** Install ground boxes in conformance with the details shown on the plans and Item 624, "Ground Boxes." When shown on the plans, provide a Class "A" concrete apron conforming to Item 421,

"Hydraulic Cement Concrete." Place ground box to line and grade as approved. All wiring connections required inside the ground box will be considered subsidiary to this bid item.

- 5.24. **Remove Ground Box.** Remove ground box and fill hole with approved fill to at least 6 in. below conduit level. Remove conductors from conduit back to the point of termination. Uncover enough conduit that 90° bends can be removed and conduit reconnected. Clean conduit as per Item 618, "Conduit," and pull and terminate new conductors. Conduit replaced within 5 ft. of the ground box will be subsidiary to this Item. Cleaning of conduit and pulling of conductors will be paid under "Install or Replace Conductor." Backfill in accordance with the construction methods of Item 400, "Excavation and Backfill for Structures." If more than 5 ft. of conduit or duct cable needs to be replaced the additional will be paid for under "Replace Underground Conduit" or "Replace Duct Cable."
- If applicable, ground box removal includes removing the existing riprap apron.
- 5.25. **Install Foundation.** Install foundation for roadway illumination assemblies as shown on the plans and in accordance with the materials and construction methods outlined in Item 416, "Drilled Shaft Foundations."
- 5.26. **Remove Foundation.** Remove foundations in accordance with Item 610, "Roadway Illumination Assemblies," and Item 104, "Removing Concrete." Backfill in accordance with the construction methods of Item 400, "Excavation and Backfill for Structures."
- 5.27. **Replace Transformer Base.** Replace transformer base in accordance with the plans or as directed. The removal of the pole, mast arm, and luminaire for replacement of the transformer base only will be considered subsidiary to the pertinent bid items.
- 5.28. **Replace Transformer Base Cover.** Replace damaged or missing covers on existing transformer bases.
- 5.29. **Replace Hand Hole Cover.** Replace damaged or missing covers on existing illumination poles.
- 5.30. **Install Ground Rod.** The installation of ground rods will include running a properly sized copper grounding conductor to the ground connection.
- 5.31. **Replace Ballast.** Replace ballast for pole mounted, underpass, sign and wall pack fixtures in accordance with the details shown on the plans or as directed.
- 5.32. **Replace Ballast (High Mast Lighting).** Replace ballast for high mast fixtures.
- 5.33. **Install or Replace Fused Disconnect.** Install or replace fused disconnect.
- 5.34. **Replace Lamp Socket.** Replace lamp socket for pole mounted, underpass, high mast and wall pack fixtures.
- 5.35. **Replace Lamp.** Replace lamps for pole mounted, underpass, sign and wall pack fixtures. Clean the reflector and inside and outside of lens with an approved cleaning solution.
- 5.36. **Replace Lamp (High Mast Lighting).** Replace lamp for individual high mast fixtures. Clean the reflector and inside and outside of lens with an approved cleaning solution.
- 5.37. **Replace Wall Pack Luminaires.** Replace wall pack luminaires on structures, rest areas, maintenance warehouses, and other facilities.
- 5.38. **Replace Lens.** Replace pole mounted, underpass, sign, wall pack or high mast luminaire lenses.
- 5.39. **Replace Wall Pack Guard.** Replace wall pack guard.
- 5.40. **Replace Fuses.** Replace fuses for pole mounted, underpass, sign and wall pack fixtures, and fused disconnects.

- 5.41. **Replace Fuse Holders.** Replace fuse holder for pole mounted, underpass, sign and wall pack fixtures.
- 5.42. **Replace Breakaway Fuse Holders.** Replace breakaway fuse.
- 5.43. **Replace Starting Aid.** Replace starting aid for pole mounted, underpass, sign and wall pack fixtures.
- 5.44. **Replace Photocells and Brackets.** Replace photocells and brackets.
- 5.45. **Replace Control Transformer.** Replace the control transformer.
- 5.46. **Replace Control Circuit.** Replace the control circuit.
- 5.47. **Replace Aviation Warning Fixtures.** Replace the aviation warning (obstruction) fixtures.
- 5.48. **Replace Aviation Warning Lamp.** Replace the aviation warning (obstruction) fixture lamp
- 5.49. **Replace Hand-Off-Auto Switch.** Replace three position Hand-Off-Automatic control switch.
- 5.50. **Replace Contactor.** Replace electromagnetic contactors.
- 5.51. **Replace Meter Bases.** Replace meter bases according to electrical service provider's requirements.
- 5.52. **Replace Time Clocks.** Replace time clocks.
- 5.53. **Replace Breaker Panel.** Replace breaker panel.
- 5.54. **Install or Replace Circuit Breaker.** Install or replace circuit breakers.
- 5.55. **Replace Flexible Power Cable or Cord.** Replace flexible power cable or cord.
- 5.56. **Replace Twist Lock Connectors.** Replace twist lock connectors.
- 5.57. **Replace Safety Lanyard.** Replace safety lanyard.
- 5.58. **Raise and Lower Ring (High Mast Lighting).** Raise and lower ring in order to perform various maintenance and repair items.
- 5.59. **Restrap Existing Conduit.** Restrap existing conduit in accordance with the details shown on the plans or as directed.
- 5.60. **Replace Missing Nuts, Washers, and Other Hardware.** Replace missing nuts washers, and other miscellaneous hardware.
- 5.61. **Troubleshoot for Repairs.** Troubleshoot location as directed to identify work needed for repairs.
- 5.62. **Project Inspections.** Inspect and review the project to determine if any items are in need of repair and provide the Engineer with a list of these items. Make repairs to those items as approved. All repairs will be paid for by their respective pay items.
- 5.63. **Install or Replace Safety Switch.** Install or Replace Safety Switch.
- 5.64. **Replace 5/16 in. Wire Rope.** Replace 5/16 in. wire rope with swaged terminals.
- 5.65. **Replace 3/8 in. Wire Rope.** Replace 3/8 in. wire rope with swaged terminals.
- 5.66. **Replace High Mast Winch.** Replace high mast winch.

- 5.67. **Replace Wire Rope Pulley.** Replace wire rope pulley.
- 5.68. **Replace Electrical Cable Pulley.** Replace electrical cable pulley.
- 5.69. **Install or Replace Access Hole Cover.** Replace damaged or missing access covers on existing high mast poles.
- 5.70. **Replace High Mast Springs.** Replace high mast spring set.
- 5.71. **Remove and Reinstall High Mast Pole for Repairs.** Remove and reinstall high mast pole from the foundation to perform any repairs to internal components.

## 6. MEASUREMENT

This Item will be measured as follows.

- 6.1. **Conduit.** By the foot of conduit installed, removed, or replaced. This will include the installation of all hardware necessary to attach and connect the conduit, and any excavation, backfill and compaction.
- Install Above-Ground Conduit
  - Remove Above-Ground Conduit
  - Replace Above-Ground Conduit
  - Install Underground Conduit
  - Remove Underground Conduit
  - Replace Underground Conduit
- 6.2. **Electrical Conductors.** By the foot of electrical conductor installed, removed, or replaced.
- Install Conductor
  - Remove Conductor
  - Replace Conductor
- 6.3. **Tray Cable.** By the foot of tray cable installed, removed, or replaced.
- Install Tray Cable
  - Remove Tray Cable
  - Replace Tray Cable
- 6.4. **Duct Cable.** By the foot of duct cable installed, removed, or replaced. This will include excavation, backfill, and compaction.
- Install Duct Cable
  - Remove Duct Cable
  - Replace Duct Cable
- 6.5. **Conduit or Duct Cable Repair and Conductor Splices.**
- Install Electrical Splice. By each electrical splice installed per conduit.
  - Repair Above-Ground Conduit. By each conduit location repaired. This will include the installation of all hardware necessary to attach and connect the conduit
  - Repair Underground Conduit. By each conduit location repaired. This will include excavation, placement of conduit, backfill and compaction.
  - Repair Underground Duct Cable. By each duct cable location repaired. This will include excavation, placement of duct cable, backfill and compaction.
- 6.6. **Road Bore.** By the foot of road bore. This will include conduit installed.

- 6.7. **Install, Remove, or Replace Roadway Illumination Assembly.** By each assembly installed, removed, or replaced. This item includes all wiring and hardware connections above the foundation.
- Install Roadway Illumination Assembly (HPS)
  - Remove Roadway Illumination Assembly (HPS)
  - Replace Roadway Illumination Assembly (HPS)
  - Install Roadway Illumination Assembly (LED)
  - Remove Roadway Illumination Assembly (LED)
  - Replace Roadway Illumination Assembly (LED)
- 6.8. **Install, Remove, or Replace Underpass Luminaire.** By each luminaire installed, removed, or replaced.
- Install Underpass Luminaire (HPS)
  - Remove Underpass Luminaire (HPS)
  - Replace Underpass Luminaire (HPS)
  - Install Underpass Luminaire (LED)
  - Remove Underpass Luminaire (LED)
  - Replace Underpass Luminaire (LED)
- 6.9. **Install, Remove, or Replace Induction Fluorescent Fixture.** By each fixture installed, removed, or replaced.
- Install Induction Fluorescent Fixture
  - Remove Induction Fluorescent Fixture
  - Replace Induction Fluorescent Fixture
- 6.10. **Install, Remove, or Replace Luminaire.** By each luminaire installed, removed, or replaced.
- Install Luminaire (HPS)
  - Remove Luminaire (HPS)
  - Replace Luminaire (HPS)
  - Install Luminaire (LED)
  - Remove Luminaire (LED)
  - Replace Luminaire (LED)
- 6.11. **Replace High Mast Luminaires.** By each high mast luminaire replaced.
- 6.12. **Replace Luminaire Pole.** By each pole replaced.
- 6.13. **Replace Luminaire Arms.** By each luminaire arm replaced.
- 6.14. **Maintain Roadway Illumination.** By each luminaire pole maintained.
- 6.15. **Maintain High Mast Illumination.** By each high mast pole maintained.
- 6.16. **Maintain Overhead Sign Lighting.** By each sign light maintained.
- 6.17. **Maintain Underpass Fixture.** By each underpass fixture maintained.
- 6.18. **Maintain Induction Fluorescent Fixture.** By each induction fluorescent fixture maintained.
- 6.19. **Scheduled Preventive Maintenance (Roadway Illumination Assembly).** By each roadway illumination pole. (Replacing lamp and ballast is subsidiary to this bid item.)
- 6.20. **Scheduled Preventive Maintenance (High Mast Assembly).** By each high mast pole regardless of the number of luminaires on the ring. (Replacing lamps and ballast is subsidiary to this bid item.)

- 6.21. **Replace Electrical Service.** By the each electrical service replaced.
- 6.22. **Replace Service Pole (Timber, Steel, or Concrete).** By each service pole replaced.
- Replace Timber Service Pole
  - Replace Steel Service Pole
  - Replace Concrete Service Pole
- 6.23. **Install Ground Box.** By each ground box installed.
- Install Ground Box
  - Install Ground Box w/ Apron
- 6.24. **Remove Ground Box.** By each ground box removed.
- 6.25. **Install Foundation.** By each foundation installed.
- 6.26. **Remove Foundation.** By each foundation removed.
- 6.27. **Replace Transformer Base.** By each base replaced.
- 6.28. **Replace Transformer Base Cover.** By each cover replaced.
- 6.29. **Replace Hand Hole Cover.** By each cover replaced.
- 6.30. **Install Ground Rod.** By each ground rod installed.
- 6.31. **Replace Ballast.** By each ballast replaced.
- 6.32. **Replace Ballast (High Mast Lighting).** By each high mast ballast replaced.
- 6.33. **Install or Replace Fused Disconnect.** By each fused disconnect installed or replaced.
- Install Fused Disconnect
  - Replace Fused Disconnect
- 6.34. **Replace Lamp Socket.** By each lamp socket replaced for pole mounted, underpass, and wall pack fixtures.
- Replace Lamp Socket for pole mounted fixtures
  - Replace Lamp Socket for underpass fixtures
  - Replace Lamp Socket for wall pack fixtures
  - Replace Lamp Socket for high mast fixture
- 6.35. **Replace Lamp.** By each lamp replaced for pole mounted, underpass, and wall pack fixtures.
- Replace Lamp for pole mounted fixtures
  - Replace Lamp for underpass fixtures
  - Replace Lamp for wall pack fixtures
- 6.36. **Replace Lamp (High Mast Lighting).** By each lamp replaced.
- 6.37. **Replace Wall Pack Luminaire.** By each wall pack replaced.
- 6.38. **Replace Lens.** By each lens replaced
- Replace Lens for pole mounted fixture
  - Replace Lens for underpass fixture
  - Replace Lens for wall pack fixture



- Replace Lens for high mast fixture
- 6.39. **Replace Wall Pack Guard.** By each guard replaced.
- 6.40. **Replace Fuse.** By each fuse replaced.
- 6.41. **Replace Fuse Holder.** By each fuse holder replaced.
- 6.42. **Replace Breakaway Fuse Holder.** By each breakaway fuse holder replaced.
- 6.43. **Replace Starting Aid.** By each starting aid replaced.
- 6.44. **Replace Photocell and Bracket.** By each photocell and bracket replaced.
- 6.45. **Replace Control Transformer.** By each transformer replaced.
  - Replace Control Transformer for High Mast
  - Replace Control Transformer for Electrical Service
- 6.46. **Replace Control Circuit.** By each control circuit replaced.
  - Replace Control Circuit for High Mast
  - Replace Control Circuit for Electrical Service
- 6.47. **Replace Aviation Warning Fixture.** By each obstruction fixture replaced.
- 6.48. **Replace Aviation Warning Lamp.** By each obstruction lamp replaced.
- 6.49. **Replace Hand-Off-Auto Switch.** By each H-O-A control switch replaced.
- 6.50. **Replace Contactor.** By each electromagnetic contactor replaced.
- 6.51. **Replace Meter Base.** By each meter base replaced.
- 6.52. **Replace Time Clock.** By each time clock replaced.
- 6.53. **Replace Breaker Panel.** By each breaker panel replaced.
- 6.54. **Install or Replace Circuit Breaker.** By each circuit breaker installed or replaced.
  - Install Circuit Breaker
  - Replace Circuit Breaker
- 6.55. **Replace Flexible Power Cable or Cord.** By foot of cable or cord replaced.
- 6.56. **Replace Twist Lock Connector.** By each twist lock connector replaced.
- 6.57. **Replace Safety Lanyard.** By foot of chain replaced. Associated hardware is considered subsidiary to this item.
- 6.58. **Raise and Lower Ring (High Mast Lighting).** By each ring raised and lowered (not part of scheduled preventive maintenance).
- 6.59. **Restrap Existing Conduit.** By each strap installed.
- 6.60. **Replace Missing Nuts, Washers, and Other Hardware.** By each nut, washer, or miscellaneous hardware replaced.

- 6.61. **Troubleshoot for Repairs.** By the man-hour of troubleshooting.
- 6.62. **Project Inspections.** By the month.
- 6.63. **Install or Replace Safety Switch.** By each safety switch installed or replaced.
- Install Safety Switch
  - Replace Safety Switch
- 6.64. **Replace 5/16 in. Wire Rope.** By each 5/16 in. wire rope with swaged terminals replaced.
- 6.65. **Replace 3/8 in. Wire Rope.** By each 3/8 in. wire rope with swaged terminals replaced.
- 6.66. **Replace High Mast Winch.** By each winch replaced.
- 6.67. **Replace Wire Rope Pulley.** By each wire rope pulley replaced.
- 6.68. **Replace Electrical Cable Pulley.** By each electrical cable pulley replaced.
- 6.69. **Install or Replace Access Hole Cover.** By each access cover installed or replaced.
- Install Access Hole Cover
  - Replace Access Hole Cover
- 6.70. **Replace High Mast Springs.** By each high mast spring set replaced.
- 6.71. **Remove and Reinstall High Mast Pole for Repairs.** By each high mast pole removed and reinstalled.

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## 7. PAYMENT

The work performed and the materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit prices bid for the various designations. This price is full compensation for furnishing all material, equipment, labor, fines, tools, and incidentals necessary to complete the work.

Lane closures will be paid for under Special Specification "Lane Closures."

# Special Specification 6001

## Portable Changeable Message Sign



### 1. DESCRIPTION

Furnish, operate, and maintain portable trailer mounted changeable message sign (PCMS) units.

### 2. MATERIALS

Furnish new or used material in accordance with the requirements of this Item and the details shown on the plans. Provide a self-contained PCMS unit with the following:

- Sign controller
- Changeable Message Sign
- Trailer
- Power source

Paint the exterior surfaces of the power supply housing, supports, trailer, and sign with Federal Orange No. 22246 or Federal Yellow No. 13538 of Federal Standard 595C, except paint the sign face assembly flat black.

2.1. **Sign Controller.** Provide a controller with permanent storage of a minimum of 75 pre-programmed messages. Provide an external input device for random programming and storage of a minimum of 75 additional messages. Provide a controller capable of displaying up to 3 messages sequentially. Provide a controller with adjustable display rates. Enclose sign controller equipment in a lockable enclosure.

2.2. **Changeable Message Sign.** Provide a sign capable of being elevated to at least 7 ft. above the roadway surface from the bottom of the sign. Provide a sign capable of being rotated 360° and secured against movement in any position.

Provide a sign with 3 separate lines of text and 8 characters per line minimum. Provide a minimum 18 in. character height. Provide a 5 × 7 character pixel matrix. Provide a message legibility distance of 600 ft. for nighttime conditions and 800 ft. for normal daylight conditions. Provide for manual and automatic dimming light sources.

The following are descriptions for 3 screen types of PCMS:

- **Character Modular Matrix.** This screen type comprises of character blocks.
- **Continuous Line Matrix.** This screen type uses proportionally spaced fonts for each line of text.
- **Full Matrix.** This screen type uses proportionally spaced fonts, varies the height of characters, and displays simple graphics on the entire sign.

2.3. **Trailer.** Provide a 2 wheel trailer with square top fenders, 4 leveling jacks, and trailer lights. Do not exceed an overall trailer width of 96 in. Shock mount the electronics and sign assembly.

2.4. **Power Source.** Provide a diesel generator, solar powered power source, or both. Provide a backup power source as necessary.

2.5. **Cellular Telephone.** When shown on the plans, provide a cellular telephone connection to communicate with the PCMS unit remotely.

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**3. CONSTRUCTION**

Place or relocate PCMS units as shown on the plans or as directed. The plans will show the number of PCMS units needed, for how many days, and for which construction phases.

Maintain the PCMS units in good working condition. Repair damaged or malfunctioning PCMS units as soon as possible. PCMS units will remain the property of the Contractor.

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**4. MEASUREMENT**

This Item will be measured by each PCMS or by the day used. All PCMS units must be set up on a work area and operational before a calendar day can be considered measurable. When measurement by the day is specified, a day will be measured for each PCMS set up and operational on the worksite.

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**5. PAYMENT**

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Portable Changeable Message Sign." This price is full compensation for PCMS units; set up; relocating; removing; replacement parts; batteries (when required); fuel, oil, and oil filters (when required); cellular telephone charges (when required); software; and equipment, materials, tools, labor, and incidentals.

# Special Specification 6005

## Testing, Training, Documentation, Final Acceptance, and Warranty



### 1. DESCRIPTION

Perform or furnish testing, training, documentation, final acceptance, and warranty on the applicable equipment or systems.

### 2. TESTING

Unless otherwise shown on the plans, perform the following tests on the applicable equipment or systems.

- 2.1. **Test Procedures Documentation.** Provide 5 copies of the test procedures and blank data forms 60 days prior to testing for each test required on this project. Include the sequence of the tests in the procedures. The Engineer will approve test procedures prior to submission of equipment for tests. Conduct all tests in accordance with the approved test procedures.

Record test data on the data forms, as well as quantitative results. Ensure the data forms are signed by an authorized representative (company official) of the equipment manufacturer. Submit 1 copy of the completed and signed data forms for acceptance or rejection of the test or equipment.

- 2.2. **Design Approval Test.** Conduct a Design Approval Test on randomly selected units from the prototype design manufacturing run. If only 1 design prototype is manufactured, perform this test on that unit. If supplying multiple types of the equipment, provide and test a sample of each type.

Certification from an independent testing laboratory of a successfully completed Design Approval Test is acceptable. Ensure that the testing by this laboratory is performed in accordance with the requirements of this specification. Failure of independent tests to comply with the requirements of this specification will be grounds for rejection of any certification.

Notify the Engineer 10 working days before conducting this testing. The Department may witness all the tests. Perform the following tests:

- 2.2.1. **Power Service Transients.** The equipment must meet the performance requirements, specified in the parent specification, when subjected to the power service transients as specified in Section 2.2.7.2, "Transient Tests (Power Service)" of the NEMA TS 2 standard, latest edition.

- 2.2.2. **Temperature and Condensation.** The equipment must meet the performance requirements, specified in the parent specification, when subjected to the following conditions in the order specified below:

- Stabilize the equipment at -30°F and test as specified in Sections 2.2.7.3., "Low-Temperature Low-Voltage Tests" and 2.2.7.4., "Low-Temperature High-Voltage Tests" of the NEMA TS 2 standard, latest edition.
- Allow the equipment to warm up to room temperature in an atmosphere having relative humidity of at least 40%. Operate the equipment for 2 hr., while wet, without degradation or failure.
- Stabilize the equipment at 165°F and test as specified in Sections 2.2.7.5., "High-Temperature High Voltage Tests" and 2.2.7.6, "High-Temperature Low-Voltage Tests" of the NEMA TS 2 standard, latest edition.

- 2.2.3. **Relative Humidity.** The equipment must meet the performance requirements, specified in the parent specification, within 30 min. of being subjected to a temperature of 165°F and a relative humidity of 18% for 48 hr.
- 2.2.4. **Vibration.** The equipment must show no degradation of mechanical structure, soldered components, or plug-in components and must operate in accordance with the manufacturer's equipment specifications after being subjected to the vibration tests as described in Section 2.2.8, "Vibration Test," of the NEMA TS 2 standard, latest edition.
- 2.2.5. **Power Interruption.** The equipment must meet the performance requirements, specified in the parent specification, when subjected to nominal input voltage variations as specified in Section 2.2.10, "Power Interruption Test," of the NEMA TS 2 standard, latest edition.
- 2.3. **Demonstration Test.** Conduct a Demonstration Test on applicable equipment at an approved Contractor facility. Notify the Engineer 10 working days before conducting this testing. The Department may witness all the tests. Perform the following tests:
- 2.3.1. **Examination of Product.** Examine each unit carefully to verify that the materials, design, construction, markings and workmanship comply with the requirements of the parent specification.
- 2.3.2. **Continuity Tests.** Check the wiring to determine conformance with the requirements of the appropriate paragraphs in the parent specification.
- 2.3.3. **Operational Test.** Operate each unit for at least 15 min. to permit equipment temperature stabilization and an adequate number of performance characteristics to ensure compliance with the requirements of the parent specification.
- 2.4. **Stand-Alone Tests.** Conduct a Stand-Alone Test for each unit after installation. The test must exercise all stand-alone (non-network) functional operations. Notify the Engineer 5 working days before conducting this test. The Department may witness all the tests.
- 2.5. **System Integration Test.** Conduct a System Integration Test on the complete functional system. Demonstrate all control and monitor functions for each system component for 72 hr. Supply 2 copies of the System Operations manual before the System Integration Test. Notify the Engineer 10 working days before conducting this testing. The Department may witness all the tests.
- 2.6. **Final Acceptance Test.** Conduct a Final Acceptance Test on the complete functional system. Demonstrate all control, monitor, and communication requirements for 90 days. The Engineer will furnish a Letter of Approval stating the first day of the Final Acceptance Test. The completion of the Final Acceptance Test occurs when system downtime due to mechanical, electrical, or other malfunctions to equipment furnished or installed does not exceed 72 hr. and any individual points of failure identified during the test period have operated free of defects as required in Section 2.7.5., "Consequences of Final Acceptance Test Failure."
- 2.7. **Consequences of Test Failure.** If a unit fails a test, submit a report describing the nature of the failure and the actions taken to remedy the situation prior to modification or replacement of the unit. If a unit requires modification, correct the fault and then repeat the test until successfully completed. Correct minor discrepancies within 30 days of written notice to the Engineer. If a unit requires replacement, provide a new unit and then repeat the test until successfully completed. Major discrepancies that will substantially delay receipt and acceptance of the unit will be sufficient cause for rejection of the unit.
- If a failure pattern develops in similar units within the system, implement corrective measures, including modification or replacement of units, to all similar units within the system as directed. Perform the corrective measures without additional cost or extension of the contract period.
- 2.7.1. **Consequences of Design Approval Test Failure.** If the equipment fails the Design Approval Test, correct the fault and then repeat the Design Approval Test until successfully completed.

- 2.7.2. **Consequences of Demonstration Test Failure.** If the equipment fails the Demonstration Test, correct the fault and then repeat the Demonstration Test until successfully completed.
- 2.7.3. **Consequences of Stand-Alone Test Failure.** If the equipment fails the Stand-Alone Test, correct the fault and then repeat the Demonstration Test until successfully completed.
- 2.7.4. **Consequence of System Integration Test Failure.** If the equipment fails the System Integration Test, correct the fault and then repeat the Systems Integration Test until successfully completed.
- 2.7.5. **Consequences of Final Acceptance Test Failure.** If a defect within the system is detected during the Final Acceptance Test, document and correct the source of failure. Once corrective measures are taken, monitor the point of failure until a consecutive 30 day period free of defects is achieved.

If after completion of the initial test period, the system downtime exceeds 72 hr. or individual points of failure have not operated for 30 consecutive days free of defects, extend the test period by an amount of time equal to the greater of the downtime in excess of 72 hr. or the number of days required to complete the performance requirement of the individual point of failure.

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### 3. TRAINING

When required on the plans, provide a minimum of 24 hr. of instruction to 10 designated personnel in the operation and maintenance procedures of equipment or systems installed. Provide the training during installation, testing, and integration. Provide the training through practical demonstrations, seminars, and other related technical procedures.

Furnish a training session agenda, a complete set of training material (manuals and schematics), and the names and qualifications of proposed instructors for approval 60 days before the training. Provide a training location. Provide 1 copy of the course material for each person. Provide training in the following areas of interest and as shown on the plans:

- The "Hands-on" operation for each type of equipment.
- Explanation of all system commands, their function and usage.
- Required preventative maintenance procedures.
- All equipment servicing procedures.
- System "troubleshooting"/problem identification procedures.

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### 4. DOCUMENTATION

Provide "as-built" documentation for the entire system and all of its individual components. Supply one (1) 11 in. x 17 in. reproducible copy of the wiring diagrams. Supply three (3) copies of the following in a manual for each equipment component:

- Complete and accurate schematic diagrams.
- Complete and accurate cabinet, enclosure, and building wiring diagrams.
- Complete installation procedures.
- Complete performance specifications (functional, electrical, mechanical and environmental) on the unit.
- Complete parts list including names of vendors for parts not identified by universal part numbers such as JEDEC, RETMA, or EIA.
- Pictorial of component layout on circuit board.
- Complete maintenance and trouble-shooting procedures.
- Complete stage-by-stage explanation of circuit theory and operation.
- Complete and detailed system operations manuals.

Furnish additional information as shown on the plans.

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**5. FINAL ACCEPTANCE**

Final acceptance is made when all work is complete, the system has successfully completed all test requirements, and the Engineer, in writing, accepts all work for the work locations in the Contract in accordance with Article 5.12., "Final Acceptance." Final acceptance relieves the Contractor from further Contract responsibilities.

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**6. WARRANTY**

Guarantee equipment furnished and installed to perform according to the manufacturer's published specifications. Warrant equipment against defects or failure in design, materials, and workmanship in accordance with the manufacturer's standard warranty. Supply equipment with no less than 95% of the manufacturer's warranty remaining on the date that equipment invoices are submitted for final payment. Any equipment with less than 95% warranty remaining will be rejected.

The Contractor will warrant or guarantee all such electronic, electrical, and mechanical equipment, materials, technical data, and products furnished and installed for a period of 1 yr. after final acceptance of the project by the Department. The Contractor's warranty or guarantee must provide for the "on-site" repair or replacement, at the Contractor's option, within 2 working days and at no cost to the Department.

Once the Contractor's warranty or guarantee expires, assign to the Department any manufacturer's standard warranty or guarantee coverage still remaining on all such electronic, electrical, and mechanical equipment, materials, technical data, and products furnished for and installed on the project. Repair or replace defective equipment, at the manufacturer's option, at no cost to the Department.

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**7. MEASUREMENT AND PAYMENT**

The work performed, materials furnished, equipment, labor, tools, and incidentals will not be measured or paid for directly but will be considered subsidiary to bid items of the Contract.



# Special Specification 6006

## Electronic Components



### 1. DESCRIPTION

Use electronic components to manufacture electronic equipment.

### 2. MATERIALS AND CONSTRUCTION METHODS

Use electronic components that comply with Electronic Industries Association (EIA) and Joint Electronic Device Engineering Council (JEDEC) Specifications. Provide industry standard electronic components available from several manufacturers. When special monolithic integrated circuits are necessary for cost-effective designs, waiving the multi-source requirements will be as directed.

Design the electronic circuitry to ensure an adjustment range from normal adjustment settings of variable components. Provide a range of adjustment to compensate for composite variations in the associated circuitry due to changes in part values during the normal or specified life of the device. Ensure the range of adjustment can compensate for variations in replacement parts within the specified tolerances. Unless otherwise shown on the plans, design the components to be under operating conditions 24 hr. a day for 10 yr. Derate electronic components by 20% with regard to ambient temperature, applied voltage, and power dissipation.

On electronic components weighing more than 2 oz., use supports other than the component's pins or electrical connectors. Solder electronic components of 2 or more leads in place. Mark the circuit reference symbol next to the component.

Meet the above requirements and satisfy the following specific requirements for the different components:

- 2.1. **Capacitors.** Provide industrial grade capacitors. Insulate the capacitors. Mark capacitors with their capacitance value, working voltage, and polarity.

Provide capacitor encasements resistant to cracking, peeling, and discoloration due to humidity and changes in temperature. Provide electrolytic capacitors capable of operating at least 185°F. Do not use electrolytic capacitors of less than 1.0 microfarad.

Use a clamp or fastener to support a capacitor to avoid damage by shock or vibration. Use a capacitor with a specific ripple or AC voltage rating, if possibly subjected to a ripple voltage in excess of 10% of the actual DC voltage across the capacitor. Use an aluminum electrolytic capacitor only when continually energized.

- 2.2. **Diodes.** If low forward drop is required in logic circuit applications, furnish justification for use of Germanium diodes prior to incorporation in the design. Mark diodes with the JEDEC part number, using an industry approved color code or clearly legible printing. Indicate the diode polarity on the diode case by the use of the diode symbol, by the 360° band on the cathode end, or by the shape of case.

- 2.3. **Indicators.** Use solid-state (LED) indicators with a useful life at least 25,000 hr.

- 2.4. **Integrated Circuits.** Print the manufacturer's part number and any information required to install the integrated circuit assembly upon the package. Test integrated circuits with at least 1 test from each group below:

- 2.4.1. **Group 1:**
- Stabilization Bake
  - Temperature Cycling
  - Power Burn-in
- 2.4.2. **Group 2:**
- Functional test with the device at the manufacturer's maximum specified temperature
  - Static and dynamic test per manufacturer's data sheet
- 2.5. **Potentiometers and Rheostats.** Use industrial grade potentiometers. Use potentiometers with a power rating at least 100% greater than the maximum power requirements of the circuit.
- 2.6. **Printed Circuit Boards.**
- 2.6.1. **Design, Fabrication and Mounting.** Use NEMA Grade G-10 glass epoxy or equivalent for printed circuit boards (refer to NEMA Publications No. L1 1-1982, Industrial Laminated Thermosetting Products). Provide a nominal thickness of 1/32 in. for circuit boards not exceeding 2 in. in any dimension. Provide a nominal thickness of 1/16 in. for circuit boards exceeding 2 in. in any dimension.
- Coat the printed circuit board assembly with a protective coating to combat mildew, moisture, and fungus. Plate the through holes that carry electrical connections from one side of the board to the other. Use 1 oz. per square foot of copper to plate through holes. Use non-corrosive material for electrical mating surfaces.
- Design and fabricate printed circuit boards and the mounting of parts and assemblies in accordance with MIL-STD-275 (latest revision) except as follows:
- Mount semiconductor devices on spacers or transipads if the device dissipates more than 250 mW or if the case temperature will rise 20°F above ambient.
  - Remove residual flux from the printed circuit board.
  - Provide a resistance between any 2 isolated, independent conductor paths of at least 100 megohms when a 500 VDC potential is applied.
- Mark operating circuit components mounted on the circuit boards. Reference the identifying characters to their respective components in the schematic diagram and in the parts list.
- 2.6.2. **Soldering.** Hand solder in accordance with MIL-STD-55110. Use of automatic flow soldering is acceptable.
- 2.7. **Relays.** Install diodes across the coils for transient suppression in DC relays. Provide replaceable relays that do not require special tools for replacement.
- 2.8. **Resistors.** Use fixed composition insulated resistors in accordance with the performance requirements of MIL-R-11. Provide industrial grade resistors with a 15-yr. design life. Mark with their resistance value, using EIA color codes or industry approved marking technique.
- Use resistors with a 10% tolerance or better and a resistance variation of no more than 5% over the temperature range 0°F to 165°F. Do not use resistors with a power rating greater than 2 W unless special ventilation or heat sinking is provided. Insulate these resistors from the printed circuit board.
- 2.9. **Transistors.** Use JEDEC registered transistors. Mark the JEDEC part number on the case. Designate the emitter or collector by use of an industry approved marking technique.
- 2.10. **Transformers.** Mark transformers with the manufacturer's part number on the case or frame, using a Radio-Electronics-Television Manufacturers Association (RETMA) color code or numbered in a manner to facilitate proper installation.

2.11. **Switches.** Derate switch contacts 50% from their maximum current ratings.

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**3. MEASUREMENT AND PAYMENT**

The work performed, materials furnished, equipment, labor, tools, and incidentals will not be measured or paid for directly, but will be subsidiary to the bid items of the Contract.

# Special Specification 6010

## Closed Circuit Television (CCTV) Field Equipment



### 1. DESCRIPTION

Furnish, install, relocate, or remove closed circuit television (CCTV) field equipment at locations shown on the plans, or as directed.

### 2. MATERIALS

2.1. **General Requirements.** Fabricate, provide, assemble, and install materials that are new, corrosion resistant and in strict accordance with the details shown on the plans and in the specifications.

Provide CCTV field equipment that is compatible with software currently in operation in order to interface with the existing equipment and software located in the Department's Traffic Management Control (TMC) Centers across the state.

CCTV field equipment to include the following:

- color video camera units,
- camera lenses, filters, control circuits and accessories,
- camera housing,
- medium duty pan and tilt units with click and drag position control,
- camera control receivers,
- local field control unit (if required for operation),
- video and camera control and power cable connectors and assemblies,
- video, data, and power surge suppression, and
- built-in ID generator.

2.2. **Functional Requirements for Analog CCTV.** Provide color video cameras that are solid state design and that meet the following functional requirements:

2.2.1. **General.**

2.2.1.1. **Digital Signal Processing (DSP):**

- digital zoom with manual override functionality,
- auto and manual iris control,
- auto and manual exposure control with built in frame buffer,
- auto and manual focus control, and
- built-in ID generator, with white letters on black outline minimum or approved equivalent.

2.2.1.2. **Image Pickup Device.** Single chip interline transfer solid state color matrix charge-coupled device (CCD) or complementary metal-oxide semiconductor (CMOS) sensor. Provide a sensor having a minimum of 752 (H) X 480 (V) effective pixels.

2.2.1.3. **Resolution.** Greater than 350 lines vertical and greater than 460 lines horizontal, interlaced 2:1, measured per EIA-170A Standard. No discernible interlace jitter or line pairing on the viewing monitor. System limiting resolution that conforms to FCC regulations for broadcast signals.

2.2.1.4. **Frame Rate.** Adjustable frame rate frequency up to 30 frames per second.

- 2.2.1.5. **Encoded NTSC Video Signal Format.** Conformance to the National Television Standards Committee (NTSC) specification and produce NTSC compatible video in accordance with EIA-170A Standard, governed by the Electronic Components Association (ECA), for video output 1 V p-p composite also known as 140 IRE units per Institute of Radio Engineers (IRE). Provide up to 16 dB automatic gain control (AGC).
- 2.2.1.6. **Output Impedance.** 75 ohms  $\pm$  5%.
- 2.2.1.7. **Aspect Ratio.** Width to height aspect ratio of 4:3.
- 2.2.1.8. **Image Quality.** Ability to produce clear, free from distortion, usable video images of the areas, vehicles, objects, and other subjects visible from a roadside CCTV site. Ensure that video produced by the camera is true, accurate, distortion free, and free from transfer smear, oversaturation, and any other image defect that negatively impacts image quality under all lighting and weather conditions in both color and monochromatic modes.
- 2.2.1.9. **Over Exposure Protection.** Minimize glare and incur no permanent damage to the camera when pointed directly at strong light sources, including the sun, for brief periods of time.
- 2.2.1.10. **Geometric Distortion.** Zero.
- 2.2.1.11. **Signal to Noise Ratio (AGC Off).** 50 dB Minimum (weighted at 4.5 MHz).
- 2.2.1.12. **Electronic Shutter Speed.** Automatic shutter that is user selectable down to at least 1/10,000 sec.
- 2.2.1.13. **Electronic Image Stabilization.** User selectable on or off electronic image stabilization at 5 Hz and 10 Hz minimum.
- 2.2.1.14. **Day (Color) and Night (Mono).** Auto and manual switchover and iris control with user selectable modes for auto and manual control capabilities.
- 2.2.1.15. **Auto White Balance.** Color quality that is maintained by a continuous through the lens automatic white balance for color temperatures from 2850 K to greater than 5100 K with less than 10 IRE units unbalance.
- 2.2.1.16. **Inverted Operation.** Automatic or manual activation image inversion or "flip" operation when rotating through 0° or 180° vertical tilt positions.
- 2.2.1.17. **Mean Time Before Failure.** A minimum of 43,800 hr. or 5 yr. without mechanical malfunction or failure. Act of God failures are exempt.
- 2.2.2. **Lens.** Provide an integral lens assembly for each camera with the following features:
- an f/1.6 or better glass multi-coated zoom lens with variable focal lengths with a minimum 30X zoom range,
  - 10X auto and manual digital zoom minimum, and
  - automatic and manual focus and iris control.
- Provide lenses with capabilities for remote control of the zoom, focus, and iris operations. Mechanical or electrical means provided to protect the motors from overrunning in extreme positions. Lens and controller system capable of both auto iris and remote manual iris operation. Capabilities of lens for auto and manual zoom and focus control. Motorized iris as opposed to auto iris type, for system control capability.
- 2.2.3. **Network Interface Requirements.** Provide equipment that is compatible with the Department's Lonestar™ software and can be integrated into the Department's TMC CCTV control sub-systems through NTCIP 1205 Version 1.08 or latest Department approved version, Open Network Video Interface Forum (ONVIF), or approved equal. Support CoHu, Pelco D, Pelco P protocols, or approved equal for control.

Provide equipment that is compatible with other devices using Telecommunications Industry Association/Electronic Industries Alliance (TIA/EIA)-232 or EIA-422/485 at a rate of 9600 bps.

Provide camera equipment that supports local and remote configuration and management. Configuration and management functions must include access to all user-programmed features, including but not limited to, network configuration, video settings, device monitoring, control setting, and security functions. Configuration and management is achieved through serial login, telnet login, web-based interface, or manufacturer software. Provide manufacturer software with camera for local configuration, system maintenance and management control.

- 2.3. **Functional Requirements for Digital CCTV.** Provide color video cameras that produce digital video in standard definition or high definition that meet the following functional requirements:
- 2.3.1. **General.**
- 2.3.1.1. **Digital Signal Processing (DSP):**
- digital zoom,
  - auto and manual iris control,
  - auto and manual exposure control with built in frame buffer,
  - auto and manual focus control, and
  - built-in ID generator, with white letters on black outline minimum or approved equivalent.
- 2.3.1.2. **Image Pickup Device.** 1.2 megapixel (1,200,000 pixels), or better, progressive scan digital CCD or CMOS sensor.
- 2.3.1.3. **Resolution.** Support the following resolutions:
- 720p (1280 x 720 pixel array),
  - D1 (720 x 480 pixel array),
  - CIF (352 x 240 pixel array), and
  - VGA (640 x 480 pixel array) at a minimum dependent on video stream configuration.
- 2.3.1.4. **Frame Rate.** Allow user selectable frame rates at 30, 15, 7, 4, 2, and 1 frames per second.
- 2.3.1.5. **Data Rate.** Scalable from 64 kbps to 8 Mbps
- 2.3.1.6. **Video Stream Format.** Allow simultaneous encoding and transmission, of a minimum, two configurable digital video streams in conformance with the Moving Picture Experts Group's MPEG-4 part 10 (H.264) and Motion JPEG (MJPEG) video compression technology in accordance with the ISO and IEC requirements detailed in the ISO/IEC 14496-10 standard or most current version. Support configuration of the following at a minimum:
- H.264,
  - MJPEG,
  - H.264 + H.264, and
  - H.264 + MJPEG.
- 2.3.1.7. **Video Stream.** Support both uni-cast (one-to-one) and multi-cast (one-to-many).
- 2.3.1.8. **Aspect Ratio.** Support width to height aspect ratio of 4:3 or 16:9 dependent on TMC monitor video format functionality.
- 2.3.1.9. **Image Quality.** Ensure that video produced by the camera is true, accurate, distortion free, and free from transfer smear, oversaturation, and any other image defect that negatively impacts image quality under all lighting and weather conditions in both color and monochromatic modes.

- 2.3.1.10. **Wide Dynamic Range (WDR).** Operation with manual override option.
- 2.3.1.11. **Over Exposure Protection.** Minimize glare and incur no permanent damage to the camera when pointed directly at strong light sources, including the sun, for brief periods of time.
- 2.3.1.12. **Geometric Distortion.** Zero.
- 2.3.1.13. **Signal to Noise Ratio (AGC Off).** 50 dB minimum (weighted at 4.5 MHz).
- 2.3.1.14. **Electronic Shutter Speed.** Automatic shutter that is user selectable down to at least 1/10,000 sec.
- 2.3.1.15. **Electronic Image Stabilization.** User selectable on or off electronic image stabilization at 5 Hz and 10 Hz minimum.
- 2.3.1.16. **Day (Color) and Night (Mono).** Auto and manual switchover and iris control with user selectable modes for auto and manual control capabilities.
- 2.3.1.17. **Auto White Balance.** Color quality that is maintained by a continuous through the lens automatic white balance for color temperatures from 2850 K to greater than 5100 K with less than 10 IRE units unbalance.
- 2.3.1.18. **Inverted Operation.** Automatic image inversion or "flip" when rotating through 0° or 180° vertical tilt positions when not an integrated unit.
- 2.3.1.19. **Mean Time Before Failure.** A minimum of 43,800 hr. or 5 yr. without mechanical malfunction or failure. Act of God failures are exempt.

2.3.2. **Lens.** Provide an integral lens assembly for each camera with the following features:

- an f/1.6 or better glass multi-coated zoom lens with variable focal lengths with a minimum 18X zoom range,
- 10X auto and manual digital zoom minimum, and
- automatic and manual focus and iris control.

Provide lenses with capabilities for remote control of the zoom, focus, and iris operations. Mechanical or electrical means provided to protect the motors from overrunning in extreme positions. Lens and controller system capable of both auto iris and remote manual iris operation. Capabilities of lens for auto and manual zoom and focus control. Motorized iris as opposed to auto iris type, for system control capability.

2.3.3. **Network Interface Requirements.**

Provide CCTV field equipment that can integrate with the Department's Lonestar™ software and can be integrated into the Department's TMC CCTV control sub-systems through NTCIP 1205 Version 1.08 or higher, Open Network Video Interface Forum (ONVIF), or approved equal. Support CoVu, Pelco D or Pelco P protocols, or approved equal for control.

Provide camera equipment with a Local Area Network (LAN) connection that supports the requirements detailed in the IEEE 802.3 Standard for 10/100 Ethernet connections for half-duplex or full-duplex and provide auto negotiation. Provide equipment with a minimum of 1 Ethernet port, which has a 10/100 Base-TX connection. Provide connectors that conform to EIA and TIA requirements.

Support, at a minimum, RTP, RTSP, UDP/IP, TCP/IP, IPv4, HTTP, IGMPv2, DHCP, NTP, IEEE 802.1x, Ethernet 802.3u, and Telnet.

Provide camera equipment that supports local and remote configuration and management. Configuration and management functions must include access to all user-programmed features, including but not limited to, network configuration, video settings, device monitoring, control setting, and security functions. Configuration

and management is achieved through serial login, telnet login, web-based interface, or manufacturer software. Provide manufacturer software with camera for local configuration, system maintenance and management control.

- 2.4. **Cable Assembly.** Provide camera power and communication cable assembly equipped with cables used for video feed, camera control including PTZ function, communications signaling, and power supply. Camera power and communication cable can be configured as a composite cable or series of isolated cables. The following cable functions may be required depending on the data and video communication interface requirements, as shown on the plans.
- 2.4.1. **Serial.** Provide shielded twisted pair serial based communication cable rated for outdoor use in conformance to EIA RS-232/422/485 Standards, governed by the Electronic Components Association (ECA). Provide serial based conversion hardware, if necessary, to achieve this function.
- 2.4.2. **Video.** Provide coaxial cable, rated for outdoor use, between the camera and the communications equipment interface that is a mid-range RG-59/U type with a solid center conductor with 100% shield coverage, with a cellular polyethylene dielectric, or a cable as recommended by the manufacturer of the CCTV field equipment.
- 2.4.3. **Ethernet.** Provide a shielded twisted pair (STP) Category 5E (or equivalent) at a minimum rated for outdoor use in conformance to TIA/EIA 568B Standard. Cable must not exceed an attenuation of 30 dB per 300 ft. of cable at 100 MHz.
- 2.4.4. **Power.** Provide 3-wire, insulated for 300 V minimum, 115 VAC or 24 VAC power cabling between the camera and the power supply. If 24 VAC power is required, provide needed power supply conversion equipment.

Power may be achieved through Power over Ethernet (PoE) through a power supply or mid-span PoE injector, to be subsidiary to the camera unit, and must conform to the IEEE 802.3af or IEEE 802.3at standard or latest revision.

Provide power and communication cable assembly the entire length of the camera support structure from the camera to the cabinet with an additional 25 ft. of slack in the cabinet. Determine the appropriate length required for each site. The cable assembly is subsidiary to the camera unit.

Provide any necessary data, video, or power conversion hardware necessary to successfully integrate the camera unit into the field equipment cabinet hardware components and onto the communications backbone.

- 2.5. **Video Encoding Interoperability.** Digital video encoders and decoders are necessary to convert the analog signal to digital, transport digital packets via UDP/IP over fiber optic, copper Ethernet, wireless, or leased line networks and convert the digital packets back to an analog signal for viewing on a display monitor. Video encoding and decoding equipment may be achieved through software or hardware means. Ensure camera's encoded video is interoperable with hardware and software decoders from other manufacturers. Ensure the camera's encoded video can be decoded by a minimum of two other manufacturer's software or hardware decoders that are currently in use by the Department. Contact the Department for decoders supported prior to procurement of camera unit.
- 2.6. **Camera Housing.** Provide camera housing assembly and hardware material that reflects sunlight.
- Provide camera housing with a sunshield to reduce the solar heating of the camera. The total weight of the camera (including housing, sunshield, and all internal components) must not exceed 35 lb.
- Construct viewing window in such a way that unrestricted camera views can be obtained at all camera and lens positions.
- Provide gaskets at cable entry point to the camera housing to prevent moisture or dust entry.



When shown on the plans or identified in the general notes, provide heating or cooling functionality with temperature sensors to maintain internal temperatures within the manufacturer required operating temperature range.

- 2.7. **Pan-Tilt Unit.** Furnish and install a medium duty anodized aluminum weatherproof pan-tilt-unit at each camera site, conforming to National Electrical Manufacturer's Association (NEMA) 4X and IP-66 rating or better, when not integral to the camera unit and housing. Provide mounting adapter and required attachment hardware to install the pan-tilt-unit to the pole or mounting bracket. Identify the type of mounting bracket and bolt pattern on shop drawings.

Provide a unit capable of a minimum of 180° vertical range of movement and horizontal movement of 360°, full, continuous rotation movement.

Provide a unit that has a pan and tilt speed of 20° per second minimum and is user adjustable through the full speed range. Unit must be capable of simultaneous pan-tilt movements with variable pan-tilt positioning control allowing variable speeds that are proportional through the zoom range.

Provide pan-tilt unit with a drive accuracy and drive repeatability of less than 1° and has an automatic pre-position speed of 120° per second minimum to a user defined preset position that is user adjustable.

Provide a pan-tilt unit, when not integral to the camera housing, capable of maintaining static position and does not move by more than 1.0° in any direction in speeds greater than 35 mph.

Ensure that the pan-tilt unit has seals and gaskets to protect the motors, gears, and cables and that the seals and gaskets are resistant to ozone, ultraviolet radiation, and other pollutants inherent to all local environmental conditions.

When shown on the plans or identified in the general notes, provide pan-tilt unit with heater that conforms to NEMA 4X standard when not integral to the camera unit and housing.

- 2.8. **Preset Functions.** Provide a camera unit capable of storing a minimum 62 presets for pan, tilt, zoom, and focus settings.

Provide a camera unit capable of user programmable tours with a minimum of 4 tours of up to 32 presets per tour. Any tours may be programmed for panning tours.

Provide a camera unit capable of user programmable sector zones with a minimum of 8 zones allowing right and left pan limitations.

Provide a camera unit capable of user programmable privacy zones with a minimum of 8 zones. Capable of click and drag position control through software.

- 2.9. **Control Receivers.** Provide a camera unit with an integrated camera control receiver, unless otherwise directed, that will execute all camera and lens functions as well as forward communication of commands for the pan-tilt functions to the pan-tilt control receiver. Mount the pan-tilt control receiver inside the pan-tilt unit.

The control receiver receives the data from the camera controller, it decodes the digital command data signals transmitted through the communication transmission interface, checks for errors, and acts on valid data to drive the pan-tilt unit and the camera controls.

Local field control is achieved through compatible control software on a laptop or through local control unit hardware located inside the field cabinet that can be EIA 19 in. rack or shelf mountable. Document that the camera control receiver and pan-tilt control receiver will execute all camera, lens, and pan-tilt functions through a laptop interface or through use of the local control unit hardware. Provide local control unit hardware only when shown on the plans or identified in the general notes.

- 2.10. **Connectors.** Provide and install connectors that are compatible with the communications equipment interfaces identified in Article 2.3.3 and Article 2.4. Supply all mating connectors. Provide all connector pins and mating connectors that are plated to achieve good electrical connection and resistance to corrosion.
- 2.11. **Source ID Generator.** Use a built-in ID Generator to insert camera ID over each of the camera-generated videos.
- Provide a minimum of 2 lines of alpha numeric, case specific, text supporting a minimum of 20 ASCII characters per line, with a minimum character height of 20 pixels, that is user programmable for displaying any combination of ID information consisting of camera, preset, privacy mask, low pressure warning, compass, and time and date at a minimum.
- Allow user selectable location of text to be displayed on the video image at the extreme top or bottom. Text display on the side of the image display prohibited .
- Automatically display the programmed ID with its associated video signal that can be turned on or off by user command.
- In the event of loss of signal or video signal failure, ID Generator automatically passes through failure message to display over video.
- Submit list of available text displays to the Department as part of documentation requirements.
- 2.12. **Cabinet Installation.** Install video communication equipment in a pole mounted equipment cabinet or in a ground mounted equipment cabinet as shown on the plans. Meet the following criteria:
- Contains all the lightning protection devices for data and video.
- Grounded to earth ground.
- Provide connectors for all inputs and outputs for data and video and additional ports for testing video and communications. Use the external connectors for testing and for connections to communication devices.
- 2.13. **Surge Protection.** Provide surge protection for the camera meeting the following requirements:
- mounting adapter – Electrically bonded to mounting structure,
  - pan-tilt mechanism – Electrically bonded to mounting adapter,
  - camera housing – Electrically bonded to pan-tilt mechanism, and
  - power and control cable surge protector – Integrated into cabinet surge protection system.
- 2.14. **Power Requirements.** Provide CCTV field equipment meeting all of its specified requirements when the input power is 115 VAC  $\pm$  20%, 60 Hz  $\pm$  3 Hz, and that maximum power required does not exceed 200 W including optional equipment.
- Provide appropriate voltage conversion, power injectors, or other power supply hardware if the camera equipment or any camera-related ancillary devices requires operating voltages other than 115 VAC  $\pm$  20%, such as 24 VAC, 12 VDC from solar power systems, or rely on PoE. Appropriate voltage converters or injectors must accept an input voltage of 115 VAC or 12 VDC from solar power systems as shown on the plans.
- 2.15. **Primary Input Power Interruption.** Provide CCTV field equipment that meets all the requirements in Section 2.1.4., "Power Interruption" of the NEMA Standard TS2 for Traffic Control System, or most current version.
- 2.16. **Power Service Transients.** Provide CCTV Field Equipment that meets the requirements for Section 2.1.6., "Transients, Power Service" of the NEMA Standard TS2, or most current version.

- 2.17. **Power Service Protection.** Provide equipment that contains readily accessible, manually resettable or replaceable circuit protection devices (such as circuit breakers or fuses) for equipment and power source protection. Provide circuit breakers or fuses sized appropriately such that no wire, component, connector, PC board or assembly is subjected to current loads in excess of their respective design limits upon failure of any single circuit element or wiring.
- 2.18. **Modular Design.** Provide CCTV field equipment hardware installed inside the cabinet that is modular in design that can be either shelf mountable or EIA 19 in. rack mountable. Clearly identify modules and assemblies with name, model number, serial number and any other pertinent information required to facilitate equipment maintenance.
- 2.19. **Connectors and Harnesses.** Make all external connections by means of connectors that are uniquely keyed to preclude improper hookups. Color-code and appropriately label with UV resistant material all wires to and from the connectors. Provide connecting harnesses of appropriate length and terminated with matching connectors for interconnection with the communications system equipment. Provide plated pins and mating connectors to improve conductivity and are corrosion resistant. All connectors utilizing solder type connections must have each soldered connection covered by a piece of heat shrink tubing securely shrunk to protect the connection for short circuiting.
- Provide a wiring diagram detailing wire function and connector pin-out.
- 2.20. **Environmental Design Requirements.** Provide equipment that conforms to NEMA TS2-2003 (R2008), International Electrotechnical Commission (IEC) 60529, and NEMA 250-2008, or most current version, for the following categories:
- 2.20.1. **Temperature.** Provide equipment that conforms to NEMA TS2 Section 2.1.5.1, or latest revision, and meets all the specified requirements during and after being subjected to any combination of the following conditions:
- ambient temperature range of -30 to 165°F,
  - temperature shock not exceeding 30°F per hour,
  - relative humidity of 0 to 100%,
  - moisture condensation on all exterior surfaces caused by temperature changes, and
  - provisions for a heater and blower function will be required to maintain internal temperatures within the manufacturer's operating temperatures for temperature ranges internal to the camera unit not conforming to NEMA TS2 Standard 2.1.5.1.
- 2.20.2. **Vibration.** Provide equipment that conforms to NEMA TS2 Section 2.1.9 and Section 2.2.3, or most current version, and meets all the specified requirements during and after being subjected to a vibration of 5 to 30 Hz up to 0.5 g applied in each of three mutually perpendicular planes for 30 min.
- 2.20.3. **Shock.** Provide equipment that conforms to NEMA TS2 Section 2.1.10 and Section 2.2.4, or most current version, and does not yield permanent mechanical deformation or any damage that renders the unit inoperable when subjected to a shock of 10 g applied in each of three mutually perpendicular planes for 30 min.
- 2.20.4. **Environmental Contaminants.** Provide equipment that conforms to IEC 60529 Section 14.2.6, or most current version, for IP 66 or greater rating when providing a pressurized unit.
- Provide equipment that conforms to IEC 60529 Section 14.2.7, or most current version, for IP 67 or greater rating when providing a non-pressurized unit.
- 2.20.5. **External Icing.** Provide equipment that is tested to conform to NEMA 250-2003 Section 5.6, or latest revision.

- 2.20.6. **Corrosion.** Provide equipment that is tested to conform to NEMA 250-2003 Section 5.10, or latest revision, when located in coastal Districts. Coastal Districts are Beaumont (BMT), Corpus Christi (CRP), Houston (HOU), Pharr (PHR), and Yoakum (YKM).
- 2.20.7. **Wind Rating.** Operational in adverse weather conditions and able to withstand wind loads in accordance with Department's basic wind velocity zone map standard as shown on the plans without permanent damage to mechanical and electrical equipment.

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### 3. CONSTRUCTION

- 3.1. **General.** Maximize standardization and consistency by utilizing industry standard techniques in equipment design and construction, with the minimum number of parts, subassemblies, circuits, cards, and modules. Design equipment for ease of maintenance.

Provide mounting bracket assemblies or apparatus to mount equipment on the following structures as detailed in the plans or on the ITS standards:

- ITS Pole,
- overhead sign bridge or cantilever overhead sign structure ,
- retaining wall, and
- concrete column or parapet.

Provide mounting bracket design with documentation submittal for approval prior to fabrication. Include all mounting plates, screws, bolts, nuts, washers, and ancillary hardware needed to fabricate the entire mounting bracket.

- 3.2. **Mechanical Components.** Provide stainless steel external screws, nuts and locking washers. Self-tapping screws are not acceptable.

Provide parts that are made of corrosion resistant material; examples include: plastic, stainless steel, anodized aluminum, or brass.

Protect all materials used in construction from fungus growth and deterioration due to sustained moisture.

Separate dissimilar metals by an inert dielectric material.

- 3.3. **Wiring.** Provide wiring that meets the requirements of the National Electrical Code (NEC) most current version. Provide wires that are cut to proper length before assembly. It is not acceptable to "double-back" wires to take up slack inside the cabinet. Lace wires neatly with nylon lacing or plastic straps. Organize cables neatly inside the cabinet and secure cables with clamps. Provide service loops at connection points when connecting to hardware inside the cabinet. No splicing of cables or exposed wiring is allowed. Clearly label all wiring.

- 3.4. **Relocation of CCTV Field Equipment.** Perform the relocation in strict conformance with the requirements herein and as shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during relocation.

Inspect the existing CCTV field equipment, with a representative from the Department, and document any evidence of damage prior to removal. Conduct a pre-removal test in accordance with the testing requirements contained in this Item to document operational functionality. Remove and deliver to the Department, existing CCTV field equipment that fail inspection.

Prior to removal of existing CCTV field equipment, disconnect and isolate the power cables from the electric power supply and disconnect all communication cabling from the equipment located inside the cabinet. Coil and store power and communication cabling inside the cabinet until such time that it can be relocated.

Remove existing CCTV field equipment as shown on the plans only at such time as authorized by the Engineer.

Use care to prevent damage to any support structures. Any portion of CCTV field equipment or camera pole structure damaged or lost will be replaced by the Contractor at his expense. Contractor to document and report to the Department any existing damage to equipment prior to removal.

Make all arrangements for connection to the power supply and communication source including any permits required for the work to be done under the Contract. Provide wire for the power connection at least the minimum size indicated on the plans and insulated for 600 V. Meet the requirements of the NEC most current version.

- 3.5. **Removal of CCTV Field Equipment.** Disconnect and isolate any existing electrical power supply prior to removal of existing CCTV field equipment,

Perform removal in strict conformance with the requirements of this Specification, and the lines, grades, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance.

Any portion of the CCTV field equipment or cabinet internal components damaged or lost will be replaced by the Contractor (with items requiring the approval of the Engineer) at no cost to the Department.

All materials not designated for reuse or retention by the Department will become the property of the Contractor and be removed from the project site at the Contractor's expense. Deliver items to be retained by the Department to a location shown on the plans or general notes. The Contractor is fully responsible for any removed equipment until released by the Engineer.

- 3.6. **Contractor Experience Requirements.** Contractor or designated subcontractor must meet the following experience requirements:

- 3.6.1. **Minimum Experience.** Three years of continuous existence offering services in the installation of CCTV camera systems.

- 3.6.2. **Completed Projects.** Three completed projects consisting of a minimum of 5 cameras in each project where the personnel installed, tested and integrated CCTV cameras on outdoor, permanently mounted structure(s) and related camera control and transmission equipment. The completed CCTV camera system installations must have been in continuous satisfactory operation for a minimum of 1 yr.

- 3.6.3. **Equipment Experience.** Three projects (may be the three in the preceding paragraph) in which the personnel worked in cooperation with technical representatives of equipment suppliers to perform specific stages of work. The Contractor will not be required to furnish equipment on this project from the supplier who furnished documentation demonstrating this experience.

Submit the names, addresses and telephone numbers of the references that can be contacted to verify the experience requirements given above.

- 3.7. **Documentation Requirements.** Provide a minimum of 2 complete sets of operation and maintenance manuals in bound hard copy format, as well as an electronic copy in Adobe PDF format on a CD/DVD or removable flash drive that include the following:

- complete and accurate wiring schematic diagrams,
- complete installation procedures,
- compliance matrix documenting conformance to this specification,
- complete performance specifications (Functional, electrical, mechanical and environmental) on the unit,
- complete parts list including names of vendors for parts not identified by universal part number such as JEDEC, RETMA, or EIA,

- pictorial of component layout on circuit board,
- ID Generator list of text display options,
- complete maintenance and trouble-shooting procedures,
- complete stage-by-stage explanation of circuit theory and operation,
- testing procedures and blank test forms,
- recovery procedures for malfunction,
- instructions for gathering maintenance assistance from manufacturer, and
- provide the Department with certification documentation verifying conformance with environmental and testing requirements contained in the special specification. Certifications may be provided by the manufacturer or through independent labs.

Identify material which is copyrighted or proprietary in nature as part of the documentation submittal. The Department will comply with sensitive material and secure submittal documentation and not distribute without written approval.

### 3.8. **Testing.**

3.8.1. **New Installations.** Unless otherwise shown on the plans, perform the following tests on the applicable equipment or systems.

3.8.1.1. **Test Procedures Documentation.** Provide 5 copies of the test procedures to include tests identified in Article 5.1.2 through Article 5.1.7 inclusive and blank data forms to the Engineer for review and comment as part of material documentation requirements for each test required on this project. Include the sequence of the tests in the procedures. The Engineer will comment, approve, or reject test procedures within 30 days after Contractor submittal of test procedures. Contractor to resubmit if necessary rejected test procedures for final approval within 10 days. Review time is calendar days. Conduct all tests in accordance with the approved test procedures.

Record test data on the data forms, as well as quantitative results. No bid item measurement or payment will be made until the Engineer has verified the test results meet the minimum requirements of the specification. The data forms for all tests, except design approval tests, must be signed by an authorized representative of the Contractor.

Provide written notice to the Engineer within 48 hr. of discovery of any testing discrepancy identified during testing by the Contractor. Furnish data forms containing the acceptable range of expected results as well as the measured values.

3.8.1.2. **Design Approval Test.** Conduct a design approval test on one randomly selected unit from the prototype design manufacturing run. If only 1 design prototype is manufactured, perform this test on that unit. If supplying multiple types of the equipment, provide and test a sample of each type.

Certification from an independent testing laboratory of a successfully completed design approval test is acceptable. Ensure that the testing by this laboratory is performed in accordance with the requirements of this specification. Failure of independent tests to comply with the requirements of this specification will be grounds for rejection of any certification.

Provide a copy of the certification to the District in which this contract is executed. The data forms for the design approval tests must be signed by an authorized representative (company official) of the equipment manufacturer or by an authorized representative of an independent testing facility.

Notify the Engineer 10 working days before conducting this testing. The Department may witness all the tests. Perform the following tests:

- 3.8.1.2.1. **Power Service Transients.** Provide equipment that meets the performance requirements, specified in this Item, when subjected to the power service transients as specified in Section 2.2.7.2, "Transient Tests (Power Service)" of the NEMA TS2 standard, most current version.
- 3.8.1.2.2. **Temperature and Condensation.** Provide equipment that meets the performance requirements, specified in this Item, when subjected to the following conditions in the order specified below:
- stabilize the equipment at -30°F and test as specified in Sections 2.2.7.3, "Low-Temperature Low-Voltage Tests" and 2.2.7.4, "Low-Temperature High-Voltage Tests" of the NEMA TS2 standard, most current version
  - allow the equipment to warm up to room temperature in an atmosphere having relative humidity of at least 40%. Operate the equipment for 2 hr., while wet, without degradation or failure, and
  - stabilize the equipment at 165°F and test as specified in Sections 2.2.7.5, "High-Temperature High Voltage Tests" and 2.2.7.6, "High-Temperature Low-Voltage Tests" of the NEMA TS2 standard, most current version.
- 3.8.1.2.3. **Relative Humidity.** Provide equipment that meets the performance requirements, specified in this Item, within 30 min. of being subjected to a temperature of 165°F and a relative humidity of 18% for 48 hr.
- 3.8.1.2.4. **Vibration.** Provide equipment that shows no degradation of mechanical structure, soldered components, or plug-in components and operates in accordance with the manufacturer's equipment specifications after being subjected to the vibration tests as described in Section 2.2.8, "Vibration Test" of the NEMA TS2 standard, most current version.
- 3.8.1.2.5. **Power Interruption.** Provide equipment that meets the performance requirements, specified in this Item, when subjected to nominal input voltage variations as specified in Section 2.2.10 "Power Interruption Test" of the NEMA TS2 standard, most current version.
- 3.8.1.3. **Demonstration Test.** Conduct a demonstration test on applicable equipment at an approved Contractor facility. The Contractor may submit procedures and results from previous contracts in the same District as this Contract provided the materials and equipment are identical, provided results are less than 5 yr. old. Notify the Engineer 10 working days before conducting this testing. The Department may witness all the tests. Perform the following tests:
- 3.8.1.3.1. **Examination of Product.** Examine each unit carefully and document that the materials, design, construction, markings and workmanship comply with the requirements of this Item.
- 3.8.1.3.2. **Continuity Tests.** Check the wiring to determine conformance with the requirements of the appropriate paragraphs in this Item.
- 3.8.1.3.3. **Operational Test.** Operate each unit for at least 15 min. to permit equipment temperature stabilization and an adequate number of performance characteristics to ensure compliance with the requirements of this Item.
- 3.8.1.4. **Field Acceptance (Stand-Alone) Test.** Conduct a field acceptance test for each unit after installation as required by the Engineer in order to demonstrate compliance with the functional requirements with this Item. Exercise all stand-alone (non-network) functional operations. Notify the Engineer 5 working days before conducting this test. The field acceptance test may consist of the following:
- 3.8.1.4.1. **Physical Construction.** Document physical construction is completed in accordance with the plans and specification.
- 3.8.1.4.2. **Electrical and Communication.** Document that all connectors for grounding, surge suppression, and electrical distribution are tightened correctly. Document all power supplies and circuits are operating under the proper voltages. Document all power and communications cables are terminated correctly, secured inside the cabinet, and fitted with appropriate connectors.

- 3.8.1.4.3. **Video Signal.** For analog signal format, conduct an impedance test, through a short 75 ohm coaxial cable, to an oscilloscope waveform monitor to ensure 75 ohm output impedance to conform with NTSC standards.
- Through use of a digital, hand-held, battery operated meter, conduct a test and measure the following video signal characteristics, if applicable:
- 3.8.1.4.3.1. **Sync.** Document the amplitude of the video synchronizing pulse and check for correct video level, coaxial cable continuity, and correct termination level is 40 IRE.
- 3.8.1.4.3.2. **Luminance.** Document the white level and correct brightness setting is 100 IRE.
- 3.8.1.4.3.3. **Composite.** Document the overall amplitude of the video signal is at 140 IRE or 1 V peak to peak.
- 3.8.1.4.3.4. **Color Burst.** Document color burst amplitude at 40 IRE.
- 3.8.1.4.3.5. **Ground-loop.** Document that no ground loop exists in the video picture. Ground loop voltages in the video signal causes bars to be present on the video picture.
- Document video image is present and free from over-saturation and any other image defect in both color and monochrome modes.
- Document video support of unicast and multicast video transmission modes.
- Document the video signal from the camera is present and of consistent quality at all connection points between the camera, the cabinet, and any video conversion hardware.
- 3.8.1.4.4. **Communication.** For digital camera models, document network connection to the camera through ping or telnet session from a remote PC. For analog camera models, document serial data transmission to execute control through serial ports.
- 3.8.1.4.5. **Pan-Tilt Mechanism.** Exercise pan, tilt, zoom, and focus in all directions and execute a minimum of 3 other unique programming commands, specified by the Department, to ensure that the communication link between the cabinet and the camera is functioning properly.
- 3.8.1.5. **System Integration Test.** Conduct a system integration test on the complete functional system. Demonstrate all control and monitor functions for each system component for 72 hr. Notify the Engineer 10 working days before conducting this testing. The Department may witness all the tests.
- Provide systems integration test procedures for proper adjustment and calibration of subsystem components. Proper adjustment and calibration involves documenting settings used to meet functional requirements while providing a margin for adjustment when future conditions change. Utilize the Department control software (when available) to perform subsystem testing. At a minimum, utilize this software to verify commands and confirms, as well as, detector actuations and occupancy dwell time. The Contractor is responsible for being familiar with any existing Department equipment and software.
- The failure of any one component material or equipment item in a system integration test is justification for rejecting the entire subsystem. Each subsystem component must function as a complete integrated subsystem for a minimal continuous 72 hr. period during the system integration test.
- 3.8.1.6. **Final Acceptance Test.** Following completion of the demonstration test, standalone test, and system integration test for all subsystems, provide completed data forms containing all of the data taken, including quantitative results for all tests, a set of "as built" working drawings, and a written request to begin a data communication and final acceptance test. Provide "as built" working drawings indicating the actual material, equipment, and construction of the various subsystem components, including established and calculated XY coordinates based on project control points provided by the Engineer, when shown on the plans. Perform field surveying and calculations under the supervision of and sealed by a licensed land surveyor.



Within 10 calendar days of the request, execute a data communications test using a Department supplied software program or Contractor supplied software approved by the Department. The data communications test may be executed by the Engineer or the Contractor with the prior approval of the Engineer. The purpose of this test is to verify that the communications plant will operate with application software provided by the State.

Perform the data communications test for a period of 72 hr. If a message error or component failure occurs anywhere in the network, resume the test once repairs are completed. All components of the communications network must operate as an integral system for the duration of the test.

A message error is defined as the occurrence of a parity error, framing error, or data error in any component of the message. The error free message rate is defined as the ratio of the number of messages in which no message error occurs to the number of messages transmitted. The error free message rate must exceed 99.99% for acceptable transmission quality, both for the system as a whole, and for each component of the network.

Provide all additional test results to the Engineer for review once a successful data communications test has been completed. If all the requirements of this specification have been satisfied, contract time will stop and all subsystems will be placed into operation and operate as a complete system for a period of 90 days.

Notify the Engineer of any defects suspected in integration or function of material or equipment. Investigate any suspected defects and correct if necessary. Provide a report of finding within 2 calendar days of notice of any suspected defects. Describe the nature of the any defects reported and any corrective action taken in the report. The integrated subsystems must operate defect free as a single complete system for a minimum of 72 continuous hours during a 30 calendar day review period. If the number of defects or frequency of failures prevents any subsystems from operating as described above, the Engineer may reject the entire subsystem(s) integration test results and resume contract time. Provide any necessary corrections and resubmit subsystem(s) integration test results and a request to begin a final acceptance test which may include "as built" plans and a data communications test.

The CCTV field equipment under this Item will not be accepted until the system, inclusive of all subsystems, has operated satisfactorily for a period of 90 days and in full compliance with the plans and specifications after approval of all submitted test results and reports.

- 3.8.1.7. **Consequences of Test Failure.** If a unit fails a test, submit a report describing the nature of the failure and the actions taken to remedy the situation prior to modification or replacement of the unit. If a unit requires modification, correct the fault and then repeat the test until successfully completed. Correct minor discrepancies within 30 days of written notice to the Engineer. If a unit requires replacement, provide a new unit and then repeat the test until successfully completed. Major discrepancies that will substantially delay receipt and acceptance of the unit will be sufficient cause for rejection of the unit.

Failure to satisfy the requirements of any test is considered a defect and the equipment is subject to rejection by the Engineer. The rejected equipment may be offered again for retest provided all noncompliance has been corrected.

If a failure pattern develops in similar units within the system, implement corrective measures, including modification or replacement of units, to all similar units within the system as directed. Perform the corrective measures without additional cost or extension of the contract period.

- 3.8.1.7.1. **Consequences of Design Approval Test Failure.** If the equipment fails the design approval test, correct the fault within 30 days and then repeat the design approval test until successfully completed.
- 3.8.1.7.2. **Consequences of Demonstration Test Failure.** If the equipment fails the demonstration test, correct the fault within 30 days and then repeat the demonstration test until successfully completed.
- 3.8.1.7.3. **Consequences of Field Acceptance (Stand-Alone) Test Failure.** If the equipment fails the stand-alone test, correct the fault within 30 days and then repeat the stand-alone test until successfully completed.

3.8.1.7.4. **Consequence of System Integration Test Failure.** If the equipment fails the system integration test, correct the fault within 30 days and then repeat the systems integration test until successfully completed.

3.8.1.7.5. **Consequences of Final Acceptance Test Failure.** If a defect within the system is detected during the final acceptance test, document and correct the source of failure. Once corrective measures are taken, monitor the point of failure until a 30 consecutive day period free of defects is achieved.

If after completion of the initial test period, the system downtime exceeds 72 hr. or individual points of failure have not operated for 30 consecutive days free of defects, extend the test period by an amount of time equal to the greater of the downtime in excess of 72 hr. or the number of days required to complete the performance requirement of the individual point of failure.

3.8.2. **Relocation and Removal.**

3.8.2.1. **Pre-Test.** Provide 5 copies of the test procedures to include tests of the basic functionality of the unit and blank data forms to the Engineer for review and comment as part of material documentation requirements. Functionality tests may include, but are not limited to, physical inspection of the unit and cable assemblies, lens iris and zoom control, video signal, and pan-tilt mechanism. Include the sequence of the tests in the procedures along with acceptance thresholds. The Engineer will comment, approve, or reject test procedures within 30 days after Contractor submittal of test procedures. Contractor to resubmit if necessary rejected test procedures for final approval within 10 days. Review time is calendar days. Conduct all tests in accordance with the approved test procedures.

Conduct basic functionality testing prior to removal of CCTV field equipment. Test all functional operations of the equipment in the presence of representatives of the Contractor and the Department. Ensure that both representatives sign the test report indicating that the equipment has passed or failed each function. Once removed, the equipment becomes the responsibility of the Contractor until accepted by the Department. Compare test data prior to removal and test data after installation. The performance test results after relocation must be equal to or better than the test results prior to removal. Repair or replace those components within the system which failed after relocation but which passed prior to removal.

3.8.2.2. **Post Test.** Testing of the CCTV field equipment is for the purpose of relieving the Contractor of maintenance of the system. The Contractor will be relieved of the responsibility for maintenance of the system in accordance with Item 7, "Legal Relations and Responsibilities", after a successful test period. The Contractor will not be required to pay for electrical energy consumed by the system.

After all existing CCTV field equipment has been installed, conduct approved continuity, stand alone, and equipment system tests. Furnish test data forms containing the sequence of tests including all of the data taken as well as quantitative results for all tests. Submit the test data forms to the Engineer at least 30 days prior to the day the tests are to begin. Obtain Engineer's approval of test procedures prior to submission of equipment for tests. Send at least 1 copy of the data forms to the Engineer.

Conduct an approved stand-alone test of the equipment installation at the field site(s). At a minimum, exercise all stand-alone (non-network) functional operations of the field equipment with all of the equipment installed per the plans as directed by the Engineer. Complete the approved data forms with test results and turn over to the Engineer for review and either acceptance or rejection of equipment. Give at least 30 working days notice prior to all tests to permit the Engineer or his representative to observe each test.

The Department will conduct approved CCTV field equipment system tests on the field equipment with the central equipment. The tests will, as a minimum, exercise all remote control functions and display the return status codes from the controller.

If any unit fails to pass a test, prepare a report and deliver it to the Engineer. Describe in the report the nature of the failure and the corrective action needed. If the failure is the result of improper installation or damage during reinstallation, reinstall or replace the unit and repeat the test until the unit passes successfully, at no additional cost to the Department or extension of the Contract period.

- 3.9. **Warranty.** Warrant the equipment against defects or failure in design, materials, and workmanship for a minimum of 3 yr. or in accordance with the manufacturer's standard warranty if that warranty period is greater. The start date of the manufacturer's standard warranty will begin after the equipment has successfully passed all tests contained in the final acceptance test plan. Any CCTV field equipment with less than 90% of its warranty remaining after the final acceptance test is completed will not be accepted by the Department. Guarantee that equipment furnished and installed for this project performs according to the manufacturer's published specifications. Assign, to the Department, all manufacturer's normal warranties or guarantees on all electronic, electrical, and mechanical equipment, materials, technical data, and products furnished for and installed on the project.

CCTV field equipment will be repaired or replaced at the Contractor's expense prior to completion of the final acceptance test plan in the event of a malfunction or failure. Furnish replacement parts for all equipment within 10 days of notification of failure by the Department.

- 3.10. **Training.** Conduct a training class for a minimum of 24 hr., unless otherwise directed, for up to 10 representatives designated by the Department on procedures of installation, operations, programming hardware settings, IP programming, port settings, testing, maintenance, troubleshooting, and repair of all equipment specified within this specification. Submit to the Engineer for approval, 10 copies of the training material at least 30 days before the training begins. Conduct training within the local area unless otherwise authorized by the Engineer. Consider operations through Department's Lonestar software when developing training modules.

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#### 4. MEASUREMENT

This Item will be measured by each CCTV field equipment unit and mounting apparatus furnished, installed, relocated, or removed, of the types specified as shown on the plans, or as directed.

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#### 5. PAYMENT

- 5.1. **Furnish and Install.** The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit bid price for "CCTV Field Equipment (Analog)", "CCTV Field Equipment (Digital)", and "CCTV Field Controller". This price is full compensation for making fully operational CCTV field equipment including any voltage converters or injectors, cables and connectors as shown on the plans; and all documentation, testing, training, software, equipment, labor, materials, tools, and incidentals.

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" for CCTV field equipment mounting assemblies will be paid for at the unit bid price for "CCTV Mount (Pole)", "CCTV Mount (Post)", "CCTV Mount (Wall)", "CCTV Mount (Parapet)", "CCTV Mount (Pendant)", and "CCTV Mount (Mast)". This price is full compensation for furnishing and installing mounting bracket assemblies, mounting bracket hardware; and all equipment, labor, materials, tools, equipment, and incidentals necessary to mount CCTV field equipment to mounting structures as shown on the plans.

- 5.2. **Install Only.** The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit bid price for "CCTV Field Equipment (Analog) (Install Only)" and "CCTV Field Equipment (Digital) (Install Only)." This price is full compensation for making fully operational CCTV field equipment including any voltage converters or injectors, furnishing and installing additional cables and connectors as shown on the plans; and all documentation, testing, training, software, equipment, labor, materials, tools, and incidentals.
- 5.3. **Relocate.** The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" for relocation of CCTV field equipment will be paid for at the unit bid price for "Relocate CCTV Field Equipment." This price is full compensation for relocating and making fully operational existing CCTV field equipment as shown on the plans; furnishing and installing additional cables or connectors as shown on the plans; for testing, delivery and storage of components designated for salvage or reuse; and all testing, training, software, equipment, labor, materials, tools, and incidentals.

- 5.4. **Remove.** The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" for removal of CCTV field equipment will be paid for at the unit bid price for "Remove CCTV Field Equipment." This price is full compensation for removing existing CCTV field equipment as shown on the plans; removal of cables and connectors; for testing, delivery and storage of components designated for salvage; and all testing training, software, equipment, labor, materials, tools, and incidentals.

# Special Specification 6062

## Intelligent Transportation System (ITS) Radio



### 1. DESCRIPTION

Furnish, install, remove, or relocate an Intelligent Transportation System (ITS) radio at locations shown on the plans, or as directed.

### 2. MATERIALS

Provide new materials that comply with the details shown on the plans and the requirements of this Item. Supply all equipment and hardware needed for a complete functioning system. Materials for equipment to be relocated will be "as-is". The Contractor will protect the existing equipment from further wear or damage.

### 3. EQUIPMENT

3.1. **General.** The ITS radio consists of a radio, power supply, antenna, antenna cables, lightning protection, grounding, all necessary mounting hardware, and radio configuration software.

Utilize the latest industry practiced techniques in equipment design and construction of parts, subassemblies, circuits, cards, and modules. Design equipment for ease of maintenance. Ensure that all component parts are readily accessible for inspection and maintenance, using hand tools. Provide test points for checking essential voltages, waveforms, signals, and similar data.

Ensure that all external screws, nuts, and locking washers are made of corrosion resistant material. Do not use self-tapping screws unless specifically approved by the Engineer.

Provide parts made of corrosion resistant material such as plastic, stainless steel, anodized aluminum, or brass.

Protect all materials used in construction from fungus growth and moisture deterioration.

Separate dissimilar metals by an inert dielectric material.

3.2. **Radio.** Each radio will be a point-to-point or point-to-multi-point single-band or dual-band radio operating in the license-free frequency as shown on the plans or as directed by the Engineer. Provide a radio that meets all of the following minimums:

3.2.1. **Frequency.** FCC unlicensed, 900 MHz, 2.4 GHz, or 5 GHz, as specified on the plans, or as directed;

3.2.2. **Channel Selection.** Dynamic Frequency Selection, with a manual override option;

3.2.3. **Minimum Range.** 15 mi., line of sight;

3.2.4. **Transmit Power.** User selectable, up to the maximum allowed by FCC rules, to at least 21 dBm, in 1 dBm steps (maximum step size). Maximum output power limited by FCC Part 15 rules for unlicensed frequencies;

3.2.5. **Receive Sensitivity.** Adaptive;

3.2.6. **Modulation.** Adaptive modulation and space diversity to provide maximum throughput;

- 3.2.7. **Forward Error Correction.** Provide forward error correction.
- 3.2.8. **Security.** Minimum security for the point-to-point backhaul network is the Advanced Encryption Standard, 128 bit block size (AES-128). Meet ISO/IEC 18033-3 standards. Minimum security for communications with Wi-Fi units is WPA2;
- 3.2.9. **Throughput.** Minimum out-of-the-box throughput of 100 Mbps for frequencies between 2.4 and 5 GHz. Minimum out-of-the-box throughput of 1 Mbps for the 900 Mhz frequency. Minimum measured throughput in the field of 50 Mbps for frequencies between 2.4 and 5 GHz;
- 3.2.10. **Networking Standards.** Provide at least the following:
- IEEE 802.1d – Ethernet Bridging,
  - IEEE 802.1p – Traffic Prioritization,
  - IEEE 802.1q – Virtual Local Area Network (VLAN),
  - IEEE 802.3 – 2012 Ethernet, and
  - IEEE 802.11-2009 – Wi-Fi (a/b/g/n) or most current version.
- 3.2.11. **Network Interface.** Minimum of one functional 10/100 Base-T RJ-45 port;
- 3.2.12. **On-Board Alignment Tools.** Provide a radio with on-board alignment tools for use aligning the antenna. These could be external LED indicators, audible indicators, or other approved mechanism; and
- 3.2.13. **FCC Certification.** Provide at least the following:
- FCC Part 15.400 (U-NII),
  - FCC Part 15.247 (ISM) 20 Mbps, and
  - FCC Part 15, Class B.

- 3.3. **Power.** Provide ITS radios meeting all specified requirements when the input power is 115 VAC  $\pm$  20%, 60 Hz  $\pm$  3 Hz, and that maximum power required does not exceed 35 W, including optional equipment.

Provide appropriate voltage conversion, power injectors, or other power supply hardware if the radio equipment or any radio-related ancillary devices require operating voltages other than 115 VAC or rely on Power over Ethernet (PoE or PoE+). Appropriate voltage converters or injectors must accept an input voltage of 115 VAC as noted above. Provide any required Power over Ethernet (PoE or PoE+) devices that are 802.3af-2003 or 802.3at-2009 compliant, meeting the power requirements of the radio equipment.

The Contractor will verify with the local power service provider to ensure that the provided equipment is compatible with the installed equipment. The Contractor will supply and install any additional equipment required for proper operation of the Radio System per the design.

Every numbered table and figure must be referenced in the accompanying text. Tables and figures should appear in the order they are referred to, no matter how fleeting the reference.

- 3.4. **Antennas.** Furnish and install radio antennas of the number and type specified on the plans, or as directed. These may include, but are not limited to:
- connectorized omni;
  - yagi;
  - sectorized (i.e. 45, 60, 90, 120 etc. degree increments);
  - parabolic antennas; and
  - integrated flat panel antennas.

Meet the following specifications:

- antenna gain as specified in the plans;

- minimum wind rating of 110 mph;
- Voltage Standing Wave Ratio (VSWR) value not exceeding 1.5 for the radio frequency specified on the plans;
- reflection coefficient value not exceeding 0.20;
- reflected power value not exceeding 4 %; and
- impedance matched to the impedance of the system so that voltage is in phase with the current.  
(Typically 50 ohms.)

3.5. **Antenna Coaxial Cables.**

3.5.1. **Nominal impedance.** Matched to the antenna's impedance to minimize the Voltage Standing Wave Ratio (VSWR). Typically 50 ohms.

3.5.2. **Maximum Attenuation.** 5 dB/100 ft. at the frequency specified on the plans.

3.5.3. **Maximum Cable Length.** 10 feet maximum length from radio to antenna when radio is mounted on an external structure. 100 feet maximum length from radio to antenna when radio is mounted in the cabinet and the antenna is mounted on the structure. Select external cable so that maximum cable attenuation is less than 5 dB total.

3.6. **Network Cable.** Provide Cat 5e shielded wire that meets the following minimum requirements:

- shielded twisted pair with drain wire;
- AWG24 solid bare copper;
- CMX outdoor rated for direct bury;
- outdoor UV rated jacket; and
- TIA/EIA-568B.2 and ISO/IEC 11801 standards.

Maximum run length for Cat 5e cable is 250 feet, or per the manufacturer's specifications.

3.7. **Lightning Protection.** Furnish and install surge protection on all coaxial cables mounted adjacent to and bonded to the cabinet ground bus. Include all mounting hardware necessary.

3.8. **Power Service Protection.** Provide equipment with readily accessible circuit protection devices (i.e. circuit breakers or fuses) for equipment and power source protection. Circuit protection devices may be resettable or replaceable.

Provide circuit breakers or fuses sized such that no wire, component, connector, PC board, or assembly will be subjected to sustained current in excess of their respective design limits upon the failure of any single circuit element of wiring.

Provide UL Listed Type 1 or Type 2 Surge Protection Device (SPD) and labeled to UL1449 Third Edition, posted at UL.com, under Certifications UL Category Code VZCA, and have a 20kA I-nominal rating. Provide SPD rated as NEMA 4. Provide a SPD with integral EMI/RFI line filtering if shown on the plans.

Provide automatic recovery from power failure within 30 sec. after resumption of power.

Provide a GFCI duplex outlet for ITS radio equipment at existing locations as shown on the plans. Provide this outlet in addition to the existing outlets within the cabinet.

3.9. **Maximum Weight.** Provide equipment with a weight not exceeding 25 lbs.

3.10. **Maximum Dimensions.**

3.10.1. **Outdoor Units.** 16 in. x 16 in. x 9 in. for integrated units, not including antenna.

- 3.10.2. **Used in Cabinets.** Provide equipment that easily fits on a single shelf without cabinet modifications.
- 3.11. **Modular Design.** Provide a modular ITS radio System design to allow components to be readily replaced in the field.  
Label with UV resistant methods to identify all modules and assemblies with name, model number, serial number and any other pertinent information required to facilitate equipment maintenance.
- 3.12. **Network Topologies.** Point-to-Point or Point-to-Multi-Point, as shown on the plans, or as directed.
- 3.13. **Connectors and Harnesses.** All external connections will be made of connectors that are keyed uniquely to preclude improper hookups. Color code and label all cables to and from the connectors on both ends.  
Provide connecting harnesses of appropriate length and terminated with matching connectors for interconnection with the communications system equipment.  
Plate all pins and mating connectors with a minimum of 20 microns of metallic native element gold (Au). Use heat shrink tubing for all solder type connections to insure that it protects the connection from short circuiting.  
Label with UV resistant methods to identify all assemblies with name, model number, serial number and any other pertinent information required to facilitate equipment maintenance.  
Provide external waterproof connections that conform to IEC 60529 Section 14.2.7, or latest revision, for IP 66 or greater rating.
- 3.14. **Mechanical Requirements.** Provide equipment that is modular in design such that it can be easily replaced in the field.  
Label with UV resistant methods to identify each unit with name, model number, serial number and any other pertinent information required to facilitate equipment maintenance.  
Coat all printed circuit boards with a clear-coat moisture and fungus resistant material (conformal coating).
- 3.15. **Environmental Requirements.** Ensure that equipment conforms to NEMA TS2-2003 (R2008), International Electrotechnical Commission (IEC) 60529, and NEMA 250-2008, or most current version, for the following categories:
- 3.15.1. **Temperature and Humidity.** Provide equipment that conforms to NEMA TS2 Section 2.1.5.1, or latest revision, and meets all the specified requirements during and after being subjected to any combination of the following conditions:
- ambient temperature range of -30 to 165°F;
  - temperature shock not exceeding 30°F per hour;
  - relative humidity of 0% to 100%; and
  - moisture condensation on all exterior surfaces caused by temperature changes.
- 3.15.2. **Vibration.** Provide equipment that conforms to NEMA TS2 Section 2.1.9 and Section 2.2.3, or most current version, and meets all the specified requirements during and after being subjected to a vibration of 5 Hz to 30 Hz up to 0.5 g applied in each of 3 mutually perpendicular planes for 30 min.
- 3.15.3. **Shock.** Provide equipment that conforms to NEMA TS2 Section 2.1.10 and Section 2.2.4, or latest revision, and does not yield permanent mechanical deformation or any damage that renders the unit inoperable when subjected to a shock of 10 g applied in each of 3 mutually perpendicular planes for 30 min.
- 3.15.4. **Environmental Contaminants.** Provide equipment that conforms to IEC 60529 Section 14.2.6, or latest revision, for IP 66 or greater rating when providing a pressurized unit.



Provide equipment that conforms to IEC 60529 Section 14.2.7, or latest revision, for IP 66 or greater rating when providing a non-pressurized unit.

- 3.15.5. **External Icing.** Provide equipment that is tested to conform to NEMA 250-2003 Section 5.6, or latest revision.
- 3.15.6. **Corrosion.** Provide equipment that is tested to conform to NEMA 250-2003 Section 5.10, or latest revision, when located in coastal Districts. Coastal Districts are Beaumont (BMT), Corpus Christi (CRP), Houston (HOU), Pharr (PHR), and Yoakum (YKM).
- 3.16. **Radio Configuration and Management Software.** Provide any and all programming and software required to make operational and support the radio system. The programming and software will be installed in the appropriate equipment at the time of acceptance testing, and will be used in the acceptance testing. Provide operations manuals, installation requirements, and licenses. Provide software with at least the following features:
- 3.16.1. **Radio Configuration.** Configuration is achieved through the following:
- a comprehensive configuration menu allowing the user to control all programmable radio settings;
  - a network tree which automatically discovers, organizes, displays, and searches for a radio; and
  - the ability to save individual radio configurations in a file that can be used to program replacement radios.
- 3.16.2. **Diagnostic Routines.** Provide the following diagnostic routines:
- 3.16.2.1. **Bandwidth Test.** For all communication links to a specific radio, including transmit and receive characteristics at the remote radios. Display signal strengths for transmit and receive. Provide client connection quality (CCQ);
- 3.16.2.2. **Spectrum Scan.** Determine the amount of background signal noise present for the specified frequency. Detect specific channels which experience interference to the extent that they are not adequate for the transmission or receipt of data. Include an option to exclude these frequencies from use; and
- 3.16.2.3. **Ping Test.** Measure and display the time it takes a packet of data to travel to and from another device in milliseconds and percent packet loss. Measure and display the variance in a minimum of seven successive ping tests (jitter).
- 3.16.3. **Networking Tools.** Provide the following network tools:
- provide a firewall configuration tool to manage multicast and broadcast traffic,
  - provide user selection of Spanning Tree Protocol (STP) and Rapid Spanning Tree Protocol (RSTP) options,
  - provide Virtual Local Area Network (VLAN) configuration tools;, and
  - provide Quality of Service (QoS) selection and configuration tools.
- 3.16.4. **Alarms.** Provide the following alarm features:
- provide 24 hr. monitoring of user selected alarms; and
  - provide option of sending email and text messages of triggered alarms.

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## 4. CONSTRUCTION AND WORK METHODS

- 4.1. **General.** Provide and install all materials, including support, calibration and test equipment, to ensure an operating and functional wireless radio system. This includes installation of power and data cables, and the power grounding and lightning suppression systems. Prior to beginning installation, inspect each site to verify suitability of the design for installation, grounding and lightning protection. Provide written documentation to the Engineer for approval prior to installation. Utilize the latest available industry standard construction

techniques with a minimum number of parts, subassemblies, circuits, cards, and modules to maximize standardization and commonality. Design equipment for ease of maintenance and orient component parts to be readily accessible for inspection and maintenance.

- 4.2. **Radio Mounting.** Provide and install all necessary radio mounts, standoffs, brackets, hardware, and grounding assemblies for the mounting surface shown in the plans. Install all radios at specified locations as shown on the plans. Any deviation between actual mounting location and those specified must be pre-approved by the Engineer.
- 4.3. **Antenna Mounts.** Provide and install all antenna mounts, standoffs, brackets, hardware, transmission line, hanger kits, grounding kits, and lightning suppressors for the mounting surface shown in the plans. Install all antennas at specified center lines. Perform antenna alignment for each path and compare with path calculations. Any variation between calculated and actual values must be brought to the attention of the Engineer.
- 4.4. **System Power and Grounding.** Prior to installation, provide a written description of the proposed grounding and lightning protection design. Connect the equipment to the 115 V circuits provided in the equipment cabinets at the sites. Bond all equipment racks in accordance with the approved manufacturer's installation specification. Ground all equipment racks to the single-point ground for the site. Provide grounding and lightning protection for all cable runs at the top of the support structure and at the equipment cabinet entry port. If the equipment cabinet and associated entry port is not collocated on the support structure, the grounding and lightning protection will also be provided at the bottom of the support structure.
- 4.5. **System Optimization.** Optimize equipment alignment and settings at each site to provide a complete, operational system.
- 4.6. **Conductors.** Provide conductors that meet the requirements of the most current version of the National Electrical Code (NEC) Provide conductors that are cut to proper length before assembly. It is not permissible to "double-back" conductors to take up slack inside the cabinet. Lace conductors neatly with nylon lacing or plastic straps. Organize conductors neatly inside the cabinet and secure cables with clamps. When connecting to hardware inside the cabinet, provide service loops at connection points. No splicing of cables or exposed conductors are allowed. Label with UV resistant methods to identify all conductors.
- 4.7. **Relocation.** Perform the relocation in strict conformance with the requirements herein and as shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during relocation.

Inspect the existing radio equipment, with a representative from the Department, and document any evidence of damage prior to removal. Conduct a pre-removal test in accordance with the testing requirements contained in this Item to document operational functionality. Remove and deliver to the Department existing radio equipment that fail inspection.

Prior to removal of existing radio equipment, disconnect and isolate the power cables from the electric power supply and disconnect all communication cabling from the equipment located inside the cabinet. Coil and store power and communication cabling inside the cabinet until such time that it can be relocated. Remove existing radio equipment as shown on the plans only at such time as authorized by the Engineer.

Use care to prevent damage to any support structures. Any components of the radio equipment or support structure damaged or lost will be replaced by the Contractor at no cost to the Department. Contractor to document and report to the Engineer any existing damage to equipment prior to removal.

Make all arrangements for connection to the power supply and communication source including any permits required for the work to be done under the Contract. Provide wire for the power connection at least the minimum size indicated on the plans and insulated for 600 volts. The power connection will meet the requirements of the most current version of the NEC.

- 4.8. **Removal.** Disconnect and isolate any existing electrical power supply prior to removal of existing radio equipment.

Perform removal in strict conformance with the requirements herein stated and the lines, grades, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance.

Any components of the radio equipment damaged or lost will be replaced by the Contractor (with items requiring the approval of the Engineer) at no cost to the Department.

All materials not designated for reuse or retention by the Department will become the property of the Contractor and be removed from the project site at the Contractor's expense. Deliver items to be retained by the Department to a location designated on the plan sheets or general notes. The Contractor is fully responsible for any removed equipment until released by the Engineer.

- 4.9. **Contractor Experience Requirements.** Utilize installers, testers, and integrators with at least the following requirements:

- 4.9.1. **Minimum Experience.** Three years continuous existence offering services in the installation of wireless communications. Experience must include the following:

- 4.9.1.1. Conducting radio installation studies consisting of:

- signal noise studies,
- spectrum analysis,
- antenna gain / radio power calculations,
- system attenuation, and
- measurement of standing wave ratios.

- 4.9.1.2. Installation, troubleshooting and repair of broadband radio systems consisting of:

- equipment installation,
- configuration of radios,
- antenna calibration, and
- cabling.

- 4.9.1.3. Installation, troubleshooting, and repair of interconnected Ethernet networks (LAN and WAN) consisting of:

- cabling,
- switch / router configuration, and
- network analysis.

- 4.9.2. **Completed Projects.** Three projects consisting of wireless communications installation, troubleshooting and repair. Each project must include transmitting signals over a minimum of 1 mile distance and installation of a minimum of 3 devices.

- 4.9.3. **Equipment Experience.** One project (may be one of the three in the preceding paragraph) in which the personnel worked in cooperation with technical representatives of equipment suppliers to perform specific stages of work. Contractor will not be required to furnish equipment on this project from the supplier who furnished documentation demonstrating this experience.

Submit the names, addresses and telephone numbers of the references that can be contacted to verify the experience requirements given above.

- 4.10. **Documentation.**

Provide all licenses, where required, for any software or hardware in the system.

Provide a medical statement as to the safety of the unit to the general public (example: Pacemakers, etc.).

Provide proof of installer qualifications.

Provide all documentation described in this specification, including written reports for:

- verification of the suitability of the design for installation, grounding and lightning protection,
- communication link throughput tests,
- equipment grounding tests,
- system level test results to include: performance charts, link summaries, climatic factors, losses and standards, and
- wiring connection diagrams for the field installation and central installation.

#### 4.11. **Testing.**

4.11.1. **New Installations.** Unless otherwise shown on the plans, perform the following tests on the applicable equipment or systems.

4.11.1.1. **Test Procedures Documentation.** Provide 5 copies of the test plan procedures and target values, as well as blank data forms 60 days prior to testing for each test required in this specification. Include the sequence of the tests in the procedures. The Engineer will approve test procedures prior to submission of equipment for tests. Conduct all tests in accordance with the approved test procedures.

Record test data on the data forms, as well as quantitative results. No bid item measurement or payment will be made until the Engineer has verified the test results meet the minimum requirements of the specification. The data forms for all tests, except design approval tests, must be signed by an authorized representative of the Contractor.

Provide written notice to the Engineer within 48 hr. of discovery of any testing discrepancy performed in testing by the contractor. Furnish data forms containing the acceptable range of expected results as well as the measured values.

4.11.1.2. **Design Approval Test.** Conduct a design approval test on randomly selected units from the prototype design manufacturing run. If only 1 design prototype is manufactured, perform this test on that unit. If supplying multiple types of the equipment, provide and test a sample of each type.

Certification from an independent testing laboratory of a successfully completed design approval test is acceptable. Ensure that the testing by this laboratory is performed in accordance with the requirements of this specification. Failure of independent tests to comply with the requirements of this specification will be grounds for rejection of any certification.

Provide a copy of the certification to the District in which this equipment is installed. The data forms for the design approval tests must be signed by an authorized representative (company official) of the equipment manufacturer or by an authorized representative of an independent testing facility.

Notify the Engineer 10 working days before conducting this testing. The Department may witness all the tests. Perform the following tests:

4.11.1.2.1. **Power Service Transients.** Provide UL Listed Type 1 or Type 2 SPD and labeled to UL1449 Third Edition, posted at UL.com, under Certifications UL Category Code VZCA, and have a 20kA I-nominal rating. Provide SPD rated as NEMA 4. SPD with integral EMI/RFI line filtering may be required if shown on the plans.

4.11.1.2.2. **Temperature and Condensation.** Meet the performance requirements, specified in this Item, when subjected to the following conditions in the order specified below:

- stabilize the equipment at -30°F and test as specified in the NEMA TS2 standard, Sections 2.2.7.3, "Low-Temperature Low-Voltage Tests" and 2.2.7.4, "Low-Temperature High-Voltage Tests", or most current version,
- allow the equipment to warm up to room temperature in an atmosphere having relative humidity of at least 40%. Operate the equipment for 2 hr., while wet, without degradation or failure, and
- stabilize the equipment at 165°F and test as specified in the NEMA TS2 standard, Sections 2.2.7.5, "High-Temperature High Voltage Tests" and 2.2.7.6, "High-Temperature Low-Voltage Tests", or most current version.

- 4.11.1.2.3. **Relative Humidity.** Meet the performance requirements, specified in this Item, within 30 min. of being subjected to a temperature of 165°F and a relative humidity of 18% for 48 hr.
- 4.11.1.2.4. **Vibration.** Show no degradation of mechanical structure, soldered components, or plug-in components, and operate in accordance with the manufacturer's equipment specifications after being subjected to the vibration tests as described in the NEMA TS2 standard, Section 2.2.8, "Vibration Test", or most current version.
- 4.11.1.2.5. **Power Interruption.** Provide automatic recovery from power failure within 305 sec. after resumption of power.
- 4.11.1.3. **Demonstration Test.** Conduct a demonstration test on applicable equipment at an approved Contractor facility. The Contractor may submit procedures and results from previous projects in the same District as this project, provided the materials and equipment are identical. Provide previous procedures and results not more than 5 yr. old. Notify the Engineer 10 working days before conducting this testing. The Department may witness all the tests. Perform the following tests:
- 4.11.1.3.1. **Examination of Product.** Examine each unit carefully to verify that the materials, design, construction, markings and workmanship comply with the requirements of this Item,
- 4.11.1.3.2. **Continuity Tests.** Check the wiring to determine conformance with the requirements of the appropriate paragraphs in this Item, and
- 4.11.1.3.3. **Operational Test.** Operate each unit for at least 15 min. to permit equipment temperature stabilization and an adequate number of performance characteristics to ensure compliance with the requirements of this Item.
- 4.11.1.4. **Field Acceptance Test.** Following completion of equipment installation and operational optimization, submit an acceptance test plan to the Engineer for review and approval. During the official acceptance testing, provide the technical staff to conduct the measurements and adjustments called for in the testing. The Engineer will participate in the testing as the official test witness. Each page of the acceptance test document will provide for data recording of the test results, and the name of Contractor's representative conducting the test as well as a suitable field for the test date and signature of the Department's test witness. Upon the Engineer's approval of the test plan and the test schedule, the acceptance testing may begin.
- Conduct a field acceptance test for each unit after installation as required by the Engineer in order to demonstrate compliance with the functional requirements with this Item. Exercise all stand-alone (non-network) functional operations. Provide a factory certified representative for installation and testing of the equipment. Notify the Engineer 5 working days before conducting this test. The field acceptance test will consist of at least the following:
- 4.11.1.4.1. **Physical Construction.** Verify physical construction is completed in accordance with the plans and specification.
- 4.11.1.4.2. **Electrical Connections.** Verify that all connectors for grounding, surge suppression, and electrical distribution are tightened correctly and are quality connectors. Verify all power supplies and circuits are operating under the proper voltages. Verify all power and communications cables are terminated correctly, secured inside the cabinet, and fitted with appropriate connectors.

- 4.11.1.4.3. **Grounding.** Field test equipment grounding for all ITS radio equipment installed in the field and provide written documentation to the engineer. Where earth ground resistance values exceed 5 ohms, develop mitigation measures for consideration. Once mitigation measures are installed, re-test that ground and update the documentation.
- 4.11.1.4.4. **Interference.** Conduct a test site survey and interference analysis prior to the installation of the equipment. Measure the existing signal noise levels at each installation site for the proposed radio frequency, identify potential sources of interference, and document the findings in a written report to the engineer. The purpose of this survey is to verify that the parameters measured during the design process have not substantially changed. If the new survey indicates that the proposed radio system will not function as designed, develop proposed mitigation strategies. Adjust antenna polarities and channel plans on equipment to minimize interference from other sources.
- 4.11.1.4.5. **Communication Link Quality.** Conduct signal tests for each communication link, including data throughput, transmit power and frequency, receiver performance and frequency, proper operation of switch over, proper operation of alarm and switches, and bit error rate (BER). Document results in a written report to the engineer. Where measured throughput drops below 50 Mbps on any link, develop mitigation measures for consideration. Once mitigation measures, if any, are implemented on a communications link, re-test that link and update the documentation.
- 4.11.1.4.6. **System Paths.** Include the following in testing of the installed system paths:
- measure and record the transmitter/receiver channel frequency and polarity;
  - measure and record the transmitter power,
  - measuring and recording the receiver fade margin, perform a one hour Bit Error Rate Test (BERT) on the primary equipment and record results, and
  - verify the operation of all local alarm and control points using the alarm and monitoring equipment provided.
- 4.11.1.4.7. **Alarms.** Test and verify the operation of the alarms and monitor equipment in accordance with the acceptance test criteria.
- 4.11.1.5. **System Integration Test.** Conduct a system integration test on the complete functional system. Demonstrate all control and monitor functions for each system component for 72 hr. Notify the Engineer 10 working days before conducting this testing. The Department may witness all the tests.

Provide Systems Integration Test procedures for proper adjustment and calibration of subsystem components. Proper adjustment and calibration involves documenting settings used to meet functional requirements while providing a margin for adjustment when future conditions change. Utilize the Department's control software (when available) to perform subsystem testing. At a minimum, utilize this software to verify communication to the Department's equipment. The Contractor is responsible for being familiar with any existing Department equipment and software.

The failure of any one component material or equipment item in a system integration test is justification for rejecting the entire subsystem. Each subsystem component must function as a complete integrated subsystem

- 4.11.1.6. **Final Acceptance Test.** Following completion of the demonstration test, field acceptance test, and system integration test for all subsystems, provide completed data forms containing all of the data taken, including quantitative results for all tests, a set of "as built" working drawings, and a written request to begin a data communication and final acceptance test. Provide "as built" working drawings indicating the actual material, equipment, and construction of the various subsystem components.

Within 10 calendar days of the request, execute a data communications test using a Department supplied software program. The data communications test may be executed by the Engineer or the Contractor with the prior approval of the Engineer. The purpose of this test is to verify that the communications plan will

operate with application software provided by the Department or contractor supplied software approved by the Engineer.

Perform the data communications test for a period of 72 hr. Ensure that the test can be performed for a continuous 72 hr. during a normal work week. If a message error or component failure occurs anywhere in the network, restart the 72 hr. test once repairs are completed. All components of the communications network must operate as an integral system for the duration of the test.

A message error is defined as the occurrence of a parity error, framing error, or data error in any component of the message. The error-free message rate is defined as the ratio of the number of messages in which no message error occurs to the number of messages transmitted. The error-free message rate must exceed 99.99% for acceptable transmission quality, both for the system as a whole, and for each component of the network.

Provide all additional test results to the Engineer for review once a successful data communications test has been completed. If all the requirements of this special provision have been satisfied, contract time will be suspended and all subsystems will be placed into operation and operate as a complete ITS radio communication system as intended for at least 30 calendar days.

Notify the Engineer of any defects suspected in integration or function of material or equipment. Investigate any suspected defects and correct if necessary. Provide a report of findings within 2 calendar days of notice of any suspected defects. Describe the nature of the any defects reported and any corrective action taken in the report. The integrated subsystems must operate defect free as a single complete system for at least 72 continuous hours during the 30 calendar day review period. If the number of defects or frequency of failures prevents all subsystems from operating as described above, the Engineer may reject the entire system integration test results and resume contract time. Provide any necessary corrections and resubmit system integration test results and a request to begin a final acceptance test which may include "as built" plans and a data communications test.

The project will not be accepted, notwithstanding other provisions in the Contract, until the system, inclusive of all subsystems, has operated satisfactorily for a period of 90 days and in full compliance with the plans and specifications after approval of all submitted test results and reports.

- 4.11.1.7. **Consequences of Test Failure.** If a unit fails a test, submit a report describing the nature of the failure and the actions taken to remedy the situation prior to modification or replacement of the unit. If a unit requires modification, correct the fault and repeat the test until successfully completed. Correct minor discrepancies within 30 days of written notice to the Engineer. If a unit requires replacement, provide a new unit and then repeat the test until successfully completed. Malfunctions that will substantially delay receipt and acceptance of the unit will be sufficient cause for rejection of the unit.

Failure to satisfy the requirements of any test is considered a defect and the equipment is subject to rejection by the Engineer. The rejected equipment may be offered again for retest provided all noncompliance has been corrected.

If a failure pattern develops in similar units within the system, implement corrective measures, including modification or replacement of units, to all similar units within the system as directed. Perform the corrective measures at no additional cost to the Department or extension of time in contract period.

- 4.11.1.7.1. **Consequences of Design Approval Test Failure.** If the equipment fails the design approval test, correct the fault and repeat the design approval test until successfully completed.
- 4.11.1.7.2. **Consequences of Demonstration Test Failure.** If the equipment fails the demonstration test, correct the fault and repeat the demonstration test until successfully completed.
- 4.11.1.7.3. **Consequences of Field Acceptance Test Failure.** If the equipment fails the field acceptance test, correct the fault and repeat the field acceptance test until successfully completed.

- 4.11.1.7.4. **Consequence of System Integration Test Failure.** If the equipment fails the system integration test, correct the fault and repeat the systems integration test until successfully completed.
- 4.11.1.7.5. **Consequences of Final Acceptance Test Failure.** If a defect within the system is detected during the final acceptance test, document and correct the source of failure. Once corrective measures are taken, monitor the point of failure until a consecutive 30 day period free of defects is achieved.
- If after completion of the initial test period, the system downtime exceeds 72 hr. or individual points of failure have not operated for 30 consecutive days free of defects, extend the test period by an amount of time equal to the greater of the downtime in excess of 72 hr. or the number of days required to complete the performance requirement of the individual point of failure.
- 4.11.2. **Relocation and Removal.**
- 4.11.2.1. **Pre-Test.** Conduct performance testing prior to removal of radio equipment. Test all functional operations, identified in this Item, of the equipment in the presence of representatives of the Contractor and the Department. Ensure that both representatives sign the test report indicating that the equipment has passed or failed each function. Once removed, the equipment becomes the responsibility of the Contractor until accepted by the Engineer. Compare test data prior to removal and test data after installation. The performance test results after relocation must be equal to or better than the test results prior to removal. Repair or replace those components within the system which failed after relocation but which passed prior to removal.
- 4.11.2.2. **Post Test.** Testing of the radio equipment is for the purpose of relieving the Contractor of maintenance of the system. The Contractor will be relieved of the responsibility for maintenance of the system in accordance with Item 7, "Legal Relations and Responsibilities", after a successful test period. The Contractor will not be required to pay for electrical energy consumed by the system.
- After all existing radio equipment has been installed, conduct approved continuity, stand alone, and equipment system tests. Furnish test data forms containing the sequence of tests including all of the data recorded as well as quantitative results for all tests. Submit the test data forms to the Engineer at least 30 days prior to the day the tests are to begin. Obtain Engineer's approval of test procedures prior to submission of equipment for tests. Provide at least 1 copy of the data forms to the Engineer.
- Conduct an approved stand-alone test of the equipment installation at the field site(s). At a minimum, exercise all stand-alone (non-network) functional operations of the field equipment with all of the equipment installed per the plans as directed by the Engineer. Complete the approved data forms with test results and provide to the Engineer for review and either acceptance or rejection of equipment. Provide at least 30 working days notice prior to all tests to permit the Engineer or his representative to observe each test.
- The Department will conduct approved radio system tests on the field equipment with the Department's central control software. The tests will, as a minimum, exercise all remote control functions and display the return status codes from the equipment.
- If any unit fails to pass a test, prepare a report and deliver the report to the Engineer. Describe in the report the nature of the failure and the corrective action needed. If the failure is the result of improper installation or damage during reinstallation, reinstall or replace the unit and repeat the test until the unit passes successfully, at no additional cost to the Department or extension of time to the contract period.
- 4.12. **Training.** Conduct a training class (minimum of 8 hr., unless otherwise noted in the plans) for up to 10 representatives designated by the Department on procedures of installation, operations, testing, maintenance and repair of all equipment specified within this specification. Submit to the Engineer for approval, 10 copies of the training material at least 30 days before the training begins. Conduct training within the local area unless otherwise authorized by the Engineer.
- 4.13. **Warranty.** Warrant the equipment against defects or failure in design, materials, and workmanship for a minimum of 3 years or in accordance with the manufacturer's standard warranty if that warranty period is



greater. The start date of the manufacturer's standard warranty will begin after the equipment has successfully passed all tests contained in the final acceptance test plan. Any ITS radio equipment with less than 100% of its warranty remaining after the final acceptance test is completed will not be accepted by the Department. Guarantee that equipment furnished and installed for this project performs according to the manufacturer's published specifications. Assign, to the Department, all manufacturer's normal warranties or guarantees on all electronic, electrical, and mechanical equipment, materials, technical data, and products furnished for and installed on the project.

Repair or replace any malfunctioning ITS radio equipment at the Contractor's expense prior to beginning the final acceptance test plan.

Repair or replace, at the manufacturer's option, defective equipment during the warranty period at no cost to the Department. Any replaced units will inherit the remainder of the failed unit's warranty period.

Furnish replacement parts and all equipment, with transportation prepaid, within 10 business days of notification of failure by the Department.

During the warranty period, provide technical support from the supplier. Provide this support within 4 hr. of request, and provided by factory certified personnel or factory certified installers of the equipment.

Provide ongoing software and firmware updates during the warranty period at no cost to the Department. All updates will be tested and approved by the Department prior to installation by the Department.

The Manufacture or the Contractor will maintain an inventory of parts to support maintenance and repair of all ITS radio equipment based on the terms of the warranty.

## 5. MEASUREMENT

This Item will be measured by each ITS radio furnished and installed, installed, relocated, or removed, of the types specified, to provide communication and functionality.

## 6. PAYMENT

- 6.1. **Furnish and Install.** The work performed and materials furnished in accordance with this Item and measured as provided for under "Measurement" will be paid for at the unit price bid for "ITS Radio" of the various types specified.

Types are defined as ITS RADIO X1 (X2/ X3) X4 (X5) where:

- X1 = Sngl (Single Band) or Dual (Dual Band)
- (X2/X3) = Frequencies Used (i.e. 5 GHz for single or 2.4 GHz or 5 GHz for dual)
- X4 = Antenna Configuration = I (Integrated) or C (Connectorized)
- (X5) = Antenna Type = O (Omnidirectional), U (Unidirectional), S (Sector), or P (Parabolic)

This price is full compensation for making fully operational an ITS radio at locations shown on the plans; all radio equipment, voltage converters or injectors, mounting brackets, hardware, cables and connectors; and all testing, training, software, equipment, labor, materials, tools, and incidentals.

- 6.2. **Install Only.** The work performed and materials furnished in accordance with this Item and measured as provided for under "Measurement" will be paid for at the unit price bid for "ITS Radio (Install Only)." This price is full compensation for making fully operational an ITS radio furnished by the Department at locations shown on the plans; and all testing, training, software, equipment, labor, materials, tools, and incidentals.
- 6.3. **Relocate.** The work performed and materials furnished in accordance with this Item and measured as provided for under "Measurement" will be paid for at the unit price bid for "Relocate ITS Radio." This price is

full compensation for relocating and making fully operational an existing an ITS radio as shown on the plans; and all testing, training, software, equipment, labor, materials, tools, , and incidentals.

- 6.4. **Remove.** The work performed and materials furnished in accordance with this Item and measured as provided for under "Measurement" will be paid for at the unit price bid for "Remove ITS Radio." This price is full compensation for removing an existing ITS radio as shown on the plans; and all testing, training, software, equipment, labor, materials, tools, and incidentals.

# Special Specification 6064

## Intelligent Transportation System (ITS) Pole with Cabinet



### 1. DESCRIPTION

Furnish, install, relocate, or remove Intelligent Transportation System (ITS) pole structures and pole mounted cabinets of the various types and sizes at locations shown on the plans, or as directed.

#### 1.1. **ITS Equipment Application.** At a minimum, the ITS pole structure serves as the structural support for the following ITS equipment applications:

- closed circuit television (CCTV),
- fixed video,
- microwave vehicle detector (MVD) or radar vehicle sensing device (RVSD),
- bluetooth equipment,
- wireless radio equipment,
- environmental sensor station (ESS),
- solar power system, and
- pole mounted cabinets.

Ensure the equipment, design, and construction use the latest available techniques with a minimum number of different parts, subassemblies, circuits, cards, and modules to maximize standardization and commonality.

Design the equipment for ease of maintenance. All component parts must be readily accessible for inspection and maintenance. The only tools and test instruments required for maintenance by maintenance personnel must be simple hand held tools, basic meters and oscilloscopes.

### 2. MATERIALS

Provide materials that comply with the details shown on the plans or as directed, the requirements of this Item, and the pertinent requirements of the following Items:

- Item 416, "Drilled Shaft Foundations,"
- Item 421, "Hydraulic Cement Concrete,"
- Item 440, "Reinforcement for Concrete,"
- Item 441, "Steel Structures,"
- Item 442, "Metal for Structures,"
- Item 445, "Galvanizing,"
- Item 449, "Anchor Bolts,"
- Item 496, "Removing Structures,"
- Item 618, "Conduit,"
- Item 620, "Electrical Conductors," and
- Item 740, "Graffiti Removal and Anti-Graffiti Coating".

#### 2.1. **Anchor Bolts.** Provide anchor bolts, nuts, and washers that conform with the details shown on the plans, the requirements of this Item, and in accordance with Item 449, "Anchor Bolts."

Furnish "medium strength, mild steel" anchor bolts for anchor bolts 1 in. or less in diameter, unless otherwise shown on the plans. Furnish "alloy steel" anchor bolts for anchor bolts greater than 1 in. diameter, unless otherwise shown on the plans.

- 2.2. **ITS Poles.** Provide material for pole shafts that conforms to the requirements on the plans and the requirements of ASTM A1011 SS Grade 50, A572 Grade 50, A1011 HSLAS Grade 50, or A595 Grade A. Material thicknesses in excess of those stipulated under A1011 will be acceptable providing it meets all other ASTM A1011 requirements and the requirements of this specification. A595 Grade A material must have a minimum of 50 ksi yield strength adjacent to base welds after fabrication.

Fabrication plants that produce steel ITS poles must be approved in accordance with DMS-7380, "Steel Non-Bridge Member Fabrication Plant Qualification." The Department maintains an MPL of approved ITS pole fabrication plants.

- 2.3. **ITS Pole Mounted Cabinet.** Provide ITS pole mounted cabinets to house ITS field equipment as shown on the plans or as directed. ITS equipment applications inside the cabinet may include, but is not limited to:

- CCTV field equipment,
- fixed video,
- radar vehicle sensing device (RVSD),
- dynamic message sign (DMS) or lane control signal (LCS) controller,
- bluetooth equipment,
- highway advisory radio (HAR),
- media conversion equipment,
- hardened ethernet switch,
- wireless radio equipment,
- environmental sensor station (ESS),
- roadway weather information system (RWIS), and
- solar power system.

Provide the cabinet with fully wired back panels, with all the necessary terminal boards, wiring, harnesses, connectors and attachment hardware for each cabinet location. Place all terminals and panel facilities on the lower portion of the cabinet walls below all shelves.

Typically, an ITS pole mounted cabinet may contain, but is not limited to, the following:

- 19-in. EIA rack,
- adjustable shelves,
- fan and thermostat,
- cabinet light,
- back panel,
- surge protection,
- terminal strips,
- interconnect harnesses with connectors,
- "Door Open" connection to back panel,
- ITS equipment hardware (as listed in Article 2.3), and
- all necessary installation and mounting hardware.

Ensure all cabinets are identical in size, shape and quality for each type as provisioned on the plans or as directed. Equip and configure the cabinet set-up as defined in this Specification and as detailed in the ITS pole with cabinet standards.

Submit details of the cabinet design and equipment layout for each cabinet to the Engineer for review and approval before fabrication.

## 2.4. Electrical Requirements.

- 2.4.1. **Primary Input Power Interruption.** Use material that meets all the requirements in Section 2.1.4., "Power Interruption" of the National Electrical Manufacturers Association (NEMA) Standard TS2 for traffic control system, or most current version.
- 2.4.2. **Power Service Transients.** Use material that meets all the requirements in Section 2.1.6., "Transients" of the NEMA Standard TS2 for traffic control system, or most current version.
- 2.4.3. **Power Service Protection.** Ensure that equipment contains readily accessible, manually resettable or replaceable circuit protection devices (such as circuit breakers or fuses) for equipment and power source protection. Provide circuit breakers or fuses sized such that no wire, component, connector, PC board or assembly is subjected to sustained current in excess of their respective design limits upon failure of any single circuit element or wiring.
- 2.4.4. **Power Distribution Panel.** Provide cabinets with a 120 VAC +/- 5 VAC power distribution panel. Provide the following components on the panel:
- 2.4.4.1. **Duplex Receptacles.** Provide two 120 VAC NEMA Type 5-15R duplex receptacles, or as shown on the plans, protected by a circuit breaker. Permanently label duplex receptacles "For Internal ITS Equipment Only." Install duplex receptacles in an isolated location and provide a clear 1/8 in. thick removable cover made from transparent thermoplastic material to cover the duplex receptacles. Ensure this cover is installed as not to interfere with the functional operation within the cabinet and allows enough space to plug in AC adapters and any necessary equipment. Submit alternative cover material for approval as part of the documentation submittal requirement.
- 2.4.4.2. **Ground Fault Circuit Interrupter (GFCI) Duplex Receptacles.** Provide at least one 120 VAC NEMA Type 5-15R GFCI duplex receptacle, or as shown on the plans, protected by a circuit breaker. This GFCI duplex receptacle is intended for maintenance personnel and is not to be used to serve equipment inside the cabinet. Permanently label GFCI duplex receptacles "For Personnel Use." Install GFCI duplex receptacles in a readily accessible location.
- Provide a 120 VAC, rack mountable outlet strip with 6 NEMA Type 5-15R receptacles with surge suppression. Plug outlet strip into GFCI duplex receptacle and label for personnel use.
- Circuit Breakers.** Determine the ampere rating, quantity, and configuration for main, accessory, spare, and equipment circuit breakers to support ITS equipment loads as shown on the plans. Provide Underwriters Laboratories (UL) 489 listed circuit breakers capable of operating in accordance with Section 2, "Environmental Standards and Test Procedures" of NEMA TS2-2003, or most current version. Provide circuit breakers with an interrupt capacity of 5,000 A. and insulation resistance of 100 megohms at 500 VDC. Provide minimum ampere rating for the following circuit types:
- 2.4.4.2.1. **Main Breaker.** Size the main circuit breaker such that the load of all branch circuits is less than the main circuit breaker ampere rating in accordance with the most current version of the National Electrical Code (NEC).
- 2.4.4.2.2. **Accessory Breaker.** Minimum 15 A. Size accessory circuit breaker to protect lighting, door switches, fans, and GFCI duplex receptacle in accordance with the most current version of the NEC.
- 2.4.4.2.3. **Equipment Breakers.** Minimum 15 A. Size equipment circuit breaker to protect ITS equipment and duplex receptacles in accordance with the most current version of the NEC.
- 2.4.4.2.4. **Spare Equipment Breaker.** Minimum 20 A. Provide one spare equipment breaker for future use.

Furnish breakers, which are in addition to any auxiliary fuses, with the electronic equipment to protect component parts. Provide 3-terminal lightning arrestor to protect the load side of all circuit breakers. Connect

the arrester into the circuit with size 8 AWG or larger stranded copper conductors. Connect arrester to the line filter as recommended by the manufacturer.

- 2.4.4.3. **Power Line Surge Protection.** Provide and install power line surge protection devices that meet the requirements of Article 2.6.
- 2.4.4.4. **Power Cable Input Junction Terminals.** Provide power distribution blocks suitable for use as a power feed and junction points for 2 and 3 wire circuits. Accommodate up to No. 4 AWG conductors on the line side of each circuit. Provide appropriate sized lugs at the junction terminals for conductors larger than a No. 4 AWG when shown on the plans.

Electrically isolate the AC neutral and equipment ground wiring from the line wiring by an insulation resistance of at least 10 megohms when measured at the AC neutral. Color code the AC neutral and equipment grounding wiring white and green respectively in accordance with the most current version of the NEC.

Utilize the back panel to distribute and properly interconnect all cabinet wiring related to the specific complement of equipment called out on the plans. Each item of equipment including any furnished by the Department must have the cable harness properly terminated at terminal boards on the back panel. Ensure all functions available at the equipment connector are carried in the connector cable harness to the terminal blocks from the power distribution panel mounted on the left side panel of the cabinet.

- 2.4.5. **Alternative Power Option.** When shown on the plans, accommodate renewable electrical power source for the design load specified in accordance with "ITS Solar Power System" Specification. Renewable electrical power source may, or may not, be integrated with public utility electrical services, as shown on the plans or as directed. Accommodate solar system components including batteries and solar charge controller when shown on the plans.
- 2.4.6. **Wiring.** Ensure all cabinet wiring identified by the use of insulated pre-printed sleeving slipped over the wire before attachment of the lug or making the connection. Supply enough text on wire markers in plain words or abbreviations with sufficient level of detail so that a translating sheet will not be required to identify the type and size of wire.

Cut all wires to the proper length before assembly. Ensure no wires are doubled back to take up slack. Ensure harnesses to connectors are covered with braided cable sleeves. Secure cables with nylon cable clamps.

Provide service loops to facilitate removal and replacement of assemblies, panels and modules. Use insulated parts and wire rated for at least 600 V. Color-code harnesses and wiring.

Route and bundle all wiring containing line voltage AC separately and shield from all low voltage, i.e., control circuits. Cover all conductors and live terminals or parts, which could be hazardous to maintenance personnel, with suitable insulating material.

Provide AC internal cabinet wiring identified in accordance with the most current version of the NEC. Provide white insulated conductors for AC neutral. Provide green insulated conductors for equipment ground. Provide any color different from the foregoing on other conductors in accordance with the most current version of the NEC. For equipment that requires grounding, provide grounding conductors and do not use conduit for grounding. Provide No. 22 AWG or larger stranded conductors for internal cabinet wiring. Provide conductors that are UL-listed THHN in accordance with the most current version of the NEC. Ensure the insulation has at least a thickness of 10 mm. Ensure all wiring containing line voltage is at least size No. 14 AWG. No strands of any conductor may be trimmed to "fit" the wiring into the breaker or terminal block.

- 2.4.7. **Terminal Strips.** Provide terminal strips located on the back panel that are accessible to the extent that it is not necessary to remove the electronic equipment from the cabinet to make an inspection or connection.

Ensure terminal blocks are 2 position, multiple pole barrier type.

Provide shorting bars in each of the positions provided along with an integral marking strip.

Arrange terminal blocks such that they will not upset the entrance, training and connection of incoming field conductors.

Identify all terminals with legends permanently affixed and attached to the terminal blocks.

Ensure not more than 3 conductors are brought to any 1 terminal screw.

Ensure no electrically energized components or connectors extend beyond the protection afforded by the barriers.

Locate all terminal blocks below the shelves.

Ensure terminals used for field connections are secure conductors by means of a No. 10-32 nickel or cadmium plated brass binder head screw.

Ensure terminals used for interwiring connections, but not for field connections, are secure conductors by means of a No. 5-32 nickel plated brass binder head screw.

Terminate all connections to and from the electronic equipment to an interwiring type block. These blocks will act as intermediate connection points for all electronic equipment input and output.

Provide termination panels that are used to distribute and properly interconnect all cabinet wiring related to the specific complement of equipment as shown on the plans. Provide properly terminated cable harnesses for each item including any furnished by the Department. Provide all functions available at the equipment terminals that are carried in the connector cable harness.

- 2.4.8. **Cabinet Internal Grounding.** The cabinet internal ground consists of at least 1 ground bus-bar permanently affixed to the cabinet and connected to the grounding electrode.

Use bare stranded No. 4 AWG copper wire between bus-bars and between the bus-bar and grounding electrode when providing multiple bus-bars.

Ensure each copper ground bus-bar has a minimum of 12 connection points, each capable of securing bare conductor ranging in size from No 4 AWG to No 14 AWG.

Return AC neutral and equipment ground wiring to these bus-bars.

- 2.4.9. **Door Switch.** Provide door switch meeting the following requirements:

- momentary, pin-type door switch,
- installed in the cabinet or on the door, and
- connected to a terminal so that the equipment installed in the cabinet can confirm input is connected to logic ground when the cabinet door is open.

Provide 2 momentary, pin type door switches for each door provided with the cabinet. Wire 1 switch to turn on the cabinet lights when the door is open and off when the door is closed. Wire the other in parallel to a terminal block to detect a cabinet intrusion condition.

- 2.5. **Mechanical Requirements.**

- 2.5.1. **Size and Construction.** Provide ITS pole mounted cabinets meeting the configuration types detailed in the Statewide ITS pole with cabinet standards.

**Table 1**  
**Minimum Cabinet Internal Dimensions**

	Depth (in.)	Width (in.)	Height (in.)
Type 1	12 <sup>1</sup>	24	24
Type 2	18	24	36
Type 3	20	24	41

1. Minimum dimension for cabinet provided without EIA 19 in. rack assembly.  
Provide 18 in. minimum depth when providing EIA 19 in. rack assembly.

Determine the suitability of the listed cabinet configuration types for the equipment at each field location identified on the plans or as desired.

2.5.2. **Ventilation.** Provide the cabinet with vent openings to allow cooling of electronic components.

Locate louvered air intake vent openings on the lower portion of the cabinet doors and covered fully on the inside with a commercially available disposable 3 layer graded pleated type filter of minimum size 6 in. (high) x 12 in. (wide) for Type 1 cabinet and 12 in. (high) x 16 in. (wide) for Type 2 and 3 cabinets. Size the louvered intake area and filter to allow maximum filtered air flow and cooling, securely mounted so that any air entering the cabinet must pass through the filter. Ensure the cabinet opening for intake of air is large enough to accommodate filter size. Screen the exhaust to prevent entry of insects. Provide the screen openings no larger than 0.0125-sq. in.

Provide a, minimum of 2, thermostatically controlled fans that are adjustable with an adjustment range of 70 to 110°F. Provide a press-to-test switch to test the operation of the fan. Provide a fan with a capacity of at least 110 cfm each.

There is no opening on the roof of the cabinet.

2.5.3. **Lighting.** Provide minimum 15 W fluorescent fixtures above each door inside the cabinet, each with clear shatter proof lens. NEMA TS2 rated light-emitting diode (LED) fixtures are acceptable instead of fluorescent light fixtures. Determine the appropriate number of fixtures to achieve at least 1000 lumens to illuminate the equipment. Position the fixtures to provide illumination to the face of the equipment in the cabinet and not into a technician's eyes.

2.5.4. **Exterior Finish.** Provide cabinets with a smooth aluminum finish and the exterior in its unpainted natural color.

When shown on the plans or as directed, provide cabinets with an anti-graffiti coating in accordance with Item 740 "Graffiti Removal and Anti-Graffiti Coating."

2.5.5. **Serial Number.** Provide the cabinets with a serial number unique to the manufacturer, preceded by an assigned 2 letter manufacturer's code. Provide at least a 0.2 in. letter height. Stamp the entire identification code and number on a metal plate which is riveted to the cabinet, stamp directly on the cabinet wall, or engrave on a metalized mylar plate that is epoxied on the upper right hand cabinet side wall.

2.5.6. **Modular Design.** Provide cabinets that have a modular design and allows ITS equipment to be installed in a variety of mounting configurations as detailed on the plans or as directed.

Provide Type 1 and Type 2 cabinets with 2 unistrut or DIN rail channels on each side wall of the cabinet for mounting power panel and auxiliary ITS equipment. Provide a 19 in. EIA rack assembly only when noted on the plans or in the general notes.

Provide Type 3 cabinets with an EIA 19 in. rack assembly, sized appropriately based on cabinet type inside height dimension and is accessible from either door. Provide a rack with a minimum of one 1RU (RU = rack



unit) horizontal power strip. Provide 2 unistrut or DIN rail channels on each side wall of the cabinet for mounting power panel and auxiliary ITS equipment.

- 2.5.7. **Shelves.** Provide adjustable shelves in each cabinet as required to support the equipment as specified on the plans. Ensure shelf adjustment at 1 RU intervals in the vertical position. Provide shelves that can be mounted to an EIA 19 in. rack cage or unistrut channel as detailed in the standards.

Provide shelves that are removable and capable of supporting the electronic equipment. Provide a minimum of 2 in. between the back and front edge of the shelf to back inside wall and door of the cabinet respectively to allow room for the equipment cables and connectors.

Provide each cabinet type with at least 1 slide out drawer with telescoping drawer guides to allow full extension from the rack frame. Provide at least 1.75 in. (high) x 16 in. (wide), drawer sized appropriately for the cabinet with a hinged lid to allow access to storage space.

- 2.5.8. **Mounting Hardware.** Provide cabinets with the appropriate "U" channel mounting brackets, stiffening plates, anchor bolts, and any other necessary hardware to mount the cabinet on the ITS pole structure. Provide mounting brackets made of 0.250 in. thick steel.

Weld cabinet mounting plates to the pole. This may be done in the field for transport reasons. Do not band the cabinet or mounting plates to the pole. Design the cabinet for pole mounting and reinforce at the points of attachment to the pole

- 2.6. **Surge Protective Devices (SPD).** Provide SPDs to protect electronics from lightning, transient voltage surges, and induced current. Install SPDs on all power, data, video, and any other conductive circuit.

- 2.6.1. **120 V or 120/240 V SPD at Service and ITS Cabinet Power Distribution Panel.** Install an SPD at the closest termination or disconnection point where the supply circuit enters the cabinet. Locate the SPD on the load side of the cabinet power distribution panel breakers and ahead of any and all electronic devices. Keep leads as short as possible with all conductor bends formed to the maximum possible radius. Connect the SPD ground lead directly to the ground bus. Use of wire nuts is prohibited. Install in accordance with manufacturers recommendations.

Provide UL Listed Type 1 or Type 2 SPD and labeled to UL 1449 Third Edition, posted at UL.com, under Certifications UL Category Code VZCA, and have a 20 kA I-nominal rating. Provide SPD rated as NEMA 4. SPD with integral EMI/RFI line filtering may be required if shown on the plans.

Do not exceed 700 V on the Voltage Protection Rating (VPR) on any mode (L-N, L-G, and N-G).

Do not exceed 150 V on the Maximum Continuous Operating Voltage (MCOV).

Equal or exceed 40 kA the SPD surge current rating per mode (L-N), (L-G), (N-G).

Equal or exceed 50 kA or the available short circuit current, whichever is higher for the SPD Short Circuit Current Rating (SCCR).

Provide SPD with directly connected Metal Oxide Varistors (MOV) exceeding 32 mm in diameter with thermal safety disconnectors. Gas tube and spark gap SPD are not be permitted. Ensure each MOV's operational status can be monitored via visual indicator, including N-G mode.

Provide SPD with one set of Normally Open (NO), Normally Closed (NC) Form C contacts for remote monitoring.

Ensure the SPD utilized for AC power does not dissipate any energy and does not provide any series impedance during standby operation. Return the unit to its non-shunting mode after the passage of any surge and do not allow the shunting of AC power

- 2.6.2. **Parallel SPD for 120 V Equipment.** Install an SPD inside of the cabinet on the power distribution to the equipment. Keep leads as short as possible with all conductor bends formed to the maximum possible radius. Connect the SPD ground lead directly to the ground bus. Use of wire nuts is prohibited. Install in accordance with manufacturers recommendations.

Provide UL Listed Type 1 or Type 2 SPD labeled to UL1449 Third Edition, posted at UL.com, under Certifications UL Category Code VZCA, and have a 20 kA I-nominal rating. Provide SPD rated as NEMA 4.

Do not exceed 700 V on the Voltage Protection Rating (VPR) on any mode (L-N and N-G).

Do not exceed 150 V on the Maximum Continuous Operating Voltage (MCOV).

Equal or exceed 40 kA the SPD surge current rating per mode (L-N) and (N-G).

Equal or exceed 50 kA or the available short circuit current, whichever is higher for the SPD Short Circuit Current Rating (SCCR).

Provide SPD with directly connected Metal Oxide Varistors (MOV) exceeding 32 mm in diameter with thermal safety disconnectors. Gas tube and spark gap SPD are not be permitted. Ensure each MOV's operational status can be monitored via visual indicator, including N-G mode.

Provide SPD with one set of Normally Open (NO), Normally Closed (NC) Form C contacts for remote monitoring.

- 2.6.3. **Low-Voltage Power, Control, Data and Signal Systems SPD.** Install a specialized SPD on all conductive circuits including, but not limited to, data communication cables, coaxial video cables, and low-voltage power cables. Ensure that these devices comply with the functional requirements shown in Table 2 for all available modes (i.e., power L-N, N-G; data and signal center pin-to-shield, L-L, L-G, and shield-G where appropriate).

These specialized SPD must have an operating voltage matching the characteristics of the circuit. Ensure that these specialized SPD are UL 497B or UL 497C Listed, as applicable.

Provide the SPD with 3 stages of surge suppression in a Pi ( $\pi$ ) configuration. The first stage (primary side) consists of parallel-connected Gas Discharge Tubes (GDTs). The second stage consists of a series connected resistor or inductor. The third stage (secondary side) consists of parallel-connected transorbs or silicone avalanche diodes (SADs).

Ground the SPD to the DIN rail and a wire terminal connection point. (Grounding solely through the DIN rail connection is not adequate and does not meet the performance or intent of this specification.)

Install coaxial SPDs in a manner that prevents ground loops and resulting signal deterioration. This is usually caused where the cable has different references to ground at either end and connecting SPDs at both ends that have only Pin to Shield protection completes a ground loop circuit through the Shield. SPDs having Pin to Shield protection, and separate Shield to Ground protection are acceptable to eliminate ground loops.

**Table 2**  
**SPD Minimum Requirements**

<b>Circuit Description</b>	<b>Maximum Continuous Operating Voltage (MCOV)</b>	<b>Frequency/ Bandwidth/ Data Rate</b>	<b>Surge Capacity</b>	<b>Maximum Let-Through Voltage</b>
12 VDC	15-20 V	N/A	5 kA per mode (8x20 $\mu$ s)	<150 Vpk
24 VAC	30-55 V	N/A	5kA per mode (8x20 $\mu$ s)	<175 Vpk
48 VDC	60-85 V	N/A	5 kA per mode (8x20 $\mu$ s)	<200 Vpk
Coaxial Composite Video	4-8 V	Up to 1.5 GHz	10 kA per mode (8x20 $\mu$ s)	<100 Vpk
RS422/RS485	8-15 V	Up to 10 Mbps	10 kA per mode (8x20 $\mu$ s)	<30 Vpk
T1	13-30 V	Up to 10 Mbps	10 kA per mode (8x20 $\mu$ s)	<30 Vpk
Ethernet Data	7-12 V	Up to 100 Mbps	3kA per mode (10x1000 $\mu$ s)	<30 Vpk

- 2.7. **Environmental Design Requirements.** Provide cabinets that meet the functional requirements of this Item during and after subsection to any combination of the following requirements:
- ambient temperature range of -30 to 165°F,
  - temperature shock not to exceed 30°F per hour, during which the relative humidity does not exceed 95%,
  - relative humidity range not to exceed 95% over the temperature range of 40 to 110°F, and
  - moisture condensation on all surfaces caused by temperature changes.
- 2.8. **Vibration.** Material used must show no degradation of mechanical structure, soldered components, plug in components or satisfactory operation in accordance with the manufacturer's equipment specifications after being subjected to the vibration test as described in the NEMA standard TS2, Section 2.2.8, "Vibration Test", or the latest revision.

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### 3. FABRICATION

- 3.1. **Anchor Bolts.** Fabricate anchor bolts, nuts, and washers in accordance with the details shown on the plans and Item 449, "Anchor Bolts." Galvanize these items in accordance with Item 445, "Galvanization."
- Provide 2 circular steel templates as shown on the plans conforming to ASTM A36 for each assembly. Tack weld the lower anchorage nuts to the lower template in the shop. Perform this welding with an appropriate jig to ensure that the anchor bolt is perpendicular to the template. Shipping of the anchor bolt cage in its assembled condition is not required.

- 3.2. **ITS Poles.** Fabricate ITS poles in accordance with the details shown on the plans, this Item, and Item 441, "Steel Structures." Alternate designs are not acceptable unless approved by the Department.

Provide properly fitting components. Provide round, octagonal (8-sided), or dodecagonal (12-sided) pole shafts tapered to the heights shown on the plans.

Permanently mark, at a visible location when erected, ITS pole base plates with the design wind speed. Locate the handholes, as shown on the plans, opposite of the direction of traffic flow.

Permanently mark, at a visible location when erected, ITS pole base plates with the fabrication plant's insignia or trademark. Place the mark on the pole base plate adjacent to the handhole access compartment.

Provide circumferential welds only at the ends of the shaft. Provide no more than 2 longitudinal seam welds in shaft sections. Grind or smooth the exterior of longitudinal seam welds to the same appearance as other shaft surfaces. Ensure 100% penetration within 6 in. of circumferential base welds and 60% minimum penetration at other locations along the longitudinal seam welds. Use a welding technique that minimizes acid entrapment during later galvanizing. Hot-dip galvanize all fabricated parts in accordance with Item 445, "Galvanizing."

Fabricate air terminal and bracket assembly to serve as a lightning arrestor in accordance with ITS pole air terminal details and IEEE standards for lightning protection. Bond air terminal with air terminal bracket via clad weld or other approved bolted connection.

- 3.3. **Cabinet.** Continuously weld all exterior seams for cabinet and doors. Fill edges to a radius of 0.03125 in. minimum. Smooth exterior welds.

Welding on aluminum cabinets are done by the gas metal arc (MIG) or gas tungsten arc (TIG) process using bare aluminum welding electrodes. Ensure electrodes conform to the requirements of the American Welding Society (AWS) A5.10 for ER5356 aluminum alloy bare welding electrodes.

Procedures, welding machines and welding machine operators for welding on aluminum must be qualified and conform with the requirements of AWS B3.0, "Welding Procedures and Performance Qualification", and to the practices recommended in AWS C5.6.

Construct all cabinets of welded sheet aluminum with a thickness of at least 0.125 in. meeting NEMA 3R standards. Do not allow wood, wood fiber product, or flammable products in the cabinet. Seal cabinet structure to prevent the entry of rain, dust, and dirt.

Provide a sunshield on the exterior top of the cabinet to reflect solar rays and mitigate temperature build-up inside the cabinet. Construct sunshield out of 0.125 in. thick aluminum and provide a minimum of 1.25 in. clearance above the top of cabinet secured in four locations.

Attach aluminum lifting eyes or ears to the top of the cabinet to permit lifting the cabinet with a sling. Lifting eyes may be permanently fabricated to the cabinet frame as long as they do not interfere with the construction and operation of the sunshield. Manufacturer may provide removable lifting eyes that can be removed after installation. Seal any penetrations to the cabinet exterior or sunshield after removal of lifting eyes.

Ensure cabinets conform to the requirements of ASTM designation: B209 for 5052-H32 aluminum sheet.

- 3.3.1. **Door.** Provide sturdy and torsionally rigid cabinet doors that substantially cover the full area of the cabinet access opening. Attach cabinet doors by a minimum of 2 heavy duty hinges or full length hinge. Provide stainless steel hinge pins.

Fabricate the doors and hinges to withstand a 100 lb. per vertical ft. force applied to the outer edge of the door when open without permanent deformation or impairment of the door or cabinet body when the load is removed.

Fit the cabinet doors with Number 2 Corbin locks and aluminum or chrome plated handles with a minimum 3/8 in. drive pin and a 3 point latch. Design the lock and latch so that the handles cannot be released until the lock is released. Provide a locking ring for a padlock along with a padlock. Provide 2 keys for the door and 2 keys for the padlock with each cabinet. Locate the lock clear of the arc of the handle. Keys must be removable in the locked position only. Mount locks with 2 stainless steel machine screws. Provide cabinet doors with a catch mechanism to hold the door open at 2 positions: 90° and 120°.

Fabricate the door and door stop mechanism to withstand a simulated wind load of 5 lb. per sq. ft. applied to both inside and outside surfaces without failure, permanent deformation, or compromising of door position.

Provide cabinets without auxiliary police doors.

Provide a gasket to act as a permanent and weather resistant seal at the cabinet door facing. The gasket material must be of a non-absorbent material and maintain its resiliency after long term exposure to the outdoor environment.

Provide a gasket with a minimum thickness of 0.25 in. Locate the gasket in a channel provided for this purpose either on the cabinet or on the door. An "L" bracket is acceptable instead of this channel if the gasket is fitted snugly against the bracket to insure a uniformly dust and weather resistant seal around the entire door facing.

3.3.2. **Mechanical Components.** Ensure all external screws, nuts, and locking washers are stainless steel. Do not use self-tapping screws unless specifically approved by the Engineer.

Ensure all parts are made of corrosion resistant material, such as plastic, stainless steel, aluminum or brass.

Ensure all materials used in construction are resistant to fungus growth and moisture deterioration.

Separate dissimilar metals by an inert dielectric material.

## 4. CONSTRUCTION

4.1. **Installation.** Locate ITS poles as shown on the plans unless otherwise directed to secure a more desirable location or to avoid conflict with utilities. Stake the ITS pole locations for verification by the Engineer.

Use established industry and utility safety practices when working near underground or overhead utilities. Consult with the appropriate utility company before beginning such work.

Construct foundations for new ITS poles in accordance with Item 416, "Drilled Shaft Foundations," and the details shown on the plans." Orient anchor bolts as shown on the plans. Install conduit per Item 618, Conduit."

Identify all items of a shipment with a weatherproof tag. This tag minimally must identify manufacturer, contract number, and date and destination of shipment.

Erect poles after foundation concrete has attained its design strength as required on the plans and Item 421, "Hydraulic Cement Concrete." Coat anchor bolt threads and tighten anchor bolts in accordance with Item 449, "Anchor Bolts." Do not grout between the base plate and the foundation.

Mount the pole mounted cabinet to the backside of the ITS pole, with door either parallel or perpendicular to the roadway, away from the direction of traffic flow, as shown on the plans. Mount cabinet plumb in all directions.

For ITS pole sites located on slopes greater than 4H:1V, mount the pole mounted cabinet to the backside of the ITS pole, from the perspective parallel to the roadway with the door facing the direction of traffic flow as shown on the plans.

Install grounding conductor from cabinet and ITS pole air terminal inside a minimum 1 in. PVC conduit within the foundation. Bond grounding conductors to the primary ground rod as part of the grounding ring in accordance with the ITS grounding details.

Construct reinforced maintenance pad, when required, with Class A concrete in accordance with Item 421, "Hydraulic Cement Concrete." Provide reinforcing steel in accordance with Item 440, "Reinforcing Steel."

- 4.2. **Relocation.** Before removal of the existing pole structure or cabinet, disconnect and isolate the power cables from the electric power supply and disconnect all cables (power and communication) from the equipment and remove any ITS equipment, associated mounting brackets, pole mounted cabinet, and cabling from the pole structure. Remove existing pole structure as shown on the plans only at such time as authorized by the Engineer.

Inspect the existing pole structure, with a representative from the Department, and document any evidence of structural stress cracks or fatigue before removal. Remove and deliver to the Department, existing pole structures that fail structural inspection to an address to be supplied by the Department.

Remove the existing pole structure in a manner acceptable to the Engineer using a method that does not cause undue overstress or damage to the structure or appurtenances attached.

Use a crane of sufficient capacity to remove the pole. Disconnect and relocate the existing pole structure from and to the foundation as shown on the plans in a manner acceptable to the Engineer.

When the poles are laid down, place the poles on timber cribbing so that the poles lie reasonably straight to prevent any damage or deterioration.

Maintain safe construction and operation practices at all times. Handle the poles in such a manner during removal so as to prevent damage to the pole's exterior finish. The Contractor will be responsible for any damage to poles.

Unless otherwise shown on the plans, remove abandoned concrete foundations, including steel, to a depth of at least 2 ft. below final grade in accordance with Item 496, "Removing Structures." Backfill the excavation with materials equal in composition and density to the surrounding area. Replace any surfacing material with similar material to an equivalent condition.

Supply all new anchor bolts required for the installation of the ITS pole structure. Match bolt dimensions and lengths previously used or as shown on the plans and as directed. Provide anchor bolts in accordance with Item 449, "Anchor Bolts."

Move existing poles to the locations shown on the plans or as directed. Construct new foundations for relocated ITS poles in accordance with Item 416, "Drilled Shaft Foundations," and the details shown on the plans. Install conduit per Item 618, "Conduit." Install existing poles on new foundations in accordance with Section 4.1, "Installation." Do not grout between the base plate and foundation.

- 4.3. **Removal.** Use established industry and utility safety practices when removing poles and assemblies located near overhead or underground facilities. Consult with the appropriate utility company before beginning work.

Inspect the pole and cabinet, where included, with a representative from the Department, and remove any ITS equipment, associated mounting hardware, and cabling still attached to the pole or inside the cabinet before commencing work. Inspect the existing pole and cabinet in place, with a representative from the Department, and document any evidence of damage to the representative before removal.

Before removal of the existing pole structure or cabinet, disconnect and isolate the power cables from the electric power supply and disconnect all cables (power and communication) from the equipment. Remove and coil existing cabling to the nearest ITS ground box or as identified on the plans.

Carefully remove the cabinet from the pole structure. Avoid damage or injury to surrounding objects or individuals. Deliver the cabinet to an address to be supplied by the Department.

Carefully remove the pole from the foundation in accordance with Item 496, "Removing Structures." Avoid damage or injury to surrounding objects or individuals. Separate the pole at the slip-fitted connections, if applicable. If the pole cannot be separated, transport the complete pole or partially separate the pole to make it transportable. Deliver the pole structure to an address to be supplied by the Department.

Unless otherwise shown on the plans, remove abandoned concrete foundations, including steel, to a depth of 2 ft. below final grade in accordance with Item 496, "Removing Structures." Backfill the excavation with materials equal in composition and density to the surrounding area. Replace surfacing material with similar material to an equivalent condition.

#### 4.4. **Testing.**

4.4.1. **Installation.** Unless otherwise shown on the plans, perform the following tests on cabinets supplied through this Item.

4.4.1.1. **Test Procedures Documentation.** Provide 5 copies of the test procedures to include tests identified in Article 4.4.2 through Article 4.4.4 inclusive and blank data forms to the Engineer for review and comment at least 45 days before testing for each test required on this project. Include the sequence of the tests in the procedures. The Engineer will comment, approve, or reject test procedures within 30 days after Contractor submittal of equipment for tests. Contractor to resubmit if necessary rejected test procedures for final approval within 10 days before testing. Review time is calendar days. Conduct all tests in accordance with the approved test procedures. The Department may witness all tests.

Record test data on the data forms and quantitative results. No bid item measurement or payment will be made until the Engineer has verified the test results meet the requirements of the specification. The data forms for all tests, except design approval tests, must be signed by an authorized representative of the Contractor.

Provide written notice to the Engineer within 48 hr. of discovery of any testing discrepancy performed in testing by the contractor. Furnish data forms containing the acceptable range of expected results and measured values.

4.4.1.2. **Design Approval Test.** Conduct a design approval test on 10% of the total number of cabinets supplied as part of the project, with at least one of each type of cabinet used on the project.

Certification from an independent testing laboratory of a successfully completed design approval test is acceptable. Ensure that the testing by this laboratory is performed in accordance with the requirements of this specification. Failure of independent tests to comply with the requirements of this specification will be grounds for rejection of any certification.

Provide a copy of the certification to the Engineer. The data forms for the design approval tests must be signed by an authorized representative (company official) of the equipment manufacturer or by an authorized representative of an independent testing facility.

Notify the Engineer 10 working days before conducting this testing. The Department may witness all the tests. Perform the following tests:

- 4.4.1.2.1. **Power Service Transients.** Provide equipment that meets the performance requirements, specified in this Item, when subjected to the power service transients as specified in NEMA TS2, Section 2.2.7.2, "Transient Tests (Power Service)", or most current version.
- 4.4.1.2.2. **Temperature and Condensation.** Provide equipment that meets the performance requirements, specified in this Item, when subjected to the following conditions in the order specified below:
- stabilize the equipment at -30°F and test as specified in NEMA TS2, Sections 2.2.7.3, "Low-Temperature Low-Voltage Tests" and 2.2.7.4, "Low-Temperature High-Voltage Tests", or most current version.
  - Allow the equipment to warm up to room temperature in an atmosphere with relative humidity of at least 40%. Operate the equipment for 2 hr., while wet, without degradation or failure.
  - Stabilize the equipment at 165°F and test as specified in NEMA TS2, Sections 2.2.7.5, "High-Temperature High Voltage Tests" and 2.2.7.6, "High-Temperature Low-Voltage Tests", or most current version.
- 4.4.1.2.3. **Relative Humidity.** Provide equipment that meets the performance requirements, specified in this Item, within 30 min. of being subjected to a temperature of 165°F and a relative humidity of 18% for 48 hr.
- 4.4.1.2.4. **Vibration.** Provide equipment that shows no degradation of mechanical structure, soldered components, or plug-in components and will operate in accordance with the manufacturer's equipment specifications after being subjected to the vibration tests as described in NEMA TS2, Section 2.2.8, "Vibration Test", or most current version.
- 4.4.1.2.5. **Power Interruption.** Provide equipment that meets the performance requirements, specified in this Item, when subjected to nominal input voltage variations as specified in NEMA TS2, Section 2.2.10, "Power Interruption Test", or most current version.
- 4.4.1.3. **Stand-Alone Tests.** Conduct a Stand-Alone Test for each cabinet after installation. Exercise all stand-alone (non-network) functional operations consisting of the following, at a minimum:
- 19-inch EIA rack,
  - adjustable shelves,
  - locking mechanism,
  - fan and thermostat,
  - cabinet light,
  - back panel,
  - circuit breakers,
  - surge protection,
  - grounding system,
  - terminal strips,
  - interconnect harnesses with connectors,
  - cabinet attachment to pole,
  - weatherproofing, and
  - "Door Open" connection to back panel.

Notify the Engineer 5 working days before conducting this test. The Engineer may witness all the tests.

- 4.4.1.4. **Consequences of Test Failure.** If a unit fails a test, submit a report describing the nature of the failure and the actions taken to remedy the situation before modification or replacement of the unit. If a unit requires modification, correct the fault and then repeat the test until successfully completed. Correct minor discrepancies within 30 days of written notice to the Engineer. If a unit requires replacement, provide a new unit and then repeat the test until successfully completed. Major discrepancies that will substantially delay receipt and acceptance of the unit will be sufficient cause for rejection of the unit.



Failure to satisfy the requirements of any test is considered a defect and the equipment is subject to rejection by the Engineer. The rejected equipment may be offered again for retest provided all noncompliance has been corrected.

If a failure pattern develops in similar units within the system, implement corrective measures, including modification or replacement of units, to all similar units within the system as directed. Perform the corrective measures within 30 calendar days without additional cost or extension of the contract period.

4.4.1.4.1. **Consequences of Design Approval Test Failure.** If the equipment fails the design approval test, correct the fault within 30 days and then repeat the design approval test until successfully completed.

4.4.1.4.2. **Consequences of Stand-Alone Test Failure.** If the equipment fails the stand-alone test, correct the fault within 30 days and then repeat the stand-alone test until successfully completed.

4.4.2. **Relocation.**

4.4.2.1. **Pre-Test.** Conduct performance testing before removal of ITS pole mounted cabinet. Test the following components or equipment, at a minimum, and document functional operations in the presence of representatives of the Contractor and the Department.

- locking mechanism,
- fan and thermostat,
- cabinet light,
- back panel,
- circuit breakers,
- surge protection system,
- grounding system, and
- "Door Open" connection to back panel.

Ensure that both representatives sign the test report indicating that the equipment has passed or failed each function. Once removed, the equipment becomes the responsibility of the Contractor until accepted by the State. Compare test data before removal and test data after installation.

4.4.2.2. **Post Test.** Testing of the ITS pole mounted cabinet is for the purpose of relieving the Contractor of maintenance of the system. The Contractor will be relieved of the responsibility for maintenance of the system in accordance with Item 7, "Legal Relations and Responsibilities", after a successful test period. The Contractor will not be required to pay for electrical energy consumed by the system.

After all existing ITS equipment has been installed, perform the same functional operation test described under Article 4.4.2.1. Furnish test data forms containing the sequence of tests including all of the data taken and quantitative results for all tests. Submit the test data forms to the Engineer at least 30 days before the day the tests are to begin. Obtain Engineer's approval of test procedures before submission of equipment for tests. Send at least 1 copy of the data forms to the Engineer.

The performance test results after relocation must be equal to or better than the test results before removal. Repair or replace those components within the system which failed after relocation but which passed before removal.

The Department will conduct approved ITS equipment system tests on the field equipment hardware with the central equipment. The tests will, as a minimum, exercise all remote control functions and display the return status codes from the controller.

If any unit fails to pass a test, prepare a report and deliver it to the Engineer. Describe in the report the nature of the failure and the corrective action needed. If the failure is the result of improper installation or damage during reinstallation, reinstall or replace the unit and repeat the test until the unit passes successfully, at no additional cost to the Department or extension of the contract period.

4.5. **Documentation.** Submit documentation for this Item consisting of the following:

4.5.1. **ITS Pole.** Shop drawings should clearly detail the following for the ITS poles submitted for the project:

- physical pole drawings,
- anchor bolts,
- material list,
- lightning suppression,
- weatherheads,
- cabinet Mounting attachments (when cabinet required), and
- grounding system.

4.5.2. **Pole Mounted Cabinet.** Shop drawings should clearly detail the following for ITS pole mounted cabinets when required as shown on the plans:

- dimensions,
- shelves,
- door,
- gasket,
- door look,
- materials list,
- exterior finish,
- ventilation,
- terminal strips,
- harnesses,
- filter,
- power distribution panel,
- surge suppression,
- back panel,
- outlets,
- circuit breakers,
- power cable terminals,
- wiring diagrams,
- cabinet grounding,
- environmental parameters, and
- connectors.

Submit shop drawings, signed, sealed, and dated by a registered professional Engineer in Texas showing the fabrication and erection details for each ITS pole including the ITS cabinet and mounting details in accordance with Item 5, "Control of the Work".

Provide at least 2 complete sets of operation and maintenance manuals in hard copy format in addition to a CD/DVD or removable flash drive that include the following:

- complete and accurate schematic diagrams,
- complete installation procedures,
- complete performance specifications (functional, electrical, mechanical and environmental) on the unit,
- complete parts list including names of vendors for parts not identified by universal part number such as JEDEC, RETMA, or EIA,
- pictorial of component layout on circuit board,
- complete maintenance and trouble-shooting procedures,
- complete stage-by-stage explanation of circuit theory and operation,
- recovery procedures for malfunction, and
- instructions for gathering maintenance assistance from manufacturer.

Identify material which is copyrighted or proprietary in nature as part of the documentation submittal. The Department will take proper provisions to secure such material and not distribute without written approval.

Provide Department with certification documentation verifying conformance with environmental and testing requirements contained in the special specification. Certifications may be provided by the manufacturer or through independent labs.

4.6. **Warranty.** The start date of the manufacturer's standard warranty will begin when the stand-alone test plan has been approved. Any equipment with less than 95% of its warranty remaining at the beginning of the stand-alone test will not be accepted by the Department. Guarantee that equipment furnished and installed

for this project performs according to the manufacturer's published specifications. Warrant the equipment against defects or failure in design, materials, and workmanship for a minimum of 5 years or in accordance with the manufacturer's standard warranty if warranty period is greater. Assign, to the Department, all manufacturer's normal warranties or guarantees on all electronic, electrical, and mechanical equipment, materials, technical data, and products furnished for and installed on the project. Repair or replace, at the manufacturer's option, defective equipment during the warranty period at no cost to the Department.

Repair or replace equipment at the Contractor's expense before beginning testing in the event of a malfunction or failure. Furnish replacement parts for all equipment within 30 days of notification of failure by the Department.

## 5. MEASUREMENT

This Item will be measured as each unit furnished, installed, relocated, or removed as shown on the plans, excluding new foundations and conduit.

## 6. PAYMENT

- 6.1. **Furnish and Install.** The work performed and materials furnished in accordance with this Item and measured as provided for under "Measurement" will be paid for at the unit price bid for "ITS Pole" of the type and height specified, including COSS/OSB extension, and "ITS Pole Mount Cabinet" of the type and configuration specified. This price is full compensation for furnishing, fabricating, and erecting ITS pole structures as shown on the plans; for furnishing, fabricating, and installing ITS pole mounted cabinets as shown on the plans; for furnishing and placing anchor bolts, nuts, washers, and templates; conducting cabinet testing; and equipment, materials, labor, tools, and incidentals necessary to provide an ITS pole structure or pole mounted cabinet complete in place and ready for the attachment of ITS equipment.

New drill shaft foundations will be paid for under Item 416, "Drilled Shaft Foundations." New conduit will be paid for under Item 618, "Conduit."

- 6.2. **Install Only.** The work performed and materials furnished in accordance with this Item and measured as provided for under "Measurement" will be paid for at the unit price bid for "ITS Pole (Install Only)" of the type and height specified, including COSS/OSB extension, and "ITS Pole Mount Cabinet (Install Only)" of the type and configuration specified. This price is full compensation for erecting ITS pole structures and installing ITS pole mounted cabinets furnished by the Department as shown on the plans; for installing and placing anchor bolts, nuts, washers, and templates; conducting cabinet testing; and equipment, materials, labor, tools, and incidentals necessary to provide an ITS pole structure or pole mounted cabinet, complete in place, and ready for the attachment of ITS equipment.

New drill shaft foundations will be paid for under Item 416, "Drilled Shaft Foundations." New conduit will be paid for under Item 618, "Conduit."

- 6.3. **Relocate.** The work performed and materials furnished in accordance with this Item and measured as provided for under "Measurement" will be paid for at the unit price bid for "ITS Pole (Relocate)" of the type and height specified, including COSS/OSB extension, and "ITS Pole Mount Cabinet (Relocate)" of the type and configuration specified. This price is full compensation for removing existing ITS pole structures or pole mounted cabinets as shown on the plans; removing existing foundations; backfilling and surface placement; hauling and erecting ITS pole structures; hauling and installing ITS pole mounted cabinets; furnishing and placing anchor bolts, nuts, washers, and templates; conducting cabinet testing; and equipment, materials, labor, tools, and incidentals necessary to relocate existing ITS pole structures or pole mounted cabinets, complete in place, and ready for the attachment of ITS equipment.

New drill shaft foundations will be paid for under Item 416, "Drilled Shaft Foundations." New conduit will be paid for under Item 618, "Conduit."

- 6.4. **Remove.** The work performed and materials furnished in accordance with this Item and measured as provided for under "Measurement" will be paid for at the unit price bid for "ITS Pole (Remove)" of the type and height specified, including COSS/OSB extension, and "ITS Pole Mount Cabinet (Remove)" of the type and configuration specified. This price is full compensation for removing existing ITS pole structures and pole mounted cabinets as shown on the plans; removing existing foundations; backfilling and surface placement; loading and hauling; and equipment; materials, labor, tools, and incidentals necessary to complete the removal of existing ITS pole structures and pole mounted cabinets.

# Special Specification 6093

## Existing Traffic Management Equipment



### 1. DESCRIPTION

Remove and relocate existing Communication Cabinets, Fiber Hubs, CCTV (Closed Circuit Television) Field Equipment, Lane Control Systems (LCS), Fiber Optic Dynamic Message Sign Systems, Video Imaging Vehicle Detection Systems (VIVDS), Radar Vehicle Sensing Devices, Wireless Ethernet Radios, and remove existing Acoustic Vehicle Sensor Systems at sites shown on plans and as specified within this specification.

### 2. REMOVE EXISTING COMMUNICATION CABINET

2.1. **Materials.** Remove the following equipment at each Communication Cabinet field site as shown on the plans (includes but is not limited to)

- Communication Cabinet (CC) including all internal components.
- Cabling from power source to cabinet.
- Cabling and connectors from telecommunications source to cabinet.
- Communication Cabinet Foundation. Remove to 2 ft. below existing grade and backfill and repair with material to match existing area surrounding removed foundation or as approved by the Engineer.

2.2. **Construction.** Prior to removal of the Communication Cabinet, disconnect and isolate any existing electrical power supply.

Perform removal in strict conformance with the requirements herein stated and the lines, grades, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during removal.

Any portion of the Communication Cabinet, including components, damaged or lost will be replaced by the Contractor at no cost to the Department.

All materials not designated for reuse or retention by the State will become the property of the Contractor and be removed from the project site at the Contractor's expense. Deliver Items to be retained by the State to TransGuide.

Store all Communication Cabinets and associated equipment removed on this project in a secure place as approved by the Engineer until time for relocation to location shown on plans. The Contractor is fully responsible for the equipment until released by the Engineer.

### 3. RELOCATE EXISTING COMMUNICATION CABINET

3.1. **Materials.** Relocate the following equipment at each Communication Cabinet field site shown on the plans (includes but is not limited to):

- Communication Cabinet (CC) with all internal components.

Contractor is responsible for reconfiguring the Local Control Unit and for all provisioning and addressing changes required in the cabinet and at TransGuide.

Construct new Communication Cabinet Foundation for relocated Communication Cabinet as shown in plans and as specified in this specification

Make the relocated Communication Cabinet fully operational and integrated with the TransGuide system.

If plans show radar detectors to be connected to relocated Communication Cabinet instead of surveillance loop detectors, remove existing digital loop vehicle detection units and deliver to TransGuide to make space for radar detector cards.

- 3.2. **Construction.** Perform the relocation in strict conformance with the requirements herein stated and the lines, grades, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during relocation. Any portion of Communication Cabinet assembly damaged or lost will be replaced by the Contractor at his expense.

Make all arrangements for connection to the power supply and telecommunications source including any permits required for the work to be done under the Contract. Furnish and install any required materials not provided by the power or telephone company in accordance with the plans. Provide wire for the power connection at least the minimum size indicated on the plans and insulated for 600 volts. Meet the requirements of the National Electrical Code (NEC).

#### 4. REMOVE EXSITING FIBER HUB

- 4.1. **Materials.** Remove the following equipment at each Fiber Hub field site as shown on the plans (includes but is not limited to):

- Fiber Hub (FH) with external and internal cabinets including all internal components.
- Cabling from power source to cabinet.
- Cabling and connectors from telecommunications source to cabinet.
- LifeLink Equipment (if existing).
- Automated Vehicle Identification System (AVI) (if existing).
- Fiber Hub Foundation. Remove to 2 ft. below existing grade and backfill and repair with material to match existing area surrounding removed foundation or as approved by the Engineer.

- 4.2. **Construction.** Prior to removal of the Fiber Hub, disconnect and isolate any existing electrical power supply.

Perform removal in strict conformance with the requirements herein stated and the lines, grades, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during removal.

Any portion of the Fiber Hub, including components, damaged or lost will be replaced by the Contractor at no cost to the Department.

All materials not designated for reuse or retention by the State will become the property of the Contractor and be removed from the project site at the Contractor's expense.

Deliver LifeLink and AVI equipment to TransGuide.

Store all Fiber Hubs and associated equipment removed on this project in a secure place as approved by the Engineer until time for relocation to location shown on plans. The Contractor is fully responsible for the equipment until released by the Engineer.

#### 5. RELOCAT EXISTING FIBER HUB

The following are the minimum requirements to relocate existing Fiber Hub and field equipment as shown on the plans.

- 5.1. **Materials.** Relocate the following equipment at each Fiber Hub field site shown on the plans (includes but is not limited to):

- Fiber Hub (FH) with external and internal cabinet and all internal components.

Furnish and install all new cables, conduit, junction boxes, grounding (ground rod), mounting hardware, etc. necessary to make the associated CCTV Field Equipment fully operational.

Contractor is responsible for reconfiguring the Local Control Unit, for furnishing, installing, provisioning and making all cross connects for any additional cards (e.g. 52B, 43B, 232, etc.) necessary (both in the Fiber Hub and at TransGuide) for TMS equipment that will be communicating with the relocated Fiber Hub, and for any other provisioning and addressing changes required in the Fiber Hub and at TransGuide. Deliver any cards not needed in relocated Fiber Hubs to TransGuide.

Construct new Fiber Hub Foundation for relocated Fiber Hub as shown in plans and as specified in this specification.

Make the relocated Fiber Hub fully operational and integrated with the TransGuide system.

- 5.2. **Construction.** Perform the relocation in strict conformance with the requirements herein stated and the lines, grades, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance.

Maintain safe construction practices during relocation. Any portion of Fiber Hub assembly damaged or lost will be replaced by the Contractor at his expense.

Make all arrangements for connection to the power supply and telecommunications source including any permits required for the work to be done under the Contract. Furnish and install any required materials not provided by the power or telephone company in accordance with the plans. Provide wire for the power connection at least the minimum size indicated on the plans and insulated for 600 volts. Meet the requirements of the National Electrical Code (NEC).

## 6. REMOVE EXISTING CCTV FIELD EQUIPMENT

- 6.1. **Materials.** Remove the following equipment at each CCTV Field Equipment site as shown on the plans (includes but is not limited to):

- CCTV Field Equipment.
- Cabling from power source to camera.
- Cabling and connectors from telecommunications source to camera.
- CCTV Tube Mount or Camera Pole.
- Lifelink Equipment and associated cabling (if existing).
- Camera Pole Foundation. Remove to 2 ft. below existing grade and backfill and repair with material to match existing area surrounding removed foundation or as approved by the Engineer.

- 6.2. **Construction.** Prior to removal of the CCTV Field Equipment, disconnect and isolate any existing electrical power supply.

Perform removal in strict conformance with the requirements herein stated and the lines, grades, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during removal.

Any portion of the CCTV Field Equipment or Lifelink equipment damaged or lost will be replaced by the Contractor at no cost to the Department.

All materials not designated for reuse or retention by the State will become the property of the Contractor and be removed from the project site at the Contractor's expense.

Deliver LifeLink equipment to TransGuide.

See plans for those locations where removed CCTV Field Equipment is to be delivered to TransGuide.

Store all CCTV Field Equipment and associated equipment removed on this project in a secure place as approved by the Engineer until time for relocation to location shown on plans. The Contractor is fully responsible for the equipment until released by the Engineer.

## 7. RELOCATE EXISTING CCTV FIELD EQUIPMENT

The following are the minimum requirements to relocate existing CCTV Field Equipment as shown on the plans.

7.1. **Materials.** Relocate the following equipment at CCTV Field Equipment sites shown on the plans (includes but is not limited to):

- CCTV Field Equipment.
- CCTV Tube mount or Camera Pole.

New foundation for relocated Camera Pole will be paid for under Item 416.

Furnish and install all new conduit, cables, junction boxes, grounding (ground rod), mounting hardware, etc., to make the relocated CCTV Field Equipment fully operational with the TransGuide system.

7.2. **Construction.** Perform the relocation in strict conformance with the requirements herein stated and the lines, grades, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during relocation.

Use care to prevent damage to any sign support structures. Any portion of CCTV Field equipment, Lifelink equipment, or sign support structure damaged or lost will be replaced by the Contractor at his expense.

Make all arrangements for connection to the power supply and telecommunications source including any permits required for the work to be done under the Contract. Furnish and install any required materials not provided by the power or telephone company in accordance with the plans. Provide wire for the power connection at least the minimum size indicated on the plans and insulated for 600 volts. Meet the requirements of the National Electrical Code (NEC).

## 8. REMOVE EXISTING LANE CONTROL SYSTEM

8.1. **Materials.** Remove the following equipment at each Lane Control System field site as shown on the plans (includes but is not limited to):

- Lane Control System (LCS) heads and mounting hardware. Remove the LCS heads from the structure immediately after the system becomes non-operational.
- LCS Controller and Cabinet.
- Cabling, conduit and connectors from LCS Controller to LCS heads.
- Cabling and connectors from power source to cabinet.
- Cabling and connectors from telecommunications source to cabinet.
- LCS Cabinet Foundation. Remove to 2 ft. below existing grade and backfill and repair with material to match existing area surrounding removed foundation or as approved by the Engineer.

8.2. **Construction.** Prior to removal of the Lane Control System, disconnect and isolate any existing electrical power supply.

Perform removal in strict conformance with the requirements herein stated and the lines, grades, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during removal.



Use care to prevent damage to the sign support structure. Any portion of the Lane Control System or sign support structure, including components, damaged or lost will be replaced by the Contractor at no cost to the Department.

All materials not designated for reuse or retention by the State will become the property of the Contractor and be removed from the project site at the Contractor's expense. Deliver Items to be retained by the State to TransGuide.

Store all Lane Control System equipment removed on this project in a secure place as approved by the Engineer until time for relocation to location shown on plans. The Contractor is fully responsible for the equipment until released by the Engineer.

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## 9. RELOCATE EXISTING LANE CONTROL SYSTEM

The following are the minimum requirements to relocate existing Lane Control System (LCS) and field equipment as shown on the plans.

- 9.1. **Materials.** Relocate the following equipment at each LCS field site shown on the plans (includes but is not limited to):
- Lane Control System heads with all mounting hardware. Furnish and install any additional "L" brackets necessary. Furnish and install additional LCS heads, if shown on the plans, with all necessary mounting hardware, subsidiary to this item.
  - LCS Controller and Cabinet - The Contractor is responsible for configuration and for any addressing changes required.

Furnish and install all new cable and conduit from LCS Controller to LCS heads.

Construct new LCS Cabinet Foundation for relocated LCS cabinet as shown in plans and as specified in this specification.

Make the relocated Lane Control System fully operational with the TransGuide system.

- 9.2. **Construction.** Perform the relocation in strict conformance with the requirements herein stated and the lines, grades, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during relocation.

Use care to prevent damage to any sign support structures. Any portion of LCS System or sign support structure damaged or lost will be replaced by the Contractor at his expense.

Make all arrangements for connection to the power supply and telecommunications source including any permits required for the work to be done under the Contract.

Furnish and install any required materials not provided by the power or telephone company in accordance with the plans. Provide wire for the power connection at least the minimum size indicated on the plans and insulated for 600 volts. Meet the requirements of the National Electrical Code (NEC).

Mount the relocated LCS Heads and shift the existing LCS heads on structures as shown on the plans and as directed by the Engineer. Reuse existing LCS head mounting hardware as permitted by the Engineer. Provide only new and corrosion resistant materials for any additional materials installed under this Item. Any adjustment and/or addition of LCS attachment hardware, support brackets and appurtenances, conduit, etc., necessary for compatibility with LCS positioning recommended by the manufacturer or as directed by the Engineer, will be subsidiary to this Item and not be paid for directly.

Submit to the Engineer for approval, 5 prints of the working drawings for attachment of LCS heads. Show on drawings any additional L brackets, head support connections, and methods of attachment of the heads to the support.

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## 10. REMOVE EXISTING FIBER OPTIC DYNAMIC MESSAGE SIGN SYSTEM (TYPE 2)

10.1. **Materials.** Remove the following equipment at each Dynamic Message Sign (DMS) field site shown on the plans (includes but is not limited to):

- Dynamic Message Sign with all mounting brackets. Remove the sign from the structure immediately after the system becomes non-operational.
- DMS Controller and Cabinet.
- Cabling and connectors from DMS Controller to DMS.
- Cabling and connectors from power source to cabinet.
- Cabling and connectors from telecommunications source to cabinet.
- Cabinet foundation. Remove to 2 ft. below existing grade and backfill and repair with material to match existing area surrounding removed foundation or as approved by the Engineer.

10.2. **Construction.** Prior to removal of the Dynamic Message Sign System, disconnect and isolate any existing electrical power supply.

Perform removal in strict conformance with the requirements herein stated and the lines, grades, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during removal.

Use care to prevent damage to the sign support structure. Any portion of the Dynamic Message Sign System or sign support structure, including components, damaged or lost will be replaced by the Contractor at no cost to the Department.

All materials not designated for reuse or retention by the State will become the property of the Contractor and be removed from the project site at the Contractor's expense. Deliver Items to be retained by the State to TransGuide.

Store all Dynamic Message Sign System equipment removed on this project in a secure place as approved by the Engineer until time for relocation to location shown on plans. The Contractor is fully responsible for the equipment until released by the Engineer.

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## 11. RELOCATE EXISTING FIBER OPTIC DYNAMIC MESSAGE SIGN SYSTEM (TYPE 2)

The following are the minimum requirements to relocate existing Dynamic Message Sign (DMS) and field equipment as shown on the plans.

11.1. **Materials.** Relocate the following equipment at each DMS field site shown on the plans (includes but is not limited to):

- Dynamic Message Sign with mounting hardware.
- DMS Controller and Cabinet.

Furnish and install all new cabling and conduit from the sign to controller cabinet.

Construct new Fiber Optic Dynamic Message Sign Cabinet Foundation for relocated DMS cabinet as shown in plans and as specified in this specification.

Make the relocated DMS system fully operational with the TransGuide system.

- 11.2. **Construction.** Perform the relocation in strict conformance with the requirements herein stated and the lines, grades, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during relocation.

Use care to prevent damage to any sign support structures. Any portion of DMS System or sign support structure damaged or lost will be replaced by the Contractor at his expense.

Make all arrangements for connection to the power supply and telecommunications source including any permits required for the work to be done under the Contract. Furnish and install any required materials not provided by the power or telephone company in accordance with the plans. Provide wire for the power connection at least the minimum size indicated on the plans and insulated for 600 volts. Meet the requirements of the National Electrical Code (NEC).

Mount the relocated DMS sign and shift the existing signs on structures as shown on the plans and as directed by the Engineer. Reuse existing DMS sign mounting hardware as permitted by the Engineer. Provide only new and corrosion resistant materials for any additional materials installed under this Item. Any adjustment and/or addition of DMS attachment hardware, support brackets and appurtenances, conduit, etc., necessary for compatibility with DMS positioning recommended by the manufacturer or as directed by the Engineer, will be subsidiary to this Item and not be paid for directly.

Submit to the Engineer for approval, 5 prints of the working drawings for attachment of DMS signs, except where 2 or more signs are of identical design, in which case a drawing for only one of the signs is necessary. Show on drawings any additional sign brackets, sign support connections, and methods of attachment of the signs to the support.

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## 12. REMOVE EXISTING VIDEO IMAGING VEHICLE DETECTION SYSTEM (VIVDS)

- 12.1. Materials. Remove the following equipment at each VIVDS field site as shown on the plans (may include but is not limited to):

- VIVDS sensors and all mounting brackets.
- Conduit, cables, and connectors from power source and telecommunications source to VIVDS sensors.
- Tube Mount (6 in. x 4 in. x 1/4 in. structural steel) mounted to Overhead Sign Bridge with Air Terminal.
- 40 ft. poles (Roadway Illumination Assembly) with 10 ft. arm.
- Pole drill shaft foundations. Remove to 2 ft. below existing grade and backfill and repair with material to match existing area surrounding removed foundation or as approved.
- VIVDS equipment cabinet with all internal components.
- Junction boxes used for VIVDS cables.
- VIVDS equipment inside TransGuide Communication Cabinet or Fiber Hub.
- Telephone communication link and components.

- 12.2. **Construction.** Prior to removal of the VIVDS, disconnect and isolate any existing electrical power supply, adhering to requirements of the National Electrical Code.

Perform removal in strict conformance with the requirements herein stated and the lines, grades, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during removal.

Any portion of the VIVDS damaged or lost will be replaced by the Contractor at no cost to the Department.

All materials not designated for reuse or retention by the State will become the property of the Contractor and be removed from the project site at the Contractor's expense. Deliver Items to be retained by the State to TransGuide.

Contact Telephone Company and terminate service at locations where telephone communication is disconnected. Provide documentation of discontinuance of service.

Store all VIVDS equipment removed on this project in a secure place as approved by the Engineer until time for relocation to location shown on plans. The Contractor is fully responsible for the equipment until released by the Engineer.

### 13. RELOCATE EXISTING VIDEO IMAGING VEHICLE DETECTION SYSTEM (VIVDS)

The following are the minimum requirements to relocate existing VIVDS as shown on the plans.

13.1. **Materials.** Relocate the following equipment at each VIVDS field site as shown on the plans (may include but is not limited to):

- VIVDS sensors and mounting brackets.
- 40 ft. poles with 10 ft. arm.
- VIVDS equipment cabinet with all internal components.
- VIVDS junction boxes.

Furnish and install new Tube Mount (6 in. x 4 in. x 1/4 in. structural steel) mounted to Overhead Sign Bridge with Air Terminal if shown on plans. Do not reuse tube mounts removed from VIVDS sites. Relocated VIVDS sensor units must be 40 ft. above roadway, therefore new tube mounts of proper length must be furnished and installed for VIVDS being relocated to Overhead Sign Bridges.

Furnish new drill shaft foundations for relocated 40 ft. poles, paid for under Item 416, as shown on plans.

Furnish and install all new conduit, cables, junction boxes, mounting hardware, etc. to make the relocated VIVDS fully operational with the TransGuide system.

13.2. **Construction.** Perform the relocation in strict conformance with the requirements herein stated and the lines, grades, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during relocation.

Use care to prevent damage to any sign support structures. Any portion of VIVDS or sign support structure damaged or lost will be replaced by the Contractor at his expense.

Where VIVDS are relocated to existing OSB's, review the structure and submit mounting details for approval.

Make all arrangements for connection to the power supply and telecommunications source including any permits required for the work to be done under the Contract. Furnish and install any required materials not provided by the power or telephone company in accordance with the plans. Provide wire for the power connection at least the minimum size indicated on the plans and insulated for 600 volts. Meet the requirements of the National Electrical Code (NEC).

Recalibrate each of the relocated VIVDS sensors for the conditions at each site (number of lanes, speeds, etc.) using radar as a control.

Provide phone numbers of new VIVDS locations where new phone service communications have been established.

### 14. REMOVE EXISTING FIBER OPTIC DYNAMIC MESSAGE SIGN SYSTEM (TYPE 3)

14.1. **Materials.** Remove the following equipment at each Dynamic Message Sign (DMS) field site shown on the plans (includes but is not limited to):

- Dynamic Message Sign with all mounting brackets. Remove the sign from the structure immediately after the system becomes non-operational.
- DMS Pole
- DMS Controller and Cabinet.
- Cabling and connectors from DMS Controller to DMS.
- Cabling and connectors from power source to cabinet.
- Cabling and connectors from telecommunications source to cabinet.
- Cabinet foundation. Remove to 2 ft. below existing grade and backfill and repair with material to match existing area surrounding removed foundation or as approved by the Engineer.
- DMS Pole drilled shaft foundation. Remove to 2 ft. below existing grade and backfill and repair with material to match existing area surrounding removed foundation or as approved by the Engineer.

- 14.2. **Construction.** Prior to removal of the Dynamic Message Sign System, disconnect and isolate any existing electrical power supply.

Perform removal in strict conformance with the requirements herein stated and the lines, grades, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during removal.

Use care to prevent damage to the sign support structure. Any portion of the Dynamic Message Sign System or sign support structure, including components, damaged or lost will be replaced by the Contractor at no cost to the Department.

All materials not designated for reuse or retention by the State will become the property of the Contractor and be removed from the project site at the Contractor's expense. Deliver Items to be retained by the State to TransGuide.

Store all Dynamic Message Sign System equipment removed on this project in a secure place as approved by the Engineer until time for relocation to location shown on plans. The Contractor is fully responsible for the equipment until released by the Engineer.

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## 15. RELOCATE EXISTING FIBER OPTIC DYNAMIC MESSAGE SIGN SYSTEM (TYPE 3)

The following are the minimum requirements to relocate existing Dynamic Message Sign (DMS) and field equipment as shown on the plans.

- 15.1. **Materials.** Relocate the following equipment at each DMS field site shown on the plans (includes but is not limited to):

- Dynamic Message Sign with mounting hardware.
- DMS pole.
- DMS Controller and Cabinet.

Furnish and install all new cabling and conduit from the sign to controller cabinet.

Construct new Fiber Optic Dynamic Message Sign Cabinet Foundation for relocated DMS cabinet as shown in plans and as specified in this specification.

New drilled shaft for relocated DMS pole will be paid for under Item 416, "Drilled Shaft Foundations" and constructed as shown in the plans.

Make the relocated DMS system fully operational with the TransGuide system.

- 15.2. **Construction.** Perform the relocation in strict conformance with the requirements herein stated and the lines, grades, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during relocation.

Use care to prevent damage to any sign support structures. Any portion of DMS System or sign support structure damaged or lost will be replaced by the Contractor at his expense.

Make all arrangements for connection to the power supply and telecommunications source including any permits required for the work to be done under the Contract. Furnish and install any required materials not provided by the power or telephone company in accordance with the plans. Provide wire for the power connection at least the minimum size indicated on the plans and insulated for 600 volts. Meet the requirements of the National Electrical Code (NEC).

Mount the relocated DMS sign on the relocated pole as shown on the plans and as directed by the Engineer. Reuse existing DMS sign mounting hardware as permitted by the Engineer. Provide only new and corrosion resistant materials for any additional materials installed under this Item. Any adjustment and/or addition of DMS attachment hardware, support brackets and appurtenances, conduit, etc., necessary for compatibility with DMS positioning recommended by the manufacturer or as directed by the Engineer, will be subsidiary to this Item and not be paid for directly.

Submit to the Engineer for approval, 5 prints of the working drawings for attachment of DMS signs, except where 2 or more signs are of identical design, in which case a drawing for only one of the signs is necessary.

Show on drawings any additional sign brackets, sign support connections, and methods of attachment of the signs to the support.

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## 16. REMOVE EXISTING RADAR VEHICLE SENSING DEVICE (RVSD)

- 16.1. **Materials.** Equipment to be removed at each RVSD site shown on the plans (includes but is not limited to):

- RVSD including all mounting hardware.
- Conduit, cables, connectors from Device to cabinet.
- Dual Loop emulation cards (if existing)

- 16.2. **Construction.** Prior to removal of the RVSD, disconnect and isolate any existing electrical power supply, adhering to requirements of the National Electrical Code.

Perform removal in strict conformance with the requirements herein stated and the lines, grades, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during removal.

Any portion of the RVSD damaged or lost will be replaced by the Contractor at no cost to the Department.

Store all RVSD equipment removed on this project in a secure place as approved by the Engineer until time for relocation to location shown on plans. The Contractor is fully responsible for the equipment until released by the Engineer.

All materials not designated for reuse or retention by the State will become the property of the Contractor and be removed from the project site at the Contractor's expense. Deliver Items to be retained by the State to TransGuide.

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## 17. RELOCATE EXISTING RADAR VEHICLE SENSING DEVICE (RVSD)

The following are the minimum requirements to relocate existing RVSD's as shown on the plans.

- 17.1. **Materials.** Relocate the following equipment at each RVSD field site as shown on the plans (may include but is not limited to):
- RVSD.
- Furnish and install all new conduit, cables, junction boxes, mounting hardware, etc. to make the relocated RVSD fully operational with the TransGuide system.
- 17.2. **Construction.** Perform the relocation in strict conformance with the requirements herein stated and the lines, grades, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during relocation.
- Use care to prevent damage to any support structures. Any portion of RVSD or support structure damaged or lost will be replaced by the Contractor at his expense.
- Where RVSD is relocated to existing OSB or other structure, review the structure and submit mounting details for approval.
- Mounting height and angle of relocated RVSD must be as recommended by manufacturer of RVSD.
- Connect RVSD to communication network as shown in plans.
- Make all arrangements for connection to the power supply and telecommunications source (if shown in plans) including any permits required for the work to be done under the Contract. Furnish and install any required materials not provided by the power or telephone company in accordance with the plans. Provide wire for the power connection at least the minimum size indicated on the plans and insulated for 600 volts. Meet the requirements of the National Electrical Code (NEC).
- Recalibrate the relocated RVSD for the conditions at each site (number of lanes, speeds, etc.) using radar as a control.
- 17.3. Provide phone numbers if necessary of new RVSD locations where new phone service communications have been established.

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## 18. REMOVE EXISTING WIRELESS ETHERNET RADIO (WER) LINK

- 18.1. **Materials.** Remove the following equipment at each WER Link as shown on the plans (includes but is not limited to):
- Wireless Ethernet Radios (1 at each end of link).
  - Mounting brackets at each end of link.
  - Cables, conduit and connectors from network and power connections to wireless Ethernet radios.
  - Wireless Ethernet radio external antennas and mounting brackets (if existing).
- 18.2. **Construction.** Prior to removal of the Wireless Ethernet Radio Link, disconnect and isolate any existing electrical power supply.
- Perform removal in strict conformance with the requirements herein stated and the lines, grades, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during removal.
- Any portion of the Wireless Ethernet Radio Link damaged or lost will be replaced by the Contractor at no cost to the Department.
- All materials not designated for reuse or retention by the State will become the property of the Contractor and be removed from the project site at the Contractor's expense.

See plans for those locations where removed WER Equipment is to be delivered to TransGuide.

Store all WER equipment and associated equipment removed on this project in a secure place as approved by the Engineer until time for relocation to location shown on plans. The Contractor is fully responsible for the equipment until released by the Engineer.

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## 19. RELOCATE EXISTING WIRELESS ETHERNET RADIO (LINK)

19.1. **Materials.** Relocate the following equipment at each WER Link as shown on the plans (includes but is not limited to):

- Wireless Ethernet Radios (1 at each end of link).
- Wireless Ethernet radio external antennas and mounting brackets (if existing).

Furnish and install all new conduit, cables, junction boxes, mounting hardware, etc. to make the relocated WER Link fully operational with the TransGuide system.

19.2. **Construction.** Perform the relocation in strict conformance with the requirements herein stated and the lines, grades, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during relocation.

Use care to prevent damage to any support structures. Any portion of the WER Link or support structure damaged or lost will be replaced by the Contractor at his expense.

Where WER Link is relocated to existing or other structures, review the structures and submit mounting details for approval.

Mounting height and angle of relocated WER must be as recommended by manufacturer of WER.

Provide an interference analysis for each WER Link to identify potential sources of interference. Adjust antenna polarities and channel plans on equipment to minimize interference from other sources.

Ensure that a manufacturer's technical representative is available on site to assist with the installation of the WER Link and communication system configuration. Alignment and configuration of WER radios is critical to obtain maximum throughput.

Connect WER to communication network as shown in plans.

Make all arrangements for connection to the power supply and telecommunications source (if shown in plans) including any permits required for the work to be done under the Contract. Furnish and install any required materials not provided by the power or telephone company in accordance with the plans. Provide wire for the power connection at least the minimum size indicated on the plans and insulated for 600 volts. Meet the requirements of the National Electrical Code (NEC).

Provision the relocated WER Link for the conditions at each site.

19.3. **Testing.** Test the WER Link after installation and provide all test results to the Engineer. Tests will include the following:

- Measure and record transmitter/receiver channel frequency and polarity
- Measure and record transmitter power
- Measure and record receiver fade margin
- Perform a 1 hour Bit Error Rate Test (BERT) and record the results
- Prior to above testing, provide Engineer with a copy of test procedure as well as test date.



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## 20. REMOVE EXISTING ACOUSTIC VEHICLE SENSOR SYSTEM

20.1. **Materials.** Equipment to be removed at each Acoustic Vehicle Sensor System site shown on the plans includes the following:

- All Acoustic Vehicle Sensors including all mounting hardware.
- Controller Card or Cards.
- Cabling and connectors from sensor to cabinet.

20.2. **Construction.** Perform the removal in strict conformance with the requirements herein stated. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during removal.

Any portion of the Acoustic Vehicle Sensor System, including components, damaged or lost will be replaced by the Contractor at no cost to the Department.

Deliver all materials designated to be removed to TransGuide.

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## 21. COMMUNICATION CABINET FOUNDATION

21.1. **Materials.** Construct new Communication Cabinet Foundation for relocated Communication Cabinet as shown on "Cabinet Foundation Details" layout.

21.2. **Construction.** Construct the foundation in strict conformance with the requirements herein stated and the location, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe constructions practices.

21.3. Construct the foundation in accordance with Item 656, "Foundations for Traffic Control Devices".

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## 22. FIBER HUB FOUNDATION

22.1. **Materials.** Construct new Fiber Hub Foundation for relocated Fiber Hub as shown on "Fiber Hub Details" layout.

22.2. **Construction.** Construct the foundation in strict conformance with the requirements herein stated and the location, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe constructions practices.

22.3. Construct the foundation in accordance with Item 656, "Foundations for Traffic Control Devices".

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## 23. LCS CABINET FOUNDATION

23.1. **Materials.** Construct new LCS Cabinet Foundation for relocated LCS Cabinet as shown on "Cabinet Foundation Details" layout.

23.2. **Construction.** Construct the foundation in strict conformance with the requirements herein stated and the location, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe constructions practices.

Construct the foundation in accordance with Item 656, "Foundations for Traffic Control Devices".

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## 24. FIBER OPTIC DYNAMIC MESSAGE SIGN CABINET FOUNDATION

24.1. **Materials.** Construct new DMS Cabinet Foundation for relocated DMS Cabinet as shown on "Cabinet Foundation Details" layout.

- 24.2. **Construction.** Construct the foundation in strict conformance with the requirements herein stated and the location, details and dimensions shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe constructions practices.

Construct the foundation in accordance with Item 656 "Foundations for Traffic Control Devices".

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## 25. TESTING

- 25.1. **Pre-Test.** Conduct performance testing prior to removal of the equipment. Test all functional operations of the equipment in the presence of representatives of the Contractor and TxDOT. Ensure that both representatives sign the test report indicating that the equipment has passed or failed each function. Once removed, the equipment becomes the responsibility of the Contractor until accepted by the State. Compare test data prior to removal and test data after installation. The performance test results after relocation must be equal to or better than the test results prior to removal. Repair or replace those components within the system which failed after relocation but which passed prior to removal.

- 25.2. **Post Test.** Testing of the TMS system is for the purpose of relieving the Contractor of maintenance of the system. The Contractor will be relieved of the responsibility for maintenance of the system in accordance with Item 7, "Legal Relations and Responsibilities", after a successful test period. The Contractor will not be required to pay for electrical energy consumed by the system.

After all TMS equipment has been installed, conduct approved continuity, stand alone, and TMS equipment system tests. Furnish test data forms containing the sequence of tests including all of the data taken as well as quantitative results for all tests. Submit the test data forms to the Engineer at least 30 days prior to the day the tests are to begin.

Obtain Engineer's approval of test procedures prior to submission of equipment for tests. Send at least 1 copy of the data forms to the Engineer.

Conduct an approved stand-alone test of the equipment installation at the field site(s). At a minimum, exercise all stand-alone (non-network) functional operations of the field equipment with all of the equipment installed per the plans as directed by the Engineer. Complete the approved data forms with test results and turn over to the Engineer for review and either acceptance or rejection of equipment. Give at least 30 working days notice prior to all tests to permit the Engineer or his representative to observe each test.

The State will conduct approved TMS equipment system tests on the field equipment with the TransGuide central equipment. The tests will, as a minimum, exercise all remote control functions and display the return status codes from the controller.

If any unit fails to pass a test, prepare a report and deliver it to the Engineer. Describe in the report the nature of the failure and the corrective action needed. If the failure is the result of improper installation or damage during reinstallation, reinstall or replace the unit and repeat the test until the unit passes successfully, at no additional cost to the Department or extension of the contract period.

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## 26. TMS EXPERIENCE REQUIREMENTS

The Contractor or subcontractor must meet the following experience requirements prior to removal and/or relocation of TMS Equipment.

- 26.1. Two years continuous existence by the Contractor or the subcontractor offering services in the installation of Fiber Optic Dynamic Message Signs (DMS), Lane Control Systems (LCS), Fiber Hubs, Communication Cabinets, VIVDS, and Closed Circuit Television cameras (CCTV).
- 26.2. Two completed projects for each of the following items: A minimum of 2 DMS, 2 LCS, 5 CCTV-cameras, 5 VIVDS, 1 Fiber Hub, 1 Communication Cabinet, 5 Radar Vehicle Sensing Devices, and 2 Wireless Ethernet Radio Links where the Contractor or the subcontractor's personnel installed and tested this equipment. All

components listed above need not be part of the same project, however, additional project references may be required in order to meet the minimum number of installed equipment items listed above. The DMS and LCS must have been installed outdoors, permanently mounted on overhead structure(s) with related sign and LCS equipment. The VIVDS, RVSD's, and WER's must have been installed outdoors, permanently mounted with related communication equipment.

The CCTV cameras must have been installed outdoors, permanently mounted on overhead structure(s) with related camera control and transmission equipment. The completed system installations must have been in continuous satisfactory operation for a minimum of 1 year.

Prior to removal and/or relocation of TMS equipment, furnish a statement which outlines contractor or subcontractor's qualifications on system installation experience. Information on system installation experience must include specific projects, locations, and dates for beginning and completion of installation. The statement must also include the name, telephone number, and address of a representative of the agency or business owning the system, who will be contacted by the Department. If requested by the State, demonstrate to the Engineer's satisfaction a working computerized control system with the various equipment items as described above.

Demonstrate a system similar in design to the system proposed. The demonstration must be performed within the state of Texas. The Contractor will not be required nor expected to pay any associated travel or living expenses of the State's representatives to witness the demonstration. Failure to meet the above requirements will be sufficient reason for not being approved for the removal and/or relocation of the TMS equipment.

If any approved subcontractors fail to complete the entire project, qualification material for other subcontractors will have to be submitted and approved before work can be continued.

Any qualification statements which do not correctly address all specified items will be rejected for the reason of insufficient data. Submit the statement 2 weeks prior to removal and/or relocation of TMS equipment to allow the Department adequate time to review and respond to the Contractor for additional information if required. Failure to submit a complete and satisfactory statement will be sufficient reason for not being approved for the removal and/or relocation work. Submit all statements required by this Special Specification to the Traffic Management Engineer located at 3500 N.W. Loop 410, San Antonio, Texas.

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## 27.

### MEASUREMENT

Remove Existing Communication Cabinet (CC) will be measured as each Communication Cabinet with all internal components removed in accordance with this specification and as shown on the plans.

Relocate Existing Communication Cabinet (CC) will be measured as each Communication Cabinet with all internal components relocated, tested and made fully operational with the TransGuide system in accordance with this specification and as shown on the plans.

Remove Existing Fiber Hub (FH) will be measured as each Fiber Hub, including external and internal cabinets with all internal components including but not limited to LifeLink, AVI and camera equipment removed in accordance with this specification and as shown on the plans.

Relocate Existing Fiber Hub (FH) will be measured as each Fiber Hub including external and internal cabinets with all internal components including but not limited to LifeLink, AVI and camera equipment relocated, tested and made fully operational with the TransGuide system in accordance with this specification and as shown on the plans.

Remove existing CCTV Field Equipment will be measured as each CCTV Field Equipment removed in accordance with this specification and as shown on the plans.

Relocate existing CCTV Field Equipment will be measured as each CCTV Field Equipment relocated, tested and made fully operational with the TransGuide system in accordance with this specification and as shown on the plans.

Remove Existing Lane Control System will be measured as each Lane Control System, including field equipment to operate the Lane Control System, removed in accordance with this specification and as shown on the plans.

Relocate Existing Lane Control System will be measured as each Lane Control System, including field equipment to operate the Lane Control System, relocated, tested and made fully operational with the TransGuide system in accordance with this specification and as shown on the plans.

Remove Existing Fiber Optic Dynamic Message Sign System (Type 2) will be measured as each sign, including field equipment to operate the sign, removed in accordance with this specification and as shown on the plans.

Relocate Existing Fiber Optic Dynamic Message Sign System (Type 2) will be measured as each sign, including field equipment to operate the sign, relocated, tested and made fully operational with the TransGuide system in accordance with this specification and as shown on the plans.

Remove Existing Video Imaging Vehicle Detection System will be measured as each VIVDS with all associated components, removed in accordance with this specification and as shown on the plans.

Relocate Existing Video Imaging Vehicle Detection System will be measured as each VIVDS with all associated components relocated, tested, and made fully operational with the TransGuide system in accordance with this specification and as shown on the plans.

Remove Existing Fiber Optic Dynamic Message Sign System (Type 3) will be measured as each sign with pole, including field equipment to operate the sign, removed in accordance with this specification and as shown on the plans.

Relocate Existing Fiber Optic Dynamic Message Sign System (Type 3) will be measured as each sign with pole, including field equipment to operate sign, relocated, tested and made fully operational with the TransGuide system in accordance with this specification and as shown on the plans.

Remove Existing Radar Vehicle Sensing Device will be measured as each RVSD with all associated components, removed in accordance with this specification and as shown on the plans.

Relocate Existing Radar Vehicle Sensing Device will be measured as each RVSD with all associated components relocated, tested, and made fully operational with the TransGuide system in accordance with this specification and as shown on the plans.

Remove Existing Wireless Ethernet Radio (Link) will be measured as each WER Link with all associated components, removed in accordance with this specification and as shown on the plans.

Relocate Existing Wireless Ethernet Radio (Link) will be measured as each WER Link with all associated components relocated, tested, and made fully operational with the TransGuide system in accordance with this specification and as shown on the plans.

Remove Existing Acoustic Vehicle Sensor System will be measured as each system removed in accordance with this specification and as shown on the plans.

Communication Cabinet Foundation will be measured as each foundation installed as shown on plans.

Fiber Hub Foundation will be measured as each foundation installed as shown on plans.

LCS Cabinet Foundation will be measured as each foundation installed as shown on plans.

Fiber Optic Dynamic Message Sign Foundation will be measured as each foundation installed as shown on plans.

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**28. PAYMENT**

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement", will be paid for at the unit price bid for "Remove Existing Communication Cabinet", "Relocate Existing Communication Cabinet", "Remove Existing Fiber Hub", "Relocate Existing Fiber Hub", "Remove Existing CCTV Field Equipment", "Relocate Existing CCTV Field Equipment", "Remove Existing Lane Control System", "Relocate Existing Lane Control System", "Remove Existing Fiber Optic Dynamic Message Sign System (Type 2)", "Relocate Existing Fiber Optic Dynamic Message Sign System (Type 2)", "Remove Existing Video Imaging Vehicle Detection System", "Relocate Existing Video Imaging Vehicle Detection System", "Remove Existing Fiber Optic Dynamic Message Sign System (Type 3)", "Relocate Existing Fiber Optic Dynamic Message Sign System (Type 3)", "Remove Existing Radar Vehicle Sensing Device", "Relocate Existing Radar Vehicle Sensing Device", "Remove Existing Wireless Ethernet Radio Link", "Relocate Existing Wireless Ethernet Radio Link", "Remove Existing Acoustic Vehicle Sensor System", "Communication Cabinet Foundation", "Fiber Hub Foundation", "LCS Cabinet Foundation", "DMS Cabinet Foundation", and "Fiber Optic Dynamic Message Sign Foundation". This price is full compensation for removing and relocating as shown on the plans; for testing, delivery and storage of components designated for retention or reuse; and for all manipulations, materials, labor, tools, equipment, and incidentals.

# Special Specification 6185

## Truck Mounted Attenuator (TMA) and Trailer Attenuator (TA)



### 1. DESCRIPTION

Furnish, operate, maintain and remove upon completion of work, Truck Mounted Attenuator (TMA) or Trailer Attenuator (TA).

### 2. MATERIALS

Furnish, operate and maintain new or used TMAs or TAs. Assure used attenuators are in good working condition and are approved for use. A list of approved TMA/TA units can be found in the Department's Compliant Work Zone Traffic Control Devices List. The host vehicle for the TMA and TA must weigh a minimum of 19,000 lbs. Host vehicles may be ballasted to achieve the required weight. Any weight added to the host vehicle must be properly attached or contained within it so that it does not present a hazard and that proper energy dissipation occurs if the attenuator is impacted from behind by a large truck. The weight of a TA will not be considered in the weight of the host vehicle but the weight of a TMA may be included in the weight of the host vehicle. Upon request, provide either a manufacturer's curb weight or a certified scales weight ticket to the Engineer.

### 3. CONSTRUCTION

Place or relocate TMA/TAs as shown on the plans or as directed. The plans will show the number of TMA/TAs needed, for how many days or hours, and for which construction phases.

Maintain the TMA/TAs in good working condition. Replace damaged TMA/TAs as soon as possible.

### 4. MEASUREMENT

4.1. **Truck Mounted Attenuator/Trailer Attenuator (Stationary).** This Item will be measured by the each or by the day. TMA/TAs must be set up in a work area and operational before a calendar day can be considered measurable. When measurement by the day is specified, a day will be measured for each TMA/TA set up and operational on the worksite.

4.2. **Truck Mounted Attenuator/Trailer Attenuator (Mobile Operation).** This Item will be measured by the hour. The time begins once the TMA/TA is ready for operation at the predetermined site and stops when notified by the Engineer. A minimum of 4 hr. will be paid each day for each operating TMA/TA used in a mobile operation.

### 5. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Truck Mounted Attenuators/Trailer Attenuators (Stationary)," or "Truck Mounted Attenuators/Trailer Attenuators (Mobile Operation)." This price is full compensation for furnishing TMA/TA: set up; relocating; removing; operating; fuel; and equipment, materials, tools, labor, and incidentals.

# Special Specification 6305

## Lane-Use Control Signal System Equipment



### 1. DESCRIPTION

Furnish, install, relocate, or remove lane-use control signal (LCS) system equipment at locations shown on the plans, or as directed.

### 2. MATERIALS

- 2.1. **General.** Furnish, assemble, fabricate, and install only new materials. LCS systems must meet the requirements of National Electrical Manufacturers Association (NEMA) TS4 (current edition) . Provide LCS with solid state display elements and modules. LCS with mechanical or electromechanical elements or shutters are prohibited.

Provide LCS field equipment that is compatible with existing infrastructure and software located in the Department's Traffic Management Centers (TMCs) across the state.

Furnish and install the following devices and components for each LCS system field site and as shown on the plans:

- LCS (quantity of signals shown on the plans),
- LCS Controller,
- LCS Controller cabinet and foundation with pad,
- Cabling, conduit, and connectors from LCS to controller, and
- LCS system software.

LCS system must self-recover from power failure once power is restored.

- 2.2. **Lane-Use Control Signal.** LCS must comply with the *Texas Manual on Uniform Traffic Control Devices* (TMUTCD) and NEMA TS 4 (current edition). Symbols displayed on 18 in. signal faces must have a width and height of at least 18 in.  $\pm$  1/2 in. and be comprised of multiple light-emitting diodes (LED). Provide an LCS with a front that is finished completely in matte black.

LCS must be capable of being independently controlled to display the following indications unless otherwise shown on the plans:

- Steady Red X,
- Steady Downward Green Arrow,
- Steady Yellow X,
- Steady Downward Diagonal Yellow Arrow (Right),
- Steady Downward Diagonal Yellow Arrow (Left) , and
- Blank

- 2.2.1. **Display.** Ensure LCS uses LED technology to display indications on a flat black, non-reflective, rectangular face. LCS must include a dimming feature that automatically adjusts for operation at full brightness during bright ambient light (Day Mode) and reduced brightness during dim ambient light (Night Mode).

The LCS must appear completely blank when not energized. Faint symbols or legends must not be visible under any light condition when power is turned off.

All LED display modules and components must be securely attached to the inside of the LCS enclosure.

LEDs must be rated for 100,000 hr. of continuous operation.

Individual LEDs must be wired such that a catastrophic loss or the failure of one or more LEDs will not result in the loss of the entire display.

- 2.2.2. **LCS Enclosure.** Ensure that the LCS enclosure includes a signal housing, door, fittings, and accessories that are noncorrosive, rust resistant, and capable of withstanding constant exposure to sunlight and corrosive atmospheres. The enclosure and door must be made of 5052-H32 sheet aluminum with a minimum thickness of 0.125 in. The enclosure with door and mounting attachments must provide NEMA 3R protection for internal components and assemblies. Do not use silicone or other sealants to seal joints.

The enclosure door must include a tamper proof hinge and a minimum of 2 captive latches to secure the door closed. The enclosure door seal must include a gasket that mates with a flat surface. The gasket must be made of closed-cell material resistant to ultraviolet, weathering, elevated temperatures, and permanent deformation, and provide a weather-tight seal when the door is closed.

LCS enclosure must be no larger than 36 x 36 in. ( $\pm 5\%$ ) in. unless otherwise shown on the plans.

The entire LCS enclosure must be flat or semi-gloss black. Shiny, reflective or non-black areas must not be visible from the front of the LCS (including door locks). Reflective front faces of any sort are not allowed.

Provide a barrier-type terminal strip or screw connection terminal block in the LCS enclosure for terminating field wires as required. Clearly mark the function of each terminal.

Ensure the housing includes provisions for weather-tight cable entry.

The weight of the LCS enclosure, including all internal electronic components must not exceed 125 lbs.

- 2.3. **LCS Controller.** Provide a LCS controller that is a software-oriented, microprocessor type with resident software stored in non-volatile memory. The LCS controller must retain all programming in nonvolatile memory.

The LCS controller must support "Central" and "Local" modes of operation. In "Central" mode, a central control computer controls the display. In "Local" mode, laptop computer software and direct inputs to the LCS controller controls the display.

The LCS controller must support the following commands:

- Display command from Central (Central mode),
- Display command from a local laptop computer (Local mode),
- LCS Status request, which reports the following:
  - LCS indication
  - Operating Mode
  - Mode of the displayed message if any (local/central)
  - Status of the photoelectric sensors
  - Light output level (day/night)
  - LCS number, location, or ID
- LED status request, which provides an instantaneous indication of the status of all the LEDs (operational/nonoperational),
- Day/Night switching command,
- Sign off command (set to blank-out), and
- Echo command, which is used to receive indications currently displayed.

The LCS Controller must include error detection and reporting features to guard against incomplete or inaccurate information transmission, such as:



- redundancy checking of all data received from the LCS Master Controller, with positive acknowledgement for all transmissions,
- status monitoring for communication line malfunction or break, and
- content validation of all received transmissions for logic and data errors.

The LCS Controller must provide fail-safe operation that prevents improper display in the case of system malfunction. The system must be capable of automatically blanking all LCS heads when communication is lost for a user-configurable amount of time. Failure of any LCS not directly associated with another LCS or communication line must not affect operation of any other non-associated LCS in the system.

- 2.3.1. **Configuration and Management.** Ensure the LCS system is provided with software that allows local and remote configuration and monitoring. Ensure the system configuration data can be saved to a computer and restored from a saved file. Ensure that display failures are recorded and reported by the LCS system. Ensure the system allows controllers to be reset remotely using NTCIP commands.
- 2.3.2. **Communications.** Ensure the LCS Controller includes a minimum of one 10/100 Base TX Ethernet port and one EIA-232 serial port. Ensure that all communication addresses are user programmable. Ensure the LCS supports NTCIP 1203v3.
- 2.4. **LCS Controller Cabinet.** NEMA traffic controller assemblies used in LCS systems must meet the requirements of NEMA TS2-2016. Model 332, 334, and 336 cabinet assemblies must meet the requirements of Caltrans TEES. Furnish field equipment cabinet in accordance with special specification "Intelligent Transportation System (ITS) Ground Mount Cabinet" or special specification "Intelligent Transportation System (ITS) Pole with Cabinet", applicable to cabinet only.
- Ensure that manually resettable or replaceable circuit protection devices (such as circuit breakers or fuses) for equipment and power source protection are provided and readily accessible.
- 2.5. **LCS System Software.** Ensure the LCS system is provided with computer software from its manufacturer that allows an operator to program, operate, exercise, diagnose, and read status of all LCS features and functions using a laptop computer.
- Ensure all licenses required for operation and use of software are included at no additional cost.
- Software updates must be provided at no additional cost during the warranty period.
- 2.6. **Mechanical.** Ensure that all parts are fabricated from corrosion resistant materials, such as plastic, stainless steel, aluminum, or brass.
- Ensure that all screws, nuts, and locking washers are stainless steel. Do not use self-tapping screws.
- Ensure equipment is clearly and permanently marked with manufacturer name or trademark and part number as well as date of manufacture or serial number.
- 2.7. **Electrical.** Ensure LCS system components operate on nominal 120 V<sub>AC</sub>. Provide a transformer with any system device that requires a nominal operating voltage other than 120 V<sub>AC</sub>.
- 2.8. **Environmental.** All LCS system components must operate properly during and after being subjected to the environmental testing procedures described in NEMA TS4, Section 2. The LCS must be able to withstand the maximum wind load defined in the Department's basic wind velocity zone map standard without any damage or loosening from structure.
- 2.9. **Connectors and Harnesses.** External connections exposed to the outdoor environment must be made with weatherproof connectors. Connectors must be keyed to ensure correct alignment and mating.

Ensure all conductors are properly color coded and identified. Ensure that every conductive contact surface or pin is gold-plated or made of a noncorrosive, nonrusting, conductive metal.

- 2.10. **Documentation.** Provide hardcopy operation and maintenance manuals, along with a copy of all product documentation on electronic media. Include the following documentation for all system devices and software:

- operator manuals,
- installation manuals with installation procedures,
- maintenance and troubleshooting procedures, and
- manufacturer's specifications (functional, electrical, mechanical, and environmental).

Provide certification from an independent laboratory that the LCS meets requirements for uniform size of messages, contrast ratios, minimum and maximum luminance, and chromaticity (color coordinated) as listed in section 5 of NEMA TS4 as well as NEMA TS4 environmental requirements for temperature, humidity, transients, vibration, and shock.

Provide certification that LCS electronic equipment meets FCC Class B requirements for electromagnetic interference and emissions.

Ensure the LCS system manufacturer has a quality assurance program for manufacturing LCS as described in this specification. Manufacturer of the LCS must be ISO 9001 certified, or provide a copy of the company quality manual for review.

- 2.11. **Warranty.** Warrant the equipment against defects or failure in design, materials, and workmanship for a minimum of 5 yr. or in accordance with the manufacturer's standard warranty if that warranty period is greater. The start date of the manufacturer's standard warranty will begin after the equipment has successfully passed all tests contained in the final acceptance test plan. Any equipment with less than 90% of its warranty remaining after the final acceptance test is completed will not be accepted by the Department. Guarantee that equipment furnished and installed for this project performs per the manufacturer's published specifications. Assign, to the Department, all manufacturer's normal warranties or guarantees on all electronic, electrical, and mechanical equipment, materials, technical data, and products furnished for and installed on the project.

Malfunctioning equipment must be repaired or replaced at the Contractor's expense prior to completion of the final acceptance test plan. Furnish replacement parts for all equipment within 10 days of notification of failure by the Department.

During the warranty period, technical support must be available via telephone within 4 hr. of the time a call is made by a user, and this support must be available from factory certified personnel.

- 2.12. **Training.** Conduct a training class for a minimum of 8 hr., unless otherwise directed, for up to 10 representatives designated by the Department on installation, configuration, operation, testing, maintenance, troubleshooting, and repair. Submit a training session agenda, a complete set of training material, the names and qualifications of proposed instructors, and proposed training location for approval at least 30 days before the training. Conduct training within the local area unless otherwise directed. Provide 1 copy of course material for each attendee. Ensure that training includes:

- "Hands-on" operation of system software and equipment;
- explanation of all system commands, their function and usage; and
- system "troubleshooting," operation, and maintenance.

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### 3. CONSTRUCTION

- 3.1. **System Installation.** Install LCS system devices per the manufacturer's recommendations. Submit shop drawings of LCS, mounting brackets, supporting structures, and hardware for review. Completion of the work must present a neat, workmanlike, and finished appearance.

Ensure installation and configuration of software on Department computers is included with the LCS system.

- 3.2. **Mechanical Components.** Ensure that all fasteners, including bolts, nuts, and washers with a diameter less than 5/8 in. are Type 316 or 304 stainless steel and meet the requirements of ASTM F593 and ASTM F594 for corrosion resistance. Ensure that all bolts and nuts 5/8 in. and over in diameter are galvanized and meet the requirements of ASTM A307. Separate dissimilar metals with an inert dielectric material.

- 3.3. **Wiring.** All wiring and electrical work supplying the equipment must meet the requirements of the most current version of the National Electrical Code (NEC). Supply and install all wiring necessary to interconnect LCS to the field cabinet and incidentals necessary to complete the work. If additional cables are required, the Contractor must furnish and install them at no additional cost to the Department. Provide conductors at least the minimum size indicated on the plans and insulated for 600 V.

Cables must be cut to proper length prior to assembly. Provide cable slack for ease of removal and replacement. All cable slack must be neatly laced with lacing or straps in the bottom of the cabinet. Ensure cables are secured with clamps and include service loops.

- 3.4. **Electrical Service.** The Contractor is responsible for checking the local electrical service to determine if a modification is needed for the equipment.

- 3.5. **Grounding.** Ensure all LCS system devices, cabinets, and supports are grounded in accordance with the NEC and manufacturer recommendations.

- 3.6. **LCS Placement.** Position LCS and verify that each is capable of being independently controlled to indicate the condition of each lane using the following indications, unless otherwise shown on the plans:

- Steady Red X,
- Steady Downward Green Arrow,
- Steady Yellow X,
- Steady Downward Diagonal Yellow Arrow (Right),
- Steady Downward Diagonal Yellow Arrow (Left), and
- Blank

- 3.7. **Equipment Mounting.** Paint all brackets, anchor bolts, and conduit runs attached to the surface of bridges or sign structures the same color as the bridge beam or truss.

If necessary, mount two 1-1/2 in. aluminum hubs onto the rear of the housing to allow for connection to pipe nipples or other mounting hardware provided by others. Ensure that the inside area of the housing is reinforced at the point where hubs are mounted to prevent fatigue cracks.

- 3.8. **Foundation.** Furnish and install the cabinet foundation with pad as shown on the plans and in accordance with Item 656.

- 3.9. **Relocation of LCS Field Equipment.** Perform the relocation in strict conformance with requirements herein and as shown on the plans. Completion of the work must present a neat, workmanlike, and finished appearance. Maintain safe construction practices during relocation.

Inspect the existing LCS field equipment with a representative from the Department and document any evidence of damage prior to removal. Conduct a pre-removal test in accordance with the testing requirements contained in this Item to document operational functionality. Remove and deliver equipment that fails inspection to the Department.

Prior to removal of existing LCS field equipment, disconnect and isolate the power cables from the electric power supply and disconnect all communication cabling from the equipment located inside the cabinet. Coil and store power and communication cabling inside the cabinet until such time that it can be relocated. Remove existing LCS field equipment as shown on the plans only when authorized by the Engineer.

Use care to prevent damage to any support structures. Any equipment or structure damaged or lost must be replaced by the Contractor (with items approved by the Engineer) at no cost to the Department.

Make all arrangements for connection to the power supply and communication source including any permits required for the work to be done under the Contract. Provide wire for the power connection at least the minimum size indicated on the plans and insulated for 600 V. Meet the most current version NEC requirements.

- 3.10. **Removal of LCS Field Equipment.** Perform removal in strict conformance with the requirements herein and as shown on the plans. Completion of the work will present a neat, workmanlike, and finished appearance. Maintain safe construction practices during removal.

Disconnect and isolate any existing electrical power supply prior to removal of existing field equipment.

Use care to prevent damage to any support structures. Any equipment or structure damaged or lost must be replaced by the Contractor (with items approved by the Engineer) at no cost to the Department.

All materials not designated for reuse or retention by the Department will become the property of the Contractor and be removed from the project site at the Contractor's expense. Deliver items to be retained by the Department to a location shown on the plans or general notes. The Contractor is fully responsible for any removed equipment until released by the Engineer.

- 3.11. **Contractor Experience Requirements.** Contractor or designated subcontractor must meet the following experience requirements:

- 3.11.1. **Minimum Experience.** Three years of continuous existence offering services in the installation of LCS systems.

- 3.11.2. **Completed Projects.** Three completed projects where personnel installed, tested and integrated LCS field equipment. The completed installations must have been in continuous satisfactory operation for a minimum of 1 yr.

- 3.11.3. **Equipment Experience.** One project (may be 1 of the 3 projects in the preceding paragraph) in which the personnel worked in cooperation with technical representatives of the equipment supplier to perform installation, integration, or acceptance testing of the work. The Contractor will not be required to furnish equipment on this project from the same supplier who was referenced in the qualification documentation.

Submit the names, addresses and telephone numbers of the references that can be contacted to verify the experience requirements.

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## 4. TESTING

Ensure that the following tests are performed on equipment and systems unless otherwise shown on the plans. The Department may witness all the tests.

- 4.1. **Test Procedures Documentation.** Provide an electronic copy of the test procedures and blank data forms 60 days prior to testing for each test required on this project. Include the sequence of the tests in the procedures. The Engineer will approve test procedures prior to submission of equipment for tests. Conduct all tests in accordance with the approved test procedures.

Record test data on the data forms as well as quantitative results. Ensure the data forms are signed by an authorized representative (company official) of the equipment manufacturer.

- 4.2. **Design Approval Test.** Ensure that the RVSD has successfully completed a Design Approval Test that confirms compliance with the environmental requirements of this specification.

Provide a certification and test report from an independent testing laboratory as evidence of a successfully completed Design Approval Test. Ensure that the testing by this laboratory is performed in accordance with the requirements of this specification.

- 4.3. **Demonstration Test.** Conduct a Demonstration Test on applicable equipment at an approved Contractor facility. Notify the Engineer 10 working days before conducting this testing. Perform the following tests:
- 4.3.1. **Examination of Product.** Examine each unit carefully to verify that the materials, design, construction, markings and workmanship comply with the requirements of this specification.
- 4.3.2. **Continuity Tests.** Check the wiring to determine conformance with the requirements of this specification.
- 4.3.3. **Operational Test.** Operate each unit for at least 15 min. to permit equipment temperature stabilization and observation of enough performance characteristics to ensure compliance with this specification.
- 4.4. **Stand-Alone Test.** Conduct a Stand-Alone Test for each unit after installation. The test must exercise all stand-alone (non-network) functional operations. Notify the Engineer 5 working days before conducting this test.
- 4.5. **System Integration Test.** Conduct a System Integration Test on the complete functional system. Demonstrate all control and monitor functions for each system component for 72 hr. Supply 2 copies of the System Operations manual before the System Integration Test. Notify the Engineer 10 working days before conducting this testing.
- 4.6. **Consequences of Test Failure.** If a unit fails a test, submit a report describing the nature of the failure and the actions taken to remedy the situation prior to modification or replacement of the unit. If a unit requires modification, correct the fault and then repeat the test until successfully completed. Correct minor discrepancies within 30 days of written notice to the Engineer. If a unit requires replacement, provide a new unit and then repeat the test until successfully completed. Major discrepancies that will substantially delay receipt and acceptance of the unit will be sufficient cause for rejection of the unit.
- If a failure pattern develops in similar units within the system, implement corrective measures, including modification or replacement of units, to all similar units within the system as directed. Perform the corrective measures without additional cost or extension of the Contract period.
- 4.7. **Final Acceptance Test.** Conduct a Final Acceptance Test on the complete functional system. Demonstrate all control, monitoring, and communication requirements and operate the system for 90 days. The Engineer will furnish a Letter of Approval stating the first day of the Final Acceptance Test. The completion of the Final Acceptance Test occurs when system downtime due to mechanical, electrical, or other malfunctions to equipment furnished or installed does not exceed 72 hr. and any individual points of failure identified during the test period have operated free of defects.
- 4.8. **Consequences of Final Acceptance Test Failure.** If a defect within the system is detected during the Final Acceptance Test, document and correct the source of failure. Once corrective measures are taken, monitor the point of failure until a consecutive 30-day period free of defects is achieved.
- If after completion of the initial test period, the system downtime exceeds 72 hr. or individual points of failure have not operated for 30 consecutive days free of defects, extend the test period by an amount of time equal to the greater of the downtime more than 72 hr. or the number of days required to complete the performance requirement of the individual point of failure.
- 4.9. **Relocation and Removal**
- 4.9.1. **Pre-Test.** Tests may include, but are not limited to, physical inspection of the unit and cable assemblies, and each message the LCS is programmed to display. Include the sequence of the tests in the procedures along

with acceptance thresholds. Rejected test procedures must be resubmitted within 10 days. Review time is calendar days. Conduct all tests in accordance with the approved test procedures.

Conduct basic functionality testing prior to removal of LCS field equipment. Test all functional operations of the equipment in the presence of representatives of the Contractor and the Department. Ensure that both representatives sign the test report indicating that the equipment has passed or failed each function. Once removed, the equipment becomes the responsibility of the Contractor until accepted by the Department. Compare test data prior to removal and after installation. The performance test results after relocation must be equal to or better than the test results prior to removal. Repair or replace those components within the system that failed after relocation, but passed prior to removal.

- 4.9.2. **Post-Test.** Testing of the LCS field equipment is to relieve the Contractor of system maintenance. The Contractor will be relieved of the responsibility for system maintenance in accordance with Item 7, "Legal Relations and Responsibilities," after a successful test period. The Contractor will not be required to pay for electrical energy consumed by the system.

After all existing LCS field equipment has been installed, conduct approved continuity, operation, and stand-alone tests. Furnish test data forms containing the sequence of tests including all the data taken as well as quantitative results for all tests. Submit the test data forms to the Engineer at least 30 days prior to the day the tests are to begin. Obtain Engineer's approval of test procedures prior to submission of equipment for tests. Send at least 1 copy of the data forms to the Engineer.

Conduct an approved stand-alone test of the equipment installation at the field sites. At a minimum, exercise all stand-alone (non-network) functional operations of the field equipment installed per the plans as directed by the Engineer. Complete the approved data forms with test results and turn over to the Engineer for review and either acceptance or rejection of equipment. Give at least 30 working days notice prior to all tests to permit the Engineer or his representative to observe each test.

The Department will conduct approved LCS field equipment system tests on the field equipment with the central equipment. The tests will, as a minimum, exercise all remote control functions and confirm communication with field equipment.

If any unit fails to pass a test, prepare and deliver a report to the Engineer. Describe the nature of the failure and the corrective action needed. If the failure is the result of improper installation or damage during reinstallation, reinstall or replace the unit and repeat the test until the unit passes successfully, at no additional cost to the Department or extension of the Contract period.

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## 5. MEASUREMENT

LCS System will be measured as each LCS field site furnished, installed, relocated, made fully operational, and tested or removed in accordance with these Special Specifications or as directed. LCS Signal Unit will be measured as each LCS Signal Unit furnished, installed, relocated, made fully operational, and tested or removed in accordance with these Special Specifications or as directed.

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## 6. PAYMENT

- 6.1. **Furnish and Install System.** The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Lane-Use Control System." This price is full compensation for furnishing, installing, configuring, integrating, and testing the completed installation including all LCS, associated equipment, and mounting hardware necessary for the LCS system site; and for all labor, tools, equipment, any required equipment modification for electrical service, documentation, testing, training, warranty, software, and incidentals necessary to complete the work. Furnishing and installing cabinet, cabinet foundation, conduit, and other items with separate specifications shall be paid separately per their respective Item and specification.

- 6.2. **Furnish and Install Signal Unit.** The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Lane-Use Control Signal Unit." This price is full compensation for furnishing, installing, configuring, integrating, and testing the completed installation including individual LCS, associated equipment, and mounting hardware; and for all labor, tools, equipment, any required equipment modification for power service, documentation, testing, training, warranty, and incidentals necessary to complete the work.
- 6.3. **Install Only.** The work performed and materials furnished in accordance with this Item will be paid for at the unit bid price for "Lane-Use Control System (Install)" and "Lane-Use Control Signal Unit (Install)." This price is full compensation for installing, configuring, integrating, and testing the completed installation including signals, controller, cabinet, cables, associated equipment, and mounting hardware; for furnishing and installing cabinet foundation; and for all labor, tools, equipment, any required equipment modifications for electrical service documentation and incidentals necessary to complete the work. Installation of cabinet, cabinet foundation, conduit, and other items with separate specifications shall be paid separately per their respective Item and specification.
- 6.4. **Relocate.** The work performed and materials furnished in accordance with this Item will be paid for at the unit bid price for "Lane-Use Control System (Relocate)" and "Lane-Use Control Signal Unit (Relocate)." This price is full compensation for relocating and making fully operational existing equipment; furnishing and installing additional cables, conduit, or connectors; testing, delivery, and storage of components designated for salvage or reuse; and all equipment, any required equipment modifications for electrical service, labor, materials, tools, and incidentals necessary to complete the work. Relocation of cabinet, cabinet foundation, and other items with separate specifications shall be paid separately per their respective Item and specification.
- 6.5. **Remove.** The work performed in accordance with this Item will be paid for at the unit bid price for "Lane-Use Control System (Remove)" and "Lane-Use Control Signal Unit (Remove)." This price is full compensation for removing existing equipment as shown on the plans; removing cables and connectors; testing, delivery, and storage of components designated for salvage; and all equipment, labor, materials, tools, and incidentals necessary to complete the work. Removal of cabinet, cabinet foundation, and other items with separate specifications shall be paid separately per their respective Item and specification.

# Special Specification 6322

## Full Color LED Dynamic Message Sign System



### 1. DESCRIPTION

Furnish and install full color matrix Light Emitting Diode (LED) Dynamic Message Signs (DMS) with nominal 18 in. tall characters. With each color DMS, Furnish and install equipment cabinet with DMS controller at the base of the sign's support structure. Provide manufacturer approved end user training.

In the case of conflicts between standards and specifications, the latest State of Texas and Department standards and specifications will govern.

### 2. MATERIALS

2.1. **General Requirements.** All materials furnished, assembled, fabricated or installed under this Item must be new, corrosion resistant and in strict accordance with this item and the pertinent requirements of the following:

- NEMA TS 4, latest edition
- TxDOT Special Specification "Intelligent Transportation System (ITS) Ground Mounted Cabinet"
- TxDOT Special Specification "Intelligent Transportation System (ITS) Pole with Cabinet", applicable to cabinet only
- TxDOT Special Specification, "Dynamic Message Sign System" for installation
- Vendor must be ISO 9001 registered

Furnish no less than 4 licensed copies of vendor software on Department laptops for each DMS, ensuring at least one CD, DVD, or electronic copy is delivered, should the licensed copy need to be reinstalled. Any auxiliary software needed for execution or diagnostics, will be supplied by the vendor.

Ensure that all materials and construction methods necessary to complete the installation conform to the requirements of the Item, the plans and the pertinent requirements of the following items.

- Item 432, "Riprap"
- Item 441, "Steel Structures"
- Item 445, "Galvanizing"
- Item 449, "Anchor Bolts"
- Item 618, "Conduit"
- Item 620, "Electrical Conductors"
- Item 656, "Foundations for Traffic Control Devices"

Ensure that the sign displays symbols, graphics and character fonts approved for DMS use by the TMUTCD and its accompanying reference documents.

Furnish the following equipment at each DMS field site shown on the plans.

- Full Color LED DMS, capable of rear mounting onto sign supports specified on TxDOT Standard Details MDM, OSB and COSS, latest versions
- Sign Controller with software, NTCIP complaint
- DMS mounting brackets and hardware
- Flashing beacons



- Cabling and connectors from power source to DMS connection point as specified by the DMS manufacturer
- Cabling and connectors from telecommunications source to DMS connection point as specified by the DMS manufacturer when required
- Power and communication cabling and connectors from controller to DMS must follow NEMA TS4, Section 4, "Controller to Sign Interface,"
- Communications as shown on the plans
- Pole-mounted control box
- DMS cabinet (pole or ground mount) and electronics
- Documentation
- All incidentals required for installing a DMS sign

- 2.2. **Dynamic Message Sign.** Ensure that the full color matrix LED DMS meets the following requirements: The color LED DMS should enable the display of text, consisting of a string of alphanumeric and other characters. Each character must be formed by a matrix of luminous pixels. All display elements and modules should be solid state. No mechanical or electromechanical elements or shutters should be used. The configuration details of signs described by this specification can be seen in Table 1 below.

Table 1

Sign Type	Large Lift-Face
Matrix Type	Full
LED - Type	AllnGaP Red LEDs InGaN Blue LEDs InGaN Green LEDs
LED Color – Wavelength	Red – 618-630 nm Blue – 460-480 nm Green – 520-540 nm
LED Viewing Angle	30°
LED Pixel Brightness	12,400 cd/m <sup>2</sup> minimum white brightness
Pixel Pitch by Sign Type	Large Lift-Face: 20 mm

### 2.2.1. Physical Characteristics

- 2.2.1.1. **General Construction.** Equipment design and construction must utilize the latest available techniques with a minimum number of different parts, subassemblies, circuits, cards and modules to maximize standardization and commonality. The equipment should be designed for ease of maintenance. All component parts must be readily accessible for inspection and maintenance. Test points must be provided for checking essential voltages.

Securely clamp cables in sign housings with cable attachments. Do not use adhesive attachments.

Ensure performance of the signs will not be impaired due to continuous vibration caused by wind, traffic or other factors. This includes the visibility and legibility of the display.

Ensure the presence of power transients or electromagnetic fields, including those created by any components of the system, will have no deleterious effect on the performance of the system. Ensure the system does not conduct or radiate signals, which will adversely affect other electrical or electronic equipment including, but not limited to, other control systems, data processing equipment, audio, radio and industrial equipment.

- 2.2.1.2. **Lift-Face Housing.** The lift-face housing dimensions and total weight not to exceed 3700 pounds will be as shown in the DMS Manufacturer's specification or in the plans.

The sign housing skin will be constructed of aluminum alloy 5052-H32 which must not be less than 1/8" thick, unless otherwise specified in this document. Framing structural members must be made of aluminum alloy 6061-T6.

The equipment within the sign housing should be protected from moisture, dust, dirt and corrosion. The lift-face housing must meet NEMA 3R enclosure criteria as defined in NEMA Standards Publication 250-2008, "Enclosures for Electrical Equipment (1000 Volts Maximum)."

The sign housings are designed in accordance with AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals – 6th Edition; for wind speeds of up to 140mph. AASHTO group load combinations include total sign weight dead load, ice, and wind loads; and the design meets the fatigue requirements for truck-induced gusts.

The housing face will be a two piece construction, consisting of internal structural members and display modules. The border from the display area to the edges of the sign must be a minimum of 4 in.

Interline spacing should not be less than 1.5% smaller than the desired interline spacing. Additionally, the minimum interline spacing matrix height is one (1) pixel.

There will be no exposed fasteners or welds on the housing face.

The bottom panel of the housing must have a minimum of four drain holes, with snap-in, drain filter plug inserts, in each section formed by internal structural members. Water drain filter plug inserts will be replaceable.

The housing must be designed to accommodate mounting on the rear vertical plane.

- 2.2.1.3. **Surface Finish.** The face (lens panel aluminum mask) will be finished with a matte-black, licensed-factory-applied, KYNAR 500 Resin, fluropolymer-based coating system. The face should be uniform in appearance and completely free from distortion, gouges and any other flaws or defects. A certification must be required from the licensed-factory KYNAR 500 coater for all aluminum face materials.

All other exterior surfaces will be a natural aluminum mill finish. No painted surfaces will be allowed.

All interior surfaces will be a natural aluminum mill finish.

- 2.2.1.4. **Exterior Skin.** The exterior skin of the housing will be 5052-H32 aluminum alloy sheet 0.125 in. minimum thickness.

The number of seams should be kept to a minimum. All exterior seams and joints must be sealed to form a rain and weather tight enclosure.

The skin material must be stitch welded to the internal structural members to form a unitized structure.

- 2.2.1.5. **Mounting.** The exterior mounting assemblies must be 6061-T6 aluminum alloy extrusions, 3/16-in. minimum thickness.

- 2.2.1.6. **Lens Panel Assembly.** The Lens Panel Assembly shall consist of a KYNAR 500 coated aluminum mask over a clear glazing. The aluminum mask must be laminated and sealed to the surface of the glazing using the 3M Scotch VHB joining system or pre-approved equivalent.

- 2.2.1.7. **Lens Panel Aluminum Mask.** The Lens Panel Aluminum Mask will be:

- 0.063 inch minimum thickness
- Finished with a matte-black, licensed-factory-applied, KYNAR 500 Resin, fluropolymer-based coating system.

- Perforated to provide an aperture for each pixel on the display modules. Each aperture should be as small as possible, without blocking the LED light output at the required viewing angle.

2.2.1.8. **Flashing Beacons.** Provide two 12 in. diameter amber LED traffic signal lamp units mounted at the two upper corners of the DMS. Flashing beacons must have 5 in. black back-plates to increase conspicuity. Flashing beacons and assembly should be removed without special tools.

When engaged, the beacons will flash in an alternating "ping-pong" operation. If one flashing beacon fails, the operation of the remaining flashing beacon should not be affected.

The flash rate and duration will be in accordance with the TMUTCD (50-60 fpm). The flashing beacons must be contained on an isolated circuit from the rest of the sign display. The DMS must support the appropriate NTCIP DMS OID Object, as specified in NTCIP DMS standard, and as defined in Lonestar™.

2.2.1.9. **Sign Display.** The face panel clear glazing (if used) should be 90% UV opaque, non-breakable, polycarbonate, or equivalent, minimum 1/8 in. thick, and clear in color. Laminate and seal the glazing to the inside surface of the lens panel.

The sign face must not be subject to fogging, frost and condensation. If an automatically controlled system is used to keep the front face panel free of fog, frost, and condensation, provide ability for monitoring and control by the sign controller. Heat generated by the system should not damage any part of the DMS.

2.2.2. **Environmental Control.**

2.2.2.1. **Ventilation.** The ventilation system must be a positive-pressure, filtered, forced-air system which cools both the display modules and the sign housing interior. Signs with negative pressure systems that use exhaust fans are not acceptable.

The ventilation system must provide a minimum of two (2) sign housing volume air changes per minute at the pressure drop developed throughout the entire ventilation system.

The inlet and exhaust filters must be electrostatic and must be sized to properly accommodate the air flow and pressure drop requirements of the ventilation system. Filters should be easily removable from within the sign housing without the use of tools. Both inlet and exhaust must use environment-friendly, washable, reusable electrostatic filters.

The ventilation system must be activated by multiple temperature sensors. There must be a minimum of one sensor located near the middle of the sign housing interior. There must be an additional temperature sensor located to accurately measure the ambient temperature outside the sign housing. The temperature sensors should have an accuracy of +/- 1.5 degrees C and a range from -40° to +74°C.

The temperatures from the sensors must be continuously measured and monitored by the sign controller. A temperature reading greater than a user selectable critical temperature should cause the sign to go to blank and the sign controller must report this action to the central controller. This user selectable critical temperature must be capable of being changed by the central controller or laptop computer. The central controller and laptop computers should have the ability to read temperature measurements from the sign controller.

The LED modules and electronic equipment must be protected by a fail-safe, back-up fan control system in the event of an electronic fan control failure or shutdown of the sign controller. The housing must be equipped with a thermally-controlled back-up system that will activate the ventilation system automatically in the event that the temperature inside the housing exceeds a pre-set limit.

2.2.2.2. **Temperature and Humidity.** Provide signs and associated field electronics that satisfy at a minimum Section 2.1.5 "TEMPERATURE AND HUMIDITY" of the NEMA TS 4, latest revision.

The enclosed housing with fans must meet the following requirements:

- Provide positive air ventilation system with intake fans
- Fans with permanently lubricated ball or roller bearings
- Fans must allow user configured on- and off- temperature settings
- Adequate air flow should be automatically tested once per day from Lonestar™. Inadequate air flow will cause an error message to be sent to the central control software.

### 2.3. **Optical and Electrical Requirements.**

2.3.1. **LED and Pixel Characteristics.** The LEDs should be AlInGaP or InGaN, Precision Optical Performance T 1-3/4 diodes. The LEDs must be rated for 100,000 hr. continuous operation at 30mA drive current, with less than 30% lumen depreciation. The cone perimeter will be defined by its 50% intensity points. The LEDs must have standoffs that hold the base of the LEDs 3.5mm + 1.0mm off the printed circuit board to promote cooling of the LEDs. Through-hole LEDs mounted flush to the printed circuit board are not acceptable. Surface-mount LEDs are not acceptable. The brightness of each LED will be measured in accordance with the CIE Test Method A, as described in CIE 127-1997, Technical Report: Measurement of LEDs. The LED brightness and color bins that are used in each pixel will be provided to the engineer for approval. Certification must be provided, with the submittals, from the LED manufacturer that demonstrates that the LEDs were tested and binned in accordance with the CIE Test Method A.

The LEDs in each pixel must be clustered to maximize long range visibility. All pixels will have equal color and on-axis intensity. All pixels in all signs in this project, including the spare parts, will have equal color and on-axis intensity. The method used to provide the equal color and intensity, as stated above, must be included in the submittals and approved by the Engineer.

The pixel strings should be powered from a regulated DC power source and the LED current must be maintained at 28 milliamperes or less per string to maximize life of the pixel. The failure of an LED in one string within a pixel should not affect the operation of any other string or pixel. Pixel power drawn from the DC supplies must not exceed 1.5 watts per pixel, including the driving circuitry.

The LEDs must be individually mounted directly to a printed circuit board and should be easily replaceable and individually removable using conventional electronics repair methods.

2.3.2. **Display Module and Driver Boards.** Each display module consists of a display board with a matrix of LED pixels. The pixels are mounted on the front side of the display module.

Each driver board must have the capability to control a minimum of nine display modules. The driver board connects to the sign interface circuits and passes information to the associated display modules, which control the character pixels. The driver board must receive control signals and display data from the sign controller. The display module must contain the control and memory elements and provide the signals to switch and read the LED pixels.

The driver boards must connect to a single control cable common to each line of display modules.

The LED display board must contain all LEDs required to form a matrix of pixels. Pixels should be arranged uniformly to display a dot-matrix character of the desired height and width. The height of a standard character will be defined as the distance from the lowest point of the lowermost pixel of the character to the highest point of the uppermost pixel of the character. Smaller characters are not acceptable.

The display modules should be rectangular, and have an identical horizontal and vertical pitch between pixels.

The separation between the last column of one module and the first column of the next should be equal to the horizontal distance between the columns of a single display module.

The separation between the last row of one module and the first row of the next must be equal to the horizontal distance between the rows of a single display module.

All LEDs must be individually and directly mounted to the LED circuit board to form the LED display board. The LED circuit board must be a single, 0.062 in., FR4, flat black printed circuit board. The LED display board should support the driver board.

All LEDs must be mounted so that their mechanical axis is normal +/- 1.00 degree to the face of the sign to ensure brightness uniformity over the face of the sign.

Design modules such that failure of one or more pixels, does not affect the operation of other pixels. Ensure failure of any module does not affect the operation of other modules.

Conformal coat Printed Circuit Boards (PCB) with a minimum 0.005 in. (5 mil) thick silicone resin or acrylic resin conformal coat. Use coating material that complies with military specification MIL-I-46058C Type SR and IPC-CC-830.

- 2.3.3. **Display Assembly.** Each display module must include an LED display circuit board. A single data exchange and addressing cable must connect the driver board to the LED boards it controls that are not directly attached to the driver board. The driver board must contain the solid state electronics necessary to control pixel data and read pixel status.

All LED boards and driver boards should be fully interchangeable and must not require any manual addressing switches or adjustment when interchanged or placed in service.

The display modules must be mounted to the display face in a manner that facilitates easy and rapid removal of each display module without disturbing adjacent display modules. Replacement of a complete display module should be possible without the use of any tools.

- 2.3.4. **Legibility.** The characters should be legible under all light conditions at a distance of 350 feet within the degree cone of vision centered around the optical axis of the pixel. The cone perimeter will be defined by its 50% intensity points.

The sign must be the proper brightness in all lighting conditions for optimum legibility. It must be bright enough to have a good target value, but not to the point where the pixels bloom, especially in low ambient light level conditions.

The brightness and color of each pixel should be uniform over the entire face of the sign within the cone of vision from 350 feet to 50 feet in all lighting conditions. Non-uniformity of brightness or color over the face of the sign under these conditions will be cause for rejection of the sign.

The sign and its controller must meet a minimum Section 8.8 "BRIGHTNESS CONTROLS" of the NEMA TS 4, latest revision. The controller should monitor and self-adjust the brightness of the display. Ensure brightness is manually and automatically adjustable from the local sign controller. Enable brightness control to be set to specific levels from the sign controller (local), laptop (remote) and Lonestar™ (central) software.

- 2.3.5. **Characters Displayed.** The signs must be capable of displaying ASCII characters 32 through 126 (including all upper and lower case letters and digits from 0 to 9) at any location in a message line. If shown in the plans, a special graphics character should be substituted for any of these characters.

The sign should normally display single stroke (5 X 7) characters with double-column spacing between characters. The sign must also be able to display compressed (4 X 7) or double-stroke (7 X 7) nominal character fonts or change the default spacing between characters. The spacing options should be one, two or three pixel columns. Each font may be edited and downloaded to the sign controller from the central controller or laptop computer at any time without any software or hardware modifications.

The sign must have the capability to display automatically-scaled character fonts applied to a given message to maximize the font size of the displayed text, up to the full height of the display for a single line of text.

Full matrix DMS capable of displaying 3 rows of 18 in. tall characters, displaying 18 to 20 characters on each row. Color sign with a minimum of 432 pixel columns and 96 pixel rows. Pixel pitch must be 20 mm

- 2.3.6. **LED DC Power.** The voltage to the LED modules and associated electronics must not exceed 25 VDC. Functioning supplies must current-share to within 10%. The combined effect of line (97 to 135 VAC) and load (10% to 100%) on the power supplies shall not exceed 1.0%. The power supplies should have an efficiency of 75%.

The power supplies must be paralleled in a diode OR configuration and supply enough power to run 100% of all pixels at 100% duty cycle at 65 degrees C (149 degrees F). Functioning supplies must current-share to within 10%.

There should be a power distribution system that connects each display module to all power supplies and minimizes the voltage drop over the face of the sign. The voltage measured at the display modules must not vary more than 50 millivolts over all the display modules in the sign with 17 pixels on at 100% intensity in each and every display module.

- 2.3.7. **Photoelectric Sensor Devices.** Three (3) photocells must be installed in the sign. These devices should permit automatic light intensity measurement of light conditions at each sign location. These photocells must be mounted in a manner to measure front, rear and ambient light conditions.

Automatic adjustment of the LED brightness should occur in small enough increments so that the brightness of the sign changes smoothly, with no perceivable brightness change between adjacent levels. Provision must be made to prevent perceivable brightening of the sign due to stray headlights shining upon the photo sensors at night.

Pixel brightness should be controlled by pulse width modulation of the DC current. The pixel current waveform must have a frequency of 100 +/- 5 Hz at nighttime brightness levels and greater than 2400 Hz at daytime brightness levels with an adjustable duty cycle of 0.1% to 99.9% in 0.5% or finer increments.

There should be a means to adjust how rapidly the sign responds to changes in ambient light as measured by the photocells. This can be used, for example, to prevent the sign from changing its brightness due to a vehicle's headlight momentarily shining on the sign. The adjustment must be made from the central controller or laptop computer and should have two different settings, one for daytime control and one for nighttime control, with the day/night ambient light threshold also being an adjustable value. In addition, there should be a means to specify different weighting factors for each photocell, to specify how prominently each photocell figures in the calculation of nighttime ambient light.

- 2.3.8. **Power.** The sign and its sign controller must be capable of operating with 120/240 VAC plus or minus 8%, 20 A per leg, 60 Hz, single-phase power.

Inside the sign housing, all 120 VAC service lines must be independently protected by a thermo magnetic circuit breaker at the sign housing entry point. All 120 VAC wiring must be located in conduit, pull boxes, raceways or control cabinets as required by the latest version of the National Electric Code (NEC). No 120 VAC wiring must be exposed to the inside or outside of the sign housing. The sign housing should not be considered as a raceway or control cabinet.

The presence of power transients or electromagnetic fields, including those created by any components of the system, shall have no deleterious effect on the performance of the system. The system shall not conduct or radiate signals which will adversely affect other electrical or electronic equipment including, but not limited to, other control systems, data processing equipment, audio, radio and industrial equipment.

The sign must have a 20 A two-pole (common trip) main, 120/240 VAC, single phase, four wire load center with 20 circuit capability. Each circuit in the sign must be powered from a separate circuit breaker.

The system power and communication lines should be protected by transient voltage suppression devices including MOVS and spark gap arrestor.

The efficiency of the power supply must be 80% or greater when operated at 50% to 100 % of maximum load. The power supply should have a power factor of 0.95 or greater at operating voltage from 50% to 100% of maximum load.

A minimum of two power supplies must be provided for redundancy. Power supplies should be designed such that if one supply fails, the remaining supply must be able to operate 100% of the pixels at full brightness. Supply 50%, 80%, and 100% full-load calculations for Volt-Amps-Reactive (VARs) and Volt-Amps (VA) loads consumed by DMS sign, operating at 240 VAC.

The sign controller must monitor and report to Lonestar™ the output voltage and functional status of regulated Direct-Current (DC) power supplies located in the DMS by monitoring diagnostic outputs located on these power supplies.

Ensure GFCI devices protect all service outlets, both at the sign display and in the cabinet. At a minimum, there should be one duplex outlet at the display, and one duplex outlet inside the cabinet.

Ensure AC cables are type Cross-Linked High Heat Water (XHHW) and sized as required by the NEC.

Ensure flashing beacons are on an isolated circuit breaker capable of being turned off without affecting the sign function.

- 2.3.9. **Transient Test Requirements.** The sign housing electronics and the control cabinet shall be separately capable of withstanding a high-energy transient having the following characteristics repeatedly applied to the AC input terminals:

A ten microfarad oil filled capacitor charged to 1000 VDC  $\pm$ 5% must be discharged into the power input terminals a minimum of three times for each polarity. Immediately following this test the unit under test should perform all of its defined functions upon the restoration of normal AC power.

- 2.4. **Field Equipment Cabinet.** With each color DMS, furnish one ground mount or pole mount cabinet configurations as specified in the plans. Furnish cabinet meeting minimum materials and construction requirements of Special Specifications Item, "Intelligent Transportation Systems (ITS) Ground Mounted Cabinet" and "Intelligent Transportation System (ITS) Pole with Cabinet" (applicable to cabinet only) with additional features described herein.

Provide the following items in the field equipment cabinet:

- Power-on indicator
- Room for communication devices (shelf mounted and rack-mounted switches, modems, terminal servers)
- Local/remote switch and LED indicator
- Alarm switch when the cabinet has been opened and capable of communicating with Lonestar™
- Provide a full-height standard EIA 19-inch rack. The rack must be secured within the cabinet by mounts at the top and bottom
- Provide a minimum of one empty pull out drawer. Ensure drawer is capable of supporting a 20 lb. load
- Provide outdoor rated markings and identification on the power protection panel

- 2.5. **Sign Controller.** Provide a sign controller with resident software. Ensure controller has a what-you-see-is-what-you-get (WYSIWYG) LCD display, representing the message being displayed. Perform all communication, control, and feedback functions for the DMS through the local sign controller. Ensure sign controller supports all Lonestar™ software functionality.

- Include a front panel user interface with graphical LCD and/or keypad for direct operation and diagnostics as described herein (keypad not needed for touchscreen interface)

Send and receive messages from the sign controller through the communication demarcation point in cabinet via the communications port housed in the field equipment cabinet. Furnishing and installation of communications and power cables from the cabinet to the utility service or the communications demark is described in Special Specification "Dynamic Message Sign System".

The controller will have power-up and auto-restart capabilities with a programmable default message (including a blank message) when recovering from a power off condition. A hardware watch dog circuit will be utilized to provide automatic reset to the controller and the modem. The central computer must be capable of remotely commanding a controller and modem reset.

The sign controller must be capable of being controlled from the central controller or the laptop computer.

- 2.5.1. **Modes of Operation.** Ensure the modes of operation are consistent with those defined in NTCIP, specifically Local, Central, and Central Override.

Ensure the sign controller can monitor individual sensor(s) status. Controller shall be able to pass sensor information to Lonestar™ such as Power Status Data, Temperature Sensor Data, and Light Sensor Data as defined in NTCIP 1203. The controller shall have cabinet door-open sensor and report back door-open status to Lonestar™.

In the event of a communications failure with the DMS central control software, the local sign controller sets the sign to blank, all pixels off, after a user-defined number of minutes unless communications are restored within this period.

The local sign controller must be remotely resettable from the central control software.

During any time the controller is in reset or bootup condition the message should be in neutral state (default, blank, all pixels off.)

DMS sign controller should support the storage and use of a minimum of 255 TMUTCD graphics which can be formatted and displayed.

## 2.6. Communication

- 2.6.1. **Ports for Remote Communication.** Controller must provide a minimum of one (1) Ethernet port with RJ45 connector and a minimum of one (1) EIA232 (RS232) configurable to EIA485 (RS485) with DB9 connector.

- 2.6.2. **Ports for Local Communication.** Controller must provide a minimum of one (1) Ethernet port with RJ45 connector, a minimum of one (1) EIA232 (RS232) configurable to EIA (RS485) with DB9 connector.

- 2.6.3. **Protocols.** The communications ports for the sign will act in accordance with all commands defined in Section 8-.10-7 "NTCIP PROTOCOL AND COMMAND SETS" of the NEMA TS 4, latest version. Ensure the communications ports for the sign act in accordance with all TxDOT NTCIP user defined commands.

- 2.6.4. **Communication Interface.** The sign controller must include separate serial interfaces for communication with the central controller and the laptop computer.

The communications between the sign controller and the central controller or laptop computer should comply with the National Transportation Communications for ITS Protocol (NTCIP). Unless otherwise stated, the software shall comply with the versions of the relevant NTCIP standards that are current at the date of this document.

In addition to the standard MIB objects, the sign should include any additional manufacturer-specific MIB objects required to support all of the sign and central software functionality defined elsewhere in this specification.



## 2.7. Clock and Timer

- 2.7.1. **Internal Clock.** The controller must meet at a minimum Section 8.9.4 "INTERNAL CLOCK" of the NEMA TS 4, latest version. Internal Clock will be backed up with a non-battery device such as a large capacitor (super capacitor) for a minimum of 168 hr.
- 2.7.2. **Watchdog Timer.** The controller must meet at a minimum Section 8.9.5 "WATCHDOG TIMER" of the NEMA TS 4, latest version.

During watchdog timer reset the sign will be blank, all pixels off.

When polled by Lonestar™ the local sign controller will submit a status report to the central control software when a watchdog event has occurred, including the current sign status and shall wait in a Neutral state until further instructions are sent from the statewide central control software, or until manually reset by local control.

- 2.8. **Initial Documentation.** Prior to sign manufacturing, provide DMS manufacturer's documentation for each sign type. Document should include each applicable equipment item or component in a searchable PDF manual and submit it for approval. Provide electronic copies of the manual and a minimum of one paper copy of the manual for each sign delivered. Ensure that DMS manufacturer's manual includes:
- Independent laboratory test reports explaining testing process and verification worksheet displaying NEMA TS 4 compliance
  - Verification of NTCIP Compliance. The Department will verify, through use of the Department's NTCIP Tester, that the equipment complies with the requirements of NTCIP 1101 Simple Transportation Management Framework; NTCIP 2101, Subnet Profile for PMPP
  - The vendor must submit documentation of successful software compliance testing with TxDOT's Lonestar™ DMS subsystem, latest version. Maintenance software shall be provided by the vendor to the Department at no cost to the Department. This software should allow fonts to be added or changed by the Department.
  - Documented testing procedures (see section 3.5)
  - DMS shop drawings
  - Power load requirements (for Sign and for the Controller Cabinet) and communications cabling pinouts for cables run between the Cabinet and DMS sign (as per Special Specification " Dynamic Message Sign System")
  - Complete and accurate schematic diagrams including circuit board schematics
  - Complete and accurate cabinet, enclosure, and building wiring diagrams
  - Complete installation procedures
  - Complete performance specifications (functional, electrical, mechanical and environmental) on the unit
  - Complete parts list including names of vendors for parts not identified by universal part numbers such as JEDEC, RETMA, or EIA
  - Pictorial of component layout on circuit board
  - Complete stage-by-stage explanation of circuit theory and operation
  - Complete and detailed system operations manuals
  - Data necessary for isolation and repair of failures or malfunctions, assuming the maintenance technicians to be capable of analytical reasoning using the information provided in above subsection. Describe accuracy, limits, and tolerances for all electrical, physical, or other applicable measurements. Include general instructions for disassembly, overhaul, and reassemble, including shop specifications or performance requirements.
  - Detailed instructions where failure to follow special procedures would result in damage to the equipment, improper operation, or danger to operating or maintenance personnel. Such instructions and specifications should be included only for such maintenance as may be accomplished by specialized

technicians and engineers in a modern Electro mechanical shop. Describe special test setup, component fabrication, and the use of special tools, jigs, and test equipment.

- A detailed physical description of size, weight, special mounting requirements, electrical connections, power requirements, and all other pertinent information necessary for proper installation and use of the equipment. Ensure the vendor works with contractor to submit sign supports and support brackets, and shop drawings compliant with Special Specification "Dynamic Message Sign System".
- Periodic maintenance schedule
- A list of certified maintenance personnel, including qualifications, experience and applicable certifications, of individuals who may be performing maintenance on products as required by this specification.

### 3. CONSTRUCTION

- 3.1. **General.** Install contractor-furnished color DMS according to the manufacturer's recommendations and in accordance to Section 3 Construction of SS6028 Dynamic Message Sign System. Ensure installation and configuration of software on Department computers is included with the color DMS.
- 3.2. **Requirements for Shop Drawings.** Submit shop drawings in Microstation DGN and PDF format for approval before fabrication; include the sign structural members and attachment supports in accordance with Standard Specification Item 5 Article 5.2 "Plans and Working Drawings". Shop drawings must be sealed by a registered professional engineer (Licensed in the U.S.).
- 3.3. **Delivery.** Deliver sign and cabinet to location determined by the Department, including removing sign from delivery truck onto ground. The Department will not provide any crane equipment to lift sign off of truck. Must provide equipment to lift. The Department will not be held liable for any damages incurred during shipment, including lifting the sign from delivery truck onto ground. Delivery will not be complete until sign has been unloaded onto ground, secured to prevent tipping, and passed the demonstration test.
- 3.3.1. **Final Documentation.** Provide as-built final documentation for approval reflecting all field changes and software modifications. Include detailed drawings of conduit layouts, cable diagrams, wiring lists, cabinet layouts, wiring diagrams and schematics for all elements of the communications system. Include the cable type, color code and function, the routing of all conductors' pairs in the cable diagrams and wiring lists.
- Provide manufacturer's software, documentation, and intellectual property rights for the computer software system and components. These must include, but are not limited to, the following:
- **Deliver.** One copy of all documentation supplied by the manufacturers for all plug-in circuit cards used in the microcomputer chassis.
  - **License.** Grant the department a non-exclusive unrestricted license that will allow the Department to use, modify, or distribute any or all of the stated communication protocols and documentation.
  - **Technical Assistance.** Include instructions for troubleshooting and warranty replacements
- 3.4. **Testing.** Ensure that the Department receives a sign capable of complying with the following test procedures which will be performed upon delivery of the Color DMS to the contractor's yard and again at installation of the Color DMS on the support structure as located in the Plans:
- 3.4.1. **Examination of Product.** Contractor will examine each unit carefully to verify that the materials, design, construction, markings and workmanship comply with the requirements of the parent specification. Department may also verify that the Color DMS furnished by the Contractor meets specification.
- 3.4.2. **Continuity Tests.** Department may check the wiring to determine conformance with the requirements.
- 3.4.3. **Operational Test.** Contractor will operate each unit for 2 hr. to permit equipment temperature stabilization and an adequate number of performance characteristics to ensure compliance with the requirements.

- 3.4.4. **Pixel Status Tests.** Contractor will conduct pixel status tests to ensure the pixels are fully functional. Ensure that Vendor must provide detection for out-of-service LED pixels through testing procedures conducted through the sign controller. When polled, controller must be required to report results to Lonestar™ DMS central software.
- **Pixel Test.** Sign must be capable of a full operational status of each pixel and report of the status to the local sign controller. Upon request from Lonestar™ software, sign should identify a list of modules with defective pixels. The pixel test may briefly disturb the displayed message for no more than 0.5 sec.
  - **Pixel Read.** Sign must be capable of reporting back to the local controller which pixels are on/off. Upon request from Lonestar™ software, sign should provide a list of which pixels are on/off. Pixel read should not interfere the displayed message.
- 3.4.5. **DMS Testing Procedures.** Contractor must coordinate with the Vendor to be present during all testing. Contractor shall submit Manufacturer-approved test procedures and worksheets detailing the following tests to ensure DMS meets all specifications defined:
- initial demonstration
  - stand-alone
- Contractor will ensure that Vendor representative shall perform both tests at location determined by the Department.
- 3.5. **Maintenance.** Ensure that the installed color DMS has a manufacturer's maintenance plan covering: Vendor must perform periodic maintenance during the warranty period as follows:
- 3.5.1. Vendor must submit a recommended periodic maintenance schedule for the review by the Department.
- 3.5.2. Vendor should have a maintenance representative located within the state of Texas. Visits by the representative to various locations identified by the Department will be required. Representative will be notified by telephone at the location and telephone number designated by the vendor as the point of contact for any repair work. Vendor must notify the Department immediately of any changes in this location and telephone number. Maintenance representative must possess and maintain an inventory of common replacement parts.
- 3.5.3. Vendor must perform periodic maintenance tests four times per year during the warranty period at no additional cost to the Department. This periodic maintenance may be performed remotely. Provide documentation to TxDOT.
- 3.5.4. Vendor must perform periodic DMS equipment maintenance on-site at intervals not exceeding 12 months. The vendor shall be responsible for all costs related to this requirement, including but not limited to the following: travel, per diem, labor, material, equipment, on-site labor, on-site material, on-site equipment, and access to the signs. The vendor must satisfy TMUTCD for temporary traffic control requirements and shall obtain approval from the Department.
- 3.5.5. Vendor shall provide to the Department a quarterly report of activities performed, in an electronic spreadsheet format. This report shall include all activities performed, equipment serviced, dates, and names of technicians who performed the maintenance. The report shall include both periodic maintenance activities as well as warranty repair work, independently categorized. Include a list of all trouble calls, with time and date received, and time and date responded, including technician.
- Minor items such as pixel outages which do not significantly affect sign operation can be scheduled for future repair not subject to the 72 hr. requirement.
- 3.6. **Training.** Provide manufacturer approved end user training to the Department and their representatives. Provide a minimum of 2 days of instruction in the operation and maintenance procedures. Train a maximum of 10 Department designated personnel.

Training will cover at minimum but is not limited to:

- Hands-on operation of the sign
- Explanation of any system commands, their function and usage
- Required preventative maintenance procedures
- Equipment servicing procedures
- Sign troubleshooting and problem identification procedures
- Use of Diagnostic software

Furnish a manufacturer approved training session agenda, a complete set of manufacturer approved training materials. Provide one copy of the course material for each person. The training room will be provided by the Department.

- 3.7. **Warranty.** Ensure that the installed color DMS has a manufacturer's warranty covering: Materials shall be warranted for 5 years from from accepted installation date. The accepted installation date is defined as the date the Department determines the sign has passed installed testing requirements. The warranty shall cover all defects in material, design, and workmanship, and shall cover 100% parts and labor for repair work, including diagnostics. If the vendor standard warranty period exceeds 72 months, with a minimum of 60 months from accepted installation date, then the standard warranty period shall be in effect. The vendor shall submit in writing the terms of warranty.

During the warranty period the vendor shall be responsible for labor, materials, shipping, traffic control and other costs as outlined below for required warranty repair. It is the intent of this warranty that the vendor performs warranty repair work. At the Department's option, the Department may perform minor warranty repairs at the vendor's expense without voiding the warranty.

All diagnostics, testing, and replacements necessary to resolve any problems shall be assumed by the vendor at no cost to the Department.

- 3.7.1. **Repairs.** The maintenance representative shall respond within next business day and be available for warranty repairs and performance of services within 72 hr. of notification by the Department throughout the duration of the Warranty. Failure to meet this requirement may result in the Department billing the vendor for repair work performed by the Department or through a 3rd party without voiding the Warranty. Document all repairs within the quarterly report of activities.

- 3.7.2. **Exclusions.** The Department will assume the expense for replacement of knocked down cabinets, support structures, and other minor items resulting from day to day operations. The Department will assume responsibility for cost of repairs resulting from collision, theft, vandalism, or acts of God.

If vendor arrives at location for diagnostics or repair and TxDOT subsequently determines an exclusion then TxDOT will assume responsibility for vendor's time and travel costs.

- 3.7.3. **Warranty Repairs by the Department.** The vendor performs all warranty repairs; however, at the Department's option, warranty repairs deemed by the Department to be minor in nature or due to vendor's failure to respond within 72 hr. of notification may be performed by the Department at the vendor's expense. Parts required for repairs made by the Department will be obtained from the vendor at no cost to the Department. The Department may request reimbursement for additional time incurred such as technician's travel time or diagnostic time. Reimbursement by the vendor to the Department for the cost of warranty repairs must be computed as follows:

- 3.7.3.1. **Labor:** Labor for warranty repairs will be calculated including travel to field locations, configuring devices, and running diagnostics on field device and communications equipment.

- 3.7.3.2. **Warranty Repair Claims:** Warranty repairs will be accumulated on Department Repair Orders and will be billed from same, unless the vendor prefers to have claims processed on the vendor's standard forms.

- 3.7.3.3. **Parts:** Replaced parts will be held 30 calendar days and will be available for inspection by the vendor or authorized representative. Copies of invoices for all parts will be provided to the vendor. The cost of parts other than those furnished to the Department at no cost by the vendor will be billed at actual cost.
- 3.7.3.4. **Billing and Payment for Warranty Repair Expenses:** Costs for minor warranty repairs will be accumulated, including labor, diagnosis time, and replacement parts (if not provided). Reimbursement payment should be made within 30 calendar days of the billing date. The warranty must be in accordance with the Special Specification 6005, "Testing, Training, Documentation, Final Acceptance and Warranty."

#### 4. MEASUREMENT

This Item will be measured as each unit furnished, installed, made fully operational and tested in accordance with these Special Specifications.

#### 5. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Color Dynamic Message System (DMS)" of cabinet mounting type specified (pole mounted, foundation mounted or wall mounted). This price is full compensation for furnishing, transportation and installation of DMS and its equipment cabinet; furnishing and installing any new mounting hardware, and DMS controller cabinet foundation when required; storing the DMS when required; cleaning and testing the DMS; replacement/repair of damaged components; disposal of unsalvageable material and for all manipulations, labor, tools, working drawings, equipment and incidentals. This price is full compensation for furnishing, placing and testing all materials and equipment, and for all tools, labor, equipment, hardware, operational software package(s), supplies, support, personnel training, shop drawings, documentation, and incidentals.

New overhead sign supports or relocation of existing overhead sign supports will be paid for under Item 650, "Overhead Sign Supports." New drilled shaft foundations will be paid for under Item 416, "Drilled Shaft Foundations." Sign walkways will be paid for under Item 654, "Sign Walkways."

# Special Specification 6350

## Dynamic LED Curve Warning System



### 1. DESCRIPTION

Fabricate, furnish and erect dynamic curve warning system consisting of chevron signs with light emitting diode (LED) lights integrated in the system, solar panels for each sign, radar detection for each approach, communication transmitters and receivers. Dynamic curve warning system function is to warn and guide motorists through a curve once activated with radar by directing the chevrons to flash sequentially.

### 2. MATERIALS

Furnish and construct materials in accordance with the following:

- Item 636, "Signs"
- Item 644, "Small Roadside Sign Supports and Assemblies"

Provide signs that meet TMUTCD W1-8R(L) or W1-2R(L). Provide sign substrate that is a minimum 0.080 5052 alloy highway grade aluminum. Provide Type B<sub>FL</sub> or Type C<sub>FL</sub> reflective sheeting on all chevron signs. Provide signs with integrated LED lights. LEDs within the signs must be wired in a manner (parallel) that all LEDs continue to flash in the event of failure of an individual LED. Sign will output 550,000 millicandelas at daytime peak ensuring sign is daylight visible. Provide LEDs that have dimming capabilities and automatically adjust flash brightness to varying light conditions. Ensure that each system comes with 1 transmitter and additional receivers for each additional chevron. Ensure that communication between devices on a curve occurs wirelessly. Transmitter will be included with the Lead LED sign. Ensure the system works with either solar power or electrical service. Unless otherwise noted, system will be provided with solar panels by the manufacturer. Provide solar panels sized to allow system to work as needed 24/7 based on the 20 yr. projected traffic count of the facility. Unless otherwise noted, batteries will be provided by the manufacturer, and should be installed in a box mounted on a pole underneath the solar panel.

Provide a curve warning system capable of being monitored and controlled through a web based system. Ensure the system allows for management of device settings (such as solar and battery output and wireless signal), schedules (flash durations), and impact detection (# of activations and optional alerts via text or email if system is triggered and/or down).

### 3. CONSTRUCTION

Install sign posts in accordance to Item 644, "Small Roadside Sign Supports and Assemblies."

- 3.1. **Vehicle speed sensor activation.** Mount a low power draw digital signal processing based radar on the lead LED chevron in the curve warning system. Ensure curve warning system is capable of detecting a compact vehicle within 300 ft. of the chevron. Ensure the radar activates the LED system and wirelessly signals the LED chevrons in the curve to sequentially turn on. House the radar and transmitter in a control box mounted on the Lead LED chevron. LED chevrons in the system can flash in unison or sequentially depending on how the system is configured and flash duration is predetermined. The radar must provide real time vehicle detection (within 112 milliseconds of vehicle arrival).

Install each chevron sign as shown on plans and in accordance with D&OM (3).

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**4. WARRANTY**

The system as a whole will have a minimum 2 yr. warranty from the time of installation and acceptance of the system. Batteries must have a 5 yr. lifespan while operating 24/7. LED will operate at least 100,000 hours. Manufacturer will ship replacement parts at no cost as required during 2 yr. warranty period, except when installation has been damaged by outside forces.

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**5. MEASUREMENT**

This Item will be measured by each LED chevron or lead LED chevron. Each lead LED chevron must have a transmitter that will communicate with other chevron signs in the curve. Each chevron will have a receiver and will be paid for separately as each "LED Chevron." The Lead LED chevron will have the vehicle speed sensor. The Lead LED chevron will be paid for separately as each "Lead LED chevron."

Lead LED chevron will include cost of web-based device monitoring and control software. Software provides automated data analysis and reporting. Software also allows for data upload, incident detection, trend analysis, historic reviews, and interactive map with all similar devices.

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**6. PAYMENT**

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bids for "LED Chevron" and "Lead LED Chevron."

This price is full compensation for furnishing and installing complete LED chevrons/lead LED chevrons including sign connections and all hardware; attaching chevrons to the supports; washing and cleaning the chevrons; and equipment, materials, labor, tools, and incidentals. The price also includes testing of the LED curve warning system and making adjustments as needed. Price is full compensation for installing solar panels to ensure optimal recharging of batteries, solar powered batteries, solar powered batteries, interconnecting chevrons/lead chevrons so transmitter and receivers communicate with each other, to the satisfaction of the Engineer. A minimum of one day (8 hr.) of on-site training is included to train employees on setup of system, software installation, software control, and set up of alert notifications.

Installation of sign post and foundations will be paid for under Item 644, "Small Roadside Sign Supports and Assemblies."

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# Special Specification 6368

## Solar Powered Vehicle Detection Activated LED Embedded Sign

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### 1. DESCRIPTION

Fabricate, furnish and install solar powered vehicle detection activated light emitting diode (LED) embedded signs; consisting of embedded LED lights placed along the border of the sign, solar panels, vehicle detection and batteries for each sign. This solar LED embedded lights function is to flash in order to enhance the sign to draw the motorist's attention to the message of the roadway sign.

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### 2. MATERIALS

Furnish and construct materials in accordance with the following:

- Item 618, "Conduit"
- Item 624, "Ground Boxes,"
- Item 636, "Signs,"
- Item 643, "Sign Identification Decals," and
- Item 644, "Small Roadside Sign Supports and Assemblies."

Provide signs that meet the TMUTCD. Provide sign substrate that meets Department Material Specification DMS-7110. Provide sign reflective sheeting as shown on the plans and in accordance with Traffic Safety Division's Typical Sign Requirements (TSR) standard sheets. Provide sign with LED lights embedded along the border of the sign. Provide high powered 1 W LEDs wired in a manner that all LEDs continue to flash in the event of failure of an individual LED. Sign must output 550 candelas at daytime peak ensuring sign is daylight visible.

Provide LEDs that have dimming capabilities and automatically adjust flash brightness to varying light conditions. LEDs will be rated to operate at least 100,000 hr. Provide solar panels and batteries sized to allow the system to work 24 hours a day, 7 days a week. The embedded LED lights must be capable of flashing only when a vehicle is detected. The detection type may include radar, thermal, infrared, microwave or other technologies approved by the Engineer. Loops cuts in the pavement are not permitted. Batteries must have a 5 yr. lifespan if operating 24 hr. per day. Batteries must be installed in a ground box, or a cabinet mounted on a pole underneath the solar panel as per manufacturer's recommendations.

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### 3. CONSTRUCTION

Install signs in accordance to Item 644, "Small Roadside Sign Assemblies."

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### 4. WARRANTY

The LED lighting system as a whole will have a minimum 2 yr. warranty from the time of installation and acceptance of the system. Manufacturer will ship replacement parts at no cost as required during 2 yr. warranty period, except when installation has been damaged by outside forces.

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### 5. MEASUREMENT

This Item will be measured by each solar powered vehicle detection activated LED Embedded sign.



6.

**PAYMENT**

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Solar Powered Vehicle Detection Activated LED Embedded Sign."

This price is full compensation for furnishing and installing complete solar powered LED signs including sign connections, plaques if required or shown in plans, and all hardware; attaching signs to the supports; washing and cleaning the signs; testing of the LED sign and making adjustments as needed; installing solar panels to ensure optimal recharging of batteries, solar powered batteries, ground boxes or pole mounted cabinet, and approved detection system to the satisfaction of the Engineer; and all equipment, materials, labor, tools, and incidentals.

The roadside sign assembly (excluding the solar powered LED sign) and foundation will be paid for under Item 644, "Small Roadside Sign Assemblies."

# Special Specification 6386

## Installation of Cellular Modem




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### 1. DESCRIPTION

Transport, install, and test Department furnished Cellular Modems as shown on the plans, as detailed in the special specification, and as directed.

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### 2. MATERIALS

The Department will furnish: Cellular Modems w/Power Supply.

Provide all materials not supplied by the Department necessary for the Cellular Modem installation. All materials provided by the Contractor must be new.

Unless otherwise shown on the plans, equipment for the Cellular Modems for this project will be stored by the Department for pick up at TxDOT El Paso District Office, 13301 Gateway West Blvd, El Paso TX 79928.

Ensure that all materials and construction methods necessary to complete the installation conform to the requirements of this Item, the plans, and the pertinent requirements of Item 620, "Electrical Conductors."

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### 3. POWER REQUIREMENTS

Provide equipment appurtenances, as required, to ensure that operations are not affected by the transient voltages, surges, and sags normally experienced on commercial power lines.

3.1. **Wiring.** Provide wiring that meets the requirements of the National Electric Code. Provide wires that are cut to proper length before assembly. Provide cable slacks to facilitate removal and replacement of assemblies, panels, and modules. Do not double-back wire to take up slack. Lace wires neatly into cable with nylon lacing or plastic straps. Secure cables with non-adhesive clamps and anchors. Provide service loops at connections.

3.2. **Power Service Protection.** Provide equipment that contains readily accessible, manually re-settable, or replaceable circuit protection devices (such as circuit breakers or fuses) for equipment and power source protection. Provide and size circuit breakers or fuses such that no wire, component, connector, PC board, or assembly must be subjected to sustained current in excess of their respective design limits upon failure of any single element or wiring.

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### 4. MECHANICAL REQUIREMENTS

4.1. **Connectors and Harnesses.** Provide external connections made by means of connectors. Provide connectors that are keyed to preclude improper hookups. Color code wires and appropriately mark origin and destination of each cable.

Provide connecting harnesses of appropriate length and terminated with matching connectors for interconnection with the communications system equipment.

Provide pins and mating connectors that are plated to improve conductivity and resist corrosion. Cover connectors utilizing solder type connections by a piece of heat shrink tubing securely shrunk to ensure that it protects the connection.

- 4.2. **Mechanical Components.** Provide external screws, nuts, and locking washers that are stainless steel. Provide parts made of corrosion resistant material, such as plastic, stainless steel, anodized aluminum, or brass. Protect materials from fungus growth and moisture deterioration. Separate dissimilar metals by an inert dielectric material.

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## 5. INSTALLATION OF CELLULAR MODEMS

Install all materials, equipment, power, video, and control cabling. Ensure an operating and functional system.

Prevent damage to all Cellular Modem components supplied by the Department. Replace any component that is damaged or lost during transportation or installation at the Contractor's expense.

**Testing.** Verify operation of the Cellular Modems, together with operation of its links, demonstrate that data can be transmitted at a satisfactory rate from the field location to the central location. Demonstrate that the Cellular Modems data packets are being received at the central site via a networked computer.

**Experience Requirements.** The Contractor or designated subcontractors involved in the installation and testing of the Cellular Modems shall, as a minimum, meet the following:

Two-year experience in the installation of Cellular Modems.

Must have a minimum record of having installed two Cellular Modems where they have been in continuously satisfactory operation for at least 1 year. The Contractor shall submit as proof, photographs or other supporting documents, and the names, addresses, and telephone numbers of the operating personnel who can be contacted regarding the system.

Provide necessary documentation of subcontractor qualifications pursuant to contract award.

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## 6. MEASUREMENT

This Item will be measured as each Cellular Modems made fully operational and tested.

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## 7. PAYMENT

The work performed and material furnished in accordance with this Item; and, measured as provided under "Measurement," will be paid for at the unit price bid for "Installation of Cellular Modems." This price is full compensation for transportation and installation of all equipment described under this Item; furnishing and installing all cables, connectors, and mounting assemblies; all documentation and testing; and all labor, manipulations, materials, tools, equipment, and incidentals.

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# Special Specification 7045

## Dry Docking 28-Car Ferryboat

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### 1. DESCRIPTION

Provide dry docking, cleaning, painting, and repair work on 28-car ferryboats.

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### 2. MATERIALS AND EQUIPMENT

Provide all labor, materials, equipment, tools, and incidentals including but not limited to mooring, lines, and line handling, gangway, and shifting ferryboats as necessary to complete the work, unless otherwise specified. Furnish all safety materials, testing, and devices necessary to perform the work in a safe and orderly manner.

Dispose of all hazardous materials pumped from the ferryboats in accordance with all federal, state, and local laws, regulations, and ordinances. Provide the Department a manifest within 30 days after completion of disposal action.

All paints and coating products used must be lead free.

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### 3. CONSTRUCTION

The Department will deliver each ferryboat to the Contractor at a mutually agreed upon time and place. After completion and acceptance of the work on each ferryboat, the Department will receive each ferryboat at the Contractor's place of business at a time mutually agreed upon by the Contractor and the Department. The Department will crew the ferryboats to and from the Contractor's yard.

Comply with the United States Coast Guard (USCG), American Bureau of Shipping (ABS), and the requirements for these items. Notify the Department prior to the commencement of work. Provide the Department with access to the premises while the Contractor is performing work.

Start work when notified by the Department. It is the intention of the Department that the Contractor will work on 1 ferryboat at a time. Continue work on ferryboat until work is complete. The Department reserves the option to defer the work on any ferryboat to a later time period.

Take all necessary precautions to protect the existing equipment, areas, and furnishings during the execution of the work. Upon arrival at the shipyard seal off the intakes to prevent any media or dust from entering the intakes which include:

- main engines,
- ship service generators,
- emergency generators, and
- any air duct or blower that enters a machinery space.

Keep water out of ferryboats while ferryboats are being worked on and the deck hatches are open. Close the deck hatches and pump the bilges out if water is present after completion of the various jobs on each ferryboat. If the liquid in the bilges is due to the Contractor having the hatches open unnecessarily or for any other reason caused by the Contractor the pumping of the bilges will be done at the Contractor's expense.

Repair or replace any damages, including all coating systems or steel work damaged due to work floats, dry-dock, bank, and gangway, to ferryboats caused by the Contractor while they are in the Contractor's possession to the satisfaction of the Engineer and at the Contractor's expense.

If any item requires a gas free certificate, such tests will be performed by a marine chemist. Testing will include but is not limited to testing for oxygen content, explosive gases, or poisonous gases. Gas free certificates that may be needed, other than those required by items of work, will be performed only after authorized by the Engineer. Provide a copy of each gas free test certificate to the Engineer after completion of testing.

Keep ferryboat clean and free of all waste and trash, including but not limited to welding rods, empty cans and boxes, rags, oil and grease, removed steel, pieces trimmed off during fitting, blasting media, and dust. Clean up any oil and grease that gets on the deck plates as soon as possible to prevent accidents and staining.

Perform all work, including inspections and testing, in compliance with all Occupational Safety and Health Administration (OSHA), ABS, and USCG rules and regulations.

All welding must be done in accordance with ABS and USCG rules and procedures. Use ABS and USCG certified welders in accordance with the latest revision to 1980 Rules for Building and Classing Steel Ferryboats for Service on Rivers and Intercoastal Waterways, ABS , Chapter 13. Provide certification papers, upon request, to the Department.

#### 4. INITIAL ITEMS OF WORK

4.1 **Dry Docking.** Provide dry dock and required set up to dry dock the ferryboat. Furnish all utilities (including daily electrical charges), scaffolds, crews, tow boats, line handlers, and overhead crane needed for the dry docking. Only 1 dry docking fee per work request will be paid for each ferryboat. Dry docking not approved by the Department will be done at Contractor's expense.

4.2 **Utility Hook Up.** Provide 3 phase electrical service to each ferryboat using the following procedures:

- hook up shore power at plug on main car deck of ferry,
- check phase rotation prior to energizing,
- remove and store the shore power receptacle,
- connect shore power leads directly to existing shore power wires,
- do not cut wire terminals off when connecting or disconnecting shore power, and
- do not connect to the main panel buss work.

The Contractor has the option to purchase and install like receptacle to supply power to the ferry.

4.3 **Test Free Certificate.** Provide 1 gas free certificate per work order to cover all items, unless otherwise approved. Each compartment will be gas freed in accordance with Special Specification 7044, "Ferryboat Coating System", Section 4.4. Provide a copy of certificate to the Engineer and provide access to all parts of the work for proper inspection.

4.4 **Gant Chart.** Provide a Gant chart, including critical path items, to show a schedule of work to be performed and completion times. Hold weekly production meetings. Provide the Department with an office, access to a copier, fax machine and telephone (computer, monitor, internet connection with email access).

4.5 **Open Rudder and Steering Compartments.** Provide work and access to inspect rudder and steering compartments as follows:

- open the hatch covers, any sounding tub and valve covers,
- install new gaskets for each hatch cover,
- grease all grease points,
- install sounding tub and valve covers with anti-seize,
- install each manhole cover, adjust hatch to ensure a water tight seal and test for any leaks,
- reinstall the hatch covers as original after all inspections and repairs are completed, and
- install protective safety covers while opened.

Open hatch covers prior to obtaining the original gas free certificate for entry and hot work on the vessel.

4.6 **Open Ballast Tanks.** Open ballast tanks hatch as follows:

- open the hatch covers, any sounding tub and valve covers,
- install new gaskets for each hatch cover,
- grease all grease points,
- install sounding tub and valve covers with anti-seize,
- install each escape hatch, adjust hatch to ensure a water tight seal and test for any leaks,
- reinstall the hatch covers as original after all inspections and repairs are completed, and
- install protective safety covers while opened.

Open hatch covers prior to obtaining the original gas free certificate for entry and hot work on the vessel.

4.7 **Open Shaft Ally Escape Hatch.** Open shaft ally escape hatch as follows:

- open the hatch covers, any sounding tub and valve covers,
- install new gaskets for each hatch cover,
- grease all grease points,
- install sounding tub and valve covers with anti-seize,
- install each escape hatch, adjust hatch to ensure a water tight seal and test for any leaks,
- reinstall the hatch covers as original after all inspections and repairs are completed, and
- install protective safety covers while opened.

4.8 **Open Engine Room Escape Hatch.** Open engine room escape hatch as follows:

- remove the escape hatch,
- install new gaskets for each escape hatch,
- grease all grease points,
- install each escape hatch, adjust hatch to ensure a water tight seal and test for any leaks,
- reinstall the hatch covers as original after all inspections and repairs are completed, and
- install protective safety covers while opened.

4.9 **Open Pilot House Escape Hatch.** Open pilot house escape hatch as follows:

- remove the escape hatch,
- install new gaskets for each escape hatch,
- grease all grease points,
- install each escape hatch, adjust hatch to ensure a water tight seal and test for any leaks,
- reinstall the hatch covers as original after all inspections and repairs are completed, and
- install protective safety covers while opened.

4.10 **Open Fuel Tanks.** Provide work and access to inspect fuel tanks manhole covers as follows:

- remove and replace all bolts with the same grade and type bolts,
- replace gaskets,
- reinstall the manhole covers as original after all inspections and repairs are completed and tank is checked by the Engineer to ensure it is clean and free of any trash water or debris that may plug up fuel lines or filters, and
- install protective safety covers while opened.

The tanks must meet all requirements put forth by the Engineer or OSHA for confined space entry and must be maintained at any time work is being performed. Not to be used in conjunction with the gas free certificate. Open manhole covers prior to obtaining the original gas free certificate for entry and hot work on the vessel.

4.11 **Open Waste Oil Tank.** Provide work and access to inspect waste oil tank manhole covers as follows:

- remove and replace all bolts with the same grade and type bolts,
- replace gaskets,
- reinstall the manhole covers as original after all inspections and repairs are completed and tank is checked by the Engineer to ensure it is clean and free of any trash wate,or debris that may plug up fuel lines or filters, and
- install protective safety covers while opened.

The tanks must meet all requirements put forth by the Engineer or OSHA for confined space entry and must be maintained at any time work is being performed not in conjunction with the gas free certificate. Open manhole covers prior to obtaining the original gas free certificate for entry and hot work on the vessel.

4.12 **Open Oily Water Tank.** Provide work and access to inspect oily water tank manhole covers as follows:

- remove and replace all bolts with the same grade and type bolts,
- replace gaskets,
- reinstall the manhole covers as original after all inspections and repairs are completed and tank is checked by the Engineer to ensure it is clean and free of any trash water or debris that may plug up fuel lines or filters, and
- install protective safety covers while opened.

The tanks must meet all requirements put forth by the Engineer or OSHA for confined space entry and must be maintained at any time work is being performed not in conjunction with the gas free certificate. Open manhole covers prior to obtaining the original gas free certificate for entry, and hot work on the vessel.

4.13 **Open Air Receivers.** Perform work of air receivers prior to inspection as follows:

- discharge all air from the 2 air receivers in the engine room,
- unbolt and remove inspection ports from the 2 air receivers for ease of inspection,
- renew the inspection ports utilizing new string reinforced neoprene gasket material, and
- clean interior of air receiver's tanks so they will be visible to USCG inspector. The Engineer will coordinate the inspection of the air receivers with the Contractor.

Upon completion of the inspection:

- reassemble and close the inspection ports with new gaskets,
- re-pressurize the compressed air system,
- test the inspection port gasket surfaces for leakage, and
- make adjustments, repositioning of gasket, tightening of nut, etc., as needed.

Provide a written report to the Engineer of the findings that includes the names of the employees and testers present at time of inspection.

Prepare and coat all new and disturbed areas in accordance with Special Specification 7044, "Ferryboat Coating Systems", Section 4.12.

## 5. TESTING AND INSPECTING

5.1 **Inspect and Test Fuel, Air, Water and Seawater Valves.** Inspect and test operation of all valves including fuel valves, water and seawater valves, air valves in engine room, shaft alley way valves, forward and aft steering compartment valves, and all valves on main deck. Provide the Engineer with test results and recommendations in writing with valve size type and locations.

5.2 **Inspect, Repair or Replace Overboard Discharge Valves and Check Valves.** Overhaul the overboard discharge valves in the following sequence:

- replace discharge valve 2 in. or smaller with 300 lb., stainless steel, screwed bonnet, solid disc, rising stem type valves, and
- discharge valves 2-1/2 in. or larger:
  - remove the bonnets,
  - remove the packing,
  - clean the inside of the discharge valves,
  - grind-in the discharge valves.
  - assemble the discharge valves in proper working order.

Overhaul the overboard check valves in the following sequence:

- replace check valves 2 in. or smaller with 300 lb., stainless steel, metal seat, screwed cap check valves, and
- check valves 2-1/2 in. or larger:
  - Remove the tops,
  - Remove the old gaskets,
  - Remove the checks,
  - Clean the bodies,
  - Reseat the stops, and
  - Install new gaskets.

Assemble check valves in proper working order.

5.3

**Hydraulic Steering System.** Test, clean and inspect hydraulic system. Test the complete hydraulic system from tank to hydraulic cylinder back to the tank. This item includes, but is not limited to the following:

- piping,
- fittings,
- cylinders,
- control blocks,
- counter balance bocks ,
- cartridges,
- o-rings,
- filters,
- valves,
- fluids,
- pumps,
- motors,
- hoses,
- seals, and
- disposal of any and all old parts,

Inspect complete hydraulic system from tank to hydraulic cylinder and back to the tank. Check for leaks, sand, dirt, trash, or anything in the system that may cause the system to fail. Provide a report and pictures of any findings, make recommendations, and present an itemized parts list to the Engineer to bring system up to manufacture's specification within 10 consecutive days from first full day boat is at yard or when the Engineer agrees to start time.

Flash complete system inspect inside of tank to ensure clean and free of any foreign materials that may obstruct system, refill system with new fluid retest to ensure system works to factory specification or to the Engineer's satisfaction.

5.4

**Hydraulic Barrier Gate System.** Test, clean and inspect hydraulic system. Test the complete hydraulic system from tank to hydraulic cylinder and back to the tank. This item includes, but is not limited to the following:

- piping,
- fittings,
- cylinders,
- control blocks,
- counter balance bocks,
- cartridges,
- o-rings,
- filters,
- valves,
- fluids,
- pumps,
- motors,
- hoses,



- seals, and
- disposal of any and all old parts.

Inspect complete hydraulic system from tank to hydraulic cylinder and back to the tank. Check for leaks, sand, dirt, trash, or anything in the system that may cause the system to fail. Provide a report and pictures of any findings, make recommendations, and present an itemized parts list to the Engineer to bring system up to manufacture's specification within 10 consecutive days from first full day boat is at yard or when the Engineer agrees to start time.

Flash complete system inspect inside of tank to ensure clean and free of any foreign materials that may obstruct system, refill system with new fluid, retest to ensure system works to factory specification or to Engineer's satisfaction.

5.5 **Hydraulic Water Tight Door System.** Test, clean and inspect hydraulic system. Test the complete hydraulic system from tank to hydraulic cylinder and back to the tank. This item includes, but is not limited to the following:

- piping,
- fittings,
- cylinders,
- control blocks,
- counter balance bocks,
- cartridges,
- o-rings,
- filters,
- valves,
- fluids,
- pumps,
- motors,
- hoses, and
- seals.

Inspect complete hydraulic system from tank to hydraulic cylinder and back to the tank. Check for leaks, sand, dirt, trash, or anything in the system that may cause the system to fail. Provide a report and pictures of any findings, make recommendations, and present an itemized parts list to the Engineer to bring system up to manufacture's specification within 10 consecutive days from first full day boat is at yard or when the Engineer agrees to start time.

Flash complete system inspect inside of tank to ensure clean and free of any foreign materials that may obstruct system, refill system with new fluid, retest to ensure system works to factory specification or to the Engineer's satisfaction.

5.6 **Inspect and Test Electrical Pumps, Controllers, Motors and Relays.** Inspect and test all electrical motors, controllers, contacts, starters, thermal overload size and relays. Provide the Engineer with written results and recommendations. Provide the Engineer with an estimate of any parts needed, man hours and time to complete repairs.

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## 6. CLEANING ITEMS

6.1. **Clean Rudder Compartment.** Clean all areas in the space. Pressure wash the entire space with detergent type degreaser at 2800-3000 psi.

- Pressure washes to remove all oils, grease, stains, etc.
- Hand clean in areas of heavy deposits.
- Protect all mechanical and electrical equipment or any other devices that may be harmed by the cleaning process to preclude the entry of water.
- Protect all perforated aluminum sheathing in overhead and entrances in such a manner as to preclude the entrance of water into the insulation behind it.

- Pump the ballast tank out after washing and dispose of all waste material in an approved manner.
- Clean the area to the satisfaction of the Engineer.

6.2. **Clean Ballast Tank.** Clean all areas in the space and pressure wash the entire space with detergent type degreaser at 2800-3000 psi.

- Pressure washes to remove all oils, grease, stains, etc.
- Hand clean in areas of heavy deposits.
- Protect all mechanical and electrical equipment or any other devices that may be harmed by the cleaning process to preclude the entry of water.
- Protect all perforated aluminum sheathing in overhead and entrances in such a manner as to preclude the entrance of water into the insulation behind it.
- Pump the ballast tank out after washing and dispose of all waste material in an approved manner.
- Clean the area to the satisfaction of the Engineer.

6.3. **Clean Void and Shaft Alley ways.** Clean shaft alley ways above and below deck plates from ceiling down out to the hull plate meets the deck down to the keel and including the keel, the upper and lower sides of the deck plates, the space under fuel tanks and the frame work supporting the deck plates to better facilitate inspection using the following procedures:

- unbolt the deck plates before cleaning,
- remove all deck plates, degrease and pressure wash,
- re-bolt the deck plates after cleaning,
- clean and wipe down hull plating for inspection,
- use a vacuum truck and dispose of the waste removed from the alley ways in an approved manner, and
- clean to the satisfaction of the Engineer.

Removal includes, but is not limited to, the pumping of water, removing of dirt, sludge, grease, grime, rags, trash, and any other items found in alley ways. Not to be used in conjunction with prepare and paint void and shaft alley ways above deck.

6.4. **Clean Engine Room above Deck Plates.** Clean area including engine room above floor plates.

- Pressures wash the engine room with detergent type degreaser at 2800-3000 psi.
- Pressures wash to remove all oils, grease, stains, etc.
- Hand clean in areas of heavy deposits.
- Protect all mechanical and electrical equipment or any other devices that may be harmed by the cleaning process to preclude the entry of water.
- Protect all perforated aluminum sheathing in overhead and entrances in such a manner as to preclude the entrance of water into the insulation behind it.
- Pump the engine room bilge out after washing and dispose of all waste material in an approved manner.
- Clean engine room above deck plates to the satisfaction of the Engineer.

All deck plates will be removed from engine room to be degreased and pressure washed.

6.5. **Clean Engine Room below Deck Plates.** Clean the engine below deck plates from where the deck plates meet the hull plating down to and including the keel. Clean upper and lower sides of the deck plates and the angle supports they are bolted to. Unbolt deck plates prior to cleaning. Clean and wipe down the hull plating for inspection. Secure plates after all inspections have been made, painting has been completed, and approval has been received from the Engineer.

This item of work includes, but is not limited to:

- pumping the bilge's free of diesel fuel, oil, and water,
- removing dirt, sludge, grime, rags, trash, and any other items found in the bilge,
- wiping the hull plating dry for inspection,
- re-bolting all deck plates using stainless steel bolts or screws, and
- all deck plates will be removed from engine room to be degreased and pressure washed.

6.6. **Clean Fuel Tanks.** Clean and hydro blast inside of fuel tanks, and renew gaskets under lids as follows:

- seal off all lines leaving tank to ensure there is not any trash or water that can get to the filters,

- remove any fuel from tank,
- remove tank lids and reinstall lids with new gaskets,
- enter tank to remove all heavy deposits,
- dry interior of tanks,
- close high, low, and tank equalization valves prior to cleaning,
- remove and dispose of fuel from tanks in an acceptable manner, and
- hydro-blast and clean interior of fuel storage tanks.

Note: Each vessel has two 3,000 gal fuel tanks.

6.7. **Clean Waste Oil Tank.** Clean and hydro blast inside of waste oil tank and renew gaskets under lids as follows:

- remove any waste oil from tank,
- hydro blast and clean interior of waste oil storage tanks,
- remove tank lids and reinstall lids with new gaskets,
- enter tank to remove all heavy deposits,
- dry interior of tanks, and
- remove and dispose of waste oil from tanks in an acceptable manner.

6.8. **Clean Oily Water Tank.** Clean and hydro blast inside of oily water tank and renew gaskets under lids as follows:

- remove any oily water from tank,
- hydro blast and clean interior of oily water storage tanks,
- remove tank lids and reinstall lids with new gaskets,
- enter tank to remove all heavy deposits, and
- dry interior of tanks.

6.9. **Open and Clean Check Valves.** Open and clean all check valves on sea water piping including all suction lines and manifolds as follows:

- open, clean, and polish check valves,
- remove and replace gaskets,
- remove checks,
- reseal stops, and
- assemble check valves in working order.

Provide the Engineer a written list of all check valves on manifold, sea water piping, and all suction lines that cannot be repaired, and include the location, total, and size of check valves.

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## 7. REMOVE AND REINSTALL

7.1. **Remove and Replace Rub Rail.** Remove and replace worn and damaged rub rail sections of piping with same size and diameter of existing rub rail.

7.2. **Removal of Suction Strainers.** Remove suction strainers from 2 steering compartments, 4 ballast tanks, 4 shaft alley ways, and 2 from engine room bilge. Reinstall all strainers in spaces using new stainless steel bolts, washers, nuts, stainless steel hose clamps and hoses to reconnect strainers to suction lines.

7.3. **Remove Keel Cooler.** Remove, clean, flush, reinstall and fill as follows:

- Remove all coolant from engines, keel coolers and holding tank.
- Remove keel cooler from hull.
- Clean any growth from coolers, presser wash, and clean to the satisfaction of the Engineer.
- Flush coolers with fresh water .
- Clean all flanges and cover with approved blanks made for flanges to ensure they remain free of dirt and debris and will not be painted. Reinstall after any painting to the hull is finished.
- Fill all engines with 50/50 power cool off-highway coolant, keel coolers and holding tank. This may take up to 400 gal.

- Bleed off any air in lines.
- Check for any leaks before putting vessel back in water.
- When vessel is back in water for at least 48 hr., run engine for a minimum of 4 to 8 hr. with an Engineer on sight to verify that the engine does not overheat.

7.4. **Remove, Clean and Reinstall Sea Valves.** The USCG requires an inspection of sea-chest valves every 2 yr. The term "sea valves" as used in this Item, is the first valve in each line coming from the sea chest; it may be a sea valve, blow down valve, or vent valve.

- Remove all sea valves from the sea chest. Removal of valve includes "entire" valve body, seat, gate and stem for USCG inspector.
- Clean gate, valve seat, and pressure test each valve at minimum of 50 lb. and furnish a written report to the Engineer certifying that the pressure check was performed and satisfactory for inspection by USCG and the Engineer.
- Re-install valves when approval is received from USCG and the Engineer.
- Install the sea valves in proper working order with new gaskets on each side of valve after inspection.
- Close all sea valves when they are installed in vessel.
- Operate all sea valves once the vessel is taken out of the dry dock.
- Tighten the packing if necessary.

Prepare and coat all new and disturbed areas in accordance with Special Specification 7044, "Ferryboat Coating Systems", and Section 4.13., "Alley ways and Engine Room – Below Deck Plates – System "D" – Mechanical Clean."

7.5. **Remove and Reinstall Underwater Sea Chest Strainer.** Remove the sea chest strainer plates from sea chest to allow the Engineer and the USCG, to visually inspect the inside of the sea chest. After the inspection and performing any needed repairs, reinstall the sea chest strainer plates as original. Prepare and paint all new and disturbed areas in accordance with Special Specification 7044, "Ferryboat Coating Systems", and Section 4.5. "Waterline Down – System "B" – Sand Sweep and Spot Blast." Apply a final topcoat of tin-based anti-foul by brush to inner and the outer side of strainer plate.

7.6. **Remove and Reinstall Anodes.** Remove and reinstall anodes as follows:

- remove all existing anodes and straps from the vessel prior to the hull being cleaned,
- furnish new anodes meeting or exceeding the following specifications:
  - M-24 Zinc Anodes,
  - Dimensions: 6 in. x 12 in. x 1-1/4 in,
  - nominal weight: 22.5 lb.,
  - contain 2 cast-in galvanized steel mounting straps, and
  - current rating: 1 amp-yr.
- paint all new and disturbed areas in accordance with Special Specification 7044, Ferryboat Coating Systems", and Section 4.5. "Waterline Down," and
- after the hull is painted weld the new anodes to the vessel at places designated by the Engineer.

Note: Each ferry requires 72 anodes.

7.7. **Repair or Replace Fuel Shut Off.** Repair or replace fuel shut off valve from deck, replace steel, install 90° gear boxes and new fuel shut off. The vender will provide all parts and materials to preform work. All parts must meet or exceed USCG rule for fuel shut off valves. The Engineer will need to approve all parts and materials before work starts after all hot work is finished. Prepare and paint in accordance with Special Specification 7044, "Ferryboat Coating System", using the method for the section where repairs were made.

7.8. **Remove and Replace Plate on Bulwarks and Superstructure.** Remove and replace deteriorated or damaged steel plating on bulwarks (including inside bracing), corners, cap rails, superstructure, and wheelhouse.

Obtain Engineer's approval of areas of repair prior to work starting. White metal blast all new plating and welds. Apply full coat of zinc-rich epoxy at 5.0 mils wet for 3.0 dry mils prior to installation. Apply remainder of coatings after installation in accordance with Special Specification 7044, "Ferryboat Coating Systems", Section 4.7., "Interior and Bulwarks and Exterior Pilothouse," Section.4.7., "Exterior Steel Superstructure" and Section .4.8., "Interior Deck Lockers".

Coat all new and disturbed areas in accordance with Special Specification 7044, "Ferryboat Coating Systems" Section 4.7. "Interior and Exterior Bulwarks and Main Steel Deck", and Section 4.8., "Interior Deck Lockers.

7.9.

**Remove And Reinstall Tail Shaft.**

- Remove the tail shaft from boat, send out to machine shop for inspection of the bearings, bearing retainer sleeve, shaft and any other parts or work needed to bring back to drawing (original plans).
- Remove both aft and forward Johnson Cutlass bearings, clean and inspect tub and bring back to (original plan) drawing specification.
- Remove SIMPLEX SIMPLAN model 135 shaft seal, clean, inspect and bring back to specification.
- Remove the shaft coupling, clean and inspect, and bring back to factory specification.
- Provide a report, pictures of any findings, recommendations, and an itemized parts list to bring bearings and shaft back to (original plan) drawing specification to the Engineer within 10 consecutive days from first full day boat is at yard or when the Engineer agrees to start time.
- Reinstall both aft and forward Johnson Cutlass bearings and bring back to (original plan) drawing specification.
- Reinstall tail shaft to (original plan) drawing specification.
- Reinstall SIMPLEX SIMPLAN model 135 shaft seal and bring back to (original plan) drawing specification.
- Reinstall the shaft coupling back to factory specification.
- Realign from main engine to propeller as per (original plan) drawing specification.

7.10.

**Remove or Reinstall Aft and Forward Line Shaft.**

- Remove the aft and forward line shaft, send out to machine shop to clean, inspect, test and any other parts or work needed to bring back to drawing specification.
- Inspect adjustable chocks VIBRACON sm 20 cs mounts.
- Inspect craft or cooper bearings not to be used in conjunction with Refurbish Cooper Bearing.
- Remove the shaft brake and all components needed to complete this line.
- Remove the shaft coupling clean and inspect bring back to factory specifications.
- Provide a report, pictures of any findings, recommendations, and an itemized parts list to bring bearings and shaft back to the original construction specification to the Engineer within 10 consecutive days from first full day boat is at yard or when the Engineer agrees to start time.
- Reinstall the aft and forward line shaft to original construction plans specification.
- Reinstall aft and forward line shaft to original construction plans specification
- Reinstall craft or cooper bearing to original construction plans specification.
- Reinstall the shaft brake and all components needed to complete this line.

7.10.1.

General Notes concerning removal and reinstallation of shafts are as follows:

- Material and workmanship must conform to USCG requirements for Subchapter "T" vessels and ABS rules for steel vessels for service on rivers and intercoastal waterways.
- All sections of shafting must be straight with respect to the centerline within a tolerance of 0.005 in. in 48 in.
- Fiberglass shaft coating will be described by Navy manual 0919-lp-008-0010 and as shown on Detail 2-2a.
- Keys and keyway to be manufactured for a Class 2 sliding fit. Keyways to have 1/8 in. bottom radn, and spooned ends per 4-3-2 / Figure 1 of ABS rules for building and classing steel vessels 2008. Keys and keyways must be finished to 63 rms after machining. All sharp corners and all tool or grinding marks must be removed.
- Shafting, coupling, coupling bolts and keys are to be forged steel, fully annealed and meeting ABS requirements for Grade 2 machine forgings.

- Installation must be to manufacturer's instructions for shaft brake, bearings, couplings, propeller nut and seals.
- Shaft for only one end is shown. The other end to be similar.
- Tail shaft bearings are to set using chockfast orange resin installed in accordance with manufacturer's recommendations. Surfaces in contact with resin are to be coated with release agent.
- RTD type bearing temperature detectors must be installed in shaft seal and pillow block bearings for engine room reading of temperatures. See construction plans for the Ferry which are available upon request.
- A shaft tachometer system must be tested to allow determination of shaft rpm and rotation at the pilot house consoles. See the construction plans.
- Exposed polished shaft surface at each end of the shaft coupling must be protected against corrosion with plastic heat shrunk sleeve.
- Adjust shaft lengths as required to suit manufactured configuration.
- Pillow block bearings and reduction gear must be aligned on vibracon adjustable chocks. installation must be in accordance with manufacturer's recommendation. See the original construction plans for the shaft alignment procedures.
- After final alignment, alignment dowels must be installed at reduction gear, pillow block bearing, shaft seal, and bulkhead seal.

7.11. **Replace Cameras.** Remove old camera and replace with the following:

7.11.1. Deck Camera.

- c10dn series day/night, ccd color camera  
1/3 in., ultra high resolution, 540 tvl (ntsc/pal),
- 13vdir series day/night lens  
1/3in. format, auto iris (direct drive), ir corrected,
- em22/mm22 mount  
ceiling/pedestal/wallmount, medium duty, enclosure, and
- eh8100 series enclosure  
specially, outdoor, pressurized.

New camera must be placed in same location as camera removed. This item will include but is not limited to the following:

- mounting bracket,
- sun shield,
- covers,
- braises,
- nuts,
- bolts,
- washers,
- connectors,
- clamps,
- straps,
- wire packing,
- conduit,
- water tight connectors,
- disconnect and reconnect camera,
- disconnect and reconnect monitor or recorder, and
- disposal of any and all old parts.

Test to ensure system works to factory specification or to the Engineer's satisfaction.

7.11.2. Engine and Rudder Room Camera. Remove old camera and replace with BU6 Series 650 TV Lines High Resolution Camera. This item will include but is not limited to the following:

- mounting bracket
- sun shield,
- covers,

- braises,
- nuts,
- bolts,
- washers,
- connectors,
- clamps,
- straps,
- wire packing,
- conduit,
- water tight connectors, and
- disconnect and reconnect camera.

Test to ensure system works to factory specification or to the Engineer's satisfaction.

- 7.12. **Replace Camera Wire.** Remove the old wire and replace with the following specified wire: CAROL A ( R ), C8028, RG59/U Type Coax, 1C 20 ANG 2C 18 AWG E60233-8 CL2-CM (UL) C C(UL), 60C AWM 20006 – Made in USA 01/11 00089106, including any equipment and incidentals necessary to perform this work or remove the old wire and replace it as directed. .

This item will include but is not limited to the following:

- remove existing wire,
- connectors,
- clamps,
- straps,
- wire packing,
- conduit,
- water tight connectors,
- disconnect and reconnect camera,
- disconnect and reconnect monitor or recorder, and
- disposal of any and all old parts.

Test to ensure system works to factory specification or to the Engineer's satisfaction.

- 7.13. **Replace Radio Antenna Wire.** Remove existing radio antenna wire and replace with new radio antenna wire, same as existing, or as directed.

New wire must be placed in same location as removed. This item will include but is not limited to the following:

- remove existing wire,
- connectors,
- clamps,
- straps,
- wire packing,
- conduit,
- water tight connectors,
- disconnect and reconnect any junction boxes, and
- disposal of any and all old parts.

Test to ensure system works to factory specification or to the Engineer's satisfaction.

- 7.14. **Replace Electrical Wire 10-4.** Remove existing wire and replace with new 10-4 conductor aluminum armor marine cable or as directed, not to exceed, but not limited to 10-4 conductor aluminum armor marine cable.

New wire must be placed in same location as removed. This item will include but is not limited to the following:

- remove existing wire,

- connectors,
- clamps,
- straps,
- wire packing,
- conduit,
- water tight connectors,
- disconnect and reconnect any junction boxes, plugs, switches, lights, and
- disposal of any and all old parts.

Test to ensure system works to factory specification or to the Engineer's satisfaction.

- 7.15. **Replace Electrical Wire 12-4.** Remove existing wire and replace with 12-4 conductor aluminum armor marine cable or as directed, not to exceed, but not limited to 12-4 conductor aluminum armor marine cable.

New wire must be placed in same location as removed. This item will include but is not limited to the following:

- remove existing wire,
- connectors,
- clamps,
- straps,
- wire packing,
- conduit,
- water tight connectors,
- disconnect and reconnect any junction boxes, plugs, switches, lights, and
- disposal of any and all old parts.

Test to ensure system works to factory specification or to the Engineer's satisfaction.

- 7.16. **Replace Electrical Wire 14-4.** Remove existing wire and replace with 14-4 conductor aluminum armor marine cable or as directed, not to exceed, but not limited to 14-4 conductor aluminum armor marine cable.

New wire must be placed in same location as removed. This item will include but is not limited to the following:

- remove existing wire,
- connectors,
- clamps,
- straps,
- wire packing,
- conduit,
- water tight connectors,
- disconnect and reconnect any junction boxes, plugs, switches, lights, and
- disposal of any and all old parts.

Test to ensure system works to factory specification or to the Engineer's satisfaction.

- 7.17. **Remove Lower Rudder.** Inspect lower rudder, bolts, nuts, o-rings, washers, keyways, bearings, pintle, and all mounting surfaces.

Provide a report, pictures of any findings, recommendations, and an itemized parts list to bring rudder back to specification to the Engineer within 10 consecutive days from first full day boat is at yard or when Engineer agrees to start time.

- Replace all bolts, nuts, O-Rings, washer, with the same as was removed or to same as (original plan) drawing specification.
- Machine to size the pintle and the bearing to the (original plan) drawing.
- Machine mounting surfaces to drawing specification to ensure meets specification.
- Reinstall lower rudder back to the (original plan) drawing specification.



- Presser test all rudder void areas repair to (original plan) drawing specification.
- Plans and drawing specification for this line will be provided upon request.

The following are additional general requirements from rudder drawings:

- Material and workmanship must conform to USCG requirements for Subchapter "T" vessels and ABS rules for steel vessels for service on rivers and intercoastal waterways.
- Upon completion, rudder voids must be air tested at 3 psi for leaks.
- After air test, fill and drain rudder voids with a float coat of environmentally benign material.
- Piping must be supported with resiliently lined hangars, poly block or similar, in accordance with ASTM F708.
- Machine shop to verify all dimensions and tolerances prior to machining.
- See systems parts list for material specifications, found on original drawings.

7.18. **Remove Upper Rudder.** Inspect upper rudder, bolts, nuts, o-rings, washers, keyways, bearings, shaft, all mounting surfaces:

- Remove the steering cylinders from tiller arm inspect pin and clevis from the cylinder for both cylinders.
- Replace bronze washer with new to meet (original plan) drawing specification.
- Replace the bronze bushing with new to meet (original plan) drawing specification.
- Remove and replace all the grease zerk fitting with 316 stainless steel zerk fitting of same size as removed clean grease channel.
- Remove the retainer tab bolt to tiller.
- Remove 4-1/4 4un-2B hex nut.
- Remove the tiller arm.
- Remove the key from tiller arm.
- Remove thrust washer.
- Remove thrust bearing, Thordon SXL.
- Remove cap ring.
- Replace neoprene o-ring with new to meet (original plan) drawing specification.
- Replace carrier bearing Thordon SXL, and neck bearing Thordon SXL with new to meet (original plan) drawing specification.

Send all parts the machine shop for inspection and ensure all parts meet dimensions and tolerances set forth in (original plan) drawing specification.

Provide a report, and pictures of any findings, recommendations, and an itemized parts list to bring rudder back to specification to the Engineer within 10 consecutive days from first full day boat is at yard or when the Engineer agrees to start time. Replace all or machine any parts as needed to bring upper rudder in to (original plan) drawing specification.

Reinstall upper rudder to meet all (original plan) drawing specification.

Test to ensure that meets USCG requirements for Subchapter "T" vessels and ABS rules for steel vessels for service on rivers and intercoastal waterways.

7.19. **Engine Removal, Rebuild and Reinstall.** Remove access hatch for engine, replace gaskets, replace all bolts with same size and type as removed, mechanically clean all gasket surfaces, apply silicone to both sides of the gasket suffices, install hatch and clean excess silicone, test to ensure that there are no leaks and that it meets the Engineer's approval. Remove Detroit Diesel Series 60G Engine NGINE from boat.

7.19.1. **Completely Disassemble Engine.** Clean and inspect all but not limited to parts, wires, bearing, seals, threads, and gaps, replace all o-rings gaskets seals. Provide a report of any findings and recommendations of any work needed to be performed and an itemized parts list to the Engineer.

7.19.2. **Cylinder Block.** Clean the cylinder block as follows:

- Remove all oil and water gallery and weep hole plugs to allow the cleaning solution to enter the inside of the oil and water passages.

- On current block, remove bolt-on plate or piston-cooling oil spray nozzle at the base of each cylinder bore.
- Immerse and agitate the block in a hot bath of a commercial, heavy-duty alkaline solution.
- Wash the block in hot water or steam clean it to remove the alkaline solution. If the water jackets are heavily scaled, proceed as follows:
  - Immerse and agitate the block in a bath of inhibited phosphoric acid.
  - Allow the block to remain in the acid bath until the bubbling action stops (approximately 30 min.).
  - Lift the block, drain it and immerse it again in the same acid solution for 10 more min. Repeat until all scale is removed from the water jacket area.
  - Rinse the block in clear, hot water to remove the acid solution.
  - Neutralize the acid that may cling to the casting by immersing the block in an alkaline bath.
  - Wash the block in clean water or steam clean it.
- Dry the cylinder block with compressed air. Blow out all of the bolt holes and passages with compressed air.
- Pressure test the block to factory specification.

- 7.19.3. **Inspection of the Cylinder Block.** Measure the bore of each cylinder with cylinder bore gage to factory specification, and provide the Engineer with documentation of findings.
- 7.19.4. **Inspection of Deck Flatness.** Check the cylinder block deck for flatness with an accurate straightedge and feeler gage to ensure that it meets to factory specification and provide the Engineer with documentation of findings.
- 7.19.5. **Inspection of Main Bearing Bores.** Measure the main bearing bores using dial bore gage which has a dial indicator calibrated in 0.0001 in. increments.
- 7.19.6. **General Inspection.**
- Check all machined surfaces for nicks or burrs that could affect the fit of mating parts.
  - Clean up as necessary by stoning.
  - Also inspect all tapped holes for thread.
  - Remove, clean, test and inspect to ensure that it meets the factory specifications.
  - Provide a report to the Engineer of any findings,
  - Recommend to the Engineer of any work that needs to be performed.
  - Provide an itemized parts list to the Engineer.
  - Replace the valve stem oil seal. Clean the valve guide bore with bore brush to remove all gum and carbon deposits.
  - Replace intake, exhaust valve and seat insert injectors.
  - Inspect injectors and injector tubs.
- 7.19.7. **Inspection of Valve Springs and Testing of Valve Spring.** Test and inspect to ensure that it meets the factory specification, provide a report of any findings and recommendations of any work need to be performed, and provide an itemized list of parts to the Engineer.
- inspection of valve guides,
  - inspection of valve seat inserts,
  - check valve seat concentricity,
  - measure valve head recess depth,
  - checking valve spring load,
  - inspection of crankshaft and related parts,
  - inspection of turbocharger and related parts,
  - inspection of exhaust manifold and related parts,
  - inspection of intake manifold and related parts,
  - inspection of intake thermostat and housing and related parts,
  - checking fire deck straightness,
  - verification of countersink geometry,
  - inspection of oil pump,

- inspection of fuel pump,
- inspection of pistons,
- inspection of piston rods,
- inspection of piston rings,
- cleaning of rocker arm assemblies,
- inspection of rocker arm assemblies and camshaft lobes,
- installation of rocker arm shaft assembly and related parts, and
- crankshaft thrust bearing.

Main Bearing. Test and inspect to ensure that all parts meets the factory specification provide a report of any findings recommendations and of any work need to be performed and an itemized parts to the Engineer.

- 7.19.8. **Removal and Cleaning of Crankshaft and Crankshaft Journal Run-out Measurements.** Check the intermediate main journals with a dial indicator for run-out when the crankshaft is rotated. Test and inspect to ensure that it meets the factory specification provide a report of any findings, recommendations and of any work need to be performed, and provide an itemized parts to the Engineer.
- 7.19.9. **Adjacent Journal Alignment.** Measure all of the main and connecting rod bearing journal diameters. Test and inspect to ensure that it meets the factory specification, provide a report of any findings and recommendations of any work needed to be performed, and provide an itemized list of parts to the Engineer.
- 7.19.10. **Journal Diameter Measurements.** Measure all of the main and connecting rod bearing journal diameters. Test and inspect to ensure that it meets the factory specification, provide a report of any findings and recommendations of any work need to be performed, and provide an itemized list of parts to the Engineer.
- 7.19.11. **Inspection for Cracks.** Test and inspect to ensure that it meets the factory specification, provide a report of any findings and recommendations of any work need to be performed, and provide an itemized list of parts to the Engineer.
- 7.19.12. **Inspect Flywheel and Flywheel Housing.**
- Provide a report and pictures of any findings, recommendations, and an itemized list of parts to bring engine back to factory specification to the Engineer within 10 consecutive days from first full day boat is at yard or when the Engineer agrees to start time.
  - Rebuild engine factory specification. Dynamometer test and run-in engine with a detailed report findings in Series 60 Engine Test Report Form from EPA04 Series 60 Workshop Manual to the Engineer for approval before engine is reinstalled in boat.
  - Reinstall engine back in the boat, realign engine to marine gear, refill all fluids, hook up all alarms, wires, brackets and all parts to ensure proper operation of engine and gear, push dock for a minimum of 8 consecutive hour with Engineer present unless otherwise directed.
  - This work is for, but not limited to, all work to disassemble, perform test, rebuild, and test run, and any parts, gaskets, seals, silicone, nuts, bolts, screws, tape, tools, or any incidentals needed to complete this job to the satisfaction of the Engineer.
- 7.20. **Remove Rebuild and Reinstall Kohler Generator.** Remove access hatch for engine room, replace gaskets, all bolts with same size and type as removed, mechanically clean all gasket surfaces, apply silicone to both sides of the gasket surfaces, install hatch and clean excess silicone, test to ensure that there are no leaks and that it meets Engineer's approval. Remove the Kohler 55EOZC marine generator from boat. Remove engine from generator.
- 7.20.1. **Completely Disassemble Engine.** Clean and inspect all but not limited to parts, wires, bearing, seals, threads, and gaps, replace all o-rings, gaskets, and seals. Provide a report of any findings, recommendations, and of any other work needed to be performed, and itemized parts.
- 7.20.1.1. Completely disassemble John Deere engine clean to factory specification. Measure all deck surfaces shafts bores as factory recommends, this includes but not limited to cylinder head, block, crank shaft, cam shaft, connecting rod, main bearing, fuel pump, fuel lines, fuel shaft, and rocker. Provide a report and pictures of any findings recommendations and itemized parts list to bring engine back to factory specification to the

Engineer within 10 consecutive days from first full day boat is at yard or when the Engineer agrees to start time.

- 7.20.2. **Inspection of Deck Flatness.** Check the cylinder block deck for flatness with an accurate straightedge and feeler gage to ensure that it meets to factory specification and provide the Engineer with documentation of findings.
- 7.20.3. **Inspection of Main Bearing Bores.** Measure the main bearing bores using dial bore gage which has a dial indicator calibrated in 0.0001 in. increments.
- 7.20.4. **General Inspection.** Check all machined surfaces for nicks or burrs that could affect the fit of mating parts. Clean up as necessary by stoning. Inspect all tapped holes for thread damage and re-tap or install helical thread inserts as necessary. Replace any loose or damaged dowel pins to factory specification and provide the Engineer with documentation of findings.
- 7.20.5. **Cylinder Head.** Remove, clean, test, and inspect to ensure that the cylinder head meets the factory specification and provide a report to the Engineer of any findings, recommendations, and any work that needs to be performed and a list of required itemized parts.
- 7.20.6. **Inspection of Valve Springs and Testing Valve Spring.** Test and inspect to ensure that the valve springs meet the factory specification. Provide to the Engineer a report of any findings, recommendations and of any work that needs to be performed. Also provide a list of itemized parts needed.
- inspection of crankshaft and related parts,
  - inspection of exhaust manifold and related parts,
  - inspection of intake manifold and related parts,
  - inspection of intake thermostat and housing and related parts,
  - checking fire deck straightness,
  - verification of countersink geometry,
  - inspection of oil pump,
  - inspection of fuel pump,
  - inspection of pistons,
  - inspection of piston rods, and
  - inspection of piston rings.
- 7.20.7. **Cleaning of Rocker Arm Assemblies.** Test and inspect to ensure that all parts meets the factory specification. Provide a report of any findings recommendations and of any work that needs to be performed and a list of itemized parts.
- inspection of rocker arm assemblies and camshaft lobes,
  - installation of rocker arm shaft assembly and related parts,
  - crankshaft thrust bearing, and
  - main bearing.
- 7.20.8. **Removal and Cleaning of Crankshaft and Journal Run-out Measurements.** Check the intermediate main journals, with a dial indicator for run-out when the crankshaft is rotated. Test and inspect to ensure that it meets the factory specification. Provide a report of any findings recommendations and of any work that needs to be performed and an itemized list of parts to the Engineer.
- 7.20.9. **Adjacent Journal Alignment.** Measure all of the main and connecting rod bearing journal diameters. Test and inspect to ensure that it meets the factory specification. Provide a report of any findings recommendations and of any work need to be performed and a list of itemized parts to the Engineer.
- 7.20.10. **Journal Diameter Measurements.** Measure all of the main and connecting rod bearing journal diameters. Test and inspect to ensure that it meets the factory specification. Provide a report of any findings recommendations and of any work need to be performed and a list of itemized parts. to the Engineer.

7.20.11. **Inspection for Cracks.** Test and inspect to ensure that it meets the factory specification. Provide a report of any findings recommendations and of any work need to be performed and a list of itemized parts to the Engineer.

7.20.12. **Inspect Flywheel and Flywheel Housing.** Test and inspect to ensure that it meets the factory specification. Provide a report of any findings recommendations and of any work need to be performed and a list itemized parts to the Engineer.

Rebuild engine factory specification for John Deere engine and Kohler 55EOZC marine generator.

7.20.13. **Completely Disassemble Generator.** Clean and inspect all parts, wires, bearing, seals, threads, and gaps, replace all o-rings gaskets seals. Provide a report of any findings recommendations and of any work need to be performed and itemized parts to the Engineer.

Test generator to ensure it meets factory specification. Provide a report and pictures of any findings recommendations and itemized parts list to bring engine back to factory specification to the Engineer within 10 consecutive days from first full day boat is at yard or when the Engineer agrees to start time.

Repair generator to meet all factory specification for Kohler 55EOZC marine generator.

Reinstall generator back in the boat, refill all fluids, hook up all alarms, wires, brackets, and all parts to ensure proper operation of generator for minimum of 8 consecutive hours under load with the Engineer present unless otherwise directed.

Provide a report and documentation of all work and final reading of, but not limited to, tempters, oil pressers, fuel presser, hertz, amps, and volts on each phase.

This work line is for but not limited to all work hours to disassemble, preform test, rebuild, and test run and any parts, gaskets, seals, silicone, nuts, bolts, screws, tape, tools, or any incidentals needed to complete this job. Provide list to the Engineer for approval.

7.21. **Remove Rebuild and Reinstall the Marine Gear.** Remove access hatch for engine room replace gaskets, all bolts with new same size and type as removed mechanically clean all gasket surfaces apply silicone to both sides of the gasket suffices install hatch and clean excess silicone test to ensure that there are no leaks and meets with the Engineer approval. Remove Twin Disc model number MGX5170 DC. 4.06: 1 Gear From boat.

7.21.1. **Completely Disassemble Gear.** Clean and inspect all but not limited to parts, wires, bearing, seals, threads, and gaps, replace all o-rings gaskets seals. Provide a report of any findings recommendations and of any work need to be performed and an itemized list of parts to the Engineer.

7.21.2. **Inspection of Marine Gear.** Check all machined surfaces for nicks or burrs that could affect the fit of mating parts. Clean-up as necessary by stoning surfaces. Inspect all tapped holes for thread damage and re-tap or install helical thread inserts as necessary. Replace any loose or damaged dowel pins, to factory specifications provide the Engineer with documentation of findings.

Inspection includes but not limited to the following:

- gears,
- clutch plates,
- shafts,
- seals,
- retainers,
- bearings,
- spacer,
- tubes,
- springs,

- flanges,
- valves,
- pumps,
- cartridge,
- nuts,
- bolts, and
- pens and any parts of interests.

Provide a report and pictures of any findings recommendations and an itemized parts list to bring gear back to factory specification to the Engineer within 10 consecutive days from first full day boat is at yard or when the Engineer agrees to start time. Rebuild marine gear to factory specification.

Reinstall marine gear back in the boat, realign engine to marine gear to intermediate shaft. Refill all fluids, hook up all alarms, wires, brackets, and all parts to ensure proper operation of engine and gear. Push dock for a minimum of 4 consecutive hours in forward and a minimum of 4 consecutive hours in reverse with Engineer present unless otherwise directed.

This work line is for but not limited to all work hours to disassemble, preform test, rebuild, and test run and any parts, gaskets, seals, silicone, nuts, bolts, screws, tape, tools, or any incidentals needed, complete this job to the Engineer for approval .

- 7.22. **Remove and Replace Deck Hatch.** Remove the old freeman hatch from deck and replace with USCG and Marine Architect approved hatch must meet the requirements for "T" vessels for service on rivers and intracoastal waterways and must be tested to meet but not limited to all USCG requirements for welding, fitting, parts, materials and workmanship. In the area in which hatch is replaced, follow all paint specification as directed.
- 7.23. **Remove and Reinstall Exhaust.** Remove the exhaust from both main engines and install piping as per Marine Architect approved drawing and the Engineer. Exhaust will be wrapped with heat resistant material that is the same as removed it must meet the requirements for "T" vessels for service on rivers and intracoastal waterways and must be tested to meet but not limited to all USCG requirements for welding, fitting, parts, materials and workmanship.

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## 8. PIPING

- 8.1. **Install or Remove and Replace Piping.** Remove and replace piping found to be in bad condition with new piping of the same type pipe as removed and join together by Tig welded, or to Engineer's satisfaction. Piping will include but not limited to pipe, angle, unions, coupling, tees. Piping must be CU-NI 90/10 ASTM B-466 class 200 seamless pipe. Fitting must be CU-NI 90/10 ASTM SB 466 or SB 467 class 200. Prepare and paint in accordance with Special Specification 7044, "Ferryboat Coating System" using the method for the section where repairs were made.

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## 9. STEEL PIPING

- 9.1. **Install or Remove and Replace Piping.** Remove and replace piping found to be in bad condition with new piping of the same type pipe as removed, and join together by the same method as piping removed, or to Engineer's satisfaction. Piping will include but not limited to pipe, angle, unions, coupling, tees. Piping must be ASTM A-106 seamless pipe. Fitting must be 300# M.I. ASTM A197. Prepare and paint all new and disturbed areas in accordance with Special Specification 7044, "Ferryboat Coating System" using the method for the section where repairs were made.
- 9.2. **Install or Remove and Replace 3 in. Piping.** Remove and replace piping found to be in bad condition with new piping of the same type pipe as removed and join together by the same method as piping removed, or to Engineer's Specification. Piping will include but not limited to pipe, angle, unions, coupling, tees. Piping must be ASTM A-106 seamless pipe. Fitting must be ASTM A-234 test, to ensure there are no leaks. The Engineer will approve replacement methods prior to work starting and verify test after work is completed.

Prepare and paint all new and disturbed areas in accordance with Special Specification 7044, "Ferryboat Coating System" using the method for the section where repairs were made.

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## 10. STAINLESS STEEL PIPING

- 10.1. **Install or Remove and Replace with 316 Stainless Steel Piping.** Remove and replace piping found to be in bad condition with new piping of the same type pipe as removed and join together by the same method as piping removed, or to Engineer's Specification. Piping will include but not be limited to pipe, angle, unions, coupling, tees. Piping must be ASTM A182 TP 316 seamless stainless steel pipe. Fitting must be 3000# stainless steel type 316 ASTM A 182. Prepare and paint all new and disturbed areas in accordance with Special Specification 7044, "Ferryboat Coating System" using the method for the section where repairs were made.

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## 11. VALVES

- 11.1. **Remove and Replace Valves.** Remove all valves found in non-working order. Replace with new valve. Valve body will be 125# bronze U.B. SCR'D ASTM B- 62 and valve trim will be bronze. Documentations must be provided to Engineer be for installation. Install in working order with new gaskets. test to ensure there are no leaks The Engineer will approve replacement prior to work starting and verify test after work is completed. Prepare and paint all new and disturbed areas in accordance with Special Specification 7044, "Ferryboat Coating System" using the method for the section Where repairs were made.
- 11.2. **Remove and Replace 3 in. Valves.** Remove all valves found in non-working order. Replace with new valve. Valve body must be C.I. ASTM A-126 125 LB flange and valve trim must be bronze removable seats STD. Trim documentations must be provided to Engineer be for installation. Install in working order with new gaskets. Test to ensure there are no leaks. The Engineer will approve replacement prior to work starting and verify test after work is completed. Prepare and paint all new and disturbed areas in accordance with Special Specification 7044, "Ferryboat Coating System" using the method for the section where repairs were made.

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## 12. DUCTILE IRON VALVES

- 12.1. **Remove and Replace Valves.** Remove all valves found in non-working order and replace with new valves. Valve body must be 125# bronze U.B. SCR'D ASTM A395 ANSI B16.10 and valve trim must be bronze and stem will be stainless steel. Documentations must be provided to Engineer be for installation. Install in working order with new. Test to ensure there are no leaks. The Engineer will approve replacement prior to work starting and verify test after work is completed. Prepare and paint all new and disturbed areas in accordance with Special Specification 7044, "Ferryboat Coating System" using the method for the section where repairs were made.
- 12.2. **Remove and Replace 3 in. Valves.** Remove all valves found in non-working order and replace with new valves. Valve body must be C.I. ASTM A395 ANSI B16.10 125 LB flange and valve trim must be bronze removable seats STD. Trim documentation must be provided to Engineer before installation. Install in working order with new gaskets. Test to ensure there are no leaks The Engineer will approve replacement prior to work starting and verify test after work is completed. Prepare and paint all new and disturbed areas in accordance with Special Specification 7044, "Ferryboat Coating System" using the method for the section where repairs were made.

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## 13. FLAT BAR

- 13.1. **Install or Remove and Replace Flat Bar.** Remove and replace deteriorated and damaged flat bar in various areas of the vessel with steel flat bar. Obtain Engineer's approval of areas of repair prior to work starting. Prepare and paint all new and disturbed areas in accordance with Special Specification 7044, "Ferryboat Coating System" using the method for the section where repairs were made.

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**14. ANGLE IRON**

**Install or Remove and Replace Angle Iron.** Crop out and replace wasted away steel angle iron in any and all areas of vessel as required in the original construction plans. Prepare and paint all new and disturbed areas in accordance with Special Specification 7044, "Ferryboat Coating System" using the method for the section where repairs were made.

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**15. PROPULSION ITEMS**

15.1. **Remove and Reinstall Shaft Brake.** Remove and reinstall shaft brake as follows:

- remove shaft brake,
- check rotor wear and check run out, and
- replace brake pads and reinstall shaft brake and test.

15.2. **Realign Shaft Brake.** Remove the shaft brake as follows:

- remove the shaft brake,
- remove the chock fast,
- realign the shaft brake mounting bracket from the center of the mounting bracket to the center of the rotor,
- install chock fast,
- after 24 hr. tighten bolts and verify alignment, and
- test to ensure alignment is running true and straight.

15.3. **Remove Rotor Turn and Reinstall.** Remove the rotor as follows:

- remove the shaft brake,
- remove the stub shaft and rotor,
- send rotor out to machine shop to have turned ,
- reinstall rotor,
- realign the shaft brake mounting bracket from the center of the mounting bracket to the center of the rotor,
- install chock fast,
- after 24 hr. tighten bolts and verify alignment, and
- test to ensure alignment is running true and straight.

Not to be used in conjunction with realignment of shaft brake.

15.4. **Refurbish Cooper Bearing.** Provide labor and material to open, disassemble, clean, reassemble and lubricate cooper bearings per specifications. Repair any damage to cooper bearings caused by the Contractor during disassembly or assembly at no additional cost to the Department.

15.5. **Replace Cooper Bearing.** Provide and install new Cooper bearing when results from item "Refurbish Cooper Bearing" finds a bearing that shows signs of failure. Engineer will approve the replacement. Replacement type will be the same as original.

Remove the propeller in the following sequence:

- remove the rope guard, if required,
- gouge off the strap that locks the wheel nut to the prop,
- gouge off the strap that locks the wheel nut to the jam nut,
- remove the 2 nuts and store,
- remove the propeller,
- make up the propeller nut hot, cold, and then hot again, and
- install straps to lock nut to propeller and nut to jam nut.

Contractor will deliver and pickup items from the machine shop. Testing for this item of work is covered under Section 15.7., "Dye Test Props for Cracks and Check Pitch of Prop", and repairs are covered under Section



15.9, "Re-Pitch Prop". If the propeller is deemed unusable, the Department will provide a new propeller for installation.

Reinstall the original, new or reconditioned propeller in reverse order.

15.6. **Remove and Reinstall Propeller.** Remove the propeller in the following sequence:

- remove the rope guard, if required,
- gouge off the strap that locks the wheel nut to the prop,
- gouge off the strap that locks the wheel nut to the jam nut,
- remove the two nuts and store,
- remove the propeller,
- make up the propeller nut hot, cold, and then hot again, and
- install straps to lock nut to propeller and nut to jam nut.

Contractor will deliver and pickup items from the machine shop. Testing for this item of work is covered under Section 15.7. "Dye Test Props for Cracks and Check Pitch of Prop", and repairs are covered under Section 15.9., "Re-Pitch Prop". If the propeller is deemed unusable, the Department will provide a new propeller for installation. Reinstall the original, new or reconditioned propeller in reverse order.

15.7. **Dye Test Prop for Cracks and Check Pitch of Prop.** Machine shop will clean prop, dye test prop for cracks and check pitch of each blade on prop. Machine shop will provide results of testing to the Engineer.

15.8. **Balance Prop.** Machine shop will re-balance and re-condition each blade on prop. Provide results of testing to the Engineer.

15.9. **Re-Pitch Prop.** Machine shop will re-pitch prop to original that is stamped in each prop. Stamped information on each prop indicates the proper pitch required.

15.10. **Repair Prop-Welding of Cracks.** Machine shop will make repairs by gouging and grinding cracks out to deepest point, leaving no signs of voids or cracks indicated by the dye-test. Make repair welds with stainless steel to match prop material. Cracks will be welded. Machine shop will dye-test repair to insure quality of weld. Machine shop will then re-pitch prop using 15.9., "Re-Pitch Prop", for payment. The Engineer and USCG will be present when repairs are made to prop by machine shop if necessary.

## 16. PAINTING ITEMS

16.1. **Prepare and Paint Hull Water Line Down.** Prepare and paint the hull from the water line down. Remove or cover all zinc anodes wheels keel coolers and any other equipment or items that the Engineer may deem critical. After the hull area is cleaned the Contractor will make a recommendation in writing as to which system to use. The Engineer will determine which system to use, either System "A", "B" or "C", only 1 system will be paid per vessel at yard on this line.

16.1.1. **Prepare and Paint Hull Water Line Down "System A"** Prepare and paint the hull from the water line down in accordance with Special Specification 7044, "Ferryboat Coating Systems", Sections 4.5. and 4.5.1., "Water Line down – System "A" – Water Blast."

16.1.2. **Prepare and Paint Hull Water Line Down "System B"**. Prepare and paint the hull from the water line down in accordance with Special Specification 7044, "Ferryboat Coating Systems", Sections 4.5 and 4.5.2., "Water Line down – System "B" – Sand Sweep and Spot Blast."

16.1.3. **Prepare and Paint Hull Water Line Down "System C"**. Prepare and paint the hull from the water line down in accordance with Special Specification 7044, "Ferryboat Coating Systems", Sections 4.5. and 4.5.3., "Water Line down – System "C" – Sandblast to Near White Metal."

- 16.2. **Prepare and Paint Hull Water Line Up.** Prepare and paint hull water line up. Remove or cover any equipment or items that the Engineer may deem critical. For System “A” or “B”, only one system will be paid per vessel at yard on this line.
- 16.2.1. **Prepare and Paint Hull Water Line Up “System A”.** Prepare and paint the hull from the water line up including rub rail to the bulwarks in accordance with Special Specification 7044, “Ferryboat Coating Systems”, Sections 4.6. and 4.6.1., “Water Line Up To and Including Rub Rail – System “A” – Sand Sweep and Spot Blast.”
- 16.2.2. **Prepare and Paint Hull Water Line Up “System B”.** Prepare and paint the hull from the water line up including rub rail to the bulwarks in accordance with Special Specification 7044, “Ferryboat Coating Systems”, Sections 4.6. and 4.6.2., “Water Line Up To and Including Rub Rail – System “B” – Sandblast to Near White Metal.”
- 16.3. **Prepare and Paint Bulwarks.** Prepare and paint bulwarks from top of rub rail to the bridge including under side of bridge over main car deck back down to main car deck, this includes pedestrians seating area, engine room access area, the windward anker, and all areas in between, including but not limited hand rail and overhead areas not to include car deck or the “A” deck floor. Remove and store all plugs, lights, junction boxes, speakers, horns fire station boxes, and any equipment that the Engineer may deem critical. Cover or remove all tags, signs, valves, windows and trim, doors, seats and glass. All wiring is to be covered or removed to ensure that there is no damage or paint will get on wire. Any wire or equipment deemed critical that is damaged or painted will be replaced without any charge to the Engineer in the same manner as it was installed or to the Engineer specification. For Systems “A” and “B”, only one system will be paid per vessel at yard on this line.
- 16.3.1. **Prepare and Paint Bulwarks “System A”.** Prepare and paint the bulwarks from rub rail to main deck in accordance with Special Specification 7044, “Ferryboat Coating Systems”, Sections 4.7. and 4.7.1., “Bulwarks and Pilothouse – System “A” – Sand Sweep and Spot Blast.”
- Prepare and paint from rub rail up over the bulwarks back down to the main deck including walk area, tire rub rail, interior and exterior of fueling station, etc.”
- Remove engine room vents, vent closure covers, and holders. Blast and paint on shore. Reinstall vents with new gaskets.
- 16.3.2. **Prepare and Paint Bulwarks “System B”** Prepare and paint the bulwarks from rub rail to main deck in accordance with Special Specification 7044, “Ferryboat Coating Systems”, Sections 4.7. and 4.7.2., “Bulwarks and Pilothouse – System “B” – Sandblast to Near White Metal.”
- Prepare and paint from rub rail up over the bulwarks back down to the main car deck “including walk area, tire rub rail, interior and exterior of fueling station, etc.”
- Remove engine room vents, vent closure covers, and holders. Blast and paint on shore. Reinstall vents with new gaskets.
- Apply 1 full coat of zinc-rich epoxy regardless of the paint manufacturer’s recommendations.
- 16.4. **Prepare And Paint Steering Compartments.** Prepare and paint rudder and steering compartments. Cover or remove all tags, signs, valves and glass. All wiring and hoses are to be covered or removed to ensure that there is no damage or paint will get on wire and hoses or equipment deemed critical. Any wire or equipment deemed critical that is damaged or painted will be replaced without any charge to the Department in the same manner as it was installed or to the Engineer specification. For Systems “A” and “B”, only 1 system will be paid per steering compartments on this line.
- 16.4.1. **Prepare and Paint Rudder Compartments “System A”.** Prepare and paint entire rudder and steering compartments in accordance with Special Specification 7044, “Ferryboat Coating Systems”, Sections 4.9. and 4.9.1., “Rudder Compartments, Ballast – System “A” – Spot Blast and Sweep.”

- 16.4.2. **Prepare and Paint Rudder Compartments “System B”.** Prepare and spot paint rudder and steering compartment in accordance with Special Specification 7044, “Ferryboat Coating Systems”, Section, 4.9. and 4.9.2., “Rudder Compartments, Ballast – System “B” – Mechanical Clean.”

Mechanical cleaning and spot coverage is not to exceed 50% of the steering compartments.

- 16.5. **Prepare and Paint Ballast Tank.** Prepare and paint ballast tank. Remove or cover all equipment or items that the Engineer may deem critical. For Systems “A” or “B”, only 1 system will be paid per ballast tank on this line.

- 16.5.1. **Prepare and Paint Ballast Tanks “System A”.** Prepare and paint ballast tanks in accordance with Special Specification 7044, “Ferryboat Coating Systems”, Sections 4.9. and 4.9.1., “Rudder Compartments, Ballast, and Void Tanks – System “A” – Spot Blast and Sweep.”

- 16.5.2. **Prepare and Paint Ballast Tank “System B”.** Prepare and paint ballast tanks in accordance with Special Specification 7044, “Ferryboat Coating Systems”, Sections 4.9. and 4.9.2., “Rudder Compartments and Ballast, and Tanks – System “B” – Mechanical Clean”. Mechanical clean and spot coverage is not to exceed 50% of the compartment.

- 16.6. **Blast and Paint Barricade Gates.** Blast and paint barricade gates and gate areas as follows:

- Raise and secure the safety gate in place.
- Remove the gate rams including hydraulic hoses.
- Cap and seal off all hydraulic fittings and piping to prevent trash from entering the system.
- Remove all grease fittings from gate hinge points and hydraulic ram hinge points and install plugs to prevent blasting media/paint from entering. The Department will provide replacement fittings for any of those found damaged.
- Blast and paint hydraulic barricade rams on shore.
- Remove and discard all trash from the ram well.
- Prepare and paint the entire barricade gate and gate area from where the gate hinge meets the asphalt to the rub rail, including both sides of the gate.
- Apply 1 full coat of zinc rich epoxy will be applied regardless of paint manufacturer recommendations.
- Reinstall the rams and bleed air from the lines.
- Check all lines and rams for leaks and proper operation.
- Reinstall grease fittings after painting is completed.

When lifting the gates manually insure that the control valve solenoid valve is operated to prevent damage from occurring to the rams. Verify solenoid valve is energized or operate manually at engine room hydraulic safety gate control location while this safety gate is being raised or lowered.

Prepare and coat all new and disturbed areas in accordance with Special Specification 7044, “Ferryboat Coating Systems,” Section 4.11. “Gate Areas”.

Remove and reinstall barricade hydraulic rams will not be charged in conjunction with this Section unless the Engineer decides to replace rams.

This item includes the work listed above, but does not limit additional work needed.

- 16.7. **Prepare and Paint Exterior of Pilothouse.** Prepare and paint exterior of pilothouse from bridge deck to include hand rails, and exhaust areas, to the top of the pilot house including but not limited to top of pilot house, all hand rails, and mast not to include bridge deck. This will be a separate item. Prepare and paint bulwarks including but not limited hand rail and overhead areas not to include car deck or the “A” deck floor. Remove and store all plugs, lights, junction boxes, speakers, horns, fire station boxes, and any equipment that the Engineer may deem critical. Cover or remove all tags, signs, valves, windows and trim, doors, seats and glass. All wiring is to be covered or removed to ensure that there is no damage or allow paint to get on wire. Any wire or equipment deemed critical that is damaged or painted will be replaced without any charge to the Department in the same manner as it was installed or to the Engineer’s specification. For systems “A” and system “B”, only one system will be paid per vessel at yard on this line.

- 16.7.1. **System “A” – Sand Sweep and Spot Blast.** Prepare and paint exterior of pilothouse from bridge deck to include hand rails exhaust areas to the top of the pilot house including but not limited to top of pilot house all hand rails and mast, in accordance with Special Specification 7044, “Ferryboat Coating Systems”, Sections 4.10. and 4.10.1.
- 16.7.2. **System “B” - Sandblast to Near White Metal.** Prepare and paint exterior of pilothouse from bridge deck to include hand rails exhaust areas to the top of the pilot house including but not limited to top of pilot house all hand rails and mast not to include bridge deck, in accordance with Special Specification 7044, “Ferryboat Coating Systems”, Sections 4.10. and 4.10.2.
- 16.8. **Prepare and Paint Interior Deck Lockers.** Prepare and paint interior deck houses. there will be 4 on main car, 2 pedestrian life jacket lockers, a CO2 locker and a deck locker these will be from deck to top and to include all areas in side locker all contents of locker will be removed and stored to ensure no paint or any equipment is damaged. Surface preparation: Remove any oil or grease with chemical cleaner. Spot clean all rusted and abraded areas by use of power driven tools, electric or pneumatic, to bare metal. Blow all cleaned areas with high-pressure air to remove all dust, etc. with no spot cleaned surfaces standing overnight without specified coating. For Systems “A”, “B” and “C”, only 1 system will be paid per vessel at yard on this line.
- 16.8.1. **Prepare and Paint Interior Deck Lockers - System “A” - Sandblast to Near White Metal.** Prepare and paint interior deck lockers - “System “A” - Sandblast to Near White Metal” in accordance with Special Specification 7044 “Ferryboat Coating Systems”, Sections 4.8. and 4.8.1., “Interior Prepare and Paint Interior Deck Lockers System “A” - Sandblast to Near White Metal”.
- 16.8.2. **Prepare and Paint Interior Deck Lockers - System “B” - Mechanically Clean Power Tools.** Prepare and paint interior deck lockers - “System “B” - Mechanically Clean Power Tools in accordance with Special Specification 7044, “Ferryboat Coating Systems”, Sections 4.8. and 4.8.2., “Interior Prepare and Paint Interior Deck Lockers System “B” - Mechanically Clean Power Tools”.
- 16.8.3. **Prepare and Paint Interior Deck Lockers - System “C” - Mechanically Clean Power Tools.** Prepare and paint interior deck lockers - “System “C” -Mechanically Clean Power Tools in accordance with Special Specification 7044, “Ferryboat Coating Systems”, Sections 4.8. and 4.8.3., “Prepare and Paint Interior Deck Lockers – System “C” - Mechanically Clean Power Tools”.
- 16.9. **Prepare and Paint Main Car Deck.** Prepare and paint main car deck from barrier gate to barrier gate and all areas in between including but not limited to pedestrian seating area engine room access area and all deck houses.
- 16.9.1. **System “C” – Non-Skid Epoxy System.** Surface preparation: Take measurements of striping on main deck for reinstallation after coating. Remove any oil or grease using a chemical cleaner. Blast entire main deck, bulwark to bulwark, to SSPC Surface Preparation near White Metal Blast. Blow all blasted areas with high pressure air to remove all sand, dust, etc. Do not leave any blasted areas standing overnight without specified coating. Protect all tire guards, bulwarks, and miscellaneous items on the main deck from sandblasting and coating. Recoat any areas with overspray from sandblasting to paint specifications. Recoat the entire area if extreme overspray occurs.
- Application as follows:
- apply 1 coat of Zinc primer at 3 mils dry,
  - apply 2 coats of epoxy at 5 mils dry per coat,
  - apply top coat of non-skid,
  - profile will be designated by the Engineer at time of application, and
  - reinstall striping using the measurements taken before blasting with the material specified in the generals. Prepare and paint main car deck in accordance with Special Specification 7044, “Ferryboat Coating Systems”, Section 4.14. and 4.14.3., “Vehicle Deck System “C” – Non-Skid Epoxy System”.
- 16.10. **Prepare And Paint “A” Deck.** Prepare and paint “A” deck the entire deck floor.

- 16.10.1. **System “C” – Non-Skid Epoxy System.** Surface preparation: Take measurements of striping on main deck for reinstallation after coating. Remove any oil or grease using a chemical cleaner. Blast entire main deck, bulwark to bulwark, to SSPC Surface Preparation near White Metal Blast. Blow all blasted areas with high pressure air to remove all sand, dust, etc. Do not leave any blasted areas standing overnight without specified coating. Protect all tire guards, bulwarks, and miscellaneous items on the main deck from sandblasting and coating. Recoat any areas with overspray from sandblasting to Paint Specifications. Recoat the entire area if extreme overspray occurs.

Application as follows:

- apply one coat of Zinc primer at 3 mil dry,
- apply two coats of epoxy at 5 mil dry per coat,
- apply top coat of non-skid,
- profile will be designated by the Engineer at time of application, and
- reinstall striping using the measurements taken before blasting with the material specified in the generals. Prepare and paint main car deck in accordance with Special Specification 7044, “Ferryboat Coating Systems”, Section 4.14. and 4.14.3., “Vehicle Deck System “C” – Non-Skid Epoxy System”.

- 16.11. **Prepare and Paint Bridge Deck.** Prepare and paint bridge deck the entire deck floor outside pilot house.

- 16.11.1. **System “C” – Non-Skid Epoxy System.** Surface preparation: Take measurements of striping on main deck for reinstallation after coating. Remove any oil or grease using a chemical cleaner. Blast entire main deck, bulwark to bulwark, to SSPC Surface Preparation near White Metal Blast. Blow all blasted areas with high pressure air to remove all sand, dust, etc. Do not leave any blasted areas standing overnight without specified coating. Protect all tire guards, bulwarks, and miscellaneous items on the main deck from sandblasting and coating. Recoat any areas with overspray from sandblasting to paint specifications. Recoat the entire area if extreme overspray occurs.

Application as follows:

- apply 1 coat of Zinc primer at 3 mil dry,
- apply 2 coats of epoxy at 5 mil dry per coat,
- apply top coat of non-skid,
- profile will be designated by the Engineer at time of application, and
- reinstall striping using the measurements taken before blasting with the material specified in the generals. Prepare and paint main car deck in accordance with Special Specification 7044, “Ferryboat Coating Systems”, Section 4.14. and 4.14.3., “Vehicle Deck System “C” – Non-Skid Epoxy System”.

- 16.12. **Prepare and Paint Void/Shaft Alleyways above Deck.** Prepare and paint void or shaft alley ways above deck. All areas from engine bulkhead to ballast tank bulkhead including but not limited to top of deck plates to the hull plate out to where the hull plate meets deck plate and all areas in between. There will be a non-skid area from deck plate to escape hatch from rib to wall approximately two feet wide and fifteen feet long. Cover or remove all tags, signs, valves, plugs, lights, glass and wire or equipment deemed critical. All wiring is to be covered or removed to ensure that there is no damage or paint will get on wire. Any wire or equipment deemed critical that is damaged or painted will be replaced without any charge to the Engineer in the same manner as it was installed or to the Engineer’s specification. For systems “A” and system “B” Only one system will be paid per vessel at yard on this line.

- 16.12.1. **Prepare and Paint Void/Shaft Alleyways above Deck –System “A”.** Prepare and paint shaft alley ways above floor plate’s compartment in accordance with Special Specification 7044, “Ferryboat Coating Systems”, Sections 4.12. and 4.12.1, “Alleyways and Engine Room – System “A” – Above Deck Plates – Spot Blast.”

- 16.12.2. **Prepare and Paint Void/Shaft Alleyways above Deck –System “B”.** Prepare and paint shaft alleyways above floor plate compartment in accordance with Special Specification 7044, “Ferryboat Coating Systems”, Sections 4.12. and 4.12.2., “Alleyways and Engine Room – Above Deck Plates – System “B” – Sandblast to Near White Metal”.

- 16.12.3. **Prepare and Paint Void/Shaft Alleyways above Deck –System “C”**. Prepare and paint void/shaft alley ways above floor plate’s compartment in accordance with Special Specification 7044, “Ferryboat Coating Systems”, Sections 4.12. and 4.12.3., “Alleyways and Engine Room – Above Deck Plates – System “C” – Mechanical Clean”. Mechanical cleaning is not to exceed 50%. Apply paint to 100% of area.
- 16.12.4. **Prepare and paint void/shaft alleyways Above Deck –System “D”**. Prepare and paint void/shaft alleyways above floor plate compartment, accordance with Special Specification 7044, “Ferryboat Coating Systems”, Sections 4.12. and 4.12.4., “Alleyways and Engine Room – Above Deck Plates – System “D” – Mechanical Clean.” Mechanical cleaned areas are not to exceed 50%.
- 16.13. **Prepare and Paint void/shaft alleyways below deck**. Prepare and paint void/shaft alley ways below deck from the bottom of deck plates to the keel from engine bulkhead to ballast tank bulkhead including but not limited area not covered by prepare and paint void/shaft alleyways above deck. Cover or remove all tags, signs, valves, plugs, lights, glass and wire or equipment deemed critical. All wiring is to be covered or removed to ensure that there is no damage or paint will get on wire. Any wire or equipment deemed critical that is damaged or painted will be replaced without any charge to Department in the same manner as it was installed or to the Engineer’s speciation. For Systems “A”, “B”, “C” and “D”, only one system will be paid per void/shaft compartment on this line.
- 16.13.1. **Prepare and Paint Shaft Alley Ways below Deck –System “A”**. Prepare and paint shaft alley ways and intermediate shaft below floor plate’s compartment in accordance with Special Specification 7044, “Ferryboat Coating Systems”, Sections 4.13. and 4.13.1., “Alleyways and Engine Room – Below Deck Plates – System “A” –Spot Blast”. Spot blast not to exceed 50%. Apply paint to 100% of area.
- 16.13.2. **Prepare and Paint Void/Shaft Alleyways below Deck –System “B”**. Prepare and paint shaft alleyways and intermediate shaft below floor plate’s compartment in accordance with Special Specification 7044, “Ferryboat Coating Systems”, Sections 4.13. and 4.13.2., “Alleyways and Engine Room – Below Deck Plates– System “B” – Sandblast to Near White Metal.”
- 16.13.3. **Prepare and Paint Void/Shaft Alley Ways below Deck –System “C**. Prepare and paint shaft alley ways and intermediate shaft below floor plate’s compartment in accordance with Special Specification 7044, “Ferryboat Coating Systems”, Sections 4.13. and 4.13.3., “Alleyways and Engine Room – Below Deck Plates – System “C” –Mechanical Clean”. Mechanically clean not to exceed 50%. Apply paint to 100% of area.
- 16.13.4. **Prepare and Paint Void/Shaft Alleyways below Deck –System “D”**. Prepare and paint shaft alleyways and intermediate shaft below floor plate’s compartment in accordance with Special Specification 7044, “Ferryboat Coating Systems”, Sections 4.13. and 4.13.4., “Alleyways and Engine Room – Below Deck Plates – System “D” –Mechanical Clean”. Mechanical cleaned area not to exceed 50%.
- 16.14. **Prepare and Paint Engine Room – Above Deck Plates**. Cover and protect all machinery, equipment, glass, lights, speakers, alarms, engines, contacts, markings on piping and wire or any equipment deemed critical is to be protect them from painting. Remove and properly dispose of all protective materials after painting. Any wire or equipment deemed critical that is damaged or painted will be replaced without any charge to the Department in the same manner as it was installed or to the Engineer’s speciation. For Systems “C” and “D”, only one system will be paid per vessel at yard on this line.
- 16.14.1. **Prepare and Paint Engine Room – Above Deck Plates – System “C”**. In accordance with Special Specification 7044, “Ferryboat Coating Systems”, Sections 4.12. and 4.12.3., “Alleyways and Engine Room – Above Deck Plates – System “C” – Mechanical Clean”. Mechanical cleaned areas are not to exceed 50%.
- 16.14.2. **Prepare and Paint Engine Room Above Floor Plates – System “D” – Mechanical Clean**. Prepare and spot paint no more than 50% of engine room above deck plates in accordance with Special Specification 7044, “Ferryboat Coating Systems”, Section 4.12., “Alleyways and Engine Room – Above Deck Plates – System “D” – Mechanical Clean”.
- 16.15. **Prepare and Paint Engine Room – Below Deck Plates**. Cover and protect all machinery, equipment, glass, lights, speakers, alarms, engines, contacts, markings on piping and wire or any equipment deemed critical is

to be protect them from painting. Remove and properly dispose of all protective materials after painting. Any wire or equipment deemed critical that is damaged or painted will be replaced without any charge to Engineer in the same manner as it was installed or to the Engineer's specification. For Systems "C" and "D", only one system will be paid per vessel at yard on this line.

- 16.15.1. **Prepare and Paint Engine Room – Below Deck Plates – System "C"**. Cover and protect all machinery, equipment, glass, lights, speakers, alarms, engines, contacts, markings on piping and other items needed to protect them from painting. Remove and properly dispose of all protective materials after painting. Prepare and paint entire engine room below deck plates in accordance with Special Specification 7044, "Ferryboat Coating Systems", Sections 4.13 and 4.13.3., "Alleyways and Engine Room – Below Deck Plates – System "C" – Mechanical Clean". Mechanical cleaned areas are not to exceed 50%.
- 16.15.2. **Prepare and Paint Engine Room below Floor Plates – System "D" Mechanical Cleaning**. Prepare and spot paint no more than 50% of engine room compartment below deck plates in accordance with Special Specification 7044, "Ferryboat Coating Systems", Sections 4.13. and 4.13.4., "Alleyways and Engine Room – Below Deck Plates – System "D" – Mechanical Clean". Cover and protect all machinery, equipment, glass, lights, speakers, alarms, engines, contacts, markings on piping and other items needed to protect them from painting. Remove and properly dispose of all protective materials after painting is completed.
- 16.16. **Prepare and Paint Interior of Waste Oil Tank**. Prepare and paint waste oil tank. Remove or cover all equipment or items that the Engineer may deem critical. For System "C" or "D", only one system will be paid per waste oil tank on this line.
- 16.16.1. **Prepare and Paint Interior of Waste Oil Tank System "C"**. Cover and protect all machinery, equipment, glass, lights, speakers, alarms, engines, contacts, markings on piping and other items to protect them from painting. Remove and properly dispose of all protective materials after painting. Prepare and paint entire engine room below deck plates Special Specification 7044, "Ferryboat Coating Systems", Sections 4.13. and 4.13.3., "Alleyways and Engine Room – Below Deck Plates – System "C" – Mechanical Clean". Mechanical cleaned areas are not to exceed 50%.
- 16.16.2. **Prepare and Paint Interior of Waste Oil Tank System "D"**. Prepare and spot paint no more than 50% of engine room compartment below deck plates in accordance with Special Specification 7044, "Ferryboat Coating Systems", Sections 4.13 and 4.13.4., "Alleyways and Engine Room – Below Deck Plates – System "D" – Mechanical Clean." Cover and protect all machinery, equipment, glass, lights, speakers, alarms, engines, contacts, markings on piping and other items needed to protect them from painting. Remove and properly dispose of all protective materials after painting is completed.
- 16.17. **Prepare and Paint Interior of Oily Water Tank**. Prepare and paint oily water tank. Remove or cover all equipment or items that the Engineer may deem critical. For System "C" or "D", only one system will be paid per oily water tank on this line.
- 16.17.1. **Prepare and Paint Interior of Oily Water Tank System "C"**. Cover and protect all machinery, equipment, glass, lights, speakers, alarms, engines, contacts, markings on piping and other items to protect them from painting. Remove and properly dispose of all protective materials after painting. Prepare and paint entire engine room below deck plates Special Specification 7044, "Ferryboat Coating Systems", Sections 4.13. and 4.13.3., "Alleyways and Engine Room – Below Deck Plates – System "C" – Mechanical Clean". Mechanical cleaned areas are not to exceed 50%.
- 16.17.2. **Prepare and Paint Interior of Oily Water Tank System "D"**. Prepare and spot paint no more than 50% of engine room compartment below deck plates in accordance with Special Specification 7044, "Ferryboat Coating Systems", Sections 4.13. and 4.13.4., "Alleyways and Engine Room – Below Deck Plates – System "D" – Mechanical Clean". Cover and protect all machinery, equipment, glass, lights, speakers, alarms, engines, contacts, markings on piping and other items needed to protect them from painting. Remove and properly dispose of all protective materials after painting is completed.

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**17. CLEAN BRASS ITEMS**

Contractor will remove all vent bells (approximately 16 vent bells per vessel), 1 vessel name plate, 1 wheelhouse bells and brackets, 2 wheelhouse air horn, 22 brass deck lights, 30 junction boxes light switches and plugs. Remove, clean, polish to brass, apply clear silicon sealer to each brass item. Re-install items after all other painting operations have been completed using a sealing compound if necessary. Bolt on items using new stainless steel hardware.

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**18. WOODEN NAME PLATE**

Remove both name plate clean sand restrain apply paint to name in the same colors as the name plate and color of stain apply clear coat reinstall after all painting to vessel is complete.

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**19. SIGN WORK**

Provide miscellaneous sign work, including any equipment and various incidentals necessary to perform this work as directed.

New signs will be placed in same location as signs removed. This item will include but is not limited to the following:

- removal of old signs,
- installation of new signs,
- design of any signs,
- material,
- machine work,
- computer work,
- parts and material to install, and
- disposal of all old parts.

Not to be used in conjunction with other items of work requiring machine shop work.

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**20. MISCELLANEOUS ITEMS**

20.1. **Welding and Fitting.** Provide miscellaneous fitting and welding, including any equipment and various incidentals necessary to perform this work, as directed. This item includes, but is not limited to the following:

- burning,
- gouging,
- fitting, etc., and
- welding any and all type's alloys, ferrous and nonferrous metals.

Not to be used in conjunction with other items of work.

20.2. **Machine Shop Work.** Provide miscellaneous machine shop work, including any equipment and various incidentals necessary to perform this work, as directed.

Provide any and all types of machine work and repairs that are normally performed by a machine shop such as the following:

- general machining,
- rebuilding, straightening and machining,
- fabrication and machining, and
- bearing repair or replacement.

Not to be used in conjunction with other items of work.



- 20.3. **Pipe Fitters.** Provide miscellaneous work by pipe fitters, including any equipment and various incidentals necessary to perform this work as directed.

This item includes, but is not limited to the following:

- measuring pipe,
- removing pipe,
- threading pipe,
- cutting pipe,
- installing pipe, and
- fitting pipe.

Not to be used in conjunction with other items of work.

- 20.4. **Electricians.** Provide miscellaneous electrical work, including any equipment and various incidentals necessary to perform this work as directed.

This item will include but is not limited to the following:

- installing electrical fixtures,
- removing old wiring,
- running new wiring,
- disconnecting electrical equipment,
- connecting electrical equipment, and
- taking electrical readings.

Not to be used in conjunction with other items of work requiring machine shop work.

- 20.5. **Overhead Crane.** Provide overhead crane with operator, including any equipment and various incidentals necessary to perform this work, to assist in loading or unloading materials and supplies from the ferry and moving materials from place to place as directed. This item will be used when the Department needs a crane to assist them in completion of their repairs. Not to be used in conjunction with other items of work.

**Welding.** Weld cracks, pitting "clad weld", seams, etc. discovered after blasting and cleaning in accordance with ABS and USCG rules and procedures. Obtain approval from the Engineer prior to work starting. Not to be used in conjunction with other items of work requiring welding.

- 20.6. **Mechanic.** Provide mechanic to make necessary miscellaneous repairs to diesel engines including any equipment and various incidentals necessary to perform this work as directed. Not to be used in conjunction with other items of work requiring a mechanic.

- 20.7. **Dehumidifying Equipment.** Provide dehumidifying equipment for use during the painting of compartments when weather conditions do not allow for normal drying and curing times.

- 20.8. **Marine Repair Mobilization.** Move in and out expenses incurred when it is necessary to travel to make repairs. Travel distance will be limited to a maximum distance by the each for the round trip from the dry docking location to the Port Aransas Ferry Headquarters. Provide vehicle and trailer if needed to transport Contractor, equipment, and materials to repair locations. Item will not be used to make repairs on vessel just returned from dry dock. The Engineer will approve this item prior to being utilized. This item will not be used for normal operations that require the pick-up and delivery of equipment, materials, parts, etc. as part of the dry docking operation.

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## 21. MEASUREMENT

An item will be considered complete only when all of the required materials and equipment have been installed and tested as per the specifications and approved by the Engineer.

Hourly items are intended to cover the cost of work that was not anticipated when the Contract was prepared. The quantity of hours is an estimate of the hours for each applicable item and does not represent a

minimum or maximum total of the hours that may be required. Report man hours accrued on any hourly bid item no later than one business day following the day the work was performed.

21.1.

**Initial Items of Work.**

- Dry Docking. By each vessel in dry dock.
- Utility Hook Up. By each vessel in dry dock.
- Test Free Certificate. By each vessel in dry dock.
- Gant Chart. By each vessel in dry dock.
- Open Rudder/Steering Compartments. By each manhole opened.
- Open Ballast Tanks. By each manhole opened.
- Open Shaft Ally Escape Hatch. By each shaft ally escape hatch open.
- Open Engine Room Escape Hatch. By each engine room escape hatch open.
- Open Pilot House Escape Hatch. By each pilot house escape hatch open.
- Open Fuel Tanks. By each fuel tank open.
- Open Waste Oil Tank. By each waste oil tank opened.
- Open Oily Water Tank. By each oily water tank opened.
- Air Receivers. By each air receiver inspected.

21.2.

**Test and Inspect.**

- Inspect and Test Fuel, Air, Water and Seawater Valves. By each vessel in dry dock.
- Inspect, Repair or Replace Overboard Discharge Valves and Check Valve. By each vessel in dry dock.
- Hydraulic Steering System. By each rudder steering system.
- Hydraulic Barrier Gate System. By each hydraulic barrier gate system.
- Hydraulic Water Tight Door System. By each water tight door.
- Inspect and Test Electrical Pumps, Controllers, Motors and Relays. By each vessel in dry dock.

21.3.

**Cleaning Items.**

- Clean Rudder Compartment. By the each.
- Clean Ballast Tank. By the each.
- Clean Void/Shaft Alleyways. By the each.
- Clean Engine Room above Deck Plates. By the each.
- Clean Engine Room below Deck Plates. By the each.
- Clean Fuel Tanks. By the each.
- Clean Waste Oil Tank. By the each.
- Clean Oily Water Tank. By the each.
- Open and Clean Check Valves. By each vessel.

21.4.

**Remove and Reinstal.**

- Remove and replace Rub Rail. By the linear foot.
- Removal of Suction Strainers. By each vessel.
- Remove Keel cooler. By each vessel in dry dock.
- Remove, Clean and Reinstall Sea Valves. By each vessel.
- Remove and Reinstall Underwater Sea Chest Strainer. By each vessel.
- Remove and Reinstall Anodes. By each anode.
- Repair or Replace Fuel Shut Off. By the each.
- Remove and Replace Plate on Bulwarks and Superstructure. By the square foot.
- Remove And Reinstall Tail Shaft. By the each.
- Remove and Reinstall Aft and Forward line Shaft. By the each.
- Replace Deck Camera. By the each.
- Replace Engine / Rudder Room Camera. By the each.
- Replace Camera Wire. By the linear foot.
- Replace Radio Antenna Wire. By the linear foot.
- Replace Electrical Wire 10-4. By the linear foot.
- Replace Electrical Wire 12-4. By the linear foot.
- Replace Electrical Wire 14-4. By the linear foot.
- Remove Lower Rudder. By the each.

- Remove Upper Rudder. By the each.
  - Engine Removal / Rebuild and Reinstall. By the each.
  - Remove Rebuild and Reinstall Kohler Generator. By the each
  - Remove Rebuild and Reinstall the Marine Gear. By the each.
  - Remove and Replace Deck Hatch. By the each.
  - Remove and Reinstall Exhaust. By the each.
- 21.5. **Piping.**
- Install or Remove and Replace 1", 2" and 3" Piping . By the linear foot.
- 21.6. **Steel Piping.**
- Install or Remove and Replace 1/2", 1", 2" and 3" Piping . By the linear foot.
- 21.7. **Stainless Steel Piping.**
- Install or Remove and Replace with 316 Stainless Steel 2" and 3" Piping . By the linear foot.
  - Install or Remove and Replace 1/2" and 1" Piping . By the linear foot.
- 21.8. **Valves.**
- Remove and Replace 1/4", 1/2", 3/4", 1-1/2", 2" and 3" valves. By the each.
- 21.9. **Ductile Iron Valves.**
- Remove and Replace 1-1/2", 2" and 3" valves. By the each.
- 21.10. **Flat Bar.**
- Install or Remove and Replace Flat bar 1" by 1/4" Thick. By linear foot.
  - Install or Remove and Replace Flat bar 3" by 1/4" Thick. By linear foot.
  - Install or Remove and Replace Flat bar 2" by 3/8" Thick. By linear foot.
  - Install or Remove and Replace Flat bar 3" by 3/8" Thick. By linear foot.
- 21.11. **Angle Iron.**
- Install or Remove and Replace Angle Iron 1" by 1" by 1/4" Thick. By the linear foot.
  - Install or Remove and Replace Angle Iron 2" by 1" by 1/4" Thick. By the linear foot.
  - Install or Remove and Replace Angle Iron 2" by 2" by 3/8" Thick. By the linear foot.
  - Install or Remove and Replace Angle Iron 3" by 3" by 3/8" Thick. By the linear foot.
- 21.12. **Propulsion Items.**
- Remove and Reinstall Shaft Brake. By the each
  - Realign Shaft Brake. By the each
  - Remove Rotor Turn and Reinstall. By the each
  - Refurbish Cooper Bearing. By the each
  - Replace Cooper Bearing. By the each
  - Remove and Reinstall Propeller. By the each
  - Dye Test Prop for Cracks and Check Pitch of Prop. By the each
  - Balance Prop. By the each.
  - Re-Pitch Prop. By the each.
  - Repair Prop-Welding of Cracks. By the each.
- 21.13. **Painting Items.**
- Prepare and Paint Hull Water Line Down. By the each.
  - Prepare and Paint Hull Water Line Up. By the each.
  - Prepare and Paint Bulwarks. By the each.
  - Prepare And Paint Steering Compartments. By the each.
  - Prepare and Paint Ballast Tank. By the each.
  - Blast and Paint Barricade Gates. By the each.
  - Prepare and Paint Exterior of Pilothouse. By the each.

- Prepare and Paint Interior Deck Lockers. By the each.
- Prepare and Paint Main Car Deck. By the each.
- Prepare And Paint "A" Deck. By the each.
- Prepare and Paint bridge deck. By the each.
- Prepare and Paint Void/Shaft Alleyways above Deck. By the each.
- Prepare and paint void/shaft alleyways below deck. By the each.
- Prepare and Paint Engine Room – Above Deck Plates. By the each.
- Prepare and Paint Engine Room – Below Deck Plates. By the each.
- Prepare and Paint Interior of Waste Oil Tank. By the each.
- Prepare and Paint Interior of Oily Water Tank. By the each.
- Clean Brass Items. By each vessel in dry dock.
- Wooden Name Plates. By each vessel in dry dock.
- Sign Work. By the hour.

21.14.

**Miscellaneous Items.**

- Welding and Fitting. By the hour.
- Machine Shop Work. By the hour.
- Pipe Fitters. By the hour.
- Electricians. By the hour.
- Overhead Crane. By the hour.
- Welding. By the hour.
- Mechanic. By the hour.
- Dehumidifying Equipment. By the day.
- Marine Repair Mobilization. By the each for the round trip from the dry docking location to the Port Aransas Ferry Headquarters.

**22.****PAYMENT**

The work performed, materials furnished, equipment, and incidentals provided will be paid for at the unit prices bid for the various items of work. The price will be full compensation for furnishing all material, unless otherwise shown on the plans and for all labor, tools, equipment, and incidentals.

# Special Specification 7148

## Lane Closures (Hourly)



### 1. DESCRIPTION

Install, maintain, and remove lane closures as shown on the plans, or as directed by the Engineer. This specification is intended for lane closures approximately 24 hours in duration or less.

### 2. MATERIALS

Furnish material in accordance with the following:

- Section 7.2.6., "Barricades, Signs, and Traffic Handling"
- Section 502.4.2., "Law Enforcement Personnel"

### 3. CONSTRUCTION

Comply with the requirements of Article 7.2., "Safety," and Item 502, "Barricades, Signs, and Traffic Handling."

The "Type" of lane closure to be implemented will be as described in Table 1 and on the plans.

**Table 1**  
**Types of Lane Closure**

Type	Description	Unit
1	1 Lane Closure – 2 Lane Road, One Lane-Two Way Operation	HR
2	1 Lane Closure – 2 Lane Road, Traffic Shift Operation	HR
3	1 Lane Closure – 4 Lane Road	HR
4	2 Lane Closure – 4 Lane Road	HR
5	Freeway 1 Lane Closure	HR
6	Freeway 2 Lane Closure	HR
7	Freeway 3 Lane Closure	HR
8	Freeway 4 Lane Closure	HR
9	Exit or Entrance Ramp Closure	HR
10	Freeway Closure Sequence Daytime Only	HR
11	Complete Freeway Closure	HR
12	One Lane Frontage Road Closure	HR
13	Two Lane Frontage Road Closure	HR
14	One Lane Connecting Ramp Closure	HR
15	Two Lane Connecting Ramp Closure	HR
16	Work Area on Shoulder	HR
17	Turn Around Closure	HR
18	Mobile Operations	HR

Additional items used for lane closures will be as described in Table 2 and on the plans.

**Table 2**  
**Additional Lane Closure Items**

Type	Description	Unit
19	Furnish Additional Flagger	HR
20	Pilot Vehicle and Operator	HR
21	Furnish Additional Arrow Board	HR

### 4. MEASUREMENT

Lane closures and additional lane closure items will be measured by the hour.

Time charges begin when the contractor arrives at the location and time as directed by the Engineer. Time charges end when the last traffic control device is removed from the roadway.

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**5. PAYMENT**

The work performed and materials furnished in accordance with the Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Lane Closure," of the type specified. This price is full compensation for furnishing all materials, equipment, labor, tools, supplies, and incidentals.

Law enforcement personnel will be paid in accordance with Item 502.

Any truck mounted attenuator required by these lane closures or mobile operations will be paid for under Special Specification, "Truck Mounted Attenuator (TMA)."

Any portable changeable message signs required by these lane closures will be paid for under Special Specification "Portable Changeable Message Sign."

# Special Specification 7193

## Traffic Management Maintenance



### 1. DESCRIPTION

Maintain, furnish, install, modify, repair, replace, or remove components of a Traffic Management System. For the purpose of this contract "restore to normal operating condition" will mean that the items will operate as intended per the original equipment manufacturer's specifications.

### 2. LICENSES AND CERTIFICATIONS

- 2.1. **Qualifications and Certifications for Traffic/Freeway Technicians.** The purpose of this item is to describe the qualifications and attributes of a traffic/freeway management technician. Any person employed by the Contractor who does not meet these qualifications or does not perform work in a safe manner will be removed from the project, and not be replaced without the express written approval of the Department.
- 2.1.1. **General.** A traffic/freeway management technician must be an English speaking individual who is familiar with and competent to do traffic signal and freeway management maintenance work. The technician must be capable of following wiring diagrams, and must be capable of testing and running diagnostics on various traffic systems and sub-systems. The technician must be skilled at making both soldered, crimp and terminal electrical connections. The technician must be familiar with the Department Standards and Specifications on construction methods for foundations and other construction items required by the Engineer.
- 2.1.2. **Certified "Fiber Optics Technician".** A certified Fiber Optics Technician is defined as a person that submits one of the following:
- A current and valid certification signifying successful completion of the Texas Engineering Extension Service (TEEX) course entitled, "Fiber Optic Installer Certification" and passing the associated test, or successful completion of the test only from the above mentioned course or completion and certification from the Light Brigade course "Fiber Optics 1-2-3" or equivalent course.
  - A current and valid certification signifying successful completion of the Electronics Technician Association (ETA) course entitled, "Fiber Optic Installer Certification" and passing the associated test, or successful completion of the test only from the above mentioned course or equivalent course
- 2.1.3. **Certified/Licensed "Electric Personnel".** Electrical licensing and electrical certification requirements must be in accordance with Item 7 and all applicable special provisions to Item 7.
- 2.1.4. **Certified "Copper Cable Splicer".** A certified "Copper Cable Splicer" is defined as a person that submits one of the following:
- A current and valid certification signifying successful completion of the Texas Engineering Extension Service (TEEX) course entitled, "Cable Splicing" and passing the associated test, or successful completion of the test only from the above-mentioned course or equivalent course.
  - A minimum of 5 years of experience in troubleshooting, grounding and bonding, splicing, sealing of the completed splice to prevent the entrance of moisture, and termination practices of copper cable in accordance with the Department and Bellcore's most recent specifications for both aerial and buried copper cable plants.
- 2.1.5. **Certified "Traffic Signal" Technician.** A certified "Traffic Signal" Technician is defined as a person that submits one of the following:

- A current and valid certification signifying successful completion of the International Municipal Signal Association (IMSA) course entitled, "Traffic Signal Technician Level I" and passing the associated test, or successful completion of the test only from the above-mentioned course or equivalent course.
- A minimum of 5 years of experience in trouble shooting, programming, installation and general maintenance of 170 and NEMA Traffic Signal Controllers and all other associated equipment.

## 2.1.6.

**Certified "Freeway Management" Technician.** A certified "Freeway Management" Technician is defined as a person that has a minimum of 2 years of experience on installing, repairing and general maintenance of the following Freeway Traffic Management (FTM) equipment\*:

- Local Control Unit (LCU) interfaces: Gates, Vehicle loop detectors, Ramp metering, Lane control signals
- Limited Distance Modem (LDM): Configuring, Installing, Testing
- CCTV Central Equipment: Transmission system, Switching system, NTSC signal standards
- CCTV Field Equipment: Transmission system, Camera electronics, Lens interfaces
- Hub Cabinets, Buildings, Interface or communications cabinets: Back panels, Detector card racks, Surge suppressions, EMI
- DMS Signs and controllers: Installation, Repairs, Communications, Copper/Fiber Optics, General Maintenance
- VIVDS systems and cameras: Installation, Repairs, Communications, Copper/Fiber Optics, General Maintenance
- IP Based equipment-Ethernet devices, CODECS, Switches, Media Converters
- Underground Environmentally Controlled Unit Vault (ECUV)-Confined Space Training and OSHA certification.

The Signal/Freeway Management System Technician must be on the job at all times and will be the individual who either does or supervises the work, and will be the individual who completes the appropriate maintenance forms upon completion of the work. This technician should also be available twenty-four hours a day to respond to emergency calls and must have a two-hour window in which to respond and evaluate the nature of the emergency. Within this two-hour window, the technician will secure the area and ensure that the area is safe for the traveling public before leaving the location.

After the emergency has been evaluated and made safe for the traveling public, the technician will have eight hours in which to mobilize its force(s) and repair the problem. If the problem cannot be repaired due to availability of part(s) and materials, a temporary solution will be allowed in order to permit the rest of the system to continue to operate. This temporary solution must be done in a safe manner and must comply with all codes and specifications as approved by the Engineer.

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**3.**
**MATERIALS**

Unless otherwise noted on the plans, the Department will only furnish Electronic Circuit Cards, Power Supplies, modems and those items listed in the General Notes. All electronic equipment and materials supplied by the Contractor will be approved by the Engineer before installation. At a minimum, the material will be in accordance with the original manufacturer's specification. All material will be new and unused. The contractor must provide three sets of submittals on items to be replaced that differ from original equipment. This includes circuit cards, lamps, video, and data communication components.

The contractor will provide all materials for preventative maintenance. Some examples could include lamps, air filters, rags, and cleaning supplies.

Assume responsibility for all materials furnished by the Department. Use material furnished by the Department for this contract only. Return unused or removed materials deemed salvageable by the Engineer to the Department upon completion of work and prior to final payment at location shown on the plans or as directed. Dispose of any material deemed not salvageable by the Engineer in accordance with



the federal, state, and local regulations. When materials are required to be furnished by the contractor, meet the material requirements of the pertinent Item for the material requirements.

Various existing items may be under warranty from the manufacturer. In the event of a failure of those items, the state will return the component(s) to the manufacturer for repair and provide the contractor with a replacement for installation. This situation will result in the contractor getting paid for troubleshooting. The state may provide electronic components to assist in troubleshooting various items.

For all material supplied by the state, the Contractor must submit either a material list on the Contractor's letterhead or a State Material Requisition Form, which must be approved by the State's Inspector. The Contractor will designate in writing the person(s) to pick up materials.

Prior to payment, all salvaged material and components will be cleaned, tagged, and returned to the locations designated by the Engineer. Otherwise, payment will not be made.

#### 4. EQUIPMENT

Required equipment includes, but is not limited to an aerial device capable of reaching overhead work, trenching machine, boring machine, concrete saw digger boom truck, fiber optic test and repair equipment such as optical time domain reflectometer, fusion splicer, and power meters. Repair or replace equipment, tools, and machinery that, in the opinion of the Engineer, may affect the quality of work or safety.

#### 5. WORK METHODS

Conform to the latest edition of the National Electric Code as adopted by the Texas Department of Licensing and Regulation, local utility requirements, the requirement of this item, and the pertinent requirements of the following Items:

- Item 416, "Drilled Shaft Foundations"
- Item 421, "Hydraulic Cement Concrete"
- Item 476, "Jacking Boring or Tunneling Pipe or Box"
- Item 618, "Conduit"
- Item 620, "Electrical Conductors"
- Item 622, "Duct Cable"
- Item 624, "Ground Boxes"
- Item 627 "Treated Timber Poles"
- Item 628, "Electrical Services"
- Item 656, "Foundations for Traffic Control Devices"
- Item 680, " Highway Traffic Signals"
- Item 682, "Vehicle and Pedestrian Signal Heads"
- Item 684, "Traffic Signal Cables"
- Item 685, "Roadside Flashing Beacon Assemblies"
- Item 686, "Traffic Signal Pole Assemblies (steel)"
- Item 687, "Pedestrian Pole Assemblies"
- Item 688, "Pedestrian Detectors and Vehicle Loop Detectors"

Perform the following work as directed:

- 5.1. **Barricades, Signs and Traffic Handling for Main Lanes of Freeway.** Provide, install, move, replace maintain, clean and remove these devices in accordance to the Texas Manual of Uniform Traffic Control Devices (MUTCD) and the TxDOT Traffic Control Plan Standards (TCP Standards).

- 5.2. **Barricades, Signs and Traffic Handling for Service Roads and Ramps.** Provide, install, move, replace maintain, clean and remove these devices in accordance to the Texas Manual of Uniform Traffic Control Devices (MUTCD) and the TxDOT Traffic Control Plan Standards (TCP Standards).
- 5.3. **Troubleshoot Equipment.** Repair, modify, troubleshoot, test or replace components to restore the assembly back into normal operation. The Contractor will install replacement equipment, as deemed necessary by the Engineer, to restore the Equipment to normal operation. The Contractor is to restore the system to safe operation until the Equipment can be permanently repaired.
- 5.4. **Power, Signal, Interconnect, and Communication Cable (of Type Specified).** Remove, replace, install, modify, and test Cable, and return all salvageable materials to the location designated by the Engineer. Install a replacement cable, furnished by the Contractor, and restore the cable to normal operation.
- 5.5. **Troubleshoot Power, Signal, Interconnect, and Communication Cable (of Type Specified).** Troubleshoot, Test, and modify the Cable. The Contractor must splice or replace the existing Cable, as deemed necessary by the Engineer, to restore the Cable to normal operation. Replacement will be paid separately.
- 5.6. **Graffiti Removal.** Clean, wash, and paint electronic cabinets and buildings located along the roadway of all dirt and graffiti. Contractor must attempt to chemically clean or pressure washes these structures prior to painting as directed by the engineer. While washing or painting use necessary action to prevent dirt or damage to vehicles and pedestrian. Paint will be applied as a last resort and applied in a professional manner. If only a small area requires work, paint the entire side or block, paint the area with matching colors. Spills, masking, and waste must be removed from the right of way and disposed in accordance to the manufacturers' recommendations.
- 5.7. **System Components.** Remove, replace, or install necessary components, rack or shelf mounted such as circuit cards, power supplies, modems, video mux or demux, T1 cards, OTN cards or other devices not listed as necessary to restore correct operation of equipment.
- 5.8. **CCTV Camera (including pan tilt unit).** Remove, replace, install, and test the CCTV Camera, pan tilt unit, and all accessories and return all salvageable materials to the location designated by the Engineer. Install a replacement unit, and restore the camera assembly to normal operation.
- 5.9. **CCTV Camera Controller.** Remove, replace, install, and test Camera Controller and all accessories and return all salvageable materials to the location designated by the Engineer. Install a replacement unit and restore the controller assembly to normal operation. Provide test procedures to verify controller functionality.
- 5.10. **CCTV Controller Cabinet (Ground or Pole Mount).** Remove, replace, install and test CCTV Controller Cabinet and all accessories and return all salvageable materials to the location designated by the Engineer. Install a replacement unit and restore the Controller Cabinet to normal operation.
- 5.11. **CCTV Camera Pole.** Remove, replace, modify, and install CCTV Camera Pole and all accessories and return all salvageable materials to the location designated by the Engineer. Install a replacement unit and restore the CCTV Camera Pole assembly to normal operation.
- 5.12. **Preventive Maintenance of CCTV Camera System.** Maintain, inspect, and test CCTV System. Complete and sign CCTV Preventive Maintenance Forms. Fill out these forms legibly and completely. A Department inspector will also sign each CCTV Preventive Maintenance Form. Verify proper operation thru TransVista during remote operation. In addition, the Contractor will list all materials used at this location. The Contractor will perform the following preventive maintenance at each location at least once during the term of the contract, and at approximately 6 months intervals or as directed by the engineer.
- Inspect camera-housing seals.
  - Clean windshield.
  - Inspect pan-tilt unit for proper operation.

- Inspect pan-tilt for environmental damage.
  - Inspect all cables for proper connections.
  - Inspect camera and lens (including zoom) for proper operation.
  - Clean controller cabinet exterior removing graffiti, dirt and debris. High pressure hose should not be used.
  - Inspect camera for environmental damage.
  - Adjust camera and DSP if necessary and restore to normal operation.
  - Inspect camera receiver for proper operation.
  - Inspect camera receiver for environmental damage.
  - Inspect camera receiver cable connections.
  - Inspect lightning rod assembly for proper connections.
  - Clean camera lens using lens paper or chamois. Camera lens will be cleaned of all water spots, dust and debris, and should appear streak free.
- 5.13. **Troubleshoot Microwave Detection (RVSD) System.** Test, troubleshoot, modify and repair components in the system to restore the assembly back into normal operation. Install replacement equipment, as deemed necessary by the Engineer, to restore the RVSD System to normal operation.
- 5.14. **RVSD.** Replace, install and test, and adjust RVSD to restore the assembly back into normal operation per the manufacturer guidelines and specifications. At minimum the Contractor will utilize the fiber optic transmission system as the carrier of the signal telecommunication system so that diagnostic tests can be performed at either the central building (Trans Vista), or at the field equipment site.
- 5.15. **RVSD Controller Cabinet (Ground or Pole Mount).** Remove, replace, modify, and install Controller Cabinet, and return all salvageable materials to the location designated by the Engineer. The Contractor will then install a replacement unit and restore the Controller Cabinet to normal operation.
- 5.16. **RVSD Pole.** Remove and replace RVSD Camera Pole and all accessories and return all salvageable materials to the location designated by the Engineer. The Contractor will then install a replacement unit and restore the RVSD Camera Pole assembly to normal operation.
- 5.17. **RVSD System Preventive Maintenance.** Maintain and service RVSD systems, and modify, complete, and sign RVSD system maintenance forms. A Department inspector will also sign the form. As part of the preventive maintenance, the Contractor will perform the following preventive maintenance at approximately 4-6 month intervals or as directed by the Engineer for solar powered RVSD systems:
- Inspect and clean solar array.
  - Align solar panel to south (if practical). Clean batteries, battery post, and all electrical connections.
  - Test battery charge (12.6-12.8 VDC).
  - Test charging system (per manufacturer specifications)
- 5.18. **Batteries.** Remove, replace, and install batteries. Clean and repair electrical connections to restore the system to normal operation and return all salvageable materials to the location designated by the Engineer. Unless otherwise noted, the batteries used will be 'gel cell', with type and size as specified by the Engineer.
- 5.19. **Amber or Color Dynamic Message Sign Controller.** Remove, replace, or install DMS Sign Controller and all accessories and return all salvageable materials to the location designated by the Engineer. Restore the Controller assembly to normal operation. Provide test procedures to verify controller functionality.
- 5.20. **Equipment Cabinet.** Remove, replace, and install Equipment Cabinet and all accessories and return all salvageable materials to the location designated by the Engineer. Restore the Cabinet assembly to normal operation.
- 5.21. **Troubleshoot Fiber Optic Cable (Multi-Mode or Single-Mode).** Test, and troubleshoot, the Fiber Optic Cable. The Contractor, at a minimum, must:

- Test the cable with an OTDR operating within the appropriate wavelengths in order to locate the fault.
- Test any optical jumpers or optical interconnects using an optical light source and power meter operating within the appropriate wavelengths.
- Locate and document where the suspect fault is.
- Documentation will be returned to TxDOT in the form of a CD or other compatible media with a personal computer format, as well as a hard copy plot of the suspect fault. The Contractor will provide the Department with the software to display the diskette information on a PC.

5.22. **Fiber Optic Cable (Multi-Mode or Single-Mode).** Remove, replace, install, and test Cable and return all salvageable materials to the location designated by the Engineer. The Contractor will then install a replacement Cable, and perform the following functions:

- Test all fiber optic cable prior to installation with an Optical Time Domain Reflectometer (OTDR) operating at 1310 nm and 1550 nm.
- Test all fiber optic cable after installation with an Optical Time Domain Reflectometer (OTDR) operating at 1310 nm and 1550 nm.
- Test all fiber optic cable with a two (2) point test using an OTDR operating at 1310 nm and 1550 nm. Provide end-to-end OTDR results in the form of a USB drive and a hard copy plot of the end-to-end tests.
- The Contractor will provide or replace any damaged fiber optic termination connector systems of fiber optic distribution bins with associated splice trays, and any auxiliary connectors or jumpers.

5.23. **Splice Fiber Optic Cable (Multi-Mode or Single-Mode).**

5.23.1. **Temporary Splicing/Repairs.**

- The Contractor will provide a quick mechanical splice configuration for splice trays, outdoor splice boxes and auxiliary jumpers, including cable dressing materials and tools required for preparing the fiber optic cable.
- This process will be provided while ordering permanent support for the fiber optic cable that is being repaired.
- All mechanical splices must be tested, with a maximum allowable loss of 0.8 dB, unless otherwise noted by the Engineer.

5.23.2. **Permanent Splicing/Repairs.**

- The Contractor will provide for replacing the faulty fiber optic cable, enclosure, splice trays, and associated cable dressing materials.
- The Contractor will provide for fusion splicing utilizing a fusion splicer with light insertion device (LID) that measures loss of the fusion splice at 1310 nm or 1550 nm, and the use of an optical power light meter (OPM) to confirm the connector/jumper losses.

5.23.3. **Testing.**

- The Contractor will provide for testing of all replaced cable and ancillary fiber optic equipment.
- This testing should consist of the use of an OTDR and Optical Power Meter and light source.
- All testing will be performed at within the appropriate wavelengths.
- The Contractor will provide end to end testing with the results recorded on a CD or other compatible electronic media and a loss plot in dB.
- The Contractor will provide all optical power meter and the results will be recorded in a loss form in dB.
- All connector loss figures must be less than: 0.03 dB for Single-Mode and Multi-Mode.
- The Contractor will provide for fusion splice loss on permanent cable to be less than: 0.03 dB for Multi-Mode or 0.03 dB for Single-Mode applications.
- The Contractor will provide all additional testing or verification and will be as directed by the Engineer.

- 5.24. **Individual Fiber.** Repair, modify, or install Individual fiber strands, and splice, terminate, or repair as needed. This item must be used in damaged pigtails or other locations where entire cable replacement is not needed, as directed by the Engineer.
- 5.25. **HUB Cabinet.** Remove, replace, test, and install damaged HUB Cabinet and all accessories and return all salvageable materials to the location designated by the Engineer. Restore the HUB Cabinet unit assembly to normal operation.
- 5.26. **HUB Building.** Remove, replace, test, and install HUB Building and all accessories and return all salvageable materials to the location designated by the Engineer. Restore the HUB Building unit assembly to normal operation.
- 5.27. **HUB Building Preventive Maintenance.** The Contractor must complete and sign Preventive Maintenance Forms at each HUB Building. The Contractor will fill out these forms, legibly and completely.
- A Department inspector will also sign each Preventive Maintenance Form at the HUB Building. In addition, the Contractor must list all materials at each location. The Contractor will perform the following preventive maintenance at each location at least once during the term of the contract, and at approximately six (6) month intervals or as directed by the engineer:
  - Test fan and thermostat and adjust as necessary.
  - Replace air filter.
  - Replace or clean air conditioner filter as directed by the Engineer.
  - Clean condensers, evaporator coils, fins, and filters.
  - Lubricate AC motors in accordance with manufacturers' specifications.
  - Lubricate locks and doors as necessary.
  - Inspect building for environmental damage.
  - Remove all graffiti. High pressure water hose should not be used. Clean off all dirt and debris.
  - Dust and vacuum all components. Use an appropriate ground strap to eliminate high electrostatic voltages caused by the flow of air.
  - Test building lights for operation and replace all lamps.
  - Inspect all cables and connectors, including fiber optic patch panels. Verify cable labeling with Engineer. Replace or add labels to cables as necessary.
  - Check building for rodent and insect infestation and dispense pesticides as necessary.
  - The Contractor must check the Uninterruptable Power Supply (UPS) by performing the following functions:
    - The by-pass switch must be checked for dynamic operations.
    - The Contractor will check the UPS controller diagnostics.
    - Contractor must check the sealed batteries for leaks or out-gassing.
    - The Contractor will remove the primary power to confirm UPS back-up operations for 30 minutes and restore power. Coordinate primary power disconnect with Engineer.
  - Test pump system as per manufacturers' specifications.
  - Test De-Humidifier and air exchangers as per manufacturers' specs.
- 5.28. **HUB Cabinet Preventive Maintenance.** The Contractor must complete and sign Preventive Maintenance Forms at each HUB Cabinet. The Contractor will fill out these forms, legibly and completely. A Department inspector will also sign each Preventive Maintenance Form. In addition, the Contractor must list all materials at each location. The Contractor will perform the following preventive maintenance at each location at least once during the term of the contract, and at approximately six (6) month intervals or as directed by the engineer:
- Test fan and thermostat and adjust as necessary.
  - Replace air filter.
  - Lubricate locks and doors as necessary.
  - Inspect cabinet for environmental damage.

- Dust and vacuum all components.
  - Test cabinets light for operation and replace lamp.
  - Inspect all cables and connectors including fiber optic patch panels. Verify cable labeling with Engineer. Replace or add labels to cables as necessary.
  - Check cabinet for rodent and insect infestation and dispense pesticides as necessary.
  - Erase or eliminate all graffiti, clean cabinet exterior of all dirt and debris.
- 5.29. **Lane Control Signal (HOV support or FRWY).** Remove, replace, install, and test Signals and all accessories (to include support brackets) and return all salvageable materials to the location designated by the Engineer. Restore the Signal assembly to normal operation.
- 5.30. **Electrical Service.** Install, repair, replace, remove, or modify an electrical service assembly in accordance with Item 628, "Electrical Services" as shown on the plans or as directed.  
Mount any and all of the following on an electrical service support assembly: conduit, weather head, load center, meter base, lighting protection, wiring, and associated hardware.
- 5.31. **Electrical Service Enclosure.** Replace Power Connection (excluding poles) must include removing and salvaging the existing equipment, installing new switch gear and complete electrical service enclosure as specified in the current Electrical Detail (ED) Sheets for types A, C, D, or T with electrical conductors and photocell, and making the connection to the power company service for complete power restoration.
- 5.32. **Bore Conduit (2" or 3").** Install, replace, remove, or modify conduits in accordance with Item 618, "Conduit" as shown on the plans or as directed. Use 90-degree sweep type elbow on conduits entering a ground box. The Contractor will furnish and install all conduits.
- 5.33. **Trench Conduit (2" or 3").** Install, replace, remove, or modify conduits in accordance with Item 618, "Conduit" as shown on the plans or as directed. Use 90-degree sweep type elbow on conduits entering a ground box. The Contractor will furnish and install all conduits.
- 5.34. **Above Ground Conduit (2" or 3").** Install, replace, remove, or modify conduits in accordance with Item 618, "Conduit" as shown on the plans or as directed. Use 90-degree sweep type elbow on conduits entering a ground box. The Contractor will furnish and install all conduits.
- 5.35. **Ground Box with Apron.** Install, remove, replace, or modify ground boxes in accordance with Item 624, "Ground Boxes", as shown on the plans, or as directed. Use ground box of the size and type specified. The Contractor will furnish all ground boxes.
- 5.36. **VIVDS Detector Camera.** Remove, replace, install, and test VIVDS Detector Camera and all accessories and return all salvageable materials to the location designated by the Engineer. Restore the assembly to normal operation.
- 5.37. **VIVDS Detector Controller.** Remove, replace, repair, modify, and test VIVDS Detector Controller and all accessories and return all salvageable materials to the location designated by the Engineer. The contractor will then install a replacement unit and restore the Controller Assembly to normal operation.
- 5.38. **Transportation Management Console CPU.** Repair, replace, install, and test Console CPU and all accessories and return all salvageable materials to the location designated by the Engineer. Restore the controller Assembly to normal operation.
- 5.39. **Transportation Management Console Monitor.** Remove, replace, repair, install, and test Console Monitor and all accessories and return all salvageable materials to the location designated by the Engineer. Restore the Assembly to normal operation.

- 5.40. **Network Management System Diagnostics Unit CPU.** Repair, replace, install, modify, and test Network Management System Diagnostics Unit CPU and all accessories and return all salvageable materials to the location designated by the Engineer.
- 5.41. **Pedestrian Pole Foundation.** Install, replace, or remove foundations of the type specified in accordance with Item 416, "Drilled Shaft Foundations", Item 656, "Foundations for Traffic Control Devices", and as shown on the plans or as directed.
- 5.42. **DMS controller Foundation.** Install, replace, or remove foundations of the type specified in accordance with Item 416, "Drilled Shaft Foundations", Item 656, "Foundations for Traffic Control Devices", and as shown on the plans or as directed.
- 5.43. **Equipment cabinet Foundation.** Install, replace, or remove foundations of the type specified in accordance with Item 416, "Drilled Shaft Foundations", Item 656, "Foundations for Traffic Control Devices", and as shown on the plans or as directed.
- 5.44. **Signal Pole Foundation.** Install, replace, or remove foundations of the type specified in accordance with Item 416, "Drilled Shaft Foundations", Item 656, "Foundations for Traffic Control Devices", and as shown on the plans or as directed.
- 5.45. **Open Transport Network (OTN).** Remove, replace, install, and test the OTN and its associated hardware and components. Provide testing procedures to Engineer before testing. A Department inspector must be present during testing and provide written approval for acceptance of new OTN equipment.
- 5.46. **Service HAR Equipment.** All Highway Advisory Radio (HAR) will be serviced annually to include clean and service batteries, and to inspect and tighten all bolts, clamps, and related hardware. Clean the solar panel (if applicable), inspect, repair, and label all wiring and cables as directed by the engineer.
- 5.47. **Bluetooth Detector.** Remove, replace, install, and test Bluetooth Detector and all accessories and return all salvageable materials to the location designated by the Engineer. Restore the Bluetooth Detector assembly to normal operation.
- 5.48. **Bluetooth Detector Maintenance.** Repair, replace, install, modify, and test Bluetooth Detector System and all accessories and return all salvageable materials to the location designated by the Engineer.
- 5.49. **Lane Management System.** Remove, replace, install, and test Lane Management System and all accessories and return all salvageable materials to the location designated by the Engineer. Restore the Lane Management System assembly to normal operation.
- 5.50. **Lane Management System Maintenance.** Service, maintain, or install items in a DMS. The Contractor must complete and sign the Lane Management System Maintenance Service Forms. The Contractor will fill out these forms, legibly and completely. A Department inspector will also sign each Lane Management System Maintenance Form. In addition, the Contractor must list all materials used at this location. The Contractor will perform the following preventive maintenance at each location at least once during the term of the contract, and at approximately six (6) month intervals, for flip disk signs. Fiber optic and LED signs will be serviced annually or as directed by the engineer:
- Clean front and back of each character module window on front access type signs. On walk in signs, only clean the exterior windows with soapy water and a chamois cloth as directed by the Engineer.
  - Replace all sign lamps.
  - Replace all sign lamp reflectors including any damaged reflective modules.
  - Check hardware and mounting bolts on door light modules and photo cells.
  - Check all electrical connections and fiber bundle connections for tightness; re-tighten as necessary.
  - Test all lamp shutters. Replace faulty shutters as necessary. Shutters will be supplied by the Department unless otherwise noted.

- Test Day, Night, and Overbright brightness levels. Replace photo cells as necessary. Photocells will be supplied by the Department unless otherwise noted.
- Clean and remove dirt and debris from each component in each cabinet.
- Test sign enclosure light. Replace lamp as necessary.
- Check cabinet heater thermostat. Replace thermostat as necessary. Thermostats will be supplied by the Department unless otherwise noted.
- Check ground fault circuit breaker. Reset or replace as necessary.
- Check time clock for correct time and date. Reset as necessary.
- Check each time clock battery. Replace as necessary.
- Check controller cabinet lamp and AC power supply voltages.
- Inspect and clean pole bases and controller cabinet for insect and rodent buildup.
- Clean controller cabinet exterior, removing dirt, debris, and graffiti.
- Inspect all steel surfaces (poles, catwalks and cabinet bases) for scratches or rust and apply cold galvanizing material as necessary.
- Inspect each foundation bolt for tightness and re-tighten as necessary.
- Inspect all pull boxes and replace as necessary.

5.51. **DMS Amber or color.** Remove, replace, and install DMS Sign and all accessories and return all salvageable materials to the location designated by the Engineer. Restore the DMS assembly to normal operation. Provide test procedures to verify controller functionality.

5.52. **DMS Amber or Color Maintenance.** Service, maintain, or install items in a DMS. The Contractor must complete and sign the Dynamic Message Sign Preventive Maintenance Forms. The Contractor will fill out these forms, legibly and completely. A Department inspector will also sign each Dynamic Message Sign Maintenance Form. In addition, the Contractor must list all materials used at this location. The Contractor will perform the following preventive maintenance at each location at least once during the term of the contract, and at approximately six (6) month intervals, for flip disk signs. Fiber optic and LED signs will be serviced annually or as directed by the engineer:

- Clean front and back of each character module window on front access type signs. On walk in signs, only clean the exterior windows with soapy water and a chamois cloth as directed by the Engineer.
- Replace all sign lamps.
- Replace all sign lamp reflectors including any damaged reflective modules.
- Check hardware and mounting bolts on door light modules and photo cells.
- Check all electrical connections and fiber bundle connections for tightness; re-tighten as necessary.
- Test all lamp shutters. Replace faulty shutters as necessary. Shutters will be supplied by the Department unless otherwise noted.
- Test Day, Night, and Overbright brightness levels. Replace photo cells as necessary. Photocells will be supplied by the Department unless otherwise noted.
- Clean and remove dirt and debris from each component in each cabinet.
- Test sign enclosure light. Replace lamp as necessary.
- Check cabinet heater thermostat. Replace thermostat as necessary. Thermostats will be supplied by the Department unless otherwise noted.
- Check ground fault circuit breaker. Reset or replace as necessary.
- Check time clock for correct time and date. Reset as necessary.
- Check each time clock battery. Replace as necessary.
- Check controller cabinet lamp and AC power supply voltages.
- Inspect and clean pole bases and controller cabinet for insect and rodent buildup.
- Clean controller cabinet exterior, removing dirt, debris, and graffiti.
- Inspect all steel surfaces (poles, catwalks and cabinet bases) for scratches or rust and apply cold galvanizing material as necessary.
- Inspect each foundation bolt for tightness and re-tighten as necessary.



- Inspect all pull boxes and replace as necessary.
- 5.53. **Field Ethernet Switch.** Replace, install, program and test Field Ethernet Switch and all accessories and return all salvageable materials to the location designated by the Engineer. Restore the Field Ethernet Switch assembly to normal operation.
- 5.54. **Video Encoder or Video Decoder.** Remove, replace, install, program and test Video Encoder or Video Decoder and all accessories and return all salvageable materials to the location designated by the Engineer. Restore the Video Encoder or Video Decoder assembly to normal operation.
- 5.55. **Terminal Server.** Remove, replace, install, program and test Terminal Server and all accessories and return all salvageable materials to the location designated by the Engineer. Restore the Terminal Server assembly to normal operation.
- 5.56. **Cellular Modem.** Remove, replace, install, program and test Cellular Modem and all accessories and return all salvageable materials to the location designated by the Engineer. Restore the Cellular Modem assembly to normal operation.
- 5.57. **12" LED Traffic Signal Lamp.** Remove replace, install, and test 12" LED Traffic Signal Lamp and all accessories and return all salvageable materials to the location designated by the Engineer. Restore the Traffic Signal Lamp assembly to normal operation.

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## 6. MEASUREMENT

This Item will be measured as follows:

- 6.1. **Barricades, Signs and Traffic Handling for main lanes of freeway.** By the hour of time used to complete placement and removal of all barricades, signs, barriers, cones, lights, signals and other such devices necessary to handle traffic upon completion of work.
- 6.2. **Barricades, Signs and Traffic Handling for service roads and ramps.** By the hour of time used to complete placement and removal of all barricades, signs, barriers, cones, lights, signals and other such devices necessary to handle traffic upon completion of work.
- 6.3. **Troubleshoot Equipment.** By the hours of time used. All connections and other work incidental to testing the unit will be considered subsidiary to this Item. A maximum of 2 technicians must be assigned per incident.
- 6.4. **Power, Signal, Interconnect, and Communication Cable.** By the linear foot. All connections and all other work subsidiary to make a working system will be considered subsidiary to this Item.
- 6.5. **Troubleshoot Power, Signal, Interconnect, and Communication Cable.** By the hour. The maximum payment will be two hours for troubleshooting copper cable. All connections and other ancillary work to make up a working system will be subsidiary to this item.
- 6.6. **Graffiti Removal.** By the square foot structure cleaned and painted. Cleaners, paint, and labor are considered subsidiary to this item. Traffic Control, if required, will be paid separately.
- 6.7. **System Component Device.** By the each item removed, replaced or installed such as modems, Video or Data Mux, Demux, T1 cards, OTN cards shelf or rack mounted, etc.
- 6.8. **CCTV Camera (including pan tilt unit and the lens).** By each unit, complete in place.
- 6.9. **CCTV Camera Controller.** By the each unit, complete in place.
- 6.10. **CCTV Controller Cabinet (Ground or Pole Mount).** By each unit, complete in place.
- 6.11. **CCTV Camera Pole.** By each unit, complete in place and should include removing and salvaging the existing equipment.
- 6.12. **Preventive Maintenance of CCTV Camera System.** By each location each time preventive maintenance is performed.
- 6.13. **Troubleshoot Microwave Detection (RVSD) System.** By each system.
- 6.14. **RVSD.** By each unit replaced, installed, tested or adjusted.

- 6.15. **RVSD Controller Cabinet (Ground or Pole Mount).** By the complete unit in place.
- 6.16. **RVSD Pole.** By each complete unit in place. This includes all sub-assemblies such as the cabinet, controller, emitter, etc.
- 6.17. **RVSD System Preventive Maintenance.** By each time, RVSD preventive maintenance is performed.
- 6.18. **Batteries.** By each battery replaced.
- 6.19. **Amber or Color Dynamic Message Sign Controller.** By each unit, complete in place.
- 6.20. **Equipment Cabinet.** By each unit, complete in place.
- 6.21. **Troubleshoot Fiber Optic Cable (Multi-Mode or Single-Mode).** By the hours used for troubleshooting. A maximum of three hours will be charged.
- 6.22. **Fiber Optic Cable (Multi-Mode or Single-Mode).** By the linear foot.
- 6.23. **Splice Fiber Optic Cable (Multi-Mode or Single-Mode).** By each splice.
- 6.24. **Individual Fiber** will be measured by the linear foot of the type of fiber (strand number) specified by the Engineer.
- 6.25. **HUB Cabinet** will be measured by each unit, complete in place.
- 6.26. **HUB Building** will be measured by each unit, complete in place.
- 6.27. **HUB Building Preventive Maintenance,** as described herein, will be measured by each intersection each time preventive maintenance is performed
- 6.28. **HUB Cabinet Preventive Maintenance,** as described herein, will be measured by each intersection each time preventive maintenance is performed.
- 6.29. **Lane Control Signal (HOV or FRWY)** will be measured by each signal head replaced, complete in place.
- 6.30. **Electrical Service** will be measured by each unit completed in place.
- 6.31. **Electrical Service Enclosure** will be measured by each unit completed in place.
- 6.32. **Bore conduit (2" or 3")** will be measured by the linear foot of conduit installed.
- 6.33. **Trench conduit (2" or 3")** will be measured by the linear foot of conduit installed.
- 6.34. **Above ground conduit (2" or 3")** will be measured by the linear foot of conduit installed.
- 6.35. **Ground Box with Apron,** will be measured by each unit replaced.
- 6.36. **VIVDS Detector Camera** will be measured by the hours of time used for each unit, complete in place.
- 6.37. **VIVDS Detector Controller** will be measured by each unit, complete in place.
- 6.38. **Transportation Management Console CPU** will be measured by each unit, complete in place.
- 6.39. **Transportation Management Console Monitor** will be measured by each unit, complete in place.
- 6.40. **Network Management System Diagnostics Unit CPU** will be measured by each unit, complete in place.
- 6.41. **Pedestrian Pole Foundation** will be measured by each foundation of the type specified.
- 6.42. **DMS controller Foundation** will be measured by each foundation of the type specified.
- 6.43. **Equipment cabinet Foundation** will be measured by each foundation of the type specified.
- 6.44. **Signal Pole Foundation** will be measured by each foundation of the type specified.
- 6.45. **Open Transport Network (OTN)** will be measured by the lump sum.
- 6.46. **Service HAR Equipment** will be measured by the each Highway Advisory Radio (HAR) location serviced.
- 6.47. **Bluetooth Detector** will be measured by the each item replaced, shelf or rack mounted, completed in place.
- 6.48. **Bluetooth Detector Maintenance,** as described herein, will be measured by each location each time preventive maintenance is performed.
- 6.49. **Lane Management System** will be measured by the each item replaced, shelf or rack mounted, completed in place.
- 6.50. **Lane Management System Maintenance,** as described herein, will be measured by each location each time preventive maintenance is performed.
- 6.51. **DMS Amber or Color** will be measured by the each item replaced, shelf or rack mounted, completed in place.
- 6.52. **DMS Amber or Color Maintenance,** as described herein, will be measured by each location each time preventive maintenance is performed.
- 6.53. **Field Ethernet Switch** will be measured by the each item replaced, shelf or rack mounted, completed in place.

- 6.54. **Video Encoder or Video Decoder** will be measured by the each item replaced, shelf or rack mounted, completed in place.
- 6.55. **Terminal Server** will be measured by the each item replaced, shelf or rack mounted, completed in place.
- 6.56. **Cellular Modem** will be measured by the each item replaced, shelf or rack mounted, completed in place.
- 6.57. **Traffic Signal Lamp 12" LED** will be measured by the each item replaced, completed in place.

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**7. PAYMENT**

The work performed and the materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit prices bid for the various designations. These prices will be full compensation for furnishing all required material as shown on the plans, and for all labor, equipment and incidentals necessary to complete the work as specified.

Termination of Wiring, Sealing, and Protection of Utilities, Removal and Replacement of Curbs and Walks, and Preservation of Sod, Shrubbery and Trees must be considered subsidiary to various bid Items.

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