

Control	6438-05-001
Project	RMC - 643805001
Highway	IH0002
County	CAMERON

## 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 FURNISH & INSTALL DYNAMIC MESSAGE SIGNS CAMERON 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 160 working 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:

SIX THOUSAND (Dollars) ( \$6,000 )

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 working 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>6438-05-001</b>
<b>Project</b>	<b>RMC - 643805001</b>
<b>Highway</b>	<b>IH0002</b>
<b>County</b>	<b>CAMERON</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>6438-05-001</b>
<b>Project</b>	<b>RMC - 643805001</b>
<b>Highway</b>	<b>IH0002</b>
<b>County</b>	<b>CAMERON</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
--	-----	-----	--	--	-----	-----------	----

**Unit price for each ton of Flexible Base**

	430	001	001	CL A CONC FOR EXT STR (CULV)  	CY	45.000	27
--	-----	-----	-----	---	----	--------	----

**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.				
	500	6001		MOBILIZATION  DOLLARS and CENTS	LS	1.000	1
	502	6001	008	BARRICADES, SIGNS AND TRAFFIC HAN- DLING  DOLLARS and CENTS	MO	5.000	2
	618	6023		CONDT (PVC) (SCH 40) (2")  DOLLARS and CENTS	LF	565.000	3
	618	6047		CONDT (PVC) (SCH 80) (2") (BORE)  DOLLARS and CENTS	LF	360.000	4
	618	6070		CONDT (RM) (2")  DOLLARS and CENTS	LF	250.000	5
	620	6008		ELEC CONDR (NO.8) INSULATED  DOLLARS and CENTS	LF	1,785.000	6
	620	6010		ELEC CONDR (NO.6) INSULATED  DOLLARS and CENTS	LF	3,570.000	7
	624	6002		GROUND BOX TY A (122311)W/APRON  DOLLARS and CENTS	EA	19.000	8
	624	6010		GROUND BOX TY D (162922)W/APRON  DOLLARS and CENTS	EA	8.000	9
	624	6028		REMOVE GROUND BOX  DOLLARS and CENTS	EA	3.000	10
	628	6002		REMOVE ELECTRICAL SERVICES  DOLLARS and CENTS	EA	3.000	11

ALT	ITEM-CODE			UNIT BID PRICE ONLY. WRITTEN IN WORDS	UNIT	APPROX QUANTITIES	DEPT USE ONLY
	ITEM NO	DESC CODE	S.P. NO.				
	628	6153		ELC SRV TY D 120/240 060(NS)SS(N)TP(O) DOLLARS and CENTS	EA	8.000	12
	647	6001		INSTALL LRSS (STRUCT STEEL) DOLLARS and CENTS	LB	1,350.000	13
	650	6204		REMOVE OVERHD SIGN SUP DOLLARS and CENTS	EA	3.000	14
	6004	6031		ITS COM CBL (ETHERNET) DOLLARS and CENTS	LF	415.000	15
	6010	6011		CCTV FIELD EQUIP (DIGITAL) (INSTL ONLY) DOLLARS and CENTS	EA	5.000	16
	6028	6001		INSTALL DMS (POLE MTD CABINET) DOLLARS and CENTS	EA	3.000	17
	6064	6068	001	ITS POLE (8 FT)(COSS/OSB) DOLLARS and CENTS	EA	5.000	18
	6064	6084	001	ITS POLE MNT CAB (TY 2)(CONF 2) DOLLARS and CENTS	EA	5.000	19
	6185	6002	002	TMA (STATIONARY) DOLLARS and CENTS	DAY	160.000	20
	6443	6001		REMOVE DYNAMIC MESSAGE SIGN SYS- TEM DOLLARS and CENTS	EA	3.000	21

# **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.

# ENGINEER SEAL

Control 6438-05-001  
Project RMC - 643805001  
Highway IH0002  
County CAMERON

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  
*Eligio Alvarez, P.E.*  
JULY 17, 2023



**2014 SPECS GENERAL NOTES:**

\*\*\*\*\*

General Requirements and Covenants to ITEMS 1 thru 9:

For all pits or quarries, comply with the “Texas Aggregate Quarry and Pit Safety Act.”

Provide on a weekly basis a list of equipment, including idle equipment, utilized on the project that week.

The 1-800 call services for utility locations do not include TxDOT facilities. Contact the Pharr District Signal Section (956-702-6225) for coordination regarding TxDOT underground lines.

The Contractor’s attention is directed to the possible presence of underground utilities on the Right of Way on this project. It is the responsibility of the Contractor to call for locates 48 hours in the advance of excavation or drilling.

All information concerning utility verification shall be provided to the Engineer.

The Contractor shall contact the local power companies prior to commencing construction. The Contractor shall coordinate with the power companies for the raising/relocation of existing power lines where deemed necessary by the Engineer or the Contractor to affect the proposed construction (subsidiary to the various bid items).

Erection of poles, luminaire, and structures located near any overhead or underground utilities shall be accomplished using established industry and utility safety practices. The Contractor shall consult with the appropriate utility companies prior to beginning such work.

The Contractor shall take extreme care when excavating or drilling in the vicinity of utilities. The Contractor shall verify the location of any underground utilities before drilling for steel pole foundations and service poles. The Contractor shall hand dig, vacuum excavate, or employ any potholing practice necessary when trying to identify and avoid damage to utilities.

The Contractor shall repair any damage to existing facilities caused by his operations deemed his liability by the Engineer, at his own expense and shall restore facilities to service in a timely manner.

The Contractor shall attend a preconstruction conference to discuss traffic control, traffic safety, construction sequences, and safety prior to start construction. The Contractor’s superintendent shall attend the preconstruction conference. The Contractor shall, at the preconstruction meeting or prior to beginning any work on the project submit a certificate indicating the completion of flagger training by a company representative.

The Contractor shall submit a work schedule, material sources, and letters designating the project superintendent, safety officer, and payroll.

**County:** Hidalgo, ETC

**Control:** 6438-05-001

**Highway:** IH-2, ETC

ITEM 2: Instructions to Bidders

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

Eugene Palacios, P.E. District Maintenance

[Eugene.Palacios@txdot.gov](mailto:Eugene.Palacios@txdot.gov)

Contractor questions will be accepted through email, phone, and in person by the above individuals. Questions may also 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.

ITEM 5: Control of the Work

The responsibility for the construction surveying on this contract will be in accordance with Article 5.9.3., "Method C."

ITEM 6: Control of Materials

To comply with the latest provisions of Build America, Buy America Act (BABA Act) of the Bipartisan Infrastructure Law, the contractor must submit a notarized original of the TxDOT Construction Material Buy America Certification Form for all items classified as construction materials. This form is not required for materials classified as a manufactured product.

Refer to the Buy America Material Classification Sheet for clarification on material categorization.

The Buy America Material Classification Sheet is located at the below link.

<https://www.txdot.gov/business/resources/materials/buy-america-material-classification-sheet.html> for clarification on material categorization.

ITEM 7: Legal Relations and Responsibilities

Roadway or Lane closures during the following key dates and/or special events are prohibited:

- National Holidays
- The day before a National Holiday
- During emergency events such as natural disasters or as directed by the Engineer
- Local Special Event (list special event(s) and date-to-date duration(s), if applicable)

ITEM 8: Prosecution and Progress

Working days will be computed and charged in accordance with Article 8.3.1.5. Calendar Day.

A total of 180 calendar days will be allowed for this project. Working days will be charged Sunday through Saturday, including all holidays, regardless of weather conditions, material availability, or other conditions not under the control of the Contractor.

The latest roadway-start-work date and beginning of time charges is October 2, 2023. These days may be extended as directed by Engineer.

The Sate Contractor shall not perform any work operations within the Railroad R.O.W. until the railroad agreements have been executed.

Prepare progress schedules as a Bar Chart.

The Contractor will begin the work to be performed under the contract within 20 days after the date of authorization.

The prosecution of the work will be conducted in such a manner as to impose minimum interference to traffic.

The Contractor shall review the monthly statement of time charges and will be allowed up to the end of the next estimate period to protest the correctness. This protest shall be in writing and shall show cause. Not filing protest by the end of the next estimate period for any time statement will indicate the Contractor's approval of the time charges as shown on that time statement and future consideration of that statement will not be permitted. If the satisfactory completion of the contract requires unforeseen work, then additional work days or suspension of time charge will be allowed for the Contractor equal to the time, which, in the opinion of the Engineer, the work as a whole is delayed.

ITEM 400: Excavation and Backfill for Structures

If the Contractor elects to cut pavement (existing/detour) for structural work beyond that required by the construction phasing shown in the plans and approved by the Engineer, it shall be restored at his expense and backfilled to its original condition or better in accordance with Item 400.

Unless shown otherwise in the plans, use a 1-ft depth for Item 400 Structural Excavation (Special) for gravel bedding needed below drainage structures with unstable material.

**Structural Excavation Special (Gravel):**

Use durable natural stone when tested in accordance with Tex-411-A, has weight loss of no more than 18% after 5 cycles of magnesium sulfate solution. Provide gravel conforming to an aggregate Grade No. 1 as shown on Table 4 of Article 421.2.

ITEM 416: Drilled Shaft Foundations

Payment for furnishing and installing anchor bolts mounted in drill shafts will be included in the unit price bid for the various diameter drill shafts.

The Contractor shall coordinate with the utility companies to verify utility locations before drilling foundations.

The Contractor shall form, or provide a smooth finish, the portions of drilled shaft that project above the ground line. Place a 3/4 inch chamfer on the top edge of each pole foundation. This work will not be paid for directly but will be considered subsidiary to this bid Item.

All drilled shaft foundations will be based on the lengths shown on the plans or those established in writing. Adequate calculations for measurements of foundations have been made in accordance with Article 9.1. of the Standard Specifications. Increases or decreases in the quantities required by change in design will be measured as specified and the revised quantities will be the basis for payment.

In the presence of excess ground water and/or unstable conditions in sub-grade soils prevents excavation to the line and depths indicated on the plans for "Drilled Shaft Foundation", other proposed methods of foundation installation such as casing, etc. shall be submitted for review and approved by the Engineer.

ITEM 421: Hydraulic Cement Concrete

Provide Sulfate Resistant Concrete for all concrete piling and drilled shafts.

Provide equipment at the batch plant for determining the free moisture and/or absorption of aggregates in accordance with applicable TXDOT Test.

Provide the following items for concrete batch inspection in accordance with specifications outlined in DMS-10101, "Computer Equipment":

- (1) One Desktop Microcomputer or One Laptop Microcomputer
- (2) One Integrated Printer/Scanner/Copier/Fax Unit
- (3) Contractor-Furnished Software
- (4) Hardware

**County:** Hidalgo, ETC

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**Highway:** IH-2, ETC

Submit to the Engineer for approval the project locations for all Portland Cement concrete washout areas prior to starting any concrete work.

Fiber Reinforced Concrete is not permitted.

ITEM 502: Barricades, Signs, and Traffic Handling

Shadow vehicles equipped with Truck-Mounted Attenuators are required for traffic handling. See notes for Item 6185: Truck Mounted Attenuator/Trailer Attenuator, for additional references pertaining to the TMAs.

Furnish and install all signs, barricades and other incidentals necessary for proper traffic control, in accordance with part VI of the "Texas Manual on Uniform Traffic Control Devices for Streets and Highways" and in accordance with the standards plan sheets. Additional devices may be needed to supplement these requirements. All warning signs shall be factory made and in satisfactory condition.

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

When a Traffic Control Plan (TCP) standard requires use of one of the following devices, Type III barricades, channelizing or shadow vehicles with orange flags or warning lights, use a shadow vehicle equipped with a Truck Mounted Attenuator (TMA).

Any lane closures will require prior approval. At least 2 calendar days prior to the work, submit for approval a work plan including proposed traffic control, schedule of work and other details. If a lane closure has to be cancelled due to weather or other unforeseen circumstances, immediately notify the inspector and reschedule the lane closure as necessary.

Closures of freeway ramps and direct connectors shall be approved by the Engineer.

For complete closure of an exit ramp or direct connector, detour signing must be provided.

Arrow boards are required. Provide a standby unit in good condition at the jobsite for immediate use.

From the beginning to the end of the project, all traffic control devices need to be in acceptable condition as per the Texas Quality Guidelines for Work Zone Traffic Control Devices.

No two consecutive ramps will; be closed concurrently. The Contractor shall submit notifications that contain the following information: date of closure, roadway and direction of closed lane, the operations of the work within the closure, and the names of the of the cross-streets between which the closure will take place. Temporary lane closures not appearing on the list will not be permitted.

Repetitive submission of temporary lane closure notifications which are not implemented in or are ineffective utilization of implemented lane closure will be subject to liquidated damages, as determined, in accordance with the Item, "Prosecution and Progress."

Police assistance will be required when closing more than one lane of traffic on the freeway, main-lanes or ramps. Scheduling and arrangements for police assistance will be the Contractor's responsibility.

The Contractor Force Account "Safety Contingency" that has been established for this project is intended to be utilized for work zone enhancements, to improve the effectiveness of the Traffic Control Plan, that could not be foreseen in the project planning and design stage. These enhancements will be mutually agreed upon by the Engineer and the Contractor's responsible Person based on weekly or more frequent traffic management reviews on the project. The "Safety Contingency" is not intended to be used in lieu of bid items established by the contract.

Replace/relocate all regulatory signs removed due to construction operations with the same sign on fixed support(s) immediately upon its removal. First obtain Project Engineer approval before removing any regulatory roadway sign. Required flaggers are to be available to direct traffic during sign intermediate down time.

Relocate any Directional Sign Assemblies removed during construction operations immediately upon their removal.

These signs shall be relocated to a location in accordance with the Latest Version of the "Texas Manual on Uniform Traffic Control Devices". In no case will a sign be removed without a replacement sign and support(s) being readily available and a location established. Removal and relocation of these signs required for traffic control will not be paid for directly but shall be considered subsidiary to Item 502.

Remove and dispose of all litter, debris, objectionable material, excess materials that accumulate at the base of all traffic control devices as directed by the Engineer.

ITEM 504: Field Office and Laboratory

For this project a field office will not be required at the project site.

ITEM 506: Temporary Erosion, Sedimentation, and Environmental Controls

Due to the nature of this project, it is unlikely a significant amount of soil will be disturbed. However, if erosion control logs are needed; it shall be placed as directed by the Engineer.

The Contractor Force Account "Erosion Control Maintenance" that has been established for this project is intended to be utilized for work zone Best Management Practice (BMP) maintenance, to improve the effectiveness of the Environmental Controls that may need maintenance attention and/or require replacement while the project is still under the construction stage. These procedures will be mutually agreed upon by the Engineer and the Contractor's Responsible Person based on weekly or more frequent BMP management

**County:** Hidalgo, ETC**Control:** 6438-05-001**Highway:** IH-2, ETC

reviews on the project. The “Erosion Control Maintenance” is not intended to be used in lieu of bid Items established by the contract.

**ITEM 618: Conduit**

All conduit ends in pole bases, controllers and ground boxes shall be plugged with 4 to 6 inches of polyurethane sealant or its equivalent after cables are in place.

Conduit shall be placed in a straight line not to exceed 2.0 feet in any direction. The depth of the conduit shall be 2.0 feet except when crossing a roadway where the depth shall not be more than 3.0 feet nor less than 1.0 foot below the bottom of the base material in the roadway when placed by the jacking or boring method. Any evidence of damage to the roadway during the jacking or boring operation shall be sufficient grounds to stop the method being used.

Conduit runs under paved roadways or driveways shall be jacked or bored and then pushed across. At these locations, galvanized rigid metal may be used. All other runs shall be made by trenching. Existing pavement which will be removed, reconstructed, or overlaid with new pavement may be trenched across.

Cutting into or removing sidewalks as directed by the Engineer in the field will be considered subsidiary to item 618.

Secure permission and approval from the proper authority prior to cutting into or removing sidewalks or curbs for installation of this item. After work is complete the Contractor shall restore any curbs or walkways, which have been removed, to their original condition and to the satisfaction of the Engineer.

Trenches for conduit runs shall be a minimum 2 feet deep and 4 inches wide. The conduit shall be placed on a 2-inch sand cushion and then backfilled with a minimum of 6 inches sand fill. The remainder of the trench shall be backfilled with flexible base, soil or two-sack concrete as required by location of conduit on the project or as directed. The top 3 inches shall match the existing surface material.

All conduit elbows and rigid 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.

Use materials from prequalified Material Producer List as shown on the Texas Department of Transportation (TxDOT) - Construction Division’s (CST) Material Producer List. Category is “Roadway Illumination and Electrical Supplies.”

The polymer concrete barrier box will not be paid for separately, but will be considered subsidiary to Item 618, “Conduit”.

Where PVC, duct cable, and HDPE conduit 1” and larger is allowed and installed as per TxDOT standards, provide a PVC elbow in place of the galvanized rigid metal elbow required by the Electrical Detail standards.

**County:** Hidalgo, ETC**Control:** 6438-05-001**Highway:** IH-2, ETC

Ensure the PVC elbow is of the same schedule rating as the conduit to which it is connected. Ensure only a flat, high tensile strength polyester fiber pull tape is used for pulling conductors through the PVC conduit system.

#### ITEM 628: Electrical Services

Costs for utility-owned power line extensions, connections charges, meter charges, consumption charges, and other charges will be paid for by the Department. The Department will reimburse the Contractor the amount billed by the utility plus an additional 5% of the invoice will be paid for labor, equipment, administrative costs, superintendence, and profit.

The Contractor Force Account “Electrical Service Contingency” that has been established for this project is intended to be utilized for reimbursement with these costs. These enhancements will be mutually agreed upon by the Engineer and the Contractor’s Responsible Person. The “Electrical Service Contingency” is not to be used in lieu of bid items established by the contract.

#### ITEM 650: Overhead Sign Supports

The locations shown for signs and sign support structures may be adjusted to fit field conditions. The locations of all signs and sign support structure must be verified, prior to the Contractor taking elevations, to determine the height of the sign support towers, for fabrications.

All sign support quantities, pipe and structural steel, will be based on the dimensions shown on the approved shop drawings, or those established in writing. Calculations for measurement of the sign support quantities will be made from the approved shop drawings, in accordance with Article 9.1, of the Standard Specifications. Increases and decreases in quantities by change in design, after shop drawings are approved, will be measured as specified and revised quantities; will be the basis for payment.

The Contractor shall provide field galvanizing equipment, ASTM A780 (Stick only) or approved alternatives, at all times. Make repairs to galvanized surfaces according to the above specifications items, at intervals where damage has occurred.

Reuse undamaged components when replacing an existing overhead DMS signs. Provide new components to replace any damaged during removal or relocation, in accordance with the Items listed in this Article, unless otherwise directed.

Disconnect and isolate electrical power supplies before removing the DMS signs. Remove and store items designated for reuse or salvage. Accept ownership of unsalvageable materials and dispose of in accordance with federal, state, and local regulations.

After sign supports, with signs attached, have been erected, individual units requiring cleaning will be washed with a cleaning solution. The cleaning solution will be capable of removing all grease, oil, dirt, streaks, and other foreign particles.



ITEM 5088: Bird Exclusion Methods

Contractor's attention is directed to the plan's EPIC sheets, Bird Exclusion Detail standard sheets and shall refer to the Migratory Bird Treaty Act requirements. Also, refer to the TPWD BMPSs sheets for specific adherence to the environmental requirements of the Best Management Practices.

ITEM 6028: LED Dynamic Message Sign System

Provide all materials not supplied by the Department necessary for the DMS installation. All materials provided by the Contractor must be new. Include a task in the project for delivery of Department furnished materials and provide a minimum of 30 days' notice to the Department for pick-up of the Department-furnished materials.

Adjustments or additions of sign attachment hardware, support brackets, and appurtenances, such as walkways, conduit, etc., may be necessary for compatibility with specified sign positioning recommended by the manufacturer, as shown on the plans, or as directed. All adjustments or additional materials will not be paid for directly but will be subsidiary to this Item.

After all signs have been installed, the Department and the DMS manufacturer will conduct approved continuity, stand alone, and DMS system tests on the installed field equipment with central, remote, and laptop equipment. A final acceptance test will be conducted to demonstrate all control, monitor, and communication requirements for 90 days. The Engineer will furnish a Letter acknowledging the final acceptance testing commencement date 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. Assume responsibility only for test failures directly related to the work in accordance with this Item. Upon completion of successful final acceptance testing, permanently mark acceptance date and project identification information inside the controller cabinet.

ITEM 6185: Truck Mounted Attenuator/Trailer Attenuator

In addition to the shadow vehicles with truck mounted attenuator (TMA) that are specified as being required on the traffic control plan for the project, the Contractor shall be able to provide 2 additional shadow vehicle(s). The Contractor will be responsible for determining if one or more of his construction operations will be ongoing at the same time and thus determine the total number of TMAs needed for the project with TMA as per TCP (6-8)-14.

CONTROL : 6438-05-001  
PROJECT : RMC - 643805001  
HIGHWAY : IH0002  
COUNTY : CAMERON

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 500 MOBILIZATION  
ITEM 502 BARRICADES, SIGNS, AND TRAFFIC HANDLING  
ITEM 618 CONDUIT (400)(476)  
ITEM 620 ELECTRICAL CONDUCTORS (610)(628)  
ITEM 624 GROUND BOXES <302>(420)(421)(432)(440)(618)(620)  
ITEM 628 ELECTRICAL SERVICES (441)(445)(449)(618)(620)(627)(656)  
ITEM 647 LARGE ROADSIDE SIGN SUPPORTS AND ASSEMBLIES (416)(421)  
(440)(441)(442)(445)(636)  
ITEM 650 OVERHEAD SIGN SUPPORTS (416)(420)(421)(441)(442)(445)  
(449)(618)(636)(654)

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

SPECIAL PROVISION "NONDISCRIMINATION" (000---002)  
SPECIAL PROVISION "CERTIFICATE OF INTERESTED PARTIES (FORM 1295)"  
(000--1019)  
SPECIAL PROVISION "SCHEDULE OF LIQUIDATED DAMAGES" (000--1243)  
SPECIAL PROVISION "NOTICE OF CONTRACTOR PERFORMANCE EVALUATIONS"  
(000---659)  
SPECIAL PROVISIONS TO ITEM 2 (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---001)(006---012)  
SPECIAL PROVISIONS TO ITEM 7 (007---004)(007---010)(007---011)  
SPECIAL PROVISIONS TO ITEM 8 (008---030)(008---033)(008---054)

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 440 (440---004)  
 SPECIAL PROVISION TO ITEM 441 (441---004)  
 SPECIAL PROVISION TO ITEM 442 (442---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 654 (654---001)  
 SPECIAL PROVISION TO ITEM 656 (656---001)  
 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 6004 NETWORKING INTELLIGENT TRANSPORTATION SYSTEM (ITS)  
 COMMUNICATIONS CABLE  
 ITEM 6005 TESTING, TRAINING, DOCUMENTATION, FINAL ACCEPTANCE, AND  
 WARRANTY  
 ITEM 6006 ELECTRONIC COMPONENTS  
 ITEM 6010 CCTV FIELD EQUIPMENT (6005) (6006)  
 ITEM 6028 INSTALLATION OF DYNAMIC MESSAGE SIGN SYSTEM (432) (441)  
 (445) (449) (618) (620)  
 ITEM 6064 INTELLIGENT TRANSPORTATION SYSTEM (ITS) POLE WITH CABINET  
 (416) (421) (440) (441) (442) (445) (449) (496) (618) (620) (740)  
 ITEM 6185 TRUCK MOUNTED ATTENUATOR (TMA) AND TRAILER ATTENUATOR (TA)  
 ITEM 6443 REMOVE DYNAMIC MESSAGE SIGN SYSTEM

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.

# 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 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.

# 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.



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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 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.

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## Special Provision to Item 6

### Control of Materials

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For this project, Item 6, "Control of Materials," 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., "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/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 and e-mail;
- reimburse the Department for CL Table 1 testing using the contract fee schedule for the CL (including mileage and travel/standby 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 and 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)**

<b>TxDOT Test</b>	<b>Test Description</b>	<b>Turn-Around Time (Calendar days)</b>
<b>SOILS/BASE</b>		
Tex-101-E	Preparation of Soil and Flexible Base Materials for Testing (included in other tests)	
Tex-104-E	Liquid Limit of Soils (included in 106-E)	
Tex-105-E	Plastic Limit of Soils (included in 106-E)	
Tex-106-E	Calculating the Plasticity Index of Soils	7
Tex-110-E	Particle Size Analysis of Soils	6
Tex-113-E	Moisture-Density Relationship of Base Materials	7
Tex-114-E	Moisture-Density Relationship of Subgrade and Embankment Soil	7
Tex-115-E	Field Method for In-Place Density of Soils and Base Materials	2
Tex-116-E	Ball Mill Method for the Disintegration of Flexible Base Material	5
Tex-117-E, Part II	Triaxial Compression Tests For Disturbed Soils and Base Materials (Part II)	6
Tex-113-E w/ Tex-117-E	Moisture-Density Relationship of Base Materials <b>with</b> Triaxial Compression Tests For Disturbed Soils and Base Materials (Part II)	10
Tex-140-E	Measuring Thickness of Pavement Layer	2
Tex-145-E	Determining Sulfate Content in Soils - Colorimetric Method	4
<b>HOT MIX ASPHALT</b>		
Tex-200-F	Sieve Analysis of Fine and Coarse Aggregate (dry, from ignition oven with known correction factors)	1 (Note 2)
Tex-203-F	Sand Equivalent Test	3
Tex-206-F, w/ Tex-207-F, Part I, w/ Tex-227-F	<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)
Tex-207-F, 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)
Tex-207-F, Part V	Density of Compacted Bituminous Mixtures, Part V- Determining Mat Segregation using a Density-Testing Gauge	3
Tex-207-F, Part VII	Density of Compacted Bituminous Mixtures, Part VII - Determining Longitudinal Joint Density using a Density-Testing Gauge	4
Tex-212-F	Moisture Content of Bituminous Mixtures	3
Tex-217-F	Deleterious Material and Decantation Test for Coarse Aggregate	4
Tex-221-F	Sampling Aggregate for Bituminous Mixtures, Surface Treatments, and LRA (included in other tests)	
Tex-222-F	Sampling Bituminous Mixtures (included in other tests)	
Tex-224-F	Determination of Flakiness Index	3
Tex-226-F	Indirect Tensile Strength Test (production mix)	4
Tex-235-F	Determining Draindown Characteristics in Bituminous Materials	3
Tex-236-F (Correction Factors)	Asphalt Content from Asphalt Paving Mixtures by the Ignition Method (Determining Correction Factors)	4
Tex-236-F	Asphalt Content from Asphalt Paving Mixtures by the Ignition Method (Production Mixture)	1 (Note 2)
Tex-241-F w/ Tex-207-F, Part I, w/ Tex-227-F	<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)
Tex-242-F	Hamburg Wheel-Tracking Test (production mix, molded samples)	3
Tex-244-F	Thermal Profile of Hot Mix Asphalt	1
Tex-246-F	Permeability of Water Flow of Hot Mix Asphalt	3
Tex-280-F	Flat and Elongated Particles	3
Tex-530-C	Effect of Water on Bituminous Paving Mixtures (production mix)	4



AGGREGATES		
Tex-400-A	Sampling Flexible Base, Stone, Gravel, Sand, and Mineral Aggregates	3
Tex-410-A	Abrasion of Coarse Aggregate Using the Los Angeles Machine	5
Tex-411-A	Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate	12
Tex-461-A	Degradation of Coarse Aggregate by Micro-Deval Abrasion	5
CHEMICAL		
Tex-612-J	Acid Insoluble Residue for Fine Aggregate	4
GENERAL		
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.</b> <b>CL is allowed one additional day to provide the signed and sealed report.</b>		

# 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 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 8 Prosecution and Progress

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Item 8, "Prosecution and Progress" 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., "Computation of Contract Time for Completion."** The second paragraph is voided and replaced by the following:

The development of the conceptual time determination is intended to establish the number of working days on the Contract. Upon request, the Engineer will provide the conceptual time determination schedule to the Contractor for informational purposes only. The schedule assumes generic resources, production rates, sequences of construction, and average weather conditions based on historic data. Schedule labor, equipment, procurement of materials, subcontractor work, and all other necessary means to prosecute the work within the number of working days specified by the 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.



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# Special Provision to Item 421

## Hydraulic Cement Concrete

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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) <small>6,8,9</small>	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) <small>6,8,9</small>	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.

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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.

# 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.

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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 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 measureable. 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 6004

## Networking Intelligent Transportation System (ITS) Communications Cable



### 1. DESCRIPTION

Furnish, install, and test twisted-pair cable for networking and telecommunication uses in the field environment.

### 2. MATERIALS

2.1. **General Requirements.** Provide new cable and connectors that are in conformance with the details shown on the plans and in the specifications. The cable must be free of deformations, holes, splits and splices.

ITS networking copper cables must be constructed for installation in an outdoor underground conduit environment. All cable provided for underground installation must contain the Outside Plant designation for outdoor usage and must be rated Non-Plenum.

Provide cable in compliance with the most current version of the following industry standards:

- NFPA National Electric Code (NEC),
- Rural Electrification Administration (REA) -PE-22 (7 CFR 1755.403), PE-39 (7 CFR 1755.390),
- ANSI /TIA-568-C, EIA/TIA-568-B.2-2001 (Category 5E Cable),
- EIA-232, EIA-422, EIA-485,
- TSB-36, and
- Underwriters Laboratory (UL).

Included in this Item are the ITS cable types listed in Table 1.

**Table 1**  
**Common Networking ITS Communication Cable Types**

Cable Type	Nominal AWG Gauge	Application
Category 5e Ethernet Cable	#24 AWG	Standard 100Base-Tx, Gigabit Ethernet, up to 100 MHz bandwidth performance
Category 6 Ethernet Cable	#24 AWG	Gigabit Ethernet; up to 250MHz bandwidth performance
Category 7 Ethernet Cable	#24 AWG	10-Gigabit Ethernet, up to 600 MHz bandwidth performance. <u>Category 7 cable is not typically utilized for ITS device applications.</u> Category 7 cable applications include high bandwidth performance at network layer switches with 10 Gigabit connections.
Serial Communications Cable (RS-232, RS-422, RS-485)	#22, #24 AWG	Serial port applications, low bandwidth and small data rate transmission (<100 kb/s)
Shielded Twisted Pair Cable	#18-24 AWG	Telephone communications, below 16 MHz bandwidth performance
Unshielded Twisted Pair (UTP) Cable	#18-24 AWG	

Included in this Item are all terminating connectors and associated equipment required for installation and testing in a field environment.

Provide cable conforming to the gauge, type, and length shown on the plans. Ensure the cable gauge supplied meets the bandwidth requirements specific to the cable application and run length.

Provide signal amplification or repeater locations for communications cable runs as shown on the plans and in the specifications.

When selecting serial communications cable for longer cable runs, verify the conductor gauge to be provided will meet signal loss requirements for cable application. Refer to Table 2 for typical cable distance limitations for ITS serial communications cable.

**Table 2**  
**Typical Network Communications Cable**  
**Distance Limitations**

Cable Type	Recommended Maximum Cable Run <sup>1</sup>
RS-232	50 ft.
RS-422 (4 wire system)	500 ft.
RS-485 (2 wire system)	500 ft.
Category 5e	300 ft.
Category 6	300 ft.

1. Cable distance limitation to be verified according to manufacturer for the cable application.

All cable provided must be manufactured with permanent markings at approximate 2 ft. intervals on the outer jacket according to manufacturer name, serial number, type, UL list and classification for identification purposes. All pairs must be color coded using standard North American communication industry colors to uniquely identify each pair in the cable.

- 2.2. **Physical Requirements.** Provide networking communications cable meeting the following physical requirements.
- 2.2.1. **Conductor.** All networking cable must be constructed of solid bare copper conductor.
- 2.2.2. **Insulation.** All networking cable must be of foamed, cellular dielectric construction. Dielectric material must adhere to and support the center cable conductor.
- 2.2.2.1. **Insulation Material.** Serial communications cable insulation must be high-density polyethylene (HDPE) or equivalent. Ethernet networking cable insulation must be polyolefin or HDPE. UTP cable insulation must be polyethylene, polyolefin, polypropylene, or fluorinated ethylene propylene.
- 2.2.3. **Shielding.** Serial communications cable shielding must contain combination foil-polyester and copper braid shield to reduce EMI interference. Ethernet networking cable must contain a combination foil-polyester shield.
- 2.2.3.1. **Coverage.** Serial communications cable must be constructed of 100% effective foil coverage, minimum 65% braided coverage. Ethernet networking cable (Category 5e, 6, 7) must contain 100% effective foil cover.
- 2.2.4. **Outer Jacket.** Outer jacket must be rated for heavy duty ultraviolet (UV) exposure, sunlight, oil, and weather resistance necessary for outdoor installation.
- 2.2.4.1. **Jacket Material.** All networking cable outer jackets must be of PVC or polyethylene construction.
- 2.2.5. **Connectors.** Connectors must be matching, weather resistant, water and moisture proof, and outdoor-rated hardware that meet cable operating voltage, temperature, and impedance characteristics. Connectors must prevent the entry and collection of moisture to the cable and electrical connection point. Provide cable sealant during installation to seal connections from moisture and corrosion.

- 2.3. **Electrical and Mechanical Requirements.** Ethernet networking cable as shown on the plans must conform to the TIA/EIA-568-C standard, and according to performance characteristics defined in TIA/EIA-568-C.4-1. All Ethernet networking cable provided must meet IEEE 802.3af and IEEE 802.3at for Power over Ethernet (PoE) applications.

Serial communications cable and UTP must conform to the following requirements:

- 2.3.1. **Capacitance.** Serial communications cable capacitance must not exceed 35 picofarads (pF) per foot of cable. UTP cable capacitance must not exceed 15 pF per foot of cable.
- 2.3.2. **Inductance.** Serial communications cable inductance must not exceed 0.30 microhenry's ( $\mu$ H) per foot of cable.
- 2.3.3. **Impedance.** Provide 100 ohm nominal impedance for UTP cables and according to the manufacturer recommendation for cable application.
- 2.3.4. **Attenuation.** Attenuation of the cable must be compliant with requirements of the proposed application.
- 2.3.5. **Resistance.** The DC resistance of the serial communications cable inner conductor must not exceed 20 ohms per 1000 ft.

2.4. **Environmental Design Requirements.**

- 2.4.1. **Installation Temperature Rating.** Cable must be rated for an outside ambient temperature range of -20°F to 165°F.
- 2.4.2. **Storage Temperature Rating.** Cable must be rated for a storage temperature range of -40°F to 165°F.

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### 3. CONSTRUCTION METHODS

- 3.1. **General.** Cable must be installed in accordance with the following industry procedures:
- ANSI/TIA -568-C,
  - BICSI Telecommunications Distribution Methods Manual (TDMM) and Information Transport Systems Installation (ITSIM),
  - NFPA National Electric Code (NEC),
  - USDA Construction of Direct Buried Plant, and
  - ICEA Standard for Aerial Service Wire - ANSI/ICEA 5-89-648.
- 3.1.1. **Cable Storage.** All uninstalled cable must be stored according to manufacturer recommended bend radius and cable reel requirements.
- 3.1.2. **Cable Labeling.** All cable must be labeled using pre-laminated labels with UV protection according to usage at all terminations. Provide weatherproof labels rated for outdoor use.
- 3.1.3. **Installation Procedure.** All cable must be inspected and tested for continuity when received, with results compared with factory pre-shipping tests. Inspect the cable nomenclature to make certain that the correct product has been received. Notify the supplier (or manufacturer) of all discrepancies for immediate correction.

Install the network cable routed as shown on the plans and follow the manufacturer recommendations for installation.

Ensure that all exposed cable ends are covered and protected against moisture and dust penetration at all times during installation. Protect cable ends during storage, cable pulls, and post-installation.

- 3.1.4. **Conduit Fill Requirements.** Install cable as shown on the plans and ensure that NEC and TIA/EIA fill requirements must be met for all cable runs.
- 3.1.5. **Cable Slack Requirements.** Provide 25 ft. cable slack maximum in pull boxes and per manufacturer requirements.
- 3.1.6. **Spacing Requirements.** Provide minimum 12 in. spacing between electrical power cable and communications cable types as described for underground installations within NEC Sections 840.44 and 840.47.
- 3.2. **Testing.** Procedures for the tests noted below are to be in accordance with industry standard practice and recorded in accordance with ANSI/TIA/EIA rules for documentation for the cable type. Perform tests in accordance with testing requirements in this Item. For all tests, provide test forms to be used that compare measured results with threshold values. The following tests must be performed, recorded, and submitted to verify the cable performance and installation:
- 3.2.1. **Cable Continuity.** Perform cable continuity test for center conductor and shield continuity and record results. The test must be performed on received cable reels to identify any discrepancies and upon final installed cable interconnections. Test continuity of each pair to show a resistance of not more than 8 ohms per 1000 ft. of conductor. Use meter with a minimum input resistance measurement to comply with RUS 7 CFR 1755.403 Copper Cable Telecommunications Plant Measurements. .
- 3.2.2. **Time Domain Reflectometry (TDR).** Perform TDR test for impedance continuity per manufacturer recommendations in coaxial cable interconnections and record results.
- 3.2.3. **Ground Resistance.** Use a Megohmmeter to perform ground resistance testing of all conductors including the shield, and conductor-to-conductor, including all individual conductors to the shield. Ensure that all conductor tests, including the shield, read infinity to ground, and from conductor to conductor and all individual conductors to the shield, read infinity. Replace cable not meeting the infinity test result at no expense to the department, whether one or multiple readings per cable are defective.
- 3.2.4. **Visual Inspection.** Where cable installation is visible, perform visual inspection (with a Department representative) to verify any evidence of the following:
- cable damage (cracks, shield damage, kinks, knots, jacket damage, crushed cable),
  - bend radius violations (at conduit fittings, cabinet locations), and
  - cable crimping method—use of manufacturers specified cable crimp tool only (use of pliers not permitted).
- 3.3. **Documentation.** Submit 3 copies of the following materials for each cable type provided for approval prior item supply:
- manufacturer cutsheets and complete specifications (physical, electrical, mechanical, and environmental),
  - manufacturer warranty information,
  - independent test lab certification, and
  - blank test forms.
- Submit 3 copies of the following materials for each cable run provided for approval post installation:
- test results,
    - completed test forms,

- cable continuity test,
- TDR test,
- “as-built” documentation for cable path as shown on the plans,
- complete maintenance and trouble-shooting procedures, and
- furnish additional information as shown on the plans.

3.4. **Warranty.** Warrant all cable against defects or failure in design, materials, and workmanship in accordance with the manufacturer’s standard warranty.

Supply cable with no less than 95% of the manufacturer’s warranty remaining on the date that equipment invoices are submitted for final payment. Any material with less than 95% warranty remaining will be rejected.

Warrant all cable furnished and installed to perform according to the manufacturer published specifications for a period of 1 year after final acceptance of the project by the Department. Provide for “on-site” repair or replacement within 2 working days and at no cost to the Department. Repair or replace any defective cable, at the manufacturer’s option, at no cost to the Department.

#### 4. **MEASUREMENT**

This Item will be measured by the linear foot of cable.

#### 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 “ITS Communications Cable (Ethernet)” and “ITS Communication Cable (Serial).” For twisted pair communications cable runs, 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 “ITS Communications Cable” of the type, size, and number of pairs specified. The price is full compensation for furnishing, installing, splicing and testing cable and connectors, as well as for installation equipment, materials, tools, 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.

### 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 6028

## Dynamic Message Sign System



### 1. DESCRIPTION

Transport, install, and test Department-furnished Dynamic Message Signs (DMS), controller, and equipment cabinets.

### 2. MATERIALS

Provide all materials not supplied by the Department necessary for the DMS installation. All materials provided by the Contractor must be new. Include a task in the project schedule for delivery of Department furnished materials and provide a minimum of 30 days' notice to the Department for pick-up of Department-furnished materials. Unless otherwise shown on the plans, DMS will be stored by the Department for pick up at location shown on the plans.

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 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"

### 3. CONSTRUCTION

- 3.1. **Installation.** Perform a site survey in advance of the proposed DMS location in order to determine the horizontal and vertical angles of the sign for optimum legibility, based on the manufacturer's recommendations.

Install DMS on overhead sign structures in accordance with this Item and the lines, grades, details and dimensions as shown on the plans or as directed. Maintain safe construction practices. Ensure the mechanical execution of work complies with NEC, Article 110.12. Equipment shall be installed in a neat and workmanlike manner.

Adjustments or additions of sign attachment hardware, support brackets, and appurtenances, such as walkways, conduit, etc., may be necessary for compatibility with specified sign positioning recommended by the manufacturer, as shown on the plans, or as directed. All adjustments or additional materials will not be paid for directly but will be subsidiary to this Item.

Prevent damage to all sign components. Replace any portion of the sign assembly that is damaged or lost during transportation or installation. Do not use any materials furnished by the Department on any work which is not required by and which does not constitute a part of the contract. Materials not used which were furnished by the Department must be returned undamaged to the location from which the materials were obtained upon completion of the work. Any unused or removed material deemed salvageable by the Engineer shall remain the property of the Department and shall be delivered to a designated site. Accept ownership of unsalvageable materials and dispose of in accordance with federal, state, and local regulations.

Stockpile all materials designated for reuse or to be retained by the Department within the project limits or at a designated location as directed.

Equipment to be installed at each DMS field site shown on the plans may include, but not be limited to, the following:

- Dynamic Message Sign (DMS), controller and cabinet (provided by the Department)
- Cabling and connectors from power source to DMS connection point as specified by the DMS manufacturer (Provided by the Contractor).
- Cabling and connectors from telecommunications source to DMS connection point as specified by the DMS manufacturer when required (Provided by the Contractor).
- Communications as shown on the plans
- Power and communication cabling and connectors from controller to DMS shall follow NEMA TS4, Section 4, "Controller to Sign Interface," (cables and termination provided by the Contractor)

Make all arrangements for connection to the power supply and telecommunications source including any required permits. Supply and install any required materials not provided by the utility companies (power or communications service provider).

Construct the foundation for DMS Controller cabinets, when required as shown on the plans, in accordance with Item 656, "Foundations for Traffic Control Devices", unless otherwise directed. Include a 6 ft. x 6 ft. x 5 in. (L x W x D) riprap maintenance pad with foundation, unless otherwise directed. Provide a 5/8-in. diameter by 8 foot copper clad steel ground rod in the foundation of each DMS Controller cabinet.

After the signs have been erected, wash the exterior of the entire sign with a biodegradable cleaning solution, approved by the Engineer, to remove all dirt, grease, oil smears, streaks, finger marks, and other foreign particles.

- 3.2. **Technical Assistance.** Ensure that a manufacturer's representative is available to assist the Contractor's technical personnel at each sign installation site. The manufacturer's representative must provide technical assistance in following areas:

- Site survey for horizontal and vertical angles of sign's mounting orientation
- Sign to structure installation (final responsibility of the Contractor, see 3.3., "Working Drawings.")
- Sign controller cabinet installation
- Sign to controller cabling
- Testing requirements given in Section 3.4., "Testing."

Do not execute the initial powering up of the signs without the permission of the manufacturer's representative.

- 3.3. **Working Drawings.** Before fabrication submit for approval 5 prints of the working drawings for attachment of each DMS. Show the details of any additional sign brackets, sign support connections, and methods of attachment of the signs to the sign support. Have a licensed professional engineer sign, seal and date the working drawings.

- 3.4. **Testing.** Testing of the sign 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 sign system in accordance with Item 7, "Legal Relations and Responsibilities," after all testing is successfully completed.

After delivery of the DMS to the storage site, an approved demonstration test will be conducted prior to transporting the sign to the installation site. Have a manufacturer's representative available to assist with making all necessary connections and preparations for this testing.

After all signs have been installed, the Department and the DMS manufacturer will conduct approved continuity, stand alone, and DMS system tests on the installed field equipment with central, remote, and



laptop equipment. A final acceptance test will be conducted to demonstrate all control, monitor, and communication requirements for 90 days. The Engineer will furnish a Letter acknowledging the final acceptance testing commencement date 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. Assume responsibility only for test failures directly related to the work in accordance with this Item. Upon completion of successful final acceptance testing, permanently mark acceptance date and project identification information inside the controller cabinet. The Department will pay for electrical energy consumed by the system.

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**4. MEASUREMENT**

This Item will be measured as each DMS system installed and tested.

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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 "Installation of Dynamic Message Sign System" of cabinet mounting type specified (pole mounted, foundation mounted or wall mounted). This price is full compensation for transportation and installation of DMS; 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.

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 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 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.

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# Special Specification 6443

## Remove Dynamic Message Sign System

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### 1. DESCRIPTION

Furnish the removal of a Dynamic Message Sign (DMS) System, as shown on the plans, as detailed in this Special Specification, and as directed.

The requirements are considered a minimum for this Item. Strict compliance with these minimum requirements will not relieve the Contractor of the responsibility for adopting whatever additional provisions may be necessary to ensure the successful completion of the work.

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### 2. MATERIALS

Remove existing Dynamic Message Sign (DMS), cabinet and support structure as shown on the plans.

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### 3. CONSTRUCTION

Present the work in a neat, professional finished appearance. Maintain safe construction practices.

Before disconnecting or removing any portion of the existing DMS System, the Contractor, with the State's Representative present, will fully examine the DMS System. Problems with the existing DMS System will be noted. The Contractor will not be responsible for repairing such items.

Carefully dismantle and remove the existing DMS System. The parts of the DMS System that are not deemed to be salvageable will become the property of the Contractor; verify with the Department.

Disconnect the existing power and communications cables from the existing DMS System. The existing trusses and sign support columns will be removed in a manner acceptable to the Engineer. Replace any damage to existing underground conduit or utilities. Replacement of damaged cable, underground conduit, or utilities will be done at the Contractor's expense.

Remove the DMS System in such a manner that it will not damage the DMS's electrical and communication systems. Compatibility with the specified DMS positioning must be maintained after the removal of the existing DMS. Compatibility of DMS positioning will include adjustments, addition of appurtenances, such as sign lights, and conduit.

Cover all openings due to disconnection of conduits or other appurtenances. These coverings will be made completely watertight before storage.

Furnish backfill material and backfill all openings due to disconnection of conduits, or other appurtenances, from the DMS System. Backfill material must be equal in composition and density to surrounding soil.

All necessary power and communications cables will be disconnected and salvaged from the electrical service or the DMS cabinet. Cables become the property of the Contractor.

Prevent any damage to the various DMS System components. Material removed that is not deemed to be salvageable is the property of the Contractor. Dispose of removed material off the right of way in accordance with federal, state, and local regulations.

Before disconnecting the cable in the cabinet or removing any portion of the existing equipment cabinet, the Contractor, with the Department present, will fully examine the existing cabinet foundation. Any problems with the existing foundation will be noted by the Contractor and the Engineer. The Contractor will not be responsible for repairing the existing cabinet foundation.

Carefully dismantle and remove the existing equipment cabinet. The equipment cabinet will become property of the Department.

Disconnect the existing power and communications cable from the existing equipment cabinet to the DMS. Disconnect the existing power circuit from the nearby electrical service. Remove and salvage the cables. Cables become the property of the Contractor.

Remove equipment cabinet in such a manner that it will not damage the DMS's electrical and communication systems.

Remove the existing DMS cabinet concrete foundation to a depth of at least 2 ft. below finish grade with all steel cut off. Backfill excavation with material equal in composition and density to the surrounding area, and by replacing any surfacing, such as asphalt pavement, concrete riprap, or brick pavers, with like material to an equivalent condition as approved.

Remove the existing support structure in accordance with Item 650, "Overhead Sign Supports." Remove the existing support structure drill shaft to a depth of at least 2 ft. below finish grade with all steel cut off. Backfill excavation with material equal in composition and density to the surrounding area. Work associated with the removal of the support structure and foundation to be subsidiary to this Item.

3.1.

**Testing.**

Pre-Test. Conduct performance testing before removal of the DMS System. 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 before removal and test data after installation. 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.

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**4. MEASUREMENT**

This Item will be measured by each Existing Dynamic Message Sign (DMS) System removed.

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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 "Remove Dynamic Message Sign (DMS) System." This price is the full compensation for all manipulations, labor, tools, equipment, and incidentals.

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