FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6	C 906-00-268		1
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	DISTRICTWIDE	
CONT.	SECT.	JOB	HIGHWAY NO.
0906	00	268	VARIOUS

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

INDEX OF SHEETS

SEE SHEET 2

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

STATE PROJECT NO. C906-00-268

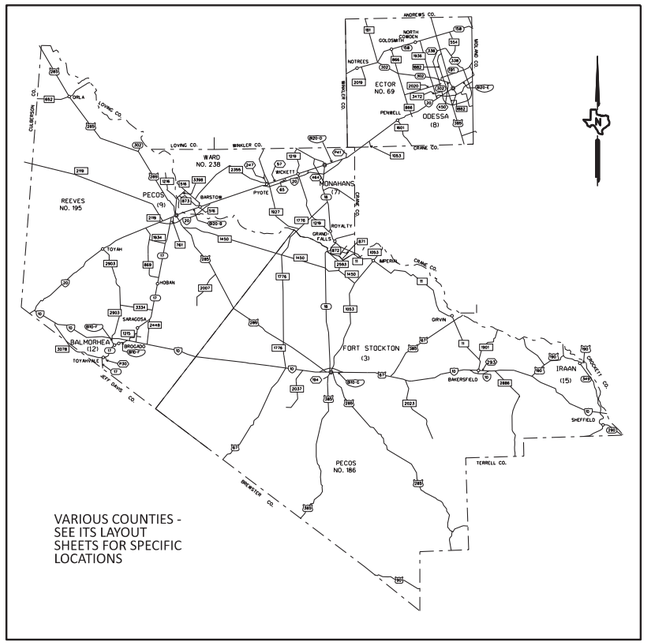
DISTRICTWIDE
VARIOUS

NET LENGTH OF PROJECT: 0.000 FT = 0 MI

LIMITS: DISTRICTWIDE

FOR THE CONSTRUCTION OF TRAFFIC CONTROL DEVICES

CONSISTING OF: INSTALLATION OF CCTV AND DMS



EXCEPTIONS: NONE
EQUATIONS: NONE
RR CROSSINGS: NONE

SCALE: NTS

FINAL PLANS

CONTRACTOR:

LETTING DATE:

DATE CONTRACTOR BEGAN WORK:

DATE WORK WAS COMPLETED:

DATE WORK WAS ACCEPTED:

FINAL CONTRACT COST: $

TEXAS DEPARTMENT OF TRANSPORTATION

10/24/2023

SUBMITTED FOR LETTING: _____ 20__

DocuSigned by:
88BF61DF326A480...

_____, P.E.
EER

10/24/2023

RECOMMENDED _____ 20__

DocuSigned by:
3811713A844D484...

_____, P.E.
DIRECTOR, TRANSPORTATION PLANNING AND DEVELOPMENT

10/24/2023

APPROVED FOR LETTING: _____ 20__

DocuSigned by:
Eric Zyss, PE
9D2D0C440F014A4...

_____, P.E.
ENGINEER

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT: SPECIAL LABOR PROVISIONS FOR STATE PROJECTS (000--008)

COUNTY _____ PROJ. NO. _____
HWY. NO. _____ LETTING DATE _____
DATE ACCEPTED _____

1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18
19	20	21	22	23	24	25	26	27
28	29	30	31	32	33	34	35	36
37	38	39	40	41	42	43	44	45
46	47	48	49	50	51	52	53	54
55	56	57	58	59	60	61	62	63

STAT08

ver. 2008.01.09

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	INDEX OF SHEETS
3, 3A-3C	GENERAL NOTES
4, 4A	ESTIMATE AND QUANTITY
5	CONSOLIDATED SUMMARY
6-17	*BC(1)-21 THRU BC(12)-21
18	*TCP(5-1)-18
19-23	*TCP(6-1)-12 THRU TCP(6-5)-12

ITS LAYOUTS

24	PROJECT LAYOUT
25-49	ITS PLAN
50	ELECTRICAL SERVICE DATA
51-52	ELECTRICAL VOLTAGE DROP
53	DMS ELEVATION DETAIL SHEET
54	ITS DETAIL DYNAMIC MESSAGE SIGN DMS ELECTRICAL GROUNDING DETAIL
55-57	BALANCED TEE OVERHEAD GUIDE AND DMS STRUCTURE DETAILS
58	DYNAMIC MESSAGE SIGN OVERHEAD SIGN SUPPORT
59	ITS MISC COMMUNICATION SYSTEM DIAGRAM DYNAMIC MESSAGE SIGN
60	ITS MISC COMMUNICATION SYSTEM DIAGRAM CCTV CAMERA

SHEET NO.	DESCRIPTION
61	*COSS-SE
62	*COSS-Z3&Z31-10
63-64	*COSSD (1-2)
65	*COSSF-21
66	*COSS-FD
67	*WV&IZ-14
68-69	*DMS (HZ-1,2)-21
70	*ITS(1)-15
71	*ITS(3)-16
72-76	*ITS(4)-15, ITS(4a)-15 THRU ITS(7)-15
77-80	*ITS(15)-15 THRU ITS(18)-15
81	*ITS(19)-17
82	*ED(1)-14
83	*ED(3)-14
84-86	*ED(4)-14 THRU ED(6)-14
87-88	*ED(9)-14 THRU ED(10)-14
89	*GF(31)DAT-19
90	*GF(31)MS-19
91	*GF(31)-19
92	*SGT(10S)31-16
93	*SGT(11S)31-18
94	*SGT(12S)31-18
95-98	*D&OM(1,2,3,6)-20

ENVIRONMENTAL

99	SWP3 NOTES
100-102	*EC(9)-16
103	ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS (EPIC)

STATE OF TEXAS
SAUL ROMERO, JR.
118987
LICENSED
PROFESSIONAL ENGINEER

Saul Romero, P.E.

SAUL ROMERO, JR., P.E.

9/15/2023
Date

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE WITH AN (•) HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

INDEX OF SHEETS

Texas Department of Transportation®

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			2
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	DISTRICTWIDE	
CONT.	SECT.	JOB	HIGHWAY NO.
0906	00	268	VARIOUS

General Notes:

Contractor questions on this project are to be addressed to the following individual(s):
ODA-PreLettingQuestions@txdot.gov

Questions may be submitted via the Letting Pre-Bid Q&A web page. This webpage can be accessed from the Notice to Contractors dashboard located at the following Address:
https://tableau.txdot.gov/views/ProjectInformationDashboard/NoticetoContractors

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

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

Item 6: Control of Materials

Restrict storage of equipment and materials to approved areas. The Engineer will not approve storage in any TxDOT yard.

Promptly and properly dispose of any waste generated from servicing equipment on the project.

Item 7: Legal Relations and Responsibilities

If access to the project is required through a new or unapproved driveway (i.e. Material source, stockpile location, field office, etc.), obtain an approved "Permit to Construct Access Driveway Facilities on Highway Right Of Way" (TxDOT Form 1058) before beginning any construction operations.

Utilities (public, private and TxDOT) exist throughout the project. Prior to any excavation, investigate to determine the utility locations within the project right of way. Contact the TxDOT Odessa Traffic Operations shop at 432-498-4690 to investigate and determine the location of any TxDOT utility that may exist within the project right of way. Exercise caution when excavating in areas where investigations have determined that utilities exist. The contractor is responsible for maintaining utility markings

No significant traffic generator events identified.

As an element of ensuring public safety and convenience under Article 7.2.4, the Contractor is hereby directed to open all closed lanes and shoulder and remove all traffic control devices from any areas where work is not being actively performed unless overnight traffic control is required and approved by the engineer. Removed devices must be stored outside of the clear zones near the right of way line or removed from the right of way line entirely.

At any time during construction that a previously installed crash cushion is damaged by the traveling public and is requested to be repaired by the Engineer, the repair will be paid at the same unit cost as the original installation.

Item 8: Prosecution and Progress

County: DISTRICTWIDE **Sheet:**
Highway: VARIOUS **Control: 0906-00-268**

The following portions of the plans may affect the Contractor's planned construction sequencing. The Contractor's attention is directed to the appropriate plan sheet or standard sheet.

-Traffic Control Plan

-Storm Water Pollution Prevention Plan

-Environmental Permit, Issues And Commitments (EPIC)

-Railroad Exhibits and/or Notes

Maintain ingress and egress to side streets and private property at all times.

Maintain ingress and egress to the frontage roads at all times.

Initiate the installation of Item 628 "Electrical Services" as part of the initial work sequence to allow TxDOT the lead-time necessary for coordination with utility companies to establish and provide for electrical service(s) proposed for this project.

Working days will be computed and charged in accordance with Article 8. 3.1.4. "Standard Workweek."

Incentive for early contract completion shall be based on contract administrative liquidated damage rates.

180 day lead time is needed to allow for sufficient time to obtain and produce materials needed for various bid items in this project.

Item 416: Drilled Shaft Foundations

For drilled shaft foundations for roadway illumination assemblies, provide Class C concrete with 6-1/2" slump for dry type placements in accordance with Table 2, Slump Requirements.

Item 427: Surface Finishes for Concrete

For Surface Area I, provide a rub finish with the exception of abutments.

Item 432: Riprap

Use approved expansion joint material and place between the proposed riprap and curb and gutter.

Reinforce all riprap on this project with no. 3 bars spaced 12 inches O.C.B.W. or no. 4 bars spaced at 18 inches O.C.B.W.

Broom finish all riprap on this project unless otherwise directed.

Polypropylene fiber may not be used in lieu of reinforcing steel.

In addition to reinforcing steel, polypropylene fiber is required at a rate of 1.5 lbs. /cy.

Item 502: Barricades, Signs, and Traffic Handling

Stop work immediately if any major traffic control element such as an advanced warning flashing panel or TMA or PCMS is not in good working order or control setup.

Maintain "No Center Line", "Do Not Pass" and "Pass With Care" signs until the permanent lane markings have been placed in accordance with plans.

Place orange fencing around sidewalk, wheelchair ramps and other pedestrian areas that pose a hazard to pedestrian traffic as directed.

Place chevrons, at a minimum, on every other drum used for outsides of curves, merging tapers and shifting tapers.

Vertical panels shall be self-righting.

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 Engineer may choose to use existing bid items if it does not slow the implementation of enhancement.

Item 506: Temporary Erosion, Sedimentation, and Environmental Controls

In accordance with the Construction General Permit (CGP), erosion control and stabilization measures should be initiated as soon as practicable to include (list what our stabilization measures are – for example, replacing topsoil from windrow, erosion control blankets, seeding, etc.)

It is not anticipated that erosion control devices will be needed on this project. In the event that devices are needed, the Storm Water Pollution Prevention Plan shall consist of using the following items and/or items as directed by the Engineer. Payment for the work may be determined in accordance with Item 4, Article 4. "Changes in the Work".

-Biodegradable Erosion Control Logs

The total disturbed area for this project is 0.5 Acres. The disturbed area in this project, all project locations in the contract, and Contractor Project Specific Locations (PSLS), within 1 mile of the project limits, for the contract will further establish the authorization requirements for storm water discharges. The department will obtain an authorization to discharge storm water from the Texas Commission On Environmental Quality (TCEQ) for the construction activities shown on the plans. The Contractor is to obtain any required authorization from the TCEQ for any Contractor PSLS for construction support activities on or off the right of way. When the total area disturbed for all projects in the contract and PSLS within 1 mile of the project limits exceeds 5 acres, provide a copy of the Contractor NOI for PSLS on the right of way, to the Engineer (or to the appropriate MS4 operator when on an off-state system route).

Upon acceptance of the project, all SW3P devices will become property of the State and maintenance responsibility is transferred to the State until final stabilization is attained.

Item 540: Metal Beam Guard Fence

Provide steel post for this project.

Item 618: Conduit

County: DISTRICTWIDE **Sheet:**
Highway: VARIOUS **Control: 0906-00-268**

Place a single continuous piece of warning tape in accordance with this item along the entire length of each underground conduit installation. Locate warning tape approximately twelve inches above conduit as indication that a buried electrical line exists below the tape. Cement stabilized backfilled conduit is exempt from this requirement. Comply with warning tape requirements for any installation of buried conduit, including portions of conduit located outside of cement stabilized backfill.

When trenched conduit is proposed beneath roadways under construction, install conduit after grading operations have been completed and before any surfacing begins at that location.

When shown on the plans as bored conduit, install conduit by an approved directional boring method.

Maintain a minimum 24” depth from finish grade to top of conduit for conduit proposed beneath pavement.

Use an approved ditching method. Place and backfill conduit proposed beneath existing pavement in accordance with the section shown in the plans. Schedule and complete work so that all lanes open to traffic at night.

For conduit raceways that are intended to remain empty or unused, extend the lower end of conduit from the face of the foundation to a minimum of 1’ beyond the edge of the foundation or the riprap apron, whichever is farthest, and use conduit cap fittings for both ends of conduit. Do not glue caps or use duct tape when capping ends of conduit raceways that are intended to remain empty. Prevent dirt and debris from entering raceways during construction by temporarily capping both ends of open raceways. Other than conduit raceways that are intended to remain unused, fit each exposed end of raceways with a bushing. Where steel raceway is used, install a ground-type bushing and connect the bushing and ground rod with a bonding jumper.

Item 620: Electrical Conductors

Note the requirements of Item 7, Article 18. Electrical Requirements, of the standard specifications.

Do not exceed four hundred and fifty feet (450’) between ground boxes where conduit and conductor is used.

Item 622: Duct Cable

Provide a minimum of 24” cover over trenched duct cable. Where rocky soil is encountered, place duct on a 2" sand cushion and backfill with a minimum of 6" sand fill.

Place a single continuous piece of warning tape in accordance with Item 618, “Conduit”, along the entire length of each underground duct cable installation. Locate warning tape approximately twelve inches above the duct as indication that a buried electrical line exists below the tape.

For conductors in duct cable, provide one (1) black XHHW insulated conductor, and one (1) red XHHW insulated conductor for ungrounded conductors, and provide one (1) green XHHW or bare conductor for the grounding conductor. Do not use red tape to color code a black insulated conductor. Unless otherwise approved, use full jacket color coding of conductor insulation.

Item 628: Electrical Services

Initiate and complete the construction of all electrical services at the earliest possible time to facilitate lead-time required to coordinate with utility companies and establish power for the proposed electrical service(s.)

Before construction or installation of any electrical service(s) on this project, contact TxDOT Odessa Traffic Operations shop at 432-498-4690 to facilitate coordination with the appropriate energy company or companies.

Physically identify the location for each proposed electrical service on the project, and request the physical address for each proposed electrical service identified; the Engineer will provide the physical address for each respective location. Permanently mark the physical address of any proposed electrical service on the respective meter base lid. Use one of two methods for permanent marking. For the preferred method of marking, use an approved die-stamp, with a minimum ½" height of alpha-numeric characters and stamp physical address on meter base lid. After stamping, apply coating of zinc-rich paint to the stamped area. Do not damage meter base. Replace meter base if determined by the Engineer as damaged or unacceptable. No additional compensation will be made for replacement of meter bases in the event an unacceptable determination is made. When approved, use an alternate method of marking by providing a brass or aluminum plate tag with the physical address embossed by a machine-stamp process. Affix this tag to the meter base by a method approved by the Engineer. Provide a sample of a stamped plate tag for approval of this alternate method. The permanent physical address is required to be marked on the meter base prior to initiation of electrical service. Materials, labor, tools, equipment and incidentals necessary to complete this work will be considered as subsidiary to Item 628, "Electrical Services".

Use materials from the Prequalified Material Producer Lists as shown on the Texas Department of Transportation (TxDOT) – Construction Division's (CST) Material Producer List. See TxDOT website (www.TxDOT.gov) - business > resources > material producer list - for list of prequalified manufacturers. Category is "Roadway Illumination and Electrical Supplies." No substitutions will be allowed for materials found on this list."

For incidental material and parts necessary for construction of electrical services, including the service entrance weather-head, rigid metal conduit (RMC) and PVC conduit, conduit fittings, service conductors, circuit breakers, ground rods and clamps, grounding bushing(s), and mounting hardware including straps and channel brackets for conduit support, furnish products and/or materials that comply with the plans and specifications. Prior to construction of any electrical service, submit to the Engineer respective catalog cut sheets for incidental materials and parts. Electrical services constructed of materials or parts which do not comply with the plans and specifications will be cause for rejection of a portion or all of the work.

Install photocell(s) facing north when practical.

Item 650: Overhead Sign Supports

The DMS sign support structure locations shown on the plans may be adjusted to fit field conditions. The tower heights shown on the plans are to be used for bidding purposes only. Prior to fabrication, the Contractor, in cooperation with the Engineer, will take finished grade elevations at the tower locations and will determine their exact height for fabrication, in accordance with the details shown on the plans.

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 Item 9: Measurement and Payment, Article 9.1, of the Standard Specifications. Increases and decreases in quantities by change in design, after the shop drawings are approved, will be measured as specified, and the revised quantities will be the basis for payment.

Provide field galvanizing equipment, ASTM A780 (Stick only) or approved alternatives, at all times. Make repairs to galvanized surfaces according to the above specifications, at locations where damage has occurred.

All towers and trusses will be matched and marked for erection by the fabricator.

County: DISTRICTWIDE **Sheet:**
Highway: VARIOUS **Control: 0906-00-268**

After the 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 smears, streaks, and other foreign particles.

Item 656: Foundations for Traffic Control Devices

Install a 5/8" x 8' copper clad ground rod in all signal poles and signal controller foundations, and make a system ground connection at the ground rod in addition to the ground connection required by the standard sheet, "Traffic Signal Controller Slab And Base". Maintain two inches (2") of ground rod extension above the finish surface of the foundation. Material, labor, tools, and incidentals necessary to provide and install this ground rod are considered subsidiary to the various bid items**.**

Item 6001: Portable Changeable Message Sign

PCMS shall be placed in operation a minimum of one (1) week prior to construction. Location(s) and duration for PCMS shall be as directed by the Engineer;

Item 6010: CCTV Field Equipment

The cables and harnesses will enter at the bottom of the CCTV housing. The CCTV will have gaskets, at entry points, to prevent moisture entry.

Item 6028: Installation of Dynamic Message Sign System:

Two 12 inch Yellow LED flashing beacons shall be installed and made operational on each DMS installed on this project. The beacons are included with the DMS and shall be configured to flash alternately.

The LED dynamic message signs installed on this project shall be configured to operate remotely from Odessa District Office using the vendor's proprietary software. Prior to completion of this project, the Contractor shall demonstrate complete operability of all DMS's installed on this project at the Odessa District Field Office.

For items provided to the contractor by TXDOT, if communication cannot be achieved from the DMS to the Odessa District Traffic Field Office due to cellular, bluetooth, or hardware issues, the Contractor will, at a minimum, demonstrate local communication directly to the DMS. The Contractor will ensure that, during construction, the attachment of the DMS to the truss structure will not interfere with the structure bolt heads.

Provide local warehouse storage for all DMS's to be installed on this project from the time of delivery by the manufacturer to the time of final installation. Assume responsibility for all sign components during receiving, storage, transport, and final installation, as required in Item 6: Control of Materials, Article 6.6 and 6.7.

Item 6185: Truck Mounted Attenuator (TMA) and Trailer Attenuator (TA)

There are no General Notes for additional shadow vehicle(s) with truck mounted attenuator (TMA) on TCP (5-1)-18; the shadow vehicle(s) with TMA specified on the traffic control plan as "required" is the quantity that has been estimated for this operation.

There are no General Notes for additional shadow vehicle(s) with truck mounted attenuator (TMA) on TCP (6-1)-12; the shadow vehicle(s) with TMA specified on the traffic control plan as “required” is the quantity that has been estimated for this operation.

There are no General Notes for additional shadow vehicle(s) with truck mounted attenuator (TMA) on TCP (6-2)-12; the shadow vehicle(s) with TMA specified on the traffic control plan as “required” is the quantity that has been estimated for this operation.

There are no General Notes for additional shadow vehicle(s) with truck mounted attenuator (TMA) on TCP (6-3)-12; the shadow vehicle(s) with TMA specified on the traffic control plan as “required” is the quantity that has been estimated for this operation.

There are no General Notes for additional shadow vehicle(s) with truck mounted attenuator (TMA) on TCP (6-4)-12; the shadow vehicle(s) with TMA specified on the traffic control plan as “required” is the quantity that has been estimated for this operation.

There are no General Notes for additional shadow vehicle(s) with truck mounted attenuator (TMA) on TCP (6-5)-12; the shadow vehicle(s) with TMA specified on the traffic control plan as “required” is the quantity that has been estimated for this operation.

The Contractor will be responsible for determining if one or more operations will be ongoing at the same time to determine the total number of TMAs needed for the project.

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0906-00-268 **DISTRICT** Odessa **COUNTY** Ector
HIGHWAY Various

			CONTROL SECTION JOB		**0906-00-268**	TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00191882**		
			COUNTY		**Ector**		
			HIGHWAY		**Various**		
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	416-6006	DRILL SHAFT (48 IN)	LF	380.000		380.000	
	416-6023	DRILL SHAFT (SIGN MTS) (54 IN)	LF	210.000		210.000	
	420-6068	CL C CONC (SIGN COLUMN)	CY	132.000		132.000	
	432-6001	RIPRAP (CONC)(4 IN)	CY	38.000		38.000	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	8.000		8.000	
	540-6002	MTL W-BEAM GD FEN (STEEL POST)	LF	1,000.000		1,000.000	
	540-6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	10.000		10.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	10.000		10.000	
	618-6023	CONDT (PVC) (SCH 40) (2")	LF	8,132.000		8,132.000	
	618-6024	CONDT (PVC) (SCH 40) (2") (BORE)	LF	1,806.000		1,806.000	
	618-6031	CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	LF	201.000		201.000	
	620-6002	ELEC CONDR (NO.14) INSULATED	LF	147.000		147.000	
	620-6007	ELEC CONDR (NO.8) BARE	LF	916.000		916.000	
	620-6008	ELEC CONDR (NO.8) INSULATED	LF	1,832.000		1,832.000	
	620-6009	ELEC CONDR (NO.6) BARE	LF	1,981.000		1,981.000	
	620-6010	ELEC CONDR (NO.6) INSULATED	LF	3,962.000		3,962.000	
	620-6011	ELEC CONDR (NO.4) BARE	LF	7,470.000		7,470.000	
	620-6012	ELEC CONDR (NO.4) INSULATED	LF	14,930.000		14,930.000	
	624-6002	GROUND BOX TY A (122311)W/APRON	EA	93.000		93.000	
	628-6250	ELC SRV TY D 120/240 100(NS)SS(N)SP(O)	EA	25.000		25.000	
	650-6031	INS OH SN SUP(30 FT BAL TEE)(SPAN ONLY)	EA	6.000		6.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	4.000		4.000	
	6010-6004	CCTV MOUNT (POLE)	EA	19.000		19.000	
	6010-6011	CCTV FIELD EQUIP (DIGITAL) (INSTL ONLY)	EA	19.000		19.000	
	6016-6008	ITS MULTI-DUCT CND (PVC-40)(CONC ENCSE)	LF	141.000		141.000	
	6016-6013	ITS MULTI-DUCT CND (RMC)	LF	4.000		4.000	
	6028-6001	INSTALL DMS (POLE MTD CABINET)	EA	6.000		6.000	
	6058-6001	BBU SYSTEM (EXTERNAL BATT CABINET)	EA	25.000		25.000	
	6064-6055	ITS POLE (60 FT)(90 MPH)	EA	19.000		19.000	
	6064-6080	ITS POLE MNT CAB (TY 2)(CONF 1)	EA	19.000		19.000	
	6064-6088	ITS POLE MNT CAB (TY 3)(CONF 1)	EA	6.000		6.000	
	6185-6002	TMA (STATIONARY)	DAY	180.000		180.000	
	6186-6002	ITS GND BOX(PCAST) TY 1 (243636)W/APRN	EA	2.000		2.000	
	6263-6002	BLUETOOTH DETECTION SYSTEM (INSTALL)	EA	25.000		25.000	
	6304-6004	ITS RVSD (DC & WWA) (INSTALL ONLY)	EA	6.000		6.000	
	6320-6001	INSTALL OF FIELD HARD ETHERNET SWITCH	EA	25.000		25.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0906-00-268 **DISTRICT** Odessa **COUNTY** Ector
HIGHWAY Various

		CONTROL SECTION JOB		**0906-00-268**		TOTAL EST.	TOTAL FINAL
		PROJECT ID		**A00191882**			
		COUNTY		**Ector**			
		HIGHWAY		**Various**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	6320-6002	INSTALL OF CELLULAR MODEM	EA	25.000		25.000	
	04	PUBLIC UTILITY FORCE ACCT WORK (NON-PARTICIPATING)	LS	1.000		1.000	
	06	MATERIAL FURNISHED BY THE STATE	LS	1.000		1.000	
	08	CONTRACTOR FORCE ACCOUNT EROSION CONTROL MAINTENANCE (NON-PARTICIPATING)	LS	1.000		1.000	
		CONTRACTOR FORCE ACCOUNT SAFETY CONTINGENCY (NON-PARTICIPATING)	LS	1.000		1.000	

	LOCATION	416 6006	416 6023	420 6068	432 6001	540-6002	540-6016	544-6001	618 6023	618 6024	618 6031	620 6002	620 6007	620 6008	620 6009	620 6010	620 6011	620 6012	624 6002	628 6250	650 6031
		DRILL SHAFT (48 IN)	DRILL SHAFT (SIGN MTS) (54 IN)	CL C CONC (SIGN COLUMN)	RIPRAP (CON) (4 IN)	MTL W-BEAM GD FEN (STEEL POST)	DOWNSTREAM ANCHOR TERMINAL SECTION	GUARDRAIL END TREATMENT (INSTALL)	CONDT (PVC) (SCH 40) (2")	CONDT (PVC) (SCH 40) (2") (BORE)	CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	ELEC. CONDR (NO. 14) INSULATED	ELEC CONDR (NO. 8) BARE	ELEC CONDR (NO. 8) INSULATED	ELEC CONDR (NO. 6) BARE	ELEC CONDR (NO. 6) INSULATED	ELEC CONDR (NO. 4) BARE	ELEC CONDR (NO. 4) INSULATED	GROUND BOX TY A (122311) W/APRON	ELC SRV TY D 120/240 100(NS)SS IN)SP (O)	INS OH SN SUP (30 FT BAL TEE) (SPAN ONLY)
		LF	LF	CY	CY	LF	EA	EA	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	EA	EA	EA
1	CCTV -IH 20 AT FM 1053	20			1.50				481	65							573	1146	4	1	
2	CCTV -IH 20 AT E BI 20 (MONAHANS)	20			1.50				229	155					405	810			3	1	
3	CCTV -IH 20 AT SH 18	20			1.50				194	66			287	574					4	1	
4	CCTV -IH 20 AT W BI 20 (MONAHANS)	20			1.50				450	50							533	1066	5	1	
5	DMS WB -IH 20 AT SH 115/FM 1927 (PYOTE)		35	22	1.50	100	1	1	288	145							454	908	3	1	1
6	CCTV -IH 20 ST SH 115/FM 1927 (PYOTE)	20			1.50				350						362	724			2	1	
7	DMS EB -IH 20 ST SH 115/FM 1927 (PYOTE)		35	22	1.50	200	2	2	402	60							489	978	4	1	1
8	CCTV -IH 20 AT E BI 20 (BARSTOW)	20			1.50	100	1	1	593								614	1228	3	1	
9	CCTV -IH 20 AT US 285	20			1.50				450	50							533	1066	5	1	
10	CCTV -IH 20 AT MM 13	20			1.50				67	33			121	242					3	1	
11	CCTV -IH 10 AT FM 3078 (EXIT 192)	20			1.50				476	54					557	1114			4	1	
12	DMS EB -IH 10 AT FM 2903/BI 10F (EXIT 206)		35	22	1.50	100	1	1	455								476	952	3	1	1
13	CCTV -IH 10 AT FM 2903/BI 10F	20			1.50				350	50							433	866	5	1	
14	DMS WB -IH 10 AT FM 2903/BI 10F (EXIT 206)		35	22	1.50	100	1	1	109	218							354	708	4	1	1
15	CCTV -IH 10 AT SH 17 (EXIT 212)	20			1.50				248	66					341	682			4	1	
16	CCTV -IH 10 REST AREA (MM 233)	20			1.50				375	45							447	894	4	1	
17	CCTV -IH 10 at US 67/FM 1776 (EXIT 248)	20			1.50				421	69							523	1046	5	1	
18	CCTV -IH 10 at SH 18 (EXIT 259B)	20			1.50				227	62					316	632			4	1	
19	CCTV -IH 10 at Exist DMS (Confirmation Camera)	20			1.50	100	1	1	254	155	201	147	229	458					3	1	
20	DMS EB -IH 10 at US 67		35	22	1.50	100	1	1	80								89	178	1	1	1
21	CCTV -IH 10 at US 67 (EXIT 273)	20			1.50				535	50							612	1224	4	1	
22	'DMS WB -IH 10 at US 67		35	22	1.50	200	2	2	95	164							280	560	3	1	1
23	CCTV -IH 10 at FM 11	20			1.50				398	62							493	976	5	1	
24	CCTV -IH 10 at US 190	20			1.50				128	130			279	558					3	1	
25	CCTV -IH 10 at SH 349/US 290	20			1.50				477	57							567	1134	5	1	
	Totals	**380**	**210**	**132**	**38**	**1000**	**10**	**10**	**8132**	**1806**	**201**	**147**	**916**	**1832**	**1981**	**3962**	**7470**	**14930**	**93**	**25**	**6**

	LOCATION	6001 6002	6010 6004	6010 6011	6016 6008	6016 6013	6058-6001	6064 6055	6064 6080	6064 6088	6185 6002	6186-6002	6263 6002	6304 6004	6320 6001	6320 6002	6028 6001	**	**	**	**
		PORTABLE CHANGEABLE MESSAGE SIGN	CCTV MOUNT (POLE)	CCTV FIELD EQUIP (DIGITAL) (INSTL ONLY)	ITS MULTI-DUCT CND (PVC-40) (CONC ENCSE)	ITS MULTI-DUCT CND (RMC)	BBU SYSTEM (EXTERNAL BATT CABINET)	ITS POLE (60 FT) (90 MPH)	ITS POLE MNT CAB (TY 2) (CONF 1)	ITS POLE MNT CAB (TY 3) (CONF 1)	TMA (STATIONARY)	ITS GND BOX (PCAST) TYI (243636) W/APRN	BLUETOOTH DETECTION SYSTEM	ITS RVSD (DC & WWA) (INSTALL ONLY)	INSTALL OF FIELD HARD ETHERNET SWITCH	INSTALL OF CELLULAR MODEM	INSTALL DMS (POLE MTD CABINET)	ETHERNET SWITCH	CELLULAR MODEM / ANTENNA	DIGITAL CCTV CAMERA EQUIPMENT	RVSD (DATA COLLECT & WWA) SYS
		EA	EA	EA	LF	LF	EA	EA	EA	EA	DAY	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
1	CCTV -IH 20 AT FM 1053		1	1			1	1	1				1		1	1		1	1	1	
2	CCTV -IH 20 AT E BI 20 (MONAHANS)		1	1			1	1	1				1		1	1		1	1	1	
3	CCTV -IH 20 AT SH 18		1	1			1	1	1				1		1	1		1	1	1	
4	CCTV -IH 20 AT W BI 20 (MONAHANS)		1	1			1	1	1				1		1	1		1	1	1	
5	DMS WB -IH 20 AT SH 115/FM 1927 (PYOTE)						1			1			1	1	1	1	1	1	1		1
6	CCTV -IH 20 ST SH 115/FM 1927 (PYOTE)		1	1			1	1	1				1		1	1		1	1	1	
7	DMS EB -IH 20 ST SH 115/FM 1927 (PYOTE)						1			1			1	1	1	1	1	1	1		1
8	CCTV -IH 20 AT E BI 20 (BARSTOW)		1	1			1	1	1				1		1	1		1	1	1	
9	CCTV -IH 20 AT US 285		1	1			1	1	1				1		1	1		1	1	1	
10	CCTV -IH 20 AT MM 13		1	1			1	1	1				1		1	1		1	1	1	
11	CCTV -IH 10 AT FM 3078 (EXIT 192)		1	1			1	1	1				1		1	1		1	1	1	
12	DMS EB -IH 10 AT FM 2903/BI 10F (EXIT 206)						1			1			1	1	1	1	1	1	1		1
13	CCTV -IH 10 AT FM 2903/BI 10F	4	1	1			1	1	1		180		1		1	1		1	1	1	
14	DMS WB -IH 10 AT FM 2903/BI 10F (EXIT 206)						1			1			1	1	1	1	1	1	1		1
15	CCTV -IH 10 AT SH 17 (EXIT 212)		1	1			1	1	1				1		1	1		1	1	1	
16	CCTV -IH 10 REST AREA (MM 233)		1	1			1	1	1				1		1	1		1	1	1	
17	CCTV -IH 10 at US 67/FM 1776 (EXIT 248)		1	1			1	1	1				1		1	1		1	1	1	
18	CCTV -IH 10 at SH 18 (EXIT 259B)		1	1			1	1	1				1		1	1		1	1	1	
19	CCTV -IH 10 at Exist DMS (Confirmation Camera)		1	1	141	4	1	1	1			2	1		1	1		1	1	1	
20	DMS EB -IH 10 at US 67						1			1			1	1	1	1	1	1	1		1
21	CCTV -IH 10 at US 67 (EXIT 273)		1	1			1	1	1				1		1	1		1	1	1	
22	'DMS WB -IH 10 at US 67						1			1			1	1	1	1	1	1	1		1
23	CCTV -IH 10 at FM 11		1	1			1	1	1				1		1	1		1	1	1	
24	CCTV -IH 10 at US 190		1	1			1	1	1				1		1	1		1	1	1	
25	CCTV -IH 10 at SH 349/US 290		1	1			1	1	1				1		1	1		1	1	1	
	Totals	**4**	**19**	**19**	**141**	**4**	**25**	**19**	**19**	**6**	**180**	**2**	**25**	**6**	**25**	**25**	**6**	**25**	**25**	**19**	**6**

** ITEMS FURNISHED BY TXDOT INCLUDING THE DMS SIGNS AND INSTALLED BY THE CONTRACTOR.

STATE OF TEXAS
ADRIANA GEIGER
108603
LICENSED
PROFESSIONAL ENGINEER

Adriana Geiger, P.E.

ADRIANA GEIGER, P.E.

11/1/2023

Date

CONSOLIDATED SUMMARY

Texas Department of Transportation®

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			5
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	DISTRICTWIDE	
CONT.	SECT.	JOB	HIGHWAY NO.
0906	00	268	VARIOUS

DATE:
FILE:

BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

1. The Barricade and Construction Standard Sheets (BC sheets) are intended to show typical examples for placement of temporary traffic control devices, construction pavement markings, and typical work zone signs. The information contained in these sheets meet or exceed the requirements shown in the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).

2. The development and design of the Traffic Control Plan (TCP) is the responsibility of the Engineer.

3. The Contractor may propose changes to the TCP that are signed and sealed by a licensed professional engineer for approval. The Engineer may develop, sign and seal Contractor proposed changes.

4. The Contractor is responsible for installing and maintaining the traffic control devices as shown in the plans. The Contractor may not move or change the approximate location of any device without the approval of the Engineer.

5. Geometric design of lane shifts and detours should, when possible, meet the applicable design criteria contained in manuals such as the American Association of State Highway and Transportation Officials (AASHTO), "A Policy on Geometric Design of Highways and Streets," the TxDOT "Roadway Design Manual" or engineering judgment.

6. When projects abut, the Engineer(s) may omit the END ROAD WORK, TRAFFIC FINES DOUBLE, and other advance warning signs if the signing would be redundant and the work areas appear continuous to the motorists. If the adjacent project is completed first, the Contractor shall erect the necessary warning signs as shown on these sheets, the TCP sheets or as directed by the Engineer. The BEGIN ROAD WORK NEXT X MILES sign shall be revised to show appropriate work zone distance.

7. The Engineer may require duplicate warning signs on the median side of divided highways where median width will permit and traffic volumes justify the signing.

8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition. Sign details not shown in this manual shall be shown in the plans or the Engineer shall provide a detail to the Contractor before the sign is manufactured.

9. The temporary traffic control devices shown in the illustrations of the BC sheets are examples. As necessary, the Engineer will determine the most appropriate traffic control devices to be used.

10. Where highway construction or maintenance work is being undertaken, other than mobile operations as defined by the Texas Manual on Uniform Traffic Control Devices, CSJ limit signs are required. CSJ limit signs are shown on BC(2). The OBEY WARNING SIGNS STATE LAW sign, STAY ALERT TALK OR TEXT LATER and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits. For mobile operations, CSJ limit signs are not required.

11. Traffic control devices should be in place only while work is actually in progress or a definite need exists.

12. The Engineer has the final decision on the location of all traffic control devices.

13. Inactive equipment and work vehicles, including workers' private vehicles must be parked away from travel lanes. They should be as close to the right-of-way line as possible, or located behind a barrier or guardrail, or as approved by the Engineer.

WORKER SAFETY NOTES:

1. Workers on foot who are exposed to traffic or to construction equipment within the right-of-way shall wear high-visibility safety apparel meeting the requirements of ISEA "American National Standard for High-Visibility Apparel," or equivalent revisions, and labeled as ANSI 107-2004 standard performance for Class 2 or 3 risk exposure. Class 3 garments should be considered for high traffic volume work areas or night time work.

2. Except in emergency situations, flagger stations shall be illuminated when flagging is used at night.

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

1. Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources.

2. Work zone traffic control devices shall be compliant with the Manual for Assessing safety Hardware (MASH).

THE DOCUMENTS BELOW CAN BE FOUND ON-LINE AT http://www.txdot.gov
COMPLIANT WORK ZONE TRAFFIC CONTROL DEVICES LIST (CWZTCD)
DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS)
MATERIAL PRODUCER LIST (MPL)
ROADWAY DESIGN MANUAL - SEE "MANUALS (ONLINE MANUALS)"
STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS (SHSD)
TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD)
TRAFFIC ENGINEERING STANDARD SHEETS

Texas Department of Transportation

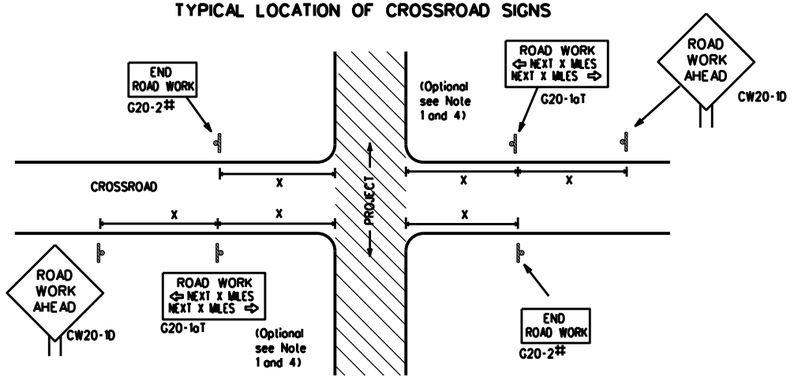
Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0906	00	268	VARIOUS
4-03 7-13	DIST	COUNTY		SHEET NO.
9-07 8-14	ODA	DISTRICTWIDE		6
5-10 5-21				

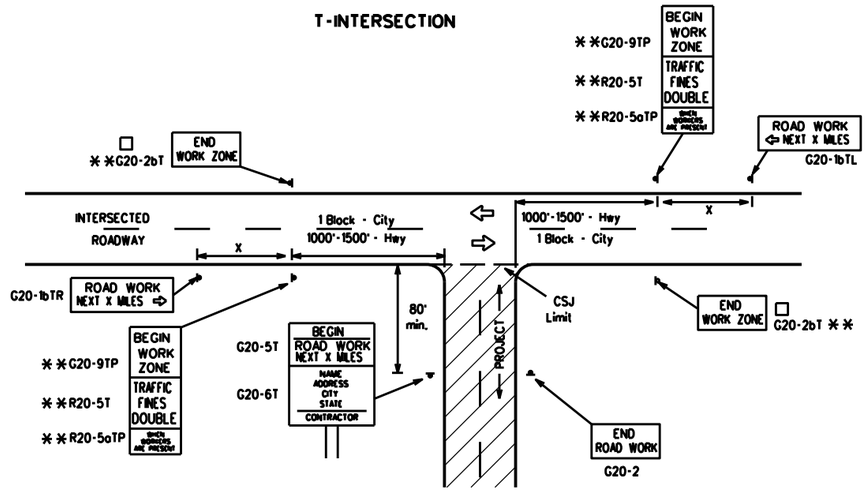
TYPICAL LOCATION OF CROSSROAD SIGNS



May be mounted on back of "ROAD WORK AHEAD"(CW20-1D) sign with approval of Engineer. (See note 2 below)

1. The typical minimum signing on a crossroad approach should be a "ROAD WORK AHEAD" (CW20-1D)sign and a (G20-2) "END ROAD WORK" sign, unless noted otherwise in plans.
2. The Engineer may use the reduced size 36" x 36" ROAD WORK AHEAD (CW20-1D) sign mounted back to back with the reduced size 36" x 18" "END ROAD WORK"(G20-2) sign on low volume crossroads (see Note 4 under "Typical Construction Warning Sign Size and Spacing"). See the "Standard Highway Sign Designs for Texas" manual for sign details. The Engineer may omit the advance warning signs on low volume crossroads. The Engineer will determine whether a road is low volume as per TMUTCD Part 5. This information shall be shown in the plans.
3. Based on existing field conditions, the Engineer/Inspector may require additional signs such as FLAGGER AHEAD, LOOSE GRAVEL, or other appropriate signs. When additional signs are required, these signs will be considered part of the minimum requirements. The Engineer/Inspector will determine the proper location and spacing of any sign not shown on the BC sheets, Traffic Control Plan sheets or the Work Zone Standard Sheets.
4. The "ROAD WORK NEXT X MILES"(G20-1aT)sign shall be required at high volume crossroads to advise motorists of the length of construction in either direction from the intersection. The Engineer will determine whether a roadway is considered high volume.
5. Additional traffic control devices may be shown elsewhere in the plans for higher volume crossroads.
6. When work occurs in the intersection area, appropriate traffic control devices, as shown elsewhere in the plans or as determined by the Engineer/Inspector, shall be in place.

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

1. The Engineer will determine the types and location of any additional traffic control devices, such as a flagger and accompanying signs, or other signs, that should be used when work is being performed at or near an intersection.
2. If construction closes the road at a T-intersection, the Contractor shall place the "CONTRACTOR NAME"(G20-6T) sign behind the Type 3 Barricades for the road closure (see BC(10) also). The "ROAD WORK NEXT X MILES" left arrow(G20-1bTL) and "ROAD WORK NEXT X MILES" right arrow (G20-1bTR)" signs shall be replaced by the detour signing called for in the plans.

TYPICAL CONSTRUCTION WARNING SIGN SIZE AND SPACING

1.5.6

SIZE

Sign Number or Series	Conventional Road	Expressway/ Freeway
CW20[4] CW21 CW22 CW23 CW25	48" x 48"	48" x 48"
CW1, CW2, CW7, CW8, CW9, CW11, CW14	36" x 36"	48" x 48"
CW3, CW4, CW5, CW6, CW8-3, CW10, CW12	48" x 48"	48" x 48"

SPACING

Posted Speed	Sign * Spacing "X"
MPH	Feet (Apprx.)
30	120
35	160
40	240
45	320
50	400
55	500 [2]
60	600 [2]
65	700 [2]
70	800 [2]
75	900 [2]
80	1000 [2]
*	* [3]

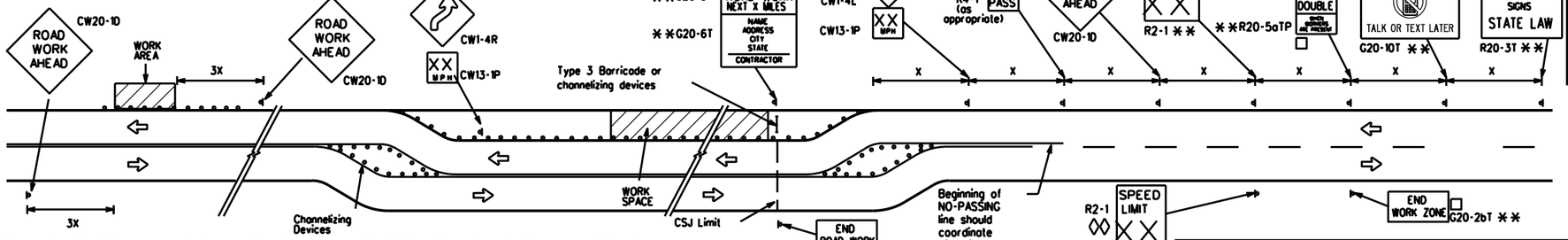
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

* Minimum distance from work area to first Advance Warning sign nearest the work area and/or distance between each additional sign.

GENERAL NOTES

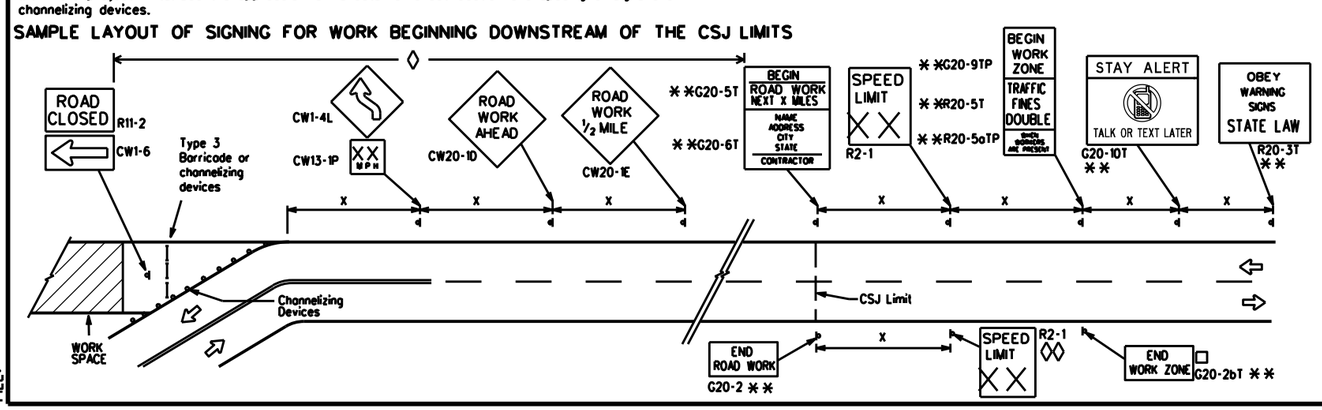
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may be used on low volume crossroads at the discretion of the Engineer as per TMUTCD Part 5. See Note 2 under "Typical Location of Crossroad Signs".
5. Only diamond shaped warning sign sizes are indicated.
6. See sign size listing in "TMUTCD", Sign Appendix or the "Standard Highway Sign Designs for Texas" manual for complete list of available sign design sizes.

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD"(CW20-1D)signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing of signs and channelizing devices.

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING DOWNSTREAM OF THE CSJ LIMITS



SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS

NOTES

The Contractor shall determine the appropriate distance to be placed on the G20-1 series signs and "BEGIN ROAD WORK NEXT X MILES"(G20-5T)sign for each specific project. This distance shall replace the "X" and shall be rounded to the nearest whole mile with the approval of the Engineer. No decimals shall be used.

□ The "BEGIN WORK ZONE"(G20-9TP) and "END WORK ZONE" (G20-2bT) shall be used as shown on the sample layout when advance signs are required outside the CSJ Limits. They inform the motorist of entering or leaving a part of the work zone lying outside the CSJ Limits where traffic fines may double if workers are present.

** CSJ limit signing is required for highway construction and maintenance work, with the exception of mobile operations.

◊ Area for placement of "ROAD WORK AHEAD" (CW20-1D)sign and other signs or devices as called for on the Traffic Control Plan.

◊◊ Contractor will install a regulatory speed limit sign at the end of the work zone.

LEGEND	
⊢⊣	Type 3 Barricade
○○○	Channelizing Devices
▬	Sign
X	See Typical Construction Warning Sign Size and Spacing chart or the TMUTCD for sign spacing requirements.

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0906	00	268	VARIOUS
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	ODA	DISTRICTWIDE		7

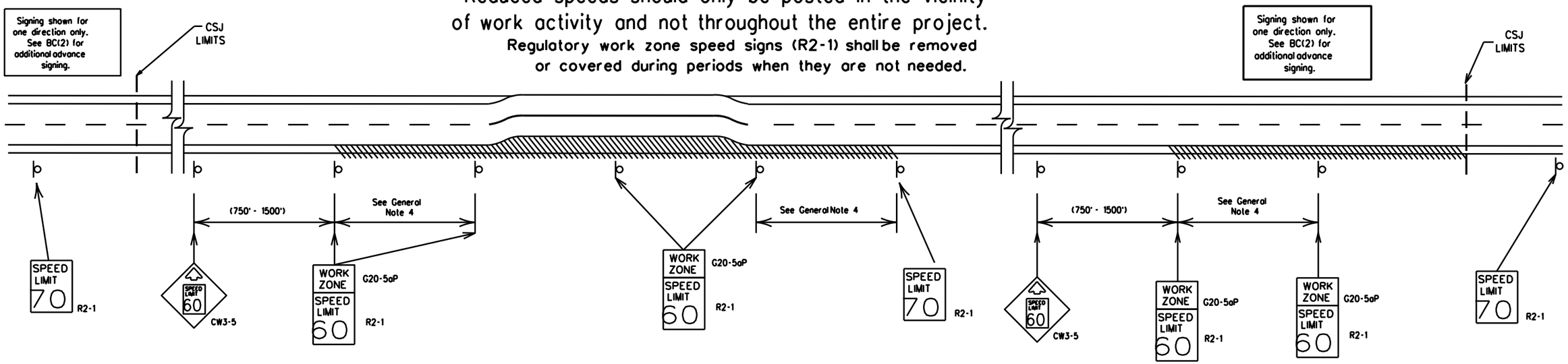
DATE:
FILE:

TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

Work zone speed limits shall be regulatory, established in accordance with the "Procedures for Establishing Speed Zones," and approved by the Texas Transportation Commission, or by City Ordinance when within incorporated City Limits.

Reduced speeds should only be posted in the vicinity of work activity and not throughout the entire project.

Regulatory work zone speed signs (R2-1) shall be removed or covered during periods when they are not needed.



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

This type of work zone speed limit should be included on the design of the traffic control plans when restricted geometrics with a lower design speed are present in the work zone and modification of the geometrics to a higher design speed is not feasible.

Long/Intermediate Term Work Zone Speed Limit signs, when approved as described above, should be posted and visible to the motorist when work activity is present. Work activity may also be defined as a change in the roadway that requires a reduced speed for motorists to safely negotiate the work area, including:

a) rough road or damaged pavement surface
b) substantial alteration of roadway geometrics (diversions)
c) construction detours
d) grade
e) width
f) other conditions readily apparent to the driver

As long as any of these conditions exist, the work zone speed limit signs should remain in place.

SHORT TERM WORK ZONE SPEED LIMITS

This type of work zone speed limit may be included on the design of the traffic control plans when workers or equipment are not behind concrete barrier, when work activity is within 10 feet of the traveled way or actually in the traveled way.

Short Term Work Zone Speed Limit signs should be posted and visible to the motorists only when work activity is present. When work activity is not present, signs shall be removed or covered. (See Removing or Covering on BC(4)).

GENERAL NOTES

1. Regulatory work zone speed limits should be used only for sections of construction projects where speed control is of major importance.
2. Regulatory work zone speed limit signs shall be placed on supports at a 7 foot minimum mounting height.
3. Speed zone signs are illustrated for one direction of travel and are normally posted for each direction of travel.
4. Frequency of work zone speed limit signs should be:
   40 mph and greater 0.2 to 2 miles
   35 mph and less 0.2 to 1 mile
5. Regulatory speed limit signs shall have black legend and border on a white reflective background (See "Reflective Sheeting" on BC(4)).
6. Fabrication, erection and maintenance of the "ADVANCE SPEED LIMIT" (CW3-5) sign, "WORK ZONE" (G20-5aP) plaque and the "SPEED LIMIT" (R2-1) signs shall not be paid for directly, but shall be considered subsidiary to Item 502.
7. Turning signs from view, laying signs over or down will not be allowed, unless as otherwise noted under "REMOVING OR COVERING" on BC(4).
8. Techniques that may help reduce traffic speeds include but are not limited to:
   A. Law enforcement.
   B. Flagger stationed next to sign.
   C. Portable changeable message sign (PCMS).
   D. Low-power (drone) radar transmitter.
   E. Speed monitor trailers or signs.
9. Speeds shown on details above are for illustration only. Work Zone Speed Limits should only be posted as approved for each project.
10. For more specific guidance concerning the type of work, work zone conditions and factors impacting allowable regulatory construction speed zone reduction see TxDOT form #1204 in the TxDOT e-form system.

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

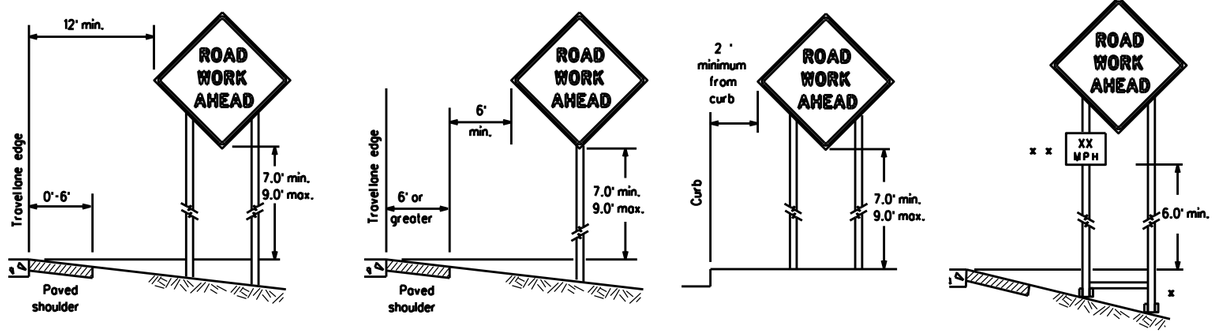
BC(3)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0906	00	268	VARIOUS
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	ODA	DISTRICTWIDE		8

DATE:
FILE:

DATE:
FILE:

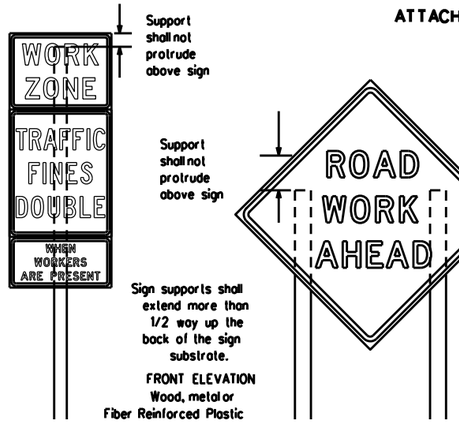
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



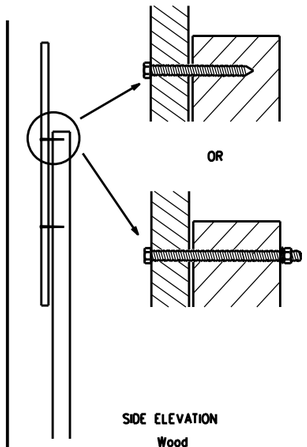
x When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

x x When plaques are placed on dual-leg supports, they should be attached to the upright nearest the travellane. Supplemental plaques (advisory or distance) should not cover the surface of the parent sign.

ATTACHMENT FOR SIGN SUPPORTS



Splicing embedded perforated square metal tubing in order to extend post height will only be allowed when the splice is made using four bolts, two above and two below the spice point. Splice must be located entirely behind the sign substrate, not near the base of the support. Splice insert lengths should be at least 5 times nominal post size, centered on the splice and of at least the same gauge material.

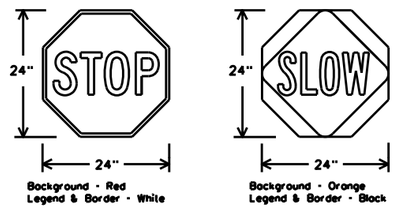


Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

Nails shall NOT be allowed. Each sign shall be attached directly to the sign support. Multiple signs shall not be joined or spliced by any means. Wood supports shall not be extended or repaired by splicing or other means.

STOP/SLOW PADDLES

1. STOP/SLOW paddles are the primary method to control traffic by flaggers. The STOP/SLOW paddle size should be 24" x 24".
2. STOP/SLOW paddles shall be retroreflectorized when used at night.
3. STOP/SLOW paddles may be attached to a staff with a minimum length of 6' to the bottom of the sign.
4. Any lights incorporated into the STOP or SLOW paddle faces shall only be as specifically described in Section 6E.03 Hand Signaling Devices in the TMUTCD.



SHEETING REQUIREMENTS (WHEN USED AT NIGHT)		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	ORANGE	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDER	WHITE	TYPE B OR C SHEETING
LEGEND & BORDER	BLACK	ACRYLIC NON-REFLECTIVE FILM

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

1. Permanent signs are used to give notice of traffic laws or regulations, call attention to conditions that are potentially hazardous to traffic operations, show route designations, destinations, directions, distances, services, points of interest, and other geographical, recreational, specific service (LOGO), or cultural information. Drivers proceeding through a work zone need the same, if not better route guidance as normally installed on a roadway without construction.
2. When permanent regulatory or warning signs conflict with work zone conditions, remove or cover the permanent signs until the permanent sign message matches the roadway condition. For details for covering large guide signs see the TS-CD standard.
3. When existing permanent signs are moved and relocated due to construction purposes, they shall be visible to motorists at all times.
4. If existing signs are to be relocated on their original supports, they shall be installed on crashworthy bases as shown on the SMD Standard sheets. The signs shall meet the required mounting heights shown on the BC Sheets or the SMD Standards. This work should be paid for under the appropriate pay item for relocating existing signs.
5. If permanent signs are to be removed and relocated using temporary supports, the Contractor shall use crashworthy supports as shown on the BC standard sheets, TLRS standard sheets or the CWZTCD list. The signs shall meet the required mounting heights shown on the BC, or the SMD standard sheets during construction. This work should be paid for under the appropriate pay item for relocating existing signs.
6. Any sign or traffic control device that is struck or damaged by the Contractor or his/her construction equipment shall be replaced as soon as possible by the Contractor to ensure proper guidance for the motorists. This will be subsidiary to Item 502.

GENERAL NOTES FOR WORK ZONE SIGNS

1. Contractor shall install and maintain signs in a straight and plumb condition and/or as directed by the Engineer.
2. Wooden sign posts shall be painted white.
3. Barricades shall NOT be used as sign supports.
4. All signs shall be installed in accordance with the plans or as directed by the Engineer. Signs shall be used to regulate, warn, and guide the traveling public safely through the work zone.
5. The Contractor may furnish either the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SHSD). The Engineer/Inspector may require the Contractor to furnish other work zone signs that are shown in the TMUTCD but may have been omitted from the plans. Any variation in the plans shall be documented by written agreement between the Engineer and the Contractor's Responsible Person. All changes must be documented in writing before being implemented. This can include documenting the changes in the Inspector's TxDOT diary and having both the Inspector and Contractor initial and date the agreed upon changes.
6. The Contractor shall furnish sign supports listed in the "Compliant Work Zone Traffic Control Device List" (CWZTCD) for small roadside signs. Supports for temporary large roadside signs shall meet the requirements detailed on the Temporary Large Roadside Signs (TLRS) standard sheets. The Contractor shall install the sign support in accordance with the manufacturer's recommendations. If there is a question regarding installation procedures, the Contractor shall furnish the Engineer a copy of the manufacturer's installation recommendations so the Engineer can verify the correct procedures are being followed.
7. The Contractor is responsible for installing signs on approved supports and replacing signs with damaged or cracked substrates and/or damaged or marred reflective sheeting as directed by the Engineer/Inspector.
8. Identification markings may be shown only on the back of the sign substrate. The maximum height of letters and/or company logos used for identification shall be 1 inch.
9. The Contractor shall replace damaged wood posts. New or damaged wood sign posts shall not be spliced.

DURATION OF WORK (as defined by the "Texas Manual on Uniform Traffic Control Devices" Part 6)

1. The types of sign supports, sign mounting height, the size of signs, and the type of sign substrates can vary based on the type of work being performed. The Engineer is responsible for selecting the appropriate size sign for the type of work being performed. The Contractor is responsible for ensuring the sign support, sign mounting height and substrate meets manufacturer's recommendations in regard to crashworthiness and duration of work requirements.
   a. Long-term stationary - work that occupies a location more than 3 days.
   b. Intermediate-term stationary - work that occupies a location more than one daylight period up to 3 days, or nighttime work lasting more than one hour.
   c. Short-term stationary - daytime work that occupies a location for more than 1 hour in a single daylight period.
   d. Short, duration - work that occupies a location up to 1 hour.
   e. Mobile - work that moves continuously or intermittently (stopping for up to approximately 15 minutes.)

SIGN MOUNTING HEIGHT

1. The bottom of Long-term/Intermediate-term signs shall be at least 7 feet, but not more than 9 feet, above the paved surface, except as shown for supplemental plaques mounted below other signs.
2. The bottom of Short-term/Short Duration signs shall be a minimum of 1 foot above the pavement surface but no more than 2 feet above the ground.
3. Long-term/Intermediate-term Signs may be used in lieu of Short-term/Short Duration signing.
4. Short-term/Short Duration signs shall be used only during daylight and shall be removed at the end of the workday or raised to appropriate Long-term/Intermediate sign height.
5. Regulatory signs shall be mounted at least 7 feet, but not more than 9 feet, above the paved surface regardless of work duration.

SIZE OF SIGNS

1. The Contractor shall furnish the sign sizes shown on BC (2) unless otherwise shown in the plans or as directed by the Engineer.

SIGN SUBSTRATES

1. The Contractor shall ensure the sign substrate is installed in accordance with the manufacturer's recommendations for the type of sign support that is being used. The CWZTCD lists each substrate that can be used on the different types and models of sign supports.
2. "Mesh" type materials are NOT an approved sign substrate, regardless of the lightness of the weave.
3. All wooden individual sign panels fabricated from 2 or more pieces shall have one or more plywood cleat, 1/2" thick by 6" wide, fastened to the back of the sign and extending fully across the sign. The cleat shall be attached to the back of the sign using wood screws that do not penetrate the face of the sign panel. The screws shall be placed on both sides of the splice and spaced at 6" centers. The Engineer may approve other methods of splicing the sign face.

REFLECTIVE SHEETING

1. All signs shall be retroreflective and constructed of sheeting meeting the color and retro-reflectivity requirements of DMS-8300 for rigid signs or DMS-8310 for roll-up signs. The web address for DMS specifications is shown on BC(1).
2. White sheeting, meeting the requirements of DMS-8300 Type A, shall be used for signs with a white background.
3. Orange sheeting, meeting the requirements of DMS-8300 Type B or Type C_{FL}, shall be used for rigid signs with orange backgrounds.

SIGN LETTERS

1. All sign letters and numbers shall be clear, and open rounded type uppercase alphabet letters as approved by the Federal Highway Administration (FHWA) and as published in the "Standard Highway Sign Design for Texas" manual. Signs, letters and numbers shall be of first class workmanship in accordance with Department Standards and Specifications.

REMOVING OR COVERING

1. When sign messages may be confusing or do not apply, the signs shall be removed or completely covered.
2. Long-term stationary or intermediate stationary signs installed on square metal tubing may be turned away from traffic 90 degrees when the sign message is not applicable. This technique may not be used for signs installed in the median of divided highways or near any intersections where the sign may be seen from approaching traffic.
3. Signs installed on wooden skids shall not be turned at 90 degree angles to the roadway. These signs should be removed or completely covered when not required.
4. When signs are covered, the material used shall be opaque, such as heavy mil black plastic, or other materials which will cover the entire sign face and maintain their opaque properties under automobile headlights at night, without damaging the sign sheeting.
5. Burlap shall NOT be used to cover signs.
6. Duct tape or other adhesive material shall NOT be affixed to a sign face.
7. Signs and anchor stubs shall be removed and holes backfilled upon completion of work.

SIGN SUPPORT WEIGHTS

1. Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand should be used.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects shall not be permitted for use as sign support weights.
4. Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs.
5. Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber (such as tire inner tubes) shall NOT be used.
6. Rubber ballasts designed for channelizing devices should not be used for ballast on portable sign supports. Sign supports designed and manufactured with rubber bases may be used when shown on the CWZTCD list.
7. Sandbags shall only be placed along or laid over the base supports of the traffic control device and shall not be suspended above ground level or hung with rope, wire, chains or other fasteners. Sandbags shall be placed along the length of the skids to weigh down the sign support.
8. Sandbags shall NOT be placed under the skid and shall not be used to level sign supports placed on slopes.

FLAGS ON SIGNS

1. Flags may be used to draw attention to warning signs. When used, the flag shall be 16 inches square or larger and shall be orange or fluorescent red-orange in color. Flags shall not be allowed to cover any portion of the sign face.

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

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©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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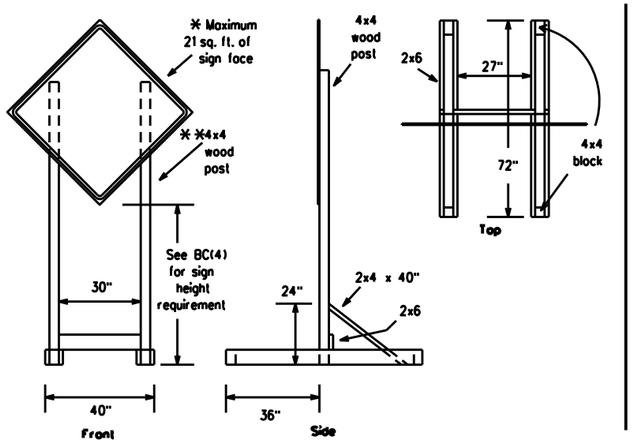
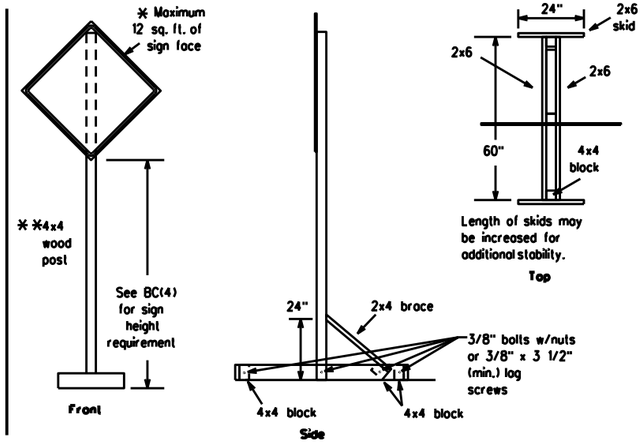
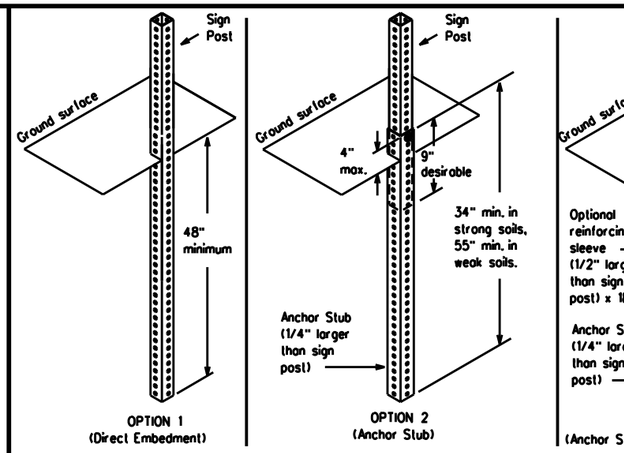


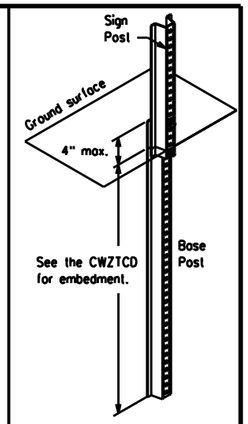


SKID MOUNTED WOOD SIGN SUPPORTS

*** LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS**



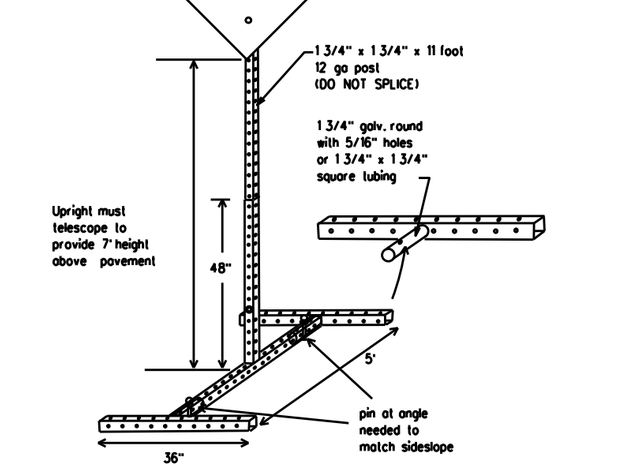
PERFORATED SQUARE METAL TUBING

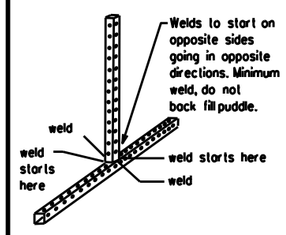


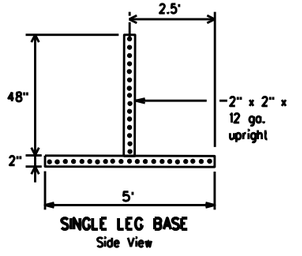
WING CHANNEL
Lap-splice/base bolted anchor

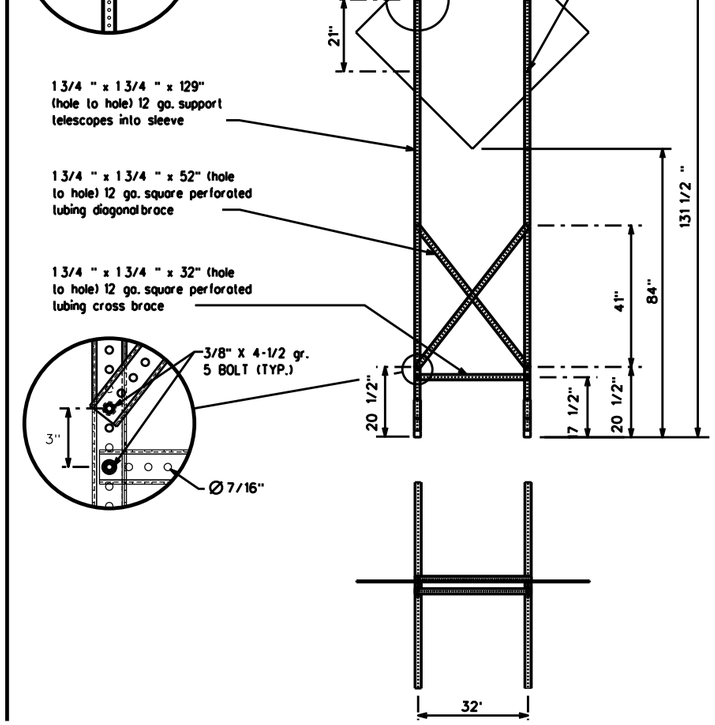
GROUND MOUNTED SIGN SUPPORTS

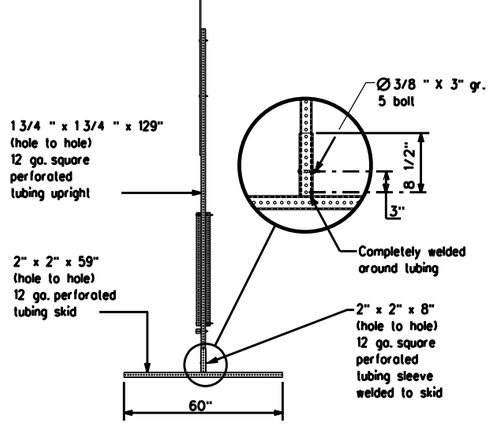
Refer to the CWZTCD and the manufacturer's installation procedure for each type sign support.
The maximum sign square footage shall adhere to the manufacturer's recommendation.
Two post installations can be used for larger signs.











SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

*** LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS**

WEDGE ANCHORS

Both steel and plastic Wedge Anchor Systems as shown on the SMD Standard Sheets may be used as temporary sign supports for signs up to 10 square feet of sign face. They may be set in concrete or in sturdy soils if approved by the Engineer. (See web address for "Traffic Engineering Standard Sheets" on BC(1)).

OTHER DESIGNS

MORE DETAILS OF APPROVED LONG/INTERMEDIATE AND SHORT TERM SUPPORTS CAN BE FOUND ON THE CWZTCD LIST. SEE BC(1) FOR WEBSITE LOCATION.

GENERAL NOTES

1. Nails may be used in the assembly of wooden sign supports, but 3/8" bolts with nuts or 3/8" x 3 1/2" lag screws must be used on every joint for final connection.
2. No more than 2 sign posts shall be placed within a 7 ft. circle, except for specific materials noted on the CWZTCD List.
3. When project is completed, all sign supports and foundations shall be removed from the project site. This will be considered subsidiary to Item 502.

* See BC(4) for definition of "Work Duration."

** Wood sign posts MUST be one piece. Splicing will NOT be allowed. Posts shall be painted white.

☐ See the CWZTCD for the type of sign substrate that can be used for each approved sign support.

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	ODA	DISTRICTWIDE		10

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DATE:
FILE:

WHEN NOT IN USE, REMOVE THE PCMS FROM THE RIGHT-OF-WAY OR PLACE THE PCMS BEHIND BARRIER OR GUARDRAIL WITH SIGN PANEL TURNED PARALLEL TO TRAFFIC

PORTABLE CHANGEABLE MESSAGE SIGNS

1. The Engineer/Inspector shall approve all messages used on portable changeable message signs (PCMS).
2. Messages on PCMS should contain no more than 8 words (about four to eight characters per word), not including simple words such as "TO," "FOR," "AT," etc.
3. Messages should consist of a single phase, or two phases that alternate. Three-phase messages are not allowed. Each phase of the message should convey a single thought, and must be understood by itself.
4. Use the word "EXIT" to refer to an exit ramp on a freeway: i.e., "EXIT CLOSED." Do not use the term "RAMP."
5. Always use the route or interstate designation (IH, US, SH, FM) along with the number when referring to a roadway.
6. When in use, the bottom of a stationary PCMS message panel should be a minimum 7 feet above the roadway, where possible.
7. The message term "WEEKEND" should be used only if the work is to start on Saturday morning and end by Sunday evening at midnight. Actual days and hours of work should be displayed on the PCMS if work is to begin on Friday evening and/or continue into Monday morning.
8. The Engineer/Inspector may select one of two options which are available for displaying a two-phase message on a PCMS. Each phase may be displayed for either four seconds each or for three seconds each.
9. Do not "flash" messages or words included in a message. The message should be steady burn or continuous while displayed.
10. Do not present redundant information on a two-phase message: i.e., keeping two lines of the message the same and changing the third line.
11. Do not use the word "Danger" in message.
12. Do not display the message "LANES SHIFT LEFT" or "LANES SHIFT RIGHT" on a PCMS. Drivers do not understand the message.
13. Do not display messages that scroll horizontally or vertically across the face of the sign.
14. The following table lists abbreviated words and two-word phrases that are acceptable for use on a PCMS. Both words in a phrase must be displayed together. Words or phrases not on this list should not be abbreviated, unless shown in the TMUTCD.
15. PCMS character height should be at least 18 inches for trailer mounted units. They should be visible from at least 1/2 (.5) mile and the text should be legible from at least 600 feet at night and 800 feet in daylight. Truck mounted units must have a character height of 10 inches and must be legible from at least 400 feet.
16. Each line of text should be centered on the message board rather than left or right justified.
17. If disabled, the PCMS should default to an illegible display that will not alarm motorists and will only be used to alert workers that the PCMS has malfunctioned. A pattern such as a series of horizontal solid bars is appropriate.

WORD OR PHRASE	ABBREVIATION
Access Road	ACCS RD
Alternate	ALT
Avenue	AVE
Best Route	BEST RTE
Boulevard	BLVD
Bridge	BRDG
Cannot	CANT
Center	CTR
Construction Ahead	CONST AHD
CROSSING	XING
Detour Route	DETOUR RTE
Do Not	DONT
East	E
Eastbound	(route) E
Emergency	EMER
Emergency Vehicle	EMER VEH
Entrance, Enter	ENT
Express Lane	EXP LN
Expressway	EXPWY
XXXX Feet	XXXX FT
Fog Ahead	FOG AHD
Freeway	FRWY, FWY
Freeway Blocked	FWY BLKD
Friday	FRI
Hazardous Driving	HAZ DRIVING
Hazardous Material	HAZMAT
High-Occupancy	HOV
Vehicle Highway	HWY
Hour(s)	HR, HRS
Information	INFO
It Is	ITS
Junction	JCT
Left	LFT
Left Lane	LFT LN
Lane Closed	LN CLOSED
Lower Level	LWR LEVEL
Maintenance	MAINT

WORD OR PHRASE	ABBREVIATION
Major	MAJ
Miles	MI
Miles Per Hour	MPH
Minor	MNR
Monday	MON
Normal	NORM
North	N
Northbound	(route) N
Parking	PKING
Road	RD
Right Lane	RT LN
Saturday	SAT
Service Road	SERV RD
Shoulder	SHLDR
Slippery	SLIP
South	S
Southbound	(route) S
Speed	SPD
Street	ST
Sunday	SUN
Telephone	PHONE
Temporary	TEMP
Thursday	THURS
To Downtown	TO DWNTN
Traffic	TRAF
Travelers	TRVLRS
Tuesday	TUES
Time Minutes	TIME MIN
Upper Level	UPR LEVEL
Vehicles (s)	VEH, VEHS
Warning	WARN
Wednesday	WED
Weight Limit	WT LIMIT
West	W
Westbound	(route) W
Wet Pavement	WET PVMT
Will Not	WONT

Roadway designation = IH-number, US-number, SH-number, FM-number

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

(The Engineer may approve other messages not specifically covered here.)

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

- FREEWAY CLOSED X MILE
- FRONTAGE ROAD CLOSED
- ROAD CLOSED AT SH XXX
- SHOULDER CLOSED XXX FT
- ROAD CLSD AT FM XXXX
- RIGHT LN CLOSED XXX FT
- RIGHT X LANES CLOSED
- RIGHT X LANES OPEN
- CENTER LANE CLOSED
- DAYTIME LANE CLOSURES
- NIGHT LANE CLOSURES
- I-XX SOUTH EXIT CLOSED
- VARIOUS LANES CLOSED
- EXIT XXX CLOSED X MILE
- EXIT CLOSED
- RIGHT LN TO BE CLOSED
- MALL DRIVEWAY CLOSED
- X LANES CLOSED TUE - FRI
- XXXXXXXX BLVD CLOSED

Other Condition List

- ROADWORK XXX FT
- ROAD REPAIRS XXXX FT
- FLAGGER XXXX FT
- LANE NARROWS XXXX FT
- RIGHT LN NARROWS XXXX FT
- TWO-WAY TRAFFIC XX MILE
- MERGING TRAFFIC XXXX FT
- CONST TRAFFIC XXX FT
- LOOSE GRAVEL XXXX FT
- UNEVEN LANES XXXX FT
- DETOUR X MILE
- ROUGH ROAD XXXX FT
- ROADWORK PAST SH XXXX
- ROADWORK NEXT FRI-SUN
- BUMP XXXX FT
- US XXX EXIT X MILES
- TRAFFIC SIGNAL XXXX FT
- LANES SHIFT *

* LANES SHIFT in Phase 1 must be used with STAY IN LANE in Phase 2.

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

- MERGE RIGHT
- FORM X LINES RIGHT
- DETOUR NEXT X EXITS
- USE XXXXX RD EXIT
- USE EXIT XXX
- USE EXIT I-XX NORTH
- STAY ON US XXX SOUTH
- USE I-XX E TO I-XX N
- TRUCKS USE US XXX N
- WATCH FOR TRUCKS
- WATCH FOR TRUCKS
- EXPECT DELAYS
- EXPECT DELAYS
- PREPARE TO STOP
- REDUCE SPEED XXX FT
- END SHOULDER USE
- USE OTHER ROUTES
- WATCH FOR WORKERS
- STAY IN LANE *

Location List

- AT FM XXXX
- BEFORE RAILROAD CROSSING
- NEXT X MILES
- PAST US XXX EXIT
- XXXXXXX TO XXXXXXX
- US XXX TO FM XXXX

Warning List

- SPEED LIMIT XX MPH
- MAXIMUM SPEED XX MPH
- MINIMUM SPEED XX MPH
- ADVISORY SPEED XX MPH
- RIGHT LANE EXIT
- USE CAUTION
- DRIVE SAFELY
- DRIVE WITH CARE

** Advance Notice List

- TUE-FRI XX AM- X PM
- APR XX-XX X PM-X AM
- BEGINS MONDAY
- BEGINS MAY XX
- MAY X-X XX PM - XX AM
- NEXT FRI-SUN
- XX AM TO XX PM
- NEXT TUE AUG XX
- TONIGHT XX PM- XX AM

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

1. Only 1 or 2 phases are to be used on a PCMS.
2. The 1st phase (or both) should be selected from the "Road/Lane/Ramp Closure List" and the "Other Condition List".
3. A 2nd phase can be selected from the "Action to Take/Effect on Travel, Location, General Warning, or Advance Notice Phase Lists".
4. A Location Phase is necessary only if a distance or location is not included in the first phase selected.
5. If two PCMS are used in sequence, they must be separated by a minimum of 1000 ft. Each PCMS shall be limited to two phases, and should be understandable by themselves.
6. For advance notice, when the current date is within seven days of the actual work date, calendar days should be replaced with days of the week. Advance notification should typically be for no more than one week prior to the work.

WORDING ALTERNATIVES

1. The words RIGHT, LEFT and ALL can be interchanged as appropriate.
2. Roadway designations IH, US, SH, FM and LP can be interchanged as appropriate.
3. EAST, WEST, NORTH and SOUTH (or abbreviations E, W, N and S) can be interchanged as appropriate.
4. Highway names and numbers replaced as appropriate.
5. ROAD, HIGHWAY and FREEWAY can be interchanged as needed.
6. AHEAD may be used instead of distances if necessary.
7. FT and MI, MILE and MILES interchanged as appropriate.
8. AT, BEFORE and PAST interchanged as needed.
9. Distances or AHEAD can be eliminated from the message if a location phase is used.

PCMS SIGNS WITHIN THE R.O.W. SHALL BE BEHIND GUARDRAIL OR CONCRETE BARRIER OR SHALL HAVE A MINIMUM OF FOUR (4) PLASTIC DRUMS PLACED PERPENDICULAR TO TRAFFIC ON THE UPSTREAM SIDE OF THE PCMS, WHEN EXPOSED TO ONE DIRECTION OF TRAFFIC. WHEN EXPOSED TO TWO WAY TRAFFIC, THE FOUR DRUMS SHOULD BE PLACED WITH ONE DRUM AT EACH OF THE FOUR CORNERS OF THE UNIT.

FULL MATRIX PCMS SIGNS

1. When Full Matrix PCMS signs are used, the character height and legibility/visibility requirements shall be maintained as listed in Note 15 under "PORTABLE CHANGEABLE MESSAGE SIGNS" above.
2. When symbol signs, such as the "Flagger Symbol"(CW20-7) are represented graphically on the Full Matrix PCMS sign and, with the approval of the Engineer, it shall maintain the legibility/visibility requirement listed above.
3. When symbol signs are represented graphically on the Full Matrix PCMS, they shall only supplement the use of the static sign represented, and shall not substitute for, or replace that sign.
4. A full matrix PCMS may be used to simulate a flashing arrow board provided it meets the visibility, flash rate and dimming requirements on BC(7), for the same size arrow.

SHEET 6 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

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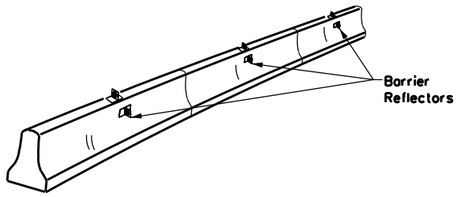
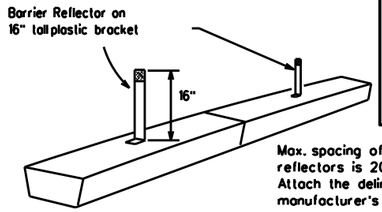
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost of the reflectors shall be considered subsidiary to Item 512.



CONCRETE TRAFFIC BARRIER (CTB)

3. Where traffic is on one side of the CTB, two (2) Barrier Reflectors shall be mounted in approximately the midsection of each section of CTB. An alternate mounting location is uniformly spaced at one end of each CTB. This will allow for attachment of a barrier grapple without damaging the reflector. The Barrier Reflector mounted on the side of the CTB shall be located directly below the reflector mounted on top of the barrier, as shown in the detail above.
4. Where CTB separates two-way traffic, three barrier reflectors shall be mounted on each section of CTB. The reflector unit on top shall have two yellow reflective faces (Bi-Directional)while the reflectors on each side of the barrier shall have one yellow reflective face, as shown in the detail above.
5. When CTB separates traffic traveling in the same direction, no barrier reflectors will be required on top of the CTB.
6. Barrier Reflector units shall be yellow or white in color to match the edgeline being supplemented.
7. Maximum spacing of Barrier Reflectors is forty (40) feet.
8. Pavement markers or temporary flexible-reflective roadway marker tabs shall NOT be used as CTB delineation.
9. Attachment of Barrier Reflectors to CTB shall be per manufacturer's recommendations.
10. Missing or damaged Barrier Reflectors shall be replaced as directed by the Engineer.
11. Single slope barriers shall be delineated as shown on the above detail.

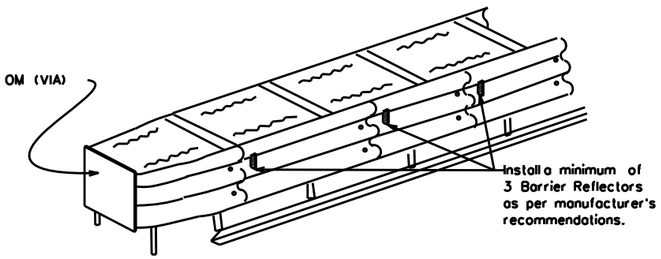


Max. spacing of barrier reflectors is 20 feet.
Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

LPCB is approved for use in work zone locations, where the posted speed is 45mph, or less. See Roadway Standard Sheet LPCB.

LOW PROFILE CONCRETE BARRIER (LPCB)

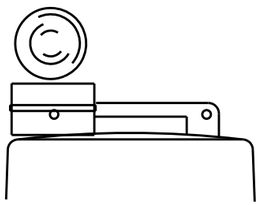


DELINEATION OF END TREATMENTS

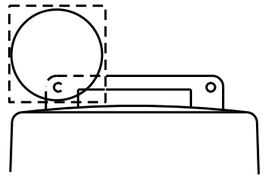
END TREATMENTS FOR CTB'S USED IN WORK ZONES

End treatments used on CTB's in work zones shall meet the appropriate crashworthy standards as defined in the Manual for Assessing Safety Hardware (MASH). Refer to the CWZTCD List for approved end treatments and manufacturers.

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



Type C Warning Light or approved substitute mounted on a drum adjacent to the travel way.



Warning reflector may be round or square. Must have a yellow reflective surface area of at least 30 square inches

WARNING LIGHTS

1. Warning lights shall meet the requirements of the TMUTCD.
2. Warning lights shall NOT be installed on barricades.
3. Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "FL". The Type A Warning Lights shall not be used with signs manufactured with Type B or C Sheeting, meeting the requirements of Departmental Material Specification DMS-8300.
4. Type-C and Type D 360 degree Steady Burn Lights are intended to be used in a series for delineation to supplement other traffic control devices. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "SB".
5. The Engineer/Inspector or the plans shall specify the location and type of warning lights to be installed on the traffic control devices.
6. When required by the Engineer, the Contractor shall furnish a copy of the warning lights certification. The warning light manufacturer will certify the warning lights meet the requirements of the latest ITE Purchase Specifications for Flashing and Steady-Burn Warning Lights.
7. When used to delineate curves, Type-C and Type D Steady Burn Lights should only be placed on the outside of the curve, not the inside.
8. The location of warning lights and warning reflectors on drums shall be as shown elsewhere in the plans.

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

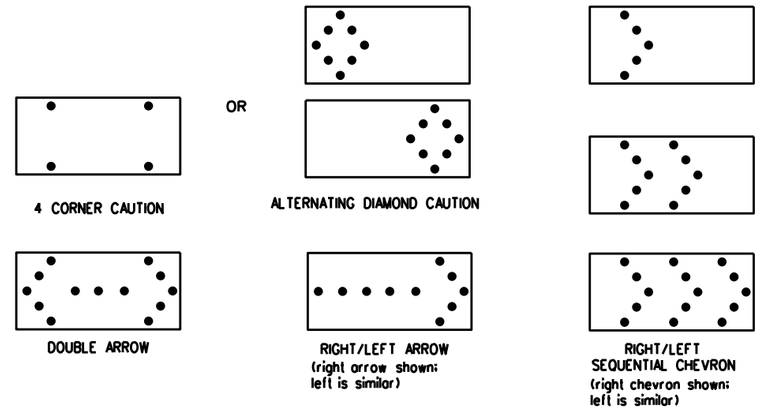
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing devices to form a merging taper may be used for delineation. If used, the successive flashing of the sequential warning lights should occur from the beginning of the taper to the end of the merging taper in order to identify the desired vehicle path. The rate of flashing for each light shall be 65 flashes per minute, plus or minus 10 flashes.
4. Type C and D steady-burn warning lights are intended to be used in a series to delineate the edge of the travel lane on detours, on lane changes, on lane closures, and on other similar conditions.
5. Type A, Type C and Type D warning lights shall be installed at locations as detailed on other sheets in the plans.
6. Warning lights shall not be installed on a drum that has a sign, chevron or vertical panel.
7. The maximum spacing for warning lights on drums should be identical to the channelizing device spacing.

WARNING REFLECTORS MOUNTED ON PLASTIC DRUMS AS A SUBSTITUTE FOR TYPE C (STEADY BURN) WARNING LIGHTS

1. A warning reflector or approved substitute may be mounted on a plastic drum as a substitute for a Type C, steady burn warning light at the discretion of the Contractor unless otherwise noted in the plans.
2. The warning reflector shall be yellow in color and shall be manufactured using a sign substrate approved for use with plastic drums listed on the CWZTCD.
3. The warning reflector shall have a minimum retroreflective surface area (one-side) of 30 square inches.
4. Round reflectors shall be fully reflectorized, including the area where attached to the drum.
5. Square substrates must have a minimum of 30 square inches of reflectorized sheeting. They do not have to be reflectorized where it attaches to the drum.
6. The side of the warning reflector facing approaching traffic shall have sheeting meeting the color and retroreflectivity requirements for DMS 8300-Type B or Type C.
7. When used near two-way traffic, both sides of the warning reflector shall be reflectorized.
8. The warning reflector should be mounted on the side of the handle nearest approaching traffic.
9. The maximum spacing for warning reflectors should be identical to the channelizing device spacing requirements.

Arrow Boards may be located behind channelizing devices in place for a shoulder taper or merging taper, otherwise they shall be delineated with four (4) channelizing devices placed perpendicular to traffic on the upstream side of traffic.

1. The Flashing Arrow Board should be used for all lane closures on multi-lane roadways, or slow moving maintenance or construction activities on the travel lanes.
2. Flashing Arrow Boards should not be used on two-lane, two-way roadways, detours, diversions or work on shoulders unless the "CAUTION" display (see detail below) is used.
3. The Engineer/Inspector shall choose all appropriate signs, barricades and/or other traffic control devices that should be used in conjunction with the Flashing Arrow Board.
4. The Flashing Arrow Board should be able to display the following symbols:



4 CORNER CAUTION

ALTERNATING DIAMOND CAUTION

DOUBLE ARROW

RIGHT/LEFT ARROW
(right arrow shown;
left is similar)

RIGHT/LEFT
SEQUENTIAL CHEVRON
(right chevron shown;
left is similar)

5. The "CAUTION" display consists of four corner lamps flashing simultaneously, or the Alternating Diamond Caution mode as shown.
6. The straight line caution display is NOT ALLOWED.
7. The Flashing Arrow Board shall be capable of minimum 50 percent dimming from rated lamp voltage. The flashing rate of the lamps shall not be less than 25 nor more than 40 flashes per minute.
8. Minimum lamp "on time" shall be approximately 50 percent for the flashing arrow and equal intervals of 25 percent for each sequential phase of the flashing chevron.
9. The sequential arrow display is NOT ALLOWED.
10. The flashing arrow display is the TxDOT standard; however, the sequential chevron display may be used during daylight operations.
11. The Flashing Arrow Board shall be mounted on a vehicle, trailer or other suitable support.
12. A Flashing Arrow Board SHALL NOT BE USED to laterally shift traffic.
13. A full matrix PCMS may be used to simulate a Flashing Arrow Board provided it meets visibility, flash rate and dimming requirements on this sheet for the same size arrow.
14. Minimum mounting height of trailer mounted Arrow Boards should be 7 feet from roadway to bottom of panel.

REQUIREMENTS			
TYPE	MINIMUM SIZE	MINIMUM NUMBER OF PANEL LAMPS	MINIMUM VISIBILITY DISTANCE
B	30 x 60	13	3/4 mile
C	48 x 96	15	1 mile

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

WHEN NOT IN USE, REMOVE THE ARROW BOARD FROM THE RIGHT-OF-WAY OR PLACE THE ARROW BOARD BEHIND CONCRETE TRAFFIC BARRIER OR GUARDRAIL.

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

1. Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the Manual for Assessing Safety Hardware (MASH).
2. Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
3. Refer to the CWZTCD for a list of approved TMAs.
4. TMAs are required on freeways unless otherwise noted in the plans.
5. A TMA should be used anytime that it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the work performance.
6. The only reason a TMA should not be required is when a work area is spread down the roadway and the work crew is on extended distance from the TMA.

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION ARROW PANEL, REFLECTORS, WARNING LIGHTS & ATTENUATOR

BC(7)-21

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GENERAL NOTES

1. For long term stationary work zones on freeways, drums shall be used as the primary channelizing device.
2. For intermediate term stationary work zones on freeways, drums should be used as the primary channelizing device but may be replaced in tangent sections by vertical panels, or 42" two-piece cones. In tangent sections, one-piece cones may be used with the approval of the Engineer but only if personnel are present on the project at all times to maintain the cones in proper position and location.
3. For short term stationary work zones on freeways, drums are the preferred channelizing device but may be replaced in tapers, transitions and tangent sections by vertical panels, two-piece cones or one-piece cones as approved by the Engineer.
4. Drums and all related items shall comply with the requirements of the current version of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) and the "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
5. Drums, bases, and related materials shall exhibit good workmanship and shall be free from objectionable marks or defects that would adversely affect their appearance or serviceability.
6. The Contractor shall have a maximum of 24 hours to replace any plastic drums identified for replacement by the Engineer/Inspector. The replacement device must be an approved device.

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

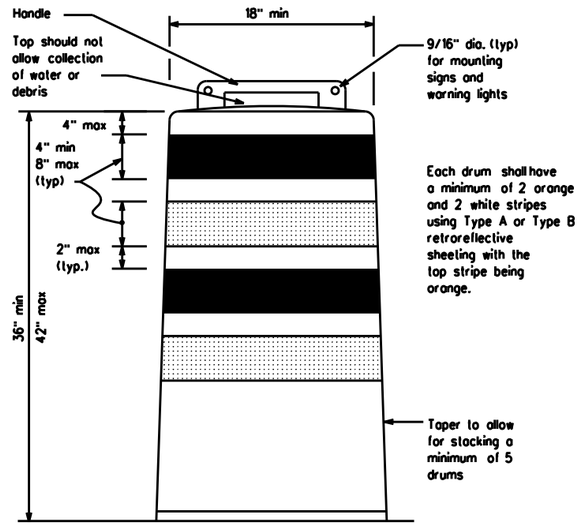
1. Plastic drums shall be a two-piece design: the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents accidental separation due to normal handling and/or air turbulence created by passing vehicles.
3. Plastic drums shall be constructed of lightweight flexible, and deformable materials. The Contractor shall NOT use metal drums or single piece plastic drums as channelization devices or sign supports.
4. Drums shall present a profile that is a minimum of 18 inches in width at the 36 inch height when viewed from any direction. The height of drum unit (body installed on base) shall be a minimum of 36 inches and a maximum of 42 inches.
5. The top of the drum shall have a built-in handle for easy pickup and shall be designed to drain water and not collect debris. The handle shall have a minimum of two widely spaced 9/16 inch diameter holes to allow attachment of a warning light, warning reflector unit or approved compliant sign.
6. The exterior of the drum body shall have a minimum of four alternating orange and white retroreflective circumferential stripes not less than 4 inches nor greater than 8 inches in width. Any non-reflectorized space between any two adjacent stripes shall not exceed 2 inches in width.
7. Bases shall have a maximum width of 36 inches, a maximum height of 4 inches, and a minimum of two footholds of sufficient size to allow base to be held down while separating the drum body from the base.
8. Plastic drums shall be constructed of ultra-violet stabilized, orange, high-density polyethylene (HDPE) or other approved material.
9. Drum body shall have a maximum unballasted weight of 11 lbs.
10. Drum and base shall be marked with manufacturer's name and model number.

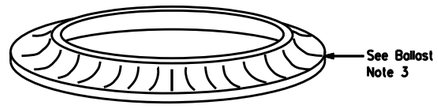
RETROREFLECTIVE SHEETING

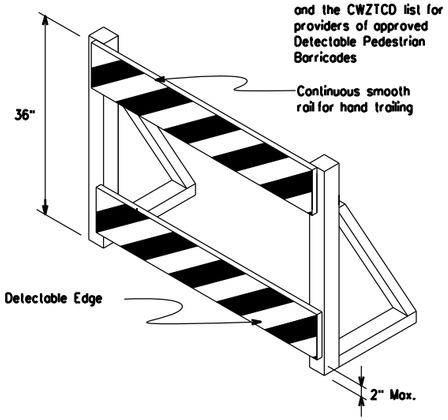
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall be suitable for use on and shall adhere to the drum surface such that, upon vehicular impact, the sheeting shall remain adhered in-place and exhibit no delaminating, cracking, or loss of retroreflectivity other than that loss due to abrasion of the sheeting surface.

BALLAST

1. Unballasted bases shall be large enough to hold up to 50 lbs. of sand. This base, when filled with the ballast material, should weigh between 35 lbs (minimum) and 50 lbs (maximum). The ballast may be sand in one to three sandbags separate from the base, sand in a sand-filled plastic base, or other ballasting devices as approved by the Engineer. Stacking of sandbags will be allowed, however height of sandbags above pavement surface may not exceed 12 inches.
2. Bases with built-in ballast shall weigh between 40 lbs. and 50 lbs. Built-in ballast can be constructed of an integral crumb rubber base or a solid rubber base.
3. Recycled truck tire sidewalls may be used for ballast on drums approved for this type of ballast on the CWZTCD list.
4. The ballast shall not be heavy objects, water, or any material that would become hazardous to motorists, pedestrians, or workers when the drum is struck by a vehicle.
5. When used in regions susceptible to freezing, drums shall have drainage holes in the bottoms so that water will not collect and freeze becoming a hazard when struck by a vehicle.
6. Ballast shall not be placed on top of drums.
7. Adhesives may be used to secure base of drums to pavement.

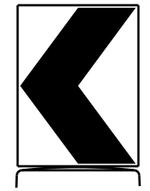




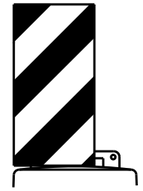


DETECTABLE PEDESTRIAN BARRICADES

1. When existing pedestrian facilities are disrupted, closed, or relocated in a TTC zone, the temporary facilities shall be detectable and include accessibility features consistent with the features present in the existing pedestrian facility. Refer to WZ(BTS-2) for Pedestrian Control requirements for Sidewalk Diversions, Sidewalk Detours and Crosswalk Closures.
2. Where pedestrians with visual disabilities normally use the closed sidewalk, a Detectable Pedestrian Barricade shall be placed across the full width of the closed sidewalk instead of a Type 3 Barricade.
3. Detectable pedestrian barricades similar to the one pictured above, longitudinal channelizing devices, some concrete barriers, and wood or chain link fencing with a continuous detectable edging can satisfactorily delineate a pedestrian path.
4. Tape, rope, or plastic chain strung between devices are not detectable, do not comply with the design standards in the "Americans with Disabilities Act Accessibility Guidelines (ADAAG)" and should not be used as a control for pedestrian movements.
5. Warning lights shall not be attached to detectable pedestrian barricades.
6. Detectable pedestrian barricades should use 8" nominal barricade rails as shown on BC(10) provided that the top rail provides a smooth continuous rail suitable for hand trailing with no splinters, burrs, or sharp edges.



18" x 24" Sign
(Maximum Sign Dimension)
Chevron CW1-8, Opposing Traffic Lane Divider, Driveway sign D70a, Keep Right R4 series or other signs as approved by Engineer



12" x 24"
Vertical Panel
mount with diagonals sloping down towards travel way

Plywood, Aluminum or Metal sign substrates shall NOT be used on plastic drums

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

1. Signs used on plastic drums shall be manufactured using substrates listed on the CWZTCD.
2. Chevrons and other work zone signs with an orange background shall be manufactured with Type B or Type C Orange_{FL} sheeting meeting the color and retroreflectivity requirements of DMS-8300, "Sign Face Material," unless otherwise specified in the plans.
3. Vertical Panels shall be manufactured with orange and white sheeting meeting the requirements of DMS-8300 Type A or Type B. Diagonal stripes on Vertical Panels shall slope down toward the intended traveled lane.
4. Other sign messages (text or symbolic) may be used as approved by the Engineer. Sign dimensions shall not exceed 18 inches in width or 24 inches in height, except for the R9 series signs discussed in note 8 below.
5. Signs shall be installed using a 1/2 inch bolt (nominal) and nut, two washers, and one locking washer for each connection.
6. Mounting bolts and nuts shall be fully engaged and adequately torqued. Bolts should not extend more than 1/2 inch beyond nuts.
7. Chevrons may be placed on drums on the outside of curves, on merging tapers or on shifting tapers. When used in these locations, they may be placed on every drum or spaced not more than on every third drum. A minimum of three (3) should be used at each location called for in the plans.
8. R9-9, R9-10, R9-11 and R9-11a Sidewalk Closed signs which are 24 inches wide may be mounted on plastic drums, with approval of the Engineer.

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Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

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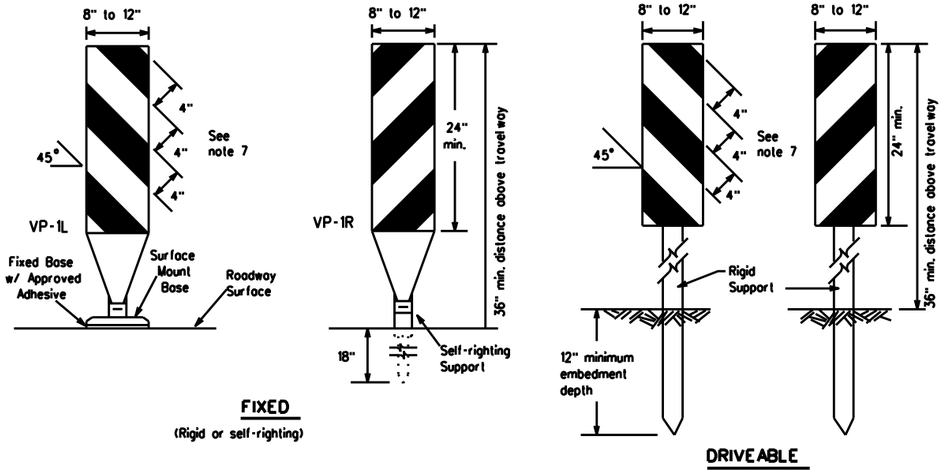
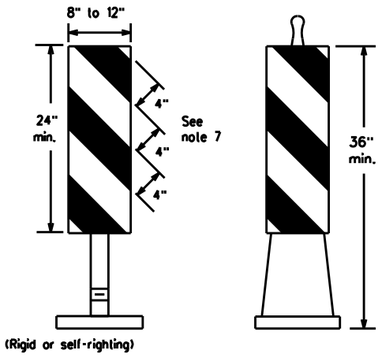


FIXED

(Rigid or self-righting)

DRIVEABLE

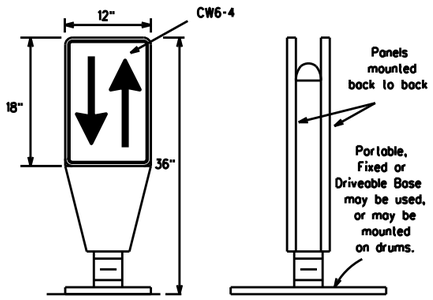


(Rigid or self-righting)

PORTABLE

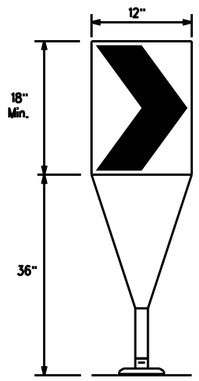
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is required. The Engineer/Inspector shall refer to the Roadway Design Manual for additional requirements on the use VP's for drop-offs.
3. VP's should be mounted back to back if used at the edge of cuts adjacent to two-way two lane roadways. Stripes are to be reflective orange and reflective white and should always slope downward toward the travel lane.
4. VP's used on expressways and freeways or other high speed roadways, may have more than 270 square inches of retroreflective area facing traffic.
5. Self-righting supports are available with portable base. See "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
6. Sheeting for the VP's shall be retroreflective Type A or Type B conforming to Departmental Material Specification DMS-8300, unless noted otherwise.
7. Where the height of reflective material on the vertical panel is 36 inches or greater, a panel stripe of 6 inches shall be used.

VERTICAL PANELS (VPs)



1. Opposing Traffic Lane Dividers (OTLD) are delineation devices designed to convert a normal one-way roadway section to two-way operation. OTLD's are used on temporary centerlines. The upward and downward arrows on the sign's face indicate the direction of traffic on either side of the divider. The base is secured to the pavement with an adhesive or rubber weight to minimize movement caused by a vehicle impact or wind gust.
2. The OTLD may be used in combination with 42" cones or VPs.
3. Spacing between the OTLD shall not exceed 500 feet. 42" cones or VPs placed between the OTLD's should not exceed 100 foot spacing.
4. The OTLD shall be orange with a black non-reflective legend. Sheeting for the OTLD shall be retroreflective Type B or Type C conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



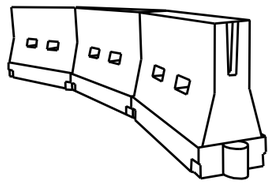
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

1. The chevron shall be a vertical rectangle with a minimum size of 12 by 18 inches.
2. Chevrons are intended to give notice of a sharp change of alignment with the direction of travel and provide additional emphasis and guidance for vehicle operators with regard to changes in horizontal alignment of the roadway.
3. Chevrons, when used, shall be erected on the outside of a sharp curve or turn, or on the far side of an intersection. They shall be in line with and at right angles to approaching traffic. Spacing should be such that the motorist always has three in view, until the change in alignment eliminates its need.
4. To be effective, the chevron should be visible for at least 500 feet.
5. Chevrons shall be orange with a black nonreflective legend. Sheeting for the chevron shall be retroreflective Type B or Type C conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.
6. For Long Term Stationary use on tapers or transitions on freeways and divided highways, self-righting chevrons may be used to supplement plastic drums but not to replace plastic drums.

CHEVRONS

GENERAL NOTES

1. Work Zone channelizing devices illustrated on this sheet may be installed in close proximity to traffic and are suitable for use on high or low speed roadways. The Engineer/Inspector shall ensure that spacing and placement is uniform and in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
2. Channelizing devices shown on this sheet may have a driveable, fixed or portable base. The requirement for self-righting channelizing devices must be specified in the General Notes or other plan sheets.
3. Channelizing devices on self-righting supports should be used in work zone areas where channelizing devices are frequently impacted by errant vehicles or vehicle related wind gusts making alignment of the channelizing devices difficult to maintain. Locations of these devices shall be detailed elsewhere in the plans. These devices shall conform to the TMUTCD and the "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
4. The Contractor shall maintain devices in a clean condition and replace damaged, nonreflective, faded, or broken devices and bases as required by the Engineer/Inspector. The Contractor shall be required to maintain proper device spacing and alignment.
5. Portable bases shall be fabricated from virgin and/or recycled rubber. The portable bases shall weigh a minimum of 30 lbs.
6. Pavement surfaces shall be prepared in a manner that ensures proper bonding between the adhesives, the fixed mount bases and the pavement surface. Adhesives shall be prepared and applied according to the manufacturer's recommendations.
7. The installation and removal of channelizing devices shall not cause detrimental effects to the final pavement surfaces, including pavement surface discoloration or surface integrity. Driveable bases shall not be permitted on final pavement surfaces. The Engineer/Inspector shall approve all application and removal procedures of fixed bases.



LONGITUDINAL CHANNELIZING DEVICES (LCD)

1. LCDs are crashworthy, lightweight, deformable devices that are highly visible, have good target value and can be connected together. They are not designed to contain or redirect a vehicle on impact.
2. LCDs may be used instead of a line of cones or drums.
3. LCDs shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
4. LCDs should not be used to provide positive protection for obstacles, pedestrians or workers.
5. LCDs shall be supplemented with retroreflective delineation as required for temporary barriers on BC(7) when placed roughly parallel to the travel lanes.
6. LCDs used as barricades placed perpendicular to traffic should have at least one row of reflective sheeting meeting the requirements for barricade rails as shown on BC(10). Place reflective sheeting near the top of the LCD along the full length of the device.

WATER BALLASTED SYSTEMS USED AS BARRIERS

1. Water ballasted systems used as barriers shall not be used solely to channelize road users, but also to protect the work space per the appropriate Manual for Assessing Safety Hardware (MASH) crashworthiness requirements based on roadway speed and barrier application.
2. Water ballasted systems used to channelize vehicular traffic shall be supplemented with retroreflective delineation or channelizing devices to improve daytime/nighttime visibility. They may also be supplemented with pavement markings.
3. Water ballasted systems used as barriers shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
4. Water ballasted systems used as barriers should not be used for a merging taper except in low speed (less than 45 MPH) urban areas. When used on a taper in a low speed urban area, the taper shall be delineated and the taper length should be designed to optimize road user operations considering the available geometric conditions.
5. When water ballasted systems used as barriers have blunt ends exposed to traffic, they should be attenuated as per manufacturer recommendations or flared to a point outside the clear zone.

If used to channelize pedestrians, longitudinal channelizing devices or water ballasted systems must have a continuous detectable bottom for users of long canes and the top of the unit shall not be less than 32 inches in height.

HOLLOW OR WATER BALLASTED SYSTEMS USED AS LONGITUDINAL CHANNELIZING DEVICES OR BARRIERS

Posted Speed	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'
35		205'	225'	245'	35'	70'
40		265'	295'	320'	40'	80'
45	L=WS	450'	495'	540'	45'	90'
50		500'	550'	600'	50'	100'
55		550'	605'	660'	55'	110'
60		600'	660'	720'	60'	120'
65		650'	715'	780'	65'	130'
70		700'	770'	840'	70'	140'
75		750'	825'	900'	75'	150'
80		800'	880'	960'	80'	160'

** Taper lengths have been rounded off.
L=Length of Taper (FT.) W=Width of Offset (FT.)
S=Posted Speed (MPH)

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

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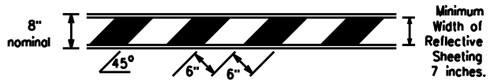
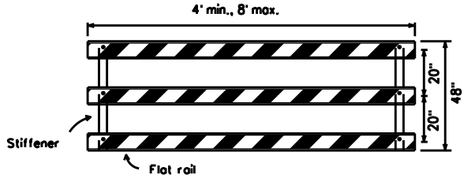
TYPE 3 BARRICADES

1. Refer to the Compliant Work Zone Traffic Control Devices List (CWZTCD) for details of the Type 3 Barricades and a list of all materials used in the construction of Type 3 Barricades.
2. Type 3 Barricades shall be used at each end of construction projects closed to all traffic.
3. Barricades extending across a roadway should have stripes that slope downward in the direction toward which traffic must turn in detouring. When both right and left turns are provided, the chevron striping may slope downward in both directions from the center of the barricade. Where no turns are provided at a closed road, striping should slope downward in both directions toward the center of roadway.
4. Striping of rails, for the right side of the roadway, should slope downward to the left. For the left side of the roadway, striping should slope downward to the right.
5. Identification markings may be shown only on the back of the barricade rails. The maximum height of letters and/or company logos used for identification shall be 1".
6. Barricades shall not be placed parallel to traffic unless an adequate clear zone is provided.
7. Warning lights shall NOT be installed on barricades.
8. Where barricades require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand is recommended. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight. Sand bags shall not be stacked in a manner that covers any portion of a barricade rails reflective sheeting. Rock, concrete, iron, steel or other solid objects will NOT be permitted. Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs. Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber (such as tire inner tubes) shall not be used for sandbags. Sandbags shall only be placed along or upon the base supports of the device and shall not be suspended above ground level or hung with rope, wire, chains or other fasteners.
9. Sheeting for barricades shall be retroreflective Type A or Type B conforming to Departmental Material Specification DMS-8300 unless otherwise noted.

Barricades shall NOT be used as a sign support.



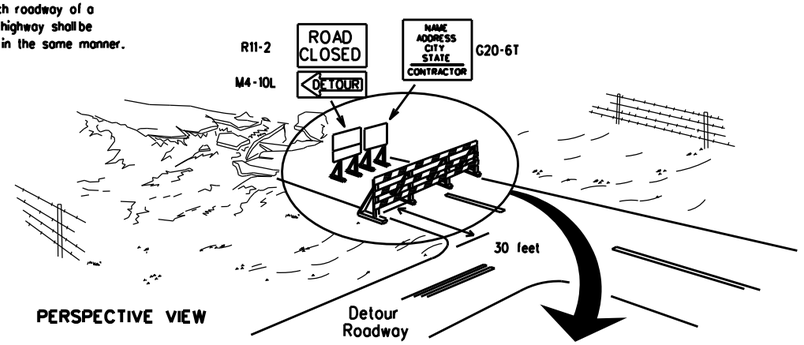
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



Stiffener may be inside or outside of support, but no more than 2 stiffeners shall be allowed on one barricade.

TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

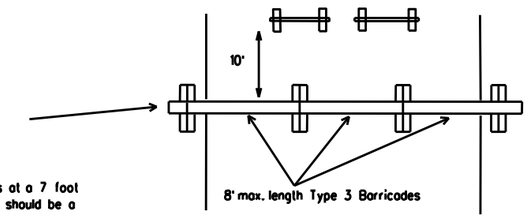
Each roadway of a divided highway shall be barricaded in the same manner.



PERSPECTIVE VIEW

The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.

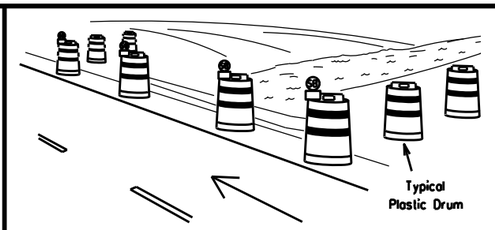
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

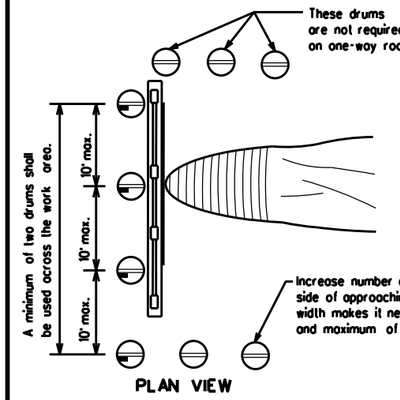
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

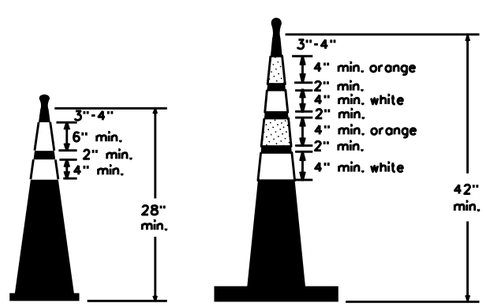
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder width is greater than 12 feet, steady-burn lights may be omitted if drums are used.
5. Drums must extend the length of the culvert widening.



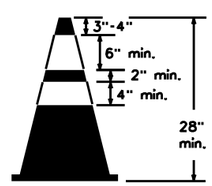
PLAN VIEW

LEGEND	
	Plastic drum
	Plastic drum with steady burn light or yellow warning reflector
SB	Steady burn warning light or yellow warning reflector

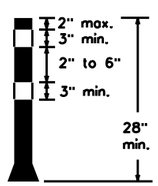
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones



One-Piece cones

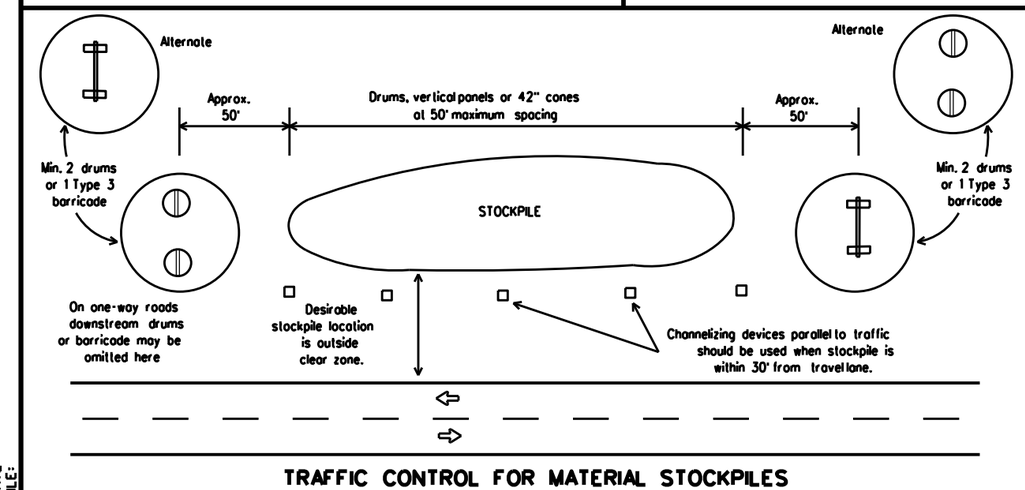


Tubular Marker

28" Cones shall have a minimum weight of 9 1/2 lbs.

42" 2-piece cones shall have a minimum weight of 30 lbs. including base.

1. Traffic cones and tubular markers shall be predominantly orange, and meet the height and weight requirements shown above.
2. One-piece cones have the body and base of the cone molded in one consolidated unit. Two-piece cones have a cone shaped body and a separate rubber base, or ballast, that is added to keep the device upright and in place.
3. Two-piece cones may have a handle or loop extending up to 8" above the minimum height shown, in order to aid in retrieving the device.
4. Cones or tubular markers shall have white or white and orange reflective bands as shown above. The reflective bands shall have a smooth, sealed outer surface and meet the requirements of Departmental Material Specification DMS-8300 Type A or Type B.
5. 28" cones and tubular markers are generally suitable for short duration and short-term stationary work as defined on BC(4). These should not be used for intermediate-term or long-term stationary work unless personnel is on-site to maintain them in their proper upright position.
6. 42" two-piece cones, vertical panels or drums are suitable for all work zone durations.
7. Cones or tubular markers used on each project should be of the same size and shape.



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

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Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

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WORK ZONE PAVEMENT MARKINGS

GENERAL

1. The Contractor shall be responsible for maintaining work zone and existing pavement markings, in accordance with the standard specifications and special provisions, on all roadways open to traffic within the CSJ limits unless otherwise stated in the plans.
2. Color, patterns and dimensions shall be in conformance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
3. Additional supplemental pavement marking details may be found in the plans or specifications.
4. Pavement markings shall be installed in accordance with the TMUTCD and as shown on the plans.
5. When short term markings are required on the plans, short term markings shall conform with the TMUTCD, the plans and details as shown on the Standard Plan Sheet WZ(STPM).
6. When standard pavement markings are not in place and the roadway is opened to traffic, DO NOT PASS signs shall be erected to mark the beginning of the sections where passing is prohibited and PASS WITH CARE signs at the beginning of sections where passing is permitted.
7. All work zone pavement markings shall be installed in accordance with Item 662, "Work Zone Pavement Markings."

RAISED PAVEMENT MARKERS

1. Raised pavement markers are to be placed according to the patterns on BC(12).
2. All raised pavement markers used for work zone markings shall meet the requirements of Item 672, "RAISED PAVEMENT MARKERS" and Departmental Material Specification DMS-4200 or DMS-4300.

PREFABRICATED PAVEMENT MARKINGS

1. Removable prefabricated pavement markings shall meet the requirements of DMS-8241.
2. Non-removable prefabricated pavement markings (foil back) shall meet the requirements of DMS-8240.

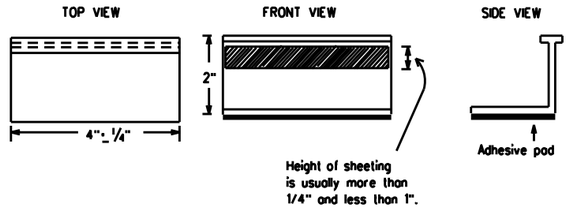
MAINTAINING WORK ZONE PAVEMENT MARKINGS

1. The Contractor will be responsible for maintaining work zone pavement markings within the work limits.
2. Work zone pavement markings shall be inspected in accordance with the frequency and reporting requirements of work zone traffic control device inspections as required by Form 599.
3. The markings should provide a visible reference for a minimum distance of 300 feet during normal daylight hours and 160 feet when illuminated by automobile low-beam headlights at night, unless sight distance is restricted by roadway geometrics.
4. Markings failing to meet this criteria within the first 30 days after placement shall be replaced at the expense of the Contractor as per Specification Item 662.

REMOVAL OF PAVEMENT MARKINGS

1. Pavement markings that are no longer applicable, could create confusion or direct a motorist toward or into the closed portion of the roadway shall be removed or obliterated before the roadway is opened to traffic.
2. The above shall not apply to detours in place for less than three days, where flaggers and/or sufficient channelizing devices are used in lieu of markings to outline the detour route.
3. Pavement markings shall be removed to the fullest extent possible, so as not to leave a discernable marking. This shall be by any method approved by TxDOT Specification Item 677 for "Eliminating Existing Pavement Markings and Markers".
4. The removal of pavement markings may require resurfacing or seal coating portions of the roadway as described in Item 677.
5. Subject to the approval of the Engineer, any method that proves to be successful on a particular type pavement may be used.
6. Blast cleaning may be used but will not be required unless specifically shown in the plans.
7. Over-painting of the markings SHALL NOT BE permitted.
8. Removal of raised pavement markers shall be as directed by the Engineer.
9. Removal of existing pavement markings and markers will be paid for directly in accordance with Item 677, "ELIMINATING EXISTING PAVEMENT MARKINGS AND MARKERS," unless otherwise stated in the plans.
10. Black-out marking tape may be used to cover conflicting existing markings for periods less than two weeks when approved by the Engineer.

Temporary Flexible-Reflective Roadway Marker Tabs



STAPLES OR NAILS SHALL NOT BE USED TO SECURE TEMPORARY FLEXIBLE-REFLECTIVE ROADWAY MARKER TABS TO THE PAVEMENT SURFACE

1. Temporary flexible-reflective roadway marker tabs used as guidemarks shall meet the requirements of DMS-8242.
2. Tabs detailed on this sheet are to be inspected and accepted by the Engineer or designated representative. Sampling and testing is not normally required, however at the option of the Engineer, either "A" or "B" below may be imposed to assure quality before placement on the roadway.
   A. Select five (5) or more tabs at random from each lot or shipment and submit to the Construction Division, Materials and Pavement Section to determine specification compliance.
   B. Select five (5) tabs and perform the following test. Affix five (5) tabs at 24 inch intervals on an asphaltic pavement in a straight line. Using a medium size passenger vehicle or pickup, run over the markers with the front and rear tires at a speed of 35 to 40 miles per hour, four (4) times in each direction. No more than one (1) out of the five (5) reflective surfaces shall be lost or displaced as a result of this test.
3. Small design variances may be noted between tab manufacturers.
4. See Standard Sheet WZ(STPM) for tab placement on new pavements. See Standard Sheet TCP(7-1) for tab placement on seal coat work.

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

1. Raised pavement markers used as guidemarks shall be from the approved product list, and meet the requirements of DMS-4200.
2. All temporary construction raised pavement markers provided on a project shall be of the same manufacturer.
3. Adhesive for guidemarks shall be bituminous material hot applied or butyl rubber pad for all surfaces, or thermoplastic for concrete surfaces.

Guidemarks shall be designated as:
YELLOW - (two amber reflective surfaces with yellow body).
WHITE - (one silver reflective surface with white body).

DEPARTMENTAL MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
TRAFFIC BUTTONS	DMS-4300
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY REMOVABLE, PREFABRICATED PAVEMENT MARKINGS	DMS-8241
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS	DMS-8242

A list of prequalified reflective raised pavement markers, non-reflective traffic buttons, roadway marker tabs and other pavement markings can be found at the Material Producer List web address shown on BC(1).

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BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

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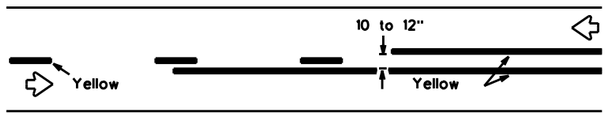
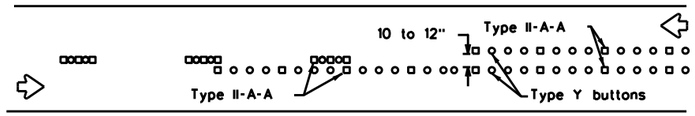
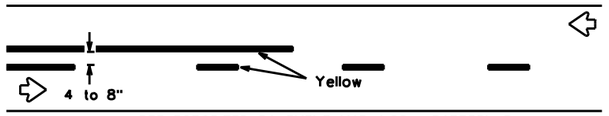
PAVEMENT MARKING PATTERNS



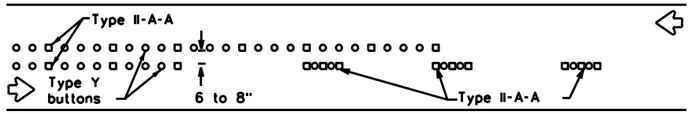
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



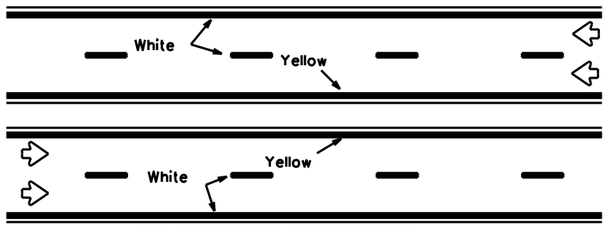
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



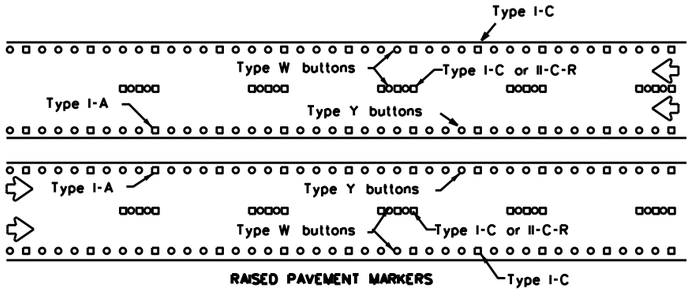
RAISED PAVEMENT MARKERS - PATTERN B

Pattern A is the TXDOT Standard, however Pattern B may be used if approved by the Engineer.
Prefabricated markings may be substituted for reflectorized pavement markings.

CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO-LANE, TWO-WAY HIGHWAYS



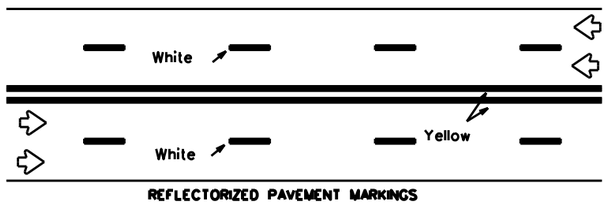
REFLECTORIZED PAVEMENT MARKINGS



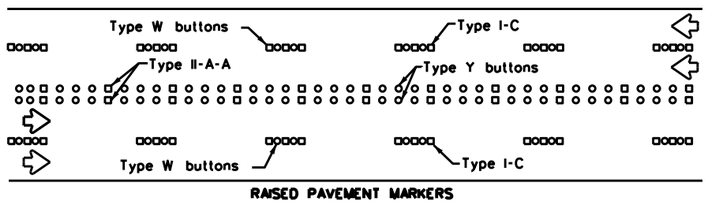
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



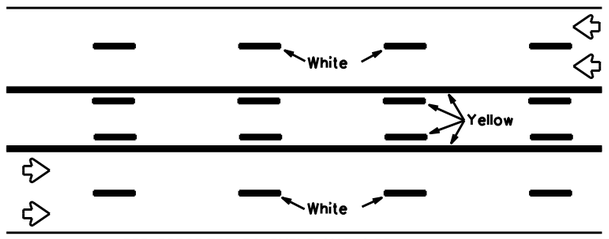
REFLECTORIZED PAVEMENT MARKINGS



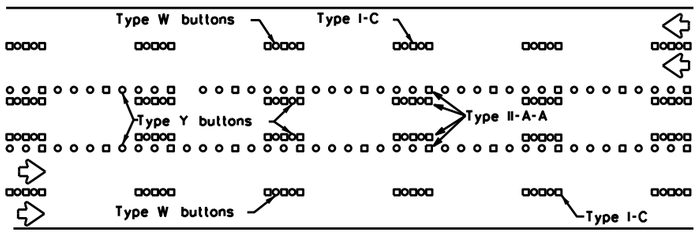
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

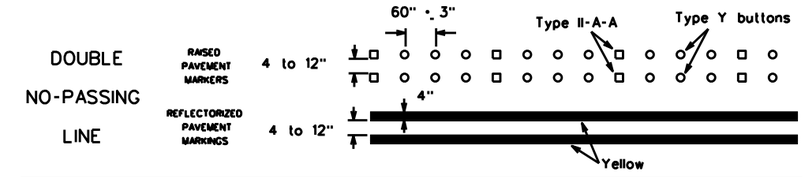
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

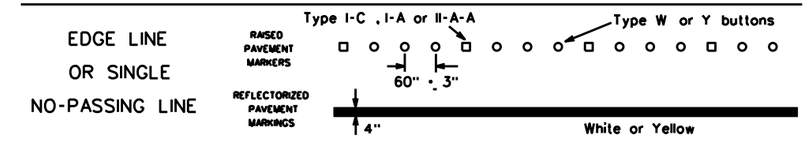
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

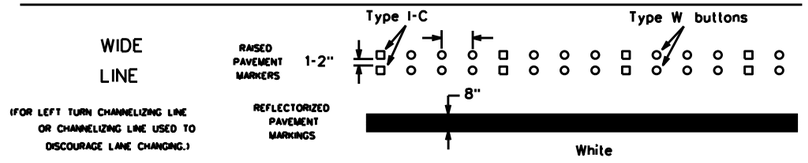


EDGE LINE OR SINGLE NO-PASSING LINE



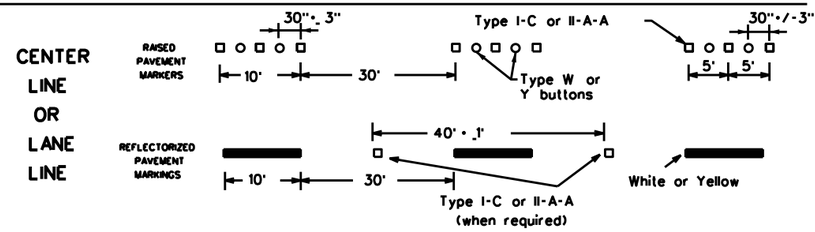
WIDE LINE

(FOR LEFT TURN CHANNELIZING LINE OR CHANNELIZING LINE USED TO DISCOURAGE LANE CHANGING.)

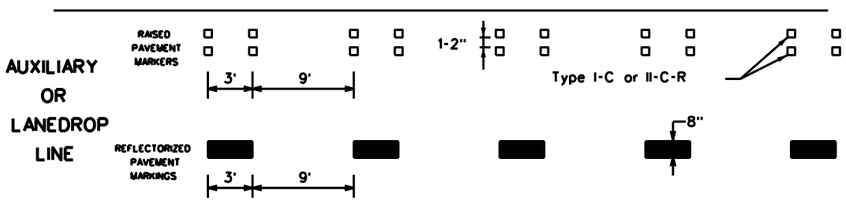


BROKEN LINES

CENTER LINE OR LANE LINE

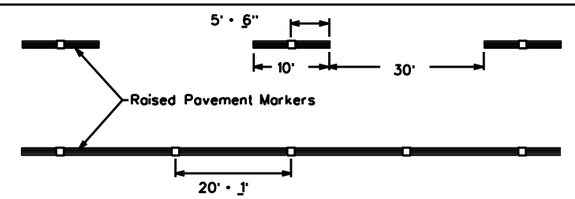


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

If raised pavement markers are used to supplement REMOVABLE markings, the markers shall be applied to the top of the tape at the approximate mid length of tape used for broken lines or at 20 foot spacing for solid lines. This allows an easier removal of raised pavement markers and tape.



Centerline only - not to be used on edge lines

Raised pavement markers used as standard pavement markings shall be from the approved products list and meet the requirements of Item 672 "RAISED PAVEMENT MARKERS."

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	0906	00	268	VARIOUS
	DIST	COUNTY		SHEET NO.
	ODA	DISTRICTWIDE		17

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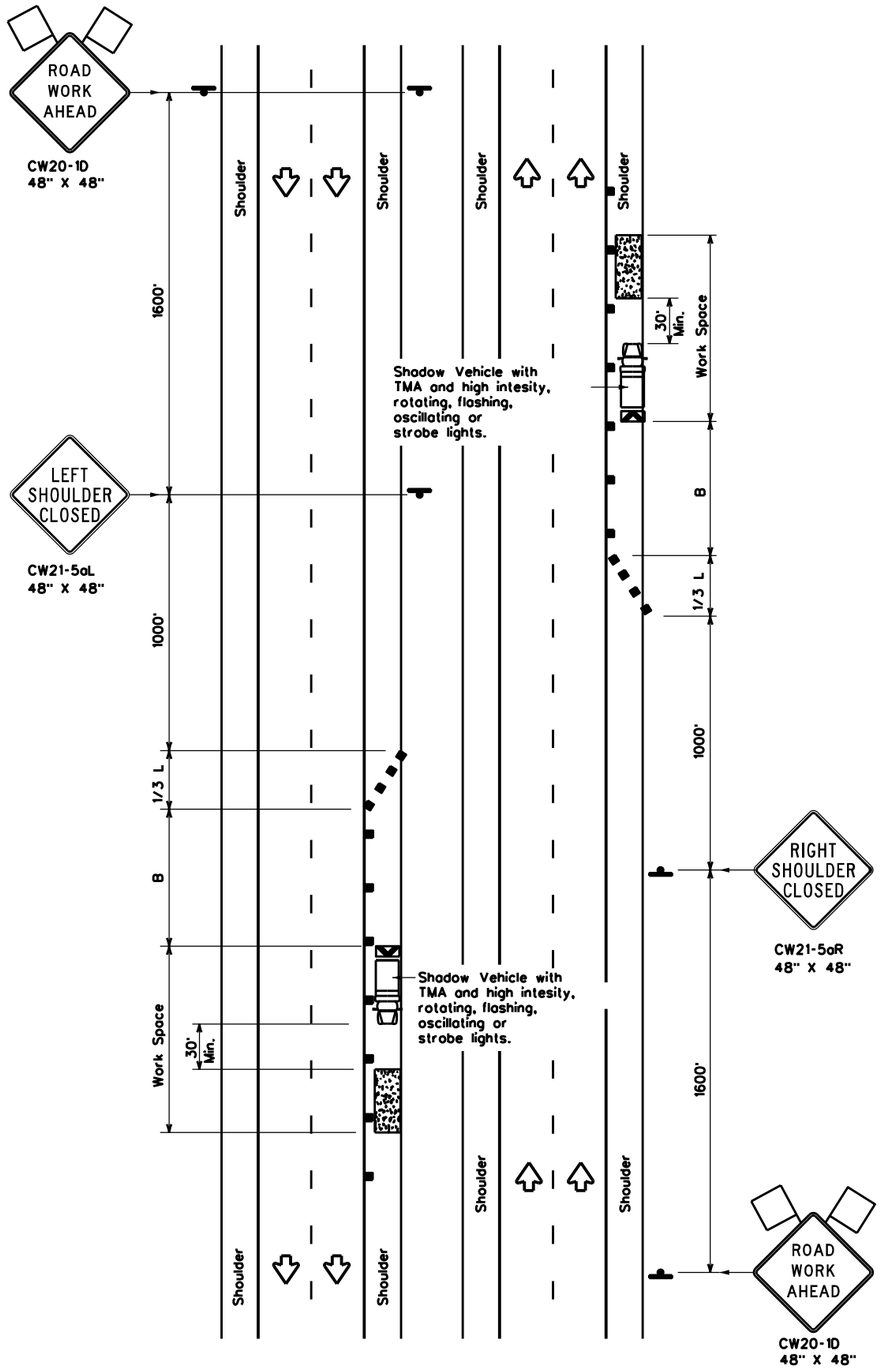
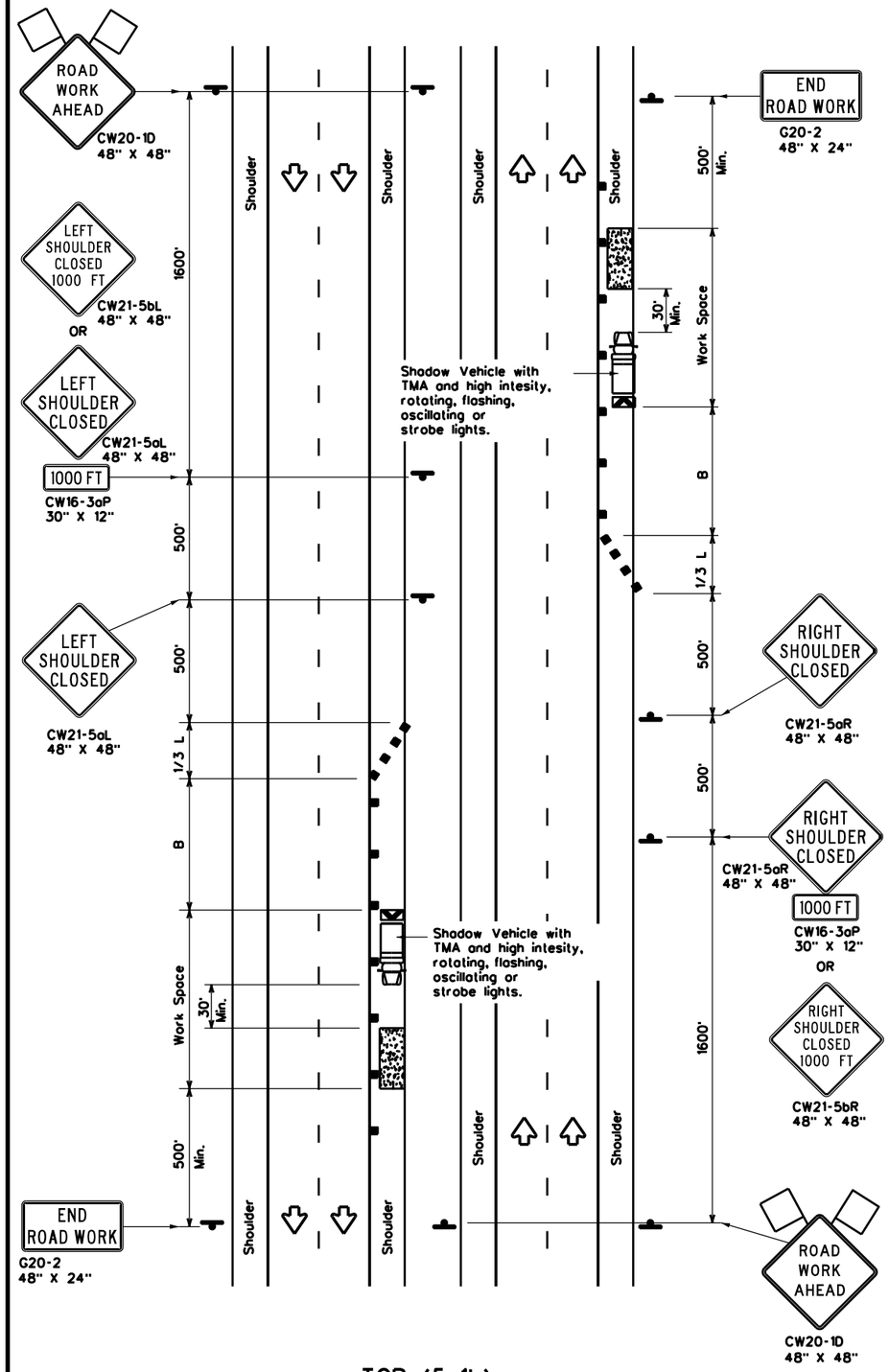
DATE:
FILE:



TCP (5-1a)

WORK AREA ON SHOULDER



TCP (5-1b)

WORK AREA ON SHOULDER

LEGEND

	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board	M	Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Suggested Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	90'
35		205'	225'	245'	35'	70'	120'
40		265'	295'	320'	40'	80'	155'
45	L=WS	450'	495'	540'	45'	90'	195'
50		500'	550'	600'	50'	100'	240'
55		550'	605'	660'	55'	110'	295'
60		600'	660'	720'	60'	120'	350'
65		650'	715'	780'	65'	130'	410'
70		700'	770'	840'	70'	140'	475'
75		750'	825'	900'	75'	150'	540'
80		800'	880'	960'	80'	160'	615'

* Conventional Roads Only

** Taper lengths have been rounded off.

L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

TYPICAL USAGE

MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
	TCP(5-1a)	TCP(5-1b)	TCP(5-1b)	

GENERAL NOTES

1. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30' to 100' in advance of the area of crew exposure without adversely effecting the performance or quality of the work. Type 3 barricades or drums may be substituted when workers on foot are no longer present when approved by the Engineer.
2. 28" tall or taller one-piece cones will be allowed only for Short Duration or Short Term stationary operations when workers are present to maintain the devices upright and in proper location. Intermediate Term stationary work areas should use Drums, Vertical Panels or 42" tall two-piece cones.

Texas Department of Transportation

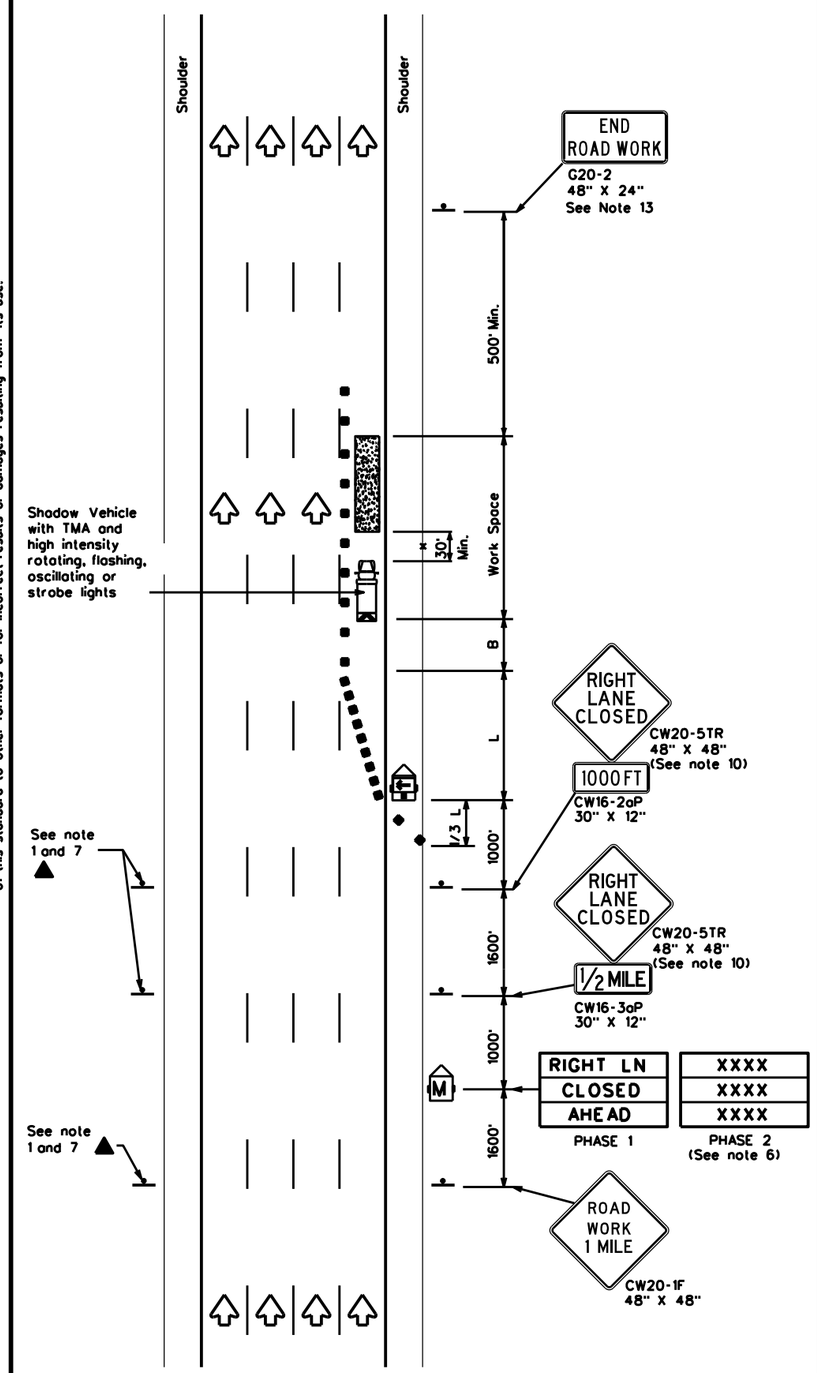
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN SHOULDER WORK FOR FREEWAYS / EXPRESSWAYS

TCP(5-1)-18

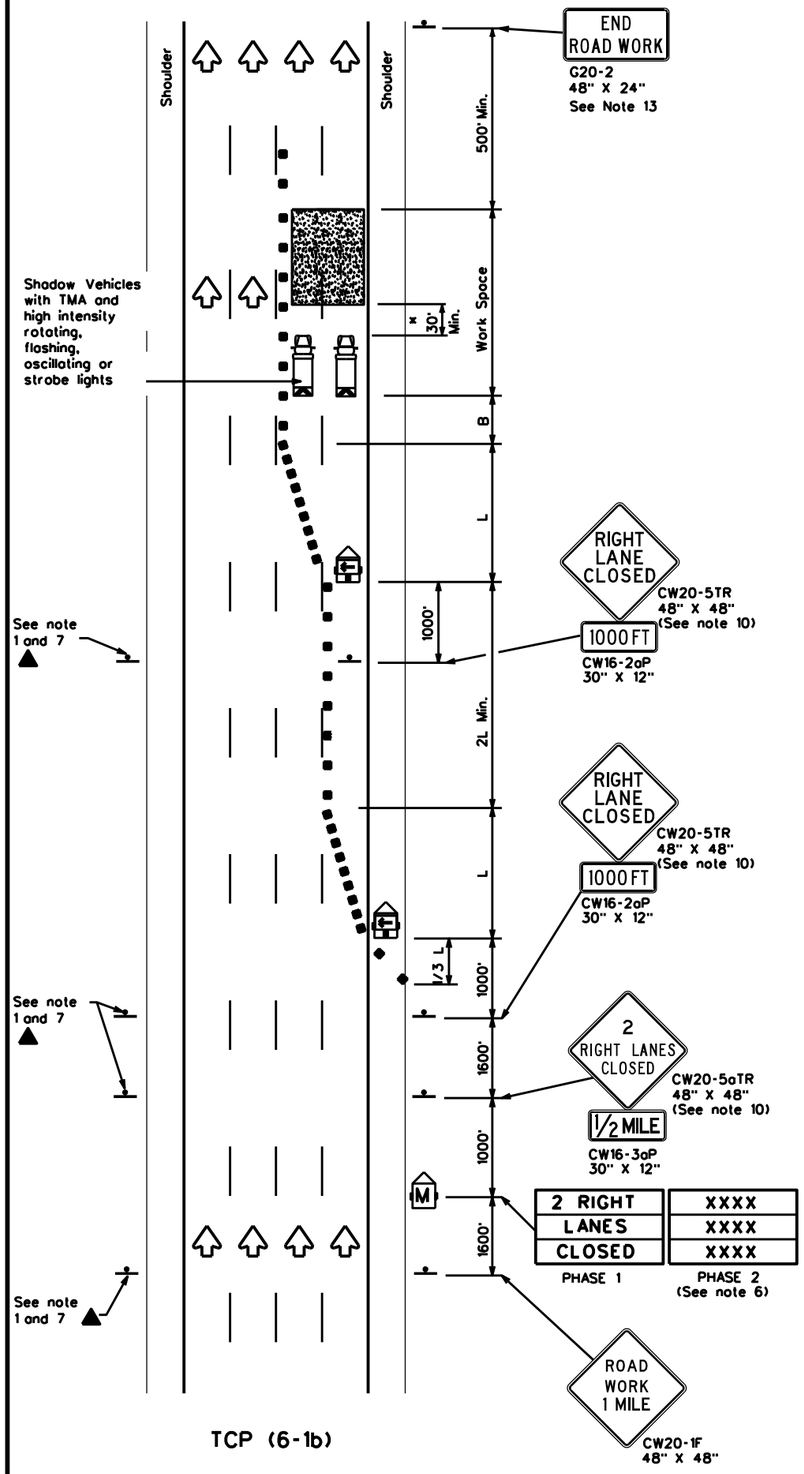
FILE: tcp5-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT February 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS	0906	00	268	VARIOUS
2-18	DIST	COUNTY		SHEET NO.
	ODA	ECTOR		18

DATE:
FILE:



TCP (6-1a)

TYPICAL FREEWAY
ONE LANE CLOSURE



TCP (6-1b)

TYPICAL FREEWAY
TWO LANE CLOSURE

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board	M	Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed	Formula	Minimum Desirable Taper Lengths "L" ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Suggested Longitudinal Buffer Space "B"
45	L=WS	450'	495'	540'	45'	90'	195'
50		500'	550'	600'	50'	100'	240'
55		550'	605'	660'	55'	110'	295'
60		600'	660'	720'	60'	120'	350'
65		650'	715'	780'	65'	130'	410'
70		700'	770'	840'	70'	140'	475'
75		750'	825'	900'	75'	150'	540'
80		800'	880'	960'	80'	160'	615'

** Taper lengths have been rounded off.
L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
	✓	✓	✓	

GENERAL NOTES

1. All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
2. Drums or 42"cones are the typical channelizing devices. For Intermediate Term Stationary work, drums shall be used on tapers with drums or 42" cones used on tangent sections. Other channelizing devices may be used as directed by the Engineer.
3. All construction signs and barricades placed during any phase of work shall remain in place until removal is approved by the Engineer.
4. The Engineer may direct the Contractor to furnish additional signs and barricades as required to maintain traffic flow, detours and motorist safety during construction.
5. Static message boards or changeable message signs stating the date and duration of ramp or freeway lane closures shall be placed a minimum of seven (7) calendar days in advance of the actual closure.
6. Phase 2 of the PCMS message should include appropriate information formatted as shown on BC(6), such as "MERGE LEFT," recommended advisory speed, delay information, or other specific warnings.
7. Duplicate construction warning signs should be erected on the medians side of freeways where median width will permit and traffic volume justifies the signing.
8. The number of closed lanes may be increased provided the spacing of traffic control devices, taper lengths and tangent lengths meet the requirements of the TMUTCD.
9. Warning signs for intermediate term stationary work should be mounted at 7' to the bottom of the sign.
10. Warning signs shown shall be appropriately altered for left lane closures. When signs are mounted at 1' height for short term stationary or short duration work, sign versions shown in the SHSD for Texas with distances on the sign face rather than mounted on a ploque below the sign may be used.
11. When possible, PCMS units should be located in advance of the last available exit ramp prior to the lane closure to allow motorists an alternate route. They may also be relocated to improve advance warning in case of unanticipated queuing or congestion.
12. For Intermediate Term Stationary work at night, floodlights should be used to illuminate the work area and equipment crossings. Floodlights shall not produce a disabling glare condition for road users or workers.
13. The END ROAD WORK (G20-2) sign may be omitted when it conflicts with G20-2 signs already in place on the project.

* A shadow vehicle equipped with a Truck Mounted Attenuator is typically required. A shadow vehicle equipped with a TMA shall be used if it can be positioned 30' to 100' in advance of the area of crew exposure without adversely affecting the work performance.

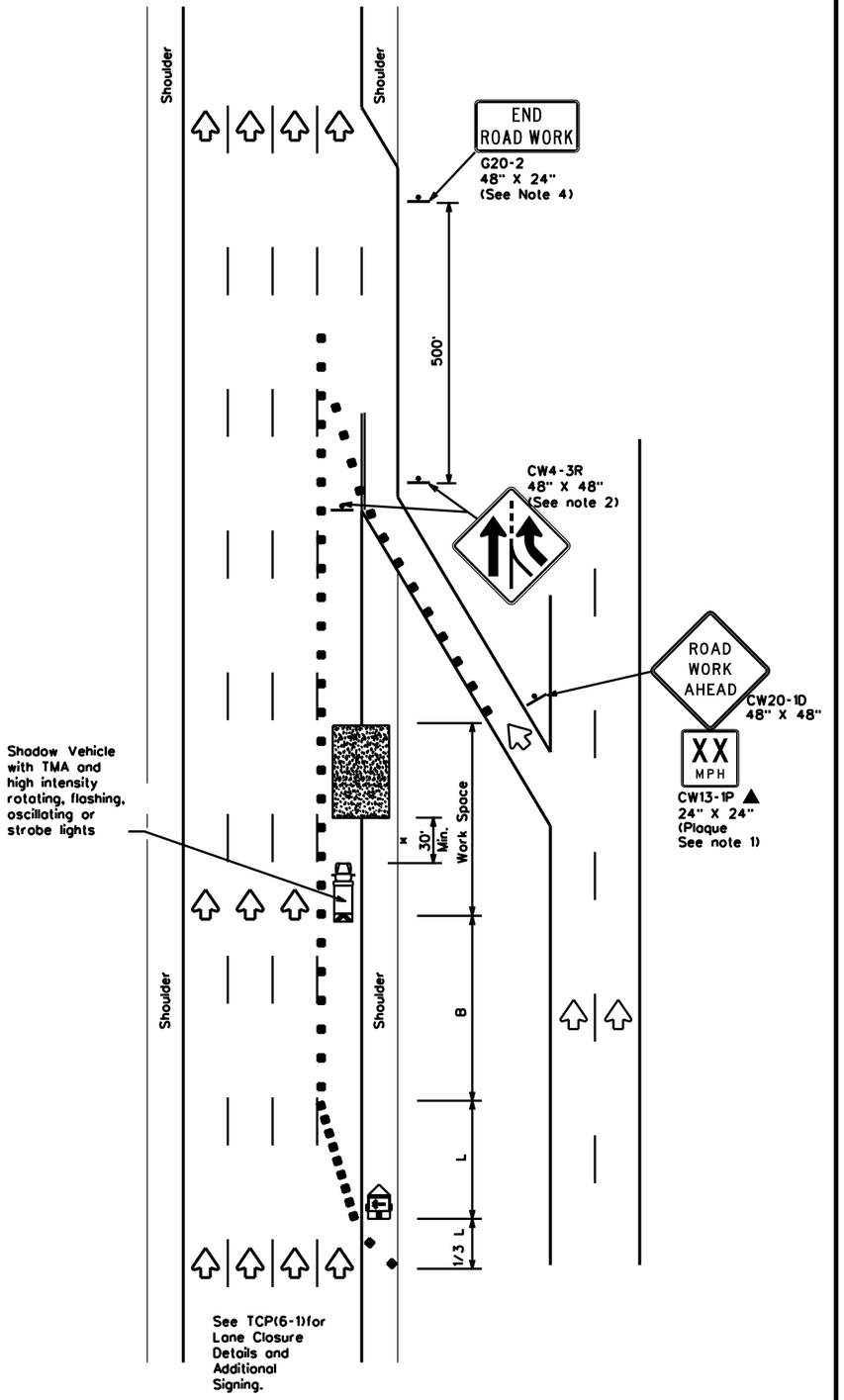
Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
FREEWAY LANE CLOSURES

TCP(6-1)-12

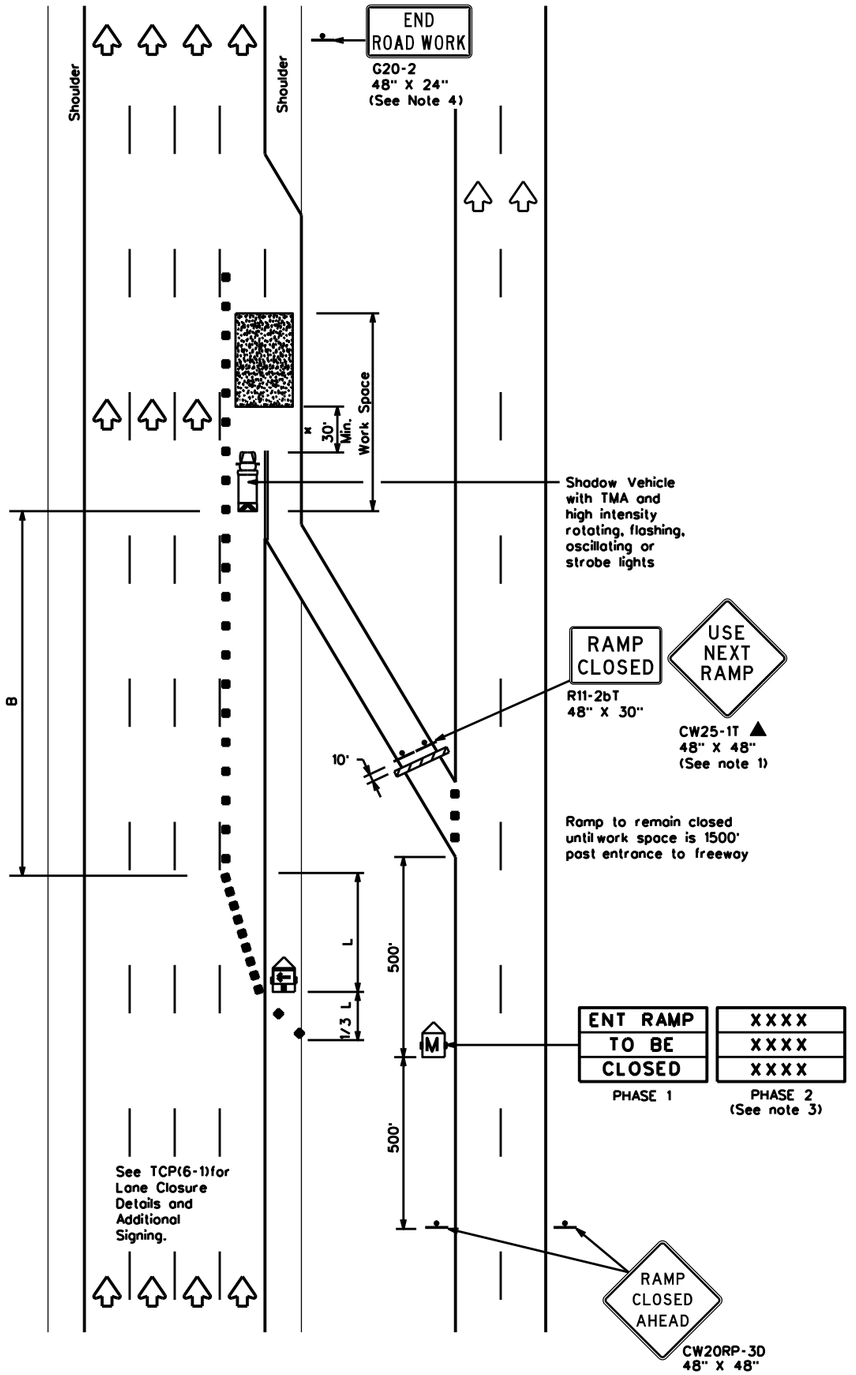
FILE: tcp6-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-12	0906	00	268	VARIOUS
	DIST	COUNTY		SHEET NO.
	ODA	ECTOR		19

201



TCP (6-2a)

ENTRANCE RAMP OPEN
WORK WITHIN 500' OF RAMP



TCP (6-2b)

ENTRANCE RAMP CLOSED

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board	M	Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed	Formula	Minimum Desirable Taper Lengths "L" ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Suggested Longitudinal Buffer Space "B"
45	L=WS	450'	495'	540'	45'	90'	195'
50		500'	550'	600'	50'	100'	240'
55		550'	605'	660'	55'	110'	295'
60		600'	660'	720'	60'	120'	350'
65		650'	715'	780'	65'	130'	410'
70		700'	770'	840'	70'	140'	475'
75		750'	825'	900'	75'	150'	540'
80		800'	880'	960'	80'	160'	615'

** Taper lengths have been rounded off.
L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
	✓	✓	✓	

GENERAL NOTES

1. All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
2. ADDED LANE Symbol (CW4-3) sign may be omitted when sign between ramp and mainlane can be seen from both roadways.
3. See "Advance Notice List" on BC(6) for recommended date and time formatting options for PCMS Phase 2 message.
4. The END ROAD WORK (G20-2) sign may be omitted when it conflicts with G20-2 signs already in place on the project.

x A shadow vehicle equipped with a Truck Mounted Attenuator is typically required. A shadow vehicle equipped with a TMA shall be used if it can be positioned 30' to 100' in advance of the area of crew exposure without adversely affecting the work performance.

Additional requirements for lane closures and advance signing shall be as shown on TCP (6-1) or as directed by the Engineer.

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
WORK AREA NEAR RAMP

TCP(6-2)-12

FILE: tcp6-2.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	0906	00	268	VARIOUS
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	ODA	ECTOR		20

DATE:
FILE:

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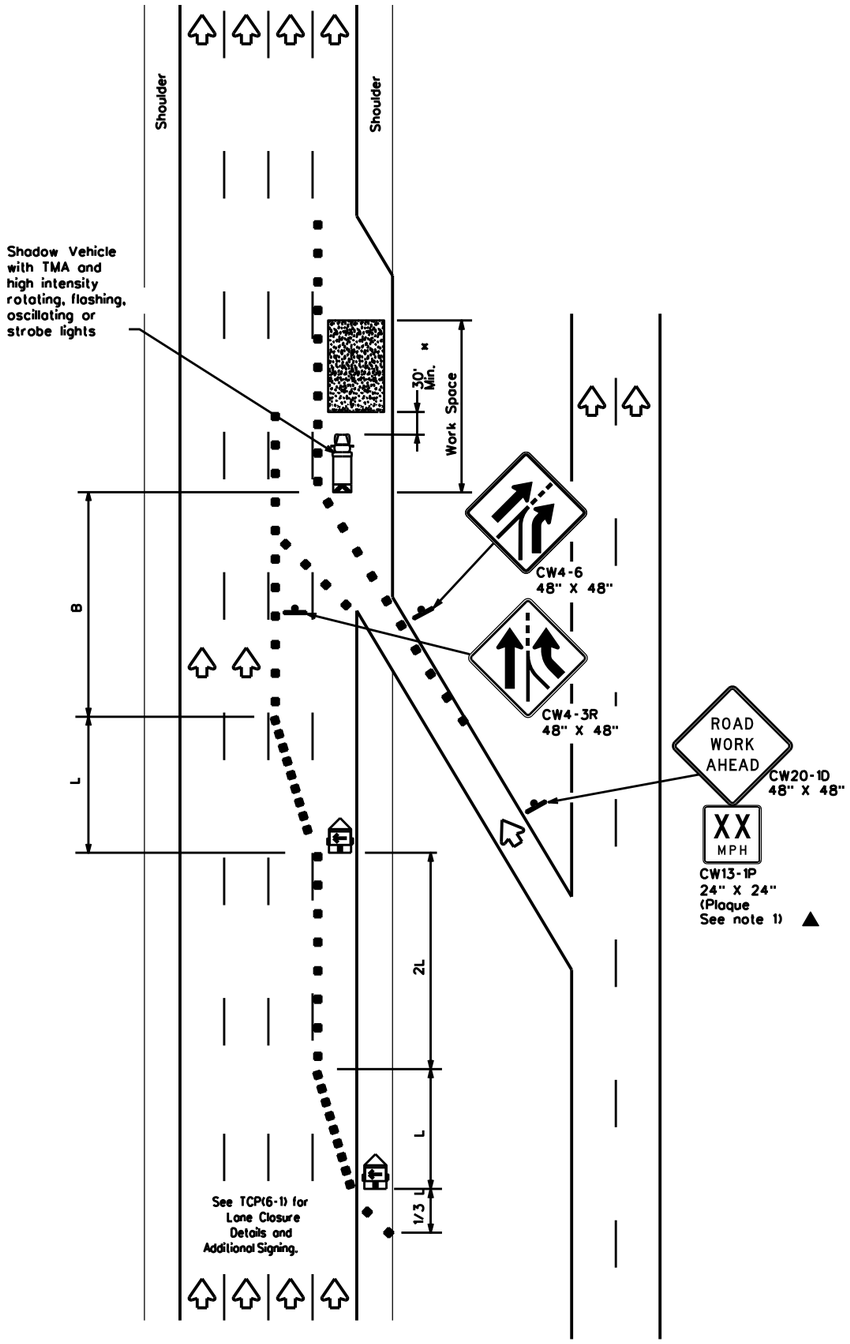
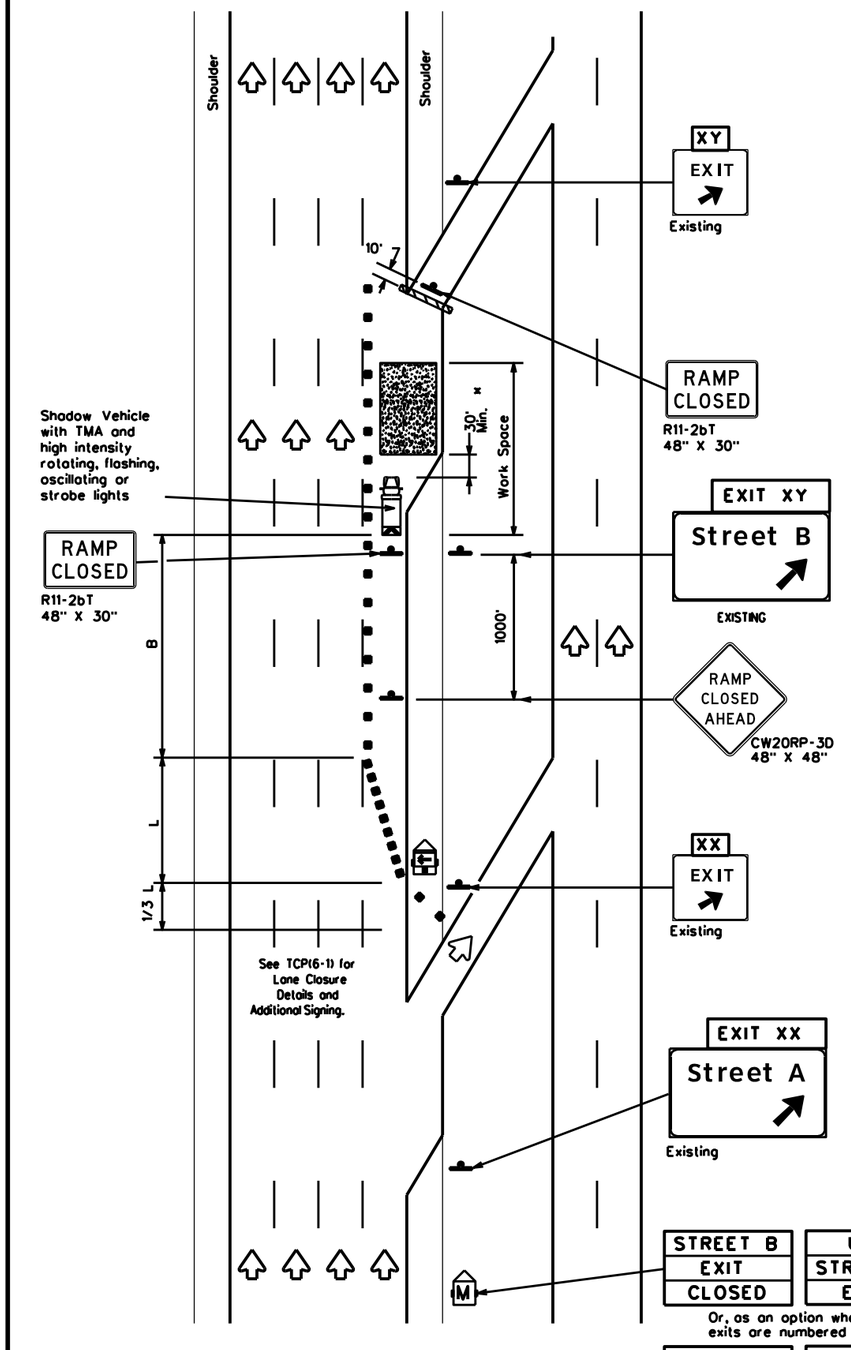
DATE:
FILE:



TCP (6-3a)

ENTRANCE RAMP OPEN



TCP (6-3b)

EXIT RAMP CLOSED
TRAFFIC EXITS PRIOR TO CLOSED RAMP

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board	M	Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed	Formula	Minimum Desirable Taper Lengths "L" **			Suggested Maximum Spacing of Channelizing Devices		Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	
45	L=WS	450'	495'	540'	45'	90'	195'
50		500'	550'	600'	50'	100'	240'
55		550'	605'	660'	55'	110'	295'
60		600'	660'	720'	60'	120'	350'
65		650'	715'	780'	65'	130'	410'
70		700'	770'	840'	70'	140'	475'
75		750'	825'	900'	75'	150'	540'
80		800'	880'	960'	80'	160'	615'

** Taper lengths have been rounded off.
L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
	✓	✓	✓	

GENERAL NOTES:

1. All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.

* A shadow vehicle equipped with a Truck Mounted Attenuator is typically required. A shadow vehicle equipped with a TMA shall be used if it can be positioned 30' to 100' in advance of the area of crew exposure without adversely affecting the work performance.

Additional requirements for lane closures and advance signing shall be as shown on TCP (6-1) or as directed by the Engineer.

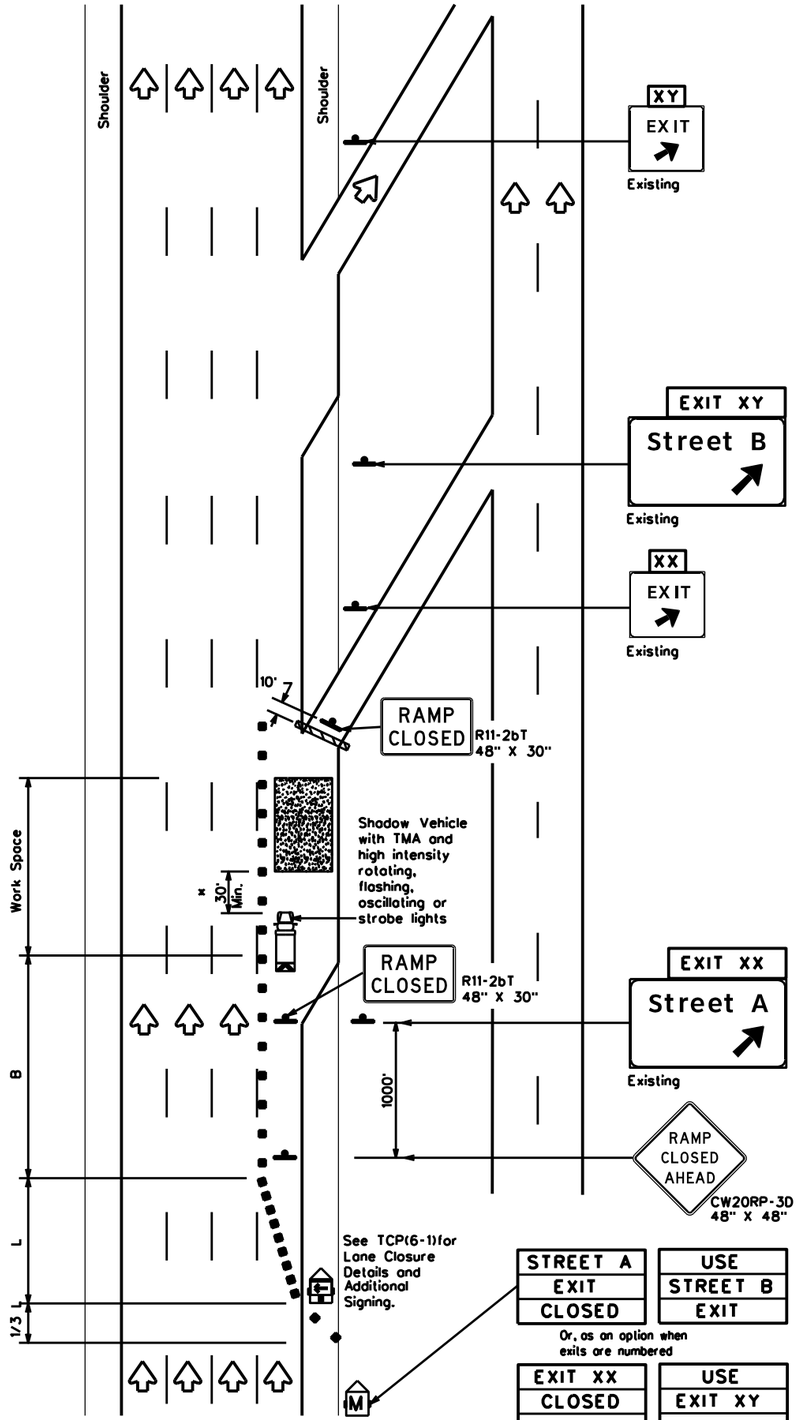
Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
WORK AREA BEYOND RAMP

TCP(6-3)-12

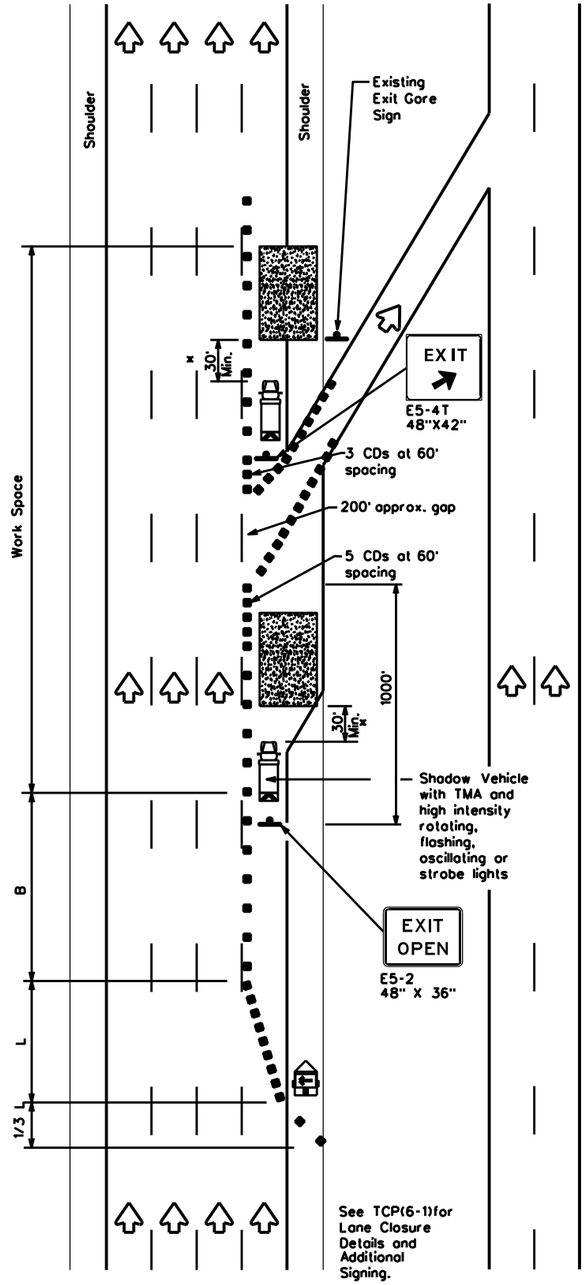
FILE: tcp6-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	0906	00	268	VARIOUS
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	ODA	ECTOR		21

DATE:
FILE:



TCP (6-4a)

EXIT RAMP CLOSED
TRAFFIC EXITS PAST CLOSED RAMP



TCP (6-4b)

EXIT RAMP OPEN

LEGEND			
	Type 3 Barricade		Channelizing Devices (CDs)
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board	M	Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed	Formula	Minimum Desirable Taper Lengths "L" ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Suggested Longitudinal Buffer Space "B"
45	L=WS	450'	495'	540'	45'	90'	195'
50		500'	550'	600'	50'	100'	240'
55		550'	605'	660'	55'	110'	295'
60		600'	660'	720'	60'	120'	350'
65		650'	715'	780'	65'	130'	410'
70		700'	770'	840'	70'	140'	475'
75		750'	825'	900'	75'	150'	540'
80		800'	880'	960'	80'	160'	615'

** Taper lengths have been rounded off.
L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
	✓	✓	✓	

GENERAL NOTES

1. All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
2. See BC Standards for sign details.

x A shadow vehicle equipped with a Truck Mounted Attenuator is typically required. A shadow vehicle equipped with a TMA shall be used if it can be positioned 30' to 100' in advance of the area of crew exposure without adversely affecting the work performance.

Additional requirements for lane closures and advance signing shall be as shown on TCP (6-1) or as directed by the Engineer.

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
WORK AREA AT EXIT RAMP

TCP(6-4)-12

FILE: tcp6-4.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT Feburary 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	0906	00	268	VARIOUS
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	ODA	ECTOR		22

DATE:
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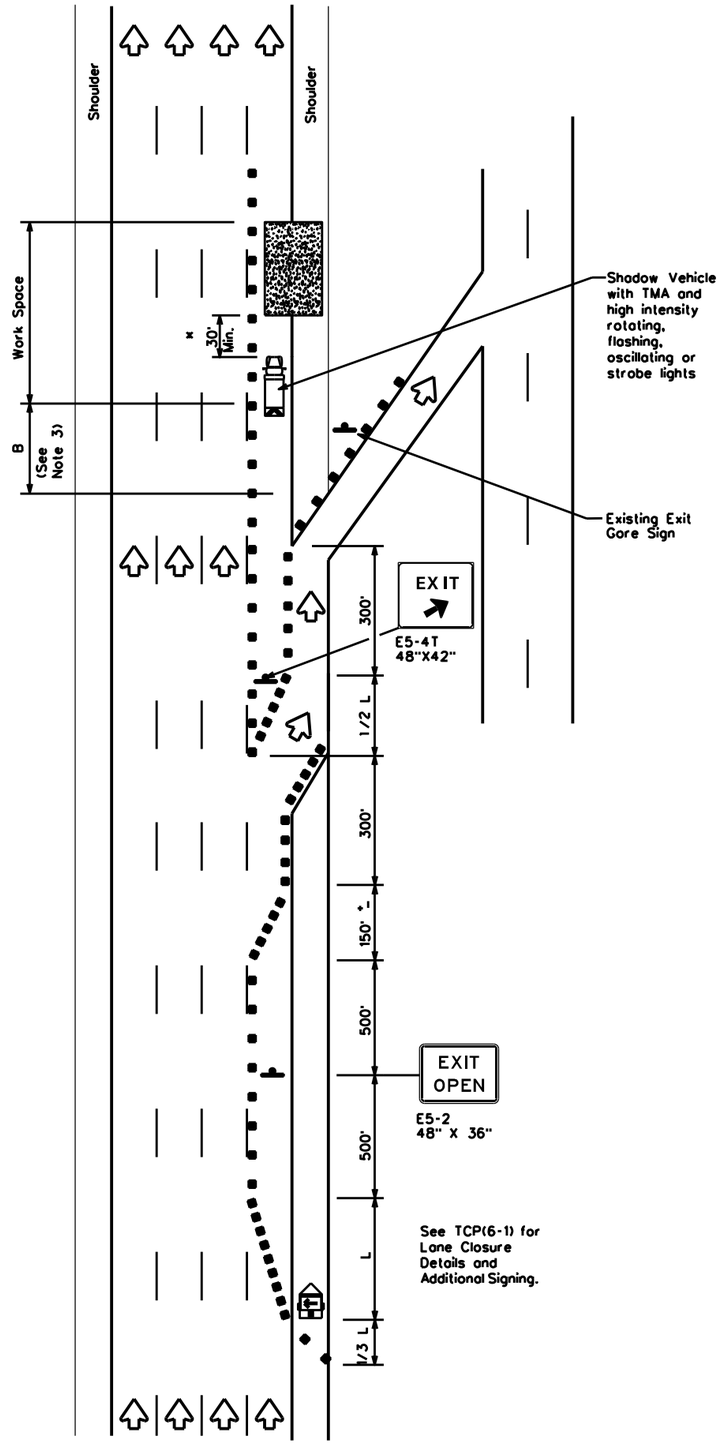
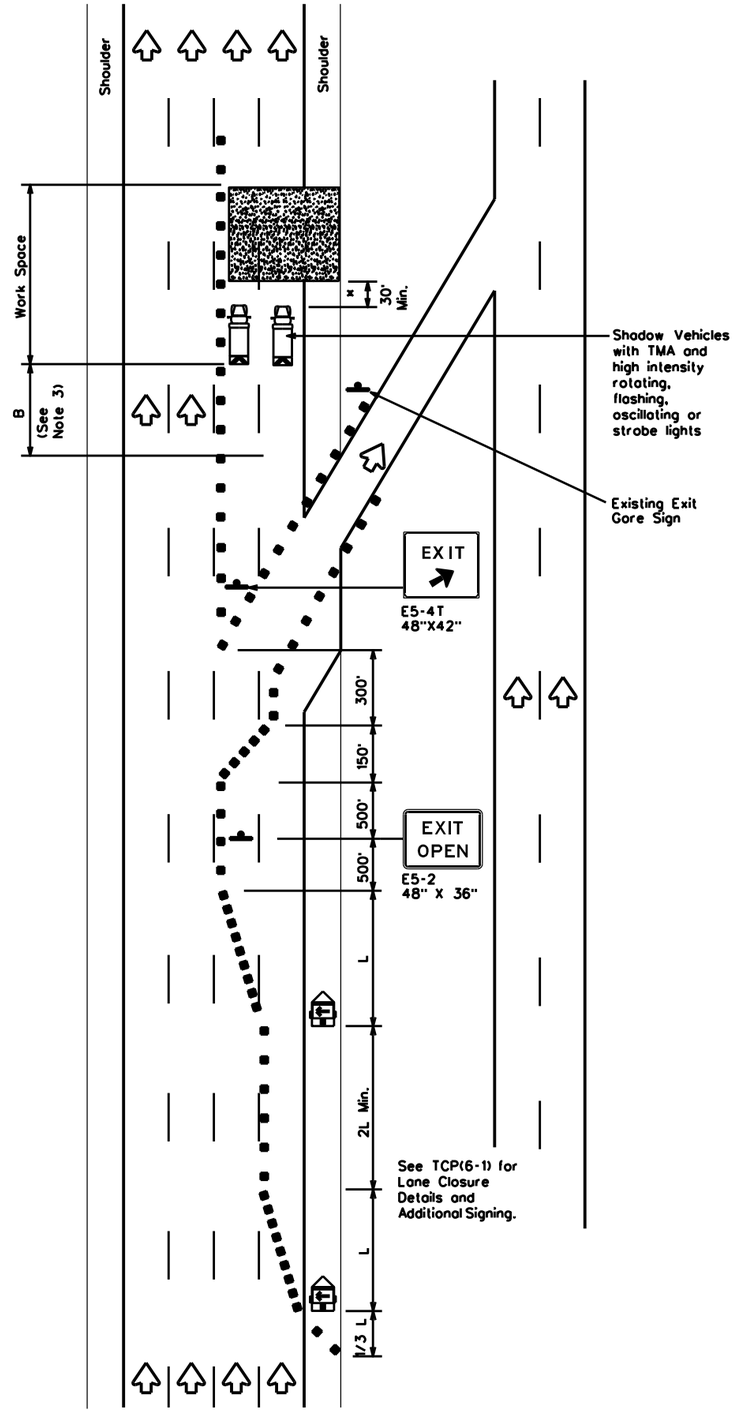


TCP (6-5a)

EXIT RAMP OPEN



TCP (6-5b)

EXIT RAMP OPEN
TWO LANE CLOSURE WITHIN 1500' PAST EXIT RAMP

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board	M	Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed	Formula	Minimum Desirable Taper Lengths "L" ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Suggested Longitudinal Buffer Space "B"
45	L=WS	450'	495'	540'	45'	90'	195'
50		500'	550'	600'	50'	100'	240'
55		550'	605'	660'	55'	110'	295'
60		600'	660'	720'	60'	120'	350'
65		650'	715'	780'	65'	130'	410'
70		700'	770'	840'	70'	140'	475'
75		750'	825'	900'	75'	150'	540'
80		800'	880'	960'	80'	160'	615'

** Taper lengths have been rounded off.
L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
	✓	✓	✓	

GENERAL NOTES

1. All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
2. See BC standards for sign details.
3. If adequate longitudinal buffer length "B" does not exist between the work space and the exit ramp, consideration should be given to closing the ramp.

x A shadow vehicle equipped with a Truck Mounted Attenuator is typically required. A shadow vehicle equipped with a TMA shall be used if it can be positioned 30' to 100' in advance of the area of crew exposure without adversely affecting the work performance.

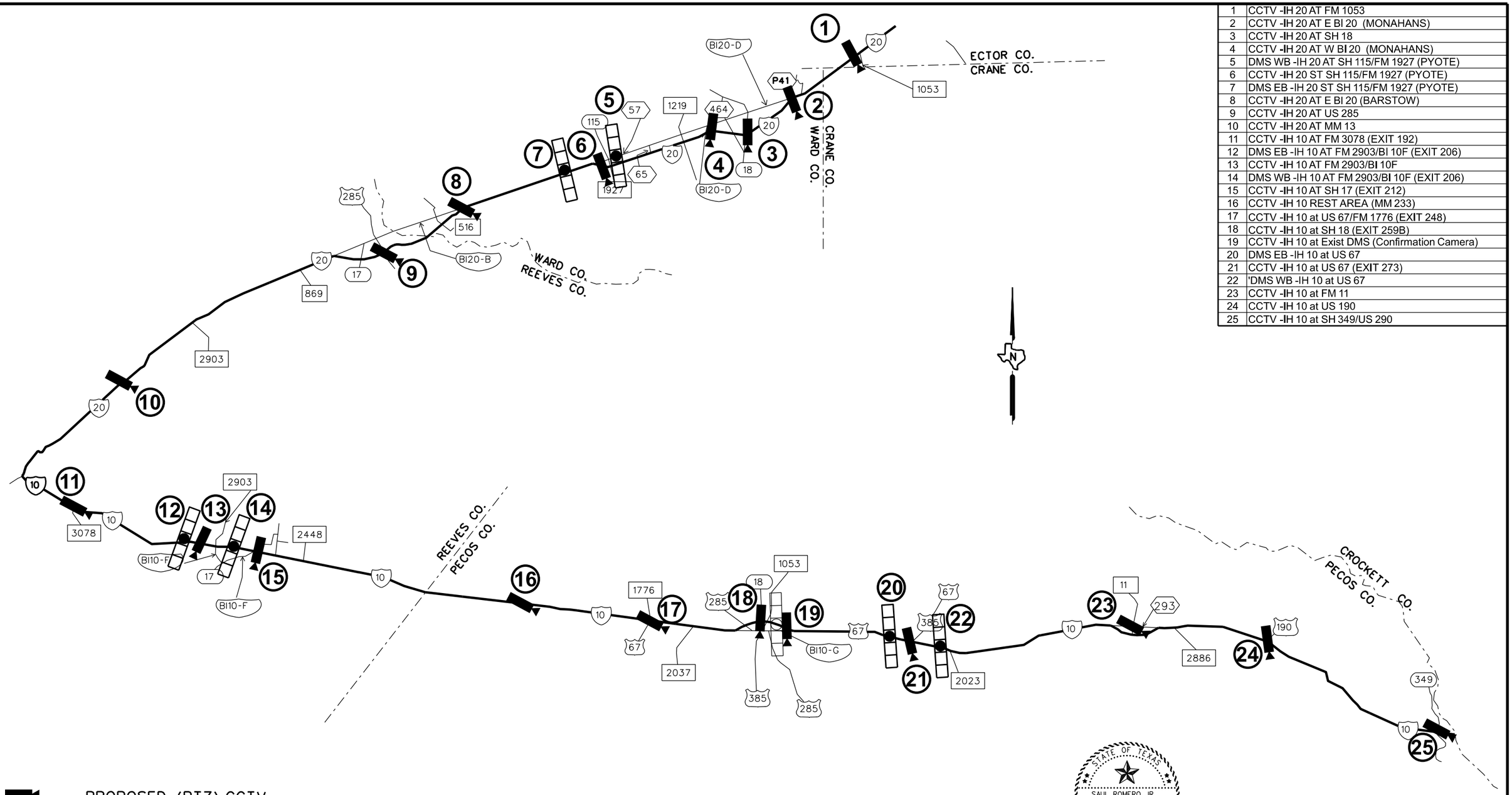
Additional requirements for lane closures and advance signing shall be as shown on TCP (6-1) or as directed by the Engineer.

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
WORK AREA BEYOND EXIT RAMP

TCP(6-5)-12

FILE: tcp6-5.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT Feburary 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0906	00	268	VARIOUS
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	ODA	ECTOR		23



1	CCTV -IH 20 AT FM 1053
2	CCTV -IH 20 AT E BI 20 (MONAHANS)
3	CCTV -IH 20 AT SH 18
4	CCTV -IH 20 AT W BI 20 (MONAHANS)
5	DMS WB -IH 20 AT SH 115/FM 1927 (PYOTE)
6	CCTV -IH 20 ST SH 115/FM 1927 (PYOTE)
7	DMS EB -IH 20 ST SH 115/FM 1927 (PYOTE)
8	CCTV -IH 20 AT E BI 20 (BARSTOW)
9	CCTV -IH 20 AT US 285
10	CCTV -IH 20 AT MM 13
11	CCTV -IH 10 AT FM 3078 (EXIT 192)
12	DMS EB -IH 10 AT FM 2903/BI 10F (EXIT 206)
13	CCTV -IH 10 AT FM 2903/BI 10F
14	DMS WB -IH 10 AT FM 2903/BI 10F (EXIT 206)
15	CCTV -IH 10 AT SH 17 (EXIT 212)
16	CCTV -IH 10 REST AREA (MM 233)
17	CCTV -IH 10 at US 67/FM 1776 (EXIT 248)
18	CCTV -IH 10 at SH 18 (EXIT 259B)
19	CCTV -IH 10 at Exist DMS (Confirmation Camera)
20	DMS EB -IH 10 at US 67
21	CCTV -IH 10 at US 67 (EXIT 273)
22	'DMS WB -IH 10 at US 67
23	CCTV -IH 10 at FM 11
24	CCTV -IH 10 at US 190
25	CCTV -IH 10 at SH 349/US 290

PROPOSED (PTZ) CCTV

PROPOSED DMS

EXISTING DMS

STATE OF TEXAS
SAUL ROMERO, JR.
118987
LICENSED
PROFESSIONAL ENGINEER

SAUL ROMERO, JR., P.E.

9/15/2023
Date

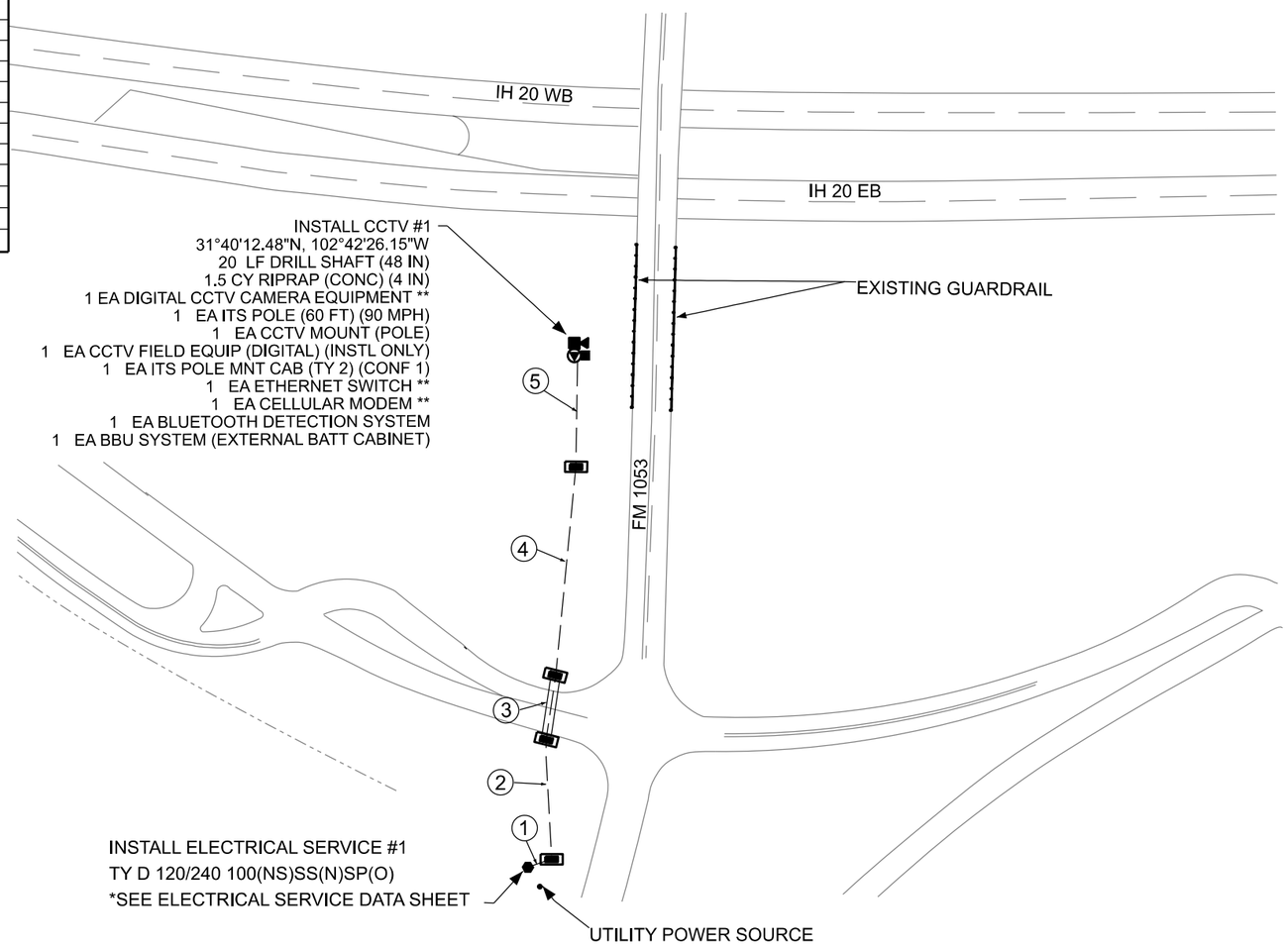
PROJECT LAYOUT

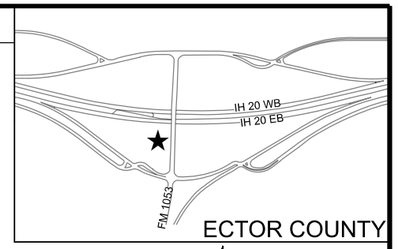
Texas Department of Transportation®

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			24
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	DISTRICTWIDE	
CONT.	SECT.	JOB	HIGHWAY NO.
0906	00	268	VARIOUS

LOCATION #1 - IH 20 AT FM 1053

LOCATION 1	SHEET SUMMARY OF QUANTITIES CCTV -IH 20 AT FM 1053		
BID ITEM	DESCRIPTION	UNITS	QTY
416 6006	DRILL SHAFT (48 IN)	LF	20
432 6001	RIPRAP (CON) (4 IN)	CY	1.50
618 6023	CONDT (PVC) (SCH 40) (2")	LF	481
618 6024	CONDT (PVC) (SCH 40) (2") (BORE)	LF	65
620 6011	ELEC CONDR (NO. 4) BARE	LF	573
620 6012	ELEC CONDR (NO. 4) INSULATED	LF	1146
624 6002	GROUND BOX TY A (122311)W/APRON	EA	4
628 6250	ELC SRV TY D 120/240 100(NS)SS IN)SP (O)	EA	1
6010 6004	CCTV MOUNT (POLE)	EA	1
6010 6011	CCTV FIELD EQUIP (DIGITAL) (INSTL ONLY)	EA	1
6058 6001	BBU SYSTEM (EXTERNAL BATT CABINET)	EA	1
6064 6055	ITS POLE (60 FT) (90 MPH)	EA	1
6064 6080	ITS POLE MNT CAB (TY 2) (CONF 1)	EA	1
6263 6002	BLUETOOTH DETECTION SYSTEM	EA	1
6320 6001	INSTALL OF FIELD HARD ETHERNET SWITCH	EA	1
6320 6002	INSTALL OF CELLULAR MODEM	EA	1
**	ETHERNET SWITCH	EA	1
**	CELLULAR MODEM/ANTENNA	EA	1
**	DIGITAL CCTV CAMERA EQUIPMENT	EA	1





	LEGEND
	PROPOSED DYNAMIC MESSAGE SIGN
	PROPOSED FOUNDATION MOUNTED DMS AND BBU CABINETS
	PROPOSED ITS POLE WITH POLE MOUNTED CABINET AND FOUNDATION MOUNTED BBU CABINET
	PROPOSED CCTV
	PROPOSED HD RVSD
	PROPOSED ECLECTRICAL SERVICE (120V/240V)
	PROPOSED ITS GROUND BOX (TY1)
	PROPOSED ITS GROUND BOX (TY A) W/ APRON
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (CONC ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (CONC ENCSE)
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (STL ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (STL ENCSE)
	PROPOSED 2-4" MULTI-DUCT RMC CONDT PROPOSED 2-3" PVC RMC CONDT
	PROPOSED 2-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT (BORED)
	PROPOSED CONDUIT RUN

NOTES:

1) EQUPMENT DESIGNATED (**) SHALL BE FURNISHED BY TXDOT AND INSTALLED BY THE CONTRACTOR.

2) LOCATE ALL UTILITIES, DRAINAGE STRUCTURES, AND OTHER CONFLICTS PRIOR TO TRENCHING, BORING, INSTALLING DRILL SHAFTS OR POLES. IF NECESSARY, ADJUST LOCATIONS IN ACCORDANCE WITH TXDOT'S POLE PLACEMENT GUIDELINES AND AS DIRECTED BY THE ENGINEER.

3) ITS POLE MOUNTED CABINET DETAILS ON STANDARD ITS (15) TYPE 2 CABINET

4) BBU CABINETS TO BE MOUNTED ON THE ITS POLE.

LOCATION 1	RUN TABLE CCTV -IH 20 AT FM 1053								
BID ITEM	DESCRIPTION	R1	R2	R3	R4	R5	UOM	TOTALS
	RUN LENGTH	10	166	65	200	105		
	POINT:POINT	ES:GB	GB:GB	GB:GB	GB:GB	GB:CCTV		
618 6023	CONDT (PVC) (SCH 40) (2")	10	166		200	105	LF	481
618 6024	CONDT (PVC) (SCH 40) (2") (BORE)			65			LF	65
620 6011	ELEC CONDR (NO. 4) BARE	13	172	71	206	111	LF	573
620 6012	ELEC CONDR (NO. 4) INSULATED	26	344	142	412	222	LF	1146

SAUL ROMERO, JR., P.E.

9/15/2023
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ITS PLAN

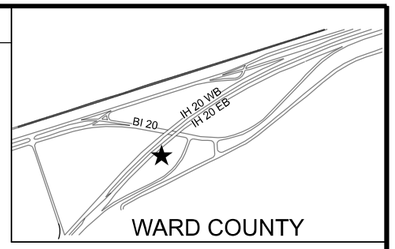
Texas Department of Transportation

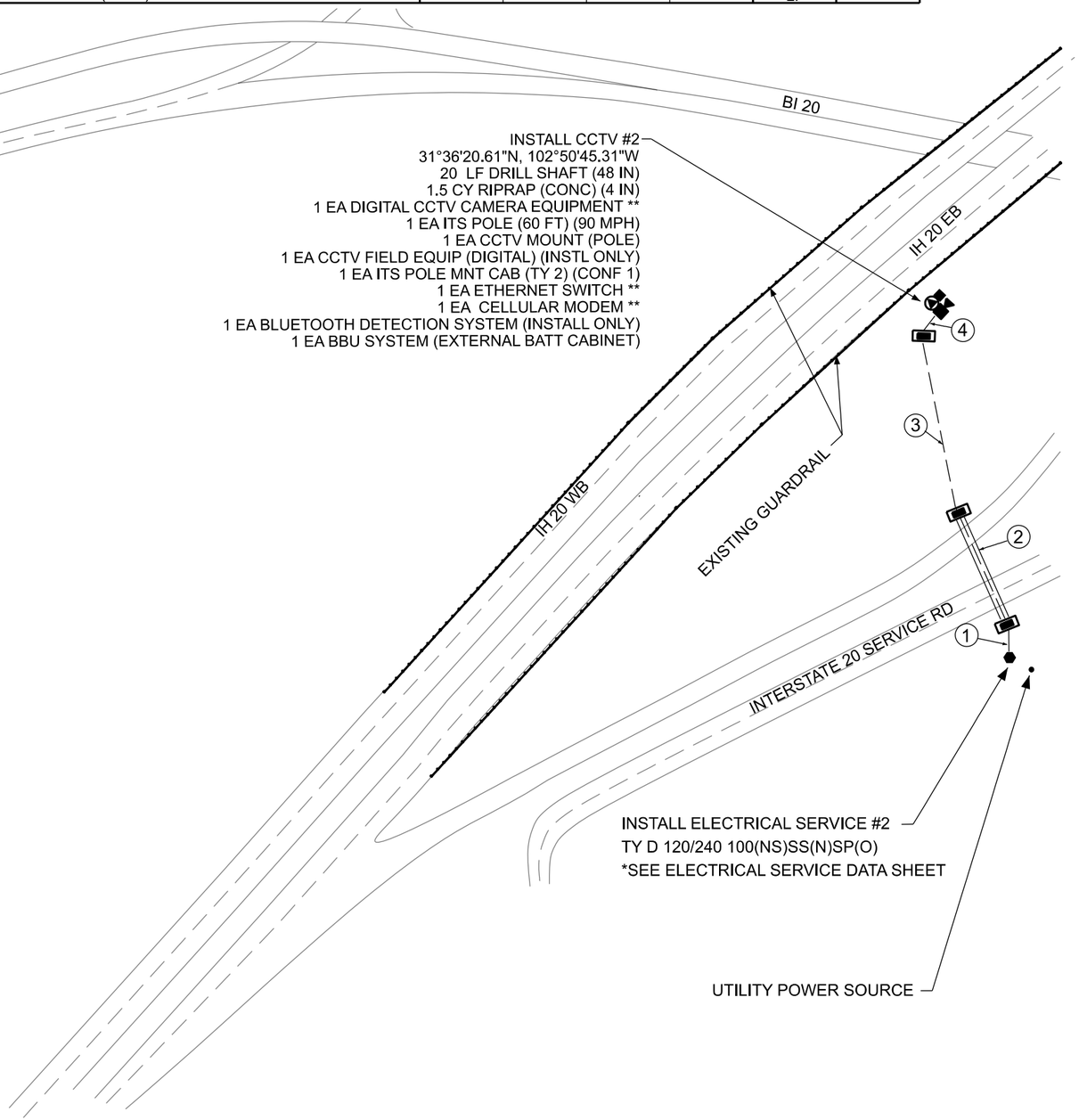
FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			25
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	DISTRICTWIDE	
CONT.	SECT.	JOB	HIGHWAY NO.
0906	00	268	VARIOUS

LOCATION #2 - IH 20 AT E BI 20 INTERCHANGE (MONOHANS)

LOCATION 2	SHEET SUMMARY OF QUANTITIES CCTV -IH 20 AT E BI 20 INTERCHANGE (MONAHANS)		
BID ITEM	DESCRIPTION	UNITS	QTY
416 6006	DRILL SHAFT (48 IN)	LF	20
432 6001	RIPRAP (CON) (4 IN)	CY	1.50
618 6023	CONDT (PVC) (SCH 40) (2")	LF	229
618 6024	CONDT (PVC) (SCH 40) (2") (BORE)	LF	155
620 6009	ELEC CONDR (NO. 6) BARE	LF	405
620 6010	ELEC CONDR (NO. 6) INSULATED	LF	810
624 6002	GROUND BOX TY A (122311)W/APRON	EA	3
628 6250	ELC SRV TY D 120/240 100(NS)SS IN)SP (O)	EA	1
6010 6004	CCTV MOUNT (POLE)	EA	1
6010 6011	CCTV FIELD EQUIP (DIGITAL) (INSTL ONLY)	EA	1
6058 6001	BBU SYSTEM (EXTERNAL BATT CABINET)	EA	1
6064 6055	ITS POLE (60 FT) (90 MPH)	EA	1
6064 6080	ITS POLE MNT CAB (TY 2) (CONF 1)	EA	1
6263 6002	BLUETOOTH DETECTION SYSTEM	EA	1
6320 6001	INSTALL OF FIELD HARD ETHERNET SWITCH	EA	1
6320 6002	INSTALL OF CELLULAR MODEM	EA	1
**	ETHERNET SWITCH	EA	1
**	CELLULAR MODEM/ANTENNA	EA	1
**	DIGITAL CCTV CAMERA EQUIPMENT	EA	1

LOCATION 2	RUN TABLE CCTV -IH 20 AT E BI 20 INTERCHANGE (MONAHANS)						
BID ITEM	DESCRIPTION	R1	R2	R3	R4	UOM	TOTALS
	RUN LENGTH	15	155	195	19		
	POINT:POINT	ES:GB	GB:GB	GB:GB	GB:CCTV		
618 6023	CONDT (PVC) (SCH 40) (2")	15		195	19	LF	229
618 6024	CONDT (PVC) (SCH 40) (2") (BORE)		155			LF	155
620 6009	ELEC CONDR (NO. 6) BARE	18	161	201	25	LF	405
620 6010	ELEC CONDR (NO. 6) INSULATED	36	322	402	50	LF	810





	LEGEND
	PROPOSED DYNAMIC MESSAGE SIGN
	PROPOSED FOUNDATION MOUNTED DMS AND BBU CABINETS
	PROPOSED ITS POLE WITH POLE MOUNTED CABINET AND FOUNDATION MOUNTED BBU CABINET
	PROPOSED CCTV
	PROPOSED HD RVSD
	PROPOSED ECLECTRICAL SERVICE (120V/240V)
	PROPOSED ITS GROUND BOX (TY1)
	PROPOSED ITS GROUND BOX (TY A) W/ APRON
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (CONC ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (CONC ENCSE)
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (STL ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (STL ENCSE)
	PROPOSED 2-4" MULTI-DUCT RMC CONDT PROPOSED 2-3" PVC RMC CONDT
	PROPOSED 2-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT (BORED)
	PROPOSED CONDUIT RUN

NOTES:

1) EQUPMENT DESIGNATED (**) SHALL BE FURNISHED BY TXDOT AND INSTALLED BY THE CONTRACTOR.

2) LOCATE ALL UTILITIES, DRAINAGE STRUCTURES, AND OTHER CONFLICTS PRIOR TO TRENCHING, BORING, INSTALLING DRILL SHAFTS OR POLES. IF NECESSARY, ADJUST LOCATIONS IN ACCORDANCE WITH TXDOT'S POLE PLACEMENT GUIDELINES AND AS DIRECTED BY THE ENGINEER.

3) ITS POLE MOUNTED CABINET DETAILS ON STANDARD ITS (15) TYPE 2 CABINET

4) BBU CABINETS TO BE MOUNTED ON THE ITS POLE.

SAUL ROMERO, JR., P.E.

9/15/2023
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ITS PLAN

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			26
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	DISTRICTWIDE	
CONT.	SECT.	JOB	HIGHWAY NO.
0906	00	268	VARIOUS

LOCATION 3	SHEET SUMMARY OF QUANTITIES CCTV -IH 20 AT SH 18		
BID ITEM	DESCRIPTION	UNITS	QTY
416 6006	DRILL SHAFT (48 IN)	LF	20
432 6001	RIPRAP (CON) (4 IN)	CY	1.50
618 6023	CONDT (PVC) (SCH 40) (2")	LF	194
618 6024	CONDT (PVC) (SCH 40) (2") (BORE)	LF	66
620 6007	ELEC CONDR (NO. 8) BARE	LF	287
620 6008	ELEC CONDR (NO. 8) INSULATED	LF	574
624 6002	GROUND BOX TY A (122311)W/APRON	EA	4
628 6250	ELC SRV TY D 120/240 100(NS)SS IN)SP (O)	EA	1
6010 6004	CCTV MOUNT (POLE)	EA	1
6010 6011	CCTV FIELD EQUIP (DIGITAL) (INSTL ONLY)	EA	1
6058 6001	BBU SYSTEM (EXTERNAL BATT CABINET)	EA	1
6064 6055	ITS POLE (60 FT) (90 MPH)	EA	1
6064 6080	ITS POLE MNT CAB (TY 2) (CONF 1)	EA	1
6263 6002	BLUETOOTH DETECTION SYSTEM	EA	1
6320 6001	INSTALL OF FIELD HARD ETHERNET SWITCH	EA	1
6320 6002	INSTALL OF CELLULAR MODEM	EA	1
**	ETHERNET SWITCH	EA	1
**	CELLULAR MODEM/ANTENNA	EA	1
**	DIGITAL CCTV CAMERA EQUIPMENT	EA	1

LOCATION #3 - IH 20 AT SH 18

INSTALL CCTV #3
31°34'29.82"N, 102°53'28.58"W
20 LF DRILL SHAFT (48 IN)
1.5 CY RIPRAP (CONC) (4 IN)
1 EA DIGITAL CCTV CAMERA EQUIPMENT **
1 EA ITS POLE (60 FT) (90 MPH)
1 EA CCTV MOUNT (POLE)
1 EA CCTV FIELD EQUIP (DIGITAL) (INSTL ONLY)
1 EA ITS POLE MNT CAB (TY 2) (CONF 1)
1 EA ETHERNET SWITCH **
1 EA CELLULAR MODEM **
1 EA BLUETOOTH DETECTION SYSTEM (INSTALL ONLY)
1 EA BBU SYSTEM (EXTERNAL BATT CABINET)

NOTES:

1) EQUPMENT DESIGNATED (**) SHALL BE FURNISHED BY TXDOT AND INSTALLED BY THE CONTRACTOR.

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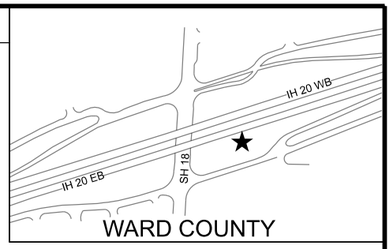
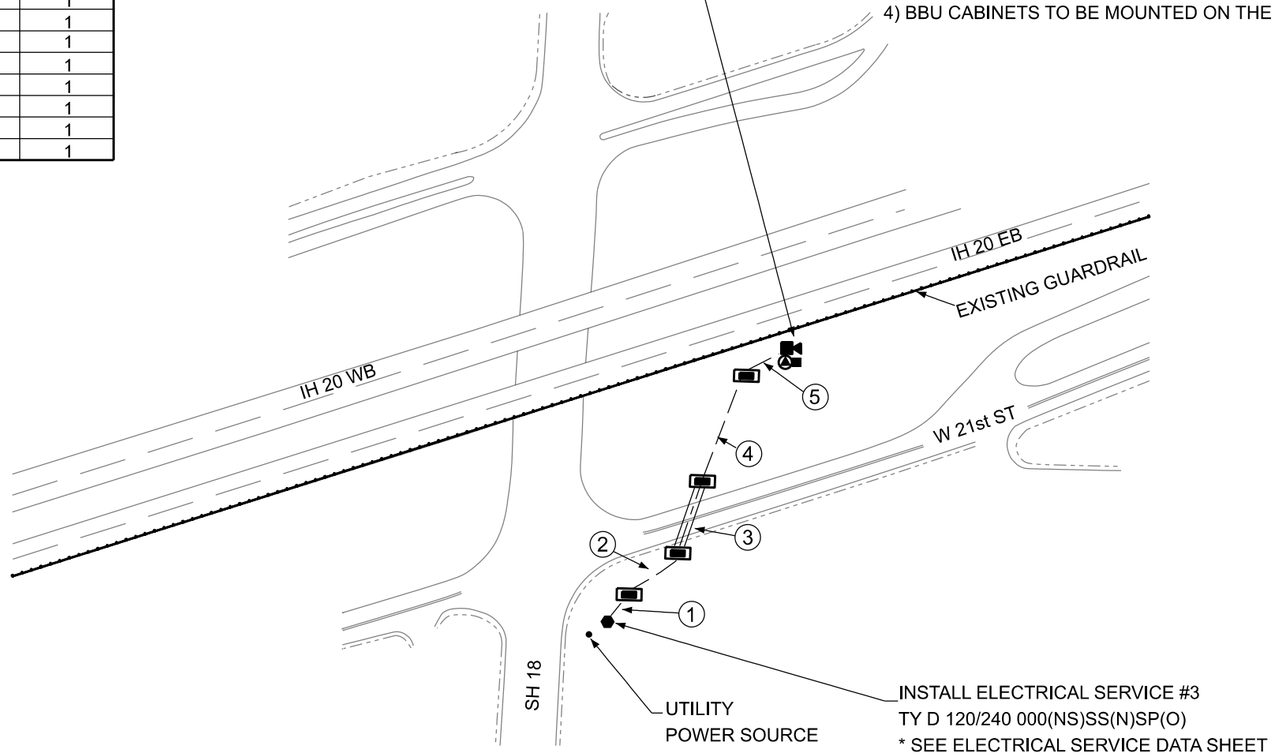
3) ITS POLE MOUNTED CABINET DETAILS ON STANDARD ITS (15) TYPE 2 CABINET

4) BBU CABINETS TO BE MOUNTED ON THE ITS POLE.





	LEGEND
	PROPOSED DYNAMIC MESSAGE SIGN
	PROPOSED FOUNDATION MOUNTED DMS AND BBU CABINETS
	PROPOSED ITS POLE WITH POLE MOUNTED CABINET AND FOUNDATION MOUNTED BBU CABINET
	PROPOSED CCTV
	PROPOSED HD RVSD
	PROPOSED ECLECTRICAL SERVICE (120V/240V)
	PROPOSED ITS GROUND BOX (TY1)
	PROPOSED ITS GROUND BOX (TY A) W/ APRON
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (CONC ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (CONC ENCSE)
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (STL ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (STL ENCSE)
	PROPOSED 2-4" MULTI-DUCT RMC CONDT PROPOSED 2-3" PVC RMC CONDT
	PROPOSED 2-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT (BORED)
	PROPOSED CONDUIT RUN

LOCATION 3	RUN TABLE CCTV -IH 20 AT SH 18							
BID ITEM	DESCRIPTION	R1	R2	R3	R4	R5	UOM	TOTALS
	RUN LENGTH	15	47	66	122	10		
	POINT:POINT	ES:GB	GB:GB	GB:GB	GB:GB	GB:CCTV		
618 6023	CONDT (PVC) (SCH 40) (2")	15	47		122	10	LF	194
618 6024	CONDT (PVC) (SCH 40) (2") (BORE)			66			LF	66
620 6007	ELEC CONDR (NO. 8) BARE	18	53	72	128	16	LF	287
620 6008	ELEC CONDR (NO. 8) INSULATED	36	106	144	256	32	LF	574

STATE OF TEXAS
SAUL ROMERO, JR.
118987
LICENSED PROFESSIONAL ENGINEER

Saul Romero, P.E.

SAUL ROMERO, JR., P.E.

9/15/2023
Date

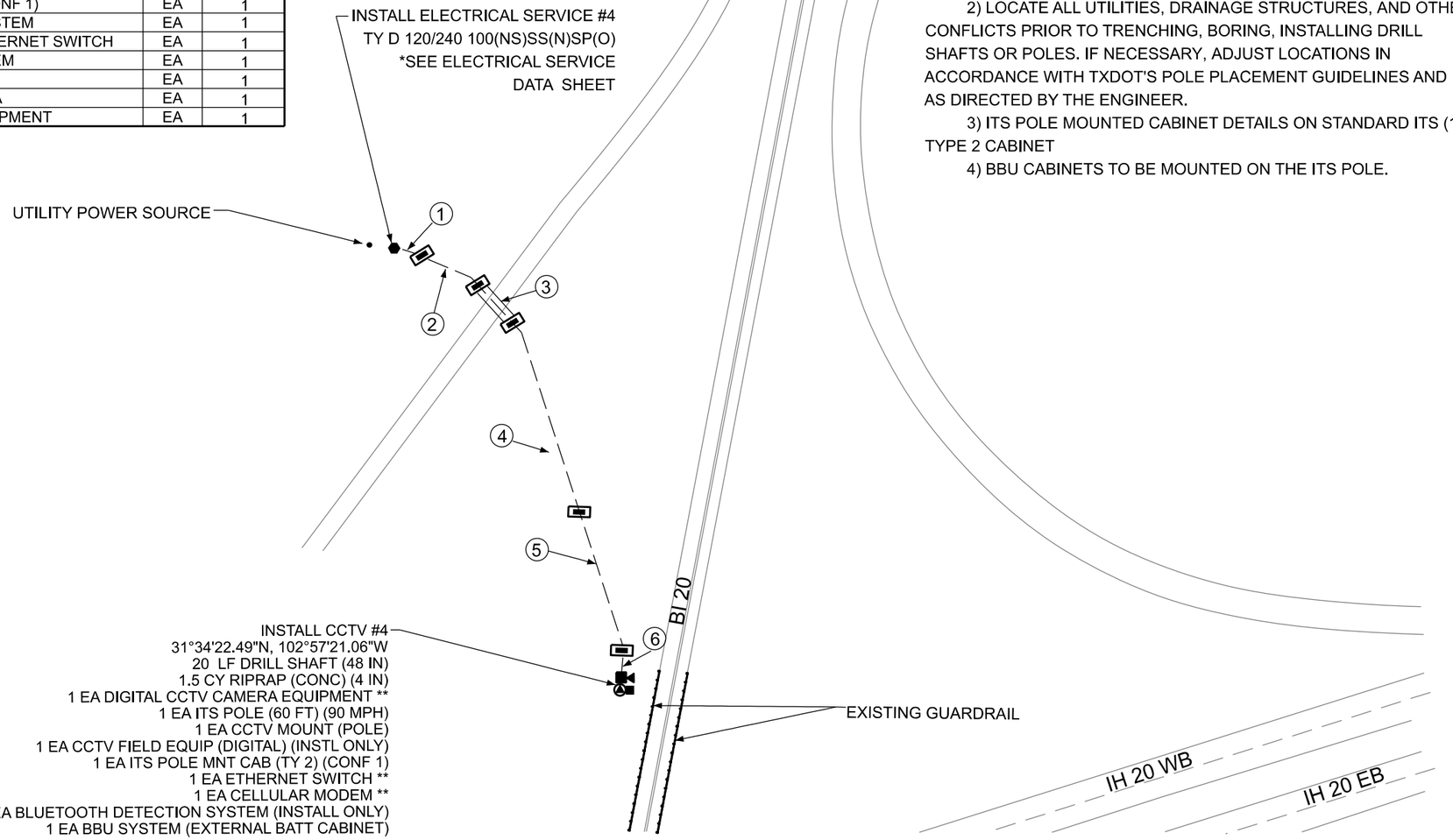
ITS PLAN

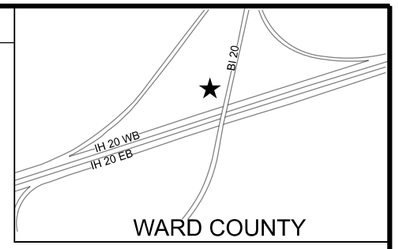
Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			27
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	DISTRICTWIDE	
CONT.	SECT.	JOB	HIGHWAY NO.
0906	00	268	VARIOUS

LOCATION #4 - IH 20 AT W BI 20 INTERCHANGE (MONAHANS)

LOCATION 4	SHEET SUMMARY OF QUANTITIES CCTV -IH 20 AT W BI 20 INTERCHANGE (MONAHANS)		
BID ITEM	DESCRIPTION	UNITS	QTY
416 6006	DRILL SHAFT (48 IN)	LF	20
432 6001	RIPRAP (CON) (4 IN)	CY	1.50
618 6023	CONDT (PVC) (SCH 40) (2")	LF	450
618 6024	CONDT (PVC) (SCH 40) (2") (BORE)	LF	50
620 6011	ELEC CONDR (NO. 4) BARE	LF	533
620 6012	ELEC CONDR (NO. 4) INSULATED	LF	1066
624 6002	GROUND BOX TY A (122311)W/APRON	EA	5
628 6250	ELC SRV TY D 120/240 100(NS)SS IN)SP (O)	EA	1
6010 6004	CCTV MOUNT (POLE)	EA	1
6010 6011	CCTV FIELD EQUIP (DIGITAL) (INSTL ONLY)	EA	1
6058 6001	BBU SYSTEM (EXTERNAL BATT CABINET)	EA	1
6064 6055	ITS POLE (60 FT) (90 MPH)	EA	1
6064 6080	ITS POLE MNT CAB (TY 2) (CONF 1)	EA	1
6263 6002	BLUETOOTH DETECTION SYSTEM	EA	1
6320 6001	INSTALL OF FIELD HARD ETHERNET SWITCH	EA	1
6320 6002	INSTALL OF CELLULAR MODEM	EA	1
**	ETHERNET SWITCH	EA	1
**	CELLULAR MODEM/ANTENNA	EA	1
**	DIGITAL CCTV CAMERA EQUIPMENT	EA	1





NOTES:

1) EQUPMENT DESIGNATED (**) SHALL BE FURNISHED BY TXDOT AND INSTALLED BY THE CONTRACTOR.

2) LOCATE ALL UTILITIES, DRAINAGE STRUCTURES, AND OTHER CONFLICTS PRIOR TO TRENCHING, BORING, INSTALLING DRILL SHAFTS OR POLES. IF NECESSARY, ADJUST LOCATIONS IN ACCORDANCE WITH TXDOT'S POLE PLACEMENT GUIDELINES AND AS DIRECTED BY THE ENGINEER.

3) ITS POLE MOUNTED CABINET DETAILS ON STANDARD ITS (15) TYPE 2 CABINET

4) BBU CABINETS TO BE MOUNTED ON THE ITS POLE.

	LEGEND
	PROPOSED DYNAMIC MESSAGE SIGN
	PROPOSED FOUNDATION MOUNTED DMS AND BBU CABINETS
	PROPOSED ITS POLE WITH POLE MOUNTED CABINET AND FOUNDATION MOUNTED BBU CABINET
	PROPOSED CCTV
	PROPOSED HD RVSD
	PROPOSED ECLECTRICAL SERVICE (120V/240V)
	PROPOSED ITS GROUND BOX (TY1)
	PROPOSED ITS GROUND BOX (TY A) W/ APRON
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (CONC ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (CONC ENCSE)
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (STL ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (STL ENCSE)
	PROPOSED 2-4" MULTI-DUCT RMC CONDT PROPOSED 2-3" PVC RMC CONDT
	PROPOSED 2-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT (BORED)
	PROPOSED CONDUIT RUN

LOCATION 4	RUN TABLE CCTV -IH 20 AT W BI 20 INTERCHANGE (MONAHANS)									
BID ITEM	DESCRIPTION	R1	R2	R3	R4	R5	R6	UOM	TOTALS
	RUN LENGTH	15	65	50	200	150	20		
	POINT:POINT	ES:GB	GB:GB	GB:GB	GB:GB	GB:GB	GB:CCTV		
618 6023	CONDT (PVC) (SCH 40) (2")	15	65		200	150	20	LF	450
618 6024	CONDT (PVC) (SCH 40) (2") (BORE)			50				LF	50
620 6011	ELEC CONDR (NO. 4) BARE	18	71	56	206	156	26	LF	533
620 6012	ELEC CONDR (NO. 4) INSULATED	36	142	112	412	312	52	LF	1066

SAUL ROMERO, JR., P.E.

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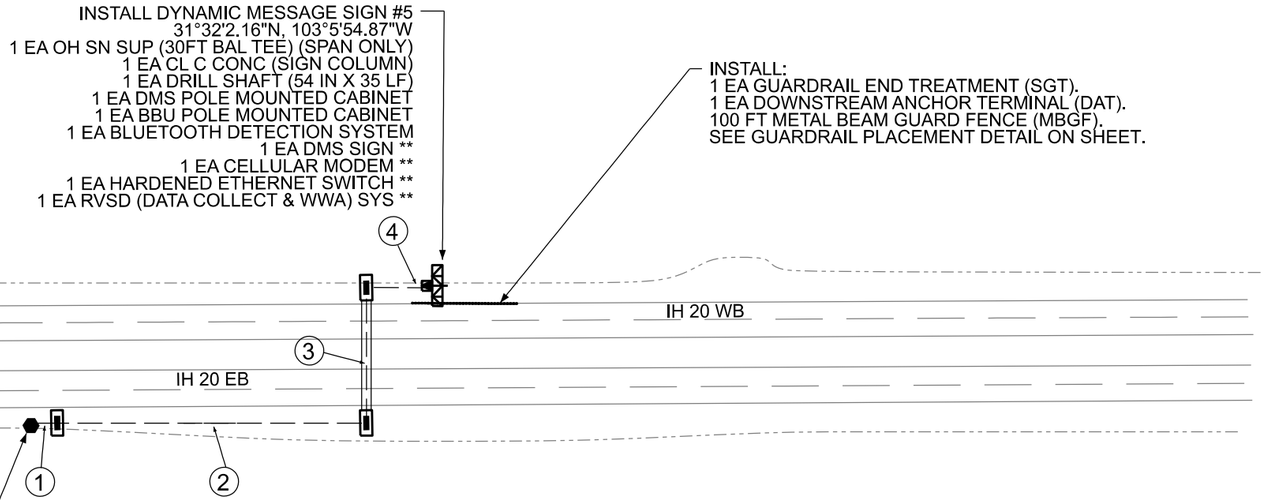
ITS PLAN

Texas Department of Transportation

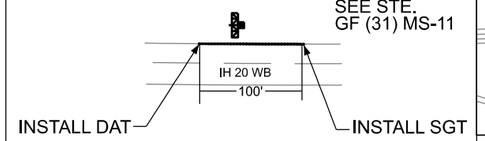
FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			28
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	DISTRICTWIDE	
CONT.	SECT.	JOB	HIGHWAY NO.
0906	00	268	VARIOUS

LOCATION 5	SHEET SUMMARY OF QUANTITIES DMS WB -IH 20 AT SH 115/FM 1927 (PYOTE)		
BID ITEM	DESCRIPTION	UNITS	QTY
416 6023	DRILL SHAFT (SIGN MTS) (54 IN)	LF	35
420 6068	CL C CONC (SIGN COLUMN)	CY	22
432 6001	RIPRAP (CON) (4 IN)	CY	1.50
540 6002	MTL W-BEAM GD FEN (STEEL POST)	LF	100
540 6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	1
544 6001	GUARDRAIL END TREATMENT (INSTALL)	EA	1
618 6023	CONDT (PVC) (SCH 40) (2")	LF	288
618 6024	CONDT (PVC) (SCH 40) (2") (BORE)	LF	145
620 6011	ELEC CONDR (NO. 4) BARE	LF	454
620 6012	ELEC CONDR (NO. 4) INSULATED	LF	908
624 6002	GROUND BOX TY A (122311)W/APRON	EA	3
628 6250	ELC SRV TY D 120/240 100(NS)SS IN)SP (O)	EA	1
650 6031	INS OH SN SUP (30 FT BALL TEE) (SPAN ONLY)	EA	1
6058 6001	BBU SYSTEM (EXTERNAL BATT CABINET)	EA	1
6064 6088	ITS POLE MNT CAB (TY 3)(CONF 1)	EA	1
6263 6002	BLUETOOTH DETECTION SYSTEM	EA	1
6304 6004	ITS RVSD (DC & WWA) (INSTALL ONLY)	EA	1
6320 6001	INSTALL OF FIELD HARD ETHERNET SWITCH	EA	1
6320 6002	INSTALL OF CELLULAR MODEM	EA	1
6028 6001	INSTALL DMS (POLE MTD CABINET)	EA	1
**	ETHERNET SWITCH	EA	1
**	CELLULAR MODEM/ANTENNA	EA	1
**	RVSD (DATA COLLECT & WWA) SYS	EA	1

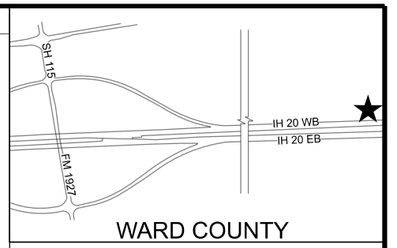
LOCATION #5 - IH 20 AT SH 115/ FM 1927



GUARDRAIL PLACEMENT DETAIL



INSTALL MBGF



WARD COUNTY

	LEGEND
	PROPOSED DYNAMIC MESSAGE SIGN
	PROPOSED FOUNDATION MOUNTED DMS AND BBU CABINETS
	PROPOSED ITS POLE WITH POLE MOUNTED CABINET AND FOUNDATION MOUNTED BBU CABINET
	PROPOSED CCTV
	PROPOSED HD RVSD
	PROPOSED ECLECTRICAL SERVICE (120V/240V)
	PROPOSED ITS GROUND BOX (TY1)
	PROPOSED ITS GROUND BOX (TY A) W/ APRON
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (CONC ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (CONC ENCSE)
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (STL ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (STL ENCSE)
	PROPOSED 2-4" MULTI-DUCT RMC CONDT PROPOSED 2-3" PVC RMC CONDT
	PROPOSED 2-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT (BORED)
	PROPOSED CONDUIT RUN

NOTES:

1) THIS LOCATION WILL REQUIRE THE EXTENSION OF ELECTRICITY BY THE ELECTRICAL SERVICE PROVIDER IN THIS AREA.

2) EQUPMENT DESIGNATED (**) SHALL BE FURNISHED BY TXDOT AND INSTALLED BY THE CONTRACTOR.

3) LOCATE ALL UTILITIES, DRAINAGE STRUCTURES, AND OTHER CONFLICTS PRIOR TO TRENCHING, BORING, INSTALLING DRILL SHAFTS OR POLES. IF NECESSARY, ADJUST LOCATIONS IN ACCORDANCE WITH TXDOT'S POLE PLACEMENT GUIDELINES AND AS DIRECTED BY THE ENGINEER.

4) DMS POLE MOUNTED CABINET DETAILS ON STANDARD ITS (16) TYPE 3 CABINET SIZE.

5) BBU CABINETS TO BE MOUNTED ON THE POLE

LOCATION 5	RUN TABLE DMS WB -IH 20 AT SH 115/FM 1927 (PYOTE)						
BID ITEM	DESCRIPTION	R1	R2	R3	R4	UOM	TOTALS
	RUN LENGTH	15	250	145	23		
	POINT:POINT	ES:GB	GB:GB	GB:GB	GB:DMS		
618 6023	CONDT (PVC) (SCH 40) (2")	15	250		23	LF	288
618 6024	CONDT (PVC) (SCH 40) (2") (BORE)			145		LF	145
620 6011	ELEC CONDR (NO. 4) BARE	18	256	151	29	LF	454
620 6012	ELEC CONDR (NO. 4) INSULATED	36	512	302	58	LF	908

STATE OF TEXAS
ADRIANA GEIGER
108603
LICENSED
PROFESSIONAL ENGINEER

Adriana Geiger, P.E.

ADRIANA GEIGER, P.E.

11/1/2023

Date

ITS PLAN

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			29
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	DISTRICTWIDE	
CONT.	SECT.	JOB	HIGHWAY NO.
0906	00	268	VARIOUS

LOCATION 6	SHEET SUMMARY OF QUANTITIES CCTV -IH 20 ST SH 115/FM 1927 (PYOTE)		
BID ITEM	DESCRIPTION	UNITS	QTY
416 6006	DRILL SHAFT (48 IN)	LF	20
432 6001	RIPRAP (CON) (4 IN)	CY	1.50
618 6023	CONDT (PVC) (SCH 40) (2")	LF	350
620 6009	ELEC CONDR (NO. 6) BARE	LF	362
620 6010	ELEC CONDR (NO. 6) INSULATED	LF	724
624 6002	GROUND BOX TY A (122311)W/APRON	EA	2
628 6250	ELC SRV TY D 120/240 100(NS)SS IN)SP (O)	EA	1
6010 6004	CCTV MOUNT (POLE)	EA	1
6010 6011	CCTV FIELD EQUIP (DIGITAL) (INSTL ONLY)	EA	1
6058 6001	BBU SYSTEM (EXTERNAL BATT CABINET)	EA	1
6064 6055	ITS POLE (60 FT) (90 MPH)	EA	1
6064 6080	ITS POLE MNT CAB (TY 2) (CONF 1)	EA	1
6263 6002	BLUETOOTH DETECTION SYSTEM	EA	1
6320 6001	INSTALL OF FIELD HARD ETHERNET SWITCH	EA	1
6320 6002	INSTALL OF CELLULAR MODEM	EA	1
**	ETHERNET SWITCH	EA	1
**	CELLULAR MODEM/ANTENNA	EA	1
**	DIGITAL CCTV CAMERA EQUIPMENT	EA	1

NOTES:

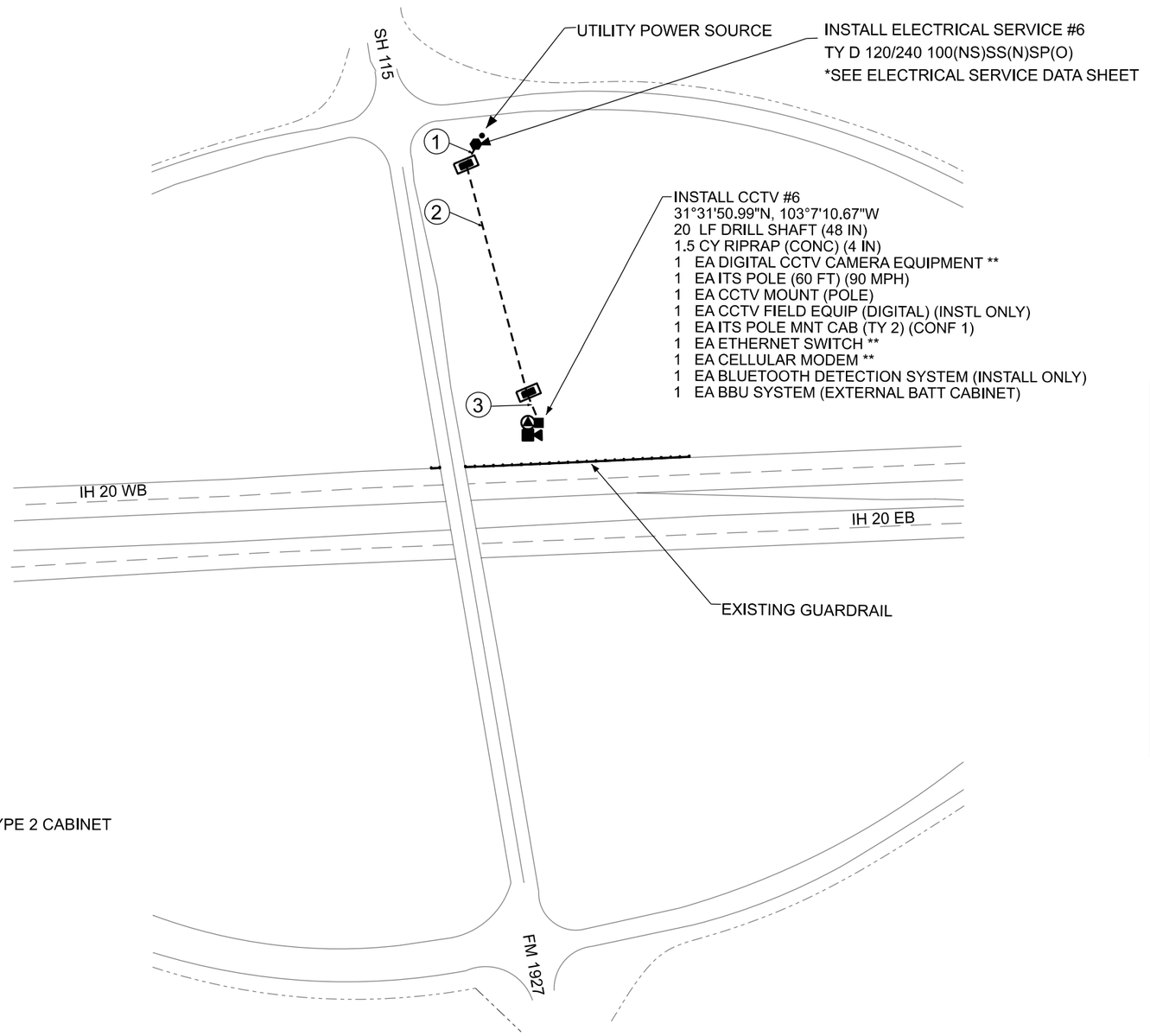
1) EQUPMENT DESIGNATED (**) SHALL BE FURNISHED BY TXDOT AND INSTALLED BY THE CONTRACTOR.

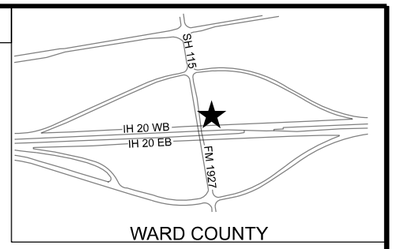
2) LOCATE ALL UTILITIES, DRAINAGE STRUCTURES, AND OTHER CONFLICTS PRIOR TO TRENCHING, BORING, INSTALLING DRILL SHAFTS OR POLES. IF NECESSARY, ADJUST LOCATIONS IN ACCORDANCE WITH TXDOT'S POLE PLACEMENT GUIDELINES AND AS DIRECTED BY THE ENGINEER.

3) ITS POLE MOUNTED CABINET DETAILS ON STANDARD ITS (15) TYPE 2 CABINET

4) BBU CABINETS TO BE MOUNTED ON THE POLE.

LOCATION #6 - IH 20 AT SH 115/ FM 1927





WARD COUNTY

	LEGEND
	PROPOSED DYNAMIC MESSAGE SIGN
	PROPOSED FOUNDATION MOUNTED DMS AND BBU CABINETS
	PROPOSED ITS POLE WITH POLE MOUNTED CABINET AND FOUNDATION MOUNTED BBU CABINET
	PROPOSED CCTV
	PROPOSED HD RVSD
	PROPOSED ECLECTRICAL SERVICE (120V/240V)
	PROPOSED ITS GROUND BOX (TY1)
	PROPOSED ITS GROUND BOX (TY A) W/ APRON
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (CONC ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (CONC ENCSE)
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (STL ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (STL ENCSE)
	PROPOSED 2-4" MULTI-DUCT RMC CONDT PROPOSED 2-3" PVC RMC CONDT
	PROPOSED 2-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT (BORED)
	PROPOSED CONDUIT RUN

LOCATION 6	RUN TABLE CCTV -IH 20 ST SH 115/FM 1927 (PYOTE)					
BID ITEM	DESCRIPTION	R1	R2	R3	UOM	TOTALS
	RUN LENGTH	20	310	20		
	POINT:POINT	ES:GB	GB:GB	GB:CCTV		
618 6023	CONDT (PVC) (SCH 40) (2")	20	310	20	LF	350
620 6009	ELEC CONDR (NO. 6) BARE	23	316	23	LF	362
620 6010	ELEC CONDR (NO. 6) INSULATED	46	632	46	LF	724

Saul Romero, P.E.

SAUL ROMERO, JR., P.E.

9/15/2023

Date

ITS PLAN

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			30
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	DISTRICTWIDE	
CONT.	SECT.	JOB	HIGHWAY NO.
0906	00	268	VARIOUS

LOCATION 7	SHEET SUMMARY OF QUANTITIES DMS EB -IH 20 ST SH 115/FM 1927 (PYOTE)		
BID ITEM	DESCRIPTION	UNITS	QTY
416 6023	DRILL SHAFT (SIGN MTS) (54 IN)	LF	35
420 6068	CL C CONC (SIGN COLUMN)	CY	22
432 6001	RIPRAP (CON) (4 IN)	CY	1.50
540 6002	MTL W-BEAM GD FEN (STEEL POST)	LF	200
540 6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	2
544 6001	GUARDRAIL END TREATMENT (INSTALL)	EA	2
618 6023	CONDT (PVC) (SCH 40) (2")	LF	402
618 6024	CONDT (PVC) (SCH 40) (2") (BORE)	LF	60
620 6011	ELEC CONDR (NO. 4) BARE	LF	489
620 6012	ELEC CONDR (NO. 4) INSULATED	LF	978
624 6002	GROUND BOX TY A (122311)W/APRON	EA	4
628 6250	ELC SRV TY D 120/240 100(NS)SS IN)SP (O)	EA	1
650 6031	INS OH SN SUP (30 FT BALL TEE) (SPAN ONLY)	EA	1
6058 6001	BBU SYSTEM (EXTERNAL BATT CABINET)	EA	1
6064 6088	ITS POLE MNT CAB (TY 3)(CONF 1)	EA	1
6263 6002	BLUETOOTH DETECTION SYSTEM	EA	1
6304 6004	ITS RVSD (DC & WWA) (INSTALL ONLY)	EA	1
6320 6001	INSTALL OF FIELD HARD ETHERNET SWITCH	EA	1
6320 6002	INSTALL OF CELLULAR MODEM	EA	1
6028 6001	INSTALL DMS (POLE MTD CABINET)	EA	1
**	ETHERNET SWITCH	EA	1
**	CELLULAR MODEM/ANTENNA	EA	1
**	RVSD (DATA COLLECT & WWA) SYS	EA	1

LOCATION #7 - IH 20 AT SH 115/ FM 1927

NOTES:

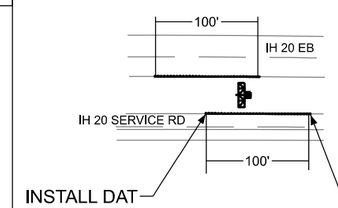
1) EQUPMENT DESIGNATED (**) SHALL BE FURNISHED BY TXDOT AND INSTALLED BY THE CONTRACTOR.

2) LOCATE ALL UTILITIES, DRAINAGE STRUCTURES, AND OTHER CONFLICTS PRIOR TO TRENCHING, BORING, INSTALLING DRILL SHAFTS OR POLES. IF NECESSARY, ADJUST LOCATIONS IN ACCORDANCE WITH TXDOT'S POLE PLACEMENT GUIDELINES AND AS DIRECTED BY THE ENGINEER.

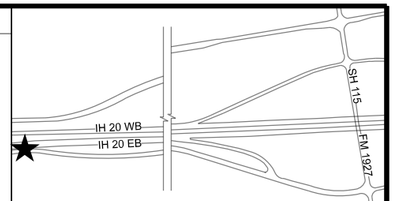
3) DMS POLE MOUNTED CABINET DETAILS ON STANDARD ITS (16) TYPE 3 CABINET SIZE.

4) BBU CABINETS TO BE MOUNTED ON THE POLE

GUARDRAIL PLACEMENT DETAIL

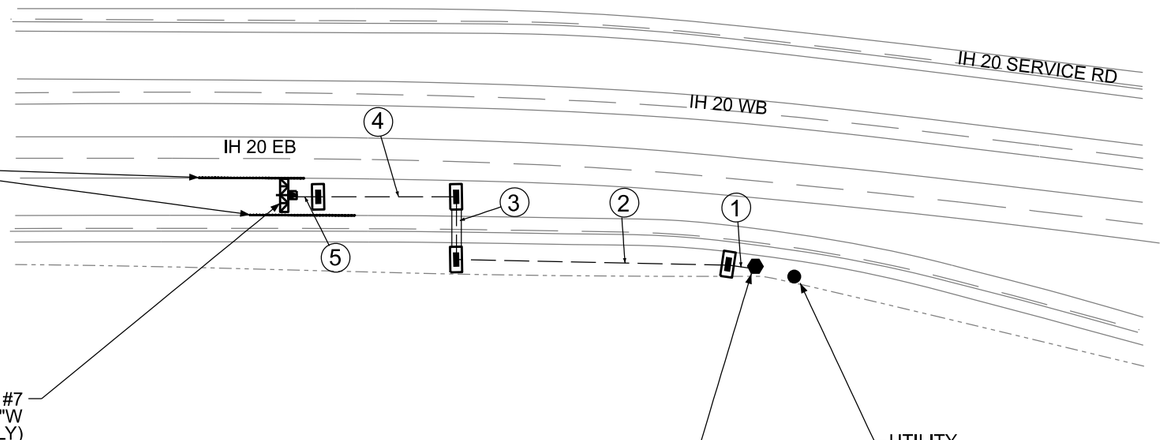


NOTE:
INSTALL MOW STRIP FOR GUARDRAIL SEE STE. GF (31) MS-11



WARD COUNTY

RAILROAD



INSTALL:
2 EA GUARDRAIL END TREATMENT (SGT).
2 EA DOWNSTREAM ANCHOR TERMINAL (DAT).
200 FT METAL BEAM GUARD FENCE (MBGF).
SEE GUARDRAIL PLACEMENT DETAIL ON SHEET.

INSTALL DYNAMIC MESSAGE SIGN #7
31°31'36.71"N, 103°8'22.85"W
1 EA OH SN SUP (30FT BAL TEE) (SPAN ONLY)
1 EA CL C CONC (SIGN COLUMN)
1 EA DRILL SHAFT (54 IN X 35 LF)
1 EA DMS POLE MOUNTED CABINET
1 EA BBU POLE MOUNTED CABINET
1 EA BLUETOOTH DETECTION SYSTEM
1 EA DMS SIGN **
1 EA CELLULAR MODEM **
1 EA HARDENED ETHERNET SWITCH **
1 EA RVSD (DATA COLLECT & WWA) SYS **

UTILITY
POWER SOURCE

INSTALL ELECTRICAL SERVICE #7
TY D 120/240 100(NS)SS(N)SP(O)
*SEE ELECTRICAL SERVICE DATA SHEET

	LEGEND
	PROPOSED DYNAMIC MESSAGE SIGN
	PROPOSED FOUNDATION MOUNTED DMS AND BBU CABINETS
	PROPOSED ITS POLE WITH POLE MOUNTED CABINET AND FOUNDATION MOUNTED BBU CABINET
	PROPOSED CCTV
	PROPOSED HD RVSD
	PROPOSED ECLECTRICAL SERVICE (120V/240V)
	PROPOSED ITS GROUND BOX (TY1)
	PROPOSED ITS GROUND BOX (TY A) W/ APRON
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (CONC ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (CONC ENCSE)
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (STL ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (STL ENCSE)
	PROPOSED 2-4" MULTI-DUCT RMC CONDT PROPOSED 2-3" PVC RMC CONDT
	PROPOSED 2-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT (BORED)
	PROPOSED CONDUIT RUN

LOCATION 7	RUN TABLE DMS EB -IH 20 ST SH 115/FM 1927 (PYOTE)							
BID ITEM	DESCRIPTION	R1	R2	R3	R4	R5	UOM	TOTALS
	RUN LENGTH	10	200	60	182	10		
	POINT:POINT	ES:GB	GB:GB	GB:GB	GB:GB	GB:DMS		
618 6023	CONDT (PVC) (SCH 40) (2")	10	200		182	10	LF	402
618 6024	CONDT (PVC) (SCH 40) (2") (BORE)			60			LF	60
620 6011	ELEC CONDR (NO. 4) BARE	13	206	66	188	16	LF	489
620 6012	ELEC CONDR (NO. 4) INSULATED	26	412	132	376	32	LF	978

STATE OF TEXAS
ADRIANA GEIGER
108603
LICENSED
PROFESSIONAL ENGINEER

Adriana Geiger, P.E.
ADRIANA GEIGER, P.E.
11/1/2023
Date

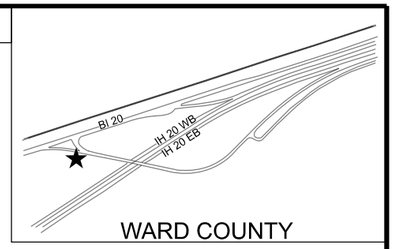
ITS PLAN

Texas Department of Transportation

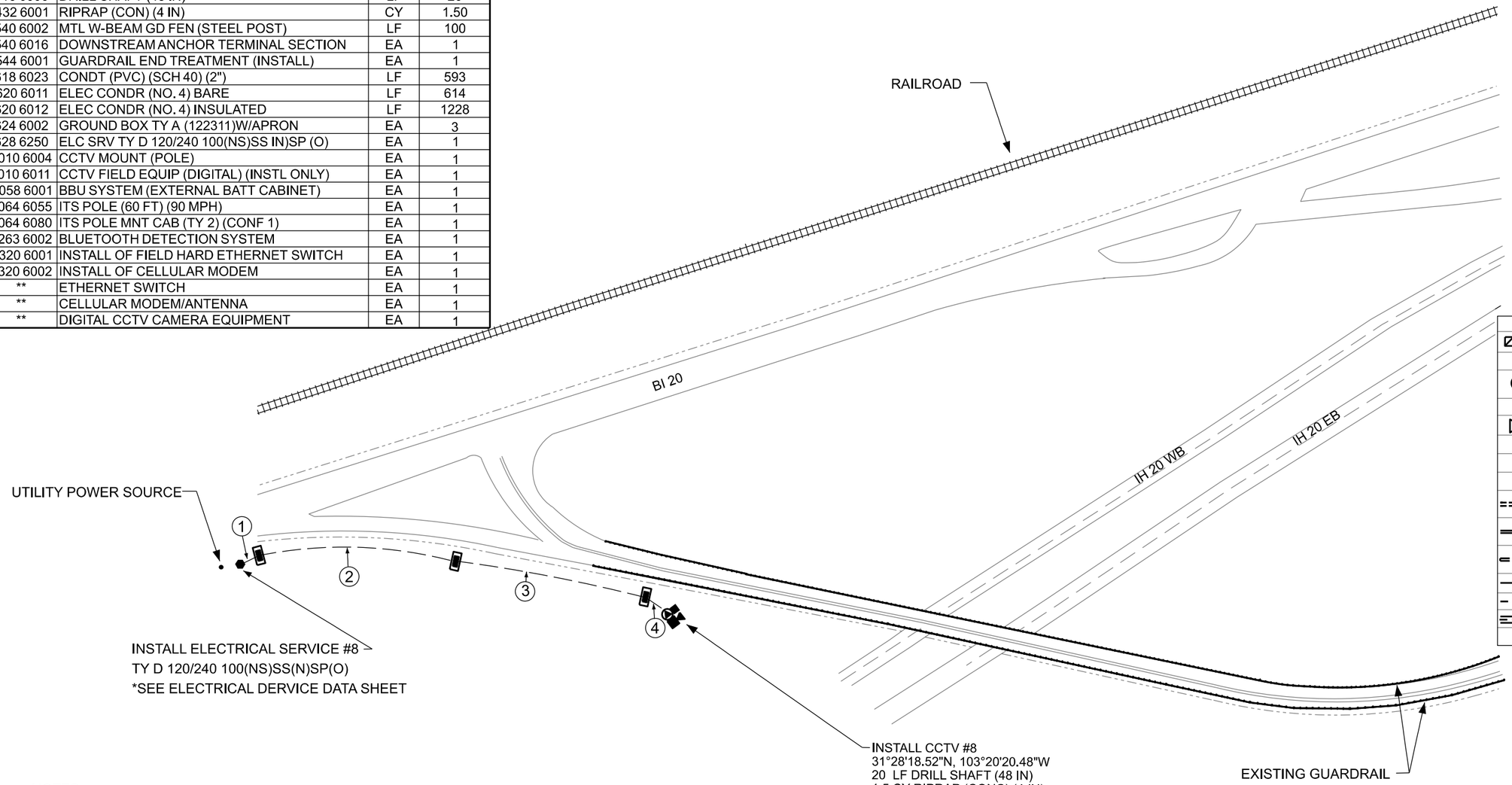
FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			31
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	DISTRICTWIDE	
CONT.	SECT.	JOB	HIGHWAY NO.
0906	00	268	VARIOUS

LOCATION #8 - IH 20 AT E BI 20 (BARSTOW)

LOCATION 8	SHEET SUMMARY OF QUANTITIES CCTV -IH 20 AT E BI 20 INTERCHANGE (BARSTOW)		
BID ITEM	DESCRIPTION	UNITS	QTY
416 6006	DRILL SHAFT (48 IN)	LF	20
432 6001	RIPRAP (CON) (4 IN)	CY	1.50
540 6002	MTL W-BEAM GD FEN (STEEL POST)	LF	100
540 6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	1
544 6001	GUARDRAIL END TREATMENT (INSTALL)	EA	1
618 6023	CONDT (PVC) (SCH 40) (2")	LF	593
620 6011	ELEC CONDR (NO. 4) BARE	LF	614
620 6012	ELEC CONDR (NO. 4) INSULATED	LF	1228
624 6002	GROUND BOX TY A (122311)W/APRON	EA	3
628 6250	ELC SRV TY D 120/240 100(NS)SS IN)SP (O)	EA	1
6010 6004	CCTV MOUNT (POLE)	EA	1
6010 6011	CCTV FIELD EQUIP (DIGITAL) (INSTL ONLY)	EA	1
6058 6001	BBU SYSTEM (EXTERNAL BATT CABINET)	EA	1
6064 6055	ITS POLE (60 FT) (90 MPH)	EA	1
6064 6080	ITS POLE MNT CAB (TY 2) (CONF 1)	EA	1
6263 6002	BLUETOOTH DETECTION SYSTEM	EA	1
6320 6001	INSTALL OF FIELD HARD ETHERNET SWITCH	EA	1
6320 6002	INSTALL OF CELLULAR MODEM	EA	1
**	ETHERNET SWITCH	EA	1
**	CELLULAR MODEM/ANTENNA	EA	1
**	DIGITAL CCTV CAMERA EQUIPMENT	EA	1



WARD COUNTY



LEGEND	
	PROPOSED DYNAMIC MESSAGE SIGN
	PROPOSED FOUNDATION MOUNTED DMS AND BBU CABINETS
	PROPOSED ITS POLE WITH POLE MOUNTED CABINET AND FOUNDATION MOUNTED BBU CABINET
	PROPOSED CCTV
	PROPOSED HD RVSD
	PROPOSED ECLECTRICAL SERVICE (120V/240V)
	PROPOSED ITS GROUND BOX (TY1)
	PROPOSED ITS GROUND BOX (TY A) W/ APRON
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (CONC ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (CONC ENCSE)
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (STL ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (STL ENCSE)
	PROPOSED 2-4" MULTI-DUCT RMC CONDT PROPOSED 2-3" PVC RMC CONDT
	PROPOSED 2-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT (BORED)
	PROPOSED CONDUIT RUN

NOTES:

1) EQUPMENT DESIGNATED (**) SHALL BE FURNISHED BY TXDOT AND INSTALLED BY THE CONTRACTOR.

2) LOCATE ALL UTILITIES, DRAINAGE STRUCTURES, AND OTHER CONFLICTS PRIOR TO TRENCHING, BORING, INSTALLING DRILL SHAFTS OR POLES. IF NECESSARY, ADJUST LOCATIONS IN ACCORDANCE WITH TXDOT'S POLE PLACEMENT GUIDELINES AND AS DIRECTED BY THE ENGINEER.

3) ITS POLE MOUNTED CABINET DETAILS ON STANDARD ITS (15) TYPE 2 CABINET

4) BBU CABINETS TO BE MOUNTED ON THE ITS POLE.

LOCATION 8	RUN TABLE CCTV -IH 20 AT E BI 20 INTERCHANGE (BARSTOW)						
BID ITEM	DESCRIPTION	R1	R2	R3	R4	UOM	TOTALS
	RUN LENGTH	20	277	276	20		
	POINT:POINT	ES:GB	GB:GB	GB:GB	GB:CCTV		
618 6023	CONDT (PVC) (SCH 40) (2")	20	277	276	20	LF	593
620 6011	ELEC CONDR (NO. 4) BARE	23	283	282	26	LF	614
620 6012	ELEC CONDR (NO. 4) INSULATED	46	566	564	52	LF	1228

STATE OF TEXAS
SAUL ROMERO, JR.
118987
LICENSED
PROFESSIONAL ENGINEER

SAUL ROMERO, JR., P.E.

9/15/2023
Date

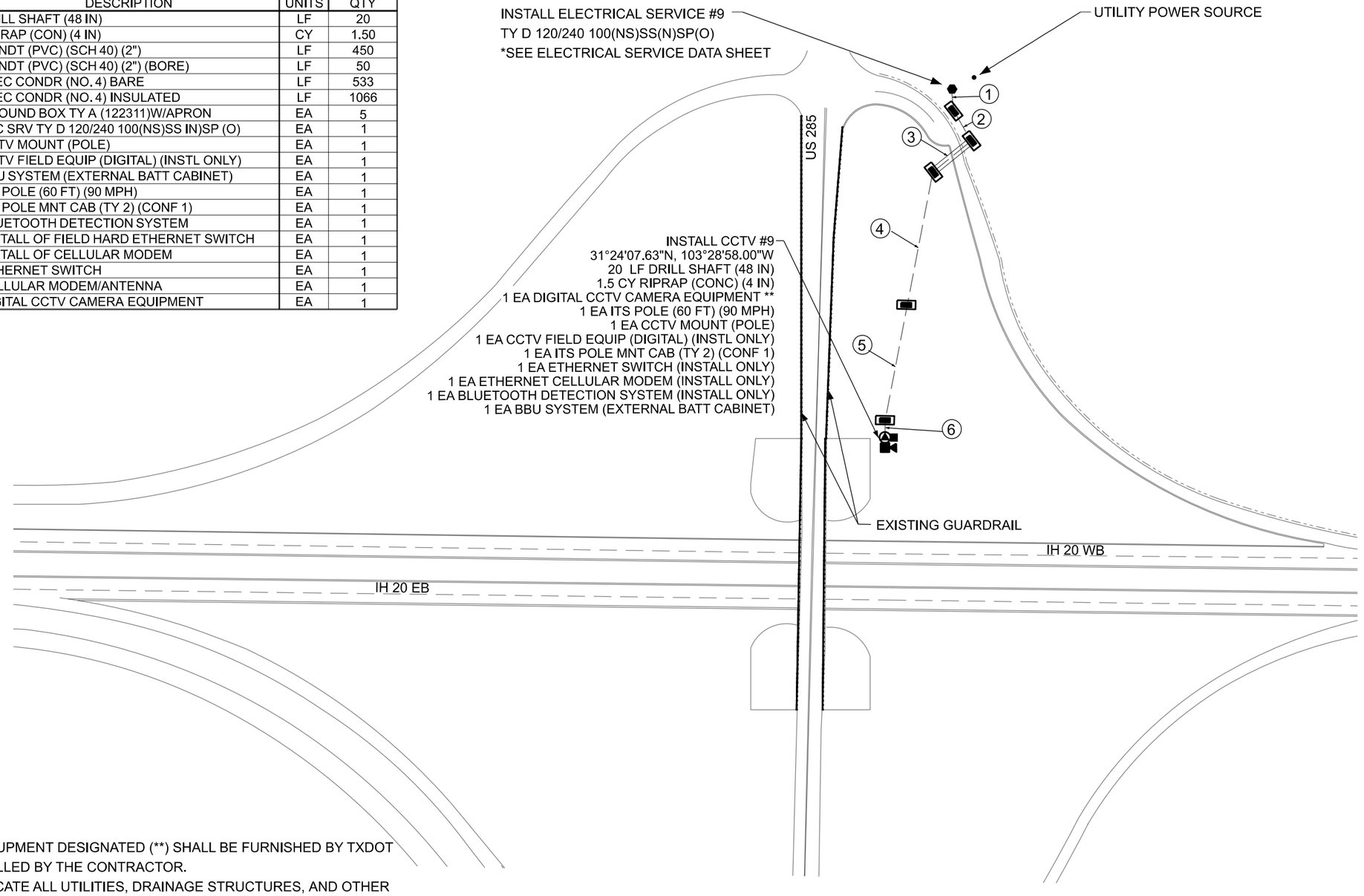
ITS PLAN

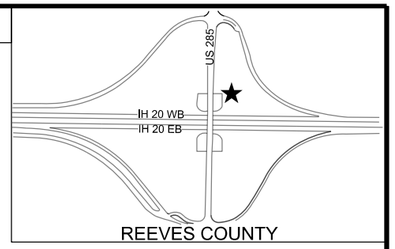
Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			32
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	DISTRICTWIDE	
CONT.	SECT.	JOB	HIGHWAY NO.
0906	00	268	VARIOUS

LOCATION 9	SHEET SUMMARY OF QUANTITIES CCTV -IH 20 AT US 285		
BID ITEM	DESCRIPTION	UNITS	QTY
416 6006	DRILL SHAFT (48 IN)	LF	20
432 6001	RIPRAP (CON) (4 IN)	CY	1.50
618 6023	CONDT (PVC) (SCH 40) (2")	LF	450
618 6024	CONDT (PVC) (SCH 40) (2") (BORE)	LF	50
620 6011	ELEC CONDR (NO. 4) BARE	LF	533
620 6012	ELEC CONDR (NO. 4) INSULATED	LF	1066
624 6002	GROUND BOX TY A (122311)W/APRON	EA	5
628 6250	ELC SRV TY D 120/240 100(NS)SS IN)SP (O)	EA	1
6010 6004	CCTV MOUNT (POLE)	EA	1
6010 6011	CCTV FIELD EQUIP (DIGITAL) (INSTL ONLY)	EA	1
6058 6001	BBU SYSTEM (EXTERNAL BATT CABINET)	EA	1
6064 6055	ITS POLE (60 FT) (90 MPH)	EA	1
6064 6080	ITS POLE MNT CAB (TY 2) (CONF 1)	EA	1
6263 6002	BLUETOOTH DETECTION SYSTEM	EA	1
6320 6001	INSTALL OF FIELD HARD ETHERNET SWITCH	EA	1
6320 6002	INSTALL OF CELLULAR MODEM	EA	1
**	ETHERNET SWITCH	EA	1
**	CELLULAR MODEM/ANTENNA	EA	1
**	DIGITAL CCTV CAMERA EQUIPMENT	EA	1

LOCATION #9 - IH 20 AT US 285





	LEGEND
	PROPOSED DYNAMIC MESSAGE SIGN
	PROPOSED FOUNDATION MOUNTED DMS AND BBU CABINETS
	PROPOSED ITS POLE WITH POLE MOUNTED CABINET AND FOUNDATION MOUNTED BBU CABINET
	PROPOSED CCTV
	PROPOSED HD RVSD
	PROPOSED ECLECTRICAL SERVICE (120V/240V)
	PROPOSED ITS GROUND BOX (TY1)
	PROPOSED ITS GROUND BOX (TY A) W/ APRON
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (CONC ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (CONC ENCSE)
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (STL ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (STL ENCSE)
	PROPOSED 2-4" MULTI-DUCT RMC CONDT PROPOSED 2-3" PVC RMC CONDT
	PROPOSED 2-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT (BORED)
	PROPOSED CONDUIT RUN

NOTES:

1) EQUPMENT DESIGNATED (**) SHALL BE FURNISHED BY TXDOT AND INSTALLED BY THE CONTRACTOR.

2) LOCATE ALL UTILITIES, DRAINAGE STRUCTURES, AND OTHER CONFLICTS PRIOR TO TRENCHING, BORING, INSTALLING DRILL SHAFTS OR POLES. IF NECESSARY, ADJUST LOCATIONS IN ACCORDANCE WITH TXDOT'S POLE PLACEMENT GUIDELINES AND AS DIRECTED BY THE ENGINEER.

3) ITS POLE MOUNTED CABINET DETAILS ON STANDARD ITE (15) TYPE 2 CABINET

4)BBU CABINETS TO BE MOUNTED ON THE ITS POLE.

LOCATION 9	RUN TABLE CCTV -IH 20 AT US 285								
BID ITEM	DESCRIPTION	R1	R2	R3	R4	R5	R6	UOM	TOTALS
	RUN LENGTH	15	23	50	200	197	15		
	POINT:POINT	ES:GB	GB:GB	GB:GB	GB:GB	GB:GB	GB:CCTV		
618 6023	CONDT (PVC) (SCH 40) (2")	15	23		200	197	15	LF	450
618 6024	CONDT (PVC) (SCH 40) (2") (BORE)			50				LF	50
620 6011	ELEC CONDR (NO. 4) BARE	18	29	56	206	203	21	LF	533
620 6012	ELEC CONDR (NO. 4) INSULATED	36	58	112	412	406	42	LF	1066

STATE OF TEXAS
SAUL ROMERO, JR.
118987
LICENSED
PROFESSIONAL ENGINEER

SAUL ROMERO, JR., P.E.

9/15/2023
Date

ITS PLAN

Texas Department of Transportation®

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			33
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	DISTRICTWIDE	
CONT.	SECT.	JOB	HIGHWAY NO.
0906	00	268	VARIOUS

LOCATION #10 - IH 20 AT MM 13

LOCATION 10	SHEET SUMMARY OF QUANTITIES CCTV -IH 20 AT MM 13		
BID ITEM	DESCRIPTION	UNITS	QTY
416 6006	DRILL SHAFT (48 IN)	LF	20
432 6001	RIPRAP (CON) (4 IN)	CY	1.50
618 6023	CONDT (PVC) (SCH 40) (2")	LF	67
618 6024	CONDT (PVC) (SCH 40) (2") (BORE)	LF	33
620 6007	ELEC CONDR (NO. 8) BARE	LF	121
620 6008	ELEC CONDR (NO. 8) INSULATED	LF	242
624 6002	GROUND BOX TY A (122311)W/APRON	EA	3
628 6250	ELC SRV TY D 120/240 100(NS)SS IN)SP (O)	EA	1
6010 6004	CCTV MOUNT (POLE)	EA	1
6010 6011	CCTV FIELD EQUIP (DIGITAL) (INSTL ONLY)	EA	1
6058 6001	BBU SYSTEM (EXTERNAL BATT CABINET)	EA	1
6064 6055	ITS POLE (60 FT) (90 MPH)	EA	1
6064 6080	ITS POLE MNT CAB (TY 2) (CONF 1)	EA	1
6263 6002	BLUETOOTH DETECTION SYSTEM	EA	1
6320 6001	INSTALL OF FIELD HARD ETHERNET SWITCH	EA	1
6320 6002	INSTALL OF CELLULAR MODEM	EA	1
**	ETHERNET SWITCH	EA	1
**	CELLULAR MODEM/ANTENNA	EA	1
**	DIGITAL CCTV CAMERA EQUIPMENT	EA	1

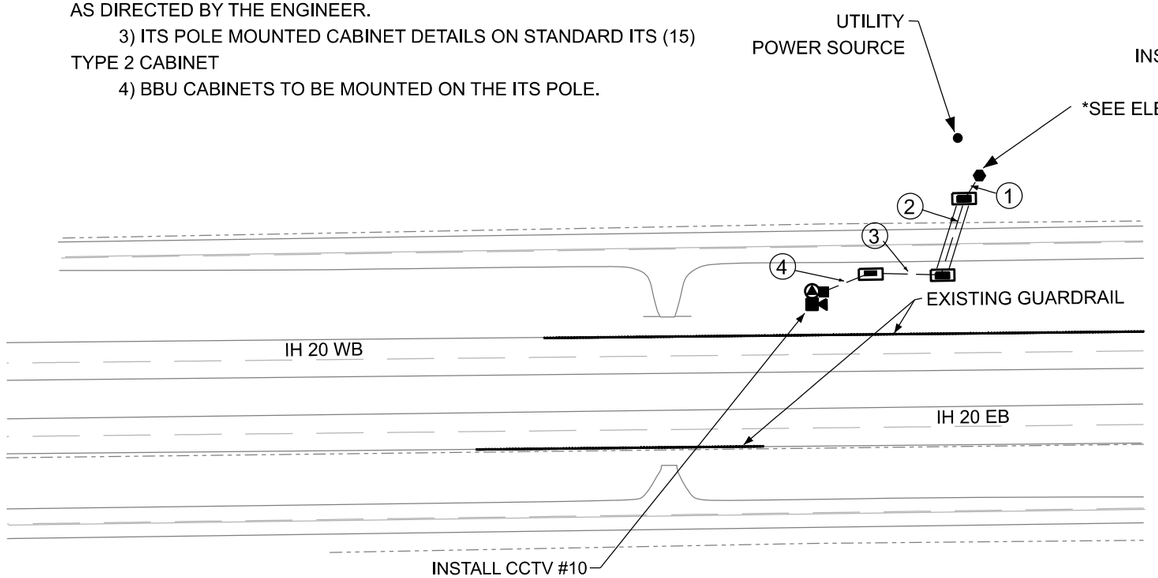
NOTES:

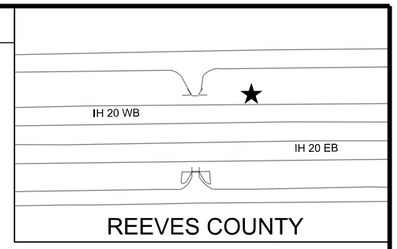
1) EQUPMENT DESIGNATED (**) SHALL BE FURNISHED BY TXDOT AND INSTALLED BY THE CONTRACTOR.

2) LOCATE ALL UTILITIES, DRAINAGE STRUCTURES, AND OTHER CONFLICTS PRIOR TO TRENCHING, BORING, INSTALLING DRILL SHAFTS OR POLES. IF NECESSARY, ADJUST LOCATIONS IN ACCORDANCE WITH TXDOT'S POLE PLACEMENT GUIDELINES AND AS DIRECTED BY THE ENGINEER.

3) ITS POLE MOUNTED CABINET DETAILS ON STANDARD ITS (15) TYPE 2 CABINET

4) BBU CABINETS TO BE MOUNTED ON THE ITS POLE.





	LEGEND
	PROPOSED DYNAMIC MESSAGE SIGN
	PROPOSED FOUNDATION MOUNTED DMS AND BBU CABINETS
	PROPOSED ITS POLE WITH POLE MOUNTED CABINET AND FOUNDATION MOUNTED BBU CABINET
	PROPOSED CCTV
	PROPOSED HD RVSD
	PROPOSED ECLECTRICAL SERVICE (120V/240V)
	PROPOSED ITS GROUND BOX (TY1)
	PROPOSED ITS GROUND BOX (TY A) W/ APRON
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (CONC ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (CONC ENCSE)
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (STL ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (STL ENCSE)
	PROPOSED 2-4" MULTI-DUCT RMC CONDT PROPOSED 2-3" PVC RMC CONDT
	PROPOSED 2-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT (BORED)
	PROPOSED CONDUIT RUN

LOCATION 10	RUN TABLE CCTV -IH 20 AT MM 13						
BID ITEM	DESCRIPTION	R1	R2	R3	R4	UOM	TOTALS
	RUN LENGTH	13	33	40	14		
	POINT:POINT	ES:GB	GB:GB	GB:GB	GB:CCTV		
618 6023	CONDT (PVC) (SCH 40) (2")	13		40	14	LF	67
618 6024	CONDT (PVC) (SCH 40) (2") (BORE)		33			LF	33
620 6007	ELEC CONDR (NO. 8) BARE	16	39	46	20	LF	121
620 6008	ELEC CONDR (NO. 8) INSULATED	32	78	92	40	LF	242

SAUL ROMERO, JR., P.E.

9/15/2023
Date

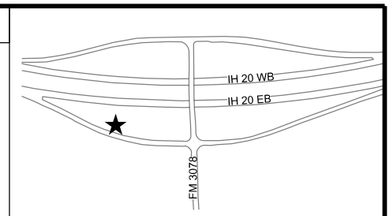
ITS PLAN

Texas Department of Transportation®

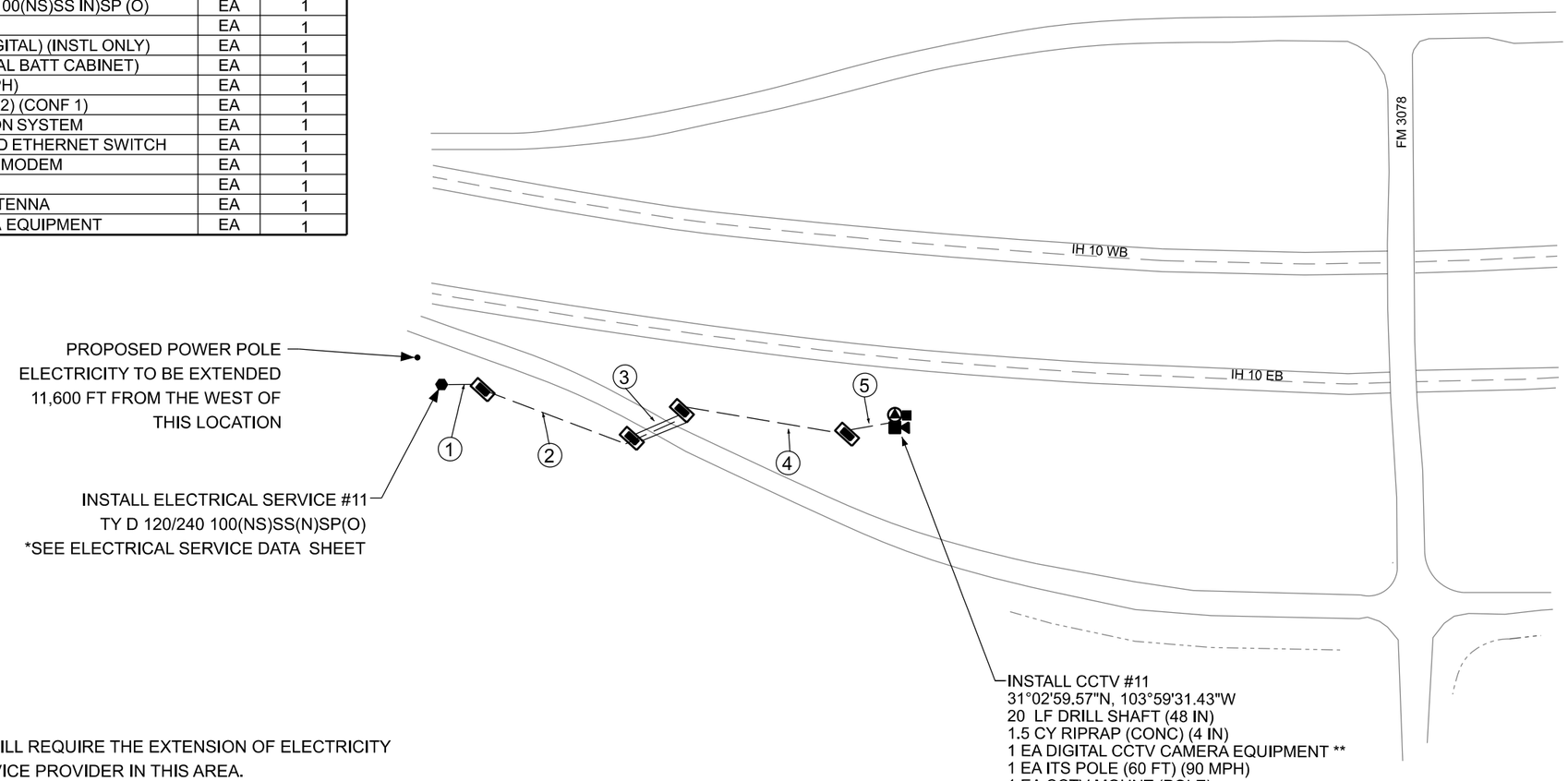
FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			34
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	DISTRICTWIDE	
CONT.	SECT.	JOB	HIGHWAY NO.
0906	00	268	VARIOUS

LOCATION 11	SHEET SUMMARY OF QUANTITIES CCTV -IH 10 AT FM 3078 (EXIT 192)		
BID ITEM	DESCRIPTION	UNITS	QTY
416 6006	DRILL SHAFT (48 IN)	LF	20
432 6001	RIPRAP (CON) (4 IN)	CY	1.50
618 6023	CONDT (PVC) (SCH 40) (2")	LF	476
618 6024	CONDT (PVC) (SCH 40) (2") (BORE)	LF	54
620 6009	ELEC CONDR (NO. 6) BARE	LF	557
620 6010	ELEC CONDR (NO. 6) INSULATED	LF	1114
624 6002	GROUND BOX TY A (122311)W/APRON	EA	4
628 6250	ELC SRV TY D 120/240 100(NS)SS IN)SP (O)	EA	1
6010 6004	CCTV MOUNT (POLE)	EA	1
6010 6011	CCTV FIELD EQUIP (DIGITAL) (INSTL ONLY)	EA	1
6058 6001	BBU SYSTEM (EXTERNAL BATT CABINET)	EA	1
6064 6055	ITS POLE (60 FT) (90 MPH)	EA	1
6064 6080	ITS POLE MNT CAB (TY 2) (CONF 1)	EA	1
6263 6002	BLUETOOTH DETECTION SYSTEM	EA	1
6320 6001	INSTALL OF FIELD HARD ETHERNET SWITCH	EA	1
6320 6002	INSTALL OF CELLULAR MODEM	EA	1
**	ETHERNET SWITCH	EA	1
**	CELLULAR MODEM/ANTENNA	EA	1
**	DIGITAL CCTV CAMERA EQUIPMENT	EA	1

LOCATION #11 - IH 10 AT FM 3078 (EXIT 192)



REEVES COUNTY



PROPOSED POWER POLE
ELECTRICITY TO BE EXTENDED
11,600 FT FROM THE WEST OF
THIS LOCATION

INSTALL ELECTRICAL SERVICE #11
TY D 120/240 100(NS)SS(N)SP(O)
*SEE ELECTRICAL SERVICE DATA SHEET

INSTALL CCTV #11
31°02'59.57"N, 103°59'31.43"W
20 LF DRILL SHAFT (48 IN)
1.5 CY RIPRAP (CONC) (4 IN)
1 EA DIGITAL CCTV CAMERA EQUIPMENT **
1 EA ITS POLE (60 FT) (90 MPH)
1 EA CCTV MOUNT (POLE)
1 EA CCTV FIELD EQUIP (DIGITAL) (INSTL ONLY)
1 EA ITS POLE MNT CAB (TY 2) (CONF 1)
1 EA ETHERNET SWITCH **
1 EA CELLULAR MODEM **
1 EA BLUETOOTH DETECTION SYSTEM (INSTALL ONLY)
1 EA BBU SYSTEM (EXTERNAL BATT CABINET)

	LEGEND
	PROPOSED DYNAMIC MESSAGE SIGN
	PROPOSED FOUNDATION MOUNTED DMS AND BBU CABINETS
	PROPOSED ITS POLE WITH POLE MOUNTED CABINET AND FOUNDATION MOUNTED BBU CABINET
	PROPOSED CCTV
	PROPOSED HD RVSD
	PROPOSED ECLECTRICAL SERVICE (120V/240V)
	PROPOSED ITS GROUND BOX (TY1)
	PROPOSED ITS GROUND BOX (TY A) W/ APRON
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (CONC ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (CONC ENCSE)
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (STL ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (STL ENCSE)
	PROPOSED 2-4" MULTI-DUCT RMC CONDT PROPOSED 2-3" PVC RMC CONDT
	PROPOSED 2-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT (BORED)
	PROPOSED CONDUIT RUN

NOTES:

1) THIS LOCATION WILL REQUIRE THE EXTENSION OF ELECTRICITY BY THE ELECTRICAL SERVICE PROVIDER IN THIS AREA.

2) EQUPMENT DESIGNATED (**) SHALL BE FURNISHED BY TXDOT AND INSTALLED BY THE CONTRACTOR.

3) LOCATE ALL UTILITIES, DRAINAGE STRUCTURES, AND OTHER CONFLICTS PRIOR TO TRENCHING, BORING, INSTALLING DRILL SHAFTS OR POLES. IF NECESSARY, ADJUST LOCATIONS IN ACCORDANCE WITH TXDOT'S POLE PLACEMENT GUIDELINES AND AS DIRECTED BY THE ENGINEER.

4) ITS POLE MOUNTED CABINET DETAILS ON STANDARD ITS (15) TYPE 2 CABINET

5) BBU CABINETS TO BE MOUNTED ON THE ITS POLE.

LOCATION 11	RUN TABLE CCTV -IH 10 AT FM 3078 (EXIT 192)								
BID ITEM	DESCRIPTION	R1	R2	R3	R4	R5	UOM	TOTALS
	RUN LENGTH	15	250	54	200	11		
	POINT:POINT	ES:GB	GB:GB	GB:GB	GB:GB	GB:CCTV		
618 6023	CONDT (PVC) (SCH 40) (2")	15	250		200	11	LF	476
618 6024	CONDT (PVC) (SCH 40) (2") (BORE)			54			LF	54
620 6009	ELEC CONDR (NO. 4) BARE	18	256	60	206	17	LF	557
620 6010	ELEC CONDR (NO. 4) INSULATED	36	512	120	412	34	LF	1114

STATE OF TEXAS
SAUL ROMERO, JR.
118987
LICENSED
PROFESSIONAL ENGINEER

SAUL ROMERO, JR., P.E.

SAUL ROMERO, JR., P.E.

9/15/2023
Date

ITS PLAN

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			35
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	DISTRICTWIDE	
CONT.	SECT.	JOB	HIGHWAY NO.
0906	00	268	VARIOUS

LOCATION 12	SHEET SUMMARY OF QUANTITIES DMS EB -IH 10 AT FM 2903/BI 10F (EXIT 206)		
BID ITEM	DESCRIPTION	UNITS	QTY
416 6023	DRILL SHAFT (SIGN MTS) (54 IN)	LF	35
420 6068	CL C CONC (SIGN COLUMN)	CY	22
432 6001	RIPRAP (CON) (4 IN)	CY	1.50
540 6002	MTL W-BEAM GD FEN (STEEL POST)	LF	100
540 6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	1
544 6001	GUARDRAIL END TREATMENT (INSTALL)	EA	1
618 6023	CONDT (PVC) (SCH 40) (2")	LF	455
620 6011	ELEC CONDR (NO. 4) BARE	LF	476
620 6012	ELEC CONDR (NO. 4) INSULATED	LF	952
624 6002	GROUND BOX TY A (122311)W/APRON	EA	3
628 6250	ELC SRV TY D 120/240 100(NS)SS IN)SP (O)	EA	1
650 6031	INS OH SN SUP (30 FT BALL TEE) (SPAN ONLY)	EA	1
6058 6001	BBU SYSTEM (EXTERNAL BATT CABINET)	EA	1
6064 6088	ITS POLE MNT CAB (TY 3)(CONF 1)	EA	1
6263 6002	BLUETOOTH DETECTION SYSTEM	EA	1
6304 6004	ITS RVSD (DC & WWA) (INSTALL ONLY)	EA	1
6320 6001	INSTALL OF FIELD HARD ETHERNET SWITCH	EA	1
6320 6002	INSTALL OF CELLULAR MODEM	EA	1
6028 6001	INSTALL DMS (POLE MTD CABINET)	EA	1
**	ETHERNET SWITCH	EA	1
**	CELLULAR MODEM/ANTENNA	EA	1
**	RVSD (DATA COLLECT & WWA) SYS	EA	1

LOCATION #12 - IH 10 AT FM 2903 - BI10F

NOTES:

1) THIS LOCATION WILL REQUIRE THE EXTENSION OF ELECTRICITY BY THE ELECTRICAL SERVICE PROVIDER IN THIS AREA.

2)EQUPMENT DESIGNATED (**) SHALL BE FURNISHED BY TXDOT AND INSTALLED BY THE CONTRACTOR.

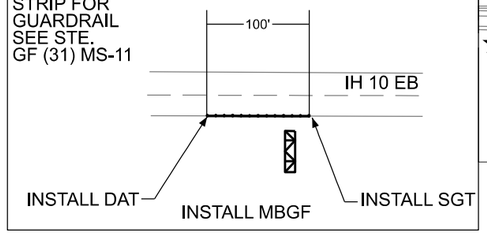
3) LOCATE ALL UTILITIES, DRAINAGE STRUCTURES, AND OTHER CONFLICTS PRIOR TO TRENCHING, BORING, INSTALLING DRILL SHAFTS OR POLES. IF NECESSARY, ADJUST LOCATIONS IN ACCORDANCE WITH TXDOT'S POLE PLACEMENT GUIDELINES AND AS DIRECTED BY THE ENGINEER.

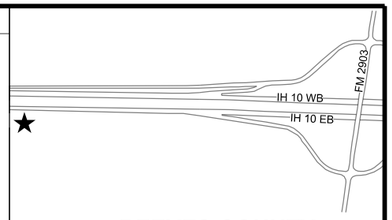
4) DMS POLE MOUNTED CABINET DETAILS ON STANDARD ITS (16) TYPE 3 CABINET.

5) BBU CABINETS TO BE MOUNTED ON THE POLE.

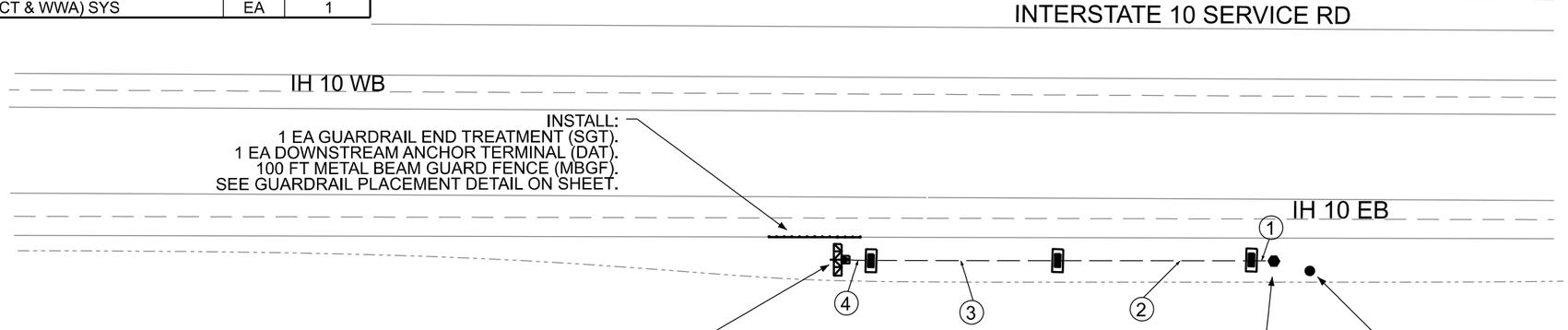
GUARDRAIL PLACEMENT DETAIL

NOTE:
INSTALL MOW STRIP FOR GUARDRAIL SEE STE. GF (31) MS-11



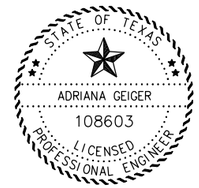


REEVES COUNTY



	LEGEND
	PROPOSED DYNAMIC MESSAGE SIGN
	PROPOSED FOUNDATION MOUNTED DMS AND BBU CABINETS
	PROPOSED ITS POLE WITH POLE MOUNTED CABINET AND FOUNDATION MOUNTED BBU CABINET
	PROPOSED CCTV
	PROPOSED HD RVSD
	PROPOSED ECLECTRICAL SERVICE (120V/240V)
	PROPOSED ITS GROUND BOX (TY1)
	PROPOSED ITS GROUND BOX (TY A) W/ APRON
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (CONC ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (CONC ENCSE)
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (STL ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (STL ENCSE)
	PROPOSED 2-4" MULTI-DUCT RMC CONDT PROPOSED 2-3" PVC RMC CONDT
	PROPOSED 2-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT (BORED)
	PROPOSED CONDUIT RUN

LOCATION 12	RUN TABLE DMS EB -IH 10 AT FM 2903/BI 10F (EXIT 206)						
BID ITEM	DESCRIPTION	R1	R2	R3	R4	UOM	TOTALS
	RUN LENGTH	15	210	210	20		
	POINT:POINT	ES:GB	GB:GB	GB:GB	GB:DMS		
618 6023	CONDT (PVC) (SCH 40) (2")	15	210	210	20	LF	455
620 6011	ELEC CONDR (NO. 4) BARE	18	216	216	26	LF	476
620 6012	ELEC CONDR (NO. 4) INSULATED	36	432	432	52	LF	952



Adriana Geiger, P.E.

ADRIANA GEIGER, P.E.

11/1/2023

Date

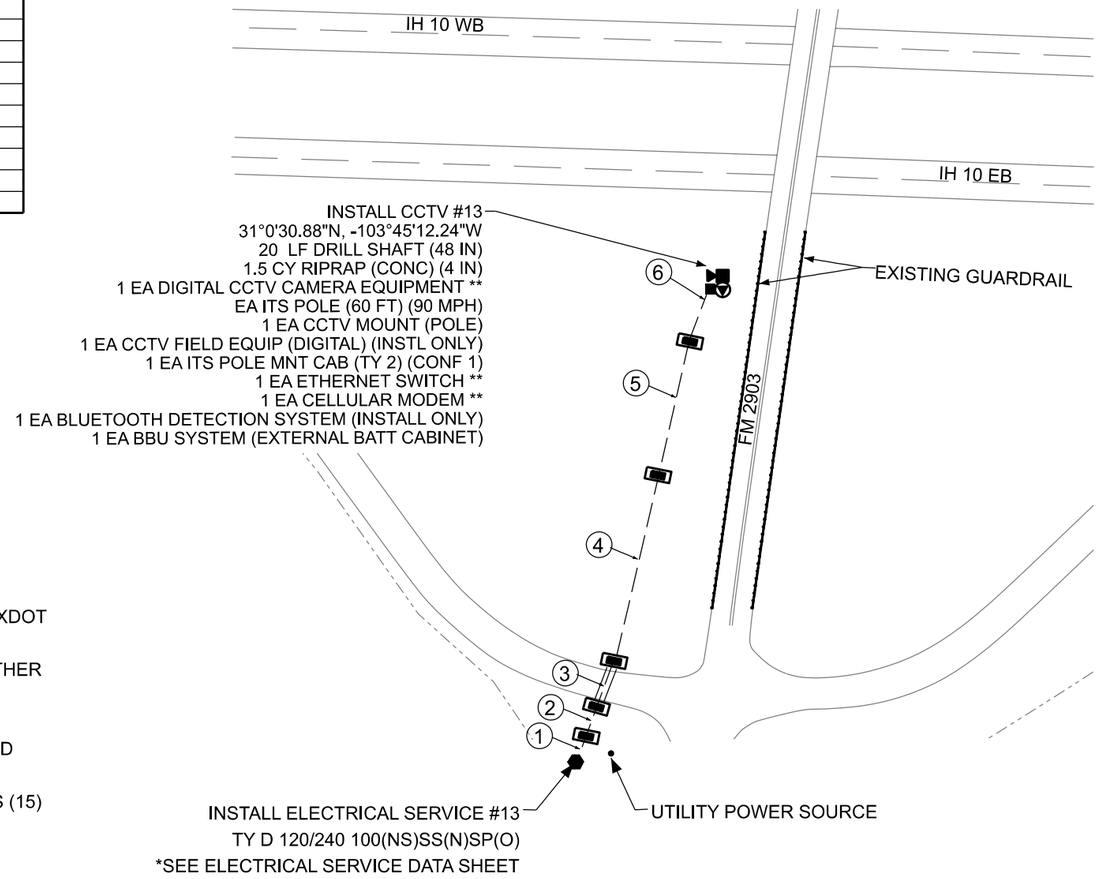
ITS PLAN

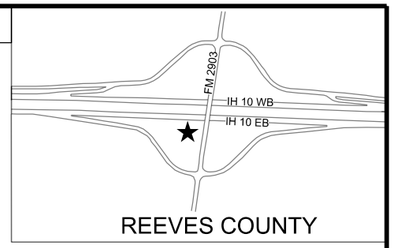
Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			36
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	DISTRICTWIDE	
CONT.	SECT.	JOB	HIGHWAY NO.
0906	00	268	VARIOUS

LOCATION #13 - IH 10 AT FM 2903 - BI10F

LOCATION 13	SHEET SUMMARY OF QUANTITIES CCTV -IH 10 AT FM 2903/BI 10F		
BID ITEM	DESCRIPTION	UNITS	QTY
416 6006	DRILL SHAFT (48 IN)	LF	20
432 6001	RIPRAP (CON) (4 IN)	CY	1.50
618 6023	CONDT (PVC) (SCH 40) (2")	LF	350
618 6024	CONDT (PVC) (SCH 40) (2") (BORE)	LF	50
620 6009	ELEC CONDR (NO. 6) BARE	LF	433
620 6010	ELEC CONDR (NO. 6) INSULATED	LF	866
624 6002	GROUND BOX TY A (122311)W/APRON	EA	5
628 6250	ELC SRV TY D 120/240 100(NS)SS IN)SP (O)	EA	1
6010 6004	CCTV MOUNT (POLE)	EA	1
6010 6011	CCTV FIELD EQUIP (DIGITAL) (INSTL ONLY)	EA	1
6058 6001	BBU SYSTEM (EXTERNAL BATT CABINET)	EA	1
6064 6055	ITS POLE (60 FT) (90 MPH)	EA	1
6064 6080	ITS POLE MNT CAB (TY 2) (CONF 1)	EA	1
6263 6002	BLUETOOTH DETECTION SYSTEM	EA	1
6320 6001	INSTALL OF FIELD HARD ETHERNET SWITCH	EA	1
6320 6002	INSTALL OF CELLULAR MODEM	EA	1
**	ETHERNET SWITCH	EA	1
**	CELLULAR MODEM/ANTENNA	EA	1
**	DIGITAL CCTV CAMERA EQUIPMENT	EA	1





	LEGEND
	PROPOSED DYNAMIC MESSAGE SIGN
	PROPOSED FOUNDATION MOUNTED DMS AND BBU CABINETS
	PROPOSED ITS POLE WITH POLE MOUNTED CABINET AND FOUNDATION MOUNTED BBU CABINET
	PROPOSED CCTV
	PROPOSED HD RVSD
	PROPOSED ECLECTRICAL SERVICE (120V/240V)
	PROPOSED ITS GROUND BOX (TY1)
	PROPOSED ITS GROUND BOX (TY A) W/ APRON
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (CONC ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (CONC ENCSE)
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (STL ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (STL ENCSE)
	PROPOSED 2-4" MULTI-DUCT RMC CONDT PROPOSED 2-3" PVC RMC CONDT
	PROPOSED 2-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT (BORED)
	PROPOSED CONDUIT RUN

NOTES:

1) EQUPMENT DESIGNATED (**) SHALL BE FURNISHED BY TXDOT AND INSTALLED BY THE CONTRACTOR.

2) LOCATE ALL UTILITIES, DRAINAGE STRUCTURES, AND OTHER CONFLICTS PRIOR TO TRENCHING, BORING, INSTALLING DRILL SHAFTS OR POLES. IF NECESSARY, ADJUST LOCATIONS IN ACCORDANCE WITH TXDOT'S POLE PLACEMENT GUIDELINES AND AS DIRECTED BY THE ENGINEER.

3) ITS POLE MOUNTED CABINET DETAILS ON STANDARD ITS (15) TYPE 2 CABINET

4) BBU CABINETS TO BE MOUNTED ON THE ITS POLE.

LOCATION 13	RUN TABLE CCTV -IH 10 AT FM 2903/BI 10F									
BID ITEM	DESCRIPTION	R1	R2	R3	R4	R5	R6	UOM	TOTALS
	RUN LENGTH	18	30	50	141	141	20		
	POINT:POINT	ES:GB	GB:GB	GB:GB	GB:GB	GB:GB	GB:CCTV		
618 6023	CONDT (PVC) (SCH 40) (2")	18	30		141	141	20	LF	350
618 6024	CONDT (PVC) (SCH 40) (2") (BORE)			50				LF	50
620 6009	ELEC CONDR (NO. 6) BARE	21	36	56	147	147	26	LF	433
620 6010	ELEC CONDR (NO. 6) INSULATED	42	72	112	294	294	52	LF	866

SAUL ROMERO, JR., P.E.

9/15/2023

Date

ITS PLAN

Texas Department of Transportation®

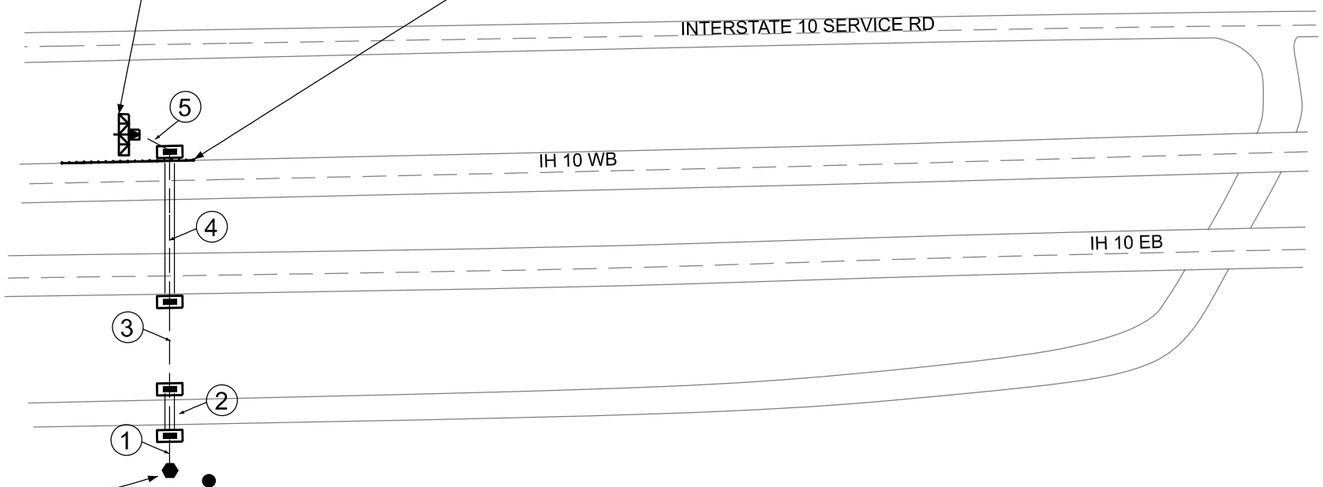
FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			37
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	DISTRICTWIDE	
CONT.	SECT.	JOB	HIGHWAY NO.
0906	00	268	VARIOUS

LOCATION 14	SHEET SUMMARY OF QUANTITIES DMS WB -IH 10 AT FM 2903/BI 10F (EXIT 206)		
BID ITEM	DESCRIPTION	UNITS	QTY
416 6023	DRILL SHAFT (SIGN MTS) (54 IN)	LF	35
420 6068	CL C CONC (SIGN COLUMN)	CY	22
432 6001	RIPRAP (CON) (4 IN)	CY	1.50
540 6002	MTL W-BEAM GD FEN (STEEL POST)	LF	100
540 6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	1
544 6001	GUARDRAIL END TREATMENT (INSTALL)	EA	1
618 6023	CONDT (PVC) (SCH 40) (2")	LF	109
618 6024	CONDT (PVC) (SCH 40) (2") (BORE)	LF	218
620 6011	ELEC CONDR (NO. 4) BARE	LF	354
620 6012	ELEC CONDR (NO. 4) INSULATED	LF	708
624 6002	GROUND BOX TY A (122311)W/APRON	EA	4
628 6250	ELC SRV TY D 120/240 100(NS)SS IN)SP (O)	EA	1
650 6031	INS OH SN SUP (30 FT BALL TEE) (SPAN ONLY)	EA	1
6058 6001	BBU SYSTEM (EXTERNAL BATT CABINET)	EA	1
6064 6088	ITS POLE MNT CAB (TY 3)(CONF 1)	EA	1
6263 6002	BLUETOOTH DETECTION SYSTEM	EA	1
6304 6004	ITS RVSD (DC & WWA) (INSTALL ONLY)	EA	1
6320 6001	INSTALL OF FIELD HARD ETHERNET SWITCH	EA	1
6320 6002	INSTALL OF CELLULAR MODEM	EA	1
6028 6001	INSTALL DMS (POLE MTD CABINET)	EA	1
**	ETHERNET SWITCH	EA	1
**	CELLULAR MODEM/ANTENNA	EA	1
**	RVSD (DATA COLLECT & WWA) SYS	EA	1

LOCATION #14 - IH 10 AT FM 2903 (EXIT 206)

INSTALL DYNAMIC MESSAGE SIGN #14
31°0'22.98"N, 103°43'46.38"W
1 EA OH SN SUP (30FT BAL TEE) (SPAN ONLY)
1 EA CL C CONC (SIGN COLUMN)
1 EA DRILL SHAFT (54 IN X 35 LF)
1 EA DMS POLE MOUNTED CABINET
1 EA BBU POLE MOUNTED CABINET
1 EA BLUETOOTH DETECTION SYSTEM
1 EA DMS SIGN **
1 EA CELLULAR MODEM **
1 EA HARDENED ETHERNET SWITCH **
1 EA RVSD (DATA COLLECT & WWA) SYS **

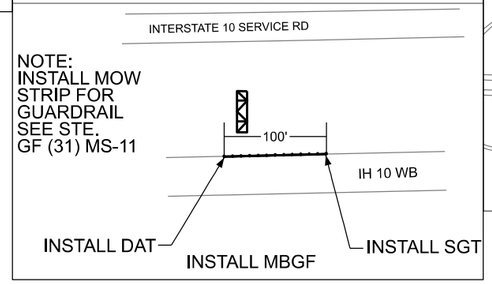
INSTALL:
1 EA GUARDRAIL END TREATMENT (SGT).
1 EA DOWNSTREAM ANCHOR TERMINAL (DAT).
100 FT METAL BEAM GUARD FENCE (MBGF).
SEE GUARDRAIL PLACEMENT DETAIL ON SHEET.

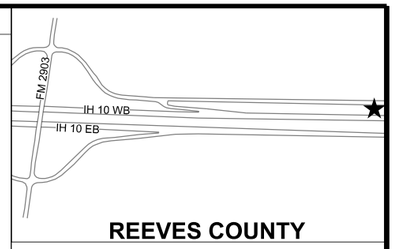


INSTALL ELECTRICAL SERVICE #14
TY D 120/240 100(NS)SS(N)SP(O)
*SEE ELECTRICAL SERVICE DATA SHEET

UTILITY POWER SOURCE

GUARDRAIL PLACEMENT DETAIL





REEVES COUNTY

	LEGEND
	PROPOSED DYNAMIC MESSAGE SIGN
	PROPOSED FOUNDATION MOUNTED DMS AND BBU CABINETS
	PROPOSED ITS POLE WITH POLE MOUNTED CABINET AND FOUNDATION MOUNTED BBU CABINET
	PROPOSED CCTV
	PROPOSED HD RVSD
	PROPOSED ECLECTRICAL SERVICE (120V/240V)
	PROPOSED ITS GROUND BOX (TY1)
	PROPOSED ITS GROUND BOX (TY A) W/ APRON
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (CONC ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (CONC ENCSE)
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (STL ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (STL ENCSE)
	PROPOSED 2-4" MULTI-DUCT RMC CONDT PROPOSED 2-3" PVC RMC CONDT
	PROPOSED 2-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT (BORED)
	PROPOSED CONDUIT RUN

NOTES:

1) EQUPMENT DESIGNATED (**) SHALL BE FURNISHED BY TXDOT AND INSTALLED BY THE CONTRACTOR.

2) LOCATE ALL UTILITIES, DRAINAGE STRUCTURES, AND OTHER CONFLICTS PRIOR TO TRENCHING, BORING, INSTALLING DRILL SHAFTS OR POLES. IF NECESSARY, ADJUST LOCATIONS IN ACCORDANCE WITH TXDOT'S POLE PLACEMENT GUIDELINES AND AS DIRECTED BY THE ENGINEER

3) DMS POLE MOUNTED CABINET DETAILS ON STANDARD ITS (16) TYPE 3 CABINET

4) BBU CABINETS TO BE MOUNTED ON THE POLE.

LOCATION 14	RUN TABLE DMS WB -IH 10 AT FM 2903/BI 10F (EXIT 206)							
BID ITEM	DESCRIPTION	R1	R2	R3	R4	R5	UOM	TOTALS
	RUN LENGTH	20	60	77	158	12		
	POINT:POINT	ES:GB	GB:GB	GB:GB	GB:GB	GB:DMS		
618 6023	CONDT (PVC) (SCH 40) (2")	20		77		12	LF	109
618 6024	CONDT (PVC) (SCH 40) (2") (BORE)		60		158		LF	218
620 6011	ELEC CONDR (NO. 4) BARE	23	66	83	164	18	LF	354
620 6012	ELEC CONDR (NO. 4) INSULATED	46	132	166	328	36	LF	708

Adriana Geiger, P.E.
ADRIANA GEIGER, P.E.
11/1/2023
Date

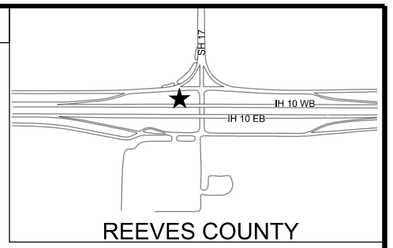
ITS PLAN

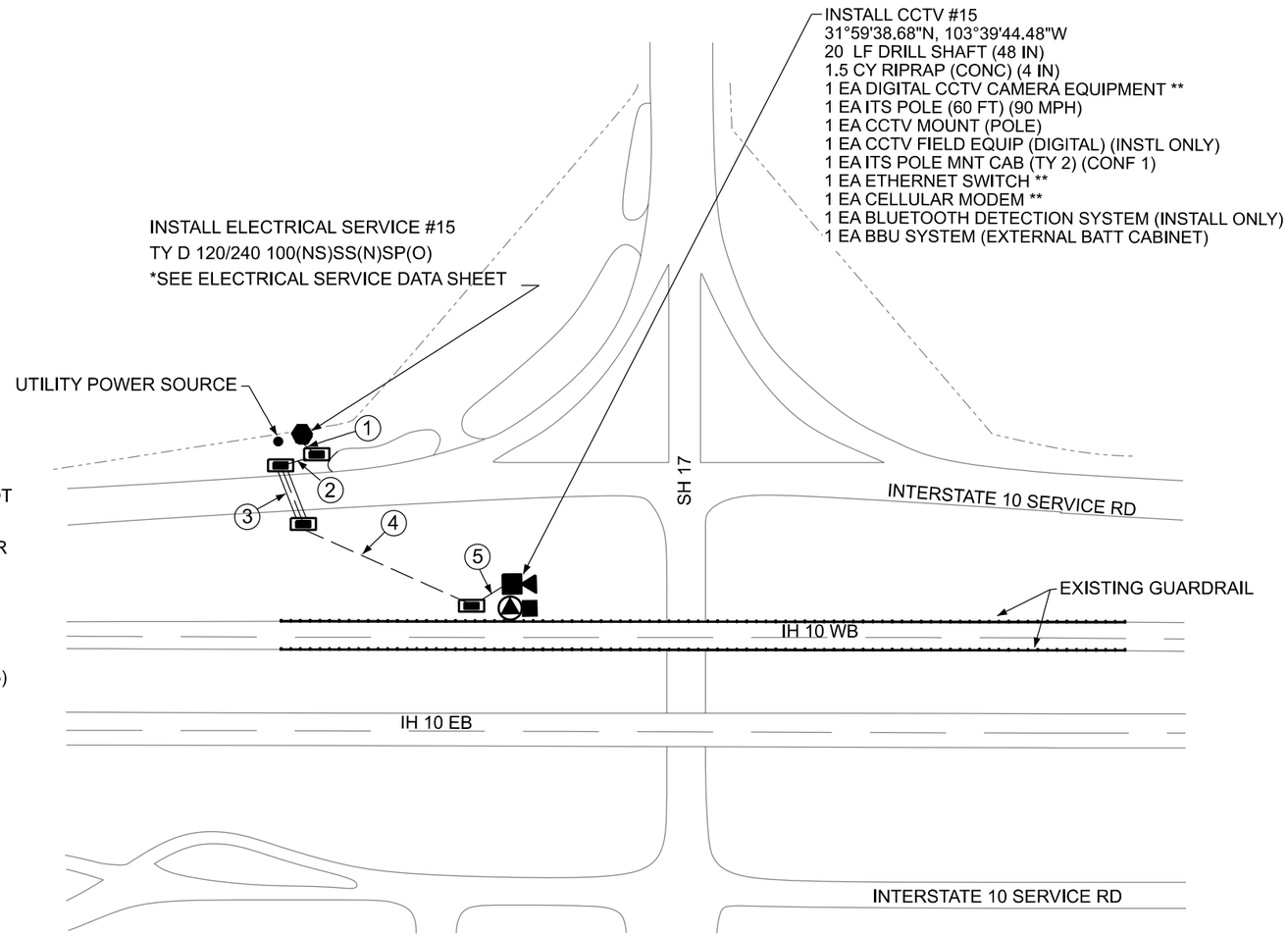
Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			38
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	DISTRICTWIDE	
CONT.	SECT.	JOB	HIGHWAY NO.
0906	00	268	VARIOUS

LOCATION 15	SHEET SUMMARY OF QUANTITIES CCTV -IH 10 AT SH 17 (EXIT 212)		
BID ITEM	DESCRIPTION	UNITS	QTY
416 6006	DRILL SHAFT (48 IN)	LF	20
432 6001	RIPRAP (CON) (4 IN)	CY	1.50
618 6023	CONDT (PVC) (SCH 40) (2")	LF	248
618 6024	CONDT (PVC) (SCH 40) (2") (BORE)	LF	66
620 6009	ELEC CONDR (NO. 6) BARE	LF	341
620 6010	ELEC CONDR (NO. 6) INSULATED	LF	682
624 6002	GROUND BOX TY A (122311)W/APRON	EA	4
628 6250	ELC SRV TY D 120/240 100(NS)SS IN)SP (O)	EA	1
6010 6004	CCTV MOUNT (POLE)	EA	1
6010 6011	CCTV FIELD EQUIP (DIGITAL) (INSTL ONLY)	EA	1
6058 6001	BBU SYSTEM (EXTERNAL BATT CABINET)	EA	1
6064 6055	ITS POLE (60 FT) (90 MPH)	EA	1
6064 6080	ITS POLE MNT CAB (TY 2) (CONF 1)	EA	1
6263 6002	BLUETOOTH DETECTION SYSTEM	EA	1
6320 6001	INSTALL OF FIELD HARD ETHERNET SWITCH	EA	1
6320 6002	INSTALL OF CELLULAR MODEM	EA	1
**	ETHERNET SWITCH	EA	1
**	CELLULAR MODEM/ANTENNA	EA	1
**	DIGITAL CCTV CAMERA EQUIPMENT	EA	1

LOCATION #15 - IH 10 AT SH 17





NOTES:

1) EQUPMENT DESIGNATED (**) SHALL BE FURNISHED BY TXDOT AND INSTALLED BY THE CONTRACTOR.

2) LOCATE ALL UTILITIES, DRAINAGE STRUCTURES, AND OTHER CONFLICTS PRIOR TO TRENCHING, BORING, INSTALLING DRILL SHAFTS OR POLES. IF NECESSARY, ADJUST LOCATIONS IN ACCORDANCE WITH TXDOT'S POLE PLACEMENT GUIDELINES AND AS DIRECTED BY THE ENGINEER.

3) ITS POLE MOUNTED CABINET DETAILS ON STANDARD ITS (15) TYPE 2 CABINET.

4)BBU CABINETS TO BE MOUNTED ON THE ITS POLE.

LEGEND	
	PROPOSED DYNAMIC MESSAGE SIGN
	PROPOSED FOUNDATION MOUNTED DMS AND BBU CABINETS
	PROPOSED ITS POLE WITH POLE MOUNTED CABINET AND FOUNDATION MOUNTED BBU CABINET
	PROPOSED CCTV
	PROPOSED HD RVSD
	PROPOSED ECLECTRICAL SERVICE (120V/240V)
	PROPOSED ITS GROUND BOX (TY1)
	PROPOSED ITS GROUND BOX (TY A) W/ APRON
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (CONC ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (CONC ENCSE)
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (STL ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (STL ENCSE)
	PROPOSED 2-4" MULTI-DUCT RMC CONDT PROPOSED 2-3" PVC RMC CONDT
	PROPOSED 2-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT (BORED)
	PROPOSED CONDUIT RUN

LOCATION 15	RUN TABLE CCTV -IH 10 AT SH 17 (EXIT 212)							
BID ITEM	DESCRIPTION	R1	R2	R3	R4	R5	UOM	TOTALS
	RUN LENGTH	10	20	66	200	18		
	POINT:POINT	ES:GB	GB:GB	GB:GB	GB:GB	GB:CCTV		
618 6023	CONDT (PVC) (SCH 40) (2")	10	20		200	18	LF	248
618 6024	CONDT (PVC) (SCH 40) (2") (BORE)			66			LF	66
620 6009	ELEC CONDR (NO. 6) BARE	13	26	72	206	24	LF	341
620 6010	ELEC CONDR (NO. 6) INSULATED	26	52	144	412	48	LF	682

SAUL ROMERO, JR., P.E.

9/15/2023

Date

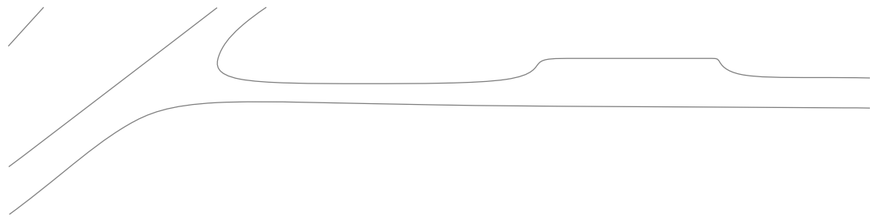
ITS PLAN

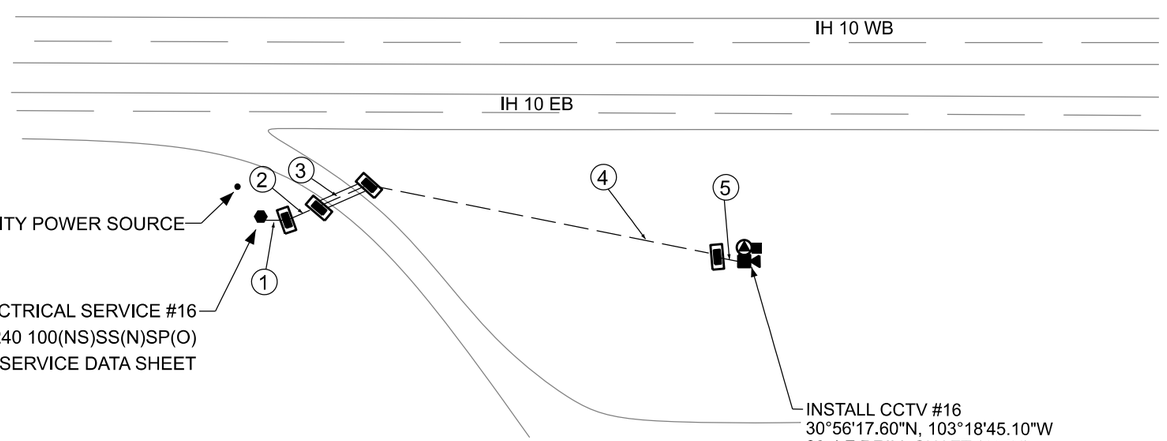
Texas Department of Transportation

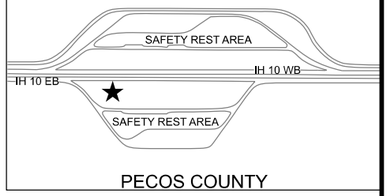
FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			39
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	DISTRICTWIDE	
CONT.	SECT.	JOB	HIGHWAY NO.
0906	00	268	VARIOUS

LOCATION #16 - IH 10 REST AREA - MM 233

LOCATION 16	SHEET SUMMARY OF QUANTITIES CCTV -IH 10 REST AREA (MM 233)		
BID ITEM	DESCRIPTION	UNITS	QTY
416 6006	DRILL SHAFT (48 IN)	LF	20
432 6001	RIPRAP (CON) (4 IN)	CY	1.50
618 6023	CONDT (PVC) (SCH 40) (2")	LF	375
618 6024	CONDT (PVC) (SCH 40) (2") (BORE)	LF	45
620 6011	ELEC CONDR (NO. 4) BARE	LF	447
620 6012	ELEC CONDR (NO. 4) INSULATED	LF	894
624 6002	GROUND BOX TY A (122311)W/APRON	EA	4
628 6250	ELC SRV TY D 120/240 100(NS)SS IN)SP (O)	EA	1
6010 6004	CCTV MOUNT (POLE)	EA	1
6010 6011	CCTV FIELD EQUIP (DIGITAL) (INSTL ONLY)	EA	1
6058 6001	BBU SYSTEM (EXTERNAL BATT CABINET)	EA	1
6064 6055	ITS POLE (60 FT) (90 MPH)	EA	1
6064 6080	ITS POLE MNT CAB (TY 2) (CONF 1)	EA	1
6263 6002	BLUETOOTH DETECTION SYSTEM	EA	1
6320 6001	INSTALL OF FIELD HARD ETHERNET SWITCH	EA	1
6320 6002	INSTALL OF CELLULAR MODEM	EA	1
**	ETHERNET SWITCH	EA	1
**	CELLULAR MODEM/ANTENNA	EA	1
**	DIGITAL CCTV CAMERA EQUIPMENT	EA	1







	LEGEND
	PROPOSED DYNAMIC MESSAGE SIGN
	PROPOSED FOUNDATION MOUNTED DMS AND BBU CABINETS
	PROPOSED ITS POLE WITH POLE MOUNTED CABINET AND FOUNDATION MOUNTED BBU CABINET
	PROPOSED CCTV
	PROPOSED HD RVSD
	PROPOSED ECLECTRICAL SERVICE (120V/240V)
	PROPOSED ITS GROUND BOX (TY1)
	PROPOSED ITS GROUND BOX (TY A) W/ APRON
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (CONC ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (CONC ENCSE)
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (STL ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (STL ENCSE)
	PROPOSED 2-4" MULTI-DUCT RMC CONDT PROPOSED 2-3" PVC RMC CONDT
	PROPOSED 2-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT (BORED)
	PROPOSED CONDUIT RUN

NOTES:

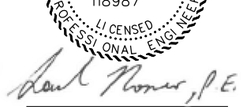
1) EQUPMENT DESIGNATED (**) SHALL BE FURNISHED BY TXDOT AND INSTALLED BY THE CONTRACTOR.

2) LOCATE ALL UTILITIES, DRAINAGE STRUCTURES, AND OTHER CONFLICTS PRIOR TO TRENCHING, BORING, INSTALLING DRILL SHAFTS OR POLES. IF NECESSARY, ADJUST LOCATIONS IN ACCORDANCE WITH TXDOT'S POLE PLACEMENT GUIDELINES AND AS DIRECTED BY THE ENGINEER.

3) ITS POLE MOUNTED CABINET DETAILS ON STANDARD ITS (15) TYPE 2 CABINET.

4) BBU CABINETS TO BE MOUNTED ON THE ITS POLE.

LOCATION 16	RUN TABLE CCTV -IH 10 REST AREA (MM 233)								
BID ITEM	DESCRIPTION	R1	R2	R3	R4	R5	UOM	TOTALS
	RUN LENGTH	10	30	45	325	10		
	POINT:POINT	ES:GB	GB:GB	GB:GB	GB:GB	GB:CCTV		
618 6023	CONDT (PVC) (SCH 40) (2")	10	30		325	10	LF	375
618 6024	CONDT (PVC) (SCH 40) (2") (BORE)			45			LF	45
620 6011	ELEC CONDR (NO. 4) BARE	13	36	51	331	16	LF	447
620 6012	ELEC CONDR (NO. 4) INSULATED	26	72	102	662	32	LF	894



SAUL ROMERO, JR., P.E.

9/15/2023
Date

ITS PLAN

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			40
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	DISTRICTWIDE	
CONT.	SECT.	JOB	HIGHWAY NO.
0906	00	268	VARIOUS

LOCATION 17	SHEET SUMMARY OF QUANTITIES CCTV -IH 10 at US 67/FM 1776 (EXIT 248)		
BID ITEM	DESCRIPTION	UNITS	QTY
416 6006	DRILL SHAFT (48 IN)	LF	20
432 6001	RIPRAP (CON) (4 IN)	CY	1.50
618 6023	CONDT (PVC) (SCH 40) (2")	LF	421
618 6024	CONDT (PVC) (SCH 40) (2") (BORE)	LF	69
620 6011	ELEC CONDR (NO. 4) BARE	LF	523
620 6012	ELEC CONDR (NO. 4) INSULATED	LF	1046
624 6002	GROUND BOX TY A (122311)W/APRON	EA	5
628 6250	ELC SRV TY D 120/240 100(NS)SS IN)SP (O)	EA	1
6010 6004	CCTV MOUNT (POLE)	EA	1
6010 6011	CCTV FIELD EQUIP (DIGITAL) (INSTL ONLY)	EA	1
6058 6001	BBU SYSTEM (EXTERNAL BATT CABINET)	EA	1
6064 6055	ITS POLE (60 FT) (90 MPH)	EA	1
6064 6080	ITS POLE MNT CAB (TY 2) (CONF 1)	EA	1
6263 6002	BLUETOOTH DETECTION SYSTEM	EA	1
6320 6001	INSTALL OF FIELD HARD ETHERNET SWITCH	EA	1
6320 6002	INSTALL OF CELLULAR MODEM	EA	1
**	ETHERNET SWITCH	EA	1
**	CELLULAR MODEM/ANTENNA	EA	1
**	DIGITAL CCTV CAMERA EQUIPMENT	EA	1

LOCATION #17 - IH 10 AT M 1776 AND US 67

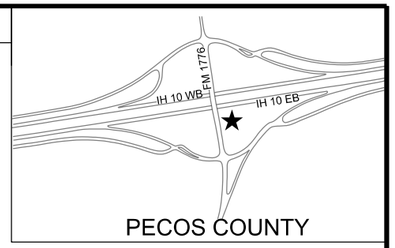
NOTES:

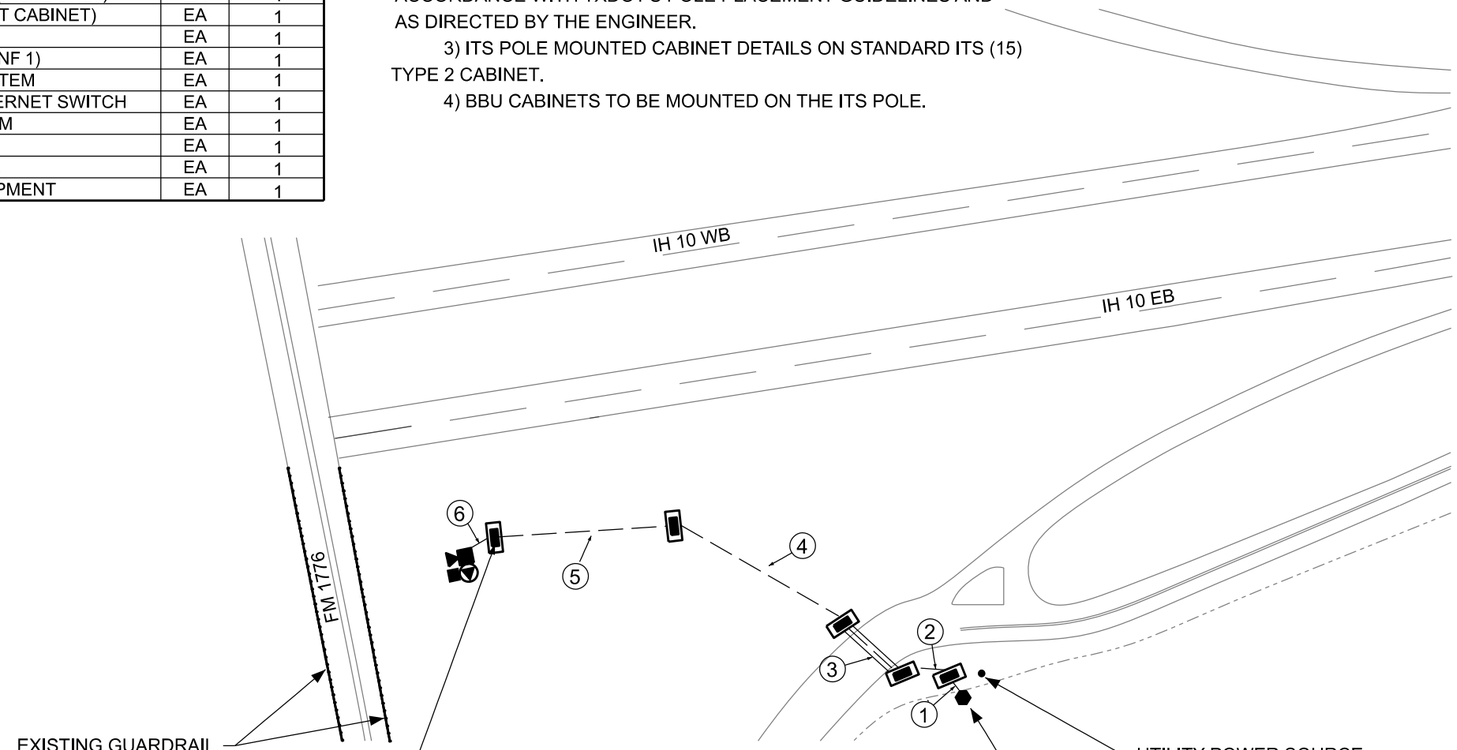
1) EQUPMENT DESIGNATED (**) SHALL BE FURNISHED BY TXDOT AND INSTALLED BY THE CONTRACTOR.

2) LOCATE ALL UTILITIES, DRAINAGE STRUCTURES, AND OTHER CONFLICTS PRIOR TO TRENCHING, BORING, INSTALLING DRILL SHAFTS OR POLES. IF NECESSARY, ADJUST LOCATIONS IN ACCORDANCE WITH TXDOT'S POLE PLACEMENT GUIDELINES AND AS DIRECTED BY THE ENGINEER.

3) ITS POLE MOUNTED CABINET DETAILS ON STANDARD ITS (15) TYPE 2 CABINET.

4) BBU CABINETS TO BE MOUNTED ON THE ITS POLE.





	LEGEND
	PROPOSED DYNAMIC MESSAGE SIGN
	PROPOSED FOUNDATION MOUNTED DMS AND BBU CABINETS
	PROPOSED ITS POLE WITH POLE MOUNTED CABINET AND FOUNDATION MOUNTED BBU CABINET
	PROPOSED CCTV
	PROPOSED HD RVSD
	PROPOSED ECLECTRICAL SERVICE (120V/240V)
	PROPOSED ITS GROUND BOX (TY1)
	PROPOSED ITS GROUND BOX (TY A) W/ APRON
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (CONC ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (CONC ENCSE)
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (STL ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (STL ENCSE)
	PROPOSED 2-4" MULTI-DUCT RMC CONDT PROPOSED 2-3" PVC RMC CONDT
	PROPOSED 2-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT (BORED)
	PROPOSED CONDUIT RUN

LOCATION 17	RUN TABLE CCTV -IH 10 at US 67/FM 1776 (EXIT 248)									
BID ITEM	DESCRIPTION	R1	R2	R3	R4	R5	R6	UOM	TOTALS
	RUN LENGTH	15	20	69	183	183	20		
	POINT:POINT	ES:GB	GB:GB	GB:GB	GB:GB	GB:GB	GB:CCTV		
618 6023	CONDT (PVC) (SCH 40) (2")	15	20		183	183	20	LF	421
618 6024	CONDT (PVC) (SCH 40) (2") (BORE)			69				LF	69
620 6011	ELEC CONDR (NO. 4) BARE	18	26	75	189	189	26	LF	523
620 6012	ELEC CONDR (NO. 4) INSULATED	36	52	150	378	378	52	LF	1046

STATE OF TEXAS
SAUL ROMERO, JR.
118987
LICENSED
PROFESSIONAL ENGINEER

Saul Romero, P.E.

SAUL ROMERO, JR., P.E.

9/15/2023

Date

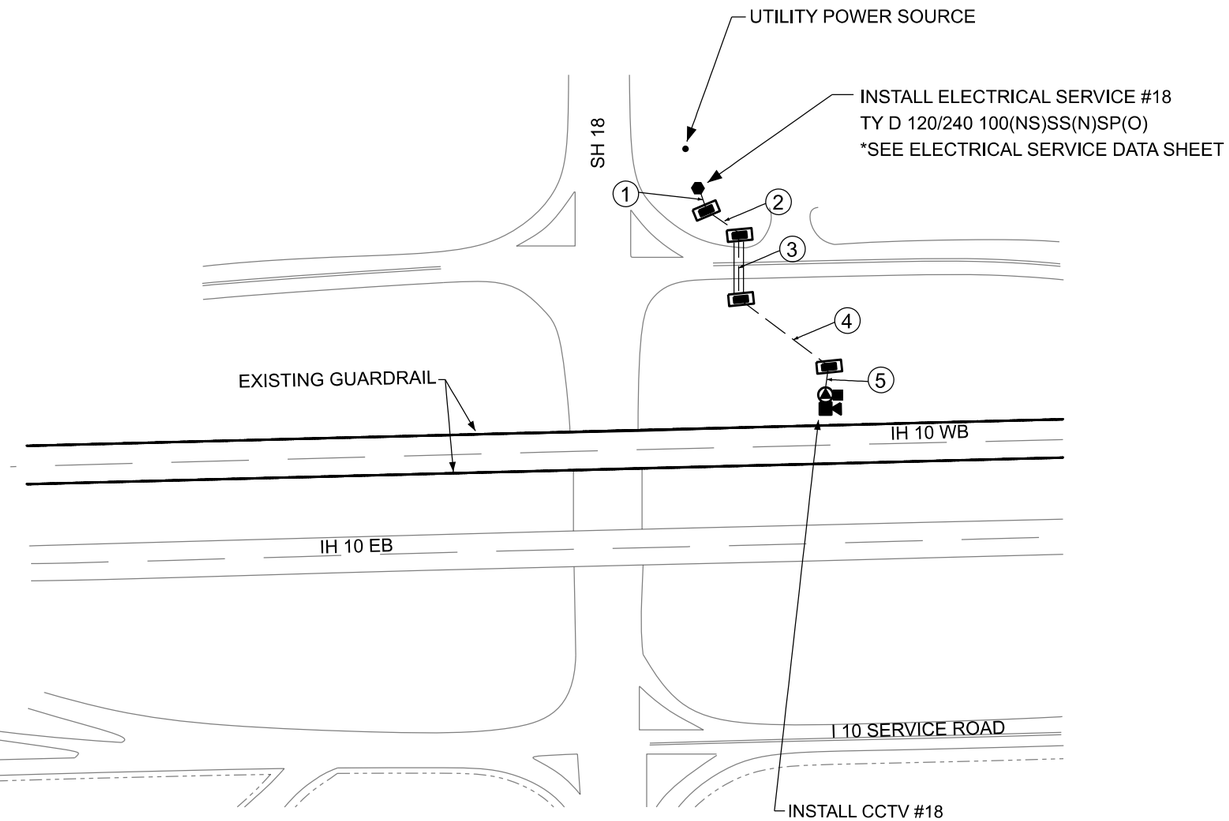
ITS PLAN

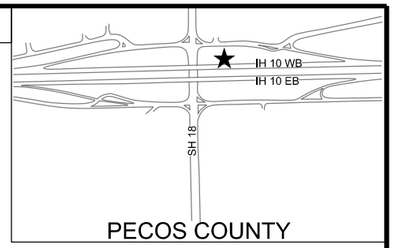
Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			41
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	DISTRICTWIDE	
CONT.	SECT.	JOB	HIGHWAY NO.
0906	00	268	VARIOUS

LOCATION 18	SHEET SUMMARY OF QUANTITIES CCTV -IH 10 at SH 18 (EXIT 259B)		
BID ITEM	DESCRIPTION	UNITS	QTY
416 6006	DRILL SHAFT (48 IN)	LF	20
432 6001	RIPRAP (CON) (4 IN)	CY	1.50
618 6023	CONDT (PVC) (SCH 40) (2")	LF	227
618 6024	CONDT (PVC) (SCH 40) (2") (BORE)	LF	62
620 6009	ELEC CONDR (NO. 6) BARE	LF	316
620 6010	ELEC CONDR (NO. 6) INSULATED	LF	632
624 6002	GROUND BOX TY A (122311)W/APRON	EA	4
628 6250	ELC SRV TY D 120/240 100(NS)SS IN)SP (O)	EA	1
6010 6004	CCTV MOUNT (POLE)	EA	1
6010 6011	CCTV FIELD EQUIP (DIGITAL) (INSTL ONLY)	EA	1
6058 6001	BBU SYSTEM (EXTERNAL BATT CABINET)	EA	1
6064 6055	ITS POLE (60 FT) (90 MPH)	EA	1
6064 6080	ITS POLE MNT CAB (TY 2) (CONF 1)	EA	1
6263 6002	BLUETOOTH DETECTION SYSTEM	EA	1
6320 6001	INSTALL OF FIELD HARD ETHERNET SWITCH	EA	1
6320 6002	INSTALL OF CELLULAR MODEM	EA	1
**	ETHERNET SWITCH	EA	1
**	CELLULAR MODEM/ANTENNA	EA	1
**	DIGITAL CCTV CAMERA EQUIPMENT	EA	1

LOCATION #18 - IH 10 AT SH 18 (EXIT 259B)





INSTALL CCTV #18
30°54'26.73"N, 102°53'0.64"W
20 LF DRILL SHAFT (48 IN)
1.5 CY RIPRAP (CONC) (4 IN)
1 EA DIGITAL CCTV CAMERA EQUIPMENT **
1 EA ITS POLE (60 FT) (90 MPH)
1 EA CCTV MOUNT (POLE)
1 EA CCTV FIELD EQUIP (DIGITAL) (INSTL ONLY)
1 EA ITS POLE MNT CAB (TY 2) (CONF 1)
1 EA ETHERNET SWITCH **
1 EA CELLULAR MODEM **
1 EA BLUETOOTH DETECTION SYSTEM (INSTALL ONLY)
1 EA BBU SYSTEM (EXTERNAL BATT CABINET)

	LEGEND
	PROPOSED DYNAMIC MESSAGE SIGN
	PROPOSED FOUNDATION MOUNTED DMS AND BBU CABINETS
	PROPOSED ITS POLE WITH POLE MOUNTED CABINET AND FOUNDATION MOUNTED BBU CABINET
	PROPOSED CCTV
	PROPOSED HD RVSD
	PROPOSED ECLECTRICAL SERVICE (120V/240V)
	PROPOSED ITS GROUND BOX (TY1)
	PROPOSED ITS GROUND BOX (TY A) W/ APRON
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (CONC ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (CONC ENCSE)
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (STL ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (STL ENCSE)
	PROPOSED 2-4" MULTI-DUCT RMC CONDT PROPOSED 2-3" PVC RMC CONDT
	PROPOSED 2-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT (BORED)
	PROPOSED CONDUIT RUN

NOTES:

1) EQUPMENT DESIGNATED (**) SHALL BE FURNISHED BY TXDOT AND INSTALLED BY THE CONTRACTOR.

2) LOCATE ALL UTILITIES, DRAINAGE STRUCTURES, AND OTHER CONFLICTS PRIOR TO TRENCHING, BORING, INSTALLING DRILL SHAFTS OR POLES. IF NECESSARY, ADJUST LOCATIONS IN ACCORDANCE WITH TXDOT'S POLE PLACEMENT GUIDELINES AND AS DIRECTED BY THE ENGINEER.

3) ITS POLE MOUNTED CABINET DETAILS ON STANDARD ITS (15) TYPE 2 CABINET.

4) BBU CABINETS TO BE MOUNTED ON THE ITS POLE.

LOCATION 18	RUN TABLE CCTV -IH 10 at SH 18 (EXIT 259B)								
BID ITEM	DESCRIPTION	R1	R2	R3	R4	R5	UOM	TOTALS
	RUN LENGTH	10	83	62	100	24		
	POINT:POINT	ES:GB	GB:GB	GB:GB	GB:GB	GB:CCTV		
618 6023	CONDT (PVC) (SCH 40) (2")	10	83		110	24	LF	227
618 6024	CONDT (PVC) (SCH 40) (2") (BORE)			62			LF	62
620 6009	ELEC CONDR (NO. 6) BARE	13	89	68	116	30	LF	316
620 6010	ELEC CONDR (NO. 6) INSULATED	26	178	136	232	60	LF	632

STATE OF TEXAS
SAUL ROMERO, JR.
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PROFESSIONAL ENGINEER

Saul Romero, P.E.

SAUL ROMERO, JR., P.E.

9/15/2023

Date

ITS PLAN

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			42
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	DISTRICTWIDE	
CONT.	SECT.	JOB	HIGHWAY NO.
0906	00	268	VARIOUS

LOCATION 19	SHEET SUMMARY OF QUANTITIES CCTV -IH 10 at Exist DMS (Confirmation Camera)		
BID ITEM	DESCRIPTION	UNITS	QTY
416 6006	DRILL SHAFT (48 IN)	LF	20
432 6001	RIPRAP (CON) (4 IN)	CY	1.50
540 6002	MTL W-BEAM GD FEN (STEEL POST)	LF	100
540 6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	1
544 6001	GUARDRAIL END TREATMENT (INSTALL)	EA	1
618 6023	CONDT (PVC) (SCH 40) (2")	LF	254
618 6024	CONDT (PVC) (SCH 40) (2") (BORE)	LF	155
618 6031	CONDT (PVC) (SCH 40) (3") (CONC ENCSE)	LF	201
620 6002	ELEC CONDR (NO. 14) INSULATED	LF	147
620 6007	ELEC CONDR (NO. 8) BARE	LF	229
620 6008	ELEC CONDR (NO. 8) INSULATED	LF	458
624 6002	GROUND BOX TY A (122311)W/APRON	EA	3
628 6250	ELC SRV TY D 120/240 100(NS)SS IN)SP (O)	EA	1
6010 6004	CCTV MOUNT (POLE)	EA	1
6010 6011	CCTV FIELD EQUIP (DIGITAL) (INSTL ONLY)	EA	1
6016 6008	ITS MULTI-DUCT CNP (PVC-40) (CONC ENCSE)	LF	141
6016 6013	ITS MULTI-DUCT CND (RMC)	LF	4
6058 6001	BBU SYSTEM (EXTERNAL BATT CABINET)	EA	1
6064 6055	ITS POLE (60 FT) (90 MPH)	EA	1
6064 6080	ITS POLE MNT CAB (TY 2) (CONF 1)	EA	1
6186 6002	ITS GND BOX (PCAST) TYI (243636) W/ APRN	EA	2
6263 6002	BLUETOOTH DETECTION SYSTEM	EA	1
6320 6001	INSTALL OF FIELD HARD ETHERNET SWITCH	EA	1
6320 6002	INSTALL OF CELLULAR MODEM	EA	1
**	ETHERNET SWITCH	EA	1
**	CELLULAR MODEM/ANTENNA	EA	1
**	DIGITAL CCTV CAMERA EQUIPMENT	EA	1

NOTES:

1) EQUPMENT DESIGNATED (**) SHALL BE FURNISHED BY TXDOT AND INSTALLED BY THE CONTRACTOR.

2) LOCATE ALL UTILITIES, DRAINAGE STRUCTURES, AND OTHER CONFLICTS PRIOR TO TRENCHING, BORING, INSTALLING DRILL SHAFTS OR POLES. IF NECESSARY, ADJUST LOCATIONS IN ACCORDANCE WITH TXDOT'S POLE PLACEMENT GUIDELINES AND AS DIRECTED BY THE ENGINEER.

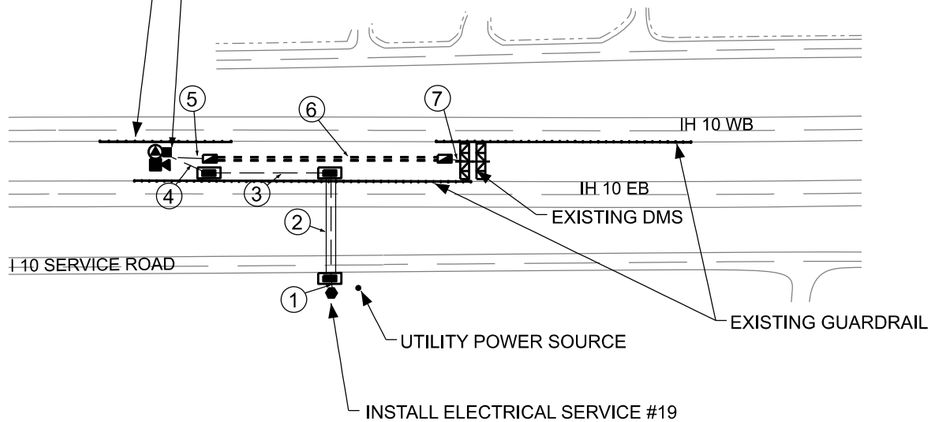
3) ITS POLE MOUNTED CABINET DETAILS ON STANDARD ITS (15) TYPE 2 CABINET.

4) BBU CABINETS TO BE MOUNTED ON THE ITS POLE.

LOCATION #19 - IH 10 AT EXIST DMS (CONFIRMATION CAMERA)

INSTALL CCTV #19
30°53'59.35"N, 102°51'36.62"W
20 LF DRILL SHAFT (48 IN)
1.5 CY RIPRAP (CONC) (4 IN)
1 EA DIGITAL CCTV CAMERA EQUIPMENT **
1 EA ITS POLE (60 FT) (90 MPH)
1 EA CCTV MOUNT (POLE)
1 EA CCTV FIELD EQUIP (DIGITAL) (INSTL ONLY)
1 EA ITS POLE MNT CAB (TY 2) (CONF 1)
1 EA ETHERNET SWITCH **
1 EA CELLULAR MODEM **
1 EA BLUETOOTH DETECTION SYSTEM (INSTALL ONLY)
1 EA BBU SYSTEM (EXTERNAL BATT CABINET)

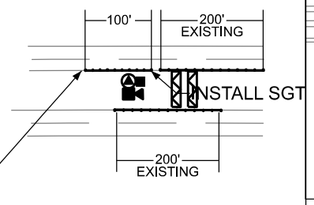
INSTALL:
1 EA GUARDRAIL END TREATMENT (SGT).
1 EA DOWNSTREAM ANCHOR TERMINAL (DAT).
100 FT METAL BEAM GUARD FENCE (MBGF).
SEE GUARDRAIL PLACEMENT DETAIL ON SHEET.



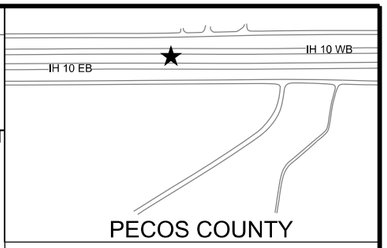
INSTALL ELECTRICAL SERVICE #19
TY D 120/240 100(NS)SS(N)SP(O)
*SEE ELECTRICAL SERVICE DATA SHEET

GUARDRAIL PLACEMENT DETAIL

NOTE:
INSTALL MOW STRIP FOR GUARDRAIL SEE STE. GF (31) MS-11



INSTALL MBGF



	LEGEND
	EXISTING DYNAMIC MESSAGE SIGN
	PROPOSED FOUNDATION MOUNTED DMS AND BBU CABINETS
	PROPOSED ITS POLE WITH POLE MOUNTED CABINET AND FOUNDATION MOUNTED BBU CABINET
	PROPOSED CCTV
	PROPOSED HD RVSD
	PROPOSED ECLECTRICAL SERVICE (120V/240V)
	PROPOSED ITS GROUND BOX (TY1)
	PROPOSED ITS GROUND BOX (TY A) W/ APRON
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (CONC ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (CONC ENCSE)
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (STL ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (STL ENCSE)
	PROPOSED 2-4" MULTI-DUCT RMC CONDT PROPOSED 2-3" PVC RMC CONDT
	PROPOSED 2-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT (BORED)
	PROPOSED CONDUIT RUN

LOCATION 19	RUN TABLE CCTV -IH 10 at Exist DMS (Confirmation Camera)										
BID ITEM	DESCRIPTION	R1	R2	R3	R4	R5	R6	R7	UOM	TOTALS
	RUN LENGTH	8	155	25	20	30	141	30		
	POINT:POINT	ES:GB	GB:GB	GB:GB	GB:CCTV	CCTV:ITGB	ITGB:ITGB	ITGB:DMS		
618 6023	CONDT (PVC) (SCH 40) (2")	8		25	20	30	141	30	LF	254
618 6024	CONDT (PVC) (SCH 40) (2") (BORE)		155						LF	155
618 6031	CONDT (PVC) (SCH 40) (3") (CONC ENCSE)					30	141	30	LF	201
620 6002	ELEC CONDR (NO. 14) INSULATED						147		LF	147
620 6007	ELEC CONDR (NO. 8) BARE	11	161	31	26				LF	229
620 6008	ELEC CONDR (NO. 8) INSULATED	22	322	62	52				LF	458
6016 6008	ITS MULTI-DUCT CNP (PVC-40) (CONC ENCSE)						141		LF	141

STATE OF TEXAS
SAUL ROMERO, JR.
118987
LICENSED
PROFESSIONAL ENGINEER

Saul Romero, P.E.

SAUL ROMERO, JR., P.E.
9/15/2023
Date

ITS PLAN

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			43
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	DISTRICTWIDE	
CONT.	SECT.	JOB	HIGHWAY NO.
0906	00	268	VARIOUS

LOCATION 20	SHEET SUMMARY OF QUANTITIES DMS EB -IH 10 at US 67		
BID ITEM	DESCRIPTION	UNITS	QTY
416 6023	DRILL SHAFT (SIGN MTS) (54 IN)	LF	35
420 6068	CL C CONC (SIGN COLUMN)	CY	22
432 6001	RIPRAP (CON) (4 IN)	CY	1.50
540 6002	MTL W-BEAM GD FEN (STEEL POST)	LF	100
540 6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	1
544 6001	GUARDRAIL END TREATMENT (INSTALL)	EA	1
618 6023	CONDT (PVC) (SCH 40) (2")	LF	80
620 6011	ELEC CONDR (NO. 4) BARE	LF	89
620 6012	ELEC CONDR (NO. 4) INSULATED	LF	178
628 6250	ELC SRV TY D 120/240 100(NS)SS IN)SP (O)	EA	1
650 6031	INS OH SN SUP (30 FT BALL TEE) (SPAN ONLY)	EA	1
6058 6001	BBU SYSTEM (EXTERNAL BATT CABINET)	EA	1
6064 6088	ITS POLE MNT CAB (TY 3)(CONF 1)	EA	1
6263 6002	BLUETOOTH DETECTION SYSTEM	EA	1
6304 6004	ITS RVSD (DC & WWA) (INSTALL ONLY)	EA	1
6320 6001	INSTALL OF FIELD HARD ETHERNET SWITCH	EA	1
6320 6002	INSTALL OF CELLULAR MODEM	EA	1
6028 6001	INSTALL DMS (POLE MTD CABINET)	EA	1
**	ETHERNET SWITCH	EA	1
**	CELLULAR MODEM/ANTENNA	EA	1
**	RVSD (DATA COLLECT & WWA) SYS	EA	1

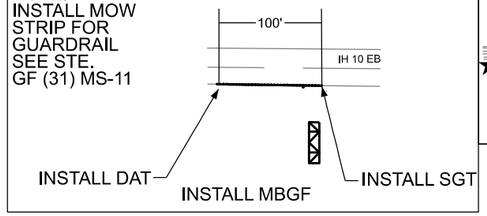
LOCATION #20 - IH 10 AT US 67 (EXIT 273)

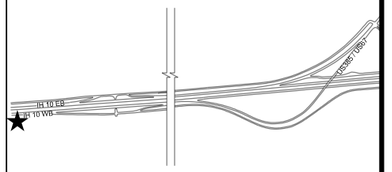
NOTES:

1) EQUPMENT DESIGNATED (**) SHALL BE FURNISHED BY TXDOT AND INSTALLED BY THE CONTRACTOR.
2) LOCATE ALL UTILITIES, DRAINAGE STRUCTURES, AND OTHER CONFLICTS PRIOR TO TRENCHING, BORING, INSTALLING DRILL SHAFTS OR POLES. IF NECESSARY, ADJUST LOCATIONS IN ACCORDANCE WITH TXDOT'S POLE PLACEMENT GUIDELINES AND AS DIRECTED BY THE ENGINEER.
3) DMS POLE MOUNTED CABINET DETAILS ON STANDARD ITS (16) TYPE 3 CABINET.
4) BBU CABINETS TO BE MOUNTED ON THE POLE.

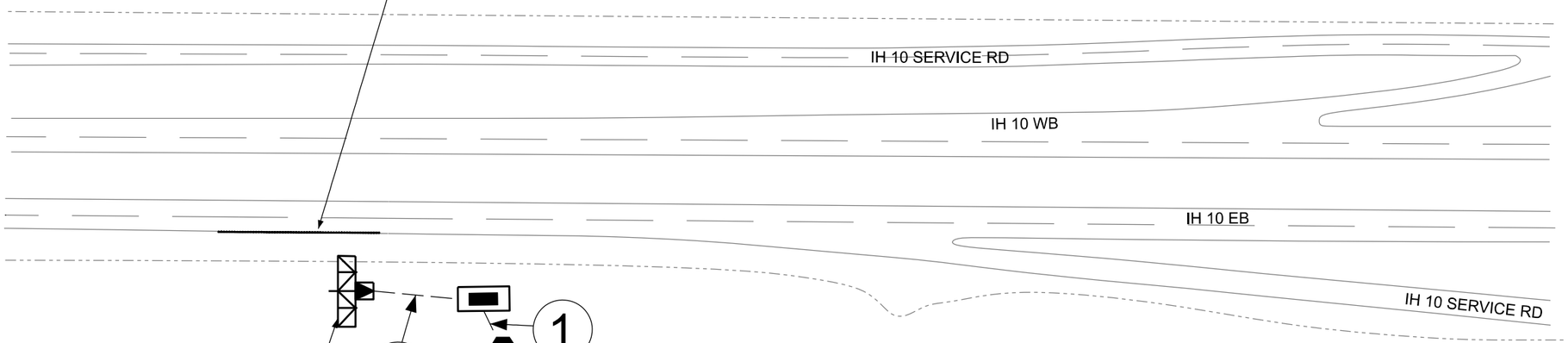
GUARDRAIL PLACEMENT DETAIL

NOTE:
INSTALL MOW STRIP FOR GUARDRAIL SEE STE. GF (31) MS-11





INSTALL:
1 EA GUARDRAIL END TREATMENT (SGT).
1 EA DOWNSTREAM ANCHOR TERMINAL (DAT).
100 FT METAL BEAM GUARD FENCE (MBGF).
SEE GUARDRAIL PLACEMENT DETAIL ON SHEET.



INSTALL DYNAMIC MESSAGE SIGN #20
30°52'52.02"N, 102°40'38.94"W
1 EA OH SN SUP (30FT BAL TEE) (SPAN ONLY)
1 EA CL C CONC (SIGN COLUMN)
1 EA DRILL SHAFT (54 IN X 35 LF)
1 EA DMS POLE MOUNTED CABINET
1 EA BBU POLE MOUNTED CABINET
1 EA BLUETOOTH DETECTION SYSTEM
1 EA DMS SIGN **
1 EA CELLULAR MODEM **
1 EA HARDENED ETHERNET **
1 EA RVSD (DATA COLLECT & WWA) SYS **

INSTALL ELECTRICAL SERVICE #20
TY D 120/240 100(NS)SS(N)SP(O)
*SEE ELECTRICAL SERVICE DATA SHEET

UTILITY POWER SOURCE

	LEGEND
	PROPOSED DYNAMIC MESSAGE SIGN
	PROPOSED FOUNDATION MOUNTED DMS AND BBU CABINETS
	PROPOSED ITS POLE WITH POLE MOUNTED CABINET AND FOUNDATION MOUNTED BBU CABINET
	PROPOSED CCTV
	PROPOSED HD RVSD
	PROPOSED ECLECTRICAL SERVICE (120V/240V)
	PROPOSED ITS GROUND BOX (TY1)
	PROPOSED ITS GROUND BOX (TY A) W/ APRON
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (CONC ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (CONC ENCSE)
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (STL ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (STL ENCSE)
	PROPOSED 2-4" MULTI-DUCT RMC CONDT PROPOSED 2-3" PVC RMC CONDT
	PROPOSED 2-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT (BORED)
	PROPOSED CONDUIT RUN

LOCATION 20	RUN TABLE DMS EB -IH 10 at US 67				
BID ITEM	DESCRIPTION	R1	R2	UOM	TOTALS
	RUN LENGTH	20	60		
	POINT:POINT	ES:GB	GB:DMS		
618 6023	CONDT (PVC) (SCH 40) (2")	20	60		80
620 6011	ELEC CONDR (NO. 6) BARE	23	66		89
620 6012	ELEC CONDR (NO. 6) INSULATED	46	132		178

STATE OF TEXAS
ADRIANA GEIGER
108603
LICENSED PROFESSIONAL ENGINEER

Adriana Geiger, P.E.
ADRIANA GEIGER, P.E.
11/1/2023
Date

PROJECT LAYOUT

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			44
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	DISTRICTWIDE	
CONT.	SECT.	JOB	HIGHWAY NO.
0906	00	268	VARIOUS

LOCATION 21	SHEET SUMMARY OF QUANTITIES CCTV -IH 10 at US 67 (EXIT 273)		
BID ITEM	DESCRIPTION	UNITS	QTY
416 6006	DRILL SHAFT (48 IN)	LF	20
432 6001	RIPRAP (CON) (4 IN)	CY	1.50
618 6023	CONDT (PVC) (SCH 40) (2")	LF	535
618 6024	CONDT (PVC) (SCH 40) (2") (BORE)	LF	50
620 6011	ELEC CONDR (NO. 4) BARE	LF	612
620 6012	ELEC CONDR (NO. 4) INSULATED	LF	1224
624 6002	GROUND BOX TY A (122311)W/APRON	EA	4
628 6250	ELC SRV TY D 120/240 100(NS)SS IN)SP (O)	EA	1
6010 6004	CCTV MOUNT (POLE)	EA	1
6010 6011	CCTV FIELD EQUIP (DIGITAL) (INSTL ONLY)	EA	1
6058 6001	BBU SYSTEM (EXTERNAL BATT CABINET)	EA	1
6064 6055	ITS POLE (60 FT) (90 MPH)	EA	1
6064 6080	ITS POLE MNT CAB (TY 2) (CONF 1)	EA	1
6263 6002	BLUETOOTH DETECTION SYSTEM	EA	1
6320 6001	INSTALL OF FIELD HARD ETHERNET SWITCH	EA	1
6320 6002	INSTALL OF CELLULAR MODEM	EA	1
**	ETHERNET SWITCH	EA	1
**	CELLULAR MODEM/ANTENNA	EA	1
**	DIGITAL CCTV CAMERA EQUIPMENT	EA	1

NOTES:

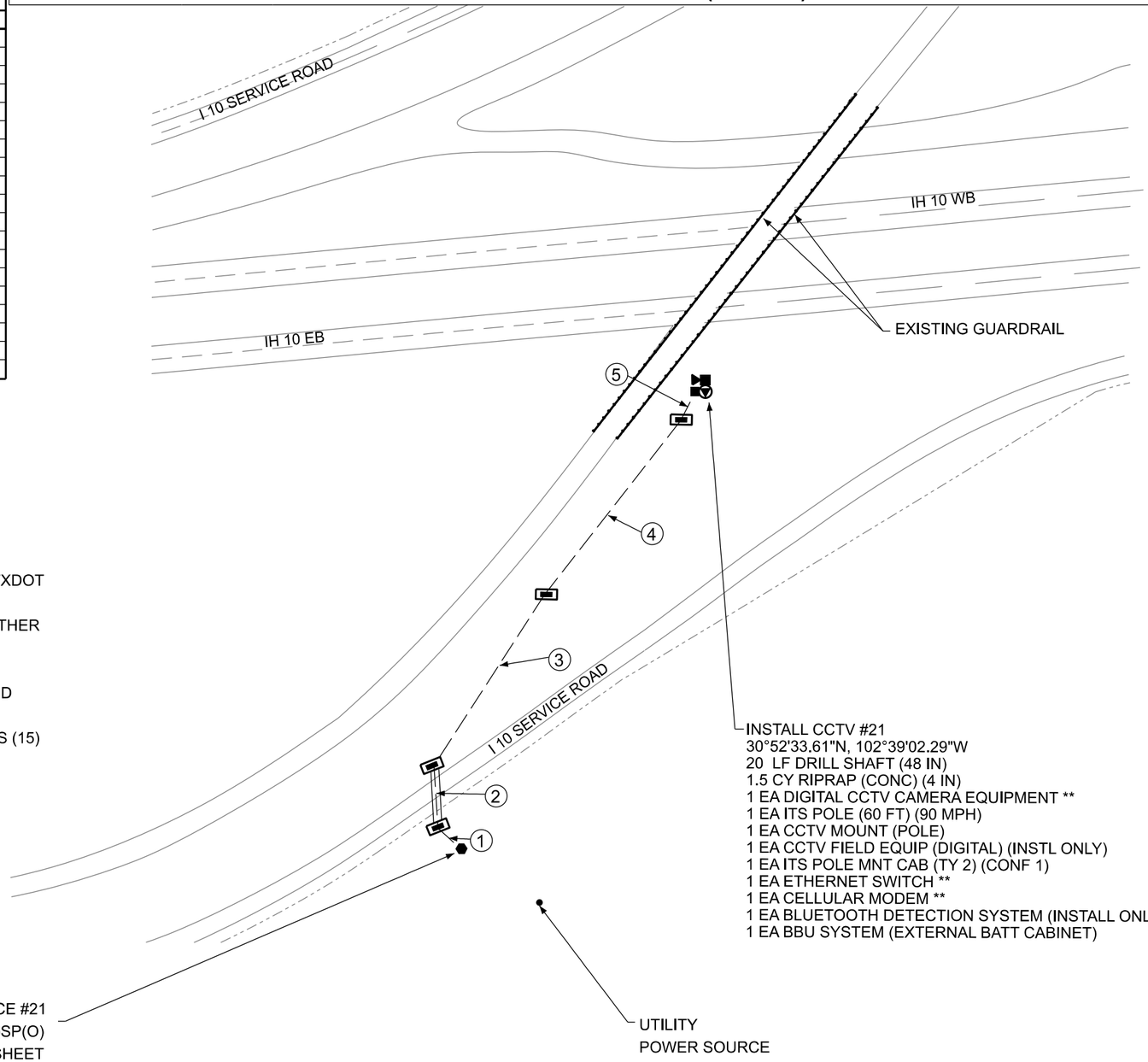
1) EQUPMENT DESIGNATED (**) SHALL BE FURNISHED BY TXDOT AND INSTALLED BY THE CONTRACTOR.

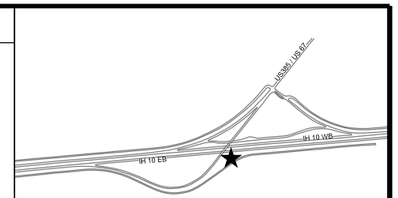
2) LOCATE ALL UTILITIES, DRAINAGE STRUCTURES, AND OTHER CONFLICTS PRIOR TO TRENCHING, BORING, INSTALLING DRILL SHAFTS OR POLES. IF NECESSARY, ADJUST LOCATIONS IN ACCORDANCE WITH TXDOT'S POLE PLACEMENT GUIDELINES AND AS DIRECTED BY THE ENGINEER.

3) ITS POLE MOUNTED CABINET DETAILS ON STANDARD ITS (15) TYPE 2 CABINET.

4) BBU CABINETS TO BE MOUNTED ON THE ITS POLE.

LOCATION #21 - IH 10 AT US 67 (EXIT 273)





PECOS COUNTY

	LEGEND
	PROPOSED DYNAMIC MESSAGE SIGN
	PROPOSED FOUNDATION MOUNTED DMS AND BBU CABINETS
	PROPOSED ITS POLE WITH POLE MOUNTED CABINET AND FOUNDATION MOUNTED BBU CABINET
	PROPOSED CCTV
	PROPOSED HD RVSD
	PROPOSED ECLECTRICAL SERVICE (120V/240V)
	PROPOSED ITS GROUND BOX (TY1)
	PROPOSED ITS GROUND BOX (TY A) W/ APRON
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (CONC ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (CONC ENCSE)
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (STL ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (STL ENCSE)
	PROPOSED 2-4" MULTI-DUCT RMC CONDT PROPOSED 2-3" PVC RMC CONDT
	PROPOSED 2-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT (BORED)
	PROPOSED CONDUIT RUN

LOCATION 21	RUN TABLE CCTV -IH 10 at US 67 (EXIT 273)							
BID ITEM	DESCRIPTION	R1	R2	R3	R4	R5	UOM	TOTALS
	RUN LENGTH	15	50	250	250	20		
	POINT:POINT	ES:GB	GB:GB	GB:GB	GB:GB	GB:CCTV		
618 6023	CONDT (PVC) (SCH 40) (2")	15		250	250	20	LF	535
618 6024	CONDT (PVC) (SCH 40) (2") (BORE)		50				LF	50
620 6011	ELEC CONDR (NO. 4) BARE	18	56	256	256	26	LF	612
620 6012	ELEC CONDR (NO. 4) INSULATED	36	112	512	512	52	LF	1224

SAUL ROMERO, JR., P.E.

9/15/2023
Date

ITS PLAN

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			45
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	DISTRICTWIDE	
CONT.	SECT.	JOB	HIGHWAY NO.
0906	00	268	VARIOUS

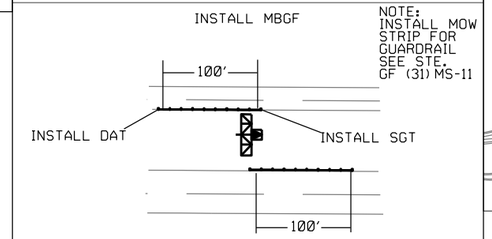
LOCATION 22	SHEET SUMMARY OF QUANTITIES 'DMS WB -IH 10 at US 67		
BID ITEM	DESCRIPTION	UNITS	QTY
416 6023	DRILL SHAFT (SIGN MTS) (54 IN)	LF	35
420 6068	CL C CONC (SIGN COLUMN)	CY	22
432 6001	RIPRAP (CON) (4 IN)	CY	1.50
540 6002	MTL W-BEAM GD FEN (STEEL POST)	LF	200
540 6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	2
544 6001	GUARDRAIL END TREATMENT (INSTALL)	EA	2
618 6023	CONDT (PVC) (SCH 40) (2")	LF	95
618 6024	CONDT (PVC) (SCH 40) (2") (BORE)	LF	164
620 6011	ELEC CONDR (NO. 4) BARE	LF	280
620 6012	ELEC CONDR (NO. 4) INSULATED	LF	560
624 6002	GROUND BOX TY A (122311)W/APRON	EA	3
628 6250	ELC SRV TY D 120/240 100(NS)SS IN)SP (O)	EA	1
650 6031	INS OH SN SUP (30 FT BALL TEE) (SPAN ONLY)	EA	1
6058 6001	BBU SYSTEM (EXTERNAL BATT CABINET)	EA	1
6064 6088	ITS POLE MNT CAB (TY 3)(CONF 1)	EA	1
6263 6002	BLUETOOTH DETECTION SYSTEM	EA	1
6304 6004	ITS RVSD (DC & WWA) (INSTALL ONLY)	EA	1
6320 6001	INSTALL OF FIELD HARD ETHERNET SWITCH	EA	1
6320 6002	INSTALL OF CELLULAR MODEM	EA	1
6028 6001	INSTALL DMS (POLE MTD CABINET)	EA	1
**	ETHERNET SWITCH	EA	1
**	CELLULAR MODEM/ANTENNA	EA	1
**	RVSD (DATA COLLECT & WWA) SYS	EA	1

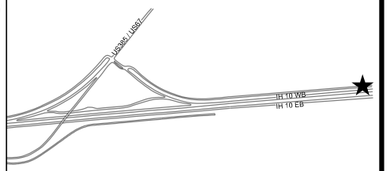
LOCATION #22 - IH 10 AT US 67 (EXIT 273)

NOTES:

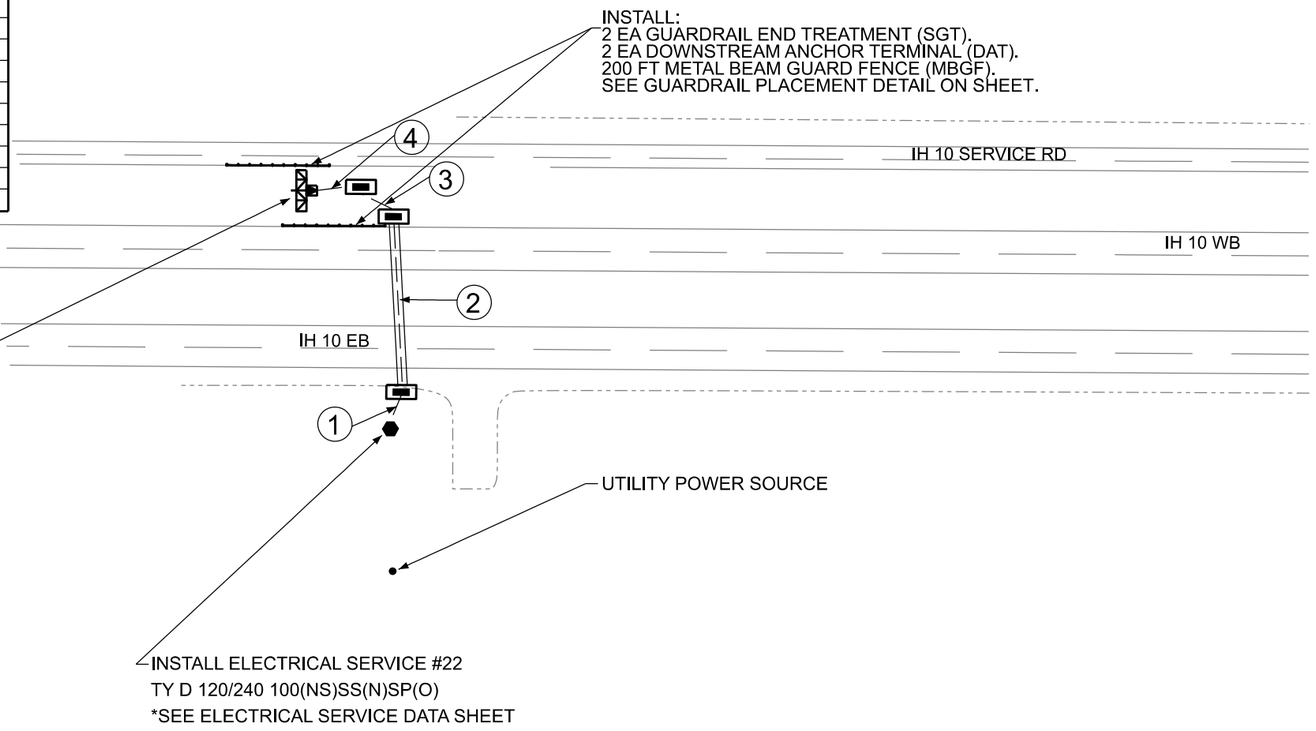
1) EQUPMENT DESIGNATED (**) SHALL BE FURNISHED BY TXDOT AND INSTALLED BY THE CONTRACTOR.
2) LOCATE ALL UTILITIES, DRAINAGE STRUCTURES, AND OTHER CONFLICTS PRIOR TO TRENCHING, BORING, INSTALLING DRILL SHAFTS OR POLES. IF NECESSARY, ADJUST LOCATIONS IN ACCORDANCE WITH TXDOT'S POLE PLACEMENT GUIDELINES AND AS DIRECTED BY THE ENGINEER.
3) DMS POLE MOUNTED CABINET DETAILS ON STANDARD ITS (16) TYPE 3 CABINET.
4) BBU CABINETS TO BE MOUNTED ON THE POLE.

GUARDRAIL PLACEMENT DETAIL





PECOS COUNTY



	LEGEND
	PROPOSED DYNAMIC MESSAGE SIGN
	PROPOSED FOUNDATION MOUNTED DMS AND BBU CABINETS
	PROPOSED ITS POLE WITH POLE MOUNTED CABINET AND FOUNDATION MOUNTED BBU CABINET
	PROPOSED CCTV
	PROPOSED HD RVSD
	PROPOSED ECLECTRICAL SERVICE (120V/240V)
	PROPOSED ITS GROUND BOX (TY1)
	PROPOSED ITS GROUND BOX (TY A) W/ APRON
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (CONC ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (CONC ENCSE)
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (STL ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (STL ENCSE)
	PROPOSED 2-4" MULTI-DUCT RMC CONDT PROPOSED 2-3" PVC RMC CONDT
	PROPOSED 2-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT (BORED)
	PROPOSED CONDUIT RUN

LOCATION 22	RUN TABLE 'DMS WB -IH 10 at US 67						
BID ITEM	DESCRIPTION	R1	R2	R3	R4	UOM	TOTALS
	RUN LENGTH	15	164	65	15		
	POINT:POINT	ES:GB	GB:GB	GB:GB	GB:DMS		
618 6023	CONDT (PVC) (SCH 40) (2")	15		65	15	LF	95
618 6024	CONDT (PVC) (SCH 40) (2") (BORE)		164			LF	164
620 6011	ELEC CONDR (NO. 4) BARE	21	170	71	18	LF	280
620 6012	ELEC CONDR (NO. 4) INSULATED	42	340	142	36	LF	560

STATE OF TEXAS
ADRIANA GEIGER
108603
LICENSED PROFESSIONAL ENGINEER

Adriana Geiger, P.E.

ADRIANA GEIGER, P.E.

11/1/2023

Date

PROJECT LAYOUT

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			46
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	DISTRICTWIDE	
CONT.	SECT.	JOB	HIGHWAY NO.
0906	00	268	VARIOUS

LOCATION 23	SHEET SUMMARY OF QUANTITIES CCTV -IH 10 at FM 11 Interchange		
BID ITEM	DESCRIPTION	UNITS	QTY
416 6006	DRILL SHAFT (48 IN)	LF	20
432 6001	RIPRAP (CON) (4 IN)	CY	1.50
618 6023	CONDT (PVC) (SCH 40) (2")	LF	398
618 6024	CONDT (PVC) (SCH 40) (2") (BORE)	LF	62
620 6011	ELEC CONDR (NO. 4) BARE	LF	493
620 6012	ELEC CONDR (NO. 4) INSULATED	LF	976
624 6002	GROUND BOX TY A (122311)W/APRON	EA	5
628 6250	ELC SRV TY D 120/240 100(NS)SS IN)SP (O)	EA	1
6010 6004	CCTV MOUNT (POLE)	EA	1
6010 6011	CCTV FIELD EQUIP (DIGITAL) (INSTL ONLY)	EA	1
6058 6001	BBU SYSTEM (EXTERNAL BATT CABINET)	EA	1
6064 6055	ITS POLE (60 FT) (90 MPH)	EA	1
6064 6080	ITS POLE MNT CAB (TY 2) (CONF 1)	EA	1
6263 6002	BLUETOOTH DETECTION SYSTEM	EA	1
6320 6001	INSTALL OF FIELD HARD ETHERNET SWITCH	EA	1
6320 6002	INSTALL OF CELLULAR MODEM	EA	1
**	ETHERNET SWITCH	EA	1
**	CELLULAR MODEM/ANTENNA	EA	1
**	DIGITAL CCTV CAMERA EQUIPMENT	EA	1

NOTES:

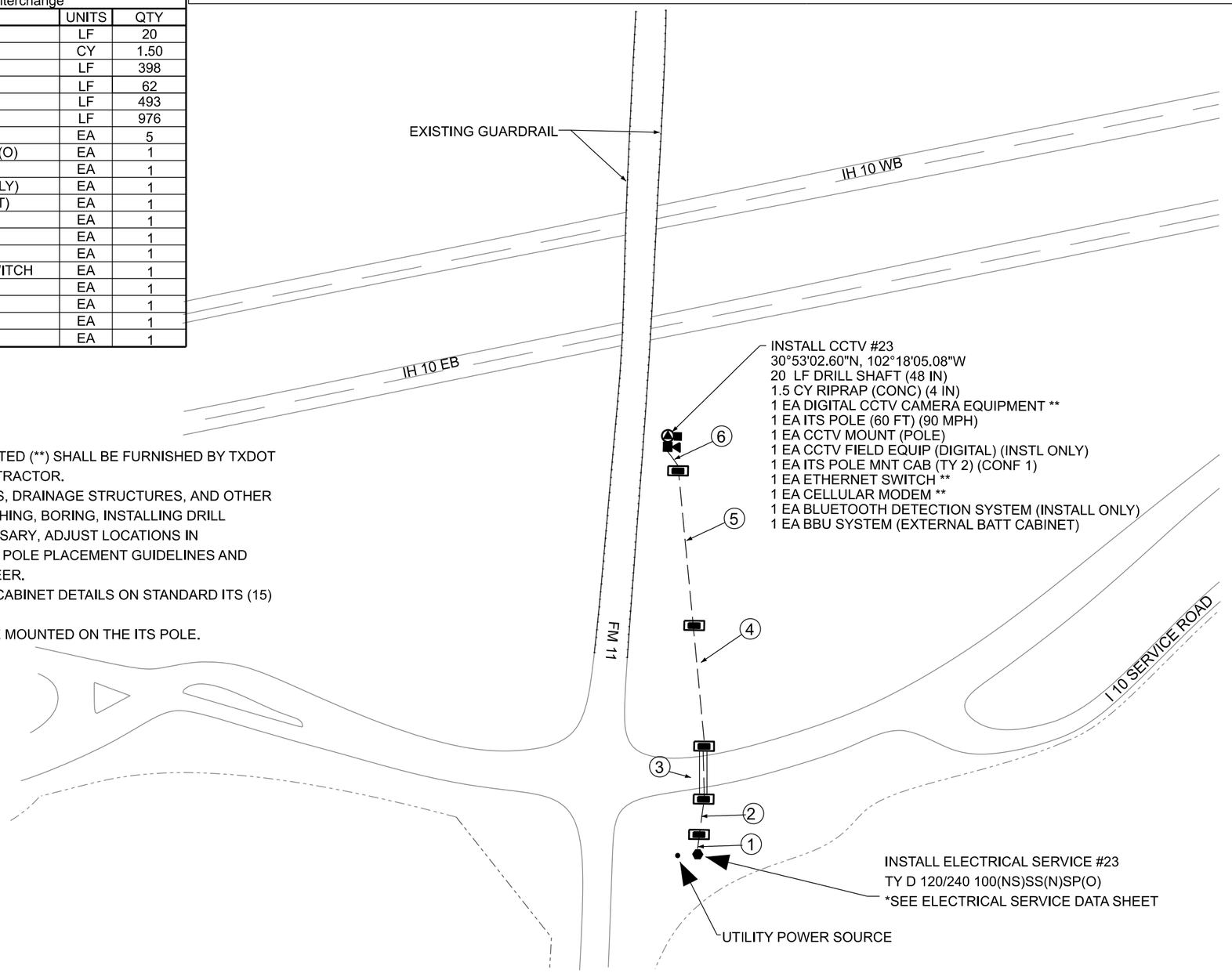
1) EQUPMENT DESIGNATED (**) SHALL BE FURNISHED BY TXDOT AND INSTALLED BY THE CONTRACTOR.

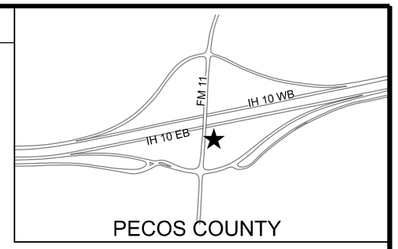
2) LOCATE ALL UTILITIES, DRAINAGE STRUCTURES, AND OTHER CONFLICTS PRIOR TO TRENCHING, BORING, INSTALLING DRILL SHAFTS OR POLES. IF NECESSARY, ADJUST LOCATIONS IN ACCORDANCE WITH TXDOT'S POLE PLACEMENT GUIDELINES AND AS DIRECTED BY THE ENGINEER.

3) ITS POLE MOUNTED CABINET DETAILS ON STANDARD ITS (15) TYPE 2 CABINET.

4) BBU CABINETS TO BE MOUNTED ON THE ITS POLE.

LOCATION #23 - IH 10 AT FM 11





	LEGEND
	PROPOSED DYNAMIC MESSAGE SIGN
	PROPOSED FOUNDATION MOUNTED DMS AND BBU CABINETS
	PROPOSED ITS POLE WITH POLE MOUNTED CABINET AND FOUNDATION MOUNTED BBU CABINET
	PROPOSED CCTV
	PROPOSED HD RVSD
	PROPOSED ECLECTRICAL SERVICE (120V/240V)
	PROPOSED ITS GROUND BOX (TY1)
	PROPOSED ITS GROUND BOX (TY A) W/ APRON
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (CONC ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (CONC ENCSE)
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (STL ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (STL ENCSE)
	PROPOSED 2-4" MULTI-DUCT RMC CONDT PROPOSED 2-3" PVC RMC CONDT
	PROPOSED 2-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT (BORED)
	PROPOSED CONDUIT RUN

LOCATION 23	RUN TABLE CCTV -IH 10 at FM 11 Interchange									
BID ITEM	DESCRIPTION	R1	R2	R3	R4	R5	R6	UOM	TOTALS
	RUN LENGTH	17	30	62	166	165	20		
	POINT:POINT	ES:GB	GB:GB	GB:GB	GB:GB	GB:GB	GB:CCTV		
618 6023	CONDT (PVC) (SCH 40) (2")	17	30		166	165	20	LF	398
618 6024	CONDT (PVC) (SCH 40) (2") (BORE)			62				LF	62
620 6011	ELEC CONDR (NO. 4) BARE	20	36	68	172	171	26	LF	493
620 6012	ELEC CONDR (NO. 4) INSULATED	40	72	126	344	342	52	LF	976

Saul Romero, P.E.

SAUL ROMERO, JR., P.E.

9/15/2023

Date

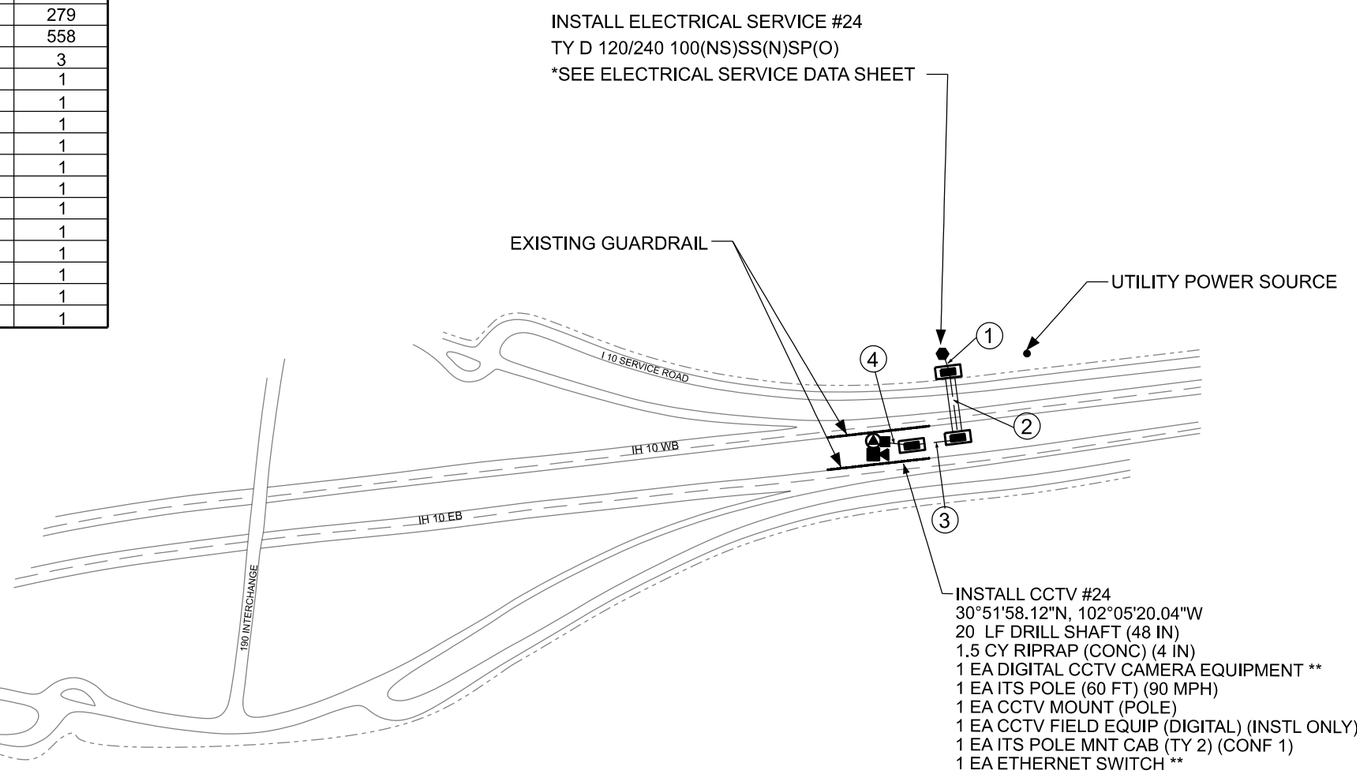
ITS PLAN

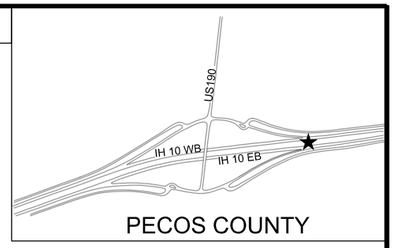
Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			47
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	DISTRICTWIDE	
CONT.	SECT.	JOB	HIGHWAY NO.
0906	00	268	VARIOUS

LOCATION 24	SHEET SUMMARY OF QUANTITIES CCTV -IH 10 at US 190 Interchange		
BID ITEM	DESCRIPTION	UNITS	QTY
416 6006	DRILL SHAFT (48 IN)	LF	20
432 6001	RIPRAP (CON) (4 IN)	CY	1.50
618 6023	CONDT (PVC) (SCH 40) (2")	LF	128
618 6024	CONDT (PVC) (SCH 40) (2") (BORE)	LF	130
620 6007	ELEC CONDR (NO. 8) BARE	LF	279
620 6008	ELEC CONDR (NO. 8) INSULATED	LF	558
624 6002	GROUND BOX TY A (122311)W/APRON	EA	3
628 6250	ELC SRV TY D 120/240 100(NS)SS IN)SP (O)	EA	1
6010 6004	CCTV MOUNT (POLE)	EA	1
6010 6011	CCTV FIELD EQUIP (DIGITAL) (INSTL ONLY)	EA	1
6058 6001	BBU SYSTEM (EXTERNAL BATT CABINET)	EA	1
6064 6055	ITS POLE (60 FT) (90 MPH)	EA	1
6064 6080	ITS POLE MNT CAB (TY 2) (CONF 1)	EA	1
6263 6002	BLUETOOTH DETECTION SYSTEM	EA	1
6320 6001	INSTALL OF FIELD HARD ETHERNET SWITCH	EA	1
6320 6002	INSTALL OF CELLULAR MODEM	EA	1
**	ETHERNET SWITCH	EA	1
**	CELLULAR MODEM/ANTENNA	EA	1
**	DIGITAL CCTV CAMERA EQUIPMENT	EA	1

LOCATION #24 - IH 10 AT US 190





	LEGEND
	PROPOSED DYNAMIC MESSAGE SIGN
	PROPOSED FOUNDATION MOUNTED DMS AND BBU CABINETS
	PROPOSED ITS POLE WITH POLE MOUNTED CABINET AND FOUNDATION MOUNTED BBU CABINET
	PROPOSED CCTV
	PROPOSED HD RVSD
	PROPOSED ECLECTRICAL SERVICE (120V/240V)
	PROPOSED ITS GROUND BOX (TY1)
	PROPOSED ITS GROUND BOX (TY A) W/ APRON
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (CONC ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (CONC ENCSE)
	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (STL ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (STL ENCSE)
	PROPOSED 2-4" MULTI-DUCT RMC CONDT PROPOSED 2-3" PVC RMC CONDT
	PROPOSED 2-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT (BORED)
	PROPOSED CONDUIT RUN

NOTES:

1) EQUPMENT DESIGNATED (**) SHALL BE FURNISHED BY TXDOT AND INSTALLED BY THE CONTRACTOR.

2) LOCATE ALL UTILITIES, DRAINAGE STRUCTURES, AND OTHER CONFLICTS PRIOR TO TRENCHING, BORING, INSTALLING DRILL SHAFTS OR POLES. IF NECESSARY, ADJUST LOCATIONS IN ACCORDANCE WITH TXDOT'S POLE PLACEMENT GUIDELINES AND AS DIRECTED BY THE ENGINEER.

3) ITS POLE MOUNTED CABINET DETAILS ON STANDARD ITS (15) TYPE 2 CABINET.

4) BBU CABINETS TO BE MOUNTED ON THE ITS POLE.

LOCATION 24	RUN TABLE CCTV -IH 10 at US 190 Interchange						
BID ITEM	DESCRIPTION	R1	R2	R3	R4	UOM	TOTALS
	RUN LENGTH	20	130	90	18		
	POINT:POINT	ES:GB	GB:GB	GB:GB	GB:CCTV		
618 6023	CONDT (PVC) (SCH 40) (2")	20		90	18	LF	128
618 6024	CONDT (PVC) (SCH 40) (2") (BORE)		130			LF	130
620 6007	ELEC CONDR (NO. 8) BARE	23	136	96	24	LF	279
620 6008	ELEC CONDR (NO. 8) INSULATED	46	272	192	48	LF	558

STATE OF TEXAS
SAUL ROMERO, JR.
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9/15/2023
Date

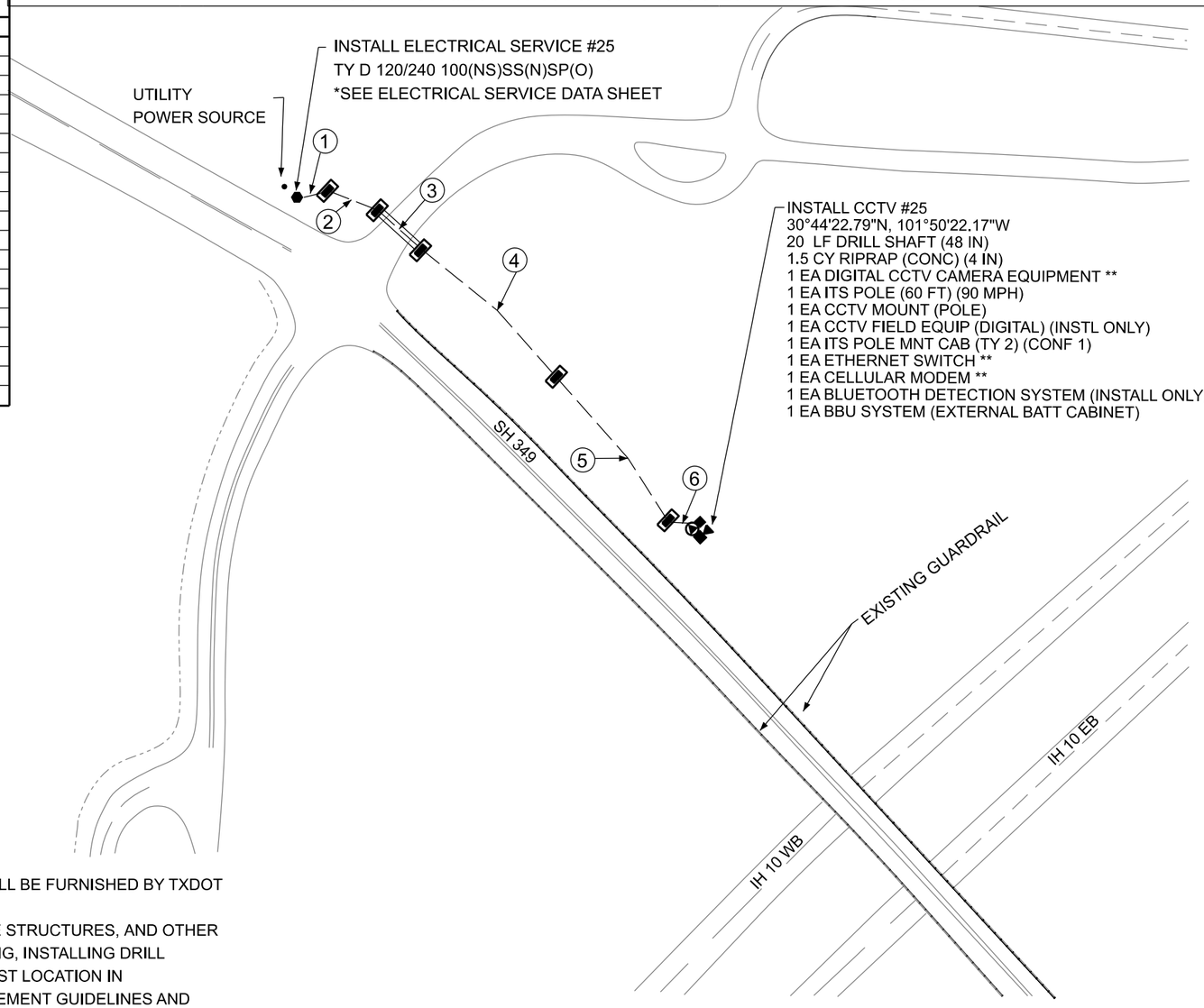
ITS PLAN

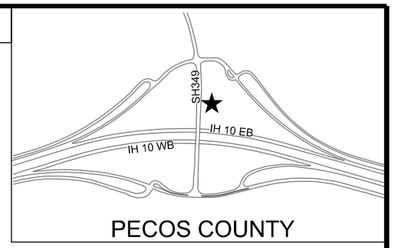
Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			48
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	DISTRICTWIDE	
CONT.	SECT.	JOB	HIGHWAY NO.
0906	00	268	VARIOUS

LOCATION 25	SHEET SUMMARY OF QUANTITIES CCTV -IH 10 at SH 349/US 290 Interchange		
BID ITEM	DESCRIPTION	UNITS	QTY
416 6006	DRILL SHAFT (48 IN)	LF	20
432 6001	RIPRAP (CON) (4 IN)	CY	1.50
618 6023	CONDT (PVC) (SCH 40) (2")	LF	477
618 6026	CONDT (PVC) (SCH 40) (2") (BORE)	LF	57
620 6011	ELEC CONDR (NO. 4) BARE	LF	567
620 6012	ELEC CONDR (NO. 4) INSULATED	LF	1134
624 6002	GROUND BOX TY A (122311)W/APRON	EA	5
628 6250	ELC SRV TY D 120/240 100(NS)SS IN)SP (O)	EA	1
6010 6004	CCTV MOUNT (POLE)	EA	1
6010 6011	CCTV FIELD EQUIP (DIGITAL) (INSTL ONLY)	EA	1
6058 6001	BBU SYSTEM (EXTERNAL BATT CABINET)	EA	1
6064 6055	ITS POLE (60 FT) (90 MPH)	EA	1
6064 6080	ITS POLE MNT CAB (TY 2) (CONF 1)	EA	1
6263 6002	BLUETOOTH DETECTION SYSTEM	EA	1
6320 6001	INSTALL OF FIELD HARD ETHERNET SWITCH	EA	1
6320 6002	INSTALL OF CELLULAR MODEM	EA	1
**	ETHERNET SWITCH	EA	1
**	CELLULAR MODEM/ANTENNA	EA	1
**	DIGITAL CCTV CAMERA EQUIPMENT	EA	1

LOCATION #25 - IH 10 AT SH 349/US 290 INTERCHANGE





	LEGEND
	PROPOSED DYNAMIC MESSAGE SIGN
	PROPOSED FOUNDATION MOUNTED DMS AND BBU CABINETS
	PROPOSED ITS POLE WITH POLE MOUNTED CABINET AND FOUNDATION MOUNTED BBU CABINET
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	PROPOSED HD RVSD
	PROPOSED ECLECTRICAL SERVICE (120V/240V)
	PROPOSED ITS GROUND BOX (TY1)
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	PROPOSED 2-4" MULTI-DUCT CONDT (SCH 40) (CONC ENCSE) PROPOSED 2-3" PVC CONDT (SCH 40) (CONC ENCSE)
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	PROPOSED 2-4" MULTI-DUCT RMC CONDT PROPOSED 2-3" PVC RMC CONDT
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	PROPOSED 1-2" PVC CONDT
	PROPOSED 1-2" PVC CONDT (BORED)
	PROPOSED CONDUIT RUN

NOTES:

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3) ITS POLE MOUNTED CABINET DETAILS ON STANDARD ITS (15) TYPE 2 CABINET.

4) BBU CABINETS TO BE MOUNTED ON THE POLE.

LOCATION 25	RUN TABLE CCTV -IH 10 at SH 349/US 290 Interchange									
BID ITEM	DESCRIPTION	R1	R2	R3	R4	R5	R6	UOM	TOTALS
	RUN LENGTH	17	40	57	200	200	20		
	POINT:POINT	ES:GB	GB:GB	GB:GB	GB:GB	GB:GB	GB:CCTV		
618 6023	CONDT (PVC) (SCH 40) (2")	17	40		200	200	20	LF	477
618 6026	CONDT (PVC) (SCH 40) (2") (BORE)			57				LF	57
620 6011	ELEC CONDR (NO. 4) BARE	20	46	63	206	206	26	LF	567
620 6012	ELEC CONDR (NO. 4) INSULATED	40	92	126	412	412	52	LF	1134

STATE OF TEXAS
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ITS PLAN

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			49
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	DISTRICTWIDE	
CONT.	SECT.	JOB	HIGHWAY NO.
0906	00	268	VARIOUS

ELECTRICAL SERVICE DATA

	Elec. Service ID	Plan Sheet Number	Electrical Service Description	Service Conduit ** Size	Service Conductors No./Size	Safety Switch Amps	Main Ckt. Bkr. Pole/Amps	Two-Pole Contractor Amps	Panelbd/ Loadcenter Amp Rating	Branch Circuit ID	Branch Ckt. Bkr. Pole/ Amps	Branch Circuit Amps	VOLTAGE	KVA Load
1	'CCTV -IH 20 AT FM 1053 31°40'7.48"N/ 102°42'26.64"W	25	ELC SRV TY D 120/240 100(NS)SS(N)SP(O)	1 1/2"	3/#6	N/A	2P/240	N/A	100	CCTV #1	1P/20	15	120	1.8
2	'CCTV -IH 20 AT E BI 20 INTERCHANGE (MONAHANS) 31°36'16.44"N/ 102°50'44.25"W	26	ELC SRV TY D 120/240 100(NS)SS(N)SP(O)	1 1/2"	3/#6	N/A	2P/240	N/A	100	CCTV #2	1P/20	15	120	1.8
3	'CCTV -IH 20 AT SH 18 31°34'27.26"N/ 102°53'30.33"W	27	ELC SRV TY D 120/240 100(NS)SS(N)SP(O)	1 1/2"	3/#6	N/A	2P/240	N/A	100	CCTV #3	1P/20	15	120	1.8
4	'CCTV -IH 20 AT W BI 20 INTERCHANGE (MONAHANS 31°34'26.37"N/ 102°57'24.95"W	28	ELC SRV TY D 120/240 100(NS)SS(N)SP(O)	1 1/2"	3/#6	N/A	2P/240	N/A	100	CCTV #4	1P/20	15	120	1.8
5	'DMS WB -IH 20 AT SH 115/FM 1927 (PYOTE) 31°31'59.60"N / 103° 5'57.71"W	29	ELC SRV TY D 120/240 100(NS)SS(N)SP(O)	1 1/2"	3/#6	N/A	2P/240	N/A	100	DMS #5	2P/70	50	240	12
6	'CCTV -IH 20 ST SH 115/FM 1927 (PYOTE) 31°31'53.83"N, -103° 7'10.78"W	30	ELC SRV TY D 120/240 100(NS)SS(N)SP(O)	1 1/2"	3/#6	N/A	2P/240	N/A	100	CCTV #6	1P/20	15	120	1.8
7	'DMS EB -IH 20 ST SH 115/FM 1927 (PYOTE) 31°31'37.22"N, -103° 8'18.14"W	31	ELC SRV TY D 120/240 100(NS)SS(N)SP(O)	1 1/2"	3/#6	N/A	2P/240	N/A	100	DMS #7	2P/70	50	240	12
8	'CCTV -IH 20 AT E BI 20 INTERCHANGE (BARSTOW) 31°28'18.13"N/ 103°20'27.17"W	32	ELC SRV TY D 120/240 100(NS)SS(N)SP(O)	1 1/2"	3/#6	N/A	2P/240	N/A	100	CCTV #8	1P/20	15	120	1.8
9	'CCTV -IH 20 AT US 285 31°24'12.31"N/103°28'59.25"W	33	ELC SRV TY D 120/240 100(NS)SS(N)SP(O)	1 1/2"	3/#6	N/A	2P/240	N/A	100	CCTV #9	1P/20	15	120	1.8
10	'CCTV -IH 20 AT MM 13 31°13'28.10"N/ 103°54'9.18"W	34	ELC SRV TY D 120/240 100(NS)SS(N)SP(O)	1 1/2"	3/#6	N/A	2P/240	N/A	100	CCTV #10	1P/20	15	120	1.8
11	'CCTV -IH 10 AT FM 3078 (EXIT 192) 31° 3'2.87"N, 103°58'35.73"W	35	ELC SRV TY D 120/240 100(NS)SS(N)SP(O)	1 1/2"	3/#6	N/A	2P/240	N/A	100	CCTV #11	1P/20	15	120	1.8
12	'DMS EB -IH 10 AT FM 2903/BI 10F (EXIT 206) 31° 0'38.57"N, 103°46'25.81"W	36	ELC SRV TY D 120/240 000(NS)SS(N)SP(O)	1 1/2"	3/#6	N/A	2P/240	N/A	100	DMS #12	2P/70	50	240	12
13	'CCTV -IH 10 AT FM 2903/BI 10F 31° 0'27.17"N/ 103°45'13.65"W	37	ELC SRV TY D 120/240 100(NS)SS(N)SP(O)	1 1/2"	3/#6	N/A	2P/240	N/A	100	CCTV #13	1P/20	15	120	1.8
14	'DMS WB -IH 10 AT FM 2903/BI 10F (EXIT 206) 31° 0'19.89"N, 103°43'47.17"W	38	ELC SRV TY D 120/240 000(NS)SS(N)SP(O)	1 1/2"	3/#6	N/A	2P/240	N/A	100	DMS #14	2P/70	50	240	12
15	'CCTV -IH 10 AT SH 17 (EXIT 212) 30°59'40.63"N/ 103°39'46.32"W	39	ELC SRV TY D 120/240 100(NS)SS(N)SP(O)	1 1/2"	3/#6	N/A	2P/240	N/A	100	CCTV #15	1P/20	15	120	1.8
16	'CCTV -IH 10 REST AREA (MM 233) 30°56'18.18"N/ 103°18'49.88"W	40	ELC SRV TY D 120/240 100(NS)SS(N)SP(O)	1 1/2"	3/#6	N/A	2P/240	N/A	100	CCTV #16	1P/20	15	120	1.8
17	'CCTV -IH 10 at US 67/FM 1776 (EXIT 248) 30°53'56.66"N/ 103° 3'14.10"W	41	ELC SRV TY D 120/240 100(NS)SS(N)SP(O)	1 1/2"	3/#6	N/A	2P/240	N/A	100	CCTV #17	1P/20	15	120	1.8
18	'CCTV -IH 10 at SH 18 (EXIT 259B) 30°54'28.94"N/102°53'2.61"W	42	ELC SRV TY D 120/240 100(NS)SS(N)SP(O)	1 1/2"	3/#6	N/A	2P/240	N/A	100	CCTV #18	1P/20	15	120	1.8
19	'CCTV -IH 10 at Exist DMS (Confirmation Camera) 30°53'57.74"N/ 102°51'37.80"W	43	ELC SRV TY D 120/240 100(NS)SS(N)SP(O)	1 1/2"	3/#6	N/A	2P/240	N/A	100	CCTV #19	1P/20	15	120	1.8
20	'DMS EB -IH 10 at US 67 30°52'51.90"N, 102°40'38.42"W	44	ELC SRV TY D 120/240 000(NS)SS(N)SP(O)	1 1/2"	3/#6	N/A	2P/240	N/A	100	DMS #20	2P/70	50	240	12
21	'CCTV -IH 10 at US 67 (EXIT 273) 30°52'33.57"N, 102°39'2.39"W	45	ELC SRV TY D 120/240 000(NS)SS(N)SP(O)	1 1/2"	3/#6	N/A	2P/240	N/A	100	CCTV #21	1P/20	15	120	1.8
22	''DMS WB -IH 10 at US 67 30°52'27.22"N, 102°37'21.55"W	46	ELC SRV TY D 120/240 000(NS)SS(N)SP(O)	1 1/2"	3/#6	N/A	2P/240	N/A	100	DMS #22	2P/70	50	240	12
23	'CCTV -IH 10 at FM 11 Interchange 30°52'58.05"N/102°18'5.59"W	47	ELC SRV TY D 120/240 100(NS)SS(N)SP(O)	1 1/2"	3/#6	N/A	2P/240	N/A	100	CCTV #23	1P/20	15	120	1.8
24	'CCTV -IH 10 at US 190 Interchange 30°51'57.57"N/ 102° 5'15.21"W	48	ELC SRV TY D 120/240 100(NS)SS(N)SP(O)	1 1/2"	3/#6	N/A	2P/240	N/A	100	CCTV #24	1P/20	15	120	1.8
25	'CCTV -IH 10 at SH 349/US 290 Interchange 30°44'27.56"N/ 101°50'18.70"W	49	ELC SRV TY D 120/240 100(NS)SS(N)SP(O)	1 1/2"	3/#6	N/A	2P/240	N/A	100	CCTV #25	1P/20	15	120	1.8

STATE OF TEXAS
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SAUL ROMERO, JR., P.E.

9/15/2023
Date

ELECTRICAL SERVICE DATA

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
6		50

STATE	STATE DIST.	COUNTY	
TEXAS	ODA	DISTRICTWIDE	
CONT.	SECT.	JOB	HIGHWAY NO.
0906	00	268	VARIOUS

	LOCATION	RUN NO.	CURRENT THIS RUN	DISTANCE TO NEXT RUN	WIRE SIZE A.W.G.	WIRE RESISTANCE	CURRENT RUNNING TOTAL	VOLTAGE DROP	RUNNING TOTAL VOLTAGE DROP	VOLTAGE DROP (NOT TO EXCEED 5% DROP)
		1	15	10	4	0.000518	15	0.08	0.08	
		2		166	4	0.000518	15	1.29	1.37	
		3		65	4	0.000518	15	0.51	1.87	3.54%
		4		200	4	0.000518	15	1.55	3.43	
1	CCTV -IH 20 AT FM 1053	5		105	4	0.000518	15	0.82	4.24	
		1	15	15	6	0.00082	15	0.18	0.18	
		2		155	6	0.00082	15	1.91	2.09	
		3		195	6	0.00082	15	2.40	4.49	3.94%
2	CCTV -IH 20 AT E BI 20 (MONAHANS)	4		19	6	0.00082	15	0.23	4.72	
		1	15	15	8	0.001308	15	0.29	0.29	
		2		47	8	0.001308	15	0.92	1.22	
		3		66	8	0.001308	15	1.29	2.51	
		4		122	8	0.001308	15	2.39	4.91	4.25%
3	CCTV -IH 20 AT SH 18	5		10	8	0.001308	15	0.20	5.10	
		1	15	15	4	0.000518	15	0.12	0.12	
		2		65	4	0.000518	15	0.51	0.62	
		3		50	4	0.000518	15	0.39	1.01	
		4		200	4	0.000518	15	1.55	2.56	3.24%
		5		150	4	0.000518	15	1.17	3.73	
4	CCTV -IH 20 AT W BI 20 (MONAHANS)	6		20	4	0.000518	15	0.16	3.89	
		1	50	15	4	0.000518	50	0.39	0.39	
		2		250	4	0.000518	50	6.48	6.86	
		3		145	4	0.000518	50	3.76	10.62	4.67%
5	DMS WB -IH 20 AT SH 115/FM 1927 (PYOTE)	4		23	4	0.000518	50	0.60	11.21	
		1	15	20	6	0.00082	15	0.25	0.25	
		2		310	6	0.00082	15	3.81	4.06	3.59%
6	CCTV -IH 20 ST SH 115/FM 1927 (PYOTE)	3		20	6	0.00082	15	0.25	4.31	
		1	50	10	4	0.000518	50	0.26	0.26	
		2		41	4	0.000518	50	1.06	1.32	
		3		200	4	0.000518	50	5.18	6.50	4.97%
		4		200	4	0.000518	50	5.18	11.68	
7	DMS EB -IH 20 ST SH 115/FM 1927 (PYOTE)	5		10	4	0.000518	50	0.26	11.94	
		1	15	20	4	0.000518	15	0.16	0.16	
		2		277	4	0.000518	15	2.15	2.31	
		3		276	4	0.000518	15	2.14	4.45	3.84%
8	CCTV -IH 20 AT E BI 20 (BARSTOW)	4		20	4	0.000518	15	0.16	4.61	
		1	15	15	4	0.000518	15	0.12	0.12	
		2		23	4	0.000518	15	0.18	0.30	
		3		50	4	0.000518	15	0.39	0.68	
		4		200	4	0.000518	15	1.55	2.24	3.24%
		5		197	4	0.000518	15	1.53	3.77	
9	CCTV -IH 20 AT US 285	6		15	4	0.000518	15	0.12	3.89	
		1	15	13	8	0.001308	15	0.26	0.26	
		2		33	8	0.001308	15	0.65	0.90	
		3		40	8	0.001308	15	0.78	1.69	1.64%
10	CCTV -IH 20 AT MM 13	4		14	8	0.001308	15	0.27	1.96	
		1	15	15	4	0.000518	15	0.12	0.12	
		2		250	4	0.000518	15	1.94	2.06	
		3		54	4	0.000518	15	0.42	2.48	3.43%
		4		200	4	0.000518	15	1.55	4.03	
11	CCTV -IH 10 AT FM 3078 (EXIT 192)	5		11	4	0.000518	15	0.09	4.12	
		1	50	15	4	0.000518	50	0.39	0.39	
		2		210	4	0.000518	50	5.44	5.83	
		3		210	4	0.000518	50	5.44	11.27	4.91%
12	DMS EB -IH 10 AT FM 2903/BI 10F (EXIT 206)	4		20	4	0.000518	50	0.52	11.78	

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Date

ELECTRICAL VOLTAGE DROP

1 OF 2

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			51
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	DISTRICTWIDE	
CONT.	SECT.	JOB	HIGHWAY NO.
0906	00	268	VARIOUS

	LOCATION	RUN NO.	CURRENT THIS RUN	DISTANCE TO NEXT RUN	WIRE SIZE A.W.G.	WIRE RESISTANCE	CURRENT TOTAL	VOLTAGE DROP	RUNNING TOTAL VOLTAGE DROP	VOLTAGE DROP (NOT TO EXCEED 5% DROP)
		1	15	18	6	0.00082	15	0.22	0.22	
		2		30	6	0.00082	15	0.37	0.59	
		3		50	6	0.00082	15	0.62	1.21	4.10%
		4		141	6	0.00082	15	1.73	2.94	
		5		141	6	0.00082	15	1.73	4.67	
13	CCTV -IH 10 AT FM 2903/BI 10F	6		20	6	0.00082	15	0.25	4.92	
		1	50	20	4	0.000518	50	0.52	0.52	
		2		60	4	0.000518	50	1.55	2.07	
		3		77	4	0.000518	50	1.99	4.07	3.53%
		4		158	4	0.000518	50	4.09	8.16	
14	DMS WB -IH 10 AT FM 2903/BI 10F (EXIT 206)	5		12	4	0.000518	50	0.31	8.47	
		1	15	10	6	0.00082	15	0.12	0.12	
		2		20	6	0.00082	15	0.25	0.37	
		3		66	6	0.00082	15	0.81	1.18	3.22%
		4		200	6	0.00082	15	2.46	3.64	
15	CCTV -IH 10 AT SH 17 (EXIT 212)	5		18	6	0.00082	15	0.22	3.86	
		1	15	10	4	0.000518	15	0.08	0.08	
		2		30	4	0.000518	15	0.23	0.31	
		3		45	4	0.000518	15	0.35	0.66	2.72%
		4		325	4	0.000518	15	2.53	3.19	
16	CCTV -IH 10 REST AREA (MM 233)	5		10	4	0.000518	15	0.08	3.26	
		1	15	15	4	0.000518	15	0.12	0.12	
		2		20	4	0.000518	15	0.16	0.27	
		3		69	4	0.000518	15	0.54	0.81	
		4		183	4	0.000518	15	1.42	2.23	3.17%
		5		183	4	0.000518	15	1.42	3.65	
17	CCTV -IH 10 at US 67/FM 1776 (EXIT 248)	6		20	4	0.000518	15	0.16	3.81	
		1	15	10	6	0.00082	15	0.12	0.12	
		2		83	6	0.00082	15	1.02	1.14	
		3		62	6	0.00082	15	0.76	1.91	2.86%
		4		100	6	0.00082	15	1.23	3.14	
18	CCTV -IH 10 at SH 18 (EXIT 259B)	5		24	6	0.00082	15	0.30	3.43	
		1	15	8	8	0.001308	15	0.16	0.16	
		2		155	8	0.001308	15	3.04	3.20	
		3		25	8	0.001308	15	0.49	3.69	3.40%
19	CCTV -IH 10 at Exist DMS (Confirmation Camera)	4		20	8	0.001308	15	0.39	4.08	
		1	50	20	4	0.000518	50	0.52	0.52	
20	DMS EB -IH 10 at US 67	2		60	4	0.000518	50	1.55	2.07	0.86%
		1	15	15	4	0.000518	15	0.12	0.12	
		2		50	4	0.000518	15	0.39	0.51	
		3		250	4	0.000518	15	1.94	2.45	3.79%
		4		250	4	0.000518	15	1.94	4.39	
21	CCTV -IH 10 at US 67 (EXIT 273)	5		20	4	0.000518	15	0.16	4.55	
		1	50	15	4	0.000518	50	0.39	0.39	
		2		164	4	0.000518	50	4.25	4.64	
		3		65	4	0.000518	50	1.68	6.32	2.80%
22	'DMS WB -IH 10 at US 67	4		15	4	0.000518	50	0.39	6.71	
		1	15	17	4	0.000518	15	0.13	0.13	
		2		30	4	0.000518	15	0.23	0.37	
		3		62	4	0.000518	15	0.48	0.85	
		4		166	4	0.000518	15	1.29	2.14	2.98%
		5		165	4	0.000518	15	1.28	3.42	
23	CCTV -IH 10 at FM 11	6		20	4	0.000518	15	0.16	3.57	
		1	15	20	8	0.001308	15	0.39	0.39	
		2		130	8	0.001308	15	2.55	2.94	
		3		90	8	0.001308	15	1.77	4.71	4.22%
24	CCTV -IH 10 at US 190	4		18	8	0.001308	15	0.35	5.06	
		1	15	17	4	0.000518	15	0.13	0.13	
		2		40	4	0.000518	15	0.31	0.44	
		3		57	4	0.000518	15	0.44	0.89	
		4		200	4	0.000518	15	1.55	2.44	3.46%
		5		200	4	0.000518	15	1.55	3.99	
25	CCTV -IH 10 at SH 349/US 290	6		20	4	0.000518	15	0.16	4.15	

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9/15/2023

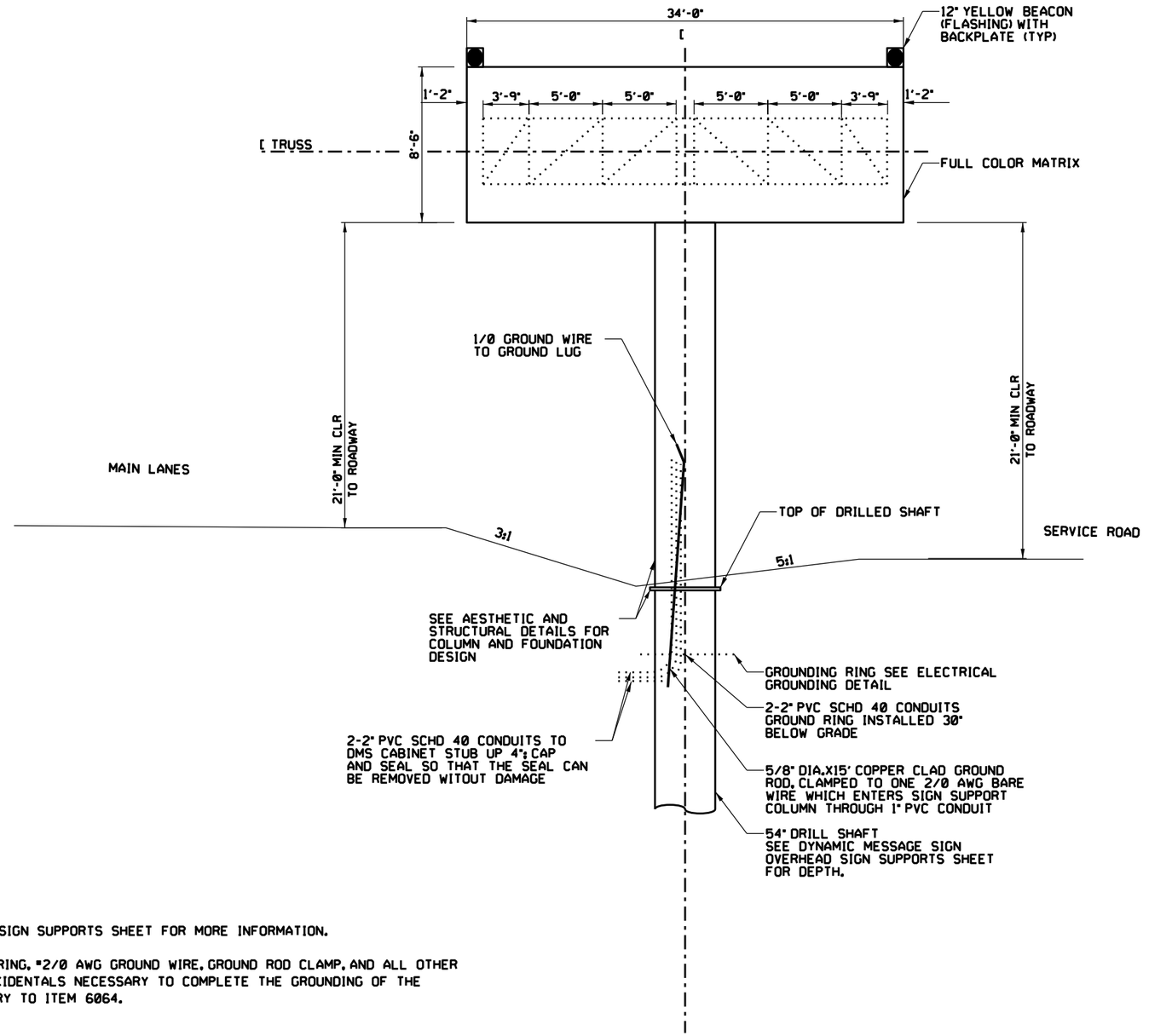
Date

ELECTRICAL VOLTAGE DROP

2 OF 2

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			52
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	DISTRICTWIDE	
CONT.	SECT.	JOB	HIGHWAY NO.
0906	00	268	VARIOUS



NOTES:

1. ALL DIMENSIONS ARE IN FT/IN.

2. REFER TO DYNAMIC MESSAGE SIGN OVERHEAD SIGN SUPPORTS SHEET FOR MORE INFORMATION.

3. FURNISHING AND INSTALLING THE GROUNDING RING, #2/0 AWG GROUND WIRE, GROUND ROD CLAMP, AND ALL OTHER MATERIALS, LABOR TOOLS, EQUIPMENT, AND INCIDENTALS NECESSARY TO COMPLETE THE GROUNDING OF THE STRUCTURE AS PER NEC SHALL BE SUBSIDIARY TO ITEM 6064.

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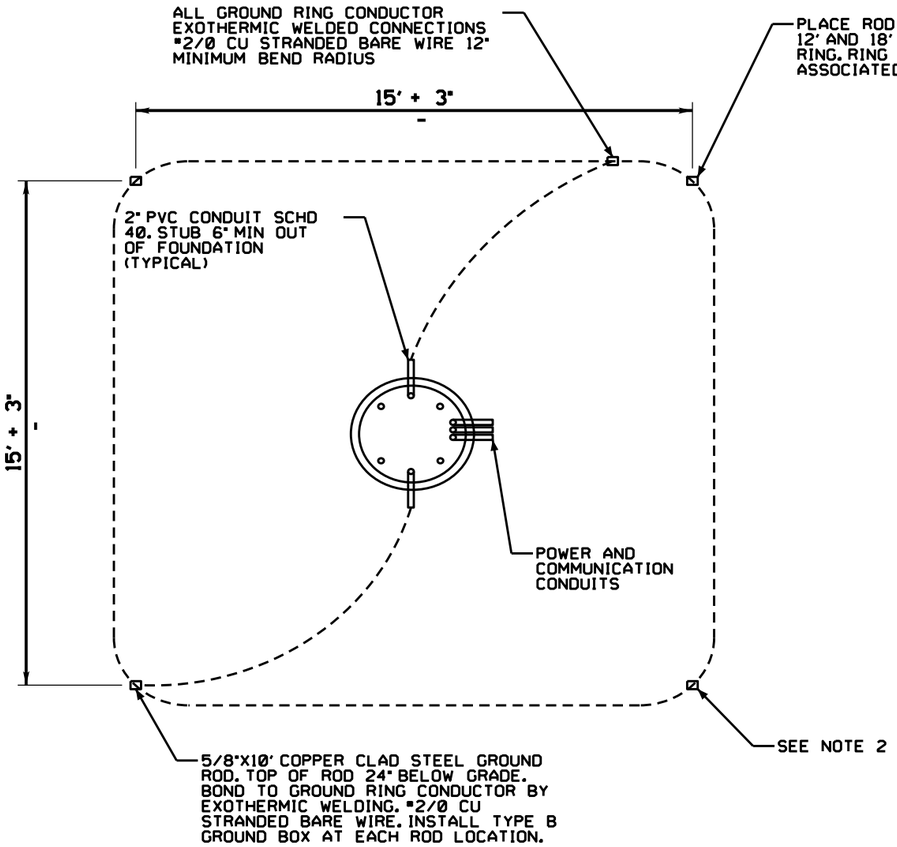
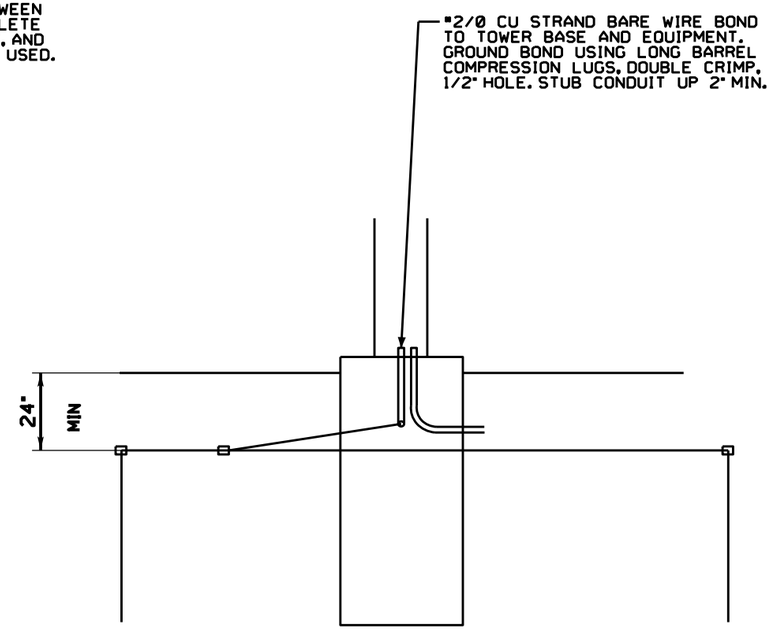
DMS ELEVATION DETAIL SHEET

Texas Department of Transportation®

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			53
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	DISTRICTWIDE	
CONT.	SECT.	JOB	HIGHWAY NO.
0906	00	268	VARIOUS





GROUNDING DETAIL FOR DMS - DRILLED SHAFT

NTS

NOTES:

1. FURNISHING AND INSTALLING GROUNDING RING, RODS, AND GROUND BOXES WILL NOT BE MEASURED OR PAID FOR DIRECTLY, BUT WILL BE CONSIDERED SUBSIDIARY TO ITEM 6064.

2. CONTRACTOR IS RESPONSIBLE FOR MARKING THE DMS STRUCTURE GROUNDING RING WITH APPROPRIATE UNDERGROUND CABLE MARKING DEVICES. THESE MARKERS SHALL BE VISIBLE FROM THE SURFACE AND DESCRIBE THE GROUNDING FOOTPRINT AROUND THE STRUCTURE. THE MARKER SHALL STATE THAT THERE SHOULD BE NO DIGGING WITHIN 10' OF DMS STRUCTURE. METHOD AND TYPE OF MARKERS TO BE DETERMINED BY CONTRACTOR AND APPROVED BY TXDOT. SPACING OF THESE MARKERS SHALL BE A MINIMUM OF 5' APART. THESE MARKERS WILL NOT BE PAID FOR DIRECTLY BUT WILL BE SUBSIDIARY TO ITEM 6064.

DATE: DATE TIME
FILE: DOCUMENT NAME

Texas Department of Transportation

Traffic Safety Division Standard

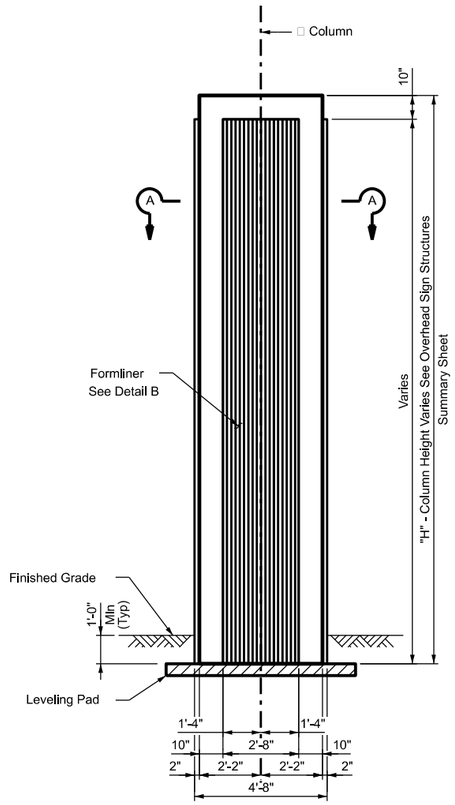
ITS DETAIL
DYNAMIC MESSAGE SIGN
ELECTRICAL GROUNDING DETAIL

FILE: ctms-dtl-01.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	0906	00	268	VARIOUS
	DIST	COUNTY		SHEET NO.
	ODA	DISTRICTWIDE		54

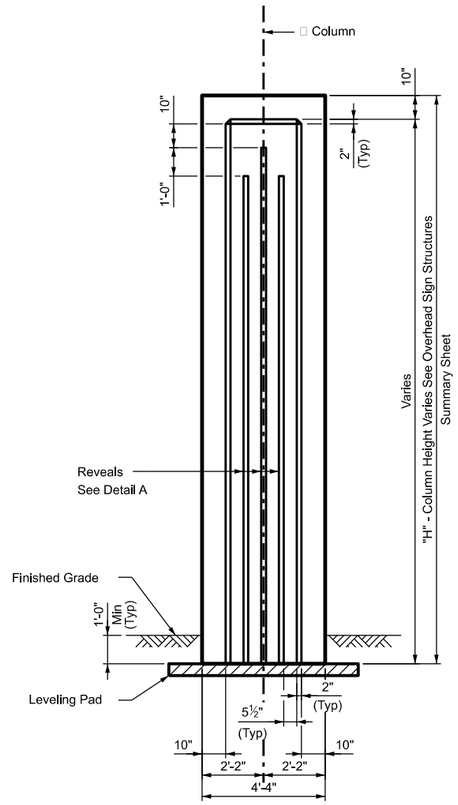
29G

GENERAL NOTES:

1. See Balanced Tee Overhead Guide and Dynamic Message Sign Structure Column Details for structural information not shown.

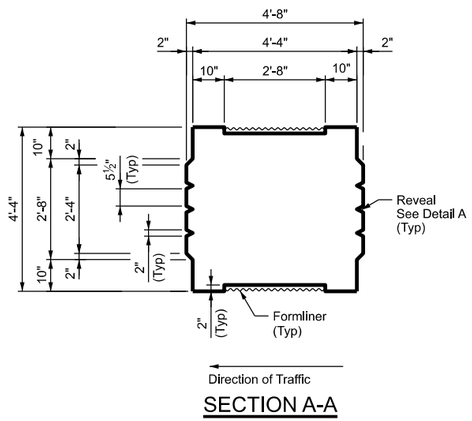


FRONT AND BACK

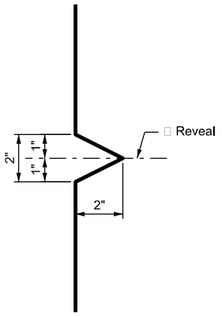


SIDE

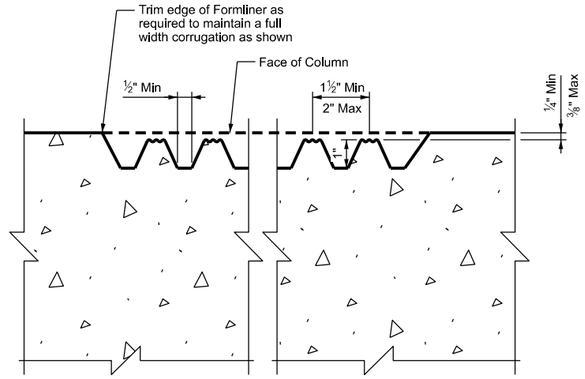
ELEVATION



SECTION A-A



DETAIL A



DETAIL B

(Section thru Fractured Fin Formliner)

SAUL ROMERO, JR., P.E.

9/15/2023
Date

Texas Department of Transportation

IH 20

BALANCED TEE OVERHEAD GUIDE AND DMS STRUCTURE DETAILS

AESTHETIC DETAILS

SHEET 1 OF 3

	PROJECT NO.		HIGHWAY NO
			VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	ODA	DISTRICTWIDE	
CONTROL	SECTION	JOB	55
0906	00	268	

$TIME$
$DATE$
$FILE$

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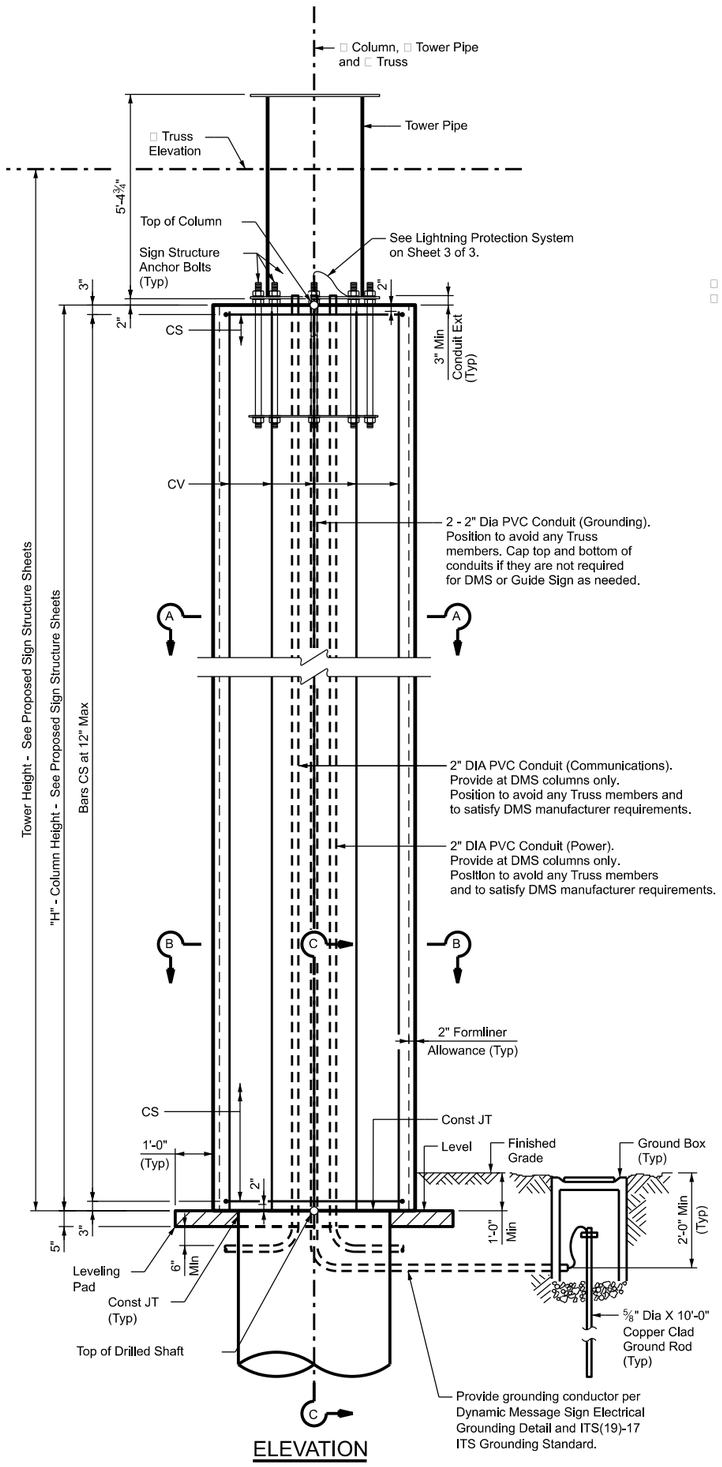
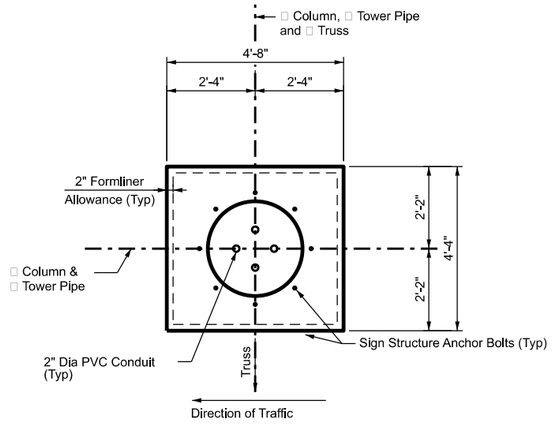
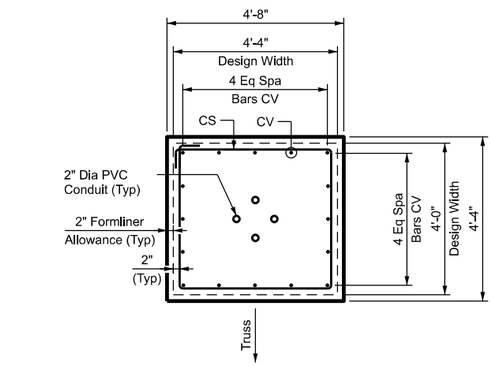


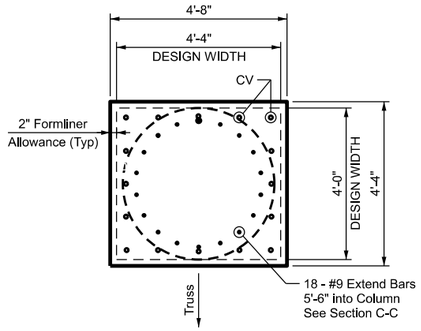
ELEVATION



PLAN

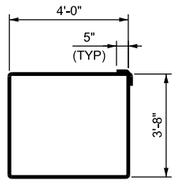


SECTION A-A

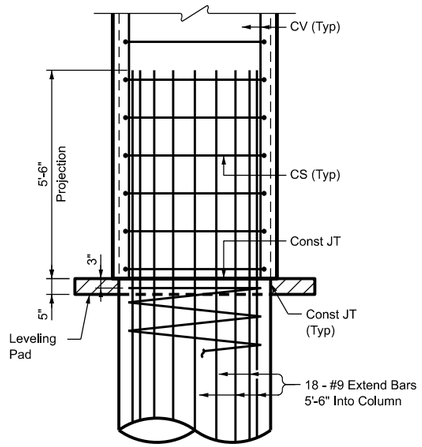


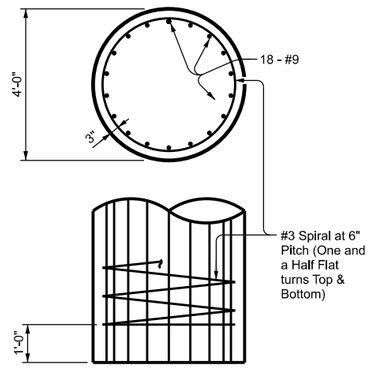
SECTION B-B

(Conduits omitted for clarity)

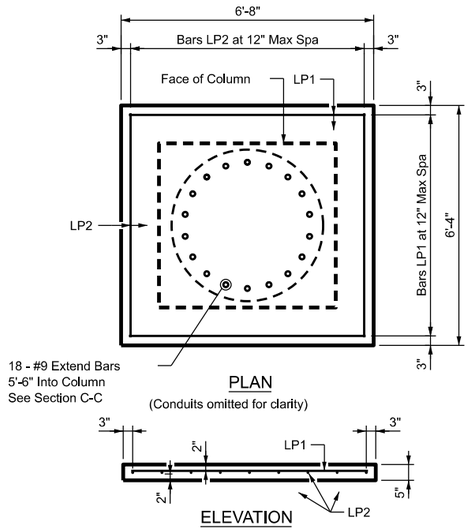


BARS CS (#4)





SECTION C-C



PLAN

(Conduits omitted for clarity)

ELEVATION

LEVELING PAD DETAILS

(Shift Bars LP1 & LP2 as required to avoid drilled shaft reinforcement. Place monolithic with drilled shaft)

TABLE OF ESTIMATED QUANTITIES

(ONE COLUMN ONLY)

BAR	NO	SIZE	LENGTH	WEIGHT
CS	26	#4	16'-2"	281
CV	16	#11	24'-10"	2,112
LP1	7	#4	6'-2"	29
LP2	8	#4	5'-10"	32
REINFORCING STEEL (LB) *				2,454
CLASS "C" CONC (SIGN COLUMN) (CY) (1)				19.4

* REINFORCING STEEL QUANTITIES ARE FOR CONTRACTOR'S INFORMATION ONLY.

(1) Quantities shown are based on an "H" value of 25'. For each linear foot variation in "H" value, make the following adjustments:

Reinforcing Steel, 96 LB/LF
Class "C" Concrete, 0.8 CY/LF

General Notes:

1. Designed according to AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signals, 6th Edition and Interim Specifications.
2. Anchor Bolt assembly, all steel hardware, conduit in the column and Ground Box is incidental to Item 650 "Overhead Sign Supports".
3. Chamfer all exposed corners ¾".

Cover dimensions are clear dimensions, unless noted otherwise.

Reinforcing bar dimensions shown are out-to-out of bar.

Material Notes:

1. Provide Grade 60 Reinforcing Steel.
2. Provide Class "C" Concrete (f'c = 3,600 psi).
3. All steel shall be galvanized.
4. Anchor Bolts shall be A193-B7.

STATE OF TEXAS
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Date

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BALANCED TEE OVERHEAD GUIDE AND DMS STRUCTURE DETAILS

COLUMN DETAILS

SHEET 2 OF 3

	PROJECT NO.		HIGHWAY NO.
			VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	00A	DISTRICTWIDE	56
CONTROL	SECTION	JOB	
0906	00	268	

$TIME$
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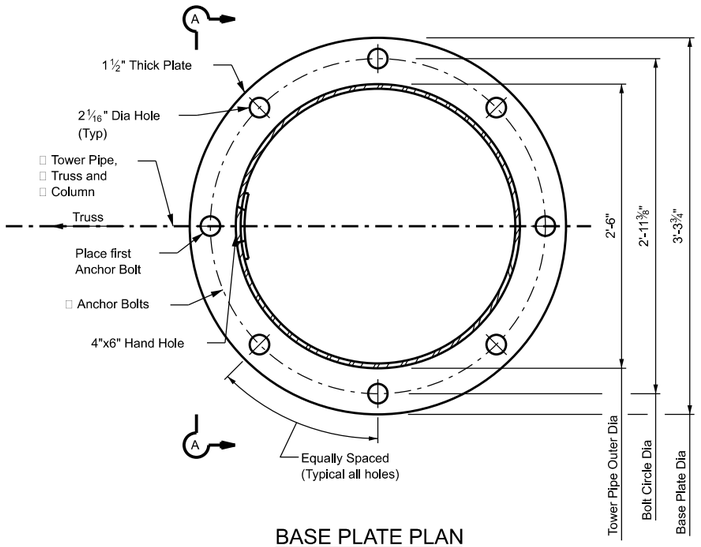
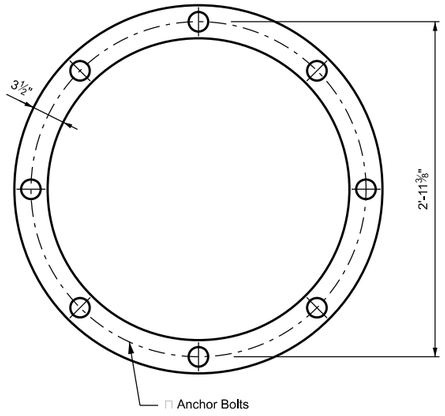
95% SUBMITTAL

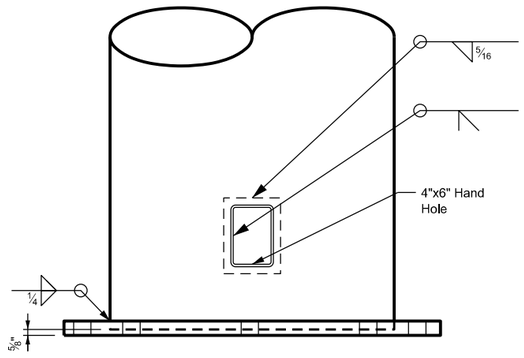


BASE PLATE PLAN



TOP VIEW OF TOP & BOTTOM TEMPLATES

(Template may be cut as necessary to clear Column Bars CVV)



VIEW A-A
BASE PLATE & HANDHOLE DETAILS

Cut 5"x7" hole in pipe.
Center 4"x6" Hand Hole in 3/8"x8"x10" back up Plate.
Provide attachable cover made from section cut from pipe.

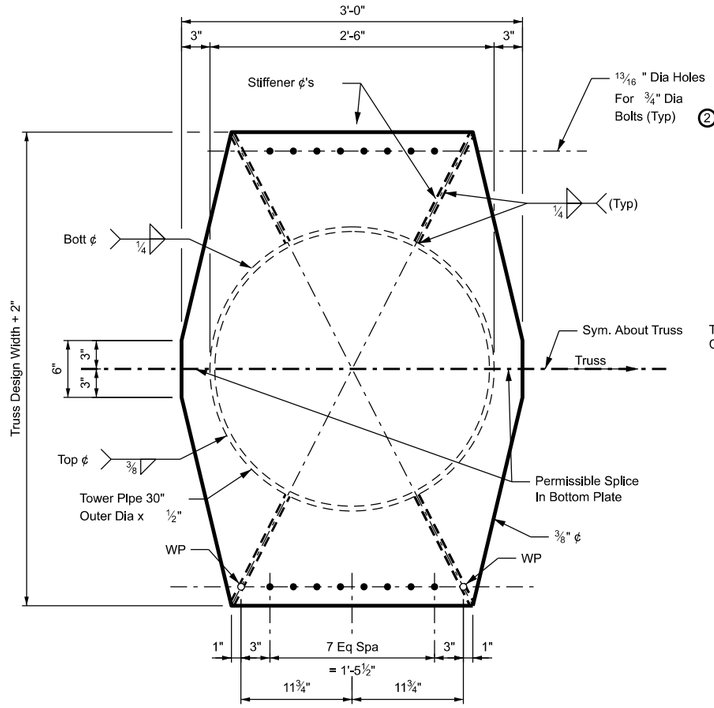
TABLE OF ESTIMATED QUANTITIES

Miscellaneous Steel (LB) *	1,717

* Miscellaneous Steel Quantites are for Contractor's information only.

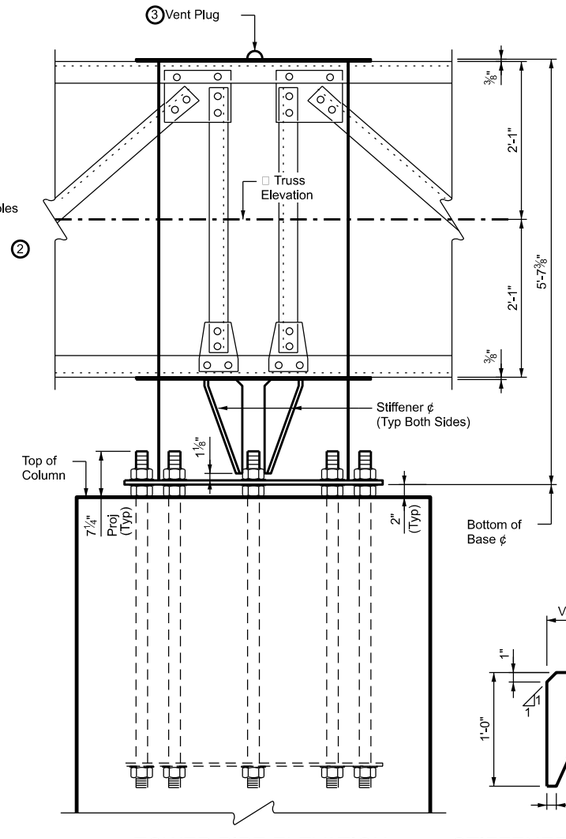
General Notes:

1. Steel for Tower Pipe shall conform to ASTM A53 Grade B or ASTM A501. Tower Pipe wall thickness shown is the minimum allowable. Fabricator may use the wall thickness shown or pipe of the same outer diameter with greater wall thickness.
2. All connection bolts shall conform to Item 447, "Structural Bolting". All structural steel, connection bolts, and exposed nuts and washers shall be galvanized in accordance with Item 445 "Galvanizing".
3. Compensate for truss deflection at free end by offsetting upper and lower Bolt Holes at Truss-To-Tower Connection. Anchor Bolts and nuts for anchor bolts shall be alloy steel per Item 449, "Anchor Bolts". Washer shall conform to ASTM F436.
4. Lubricate and tighten anchor bolts when erecting the structure per Item 449, "Anchor Bolts". After the structure has been aligned in its final position and the anchor bolts have been properly tightened, tack weld anchor bolt nuts to washers and tack weld washers to the base Plate. Galvanizing in tack welded areas shall be repaired in accordance with Item 445, "Galvanizing".
5. Miscellaneous Steel for tower pipe, connection plates, and anchor bolt assemblies will be considered subsidiary to Class "C" Concrete (Sign Column).
6. Prior to placing sign structure anchor bolts for tower pipe, the Contractor shall coordinate with the state to obtain the view angle offset for each the dms locations to orient the tower pipe for optimum dms view axis alignment.



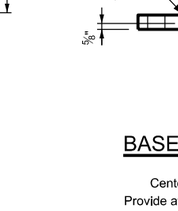
TOWER PIPE TO TRUSS CONNECTION PLATE DETAIL

② Provide 8 3/4" Dia bolts for all COSS & OSB structures regardless of bolt size and number shown on the truss standards.

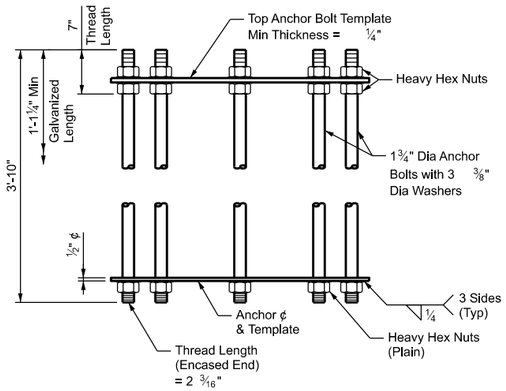


TOWER PIPE ELEVATION

③ Cap shall be Solid Steel Sheet 3/8" nominal thickness, drill, tap, and plug Galvanizing Vent. Weld Plate to Pipe with 3/8" Weld all around.



STIFFENER ¢ DETAIL

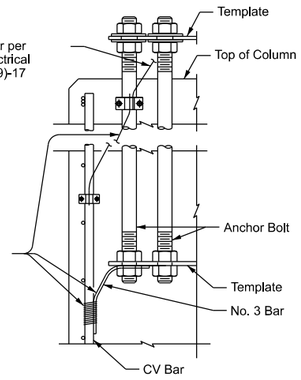


ANCHOR BOLT ASSEMBLY

(Prior to Installation)

Provide grounding conductor per Dynamic Message Sign Electrical Grounding Detail and ITS(19)-17 ITS Grounding Standard.

Bond anchor bolts to rebar with 1/0 jumper and two mechanical connectors or by bending No. 3 bar on bottom template as shown and wire tightly with ten turns of No. 10 wire or one mechanical connector. Provide Mechanical connectors that are UL listed for concrete encasement.



LIGHTNING PROTECTION SYSTEM

STATE OF TEXAS
SAUL ROMERO, JR.
118987
LICENSED
PROFESSIONAL ENGINEER

Saul Romero, P.E.

SAUL ROMERO, JR., P.E.

9/15/2023
Date

Texas Department of Transportation

IH 20

BALANCED TEE OVERHEAD GUIDE AND DMS STRUCTURE DETAILS

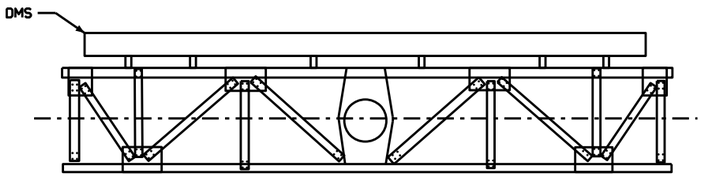
TOWER PIPE DETAILS

SHEET 3 OF 3

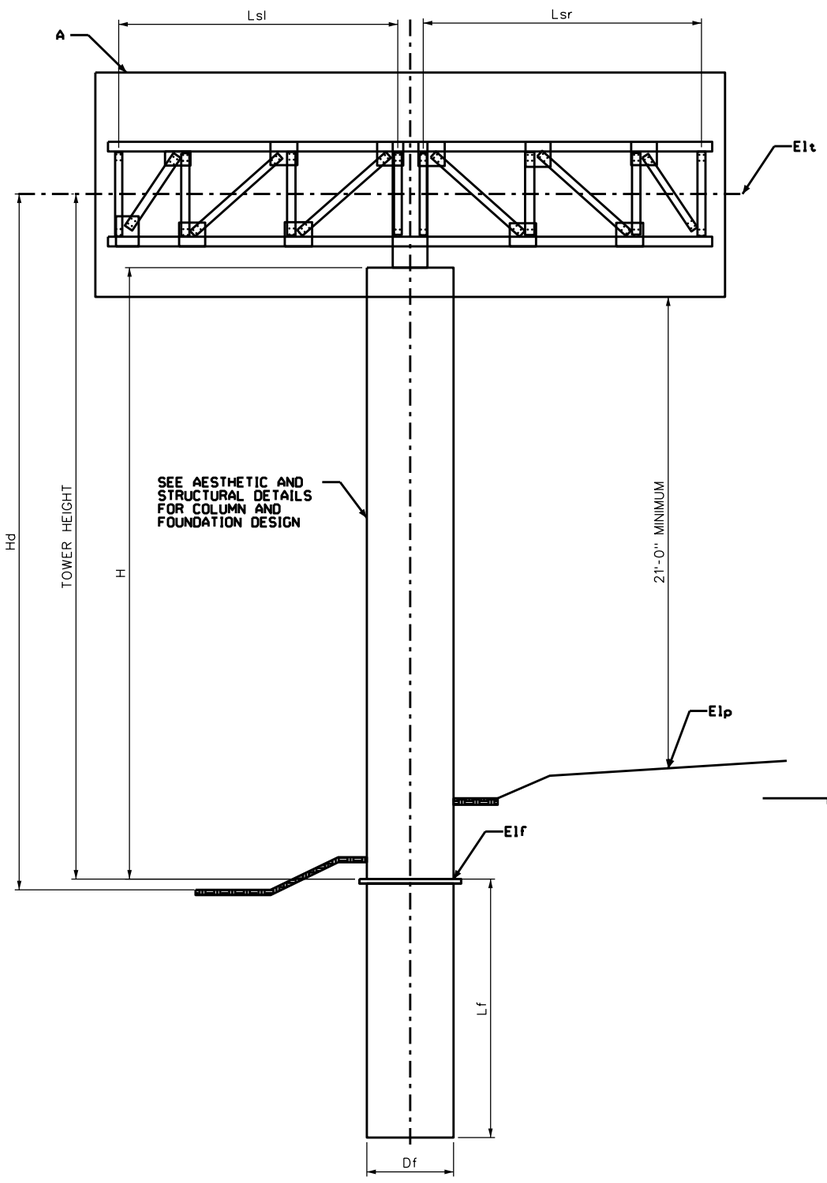
	PROJECT NO.		HIGHWAY NO
			VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	ODA	DISTRICTWIDE	57
CONTROL	SECTION	JOB	
0906	00	268	

$TIME$
$DATE$
$FILE$

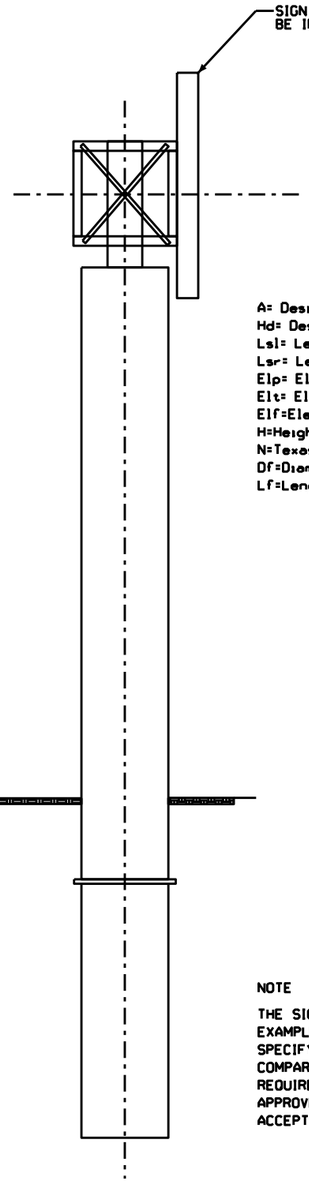
$FILES$



PLAN



ELEVATION REAR VIEW



ELEVATION END VIEW

ITS DEVICE NO.	SIGN STRUCTURE	DIRECTION	* LAT & LONG	A (FT2)	Hd (FT)	Lsl(FT)	Lsr (FT)	H (FT)	Df (IN)	Lf (FT)
LOCATION 5	BAL TEE	WB IH20	31° 32'2.16"N 103° 5'54.87"W						54	35
LOCATION 7	BAL TEE	EB IH20	31° 31'36.71"N 103° 8'22.85"W						54	35
LOCATION 12	BAL TEE	EB IH10	31° 0'39.08"N 103° 46'31.03"W						54	35
LOCATION 14	BAL TEE	WB IH10	31° 0'22.98"N 103° 43'46.38"W						54	35
LOCATION 20	BAL TEE	EB IH10	30° 52'52.02"N 102° 40'38.94"W						54	35
LOCATION 22	BAL TEE	WB IH10	30° 52'29.22"N 102° 37'22.34"W						54	35

*ESTIMATED LOCATION TO BE APPROVED BY ENGINEER

A= Design Sign Area
Hd= Design Height
Lsl= Length of Span, Left
Lsr= Length of Span, Right
Elp= Elevation of Pavement, Critical
Elt= Elevation of ℄ of Truss
Elf=Elevation of Top of Foundation
H=Height of Column
N=Texas Cone Pentrometer Value
Df=Diameter of Foundation
Lf=Length of Foundation

NOTE

THE SIGN AND SUPPORT SHOWN IS AN EXAMPLE ONLY AND IS NOT INTENDED TO SPECIFY A CERTAIN PRODUCT. OTHER COMPARABLE DESIGNS, WHICH MEET THE REQUIREMENTS OF THE SPECIFICATIONS AS APPROVED BY THE ENGINEER, WILL BE ACCEPTABLE.

NOTES:

1. SUBMIT THE STRUCTURAL DESIGN AND DMS TO TRUSS-MOUNTING DESIGN DETAILS TO THE ENGINEER FOR APPROVAL PRIOR TO FABRICATION. THE SUBMITTED DRAWINGS FOR THE STRUCTURAL DESIGN AND DMS TO TRUSS-MOUNTING DESIGN SHALL BE DONE BY A TEXAS REGISTERED PROFESSIONAL ENGINEER, SHALL BE DATED AND SHALL BEAR THE ENGINEER'S SEAL AND SIGNATURE.
2. THE TRUSS, TOWER, AND FOUNDATION HAVE BEEN ANALYZED FOR A DMS UNIT WITH THE DIMENSIONS OF 8.5'H X 31'W X 4'D AND A WEIGHT OF 4,000 LBS. ANY INCREASE IN THE DIMENSION OR WEIGHT WILL REQUIRE A REANALYSIS OF THE STRUCTURE.
3. PRIOR TO PLACING SIGN STRUCTURE ANCHOR BOLTS FOR TOWER PIPE, THE CONTRACTOR SHALL COORDINATE WITH THE STATE TO OBTAIN THE VIEW ANGLE OFFSET FOR EACH DMS LOCATION TO ORIENT THE TOWER PIPE FOR OPTIMUM DMS VIEW AXIS ALIGNMENT. THE NAME, ADDRESS, AND CONTACT PERSON FOR THE DMS MANUFACTURER SHALL BE PROVIDED BY THE STATE. PAYMENT SHALL NOT BE MADE DIRECTLY FOR SUCH COORDINATION, OR OTHER INCENIDENTALS REQUIRED TO COMPLETE THIS WORK, BUT SHALL BE CONSIDERED SUBSIDIARY TO ITEM 6064.
4. REFER TO STANDARD PLANS COSS-Z31-10, COSSD, COSS-F, COSS-FD, DMS ELEVATION DETAIL SHEET, AND AESTHETIC AND STRUCTURAL DETAILS FOR ADDITIONAL INFORMATION.
5. ALL DIMENSIONS SHOWN IN FEET UNLESS OTHERWISE SHOWN.
6. THIS DETAIL DRAWING IS INTENDED TO BE DESCRIPTIVE OF CONFIGURATION WHICH WILL BE ACCEPTABLE BUT IS NOT INTENDED TO BE RESTRICTIVE. CONTRACTOR MAY OFFER ALTERNATIVE DESIGNS, IN COMPLIANCE WITH TEXAS STANDARD SPECIFICATIONS - ITEM 5, TO BE APPROVED BY THE ENGINEER.

STATE OF TEXAS
SAUL ROMERO, JR.
118987
LICENSED
PROFESSIONAL ENGINEER

Saul Romero, P.E.

SAUL ROMERO, JR., P.E.

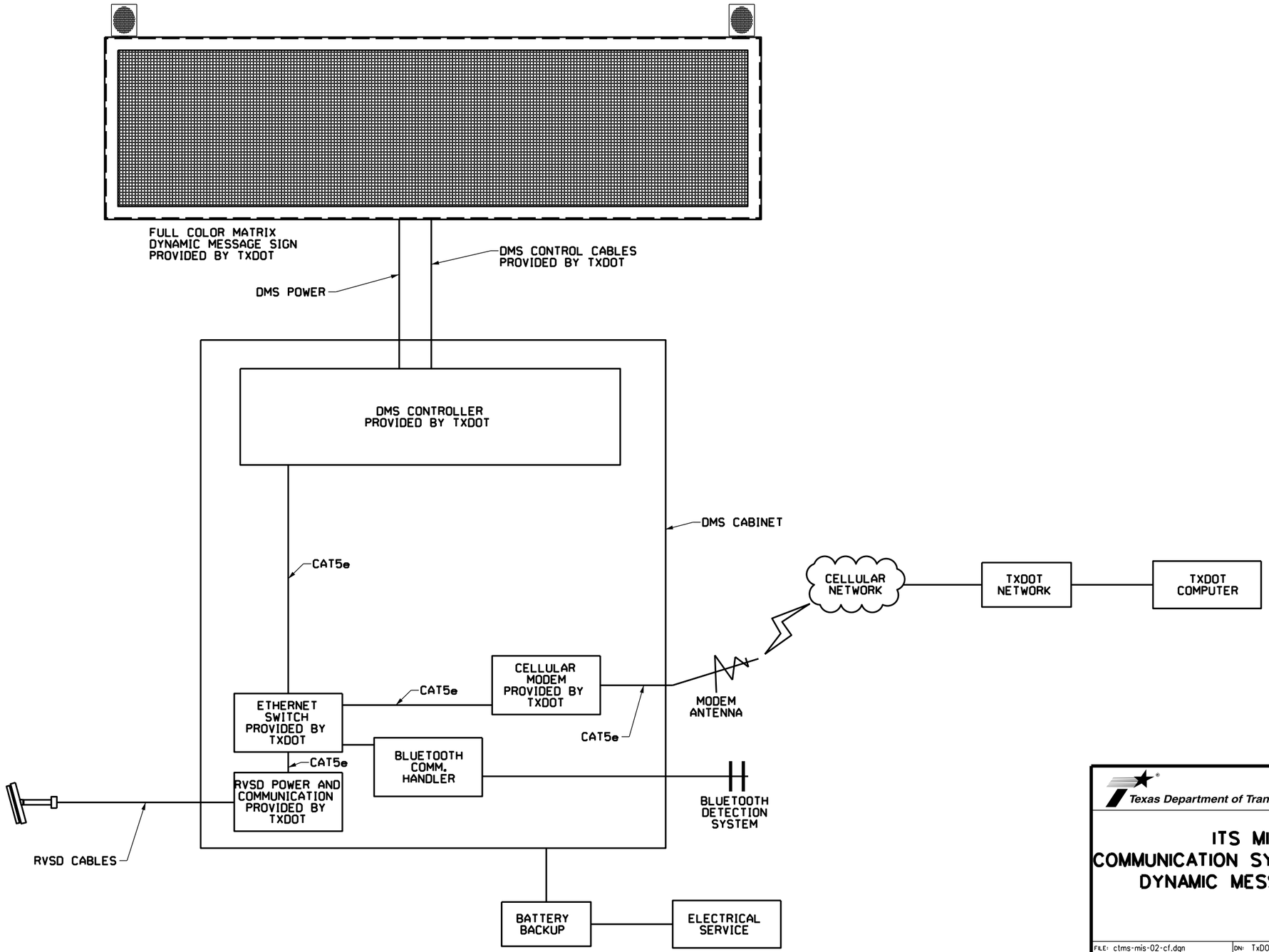
9/15/2023
Date

DYNAMIC MESSAGE SIGN OVERHEAD SIGN SUPPORT

Texas Department of Transportation®

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			58
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	DISTRICTWIDE	
CONT.	SECT.	JOB	HIGHWAY NO.
0906	00	268	VARIOUS

DATE: DATE TIME
FILE: DOCUMENT NAME



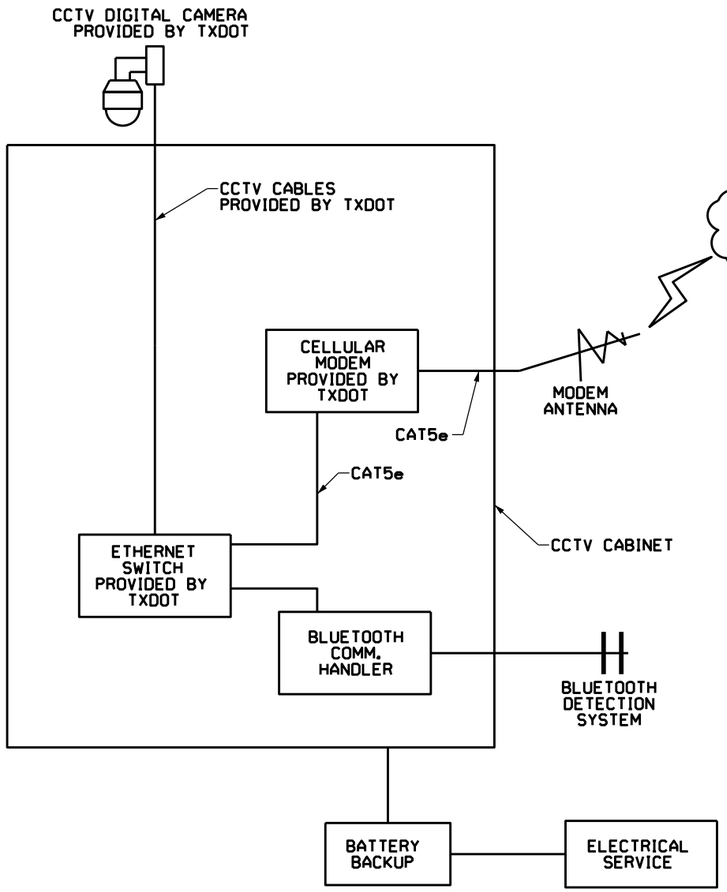
Texas Department of Transportation

Traffic Safety Division Standard

ITS MISC
COMMUNICATION SYSTEM DIAGRAM
DYNAMIC MESSAGE SIGN

FILE: ctms-mis-02-cf.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	0906	00	268	VARIOUS
	DIST	COUNTY		SHEET NO.
	ODA	DISTRICTWIDE		59

DATE: DATE TIME
FILE: DOCUMENT NAME



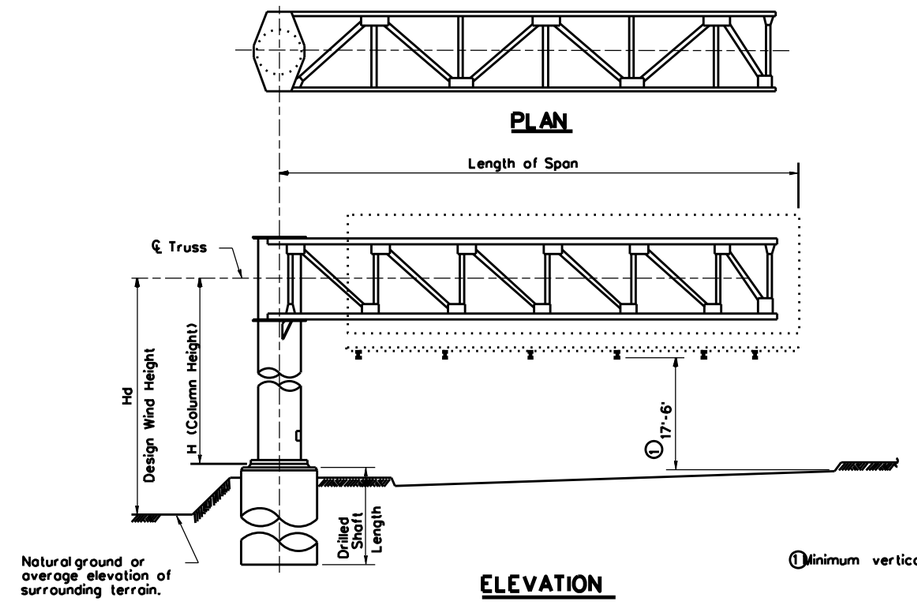
Texas Department of Transportation

Traffic Safety Division Standard

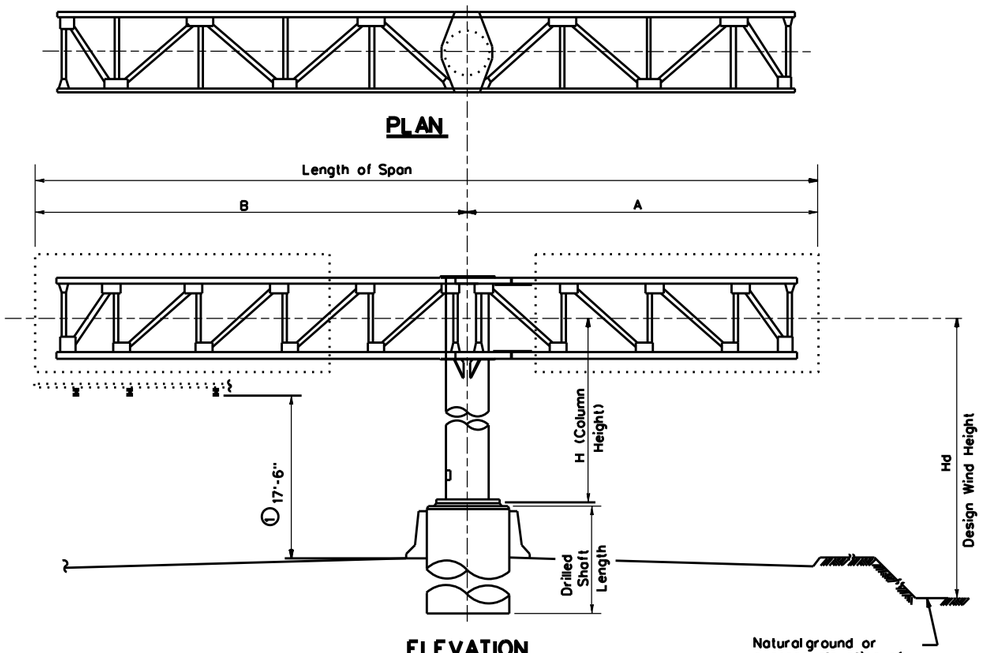
ITS MISC
COMMUNICATION SYSTEM DIAGRAM
CCTV CAMERA

FILE: ctms-mis-02-cf.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT			
©TxDOT February 2021	CONT	SECT	JOB		HIGHWAY		
REVISIONS	0906	00	268		VARIOUS		
	DIST	COUNTY			SHEET NO.		
	ODA	DISTRICTWIDE			60		

DATE:
FILE:



① Minimum vertical clearance



SELECTION EXAMPLE CANTILEVER SPAN

Given: Cantilever Span = 33'; Column Height, H = 23.3.'; Design Wind Height, Hd = 27'; Avg. Penetrometer Value, N = 15 (clay type soil): Hill County

Step 1: Select applicable COSS standard.
From Wind Velocity and Ice Zone sheet (WV & IZ-96) determine that Hill County is in Zone 4 (70 mph) and is above the ice line. Since Design Wind Height is less than 30', use standard COSS-Z4 & Z41. If Design Wind Height is more than 30', use COSS-Z3 & Z31. NOTE: in Zone 1 if Design Wind Height is greater than 30' use HCOSS-Z1.

Step 2: Determine tower details from COSS-Z4 & Z41. Use column height to nearest tabulated value' i.e., 23'. Round span length up to the nearest tabulated value, i.e., 35'.
Tower details are:
Tower pipe 24" Dia with min. wall thickness = 0.312"
Base plate 33 ¾" Dia x 1 ¾"
Anchor bolts 8~1 ¾" Dia on 29 ⅜" bolt circle
Horizontal deflection of tower at L truss = ℄0.889". During installation, double nuts at base plate may be used to plumb tower to compensate for horizontal deflection.
Design Moment = 244 Kip-ft
Design Torsion = 162 Kip-ft

Step 3: Determine truss details from COSS-Z4 & Z41.
Read from small table at bottom of sheet for span = 35'.
Truss design width, W and depth, D = 4.0'x 4.0'.
Chord L 3 x 3 x 5/16(HYC) with 6 bolt connection at tower
D.L. Diag. L 2 x 2 x 3/16(HYC) with 2 bolt connection
W. L. Diag. L 3 x 3 x 3/16(HYC) with 2 bolt connection
D. L. Vert. L 2 x 2 x 3/16(HYC) with 2 bolt connection
W. L. Strut. L 2 x 2 x 3/16(HYC) with 1 bolt connection
Bolts are ⅝" Dia high strength with 5~¾" Dia bolt alternate for chord connection at tower.
D.L. of truss = 50 lb/ft
Truss deflection at free end = 3.2". The fabricator shall compensate for this deflection by offsetting bolt holes between the upper and lower chords at the truss-to-tower connection.

Step 4: Determine foundation details. Use standard COSSF.
From COSSF with 24" Dia pipe and 1 ¾" Dia anchor bolts:
Anchor Bolts 1 ¾" Dia x 3'-10"
Drilled Shaft Dia 42"
Vertical Reinforcing 12 ~ #10 bars
Spiral C = #4 at 6" pitch Grade 60.
Misc. handhole, base plate, anchor bolt, and foundation details are shown on COSSF.

Step 5: Determine drilled shaft length from COSS-FD.
Enter the appropriate graph (for 42" Dia drilled shaft in clay soil) from the bottom with N = 15. Proceed upward interpolating moment curves (solid lines) to locate 244 Kip-ft. Project to the left side of the graph to determine the required embedment length, i.e., 12'.
Repeat the procedure for torsion curves (dashed lines) to locate 162 Kip-ft. The embedment length required to satisfy torsion is 14'. Add 3'-0" to the longer length to obtain a required drilled shaft length of 17'.

SELECTION EXAMPLE DOUBLE CANTILEVER SPAN

Given: Short span, A = 9'; Long Span, B = 25'; Total Cantilever Span = 34'; Column Height, H = 24'; Design Wind Height, Hd = 26'; Avg. Penetrometer Value, N = 20 (clay type soil): Wheeler County.

Step 1: Select applicable COSS standard.
From Wind Velocity and Ice Zone sheet determine that Wheeler County is in Zone 2 (90 mph) and is above the ice line. Since Design Wind Height is less than 30' use standard COSS-Z2I. If Design Wind Height is more than 30', use HCOSS-Z1.

Step 2: Determine tower details from COSS-Z2I.
Use column height = 24'. Round total span length up to the next longer tabulated length span, i.e., 35'. If total span length is greater than 40', a special design would be required.
Tower details are:
Tower pipe 30" Dia with min. wall thickness = 0.310"
Base Plate 40 ½" Dia x 1 ¾"
Anchor bolts 8 ~ 2" Dia on 35 ¾" bolt circle
Horizontal deflection of tower at L truss = ℄0.574-0.316 = 0.26".
During installation, double nuts at base plate may be used to plumb tower and compensate for horizontal deflection.
Design Moment = 403 Kip-ft (use total span = 35')
Design Torsion = 136 Kip-ft (use long span = 25')

Step 3: Determine truss details from COSS-Z2I.
Read from small table at bottom of sheet 2 of 2 for Span A = 9' (use 10'):
Chord L 3 x 3 x 3/16(HYC) with 3 bolt connection at splice
D.L. Diag. L 2 x 2 x 3/16(HYC) with 2 bolt connection
W.L. Diag. L 3 x 3 x 3/16(HYC) with 2 bolt connection
D.L. Vert. L 2 x 2 x 3/16(HYC) with 2 bolt connection
W.L. Strut. L 2 x 2 x 3/16(HYC) with 1 bolt connection
Bolts are ⅝" Dia high strength.
D.L. of truss = 42 lb/ft.
Span B = 25':
Chord L 3 x 3 x 1/4(HYC) with 4 bolt connection at tower
D.L. Diag. L 2 x 2 x 3/16(HYC) with 2 bolt connection
W.L. Diag. L 3 x 3 x 3/16(HYC) with 2 bolt connection
D.L. Vert. L 2 x 2 x 3/16(HYC) with 2 bolt connection
W.L. Strut. L 2 x 2 x 3/16(HYC) with 1 bolt connection
Bolts are ⅝" Dia high strength with 3 ~ ¾" Dia bolt alternate for chord connection at tower.
D.L. of truss = 47 lb/ft.
Truss defl. at free end = 0.2" for Span A, = 1.3" for Span B.
The fabricator shall compensate for deflections by offsetting bolt holes between upper and lower chords at splice and at truss-to-tower connection. Top chord shall be shortened between the tower and the splice to achieve the required offset.

Step 4: Determine foundation details. Use standard COSSF.
From COSSF with 30" Dia pipe and 2" Dia anchor bolts:
Anchor bolts 2" Dia x 4'-3"
Drilled shaft Dia 54"
Vertical Reinforcing 18 ~ #10 bars
Spiral C = #4 at 6" pitch Grade 60
Misc. handhole, base plate, anchor bolt, and foundation details are shown on COSSF.

Step 5: Determine drilled shaft length from COSS-FD.
Enter the appropriate graph (for 54" Dia drilled shaft in clay type soil) from the bottom with N = 20. Proceed upward interpolating moment curves (solid lines) to locate 403 Kip-ft. Project to the left side of graph to determine required embedment length, i.e., 13'.
Repeat the procedure for the torsion curves (dashed lines) to locate 136 Kip-ft. Embedment length required to satisfy torsion is 9'.
Add 3' to the longer length to obtain required drilled shaft length of 16'.

Texas Department of Transportation
Traffic Operations Division

CANTILEVER OVERHEAD SIGN SUPPORTS SELECTION EXAMPLES

COSS-SE

REVISIONS

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

CONT	SECT	JOB	HIGHWAY
0906	00	268	VARIOUS
DIST	COUNTY		SHEET NO.
ODA	DISTRICTWIDE		61

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ZONE 3 WITH AND WITHOUT ICE 80 MPH WIND

10' SPAN

TOWER HEIGHT (ft)	TOWER PIPE O.D. (in)	TOWER PIPE WALL THICK (in)	TOWER PIPE DEFL ΔH (in)	ANCHOR BOLTS SIZE DIA (in)	ANCHOR BOLTS NO.	ANCHOR BOLTS BOLT CIR DIA	BASE PLATE SIZE (in)	TRUSS DEFL ΔV (in)	SHEAR V (Kips)	TORSION T (K-ft)	MOMENT M (K-ft)
14'	16	0.250	0.105	1 1/4	6	20 1/2"	24 x 1 1/4	0.2	3.59	16.19	49.87
15'			0.120						3.61		53.42
16'			0.137						3.62		57.00
17'			0.154						3.64		60.59
18'			0.173						3.66		64.21
19'			0.193		6				3.67		67.85
20'			0.214		8				3.69		71.51
21'			0.235						3.71		75.18
22'			0.258					0.2	3.73		78.88
23'			0.282					0.3	3.74		82.59
24'			0.308						3.76		86.33
25'			0.334				24 x 1 1/4		3.78		90.08
26'			0.361				24 x 1 3/8		3.79		93.85
27'			0.389						3.81		97.64
28'			0.419						3.83		101.44
29'			0.449						3.84		105.26
30'			0.481						3.86		109.11
31'			0.513				24 x 1 3/8		3.88		112.96
32'	16	0.250	0.547	1 1/4	8	20 1/2"	24 x 1 1/2	0.3	3.89	16.19	116.84

15' SPAN

TOWER HEIGHT (ft)	TOWER PIPE O.D. (in)	TOWER PIPE WALL THICK (in)	TOWER PIPE DEFL ΔH (in)	ANCHOR BOLTS SIZE DIA (in)	ANCHOR BOLTS NO.	ANCHOR BOLTS BOLT CIR DIA	BASE PLATE SIZE (in)	TRUSS DEFL ΔV (in)	SHEAR V (Kips)	TORSION T (K-ft)	MOMENT M (K-ft)
14'	16	0.250	0.235	1 3/8	8	20 3/4"	24 1/2 x 1 3/8	0.5	5.40	37.56	76.63
15'			0.270					0.6	5.41		81.91
16'			0.308					0.6	5.43		87.23
17'			0.347					0.7	5.45		92.57
18'			0.389				24 1/2 x 1 3/8	0.7	5.46		97.94
19'			0.434				24 1/2 x 1 1/2	0.7	5.48		103.33
20'			0.481					0.8	5.50		108.75
21'		0.250	0.530						5.51		114.19
22'		0.281	0.521	1 3/8		20 3/4"	24 1/2 x 1 1/2		5.53		119.66
23'		0.281	0.569	1 1/2		21"	25 x 1 5/8		5.55		125.14
24'		0.281	0.620						5.56		130.65
25'		0.312	0.610						5.58		136.18
26'		0.312	0.660				25 x 1 5/8		5.60		141.73
27'		0.312	0.711				25 x 1 3/4		5.62		147.30
28'		0.344	0.699						5.63		152.89
29'		0.344	0.750						5.65		158.50
30'		0.344	0.802	1 1/2		21"	25 x 1 3/4		5.67		164.12
31'		0.375	0.791	1 3/4		21 1/2"	26 x 1 7/8		5.68		169.77
32'	16	0.375	0.843	1 3/4	8	21 1/2"	26 x 1 7/8	0.8	5.70	37.56	175.43

20' SPAN

TOWER HEIGHT (ft)	TOWER PIPE O.D. (in)	TOWER PIPE WALL THICK (in)	TOWER PIPE DEFL ΔH (in)	ANCHOR BOLTS SIZE DIA (in)	ANCHOR BOLTS NO.	ANCHOR BOLTS BOLT CIR DIA	BASE PLATE SIZE (in)	TRUSS DEFL ΔV (in)	SHEAR V (Kips)	TORSION T (K-ft)	MOMENT M (K-ft)
14'	20	0.250	0.213	1 1/4	8	24 1/2"	28 x 1 1/4	0.7	7.43	69.08	107.16
15'			0.244	1 1/4		24 1/2"	28 x 1 1/4	0.7	7.43		113.96
16'			0.278	1 3/8		24 3/4"	28 1/2 x 1 3/8	0.8	7.45		121.17
17'			0.314					0.8	7.47		128.42
18'			0.352					0.9	7.49		135.72
19'			0.392	1 3/8		24 3/4"	28 1/2 x 1 3/8	0.9	7.51		143.06
20'			0.435	1 1/2		25"	29 x 1 1/2	1.0	7.53		150.43
21'			0.479					1.0	7.55		157.84
22'			0.526					1.1	7.57		165.28
23'		0.250	0.575				29 x 1 1/2		7.60		172.75
24'		0.281	0.560				29 x 1 5/8		7.62		180.26
25'		0.281	0.607	1 1/2		25"	29 x 1 5/8		7.64		187.79
26'		0.281	0.657	1 3/4		25 3/8"	29 3/4 x 1 5/8		7.66		195.35
27'		0.310	0.640				29 3/4 x 1 3/4		7.68		202.94
28'		0.310	0.688						7.70		210.55
29'		0.310	0.738						7.72		218.20
30'		0.340	0.721				29 3/4 x 1 3/4		7.74		225.86
31'		0.340	0.770				29 3/4 x 1 7/8		7.77		233.56
32'	20	0.340	0.821	1 3/4	8	25 3/8"	29 3/4 x 1 7/8	1.1	7.79	69.08	241.27

25' SPAN

TOWER HEIGHT (ft)	TOWER PIPE O.D. (in)	TOWER PIPE WALL THICK (in)	TOWER PIPE DEFL ΔH (in)	ANCHOR BOLTS SIZE DIA (in)	ANCHOR BOLTS NO.	ANCHOR BOLTS BOLT CIR DIA	BASE PLATE SIZE (in)	TRUSS DEFL ΔV (in)	SHEAR V (Kips)	TORSION T (K-ft)	MOMENT M (K-ft)
14'	20	0.281	0.308	1 1/2	8	25"	29 x 1 1/2	1.3	9.14	107.68	135.49
15'		0.281	0.354					1.4	9.17		144.13
16'		0.281	0.403					1.4	9.19		152.86
17'		0.281	0.455	1 1/2		25"	29 x 1 1/2	1.5	9.21		161.65
18'		0.312	0.460	1 3/4		25 3/8"	29 3/4 x 1 5/8	1.5	9.23		170.51
19'		0.312	0.513				29 3/4 x 1 5/8	1.5	9.25		179.43
20'		0.312	0.568				29 3/4 x 1 3/4	1.6	9.27		188.39
21'		0.312	0.627					1.6	9.29		197.41
22'		0.344	0.628					1.6	9.31		206.47
23'		0.344	0.686				29 3/4 x 1 3/4	1.7	9.34		215.57
24'		0.344	0.747				29 3/4 x 1 7/8		9.36		224.71
25'		0.375	0.748				29 3/4 x 1 7/8		9.38		233.89
26'		0.375	0.809	1 3/4		25 3/8"	29 3/4 x 1 7/8	1.7	9.40		243.10
27'		0.375	0.872	2		25 3/4"	30 1/2 x 2	1.8	9.42		252.34
28'		0.406	0.870						9.44		261.62
29'		0.406	0.933						9.46		270.93
30'		0.406	0.999				30 1/2 x 2		9.48		280.27
31'		0.441	0.992				30 1/2 x 2 1/4		9.50		289.64
32'	20	0.441	1.057	2	8	25 3/4"	30 1/2 x 2 1/4	1.8	9.53	107.68	299.04

ZONE 3 WITH AND WITHOUT ICE 80 MPH WIND

30' SPAN

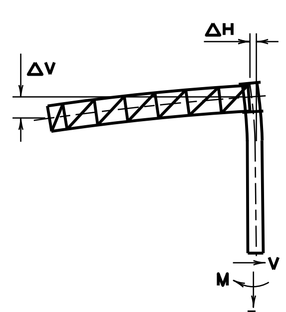
TOWER HEIGHT (ft)	TOWER PIPE O.D. (in)	TOWER PIPE WALL THICK (in)	TOWER PIPE DEFL ΔH (in)	ANCHOR BOLTS SIZE DIA (in)	ANCHOR BOLTS NO.	ANCHOR BOLTS BOLT CIR DIA	BASE PLATE SIZE (in)	TRUSS DEFL ΔV (in)	SHEAR V (Kips)	TORSION T (K-ft)	MOMENT M (K-ft)
14'	24	0.250	0.289	1 1/2	8	29"	33 x 1 1/2	1.6	11.00	155.44	167.11
15'		0.250	0.331	1 1/2		29"	33 x 1 1/2	1.6	11.03		177.27
16'		0.281	0.338	1 3/4		29 3/8"	33 3/4 x 1 1/2	1.6	11.05		187.54
17'			0.381				33 3/4 x 1 1/2	1.7	11.08		197.93
18'			0.428				33 3/4 x 1 1/2	1.8	11.10		208.40
19'		0.281	0.477				33 3/4 x 1 5/8		11.13		218.97
20'		0.312	0.477				33 3/4 x 1 5/8		11.15		229.60
21'			0.526				33 3/4 x 1 5/8	1.8	11.18		240.31
22'			0.577				33 3/4 x 1 3/4	1.9	11.20		251.08
23'			0.631				33 3/4 x 1 3/4	2.0	11.23		261.91
24'		0.312	0.687	1 3/4		29 3/8"	33 3/4 x 1 3/4		11.25		272.80
25'		0.344	0.679	2		29 3/4"	34 1/2 x 1 3/4		11.28		283.74
26'			0.735				34 1/2 x 2	2.0	11.30		294.73
27'			0.792					2.1	11.33		305.77
28'			0.852					2.2	11.36		316.85
29'		0.344	0.914						11.38		327.97
30'		0.375	0.901						11.41		339.13
31'		0.375	0.962					2.2	11.43		350.34
32'	24	0.375	1.023	2	8	29 3/4"	34 1/2 x 2	2.3	11.44	155.44	361.13

35' SPAN

TOWER HEIGHT (ft)	TOWER PIPE O.D. (in)	TOWER PIPE WALL THICK (in)	TOWER PIPE DEFL ΔH (in)	ANCHOR BOLTS SIZE DIA (in)	ANCHOR BOLTS NO.	ANCHOR BOLTS BOLT CIR DIA	BASE PLATE SIZE (in)	TRUSS DEFL ΔV (in)	SHEAR V (Kips)	TORSION T (K-ft)	MOMENT M (K-ft)
14'	30	0.250	0.210	1 3/4	8	35 3/8"	39 3/4 x 1 1/2	1.5	12.87	211.58	202.48
15'			0.241					1.6	12.90		213.97
16'			0.275					1.6	12.93		225.63
17'		0.250	0.310					1.7	12.97		237.46
18'		0.281	0.310					1.7	13.00		249.43
19'			0.346					1.7	13.03		261.52
20'			0.383					1.8	13.06		273.72
21'			0.422					1.8	13.09		286.04
22'			0.463					1.9	13.12		298.44
23'			0.507	1 3/4		35 3/8"	39 3/4 x 1 1/2	2.0	13.16		310.94
24'			0.552	2		35 3/4"	40 1/2 x 1 5/8	2.0	13.19		323.51
25'			0.598				40 1/2 x 1 5/8	2.1	13.22		336.16
26'			0.647				40 1/2 x 1 5/8	2.2	13.25		348.89
27'			0.698				40 1/2 x 1 3/4	2.2	13.28		361.68
28'		0.281	0.751					2.3	13.31		374.53
29'		0.310	0.726					2.2	13.35		387.45
30'			0.777					2.2	13.38		400.42
31'			0.830					2.3	13.41		413.45
32'	30	0.310	0.884	2	8	35 3/4"	40 1/2 x 1 3/4	2.4	13.44	211.58	426.53

40' SPAN

TOWER HEIGHT (ft)	TOWER PIPE O.D. (in)	TOWER PIPE WALL THICK (in)	TOWER PIPE DEFL ΔH (in)	ANCHOR BOLTS SIZE DIA (in)	ANCHOR BOLTS NO.	ANCHOR BOLTS BOLT CIR DIA	BASE PLATE SIZE (in)	TRUSS DEFL ΔV (in)	SHEAR V (Kips)	TORSION T (K-ft)	MOMENT M (K-ft)
14'	30	0.280	0.260	1 3/4	8	35 3/8"	39 7/8 x 1 1/2	2.1	14.65	276.72	242.20
15'			0.298	1 3/4		35 3/8"	39 7/8 x 1 1/2	2.2	14.68		254.69
16'			0.339	1 3/4		35 3/8"	39 7/8 x 1 1/2	2.3	14.71		267.44
17'			0.383	2		35 3/4"	40 1/2 x 1 1/2	2.4	14.75		280.40
18'			0.429				40 1/2 x 1 5/8	2.5	14.78		293.56
19'		0.280	0.478					2.6	14.81		306.90
20'		0.312	0.478					2.6	14.84		320.39
21'			0.527				40 1/2 x 1 5/8	2.6	14.87		334.02
22'			0.578				40 1/2 x 1 3/4	2.7	14.90		347.79
23'			0.632					2.8	14.94		361.67
24'			0.688					2.9	14.97		375.66
25'		0.312	0.747				40 1/2 x 1 3/4	3.0	15.00		389.75
26'		0.340	0.736				40 1/2 x 2	3.0	15.03		403.94
27'			0.794	2		35 3/4"	40 1/2 x 2	3.0	15.06		418.22
28'			0.854	2 1/4		36"	41 x 2	3.1	15.09		432.57
29'			0.916					3.2	15.13		447.01
30'		0.340	0.980						15.16		461.52
31'		0.375	0.963						15.19		476.10
32'	30	0.375	1.026	2 1/4	8	36"	41 x 2	3.2	15.22	276.72	490.75



ELEVATION

(SHOWING DESIGN LOADS AND DEAD LOAD DEFLECTIONS)

TRUSS DETAILS

SPAN	10', 15', & 20' 25'	30' 35'	40'		
W x D = WIDTH x DEPTH	4.0 x 4.0	4.0 x 4.0	4.0 x 4.0	4.5 x 4.5	4.5 x 4.5
CHORD-① Unless Otherwise Shown	L 3 x 3 x 3/16 ②[3] L	x 3 x 3 1/4 [4]② x	x3 3 [6] 1/4 x x	3 [3] L 5/16 x x	3 [4] 3 1/2 5/16
DEAD LOAD DIAGONAL-②	L 2 x 2 x 3/16 [2] L	x 2 x 2 3/16 [2] L x	x2 2 [2] 3/16 x x	2 [2] L 3/16 x x	2 [3] 2 3/16
WIND LOAD DIAGONAL-②	L 2 1/2 x 2 1/2 3/16 [2] L	x 2 1/2 x 2 1/2 3/16 [2] L x	x3 3 [2] 1/4 x x	3 [3] L 1/4 x x	3 [3] 3 1/4
DEAD LOAD VERTICAL-②	L 2 x 2 x 3/16 [2] L	x 2 x 2 3/16 [2] L x	x2 2 [2] 3/16 x x	2 1/2 2 [2] 1/2 L 3/16 x x	2 [2] 2 1/2 3/16
WIND LOAD STRUT-②	L 2 x 2 x 3/16 [1] L	x 2 x 2 3/16 [1] L x	x 2 2 [1] L 3/16 x x	2 [1] 2 3/16 x	[1] 2 3/16
TRUSS DEAD LOAD	38 lb/ft	43 lb/ft 45 lb/ft	53 lb/ft	62 lb/ft	
SIZE H.S. BOLTS IN CONNECTION	5/8" DIA	5/8" DIA	5/8" DIA	5/8" DIA	5/8" DIA
NO. & SIZE OF H.S. BOLTS IN CHORD ANGLE TO TOWER CONNECTION PLATE	3 ~ 5/8" DIA ea	4 ~ 5/8" DIA or 3 ~ 3/4" DIA ea	6 ~ 5/8" DIA or 5 ~ 3/4" DIA ea	7 ~ 5/8" DIA or 5 ~ 3/4" DIA ea	9 ~ 5/8" DIA or 7 ~ 3/4" DIA ea

① "Low-Alloy Steel" for non-bridge structures per Item 442, "Metal For Structures".

② "Carbon Steel" for non-bridge structures per Item 442, "Metal For Structures".

GENERAL NOTES :

Design conforms to AASHTO 1994 Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Revisions thereto.

Steel for tower pipe shall conform to ASTM A53 Grade B or to ASTM A501. Tower pipe wall thickness shown is the minimum allowable. Fabricator may use the wall thickness shown or pipe of the same diameter with greater wall thickness.

All connection bolts shall conform to Item 447, "Structural Bolting". All structural steel, connection bolts, nuts and washers shall be galvanized in accordance with the Specifications.

Compensate for truss deflection at free end by offsetting upper and lower bolt holes at truss-to-tower connection.

For truss details see standard drawing COSSD.

For base and foundation details see standard drawing COSSF.

For cantilever truss lengths falling between those shown use sizes called for in the next longer span.

Truss and towers for cantilever sign supports are designed for the equivalent area of a 10'-0" deep sign panel over 100% of the span length. Design includes 3 pounds per foot squared for sign panel and 20 pounds per foot for lights and 50 pounds per foot for walkways all placed as specified for the design sign panel.

Details called for hereon are applicable for Design Wind Heights up to 30' inclusive.

Number of High Strength bolts required in truss connection or splice are indicated in brackets, e.g. [3], after the member size.

Deflections shown include the design loads for Truss, Sign Panel, Lights and Walkways.

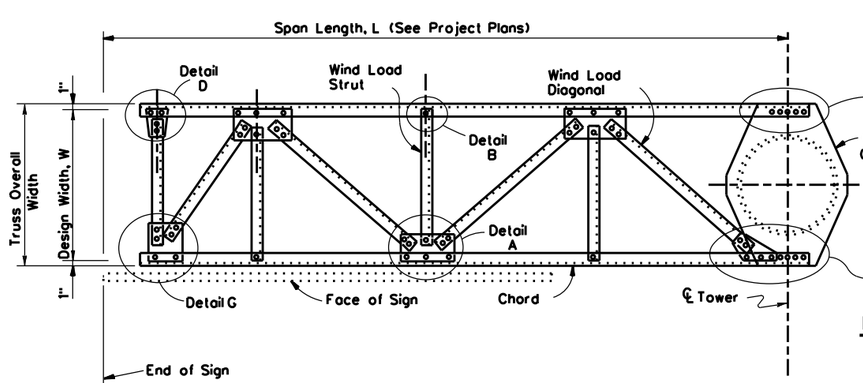
Texas Department of Transportation
Traffic Operations Division

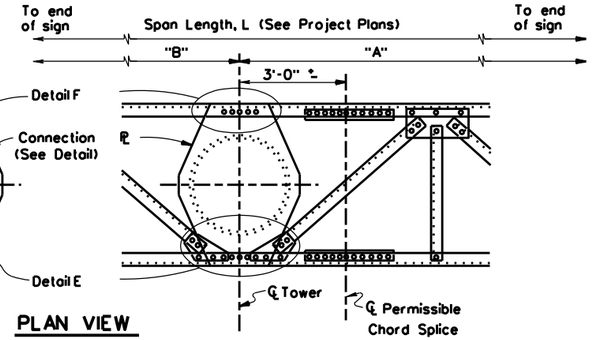
CANTILEVER OVERHEAD SIGN SUPPORTS

COSS-Z3 & Z31-10

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
REVISIONS 4-10	CONT 0906 / SECT 00	JOB 268	HIGHWAY VARIOUS
	DIST ODA	COUNTY DISTRICTWIDE	SHEET NO. 62

DATE:
FILE:



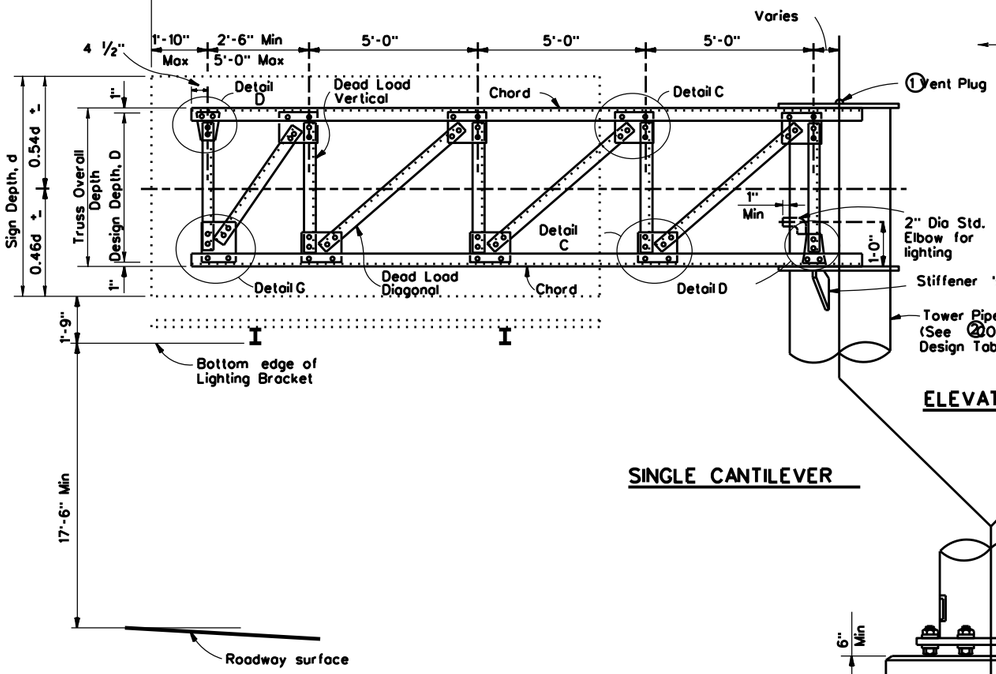


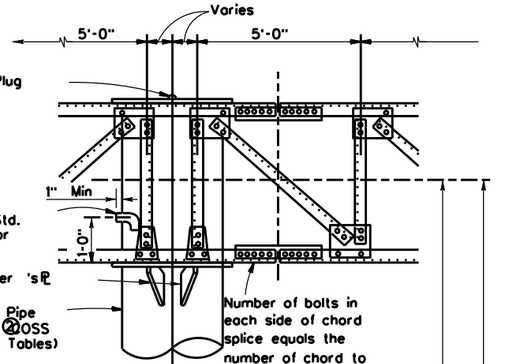
PLAN VIEW

GENERAL NOTES:

Design conforms to 1975 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals and Interim revisions thereto. Connection details are typical only. Actual size of member and number of bolts will vary. The details on this sheet are intended as a guide only. See "Cantilever Overhead Sign Supports" or "High Level Cantilever Overhead Sign Supports" sheets for number of bolts and size of members.

Gusset plates to be same thickness as thickest web member in connection.

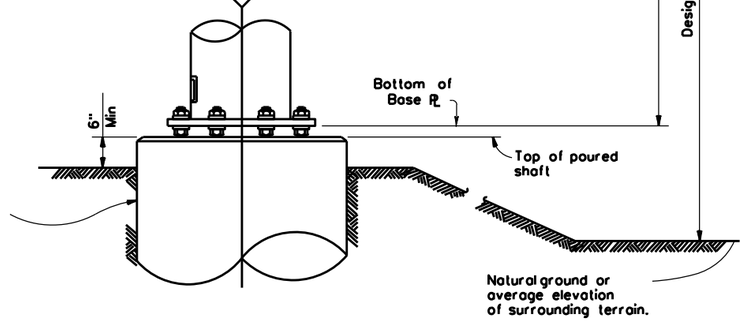




ELEVATION

SINGLE CANTILEVER

DOUBLE CANTILEVER



See standard drawing, COSSF for Hand Hole, Base ℄ Anchor Bolt and Foundation Details.

① Note: Cap shall be solid steel sheet ⅜" nominal thickness. Drill, tap and plug galvanizing vent. Weld plate to pipe with ⅜" weld all around.

② For COSS design tables see standard drawing, "Cantilever Overhead Sign Supports" or "High Level Cantilever Overhead Sign Supports".

Texas Department of Transportation
Traffic Operations Division

CANTILEVER OVERHEAD SIGN SUPPORT DETAILS

COSSD

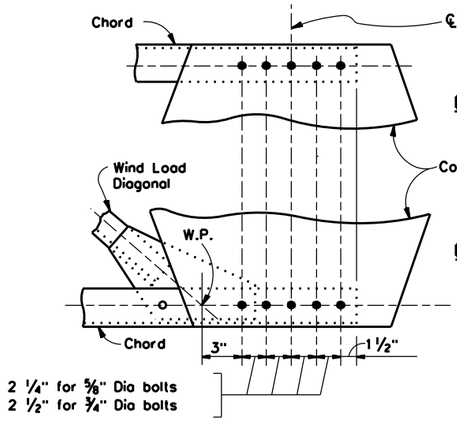
REVISIONS

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

CONT	SECT	JOB	HIGHWAY
0906	00	268	VARIOUS

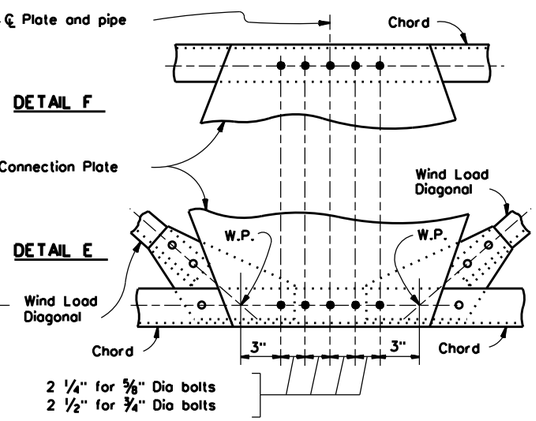
DIST	COUNTY	SHEET NO.
ODA	DISTRICTWIDE	63

DATE:
FILE:



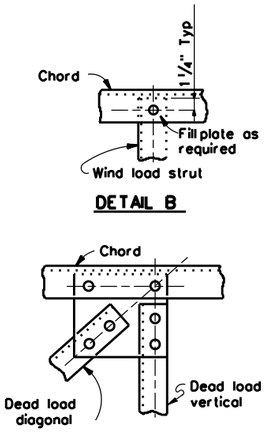
DETAIL F

SINGLE CANTILEVER



DETAIL E

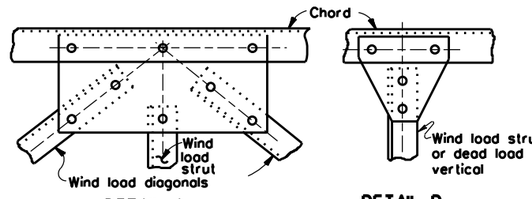
DOUBLE CANTILEVER



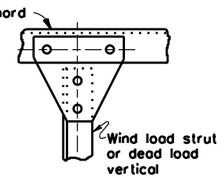
DETAIL B

DETAIL C

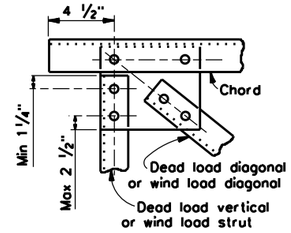
CONNECTION DETAILS



DETAIL A

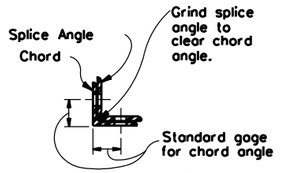


DETAIL D

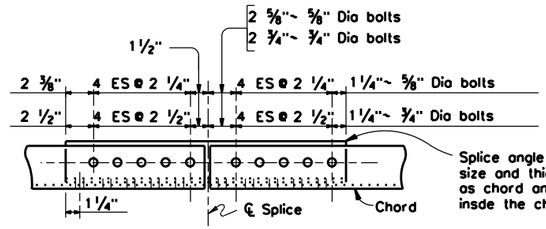


DETAIL G

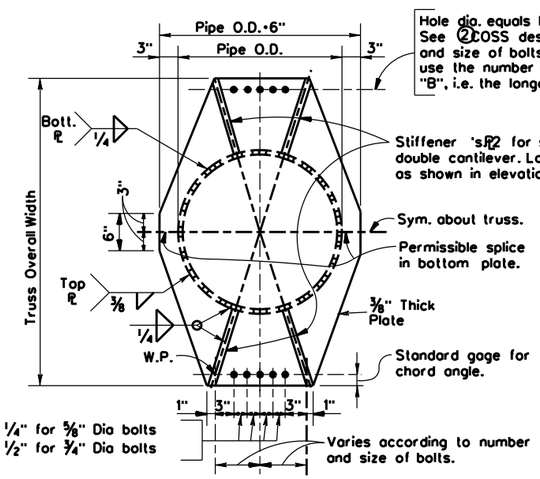
TOTAL NO. OF BOLTS IN DIAG'S. IN JOINT	NUMBER OF BOLTS REQD. IN GUSSET ℄ TO CHORD CONNECTION
0	2
2	2
3	3
4	3
5	4
6	4
8	5
10	6



SECTION ON ℄SPLICE



SINGLE SHEAR CHORD SPLICE



Hole dia. equals bolt diam. plus 1/16". See ②COSS design tables for number and size of bolts. For double cantilever use the number and size of bolts for span "B", i.e. the longer of the two spans.

Stiffener 's ℄ 2 for single cantilever, 4 for double cantilever. Locate below bottom chord as shown in elevation.

Sym. about truss.

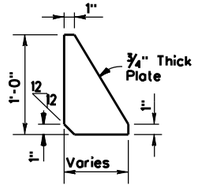
Permissible splice in bottom plate.

⅜" Thick Plate

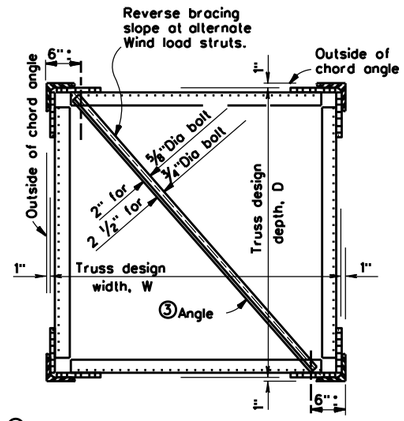
Standard gage for chord angle.

Varies according to number and size of bolts.

CONNECTION PLATE DETAIL



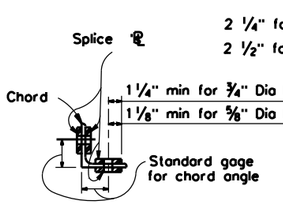
STIFFENER ℄ DETAIL



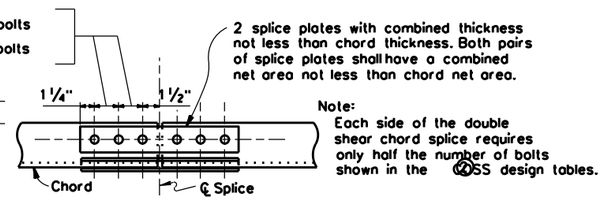
③2" x 2" x 3/16" angle for ⅝" Dia bolts [1]
2 ½" x 2" x 3/16" angle for ¾" Dia bolts [1]

TRUSS SECTION

(DIAGONALS NOT SHOWN)

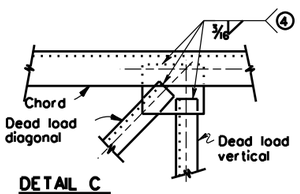


SECTION ON ℄SPLICE



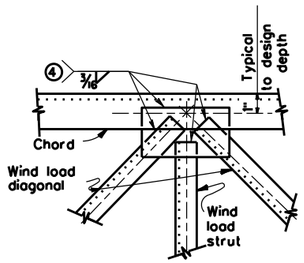
DOUBLE SHEAR CHORD SPLICE

SPLICE DETAILS



DETAIL C

(Gusset plates in other details to be similar)



DETAIL A

ALTERNATE WELDED CONNECTION DETAILS

④ MINIMUM LENGTH OF 3/16" FILLET WELD REQUIRED		
NUMBER OF BOLTS	TO REPLACE ⅝" DIA BOLTS	TO REPLACE ¾" DIA BOLTS
1	2"	3"
2	4"	6"
3	6"	9"
4	8"	11 ½"
5	10"	14 ½"
6	12"	17 ½"
7	14"	20"

SHEET 2 OF 2

Texas Department of Transportation
Traffic Operations Division

CANTILEVER OVERHEAD SIGN SUPPORT DETAILS

COSSD

REVISIONS

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
CONT	SECT	JOB	HIGHWAY
0906	00	268	VARIOUS
DIST	COUNTY		SHEET NO.
ODA	DISTRICTWIDE		64

DATE:
FILE:

Washers shall conform to ASTM F436.

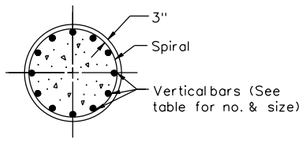
ANCHOR BOLT DIA.	WASHER DIMENSIONS				HOLE IN BASE PLATE
	OUTSIDE DIAMETER	HOLE DIAMETER	THICKNESS		
d			MIN.	MAX.	
1 1/2" or less	2d	d + 1/8"	0.136"	0.177"	d + 1/4"
1 3/4"	2d - 1/8"	d + 1/8"	0.178"	0.280"	d + 5/16"
2"	2d - 1/4"	d + 1/8"	0.178"	0.280"	d + 5/16"
Over 2"	2d - 1/2"	d + 1/8"	0.240"	0.340"	d + 5/16"

ANCHOR BOLT SIZE				
DIA	BOLT ① LENGTH	THREAD ① LENGTH	PROJECTION LENGTH	GALVAN. ① LENGTH
1 1/4"	2'-11"	5"	5 1/4"	11 1/4"
1 3/8"	3'-1"	5 1/2"	5 3/4"	11 3/4"
1 1/2"	3'-4"	6"	6 1/4"	1'-0 1/4"
1 3/4"	3'-10"	7"	7 1/4"	1'-1 1/4"
2"	4'-3"	8"	8 1/4"	1'-2 1/4"
2 1/4"	4'-9"	9"	9 1/4"	1'-3 1/4"
2 1/2"	5'-2"	10"	10 1/4"	1'-4 1/4"
2 3/4"	5'-8"	11"	11 1/4"	1'-5 1/4"
3"	6'-1"	1'-0"	1'-0 1/4"	1'-6 1/4"

①Anchor Bolt Fabrication Tolerances:
Bolt Length ~ + - 1/2"
Thread Length ~ + - 1/2"
Galvanized Length ~ - 1/4"

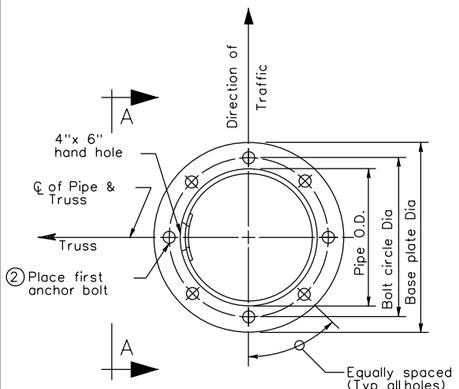
② Thread lenght applies to upper and lower threads

ANCHOR BOLT SIZE	PIPE OUTSIDE DIAMETER											
	16"			20"			24"			30"		
	BOLT CIRCLE DIA	DRILLED SHAFT SIZE	DRILLED SHAFT REINF	BOLT CIRCLE DIA	DRILLED SHAFT SIZE	DRILLED SHAFT REINF	BOLT CIRCLE DIA	DRILLED SHAFT SIZE	DRILLED SHAFT REINF	BOLT CIRCLE DIA	DRILLED SHAFT SIZE	DRILLED SHAFT REINF
1 1/4"Dia x 2'-11"	20 1/2"	36" Dia	14-#8 (A)	24 1/2"	36" Dia	14-#8 (A)						
1 3/8"Dia x 3'-1"	20 3/4"	36" Dia	12-#9 (A)	24 3/4"	42" Dia	14-#9 (A)						
1 1/2"Dia x 3'-4"	21"	36" Dia	12-#9 (A)	25"	42" Dia	14-#9 (A)	29"	42" Dia	14-#9 (C)			
1 3/4"Dia x 3'-10"	21 1/2"	36" Dia	10-#10(A)	25 3/8"	42" Dia	12-#10(B)	29 3/8"	48" Dia	16-#10(C)	35 3/8"	54" Dia	18-#10(C)
2"Dia x 4'-3"	22"	36" Dia	12-#10(A)	25 3/4"	42" Dia	12-#10(B)	29 3/4"	48" Dia	16-#10(C)	35 3/4"	54" Dia	18-#10(C)
2 1/4"Dia x 4'-9"	22 1/2"	42" Dia	12-#11(A)	26"	42" Dia	10-#11(B)	30"	48" Dia	14-#11(C)	36"	54" Dia	14-#11(D)
2 1/2"Dia x 5'-2"				26 1/2"	42" Dia	12-#11(B)	30 1/2"	48" Dia	16-#11(C)	36 1/2"	54" Dia	16-#11(D)
2 3/4"Dia x 5'-8"							31 1/2"	48" Dia	18-#11(D)	37"	54" Dia	20-#11(D)
3"Dia x 6'-1"										37 1/2"	54" Dia	24-#11(D)



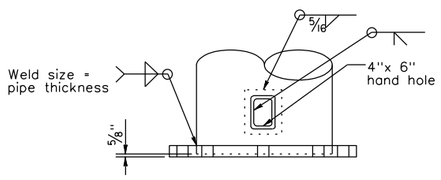
SECTION

A = #3 Plain spiral at 6" pitch (Grade 40)
B = #4 Plain spiral at 6" pitch (Grade 40)
C = #4 Plain spiral at 6" pitch (Grade 60)
D = #4 Plain spiral at 3 1/2" pitch (Grade 60)



PLAN

② See "Cantilever Overhead Sign Support" or "High Lever Cantilever Overhead Sign Support" sheets for number and size.

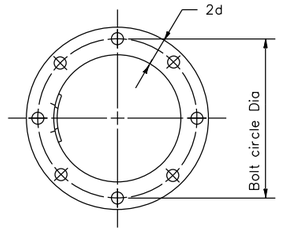


Cut 5" x 7" hole in pipe. Center 4" x 6" hand hole in 3/8" x 8" x 10" back up plate. Provide attachable cover made from section cut from pipe.

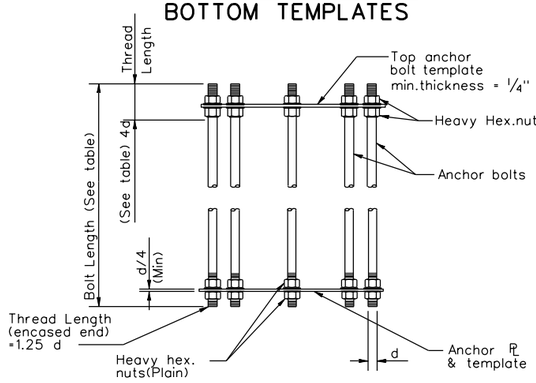
VIEW A-A

③ BASE PLATE & HANDHOLE DETAILS

③ See "Cantilever Overhead Sign Support" or "High Level Cantilever Overhead Sign Support" sheets for Diameter and thickness of base plate.

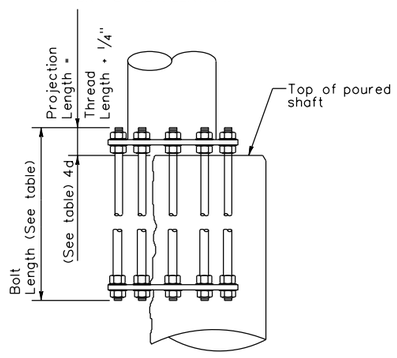


TOP VIEW OF TOP & BOTTOM TEMPLATES

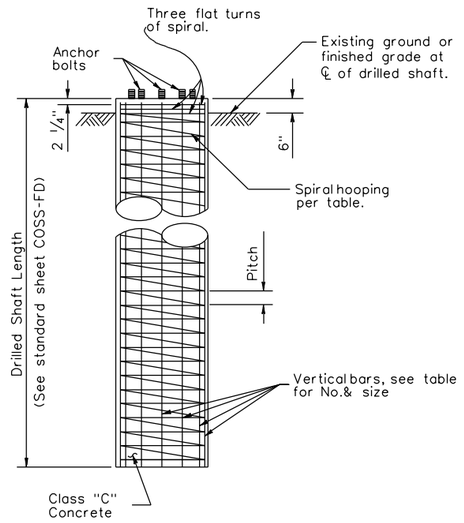


ANCHOR BOLT ASSEMBLY

(PRIOR TO INSTALLATION)

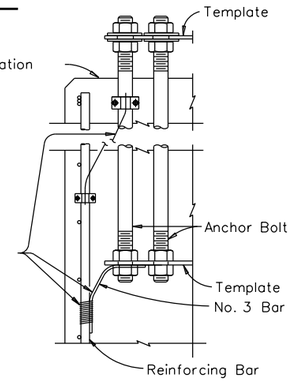


BEARING SEAT ELEVATION



FOUNDATION DETAIL

Bond anchor bolts to rebar with 1/0 jumper and two mechanical connectors or by bending No. 3 bar on bottom template as shown and wire tightly with ten turns of No. 10 wire or one mechanical connector. Provide Mechanical connectors that are UL listed for concrete encasement.



LIGHTNING PROTECTION SYSTEM

GENERAL NOTES

1. Concrete shall be Class "C".
2. Reinforcing shall conform to Item 440, "Reinforcing Steel".
3. Anchor bolts and nuts for anchor bolts shall be "Alloy Steel" per Item 449, "Anchor Bolts".
4. Anchor bolts shall be rigidly held in position during concrete placement using steel templates at the top and bottom. The top templates shall be removed after the concrete has set.
5. Lubricate and tighten anchor bolts when erecting the structure per Item 449, "Anchor Bolts". After the structure has been aligned in its final position and the anchor bolts have been properly tightened, tack weld anchor bolt nuts to washer, and tack weld washers to base plate. Galvanizing in tack welded areas shall be repaired in accordance with Item 445, "Galvanizing".
6. All vertical reinforcing shall be carried to the bottom of the Drilled Shaft.

Texas Department of Transportation

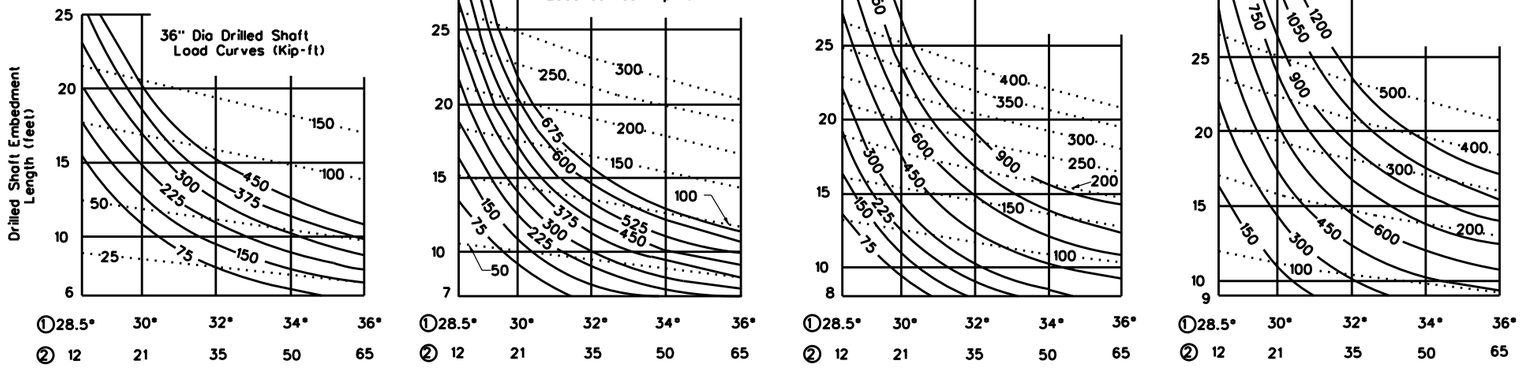
Traffic Safety Division Standard

CANTILEVER OVERHEAD SIGN SUPPORT FOUNDATION

COSSF-21

FILE: cossf-21.dgn	DN:	CK:	DW:	CK:
©TxDOT November 2007	CONT	SECT	JOB	HIGHWAY
REVISIONS	0906	00	268	VARIOUS
8-21	DIST	COUNTY		SHEET NO.
	ODA	ECTOR		65

DATE:
FILE:



① Ø = Angle of internal friction of soil (degrees)

② N = Texas cone penetrometer value (blows per ft)

④ C(psi) = Cohesive shear strength of soil (psi)

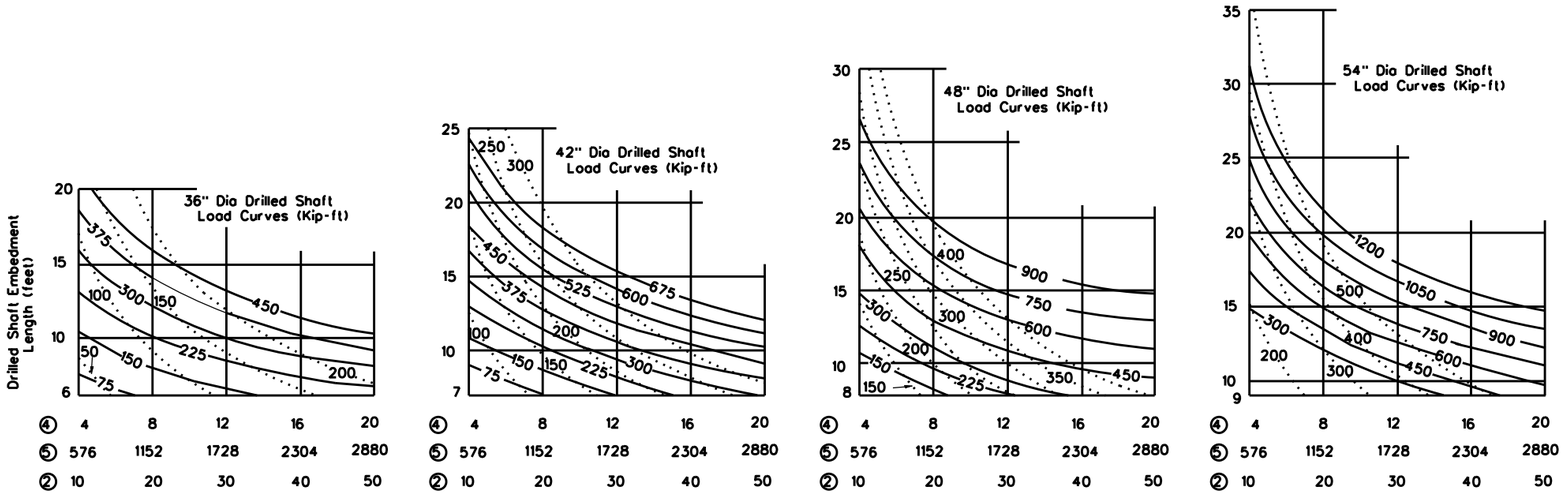
⑤ C(psf) = Cohesive shear strength of soil (psf)

③ SUBMERGED SAND SOIL (COHESIONLESS)

Moment ——

Torsion .....

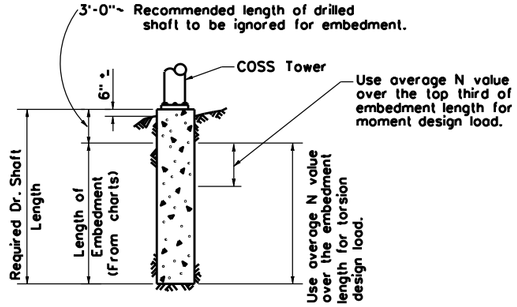
③ Note:
For unsubmerged sands and clayey sands the charts for clay soil will give a conservative foundation design.



CLAY SOIL (COHESIVE)

Moment ——

Torsion .....



PROCEDURE:

1. Determine design moment and torsion, and the required drilled shaft diameter as outlined in the selection example sheet COSS-SE.
2. Make an initial estimate of the required embedment length.
3. From soil exploration data determine type of soil and average N value or soil property along the upper third of the drilled shaft.
4. Enter chart (for the correct shaft diameter and soil type) from the bottom at the average N value or soil property determined in step 3.
5. Proceed vertically into chart and locate intersection with design moment. Interpolate between moment curves (solid lines) as needed.
6. From intersection point turn 90° to left and read embedment length along vertical scale.
7. If embedment length differs significantly from estimated value return to step 3 with the embedment length determined in step 6.
8. From soil exploration data determine average N value or soil property over the entire length of the embedment.
9. Enter chart (for correct shaft diameter and soil type) from the bottom at the average N value or soil property determined in step 8.
10. Proceed vertically into chart and locate intersection with design torsion. Interpolate between torsion curves (dashed lines) as needed.
11. From intersection point turn 90° to left and read embedment length along vertical scale.
12. Compute the required length of drilled shaft by adding 3'-0" to longer embedment length required for moment or torsion.

GENERAL NOTES:

These charts are for use with Cantilever Overhead Sign Supports with one shaft per tower.

Solid curves are base moment in Kip-ft.

Dash curves are base torsion in Kip-ft.

Minimum embedment of drilled shaft is two diameters.

Add 3'-0" to the required embedment length to determine the required length of drilled shaft.

Texas Department of Transportation
Traffic Operations Division

FOUNDATION EMBEDMENT SELECTION CHARTS

COSS-FD

REVISIONS

DN: TXDOT | CK: TXDOT | DW: TXDOT | CK: TXDOT

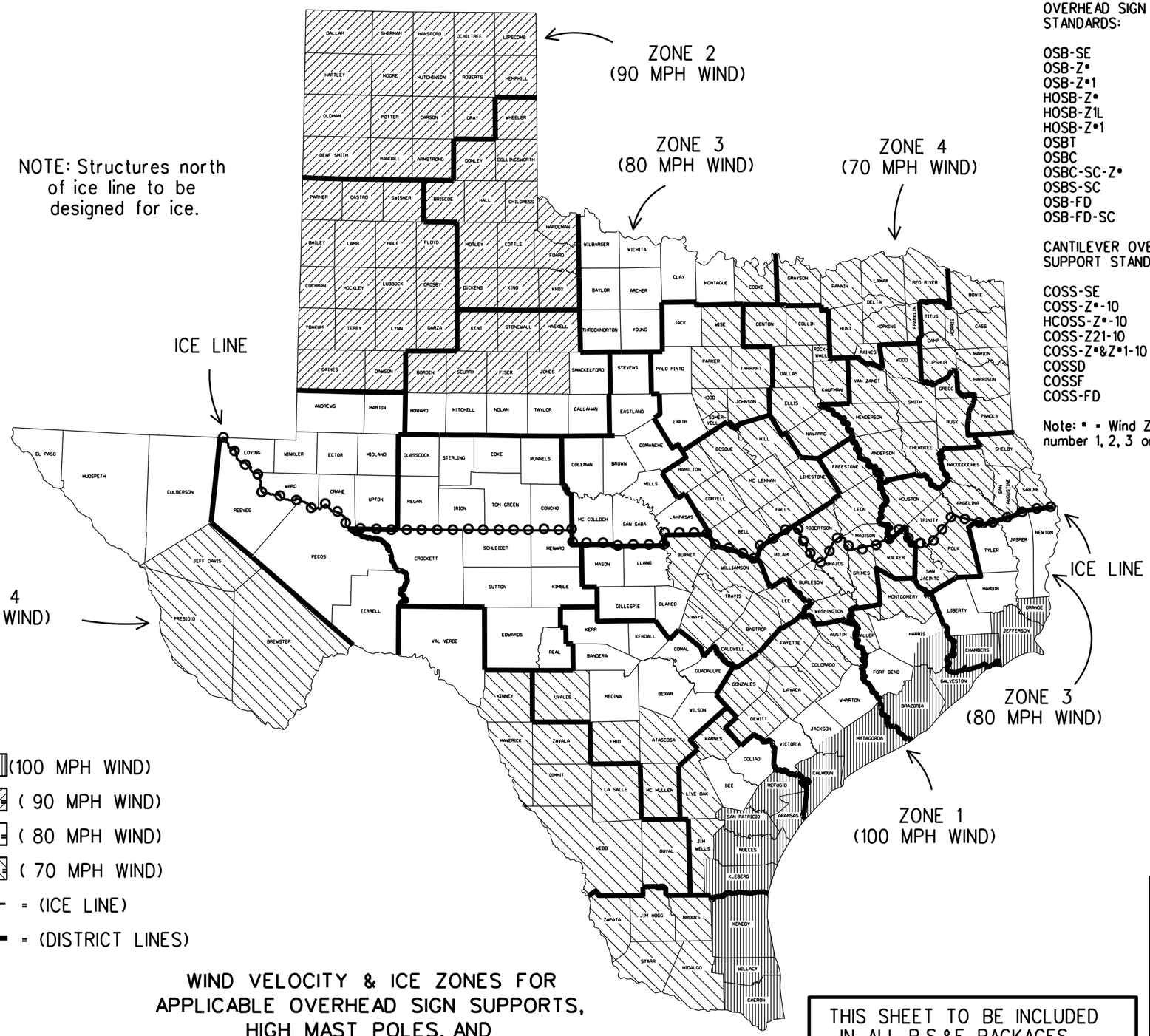
CONT	SECT	JOB	HIGHWAY
0906	00	268	VARIOUS
DIST	COUNTY		SHEET NO.
ODA	DISTRICTWIDE		66

DATE:
FILE:

DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:

NOTE: Structures north of ice line to be designed for ice.



LEGEND

ZONE 1 - (100 MPH WIND)
ZONE 2 - (90 MPH WIND)
ZONE 3 - (80 MPH WIND)
ZONE 4 - (70 MPH WIND)
= (ICE LINE)
= (DISTRICT LINES)

WIND VELOCITY & ICE ZONES FOR APPLICABLE OVERHEAD SIGN SUPPORTS, HIGH MAST POLES, AND TRAFFIC SIGNAL POLES

Based on 50 Year Mean Recurrence Interval of Fastest Mile Wind Velocity at 33 feet height.

THIS SHEET TO BE INCLUDED IN ALL P.S.&E. PACKAGES CONTAINING ONE OR MORE OF THE APPLICABLE STANDARD SHEETS LISTED HEREON

APPLICABLE STANDARDS SHEETS

OVERHEAD SIGN BRIDGE STANDARDS:

OSB-SE
OSB-Z•
OSB-Z•1
HOSB-Z•
HOSB-Z1L
HOSB-Z•1
OSBT
OSBC
OSBC-SC-Z•
OSBS-SC
OSB-FD
OSB-FD-SC

CANTILEVER OVERHEAD SIGN SUPPORT STANDARDS:

COSS-SE
COSS-Z•-10
HCOSS-Z•-10
COSS-Z21-10
COSS-Z•&Z•1-10
COSSD
COSSF
COSS-FD

Note: • = Wind Zone number 1, 2, 3 or 4

HIGH MAST ILLUMINATION POLE STANDARDS:

HMIP-98
HMIF-98

WALKWAYS AND BRACKETS STANDARDS:

SWW
SB(SWL-1)

TRAFFIC SIGNAL POLE STANDARDS:

SP-80
SP-100
SMA-80
SMA-100
DMA-80
DMA-100
MA-C
MAC(ILSN)
MAD-D
TS-FD
LUM-A
CFA
LMA
TS-C
MA-DPD

FOR HARRIS CO. ONLY
Zone line is just North of US 90, around on the North, West and South sides of IH 610 and down the West side of SH 288.

FOR JACKSON CO. ONLY
Zone line is just North of SH 616.

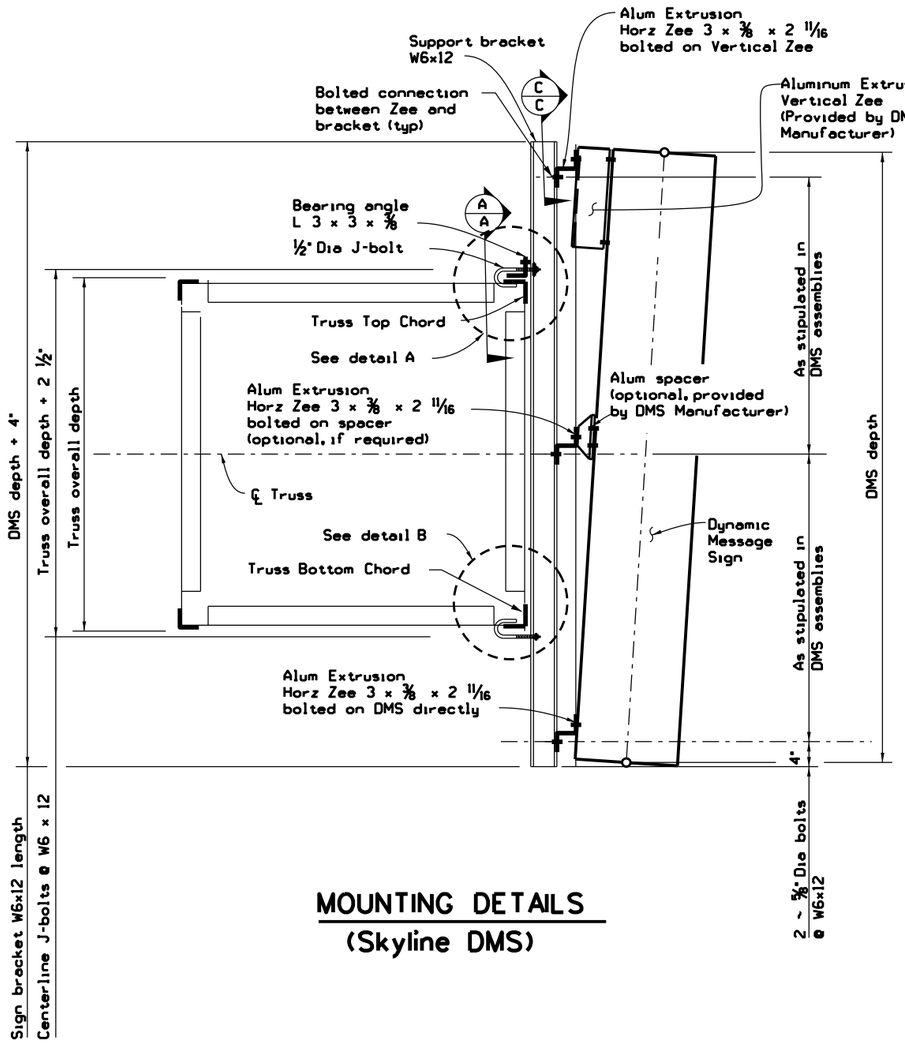
Texas Department of Transportation

Traffic Operations Division Standard

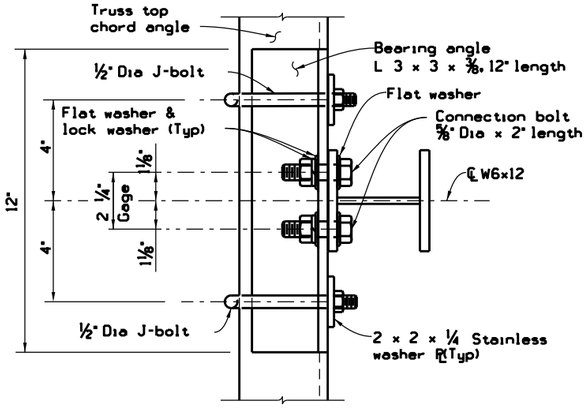
WIND VELOCITY AND ICE ZONES

WV & IZ-14

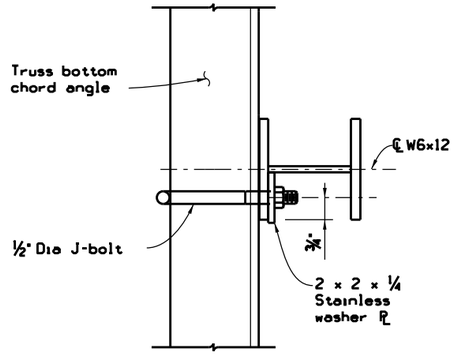
FILE: windice.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT April 1996	CONT	SECT	JOB	HIGHWAY
REVISIONS	0906	00	268	VARIOUS
8-14- Added list of applicable standards, restricting use to structures designed for fastest mile wind speeds.	DIST	COUNTY		SHEET NO.
	ODA	DISTRICTWIDE		67



MOUNTING DETAILS
(Skyline DMS)



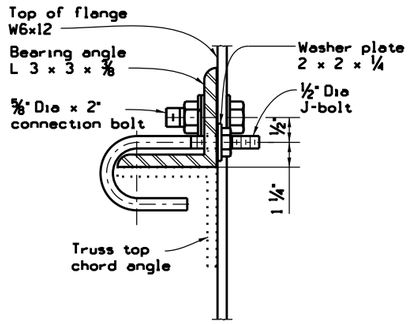
TOP VIEW
TRUSS TOP CONNECTION



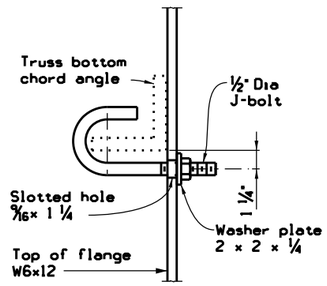
TOP VIEW
TRUSS BOTTOM CONNECTION

GENERAL NOTES:

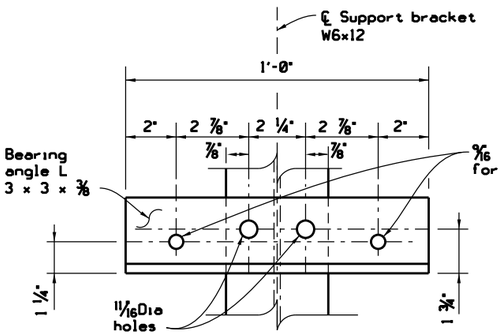
1. Determine the adequacy of the overhead sign support structure to support the dynamic message sign (DMS) prior to attaching the sign to the truss.
2. Designed according to the 1994 edition of the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Revisions. Designed for a Sustained (Fastest Mile) Wind Velocity of 100 mph with a gust factor of 1.3. Connections are designed for a DMS weight of 3800 lbs. The structural support is designed for an Effective Projected Area (EPA) of 441 sq. ft. based on a DMS nominal width of 30.5 feet and nominal depth of 8.25 feet, with a drag coefficient of 1.7 applied, plus four 1'-8" square flashing beacons with a drag coefficient of 1.2. DMS attachment is designed for a horizontal eccentricity of 1.3 ft. from the face of the truss to the center of gravity of the DMS. Provide an even number of sign supporting brackets (6 minimum), W6x12, spaced at 5'-6" max. The maximum distance between the sign edge to the nearest supporting bracket is 2'-3".
3. Verify applicable field dimensions before fabrication. Determine the required number and spacing of sign support brackets, along with the Aluminum Extrusion Vertical and Horizontal Zees provided by the DMS manufacturer, to connect the DMS to the truss. For the J-bolt connection of DMS to overhead sign structure, align each arranged sign bracket with its bearing angle to avoid conflict with the truss connection bolts at the point of attachment.
4. Provide structural steel meeting the requirements of ASTM A36, A572 Gr 50 or A588. Provide connection bolts meeting the requirements of ASTM F3125, Grade A325 or A449 with 1 heavy hex nut, 2 flat washers, and 1 lock washer. Provide Type 304 stainless steel J bolt and washer plate, with bolt minimum yield strength of 50 ksi and an elongation of 16 percent in 2 inches. Galvanize all parts except stainless steel.
5. Prior to the initialization of DMS mounting, the DMS manufacturer must provide and install the 6061-T6 Aluminum Extrusion Vertical and Horizontal Zees, 3 x ⅜ x 2 11/16, and the specified Aluminum Spacers (if any) to the back of the DMS.
6. The sign support bracket attached to the truss shown here is an example only. Adjust the bracket position along the truss depth to achieve the required vertical clearance to be confirmed by the Engineer.
7. When the structure is to be exposed to a highly corrosive environment, provide elastomeric spacer to separate aluminum alloy parts from direct contact with steel.



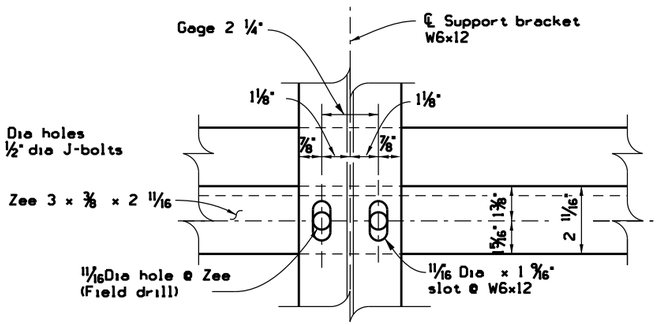
DETAIL A



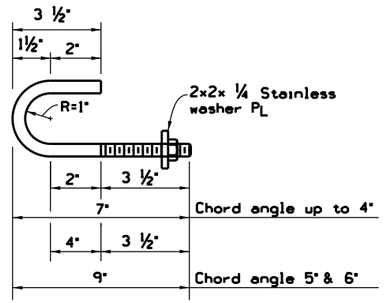
DETAIL B



SECTION A-A
(Truss chord angle not shown)



SECTION C-C



½" Dia J-BOLT

Texas Department of Transportation

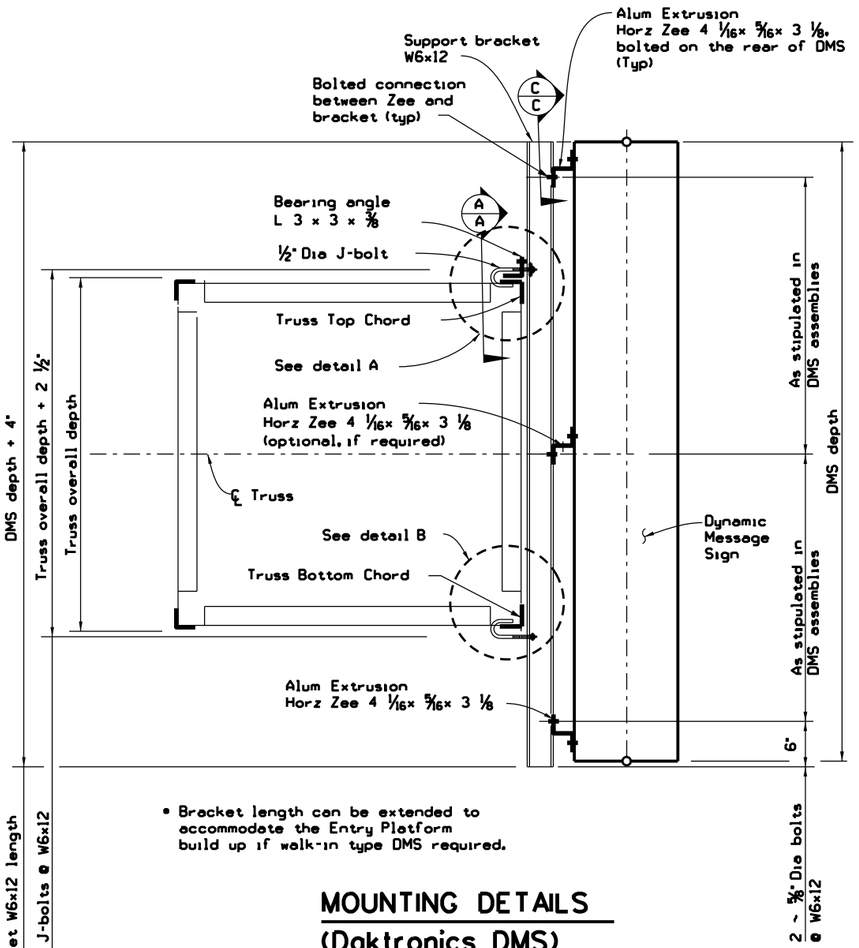
Traffic Safety Division Standard

DMS-TO-TRUSS MOUNTING WITH HORIZONTAL ZEE EXTRUSIONS

DMS(HZ-1)-21

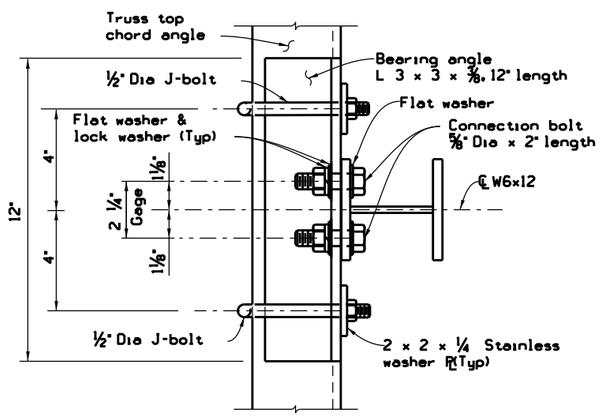
FILE: dms(hz-1)-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	0906	00	268	VARIOUS
	DIST	COUNTY		SHEET NO.
	ODA	ECTOR		68

DATE:
FILE:

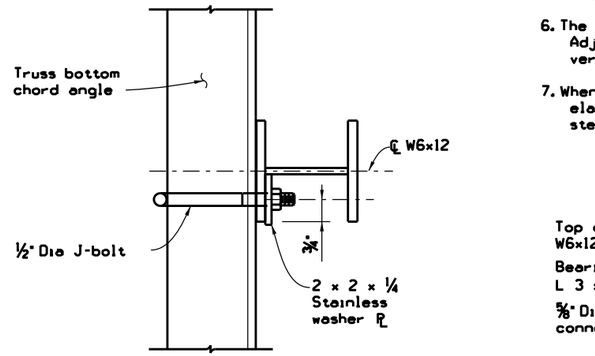


• Bracket length can be extended to accommodate the Entry Platform build up if walk-in type DMS required.

MOUNTING DETAILS
(Daktronics DMS)



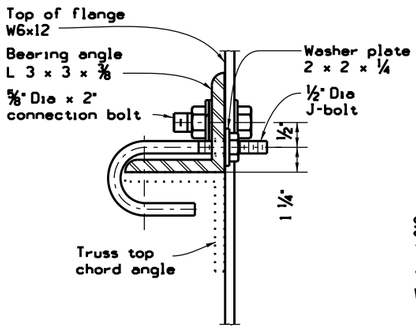
TOP VIEW
TRUSS TOP CONNECTION



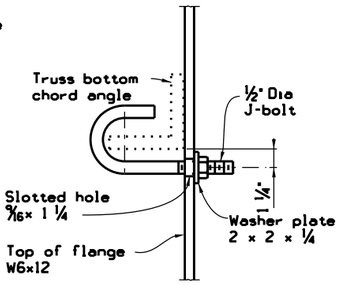
TOP VIEW
TRUSS BOTTOM CONNECTION

GENERAL NOTES:

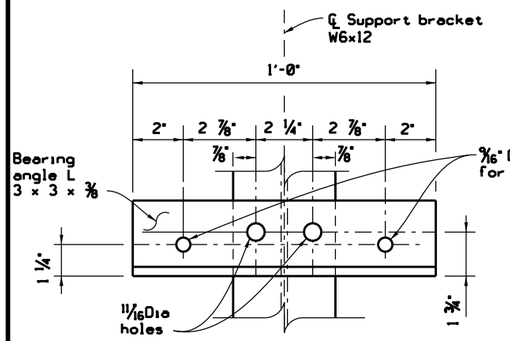
1. Determine the adequacy of the overhead sign support structure to support the dynamic message sign (DMS) prior to attaching the sign to the truss.
2. Designed according to the 1994 edition of the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Revisions. Designed for a Sustained (Fastest Mile) Wind Velocity of 100 mph with a gust factor of 1.3. Connections are designed for a DMS weight of 3800 lbs. The structural support is designed for an Effective Projected Area (EPA) of 399 sq. ft. based on a DMS nominal width of 29.1 feet and nominal depth of 7.8 feet, with a drag coefficient of 1.7 applied, plus four 1'-8" square flashing beacons with a drag coefficient of 1.2. DMS attachment is designed for a horizontal eccentricity of 2.4 ft. from the face of the truss to the center of gravity of the DMS. Provide an even number of sign supporting brackets (6 minimum), W6x12, spaced at 5'-6" max. The maximum distance between the sign edge to the nearest supporting bracket is 2'-3".
3. Verify applicable field dimensions before fabrication. Determine the required number and spacing of sign support brackets, along with the Aluminum Extrusion Horizontal Zees provided by the DMS manufacturer, to connect the DMS to the truss. For the J-bolt connection of DMS to overhead sign structure, align each arranged sign bracket with its bearing angle to avoid conflict with the truss connection bolts at the point of attachment.
4. Provide structural steel meeting the requirements of ASTM A36, A572 Gr 50 or A588. Provide connection bolts meeting the requirements of ASTM F3125, Grade A325 or A449 with 1 heavy hex nut, 2 flat washers, and 1 lock washer. Provide Type 304 stainless steel J bolt and washer plate, with bolt minimum yield strength of 50 ksi and an elongation of 16 percent in 2 inches. Galvanize all parts except stainless steel
5. Prior to the initialization of DMS mounting, the DMS manufacturer must provide and install the 6061-T6 Aluminum Extrusion Horizontal Zees, 4 1/16x 5/16x 3 1/8.
6. The sign support bracket attached to the truss shown here is an example only. Adjust the bracket position along the truss depth to achieve the required vertical clearance to be confirmed by the Engineer.
7. When the structure is to be exposed to a highly corrosive environment, provide elastomeric spacer to separate aluminum alloy parts from direct contact with steel.



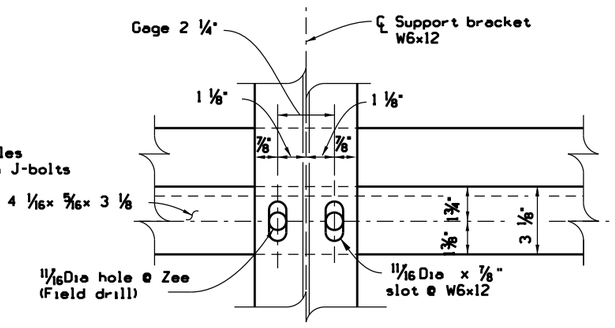
DETAIL A



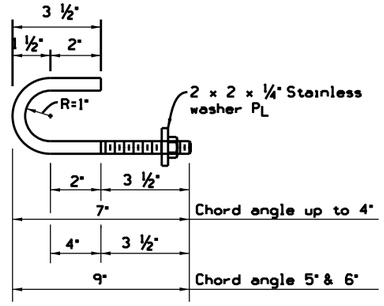
DETAIL B



SECTION A-A
(Truss chord angle not shown)



SECTION C-C



1/2" Dia J-BOLT

Texas Department of Transportation

Traffic Safety Division Standard

DMS-TO-TRUSS MOUNTING WITH HORIZONTAL ZEE EXTRUSIONS

DMS(HZ-2)-21

FILE: dms(hz-2)-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0906	00	268	VARIOUS
	DIST	COUNTY		SHEET NO.
	ODA	ECTOR		69

DATE:
FILE:

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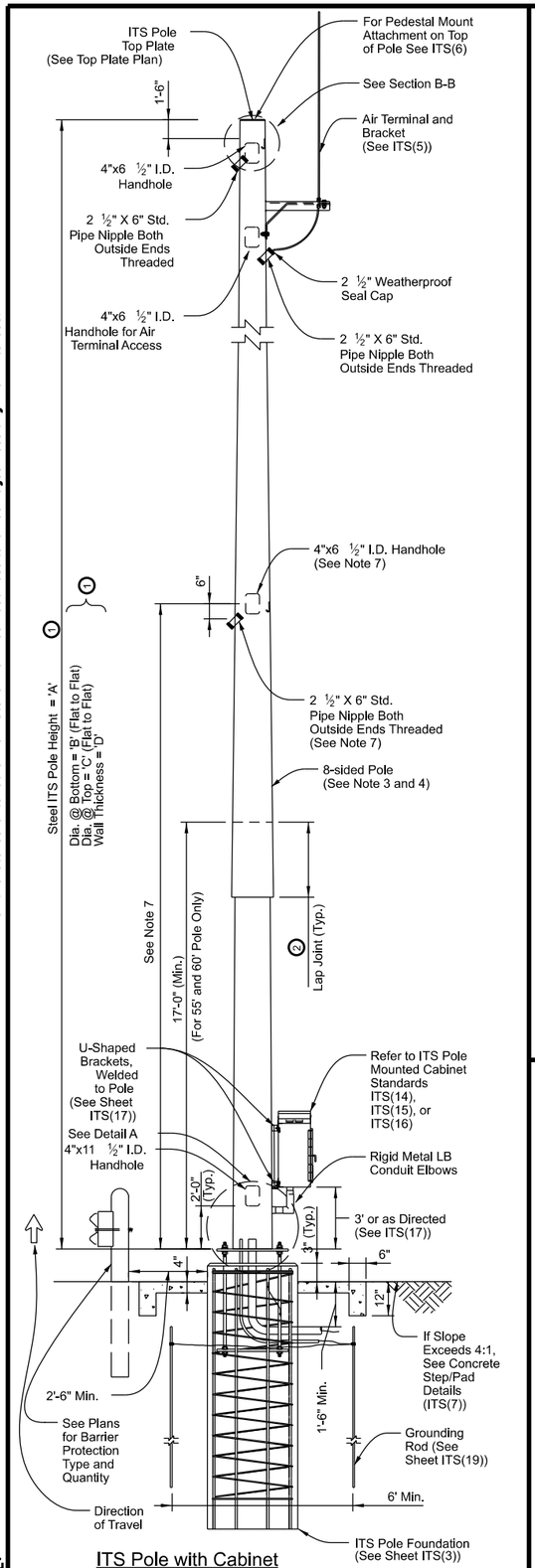
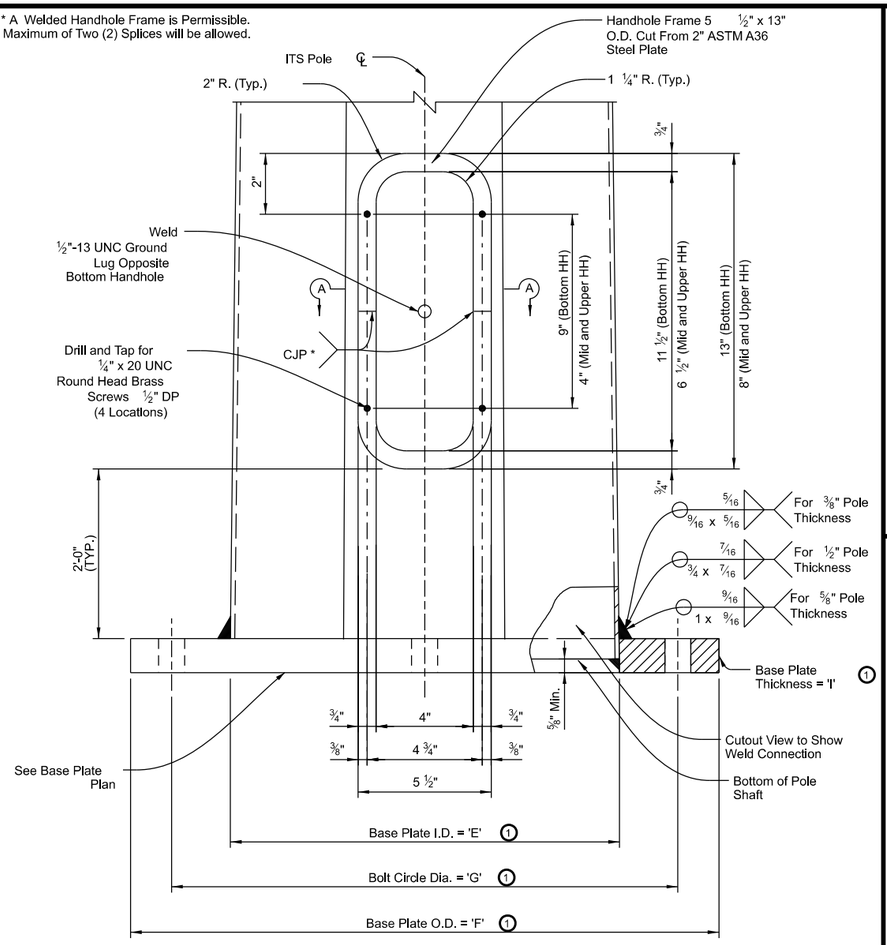
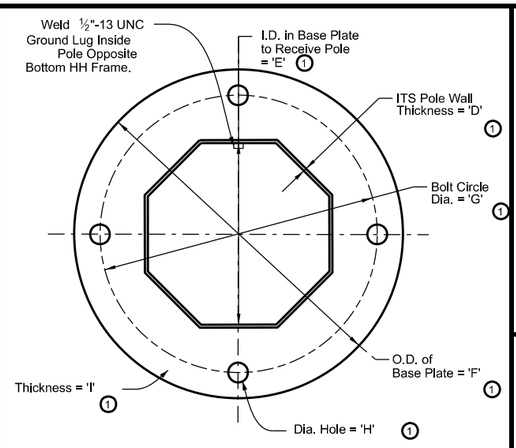


ITS Pole with Cabinet

* A Welded Handhole Frame is Permissible.
Maximum of Two (2) Splices will be allowed.

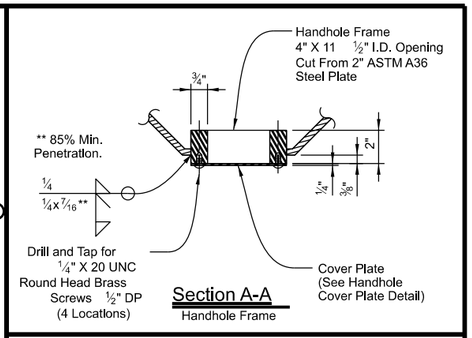


Detail A



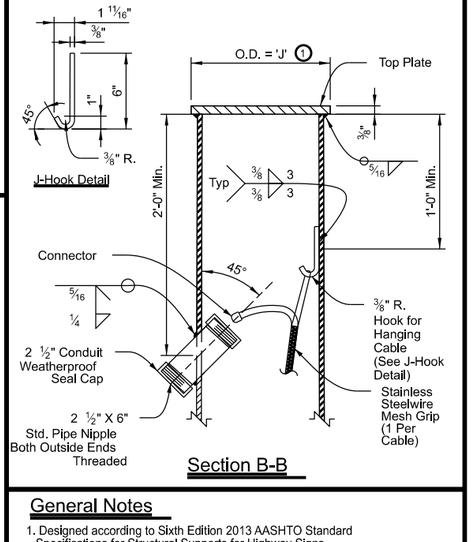
Base Plate Plan

4 Bolt Base Plate (ASTM A36)

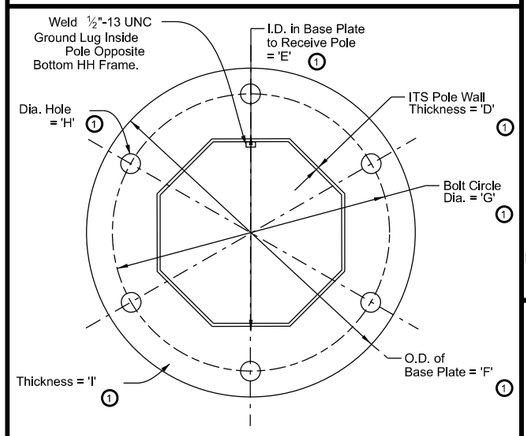


Section A-A

Handhole Frame



Section B-B



Base Plate Plan

6 Bolt Base Plate (ASTM A36)

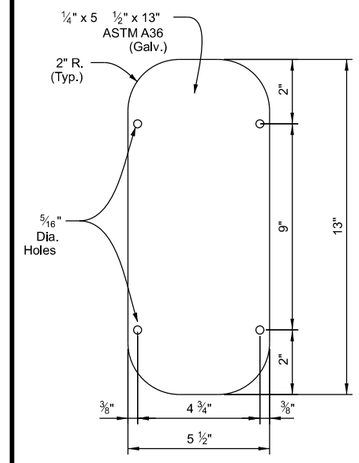
General Notes

1. Designed according to Sixth Edition 2013 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications.
2. Unless otherwise noted, all parts shall be galvanized after fabrication in accordance with Item 445, "Galvanizing."
3. Deviation from the design criteria, values, and dimensions shown herein and on ITS(4), constitutes an alternative design and will require submission of shop drawings and calculations for approval, sealed by a Texas Professional Engineer.
4. Direct substitution of twelve sided or round poles, matching the design criteria, values, and dimensions shown herein, require submission of shop drawings for approval to confirm design criteria and values on ITS(4) is met.
5. Locate handholes opposite of the direction of travel.
6. Appropriate number of anchor bolts for base plate determined by height of pole. See 'L' on sheet ITS(4).
7. Location for ITS equipment mount may vary by device. Locate mid span handhole and pipe nipple to accommodate location for ITS equipment as identified in the plans or per manufacturer recommendations. Identify location for mid span handhole and pipe nipple on shop drawings for approval.

Reference Notes:

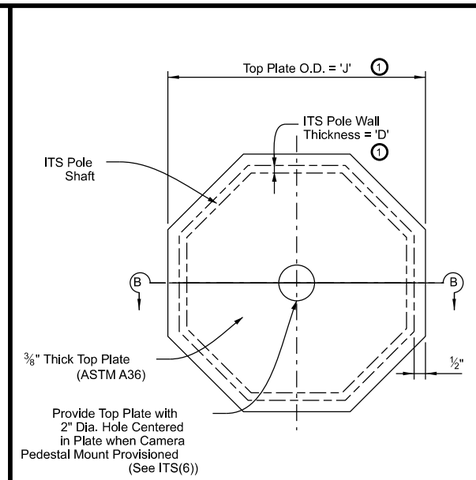
(1) See tables on Sheet ITS(4) for values of dimension variables.

(2) See lap joint note for 55' and 60' pole heights on ITS(4) at the bottom of each table.

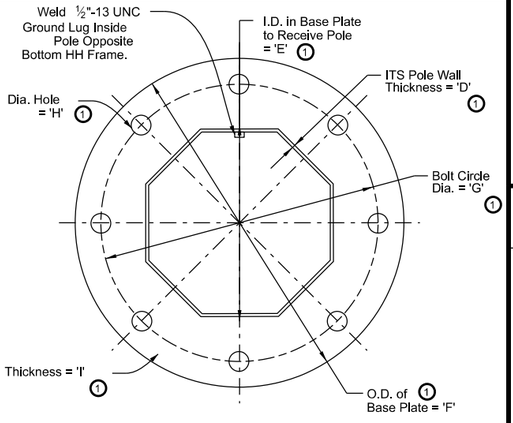


Handhole Cover Plate Detail

(Bottom Handhole)



Top Plate Plan



Base Plate Plan

8 Bolt Base Plate (ASTM A36)

Texas Department of Transportation

Traffic Operations Division Standard

ITS POLE DETAILS OCTAGONAL POLE (EIGHT SIDED POLE)

ITS(1)-15

FILE: its(1)-15.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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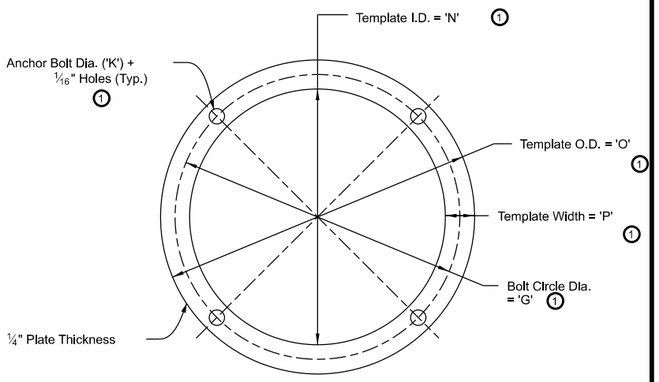
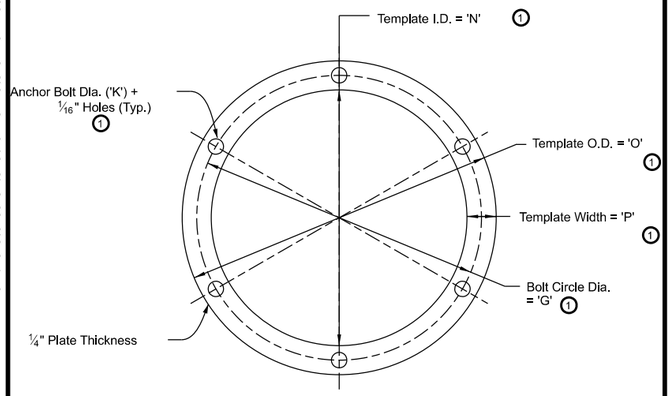
REVISIONS	0906	00	268	VARIOUS
	DIST	COUNTY		SHEET NO.
	ODA	DISTRICTWIDE		70



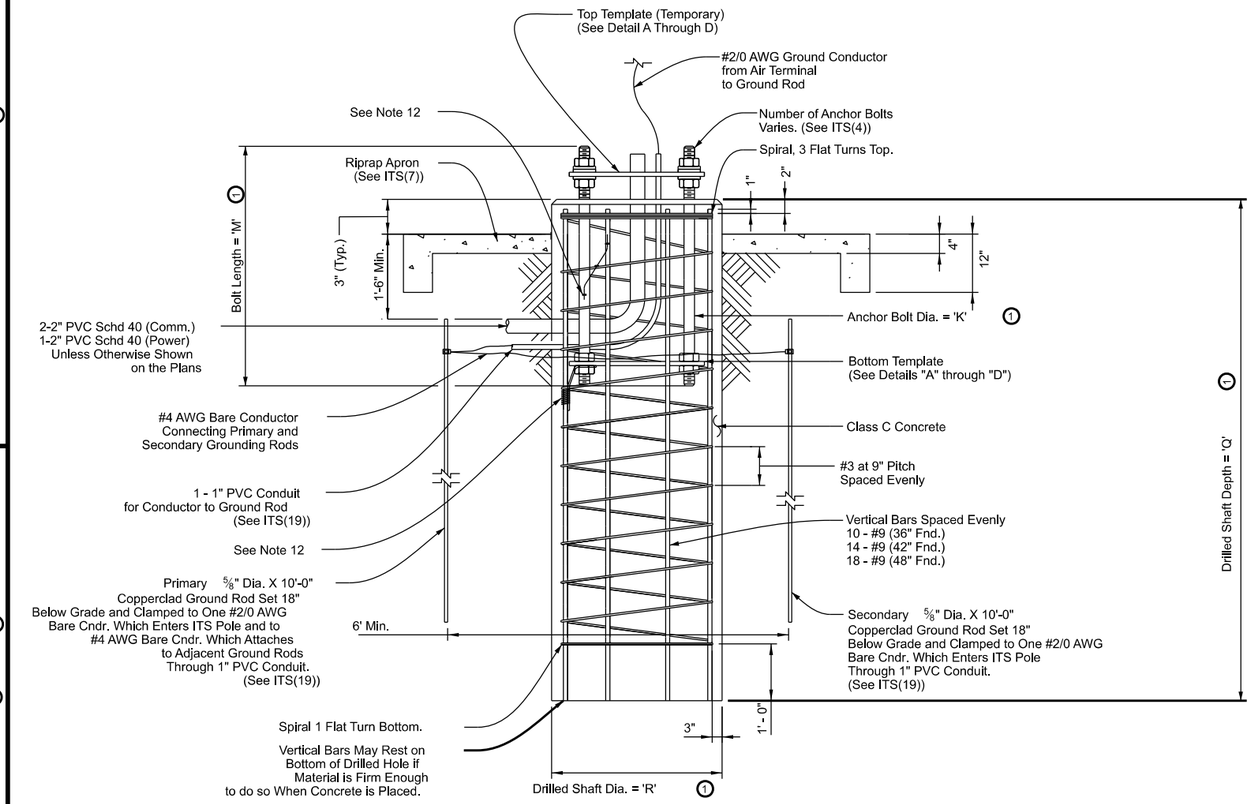
Top and Bottom Template (Four Bolt)

Detail A



Top and Bottom Template (Six Bolt)

Detail B



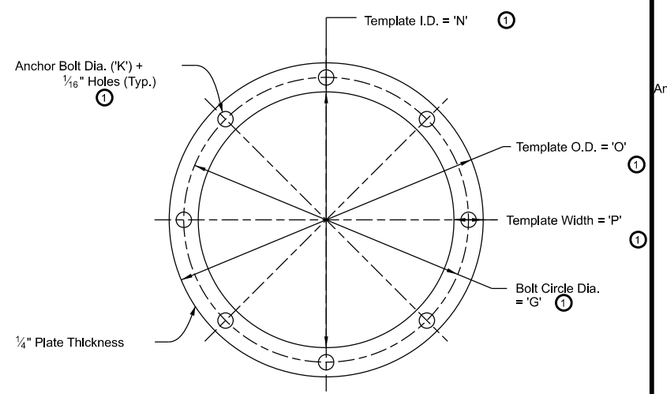
Foundation Details (Typical)

Elevation

Not to Scale

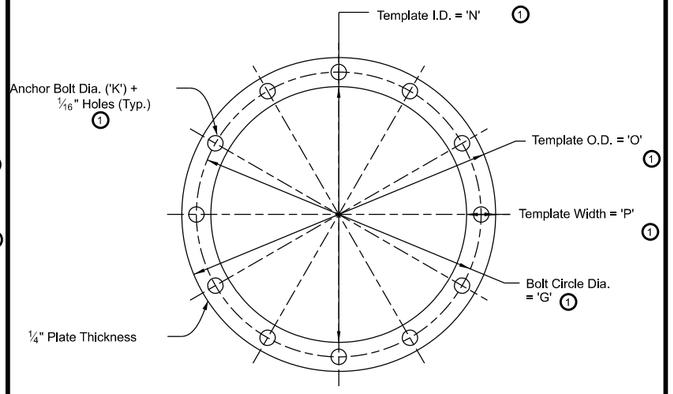
General Notes:

1. Drilled shaft concrete shall be Class "C" (f'c = 3,600 PSI) in accordance with Item 416, "Drilled Shaft Foundations."
2. Reinforcing bars shall be Grade 60 (Fy = 60 KSI) and conform to ASTM A-615. All reinforcing shall conform to Item 440, "Reinforcing Steel."
3. Provide ASTM A-36 steel for templates. Top and bottom templates need not be galvanized.
4. Anchor bolts shall be rigidly held in position during concrete placement using steel templates at the top and bottom. Top templates shall remain in place until the concrete has cured in place beyond initial set time.
5. Lubricate and tighten anchor bolts, when erecting pole, in accordance with Item 449, "Anchor Bolts."
6. Anchor bolts shall conform to ASTM F1554 Grade 55, or ASTM A193 B7 with ASTM A194 Grade 2H or A563 heavy hex nuts with F436 washers. Galvanize a minimum of the top end thread length plus 6 inches for all anchor bolts unless otherwise noted. Exposed washers and exposed nuts shall be galvanized. All galvanizing shall be in accordance with Item 445, "Galvanizing."
7. All vertical reinforcement shall be carried to the bottom of the drilled shaft.
8. Place three flat turns of the spiral bar at the top and one flat turn at the bottom of the drilled shaft.
9. Drilled shaft shall be measured by the linear foot and paid under Item 416, "Drill Shaft Foundations."
10. If rock is encountered, the drilled shaft to extend a minimum of two diameters into solid rock.
11. Location for conduit entering foundation may vary. Orient conduit entering foundation to coincide with location of ground boxes and primary ground rod.
12. Bond anchor bolts to rebar with #2/0 AWG jumper and two mechanical connectors or by bending No. 3 bar on bottom template as shown and wire tightly with ten turns of No. 10 wire or one mechanical connector. Mechanical connectors shall be UL Listed for concrete encasement.



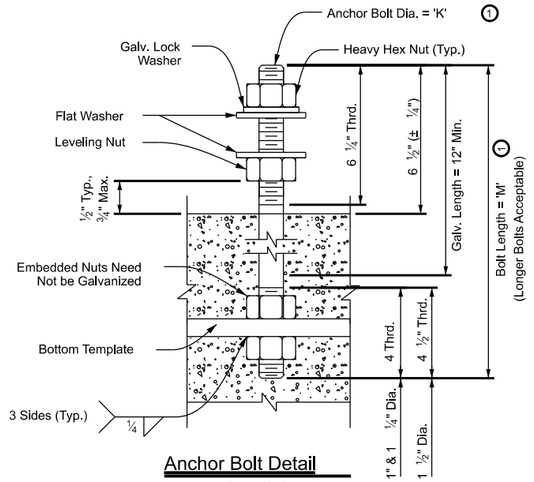
Top and Bottom Template (Eight Bolt)

Detail C



Top and Bottom Template (Twelve Bolt)

Detail D



Anchor Bolt Detail

Detail D

Reference Notes:

(1) See tables on Sheet ITS(4) for values of dimension variables.

Texas Department of Transportation

Traffic Operations Division Standard

ITS POLE FOUNDATION DETAILS

ITS(3)-16

FILE: ITS(3)-16.DGN	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0906	00	268	VARIOUS
April 2016	DIST	COUNTY		SHEET NO.
	0DA	DISTRICTWIDE		71

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FILE:

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TABLE 1: ITS POLE - 90 MPH (W/ 2 SOLAR PANELS) (4)

POLE TYPE (1)	POLE HEIGHT (FT)	POLE SHAFT (1)(10)			BASE PLATE (1)					TOP PLATE (2)	ANCHOR BOLT (3)						FOUNDATION (3)			
		BOTTOM OUTSIDE DIA. (IN)	TOP OUTSIDE DIA. (IN)	WALL THICKNESS (IN)	INSIDE DIA. (IN)	OUTSIDE DIA. (IN)	BOLT CIRCLE DIA. (IN)	BOLT HOLE DIA. (IN)	THICKNESS (IN)	OUTSIDE DIA. (IN)	DIA. (IN)	NO. OF BOLTS	LENGTH OF BOLT MIN. (IN)	TEMPLATE INSIDE DIA. (IN)	TEMPLATE OUTSIDE DIA. (IN)	TEMPLATE WIDTH (IN)	DRILL SHAFT DEPTH - TEXAS CONE PENETROMETER (N - BLOWS/FT.) (SEE NOTE 5)			DRILLED SHAFT DIA. (IN)
																	N = 10	N = 15	N = 40	
		'A'	'B'	'C'	'D'	'E'	'F'	'G'	'H'	'I'	'J'	'K'	'L'	'M'	'N'	'O'	'P'	'Q'			'R'
8 SIDED	20	10	8	1/2	10-1/16	21	16	1-1/4	1-1/2	9	1	4	29	14	18	2	12	11	10	36
	30	13	9	1/2	13-1/16	24	19	1-9/16	1-1/2	10	1-1/4	4	35	16-1/2	21-1/2	2-1/2	15	13	10	36
	40	15	9	1/2	15-1/16	26	21	1-9/16	1-1/2	10	1-1/4	6	35	18-1/2	23-1/2	2-1/2	17	14	11	42
	45	16	10	1/2	16-1/16	27	22	1-9/16	1-1/2	11	1-1/4	6	35	19-1/2	24-1/2	2-1/2	18	16	12	42
	50	17	10	1/2	17-1/16	28	23	1-9/16	1-1/2	11	1-1/4	6	35	20-1/2	25-1/2	2-1/2	19	16	12	42
	55 (6)(7)	19	11	5/8	19-1/16	30	25	1-13/16	2	12	1-1/2	6	40	22	28	3	21	18	13	42
	60 (6)(7)	20	11	5/8	20-1/16	31	26	1-13/16	2	12	1-1/2	6	40	23	29	3	21	19	14	48

TABLE 2: ITS POLE - 110 MPH (W/ 2 SOLAR PANELS) (4)

POLE TYPE (1)	POLE HEIGHT (FT)	POLE SHAFT (1)(10)			BASE PLATE (1)					TOP PLATE (2)	ANCHOR BOLT (3)						FOUNDATION (3)			
		BOTTOM OUTSIDE DIA. (IN)	TOP OUTSIDE DIA. (IN)	WALL THICKNESS (IN)	INSIDE DIA. (IN)	OUTSIDE DIA. (IN)	BOLT CIRCLE DIA. (IN)	BOLT HOLE DIA. (IN)	THICKNESS (IN)	OUTSIDE DIA. (IN)	DIA. (IN)	NO. OF BOLTS	LENGTH OF BOLT MIN. (IN)	TEMPLATE INSIDE DIA. (IN)	TEMPLATE OUTSIDE DIA. (IN)	TEMPLATE WIDTH (IN)	DRILL SHAFT DEPTH - TEXAS CONE PENETROMETER (N - BLOWS/FT.) (SEE NOTE 5)			DRILLED SHAFT DIA. (IN)
																	N = 10	N = 15	N = 40	
		'A'	'B'	'C'	'D'	'E'	'F'	'G'	'H'	'I'	'J'	'K'	'L'	'M'	'N'	'O'	'P'	'Q'			'R'
8 SIDED	20	10	8	1/2	10-1/16	21	16	1-1/4	1-1/2	9	1	4	29	14	18	2	14	12	10	36
	30	13	9	1/2	13-1/16	24	19	1-9/16	1-3/4	10	1-1/4	6	35	16-1/2	21-1/2	2-1/2	18	15	11	36
	40	15	9	1/2	15-1/16	25	21	1-9/16	1-3/4	10	1-1/4	6	35	18-1/2	23-1/2	2-1/2	20	17	12	42
	45	16	10	1/2	17-1/16	27	22	1-9/16	1-3/4	11	1-1/4	8	35	19-1/2	24-1/2	2-1/2	21	18	13	42
	50	17	10	1/2	18-1/16	28	23	1-9/16	1-3/4	11	1-1/4	8	35	20-1/2	25-1/2	2-1/2	22	19	14	42
	55 (7)	19	11	5/8	19-1/16	30	25	1-9/16	2	12	1-1/4	8	35	22-1/2	27-1/2	2-1/2	24	20	14	42
	60 (7)	20	11	5/8	20-1/16	31	26	1-13/16	2	12	1-1/2	6	40	23	29	3	25	21	15	48

TABLE 3: ITS POLE - 130 MPH (W/ 1 SOLAR PANEL) (5)

POLE TYPE (1)	POLE HEIGHT (FT)	POLE SHAFT (1)(10)			BASE PLATE (1)					TOP PLATE (2)	ANCHOR BOLT (3)						FOUNDATION (3)			
		BOTTOM OUTSIDE DIA. (IN)	TOP OUTSIDE DIA. (IN)	WALL THICKNESS (IN)	INSIDE DIA. (IN)	OUTSIDE DIA. (IN)	BOLT CIRCLE DIA. (IN)	BOLT HOLE DIA. (IN)	THICKNESS (IN)	OUTSIDE DIA. (IN)	DIA. (IN)	NO. OF BOLTS	LENGTH OF BOLT MIN. (IN)	TEMPLATE INSIDE DIA. (IN)	TEMPLATE OUTSIDE DIA. (IN)	TEMPLATE WIDTH (IN)	DRILL SHAFT DEPTH - TEXAS CONE PENETROMETER (N - BLOWS/FT.) (SEE NOTE 5)			DRILLED SHAFT DIA. (IN)
																	N = 10	N = 15	N = 40	
		'A'	'B'	'C'	'D'	'E'	'F'	'G'	'H'	'I'	'J'	'K'	'L'	'M'	'N'	'O'	'P'	'Q'			'R'
8 SIDED	20	10	8	1/2	10-1/16	21	16	1-9/16	1-3/4	9	1-1/4	4	35	13-1/2	18-1/2	2-1/2	16	14	10	36
	30	13	9	1/2	15-1/16	24	19	1-9/16	1-3/4	10	1-1/4	6	35	16-1/2	21-1/2	2-1/2	18	16	11	36
	40	15	9	1/2	15-1/16	26	21	1-9/16	1-3/4	10	1-1/4	6	35	18-1/2	23-1/2	2-1/2	21	18	13	42
	45	16	10	1/2	16-1/16	27	22	1-9/16	1-3/4	11	1-1/4	8	35	19-1/2	24-1/2	2-1/2	23	19	14	42
	50	17	10	1/2	17-1/16	28	23	1-9/16	2	11	1-1/2	8	40	20	26	3	24	20	14	42
	55 (7)	19	11	5/8	19-1/16	30	25	1-13/16	2	12	1-1/2	8	40	22	28	3	27	22	15	42
	60 (7)	20	11	5/8	20-1/16	31	26	1-13/16	2	12	1-1/2	8	40	23	29	3	28	23	16	48

TABLE 4: ITS POLE WITH STIFFENERS - 90 MPH (W/ 4 SOLAR PANELS) (8)

POLE TYPE (1)	POLE HEIGHT (FT)	POLE SHAFT (1)			BASE PLATE (1)					TOP PLATE (2)	ANCHOR BOLT (3)						FOUNDATION (3)			
		BOTTOM OUTSIDE DIA. (IN)	TOP OUTSIDE DIA. (IN)	WALL THICKNESS (IN)	INSIDE DIA. (IN)	OUTSIDE DIA. (IN)	BOLT CIRCLE DIA. (IN)	BOLT HOLE DIA. (IN)	THICKNESS (IN)	OUTSIDE DIA. (IN)	DIA. (IN)	NO. OF BOLTS	LENGTH OF BOLT MIN. (IN)	TEMPLATE INSIDE DIA. (IN)	TEMPLATE OUTSIDE DIA. (IN)	TEMPLATE WIDTH (IN)	DRILL SHAFT DEPTH - TEXAS CONE PENETROMETER (N - BLOWS/FT.) (SEE NOTE 5)			DRILLED SHAFT DIA. (IN)
																	N = 10	N = 15	N = 40	
		'A'	'B'	'C'	'D'	'E'	'F'	'G'	'H'	'I'	'J'	'K'	'L'	'M'	'N'	'O'	'P'	'Q'			'R'
8 SIDED	30	13	9	3/8	13-1/16	28	22	1-1/4	1-3/4	10	1	8	29	20	24	2	17	15	11	42
	40	15	9	1/2	15-1/16	30	24	1-1/4	2	10	1	8	29	22	26	2	20	17	12	42
	45	16	10	1/2	16-1/16	31	25	1-9/16	2	11	1-1/4	8	35	22-1/2	27-1/2	2-1/2	21	18	13	42
	50	17	10	1/2	17-1/16	32	26	1-9/16	2	11	1-1/4	8	35	23-1/2	28-1/2	2-1/2	21	18	13	42
12 sided	55 (7)	19	11	5/8	19-1/16	34	27	1-9/16	2	12	1-1/4	12	35	24-1/2	29-1/2	2-1/2	21	18	13	48
	60 (7)	20	12	5/8	20-1/16	35	28	1-9/16	2	13	1-1/4	12	35	25-1/2	30-1/2	2-1/2	22	19	14	48

TABLE 5: ITS POLE WITH STIFFENERS - 110 MPH (W/ 4 SOLAR PANELS) (8)

POLE TYPE (1)	POLE HEIGHT (FT)	POLE SHAFT (1)			BASE PLATE (1)					TOP PLATE (2)	ANCHOR BOLT (3)						FOUNDATION (3)			
		BOTTOM OUTSIDE DIA. (IN)	TOP OUTSIDE DIA. (IN)	WALL THICKNESS (IN)	INSIDE DIA. (IN)	OUTSIDE DIA. (IN)	BOLT CIRCLE DIA. (IN)	BOLT HOLE DIA. (IN)	THICKNESS (IN)	OUTSIDE DIA. (IN)	DIA. (IN)	NO. OF BOLTS	LENGTH OF BOLT MIN. (IN)	TEMPLATE INSIDE DIA. (IN)	TEMPLATE OUTSIDE DIA. (IN)	TEMPLATE WIDTH (IN)	DRILL SHAFT DEPTH - TEXAS CONE PENETROMETER (N - BLOWS/FT.) (SEE NOTE 5)			DRILLED SHAFT DIA. (IN)
																	N = 10	N = 15	N = 40	
		'A'	'B'	'C'	'D'	'E'	'F'	'G'	'H'	'I'	'J'	'K'	'L'	'M'	'N'	'O'	'P'	'Q'			'R'
8 SIDED	30	13	9	1/2	13-1/16	28	22	1-9/16	2-1/4	10	1-1/4	8	35	19-1/2	24-1/2	2-1/2	20	17	12	42
	40	16	10	1/2	16-1/16	31	25	1-9/16	2-1/4	11	1-1/4	8	35	22-1/2	27-1/2	2-1/2	24	20	14	42
	45	17	11	1/2	17-1/16	32	26	1-9/16	2-1/4	12	1-1/4	8	35	23-1/2	28-1/2	2-1/2	25	21	15	42
	50	18	11	1/2	18-1/16	32	26	1-13/16	2-1/2	12	1-1/2	8	40	23	29	3	25	21	15	48
12 SIDED	55 (7)	19	11	5/8	19-1/16	34	27	1-9/16	2-1/4	12	1-1/4	12	35	24-1/2	29-1/2	2-1/2	24	21	15	48
	60 (7)	20	12	5/8	20-1/16	35	28	1-9/16	2-1/4	13	1-1/4	12	35	25-1/2	30-1/2	2-1/2	25	22	15	48

TABLE 6: ITS POLE WITH STIFFENERS - 130 MPH (W/ 3 SOLAR PANELS) (9)

POLE TYPE (1)	POLE HEIGHT (FT)	POLE SHAFT (1)			BASE PLATE (1)					TOP PLATE (2)	ANCHOR BOLT (3)						FOUNDATION (3)			
		BOTTOM OUTSIDE DIA. (IN)	TOP OUTSIDE DIA. (IN)	WALL THICKNESS (IN)	INSIDE DIA. (IN)	OUTSIDE DIA. (IN)	BOLT CIRCLE DIA. (IN)	BOLT HOLE DIA. (IN)	THICKNESS (IN)	OUTSIDE DIA. (IN)	DIA. (IN)	NO. OF BOLTS	LENGTH OF BOLT MIN. (IN)	TEMPLATE INSIDE DIA. (IN)	TEMPLATE OUTSIDE DIA. (IN)	TEMPLATE WIDTH (IN)	DRILL SHAFT DEPTH - TEXAS CONE PENETROMETER (N - BLOWS/FT.) (SEE NOTE 5)			DRILLED SHAFT DIA. (IN)
																	N = 10	N = 15	N = 40	
		'A'	'B'	'C'	'D'	'E'	'F'	'G'	'H'	'I'	'J'	'K'	'L'	'M'	'N'	'O'	'P'	'Q'			'R'
8 SIDED	30	13	9	1/2	13-1/16	28	22	1-9/16	2-1/2	10	1-1/4	8	35	19-1/2	24-1/2	2-1/2	23	19	14	42
	40	16	10	1/2	16-1/16	31	25	1-9/16	2-1/2	11	1-1/2	8	40	22	28	3	25	21	14	42
	45	17	11	1/2	17-1/16	32	26	1-13/16	2-1/2	12	1-1/2	8	40	23	29	3	26	22	16	48
	50	18	11	1/2	18-1/16	33	27	1-13/16	2-1/2	12	1-1/2	8	40	24	30	3	27	23	16	48
12 SIDED	55 (7)	19	11	5/8	19-1/16	34	27	1-9/16	2-1/4	12	1-1/4	12	35	24-1/2	29-1/2	2-1/2	26	22	16	48
	60 (7)	20	12	5/8	20-1/16	35	28	1-9/16	2-1/4	13	1-1/4	12	35	25 1/2	30 1/2	2-1/2	27	23	16	48

General Notes:

1. Designed according to Sixth Edition 2013 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications thereto.

2. Table 1 and Table 4 design wind speed equals 90 MPH (3-Second Wind Gusts) with a 1.14 gust factor. A wind importance factor of 1.00 is applied to adjust the wind speed to a 50 year recurrence interval at 33 FT above the ground for Exposure C category in accordance with TxDOT WV&IZ(LTS2013). Design values listed in the table allow the base of the pole to be elevated above the surrounding ground level no more than 20 FT.

3. Table 2 and Table 5 design wind speed equals 110 MPH (3-Second Wind Gusts) with a 1.14 gust factor. A wind importance factor of 1.00 is applied to adjust the wind speed to a 50 year recurrence interval at 33 FT above the ground for Exposure C category in accordance with TxDOT WV&IZ(LTS2013). Design values listed in the table allow the base of the pole to be elevated above the surrounding ground level no more than 20 FT.

4. Table 3 and Table 6 design wind speed equals 130 MPH (3-Second Wind Gusts) with a 1.14 gust factor. A wind importance factor of 1.00 is applied to adjust the wind speed to a 50 year recurrence interval at 33 FT above the ground for Exposure C category in accordance with TxDOT WV&IZ(LTS2013). Design values listed in the table allow the base of the pole to be elevated above the surrounding ground level no more than 20 FT.

5. Recommended embedment lengths are for information purposes only. Foundation embedment depth is based off Texas Cone Penetrometer Value N = 10 blows/ft. for soft soils and up to 40 blows/ft. for hard soils. Foundation lengths shall be as shown on the plans, or as directed by the Engineer. Foundations will be paid for under Item 416, "Drilled Shaft Foundations" unless otherwise shown on the plans.

6. Deviation from the design criteria and values contained in the tables above constitute and alternative design and will require submission of shop drawings and calculations for approval, sealed by a Texas Professional Engineer.

7. 12-sided or round poles as a direct substitution for 8-sided and round poles as a direct substitution for 12-sided poles, meeting the design criteria and values contained in the tables above, require submission of shop drawings for approval.

Reference Notes

(1) See the following ITS Pole Standard sheets:
- 8-sided Pole - ITS(1)
- 12-sided Pole - ITS(2)

(2) Provision for 2" Dia. opening in top plate for poles requiring cameras mounted on top.
- See ITS Pole Mounting Details - ITS(6)

(3) See ITS Pole Foundation Details - ITS(3)

(4) Designed to support the following:
- Two Type 3 ITS pole mounted cabinets (280 LBS/EA and EPA = 14.50 sq. ft. per cabinet). See ITS(16).
- Two 250 W (50 LBS/EA and EPA = 30.70 sq. ft. per panel) solar panels (see ITS(24) "Solar Panel Matrix Table")
- Combined ITS equipment dead load of 170 LBS with an EPA = 6 sq. ft.

(5) Designed to support the following:
- Two Type 3 ITS pole mounted cabinets (280 LBS/EA and EPA = 14.50 sq. ft. per cabinet). See ITS(16).
- One 250 W (50 LBS/EA and EPA = 30.70 sq. ft. per panel) solar panels (see ITS(24) "Solar Panel Matrix Table")
- Combined ITS equipment dead load of 170 LBS with an EPA = 6 sq. ft.

(6) Pole heights at 55 Ft. and 60 Ft. located in the AMA, CHS, and LBB Districts, will require special design and design values shown shall not be used. Submit shop drawings for pole design and supporting calculations for 55 Ft. and 60 Ft. pole heights signed and sealed by a Texas Professional Engineer for approval.

(7) Ensure minimum nominal splice length is 1.5 times the average pole diameter at the splice to the nearest inch. Ensure longitudinal seam welds that will be in contact at a slip joint splice are ground smooth for the length of splice plus a minimum of six inches. Ensure a 100% longitudinal seam weld for a length of 1.5 pole diameter plus a minimum of 6 inches in outer sections at splices and at base plate. Provide 85% penetration in longitudinal seam welds at other pole sections.

(8) Designed to support the following:
- Two Type 3 ITS pole mounted cabinets (280 LBS/EA and EPA = 14.50 sq. ft. per cabinet). See ITS(16).
- Four 250 W (50 LBS/EA and EPA = 30.70 sq. ft. per panel) solar panels (see ITS(24) "Solar Panel Matrix Table")
- Combined ITS equipment dead load of 170 LBS with an EPA = 6 sq. ft.

Refer to ITS(4A) for stiffening plate details at the pole to base plate connection.

(9) Designed to support the following:
- Two Type 3 ITS pole mounted cabinets (280 LBS/EA and EPA = 14.50 sq. ft. per cabinet). See ITS(16).
- Three 250 W (50 LBS/EA and EPA = 30.70 sq. ft. per panel) solar panels (see ITS(24) "Solar Panel Matrix Table")
- Combined ITS equipment dead load of 170 LBS with an EPA = 6 sq. ft.

Refer to ITS(4A) for stiffening plate details at the pole to base plate connection.

(10) When solar panels are not provisioned in the plans, ITS pole wall thickness may be reduced by 1/8".

Texas Department of Transportation

Traffic Operations Division Standard

ITS POLE DESIGN DETAILS DATA LOOKUP TABLE

ITS(4)-15

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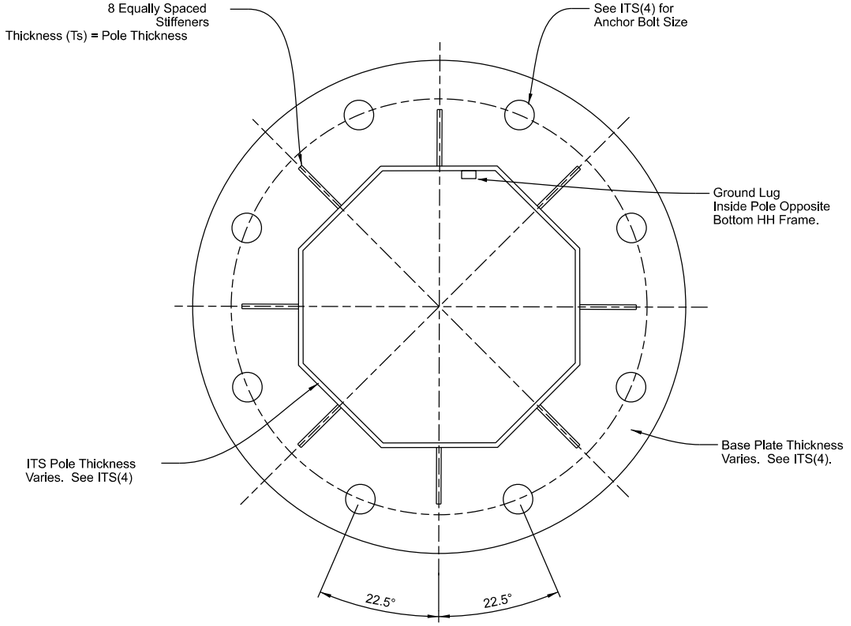
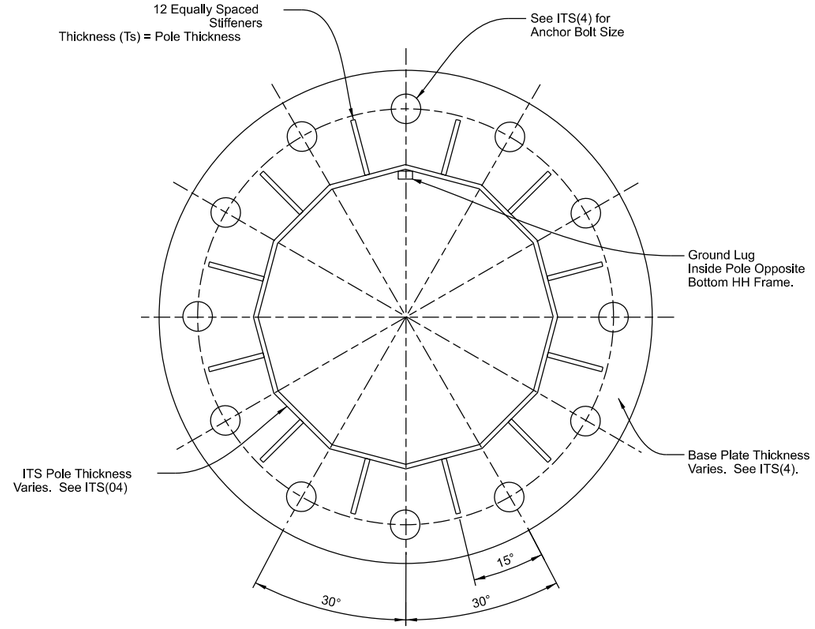


8-sided Pole Base Plate Detail



12-sided Pole Base Plate Detail

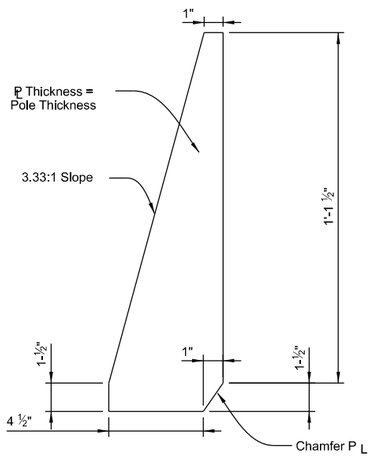
General Notes:

1. Steel stiffening plates shall conform to ASTM A36.
2. Make all welds conform to Item 441, "Steel Structures."
3. Galvanize in accordance with Item 445, "Galvanizing" unless otherwise noted.
4. Submit shop drawings detailing stiffening plate orientation along with ITS equipment intended for mounting for review and approval prior to fabrication.
5. HH = Handhole
6. T = Thickness

Reference Notes:

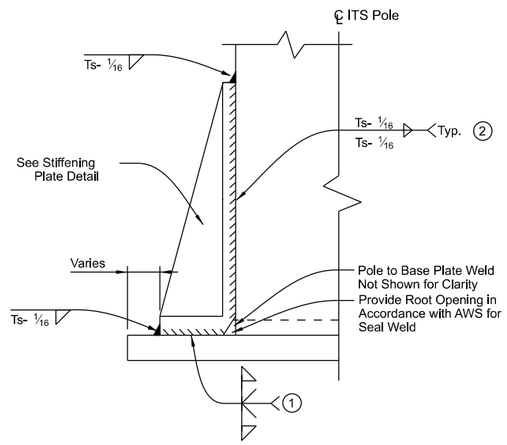
(1) Complete Joint Penetration Weld per AWS

(2) Wrap Fillet Weld Around Tip of Stiffener



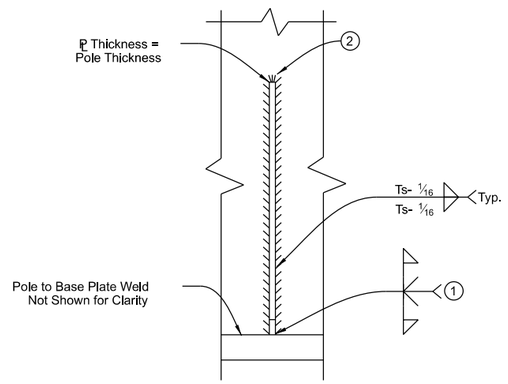
Stiffening Plate Detail

Not to Scale



Stiffening Detail - Elevation View

Not to Scale



Stiffening Detail - Front View

Not to Scale

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Traffic Operations Division Standard

ITS POLE STIFFENER PLATE DETAILS

ITS(4A)-15

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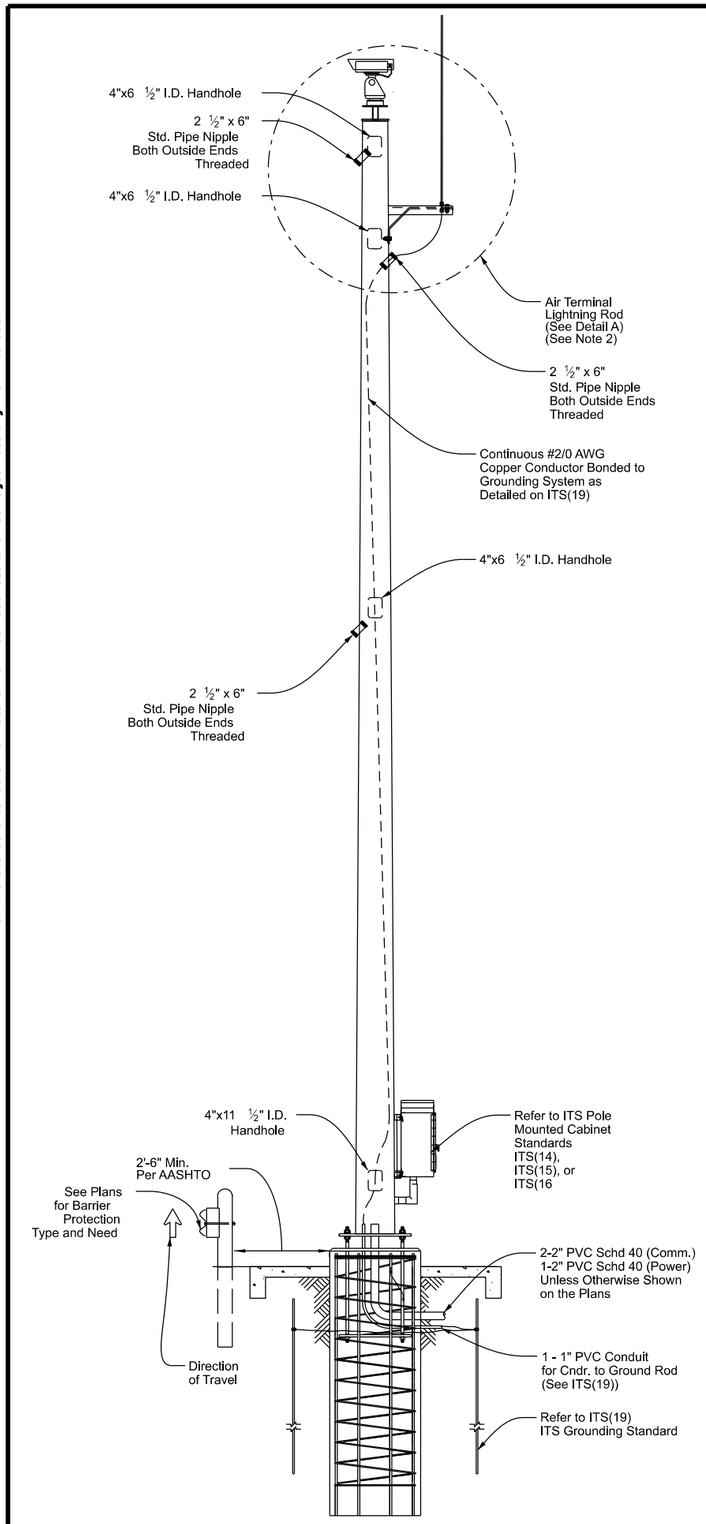
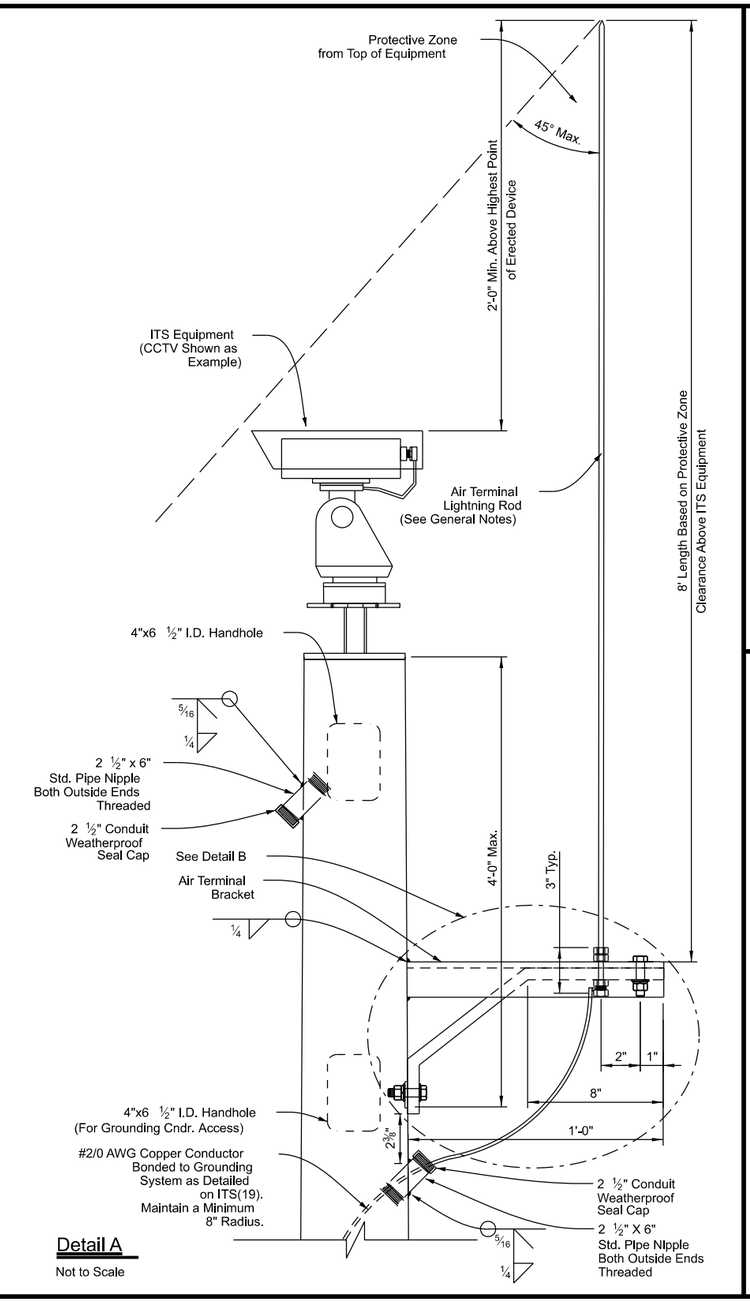


ITS Pole with Cabinet



Detail A

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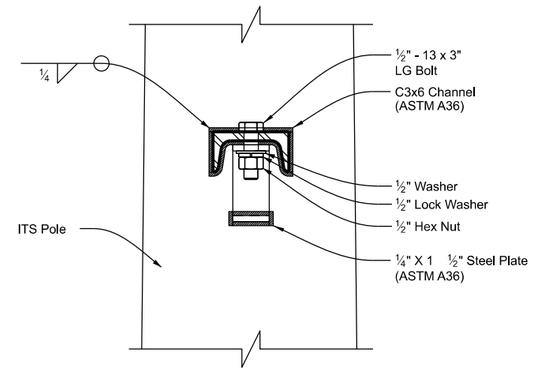

Section A-A

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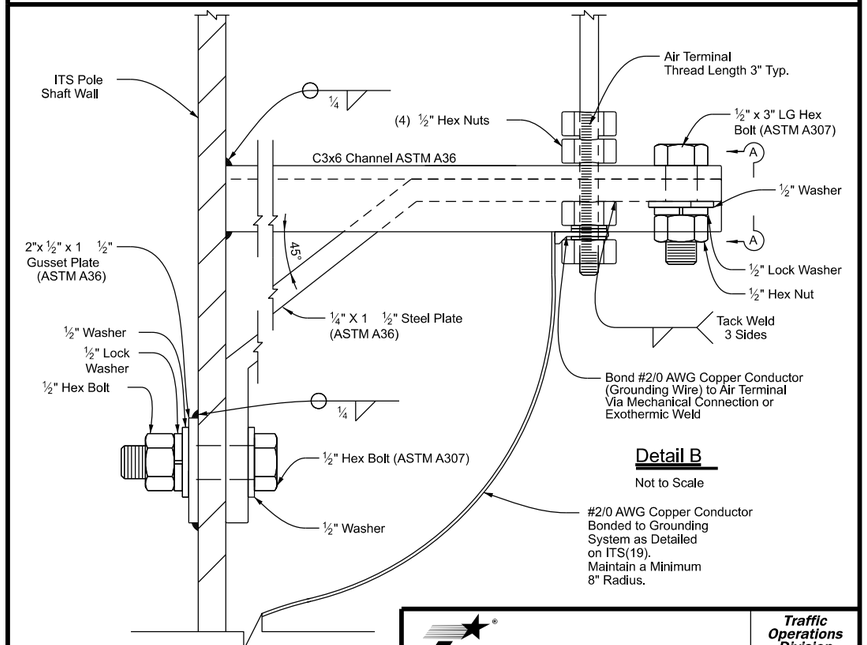

Detail B

Not to Scale

General Notes:

1. Provide lightning protection using air terminals on structures utilizing the rolling sphere method. Provide lightning protection system consisting of air terminals, down conductor, and grounding system installed in accordance with NFPA 780 and tested in accordance with IEEE 142. Meet the following requirements:
   A. Position - in center of least utilized field of view.
   B. Height - camera equipment to be within 45 degree protective zone of air terminal.
   C. Material - ½" ETP alloy 110 copper air terminal (Class II)
   D. Clearance - 24" minimum height above highest point of ITS equipment.
   E. Bonding - attach air terminal to bracket by exothermic weld or with approved clamping.
   F. Structure wind rating in accordance with TxDOT WV & IZ (LTS2013).
   G. Galvanize air terminal bracket in accordance with Item 445, "Galvanizing."
2. Alternative orientation for air terminal and pole mounted cabinet due to project specific needs to be indicated on the plans and detailed in shop drawing submittal for approval.
3. Weld air terminal bracket to ITS pole in accordance with Item 448 "Structural Field Welding." Bracket may be welded by the fabricator in the shop prior to delivery. A bolted connection for the air terminal bracket is acceptable in lieu of a welded connection with approval by the Engineer and detailed in the shop drawings.

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ITS POLE AIR TERMINAL DETAILS

ITS(5)-15

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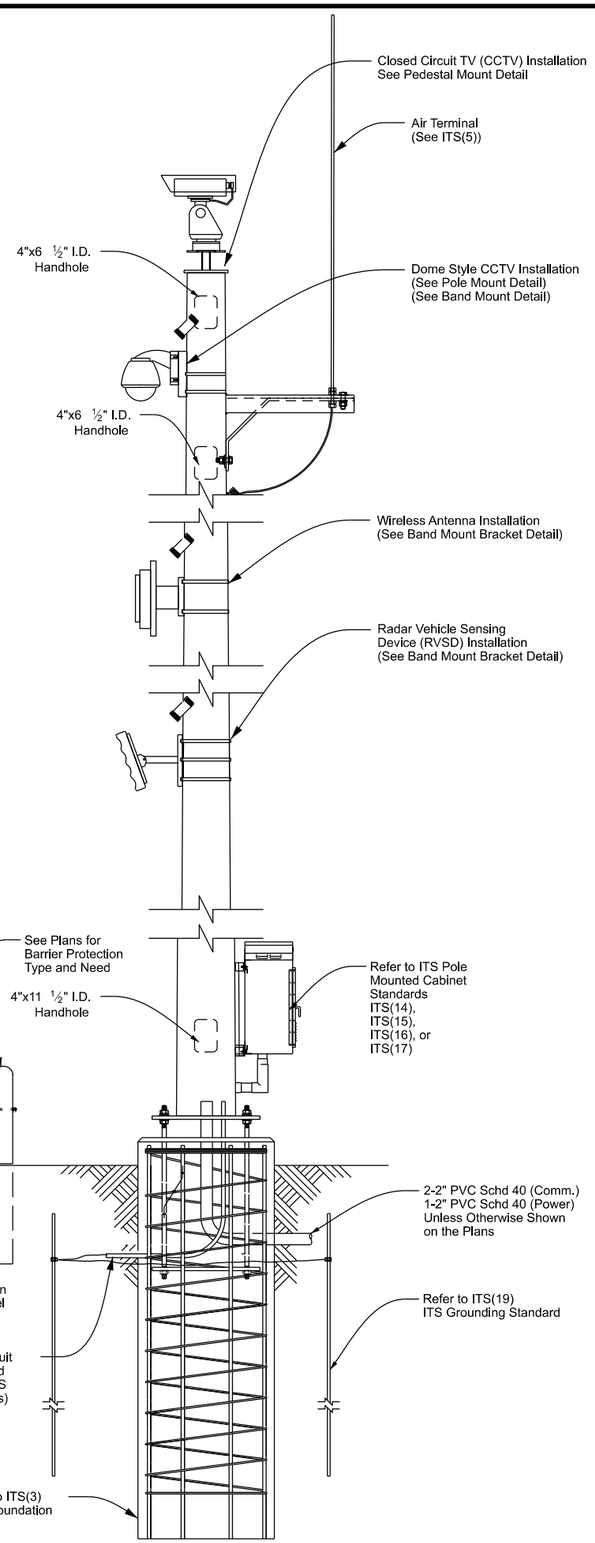
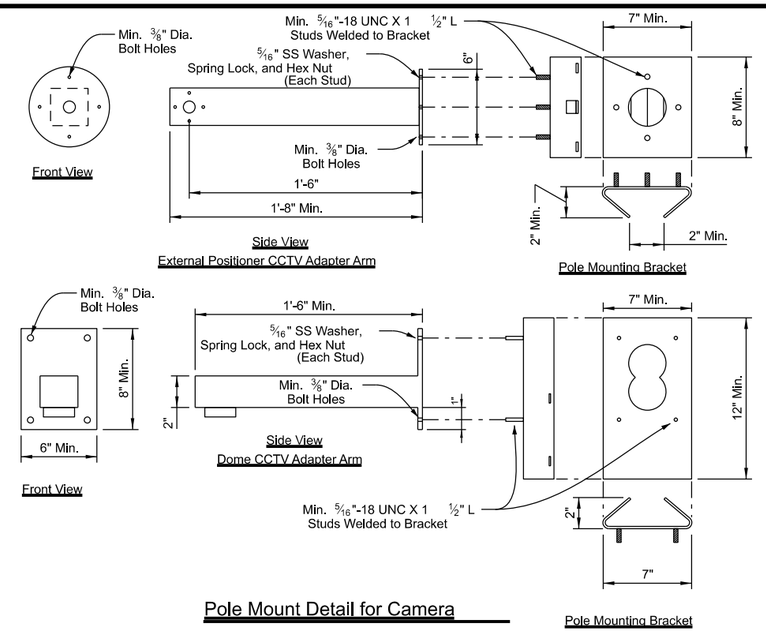
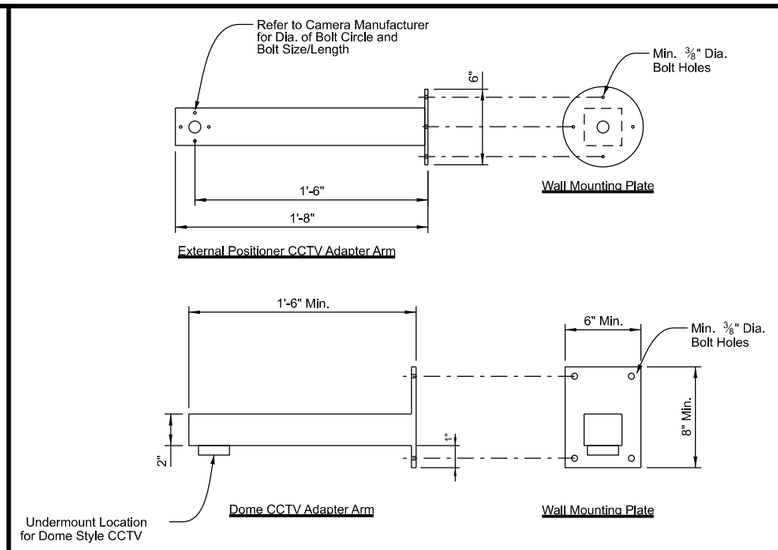


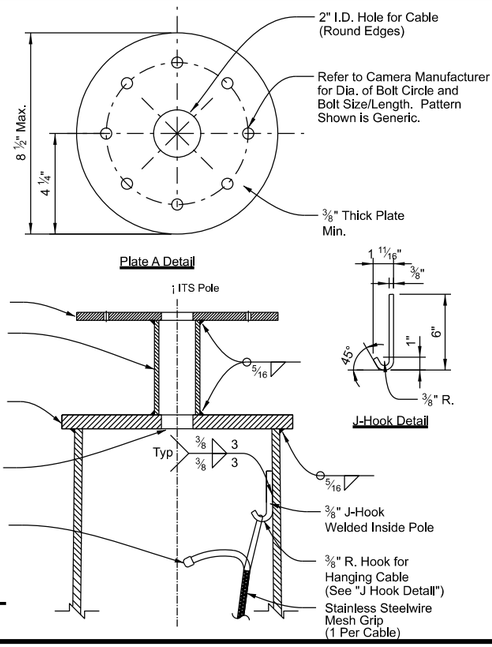
ITS Pole with Cabinet



Pole Mount Detail for Camera

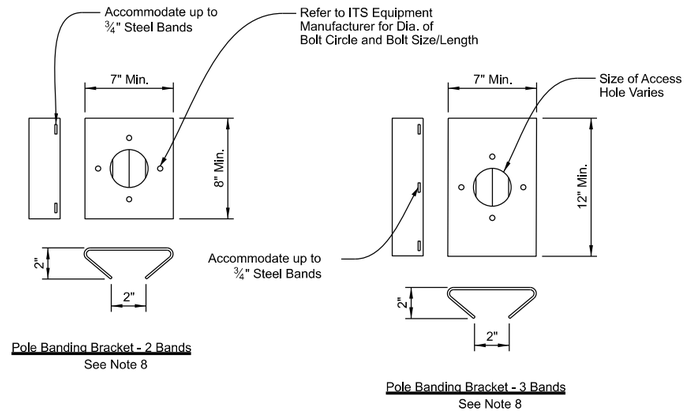


Wall Mount Detail



Pedestal Mount

Pole Top Detail



Band Mount Bracket Details

General Notes:

1. Designed according to Sixth Edition AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications.
2. Hang all cabling inside ITS pole structure with stainless steel wire mesh grips.
3. Bolt positioning in the pedestal top plate (Plate "A") for the pan/tilt base must be determined in the field per camera manufacturers recommendations. This will allow positioning of the camera to maximize coverage area. The Engineer will determine the camera's blind zone at each location.
4. Provide pedestal top plate and Plate "A" that conform to ASTM A36.
5. Make all welds conform to Item 441 and AWSD 1.1 (Structural Welding). Repair damaged galvanized coating per Item 445, "Galvanizing."
6. Galvanize parts in accordance with Item 445, "Galvanizing" unless otherwise noted.
7. The type of ITS equipment shown to be mounted to the ITS pole is intended to represent the most common ITS equipment applications and should not be treated as all inclusive. Other ITS equipment applications may exist that are project specific.
8. Mounting brackets are intended to be diagrammatic and for information only, and are not all inclusive. Contractor responsible for submitting mounting bracket design for approval by the Engineer prior to fabrication. Mounting bracket designed to support a maximum 35 Lbs. Off-the-shelf mounting brackets are acceptable and shall be submitted by shop drawing for approval.
9. Mounting heights to be determined in the field based on manufacturer recommendations.

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ITS POLE EQUIPMENT MOUNTING DETAILS

ITS(6)-15

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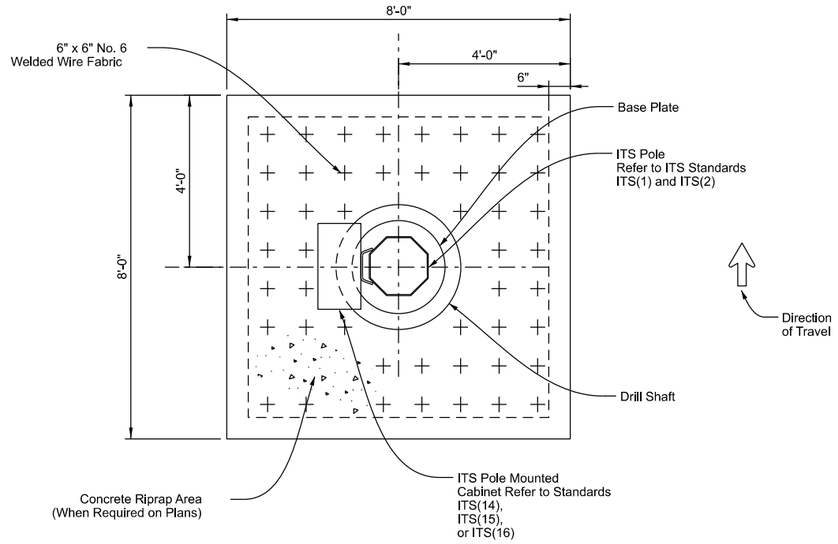
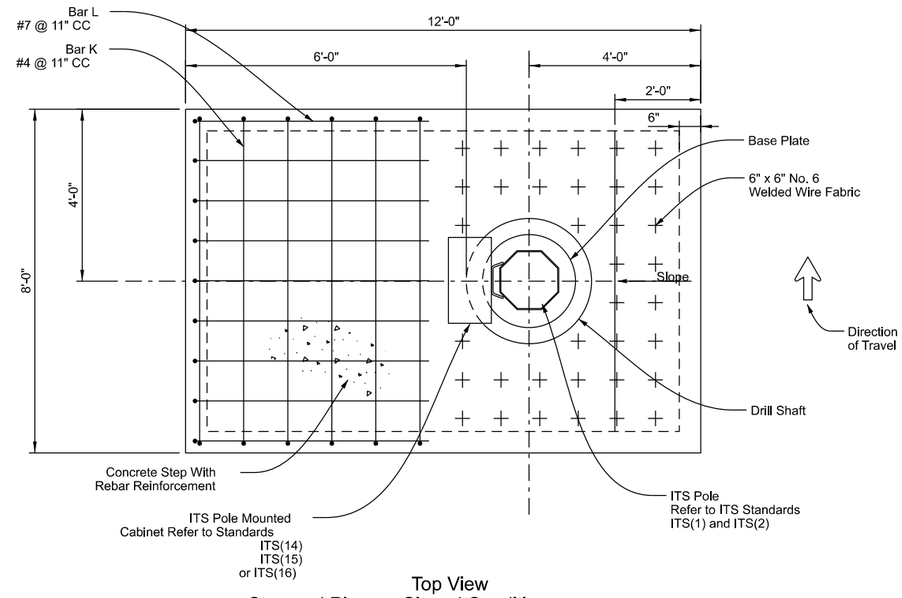


Top View
Riprap - Non-Sloped Conditions



Top View
Step and Riprap - Sloped Conditions

General Notes:

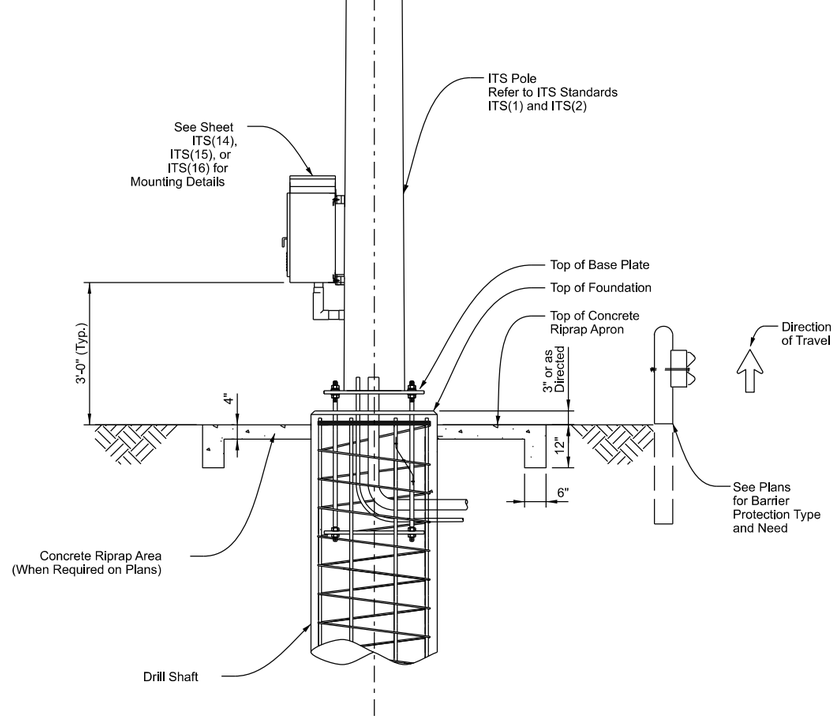
1. For non-sloped grassy areas, an 8' x 8' concrete riprap apron shall be poured around ITS pole foundations (see detail on this sheet), estimated at 1.25 CY per site, paid for under Item 432 "Riprap."

2. For sloped grassy areas, a concrete "step" (for maintenance personnel to access cabinet) shall be poured as part of the riprap apron. The step shall vary in height depending on slope, but shall extend 6' horizontally from ITS pole drilled shaft foundation and be the same width as riprap apron (8'). Step shall be poured at same time as riprap apron (see detail on this sheet). Any additional concrete necessary to fabricate step (over and above the 1.25 CY) shall be considered subsidiary to the various bid items and no direct payment shall be made.

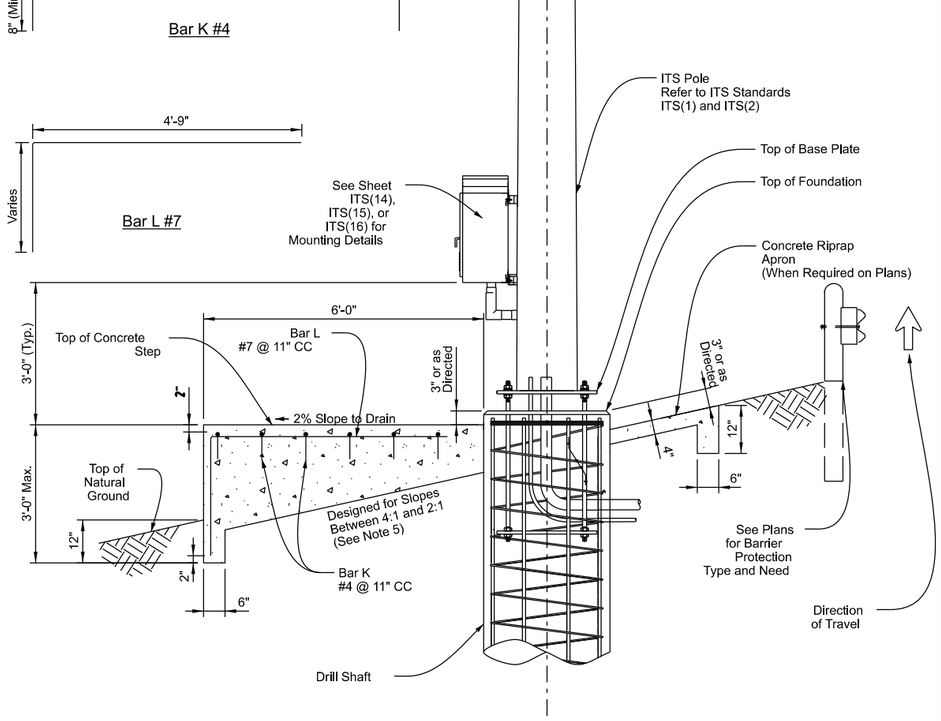
3. For sloped areas where riprap exists, a 6' (horizontal from drilled shaft foundation) x 4' wide step shall be installed (see detail this sheet). Concrete for step shall be considered subsidiary to the various bid items and no direct payment shall be made.

4. Cabinet orientation may vary depending on field conditions or project constraints. Accommodate configuration of platform according to cabinet orientation.

5. Slopes greater than a 2:1 or when 3'-0" Max. step wall height is exceeded, an alternative design with safety railing is required and shall be detailed in the shop drawings for approval.



Elevation View
Riprap Apron Detail - Non-Sloped Conditions



Elevation View
Riprap Apron/Step Detail - Sloped Conditions
(Slopes Exceeding 4:1)

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ITS POLE RIPRAP DETAILS

ITS(7)-15

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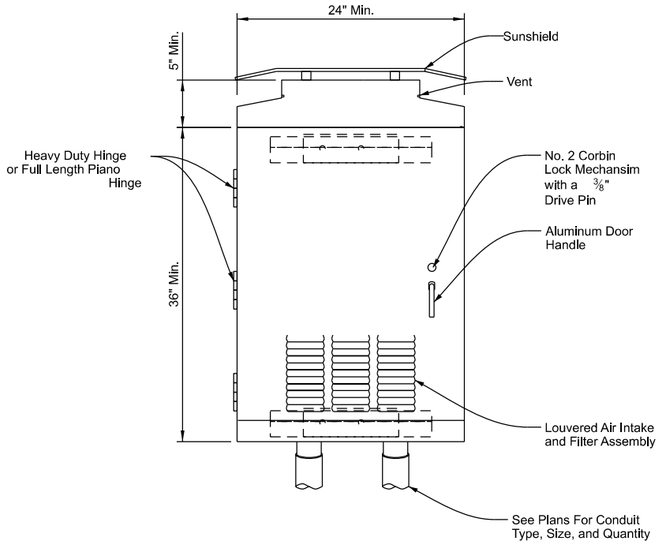
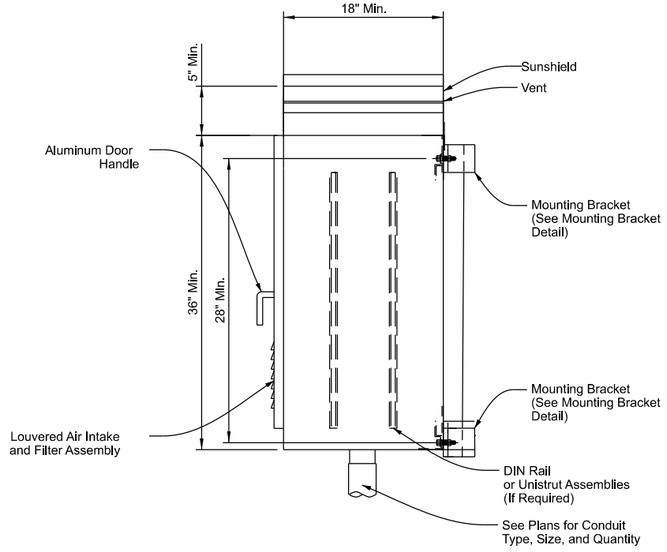


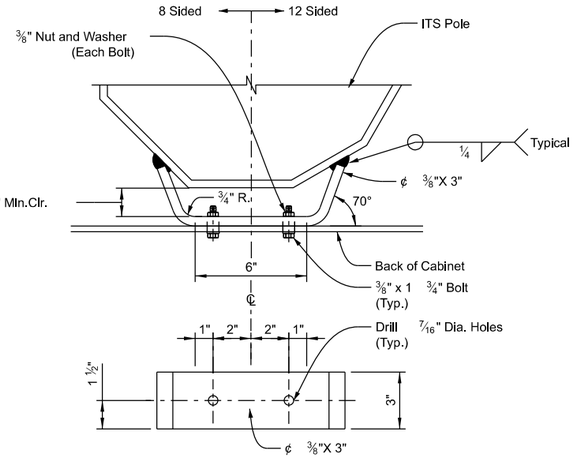
Pole Mounted Cabinet - Type 2 Front View

Not to Scale



Pole Mounted Cabinet - Type 2 Side View

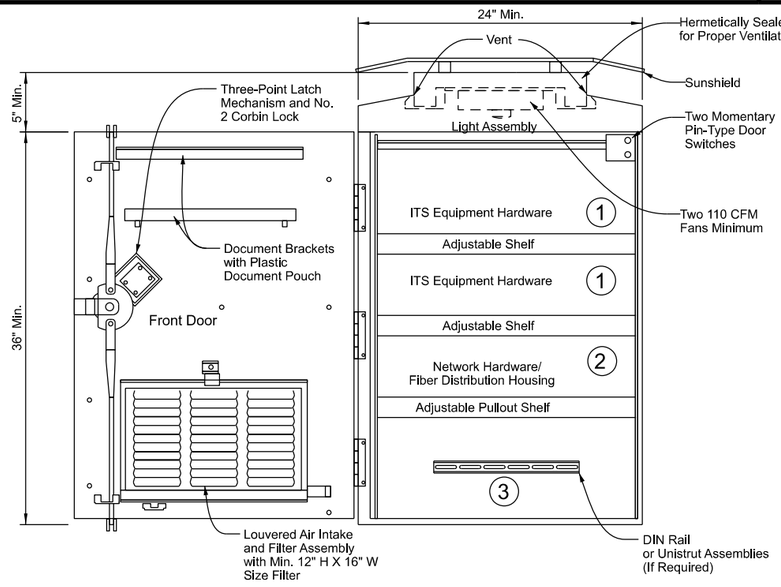
Not to Scale



Note:
ITS Pole May be Round, Octagonal (8 Sided), or Dodecahedron (12 Sided).
See ITS(1), and ITS(2) for Details.

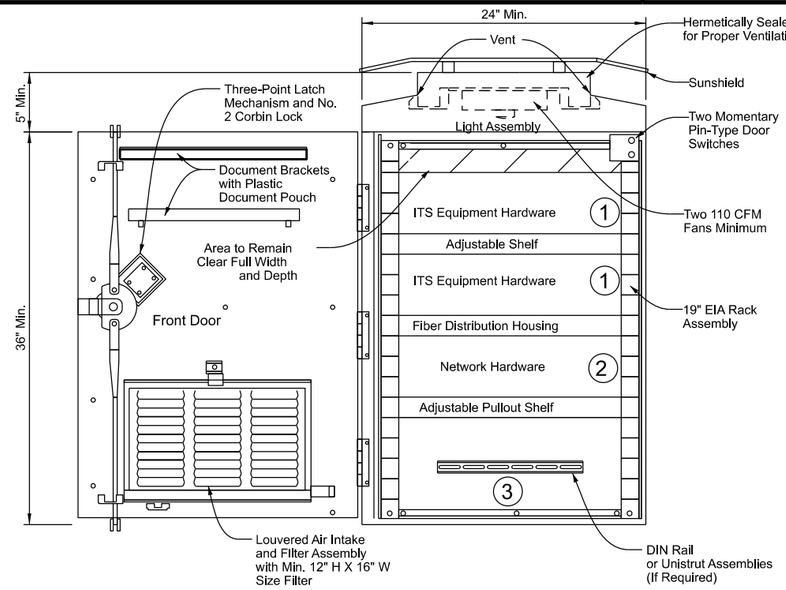
Mounting Bracket Detail

Not to Scale



Interior - Type 2 Without 19" EIA Rack - Front View

Not to Scale



Interior - Type 2 With 19" EIA Rack - Front View

Not to Scale

Typical Equipment Layout Legend	
	Example Equipment
1	CCTV Interface Panel, Radar Vehicle Sensing Device (RVSD) Equipment, DMS/LCS Controller Environmental Sensor Station (ESS) Equipment, Bluetooth Equipment, or ITS Radio Equipment (See General Note 1)
2	Ethernet Switch, Video Encoder, Terminal Server, Fiber Optic Transceivers, or Media Conversion Equipment (See General Note 1)
3	Power Distribution Assembly, Service Entrance Breakers, Primary AC Power, Auxiliary Power Strip, Ground Bus Bar Surge Protection Equipment

General Notes:

1. Layout of hardware equipment and configuration shown is diagrammatic in nature and intended to represent a preferred Type 2 pole mounted cabinet setup. Hardware needed for each Type 2 cabinet varies and not all cabinet equipment may be shown. The contractor will be responsible for configuring cabinets with all appropriate ITS hardware and power supplies in accordance with the plans and specifications. The contractor may alter the cabinet configuration shown to maximize space and ensure easy access for maintenance.

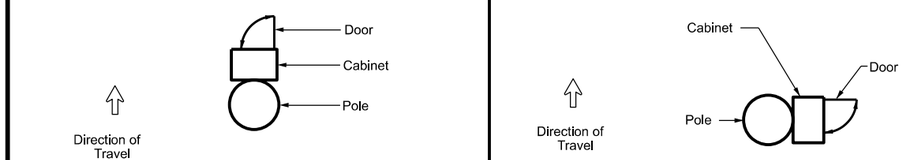
2. Mount cabinet as detailed on ITS(15) or ITS(17). Orientation of cabinet on ITS pole may vary depending on field conditions. Mount the pole mounted cabinet to the backside of the ITS pole, to allow maintenance personnel to access the cabinet while being able to view oncoming traffic.

3. For ITS pole sites located on slopes greater than 4H:1V, mount the cabinet to the backside of the ITS pole as detailed on ITS(7). Mounting height to accommodate maintenance pad for easy access.

4. All dimensions are approximate and represent minimum cabinet dimensions.

5. Provide conduit entrances at the bottom of the cabinet.

6. Paid under Special Specification "ITS Pole with Cabinet" (Configuration 1) without 19" EIA rack.
   Paid under Special Specification "ITS Pole with Cabinet" (Configuration 2) with 19" EIA rack.



Orientation of Type 2 Cabinet on ITS Pole (Typical)

Not to Scale

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Traffic Operations Division Standard

ITS POLE MOUNTED CABINET TYPE 2 DETAILS

ITS(15)-15

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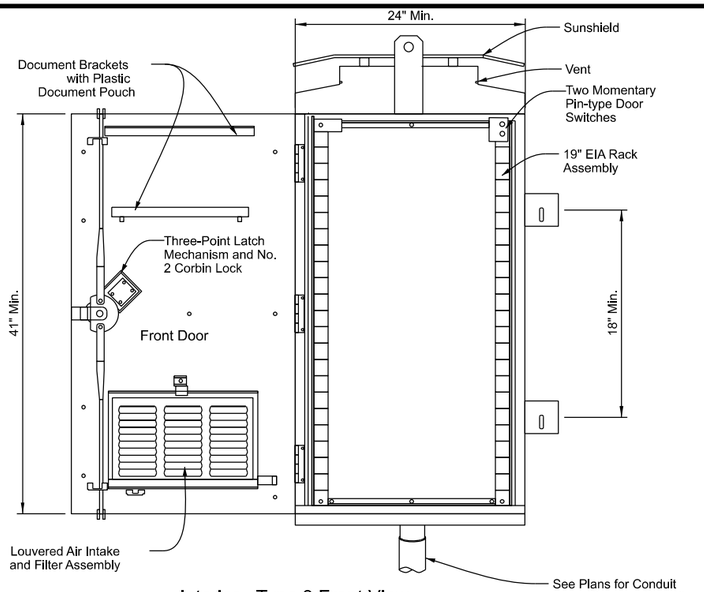
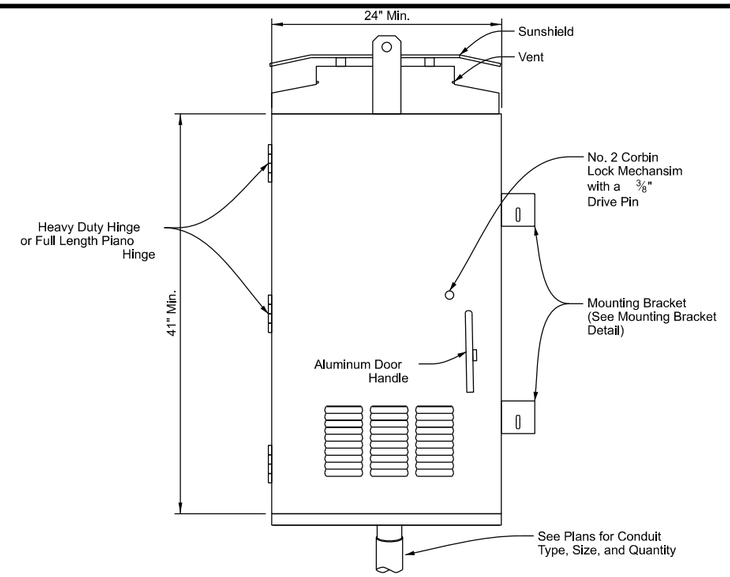


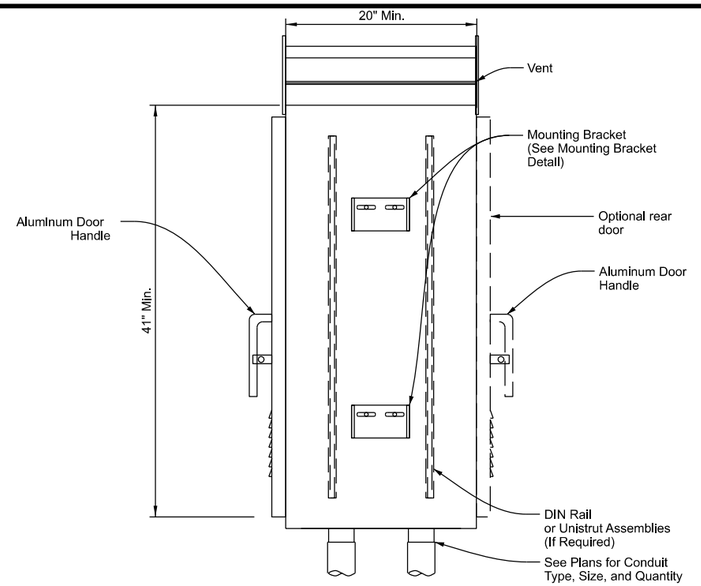
Interior - Type 3 Front View

Not to Scale



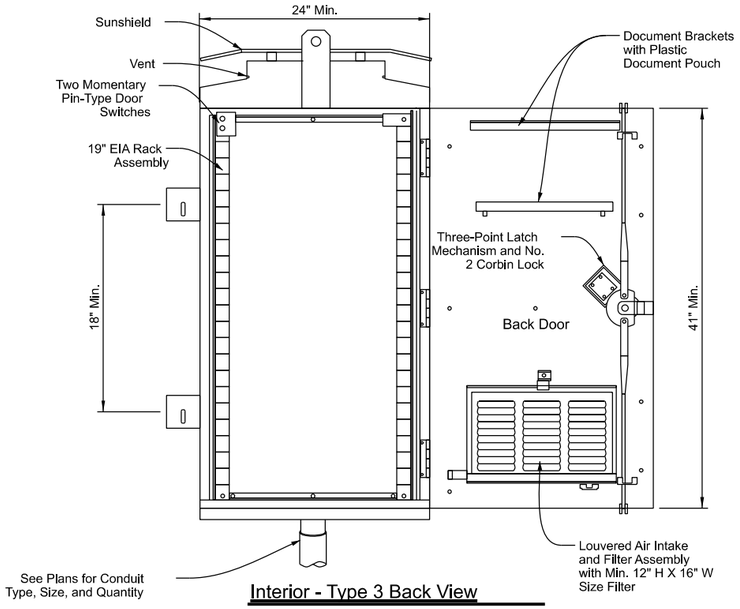
Pole Mounted Cabinet - Type 3 Front View

Not to Scale



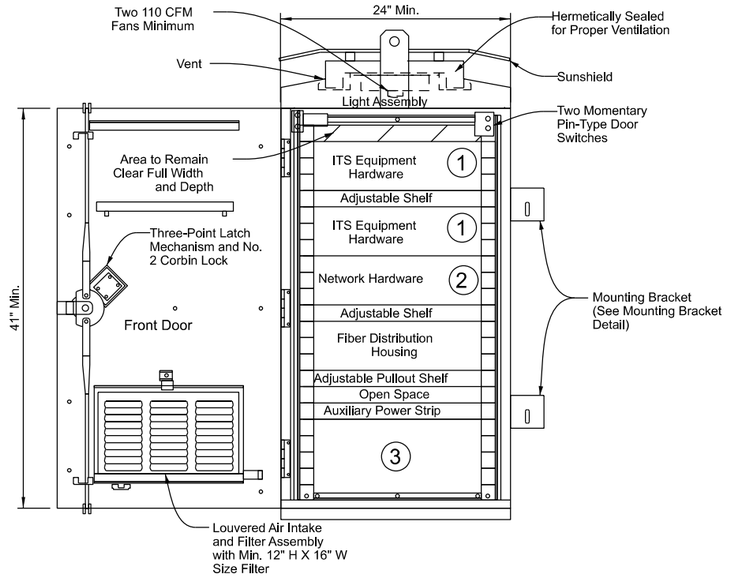
Pole Mounted Cabinet - Type 3 Side View

Not to Scale



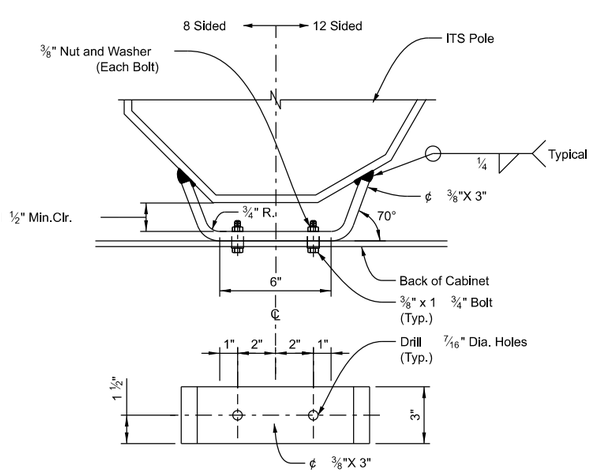
Interior - Type 3 Back View

Not to Scale



Interior - Type 3 With Rack Front View

Not to Scale



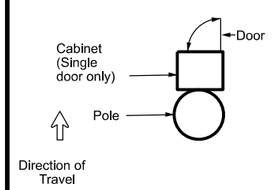
Note:
ITS Pole May be Round, Octagonal (8 Sided), or Dodecahedron (12 Sided).
See ITS(1), and ITS(2) for Details.

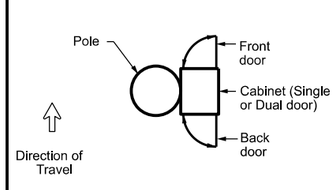
Mounting Bracket Detail

Not to Scale

General Notes:

1. Layout of hardware equipment and configuration shown is diagrammatic in nature and intended to represent a preferred Type 3 pole mounted cabinet setup. Hardware needed for each Type 3 cabinet varies and not all cabinet equipment may be shown. The contractor will be responsible for configuring cabinets with all appropriate ITS hardware and power supplies in accordance with the plans and specifications. The contractor may alter the cabinet configuration shown to maximize space and ensure easy access for maintenance.
2. Mount cabinet as detailed on ITS(16) or ITS(17). Orientation of cabinet on ITS pole may vary depending on field conditions. Mount the pole mounted cabinet to the backside of the ITS pole, to allow maintenance personnel to access the cabinet while being able to view oncoming traffic. A dual door configuration (configuration 2) is detailed above.
3. For ITS pole sites located on slopes greater than 4H:1V, Mount the cabinet to the backside of the ITS pole as detailed on ITS(7). Mounting height to accommodate maintenance pad for easy access.
4. All dimensions are approximate and represent minimum cabinet dimensions.
5. Provide conduit entrances at the bottom of the cabinet.
6. Paid under Special Specification "ITS Pole with Cabinet" (Configuration 1) with single door. Paid under Special Specification "ITS Pole with Cabinet" (Configuration 2) with dual door





Orientation of Type 3 Cabinet on ITS Pole (Typical)

Not to Scale

Typical Equipment Layout Legend

	Example Equipment
1	CCTV Interface Panel, Radar Vehicle Sensing Device (RVSD) Equipment, DMS/LCS Controller Environmental Sensor Station (ESS) Equipment, Bluetooth Equipment, or ITS Radio Equipment (See General Note 1)
2	Ethernet Switch, Video Encoder, Terminal Server, Fiber Optic Transceivers, or Media Conversion Equipment (See General Note 1)
3	Power Distribution Assembly, Service Entrance Breakers, Primary AC Power, Auxiliary Power Strip, Ground Bus Bar Surge Protection Equipment

Texas Department of Transportation

Traffic Operations Division Standard

ITS POLE MOUNTED CABINET TYPE 3 DETAILS

ITS(16)-15

FILE: its(16)-15.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT June 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0906	00	268	VARIOUS
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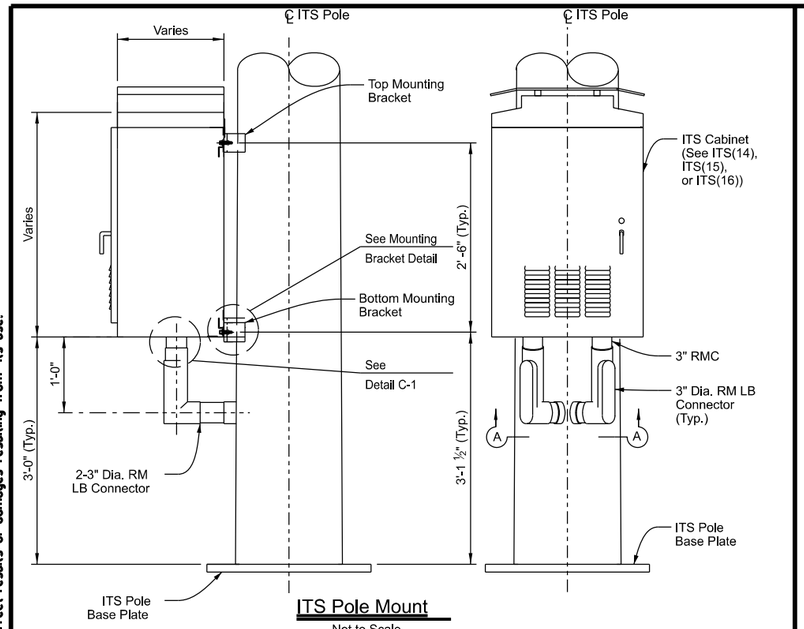

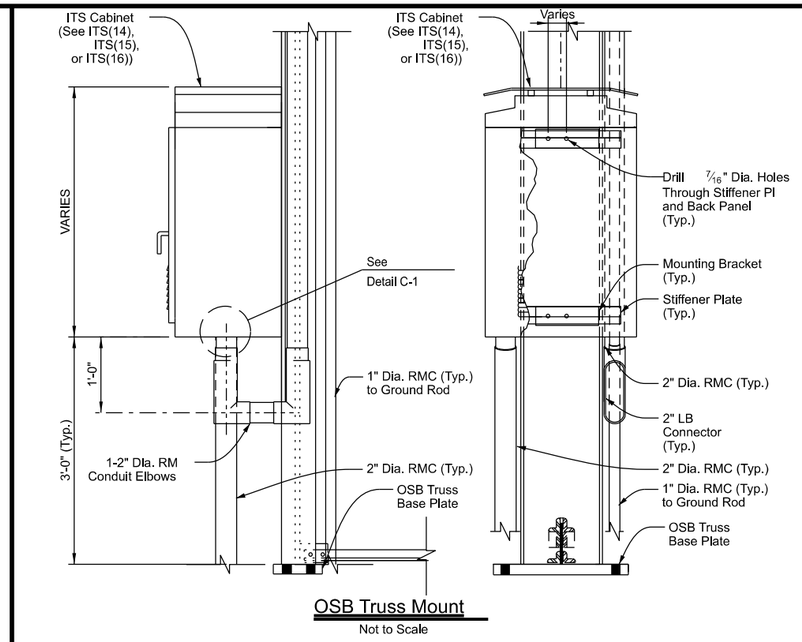

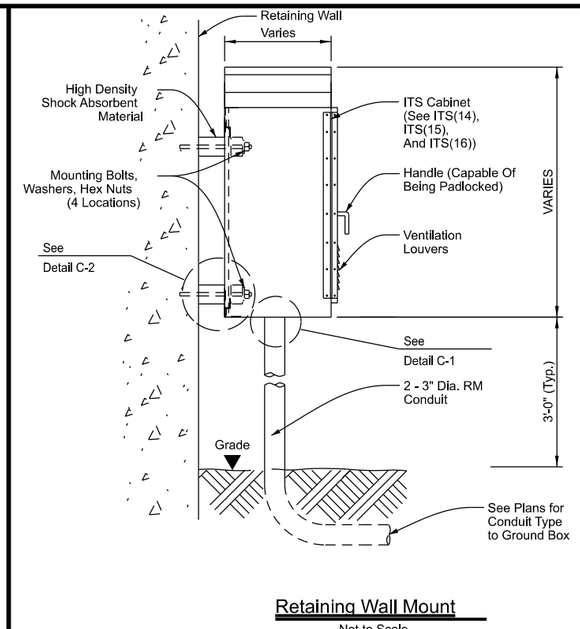

General Notes:

1. Mount cabinet as detailed on ITS(14), ITS(15), ITS(16), or ITS(17). Orientation of cabinet on ITS pole may vary depending on field conditions. Mount the pole mounted cabinet to the backside of the ITS pole, to allow maintenance personnel to access the cabinet while being able to view oncoming traffic.
2. For ITS pole sites located on slopes greater than 4V:1H, mount the cabinet to the backside of the ITS pole as detailed on ITS(7). Mounting height to accommodate maintenance pad for easy access.
3. All dimensions are approximate and represent minimum dimensions.
4. Provide conduit entrances at the bottom of the cabinet.

Texas Department of Transportation

Traffic Operations Division Standard

ITS POLE MOUNTED CABINET MISC. MOUNTING DETAILS

ITS(17)-15

FILE: its(17)-15.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0906	00	268	VARIOUS
	DIST	COUNTY		SHEET NO.
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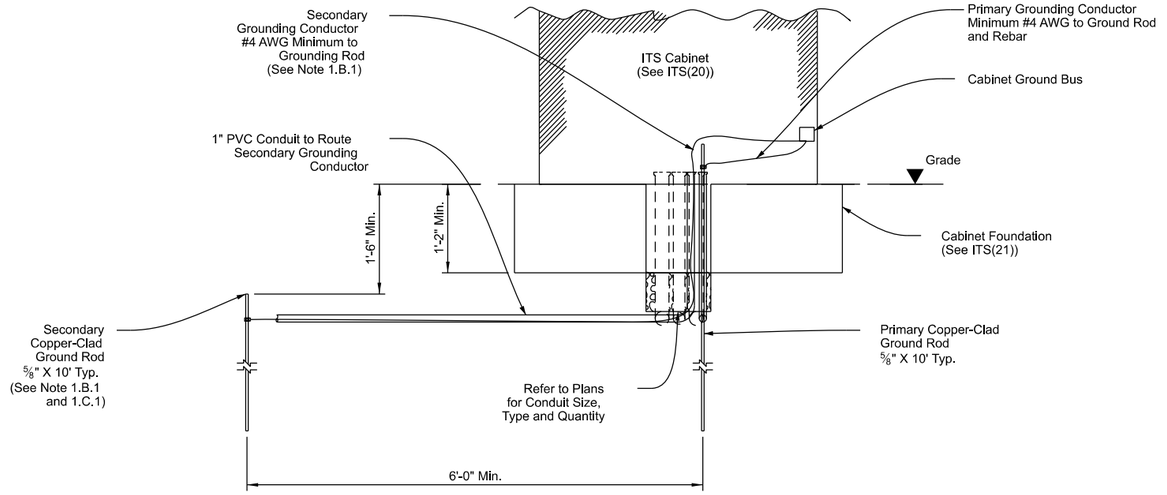
DATE:
FILE:

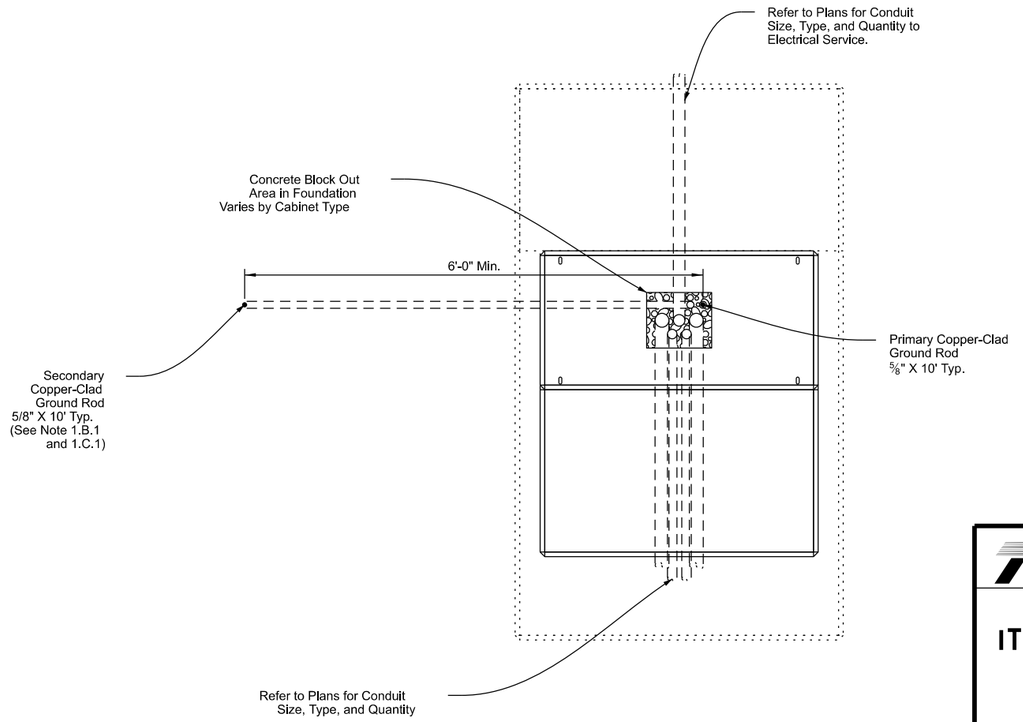
General Notes:

1. Grounding System:
   - A. Description:
     1. Provide ground system consisting of copper wires, ground rods, and concrete-encased grounding electrodes (Ufers), of the configuration shown to minimize potential gradient irregularities, drain leakage, and fault currents to earth.
   - B. Performance:
     1. Provide a grounding system, consisting of a minimum one ground rod, having a resistance not greater than 5 Ohms to ground. Additional ground rods may be added to the system to achieve less than 5 Ohms resistance.
   - C. Design Criteria:
     1. The combined ground resistance of separate systems bonded together below grade may be used to meet the specified ground resistance, but the minimum number of rods indicated shall still be provided.
     2. Measure the resistance of systems requiring separate ground resistance separately before bonding below grade.
     3. Only provide UL-approved materials listed for grounding systems.
     4. Do not combine materials that can form an electrolytic couple that will accelerate corrosion in the presence of moisture, unless moisture is permanently excluded from the junction of such materials.
     5. Submit product data for the materials and products used to perform the work of this section.
   - D. Materials:
     1. Conductors:
        - a. Bare Ground Conductor:
          1) For No. 8 AWG or larger bare ground wire sizes, provide soft drawn copper, Class A or Class B, stranded wire meeting the requirements of ASTM B 8.
     2. Ground Compression Connectors:
        - a. Provide molds, thermite packages, and other material for ground compression connectors that are full-rated to carry 100% of the cable rating and which meet IEEE 837.
          1) Provide the compression materials from a single manufacturer throughout the project.
        - b. Provide the items necessary for connecting cable to ground rods.
     3. Ground Rods:
        - a. Provide copper-clad steel ground rods conforming to the requirements specified in UL 467.
          1) Diameter: $\frac{5}{8}$ in.
          2) Length: 10 Ft.
2. Installation:
   - A. Install grounding components and systems in accordance with the requirements specified in UL 467, IEEE 81, and IEEE 142.
   - B. System Grounding:
     1. Ground Rods:
        - a. Drive ground rods into the ground until the tops of the rods are approximately 18 in. below finished grade.
        - b. If multiple ground rods are needed to meet the minimum resistance of 5 Ohms, space ground rods as evenly as possible, at least 6 feet apart, and so conductors will be connected below grade.
     2. Conductors:
        - a. Provide minimum No. 4 AWG ground wire for system and equipment grounding.
        - b. Using suitable fasteners, securely attach exposed ground wires to structural supports at not more than 2 ft. intervals, where applicable.
        - c. Bends in ground wires greater than 45 degrees are unacceptable.
     3. Cable Connections:
        - a. Use approved exothermic-welded connections for conductor splices and connections between conductors and other components.
3. Testing:
   - A. Resistance Test:
     1. Test Procedure:
        - a. The ground-resistance measurements of each ground Rod shall be taken.
          1) The resistance to ground shall be measured in accordance with the fall-of-potential method specified in IEEE 81 and IEEE 142.
          2) Ground-resistance measurements shall be made in normally dry weather, not less than 48 hours after rainfall, and with the ground under test isolated from other grounds.
        - b. Test reports shall be prepared that indicate the location of the ground rod, the grounding system, and the resistance and soil conditions at the time the test was performed.
     2. Acceptance Criteria:
        - a. The grounding system must have a resistance not greater than 5 Ohms.
        - b. Do not energize any part of the electrical distribution system prior to the resistance testing of that system's ground rods and grounding system, and submission of the test results for approval.
     3. Inspections:
        - a. Prepare and submit as-built record drawings of the grounding system as installed and test reports for approval.



Ground Mounted Cabinet - Side View

(Slab & Base)
Not to Scale



Ground Mounted Cabinet - Top View

(Slab & Base)
Not to Scale

Texas Department of Transportation

Traffic Operations Division Standard

ITS CABINET GROUNDING DETAILS

ITS(18)-15

FILE: its(18)-15.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
June 2015	CONT	SECT	JOB	HIGHWAY
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DATE:
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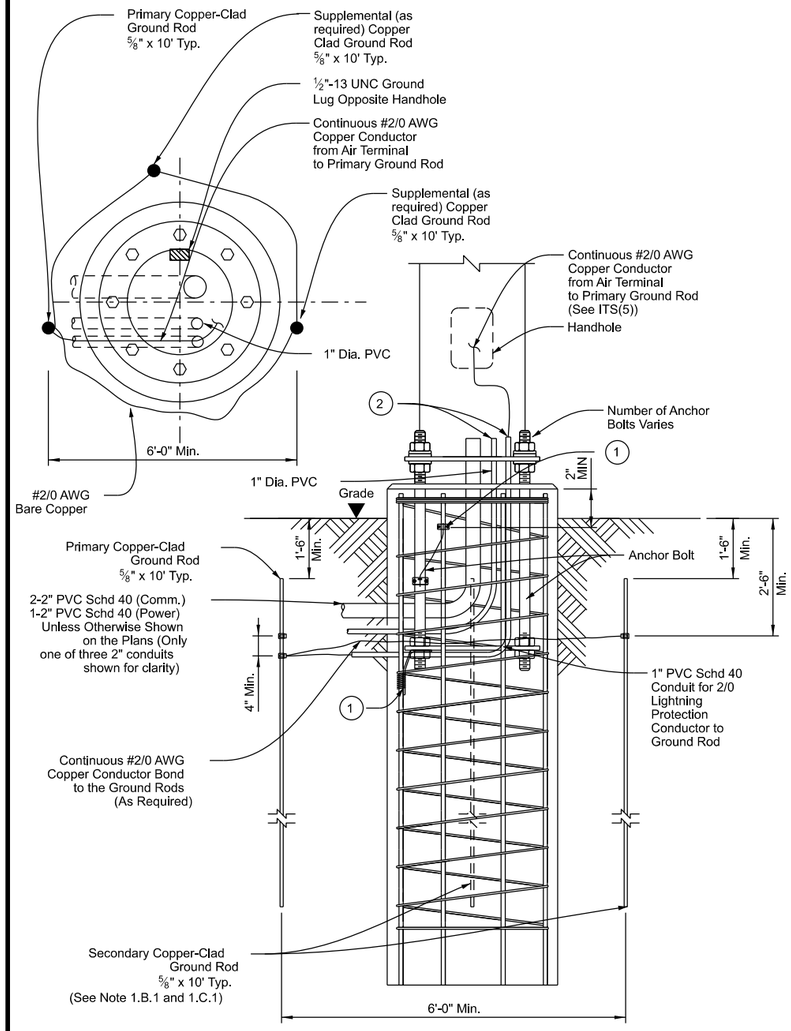
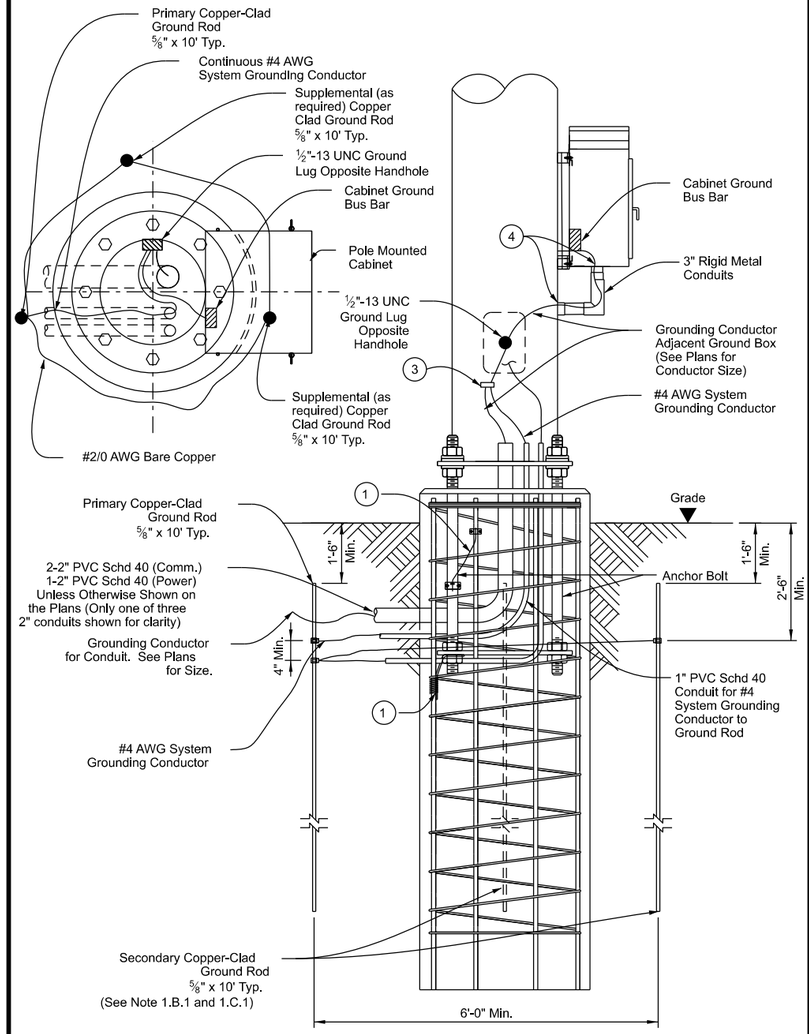
General Notes:

1. Grounding System:
   - A. Description:
     1. Provide ground system consisting of copper wires, ground rods, and concrete-encased grounding electrodes (Ufers), of the configuration shown to minimize potential gradient irregularities, drain leakage, and fault currents to earth.
   - B. Performance:
     1. Provide a grounding system, consisting of a minimum one ground rod, having a resistance not greater than 5 Ohms to ground. Provide up to 2 additional supplemental ground rods if necessary to achieve a resistance not greater than 5 Ohms to ground. If a total of 3 ground rods is needed then install as as part of a ground ring.
     2. If a ground ring is required, provide a minimum conductor length of 20 ft. placed at a minimum depth of 30 in..
   - C. Design Criteria:
     1. The grounding system of the ITS pole may be bonded below grade to the grounding systems of other nearby equipment to meet the specified grounding resistance. A minimum of one ground rod for the ITS pole is still required.
     2. Separately measure the grounding resistance of each system before bonding together below grade.
     3. Only provide UL-approved materials listed for grounding systems.
     4. Do not combine materials that can form an electrolytic couple that will accelerate corrosion in the presence of moisture, unless moisture is permanently excluded from the junction of such materials.
     5. Submit product data for the materials and products used to perform the work of this section.
   - D. Materials:
     1. Conductors:
        a. Bare Ground Conductor:
           1) Provide prequalified copper conductors appearing on the Material Producers List according to Item 618.
     2. Ground Compression Connectors:
        a. Provide molds, thermite packages, and other material for exothermic welding of grounding connections.
        b. Provide listed compression connectors fully rated to carry 100% of the cable rating and that meet IEEE 837. Provide compression materials from a single manufacturer througout the project.
     3. Ground Rods:
        a. Provide copper-clad steel ground rods conforming to the requirements specified in DMS 11040.
           1) Diameter: $\frac{5}{8}$ in.
           2) Length: 10 ft.
2. Installation:
   - A. Install grounding components and systems in accordance with the requirements specified in IEEE 142.
   - B. System Grounding:
     1. Ground Rods:
        a. Drive ground rods into the ground until the tops of the rods are a minimum of 18 in. below finished grade.
        b. If multiple ground rods are needed to meet the minimum resistance of 5 Ohms, space ground rods as evenly as possible, at least 6 feet apart, so conductors will be connected below grade.
     2. Conductors:
        a. Provide minimum No. 2/0 AWG ground wire for lightning protection from air terminal.
        b. Provide minimum No. 4 AWG ground wire for system and equipment grounding.
        c. Using suitable fasteners, securely attach exposed ground wires to structural supports at not more than 2 ft. intervals, where applicable.
        d. Bends in ground wires greater than 45 degrees are unacceptable.
     3. Cable Connections:
        a. Use exothermic-welded connections or listed compression connectors for conductor splices and connections between conductors and other components.
3. Testing:
   - A. Resistance Test:
     1. Test Procedure:
        a. The ground-resistance measurements of each ground Rod shall be taken.
           1) The resistance to ground shall be measured in accordance with the fall-of-potential method specified in IEEE 81 and IEEE 142.
           2) Ground-resistance measurements shall be made in normally dry weather, not less than 48 hours after rainfall, and with the ground under test isolated from other grounds.
        b. Test reports shall be prepared that indicate the location of the ground rod, the grounding system, and the resistance and soil conditions at the time the test was performed.
     2. Acceptance Criteria:
        a. The grounding system must have a resistance not greater than 5 Ohms.
        b. Do not energize any part of the electrical distribution system prior to the resistance testing of that system's ground rods and grounding system, and submission of the test results for approval.
     3. Inspections:
        a. Prepare and submit as-built record drawings of the grounding system as installed and test reports for approval.



Grounding System

Not to Scale



Grounding System with Pole Mounted Cabinet

Not to Scale

Reference Notes:

1. Bond anchor bolts to rebar with #2/0 AWG jumper and two mechanical connectors or by bending No. 3 bar on bottom template as shown and wire tightly with ten turns of No. 10 wire or one mechanical connector. Mechanical connectors shall be UL Listed for concrete encasement.
2. Cut PVC approximately 1 in. above concrete and install bell or bushing. Align conduit as close as possible to point of attachment to base plate to minimize bends in #2/0 wire.
3. Bond grounding conductors via cadweld or mechanical connector, rated for size and number of conductors.
4. Provide and Install a grounding type bushing on metal conduit terminations. Install a bonding jumper from each grounding bushing to the nearest ground rod, grounding lug, or equipment grounding conductor. Ensure all bonding jumpers are the same size as the equipment grounding conductor.

Texas Department of Transportation

Traffic Operations Division Standard

ITS POLE GROUNDING DETAILS

ITS(19)-17

FILE: its(19)-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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7-17	DIST	COUNTY		SHEET NO.
	ODA	DISTRICTWIDE		81

DATE:
FILE:

GENERAL NOTES FOR ALL ELECTRICAL WORK

1. The location of all conduits, junction boxes, ground boxes, and electrical services is diagrammatic and may be shifted to accommodate field conditions.

2. Provide new and unused materials. Ensure that all materials and installations comply with the applicable articles of the National Electrical Code (NEC), TxDOT standards and specifications, National Electrical Manufacturers Association (NEMA), and are listed by Underwriters Laboratories (UL) or a Nationally Recognized Testing Lab (NRTL). NRTLs such as Canadian Standard Association (CSA), Intertek Testing Services NA Inc., or FM Approvals LLC can be considered equivalent to UL. Where reference is made to NEMA listed devices, International Electrotechnical Commission (IEC) listed devices will not be considered an acceptable equal to a NEMA listed device. Acceptable devices may have both a NEMA and IEC listing. Faulty fabrication or poor workmanship in any material, equipment, or installation is justification for rejection. Replace or reinstall rejected material or equipment at no additional cost to the Department.

3. Miscellaneous nuts, bolts and hardware, except for high strength bolts, may be stainless steel when plans specify galvanized, provided the bolt size is ½ in. or less in diameter.

4. Provide the following test equipment as required by the Engineer to confirm compliance with the contract and the NEC: voltmeter, ammeter, megohm meter (1000 volt DC), ground resistance tester, torque wrenches, and torque screwdrivers. Ensure all equipment has been properly calibrated within the last year. Provide calibration certification to the Engineer upon request. Operate test equipment during inspection as requested by the Engineer.

5. Install grounding as shown on the plans and in accordance with the NEC. Ensure all metallic conduits; metal poles; luminaires; and metal enclosures are bonded to the equipment grounding conductor. Provide stranded bare copper or green insulated grounding conductors. Ground rods, connectors, and bonding jumpers are subsidiary to the various bid items.

6. When required by the Engineer, notify the Department in writing of materials from the Material Producers List (MPL) intended for use on each project. Prequalified materials are listed on the MPL on TxDOT's website under "Roadway Illumination and Electrical Supplies." No substitutions will be allowed for materials on this list.

CONDUIT

A. MATERIALS

1. Provide conduit, junction boxes, fittings, and hardware as per TxDOT Departmental Material Specification (DMS) 11030 "Conduit" and Item 618 "Conduit" of TxDOT's "Standard Specifications For Construction And Maintenance Of Highways, Streets, And Bridges," latest edition. Provide conduits listed under Item 618 on the MPL under "Roadway Illumination and Electrical Supplies." Provide conduit types according to the descriptive code or as shown on the plans. Do not substitute other types of conduits for those shown. Provide liquidtight flexible metal conduit (LFMC) when flexible conduit is called for on galvanized steel rigid metallic conduit (RMC) systems. Provide liquidtight flexible nonmetallic conduit (LFNC) when flexible conduit is called for on polyvinyl chloride (PVC) systems.

2. Provide galvanized steel RMC for all exposed conduits, unless otherwise shown on the plans. Properly bond all metal conduits.

3. Unless otherwise shown on the plans, provide junction boxes with a minimum size as shown in the following table, which applies to the greatest number of conductors entering the box through one conduit with no more than four conduits per box. When a mixture of conductor sizes is present, count the conductors as if all are of the larger size. For situations not applicable to the table, size junction boxes in accordance with NEC.

AWG	3 CONDUCTORS	5 CONDUCTORS	7 CONDUCTORS
#1	10" x 10" x 4"	12" x 12" x 4"	16" x 16" x 4"
#2	8" x 8" x 4"	10" x 10" x 4"	12" x 12" x 4"
#4	8" x 8" x 4"	10" x 10" x 4"	10" x 10" x 4"
#6	8" x 8" x 4"	8" x 8" x 4"	10" x 10" x 4"
#8	8" x 8" x 4"	8" x 8" x 4"	8" x 8" x 4"

4. Junction boxes with an internal volume of less than 100 cu. in. and supported by entering raceways must have threaded entries or hubs identified for the intended purpose and supported by connection of two or more rigid metal conduits. Secure conduit within 3 ft. of the enclosure or within 18 in. of the enclosure if all conduit entries are on the same side. Mechanically secure all junction boxes with an internal volume greater than 100 cu. inches.

5. Provide hot dipped galvanized cast iron or sand cast aluminum outlet boxes for junction boxes containing only 10 AWG or 12 AWG conductors. Do not use die cast aluminum boxes. Size outlet boxes according to the NEC.

6. Do not use intermediate metal conduit (IMC) or electrical metallic tubing (EMT) unless specifically required by the plan sheets. When EMT is called for, provide junction boxes made from galvanized steel sheeting, listed and approved for outdoor use, unless otherwise noted on the plans. Size all galvanized steel junction boxes in accordance with the NEC. Provide junction boxes for IMC conduit systems that meet the same requirements for junction boxes used with RMC systems.

7. Provide PVC junction boxes intended for outdoor use on PVC conduit systems, unless otherwise noted on the plans.

8. Provide PVC elbows in PVC conduit systems, unless otherwise shown on the plans. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the PVC conduit system. When galvanized steel RMC elbows are specifically called for in the plans and any portion of the RMC elbow is buried less than 18 in., ground the RMC elbow by means of a grounding bushing on a rigid metal extension. Grounding of the rigid metal elbow is not required if the entire RMC elbow is encased in a minimum of 2 in. of concrete. PVC extensions are allowed on these concrete encased rigid metal elbows. RMC or PVC elbows are subsidiary to various bid items.

9. When required, provide High-Density Polyethylene (HDPE) conduit with factory installed internal conductors according to Item 622 "Duct Cable." At the Contractor's request and with approval by the Engineer, substitute HDPE conduit with no conductors for bored schedule 40 or schedule 80 PVC conduit bid under Item 618. Ensure bored HDPE substituted for PVC is schedule 40 and of the same size PVC called for in the plans. Ensure the substituted HDPE meets the requirements of Item 622, except that the conduit is supplied without factory-installed conductors. Make the transition of the HDPE conduit to PVC (or RMC elbow when required) at the bore pit. Provide conduit of the size and schedule as shown on the plans. Do not extend substituted conduit into ground boxes or foundations. Provide PVC or galvanized steel RMC elbows as called for at all ground boxes and foundations.

10. Use two-hole straps when supporting 2 in. and larger conduits. On electrical service poles, properly sized stainless steel or hot dipped galvanized one-hole standoff straps are allowed on the service riser conduit.

B. CONSTRUCTION METHODS

1. Provide and install expansion joint conduit fittings on all structure-mounted conduits at the structure's expansion joints to allow for movement of the conduit. In addition, provide and install expansion joint fittings on all continuous runs of galvanized steel RMC conduit externally exposed on structures such as bridges at maximum intervals of 150 ft. When requested by the project Engineer, supply manufacturer's specification sheet for expansion joint conduit fittings. Repair or replace expansion joint fittings that do not allow for movement at no additional cost to the Department. Provide the method of determining the amount of expansion to the Engineer upon request. Do not use LFMC or LFNC as a substitute for the required expansion conduit fittings.

2. Space all conduit supports at maximum intervals of 5 ft. Install conduit spacers when attaching metal conduit to surface of concrete structures. See "Conduit Mounting Options" on ED(2). Install conduit support within 3 ft. of all enclosures and conduit terminations.

3. Do not attach conduit supports directly to pre-stressed concrete beams except as shown specifically in the plans or as approved by the Engineer.

4. Unless otherwise shown on the plans, jack or bore conduit placed beneath existing roadways, driveways, sidewalks, or after the base or surfacing operation has begun. Backfill and compact the bore pits below the conduit per Item 476 "Jacking, Boring, or Tunneling Pipe or Box" prior to installing conduit or duct cable to prevent bending of the connections.

5. When placing conduit in the sub-grade of new roadways, backfill all trenches with excavated material unless otherwise noted on the plans. When placing conduit in the sub-base of new roadways, backfill all trenches with cement-stabilized base as per requirements of Items 110 "Excavation", 400 "Excavation and Backfill for Structures", 401 "Flowable Backfill", 402 "Trench Excavation Protection", and 403 "Temporary Special Shoring."

6. Provide and place warning tape approximately 10 in. above all trenched conduit as per Item 618.

7. During construction, temporarily cap or plug open ends of all conduit and raceways immediately after installation to prevent entry of dirt, debris and animals. Temporary caps constructed of durable duct tape are allowed. Tightly fix the tape to the conduit opening. Clean out the conduit and prove it clear in accordance with Item 618 prior to installing any conductors.

8. Ensure conduit entry into the top of any enclosure is waterproof by installing conduit sealing hubs or using boxes with threaded bosses. This includes surface mounted safety switches, meter cans, service enclosures, auxiliary enclosures and junction boxes. Grounding bushings on water tight sealing hubs are not required.

9. Fit the ends of all PVC conduit terminations with bushings or bell end fittings. Provide and install a grounding type bushing on all metal conduit terminations.

10. Install a bonding jumper from each grounding bushing to the nearest ground rod, grounding lug, or equipment grounding conductor. Ensure all bonding jumpers are the same size as the equipment grounding conductor. Bonding of conduit used as a casing under roadways for duct cable is not required, if the duct extends the full length through the casing.

11. At all electrical services, install a 6 AWG solid copper grounding electrode conductor.

12. Place conduits entering ground boxes so that the conduit openings are between 3 in. and 6 in. from the bottom of the box. See the ground box detail on sheet ED(4).

13. Seal ends of all conduits with duct seal, expandable foam, or by other methods approved by the Engineer. Seal conduit immediately after completion of conductor installation and pull tests. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a conduit sealant.

14. File smooth the cut ends of all mounting strut and conduit. Before installing, paint the field cut ends of all mounting strut and RMC (threaded or non-threaded) with zinc rich paint (94% or more zinc content) to alleviate overspray. Use zinc rich paint to touch up galvanized material as allowed under Item 445 "Galvanizing." Do not paint non-galvanized material with a zinc rich paint as an alternative for materials required to be galvanized.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUITS & NOTES

ED(1)-14

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ELECTRICAL CONDUCTORS

A. MATERIAL INFORMATION

1. Provide Type XHHW insulated conductors in accordance with Departmental Material Specification (DMS)11040 "Conductors" and Item 620 "Electrical Conductors." Provide conductors as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies" Item 620. Color code insulated conductors in conformance with the NEC. Identify grounded (neutral) conductors with white insulation. Identify grounding conductors (ground wires) with green insulation or bare conductors. Identify ungrounded (hot) conductors with any color insulation except green, white, or gray. Keep color scheme consistent throughout the wiring system. Identify conductors 6 American Wire Gauge (AWG) and smaller by continuous color jacket. Identify electrical conductors 4 AWG and larger by continuous color jacket or by colored tape. When identifying conductors with colored tape, mark at least 6 in. of the conductor's insulation with half laps of tape.

2. Provide a solid copper 6 AWG grounding electrode conductor to bond the electrical service equipment to the concrete encased grounding electrode or the ground rod at the service location. Connect the grounding electrode conductor to the ground rod with a UL listed connector in accordance with DMS 11040. Connect the grounding electrode conductor to the concrete encased grounding electrode as shown in the plans.

3. Where two or more circuits are present in one conduit or enclosure, permanently identify the conductors of each branch circuit by attaching a non-metallic tag around both circuit conductors at each accessible location. Provide tags with two straps, large enough to indicate circuit number, letter, or other identification as shown in the plans. Print circuit identification on the tag with a permanent marker.

4. Use listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors for splicing as specified in DMS 11040. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Provide UL listed gel-filled insulating splice covers. Splicing materials, insulating materials, breakaway disconnects, splice covers, and fuse holders are subsidiary to various bid items.

B. CONSTRUCTION METHODS

1. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the conduit system. After installing conductors in conduit, perform conductor pull test. If a conductor cannot be freely pulled, make any needed alterations or repairs at no additional cost to the department. Perform insulation resistance tests in accordance with Item 620. Coordinate with the Engineer to witness the tests.

2. Leave 2 ft. minimum, 3 ft. maximum length for each conductor up to the splice in ground boxes. Leave 3 ft. minimum, 4 ft. maximum length of conductor in ground boxes when pulled through with no splice. Leave 1 ft. minimum, 1.5 ft. maximum length of conductor at enclosures, weatherheads and pole bases.

3. Make splices only in junction boxes, ground boxes, pole bases, or electrical enclosures and use only listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors. Insulate splices with heavy wall heat shrink tubing or gel-filled insulating splice covers to provide a watertight splice. Overlap conductor insulation with heat shrink tubing a minimum of 2 in. past both sides of the splice. Where heat shrink tubing may not shrink sufficiently to provide a watertight seal around the individual conductors, prior to heating the tubing, increase the diameter of the conductor insulation using hot melt adhesive tape to provide a watertight seal between the individual conductors and the heat shrink tubing. Ensure the tape extends past the heat shrink tubing. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Heat shrink tubing that appears to have been burned, or overheated, is considered defective and must be replaced.

4. Size and install gel-filled insulating splice covers according to manufacturer's specifications when used in place of heat shrink tubing.

5. Wire nuts with factory applied waterproof sealant may be used for 8 AWG or smaller conductors in above ground junction boxes, but not in pole bases or ground boxes. Install wire nuts in an upright position to prevent the accumulation of water.

6. Support conductors in illumination poles with a J-hook at the top of the pole.

7. When terminating conductors, remove the insulation and jacketing material without nicking the individual strands of the conductor. Conductors with nicked individual conductor strands or removed strands will be considered damaged.

8. Replace conductors and cables that are damaged beyond repair or that fail an insulation resistance test at no additional cost to the department.

9. Do not repair damaged conductors with duct tape, electrical tape, or wire nuts. Use only approved splicing methods.

10. Do not terminate more than one conductor under a single connector, unless the connector is rated for multiple conductors. Do not exceed the pressure connector's listing for maximum number and size of conductors allowed.

11. Install breakaway connectors on conductors bid under Item 620 whenever those conductors pass through a breakaway support device. Follow manufacturer's instructions when terminating conductors to breakaway connectors. Properly torque threaded connections. Proper terminations are critical to the safe operation of breakaway devices. Trim waterproofing boots on breakaway connectors to fit snugly around the conductor to ensure waterproof connection. Only one conductor may enter a single opening in a boot. Provide waterproof boots with the correct number of openings. Leave unused openings factory sealed. Use prequalified breakaway connectors as shown on the MPL.

12. Provide and install a separate stranded equipment grounding conductor (EGC) in all conduits that contain circuit wiring of 50 volts or more. Unless shown elsewhere, size the EGC to be the same size as the largest current carrying conductor contained in the conduit. Ensure all EGCs are bonded together at every accessible location. For traffic signal installations, provide a minimum size 8 AWG EGC. The EGC is paid for under Item 620.

C. TEMPORARY WIRING

1. Install temporary conductors and electrical equipment in accordance with the NEC article "Temporary Installations" and Department standard sheets.

2. Provide a ground fault circuit interrupter (GFCI) for power outlets for portable electrical equipment, power tools, ice machines, ice storage bins and refrigerators located outdoors at grade. GFCI may be any one of the following: molded cord and plug set, receptacle, or circuit breaker type.

3. Use listed wire nuts with factory applied sealant for temporary wiring where approved.

4. Enclose conductor splices within a listed enclosure or ground box, or ensure the splices are more than 10 ft. above grade vertically and more than 5 ft. horizontally from any metal structure. Where installing temporary conductors in areas subject to vehicle traffic or mobile construction equipment, ensure the vertical clearance to ground is at least 18 ft. when measured at the lowest point. Ground messenger wires that support power conductors in conformance with the NEC.

5. Protect and when necessary repair any existing electrical conduits uncovered during the construction process in a timely manner and in conformance with the NEC.

GROUND RODS & GROUNDING ELECTRODES

A. MATERIAL INFORMATION

1. Provide and install a grounding electrode at electrical services. Provide ground rods according to DMS 11040 and the plans. Larger diameter or longer length rods may be called for in some specific locations, see the individual plans sheets. Concrete encased grounding electrodes may be called for in specific locations including electrical service, see individual plan sheets.

B. CONSTRUCTION METHODS

1. Furnish auxiliary ground rods for lightning protection and install in soil, concrete, or both, as called for in the plans. For ground rods installed in concrete, ensure the connection of the conductor to the ground rod is readily accessible for inspection or repairs. For ground rods installed in soil, ensure that the upper end is between 2 to 4 in. below finished grade.

2. Do not place ground rods in the same drilled hole as a timber pole.

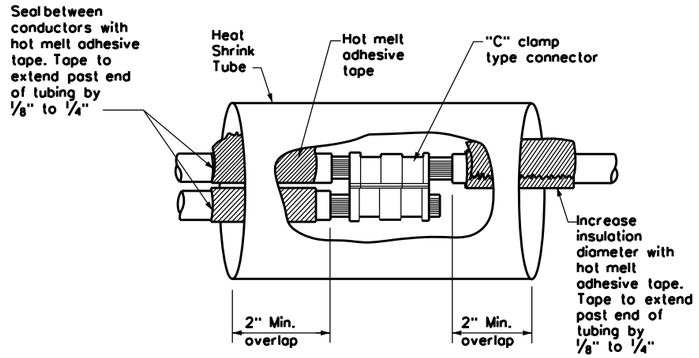
3. Install ground rods so the imprinted part number is at the upper end of the rod.

4. Remove all non-conductive coatings such as concrete splatter from the rod at the clamp location.

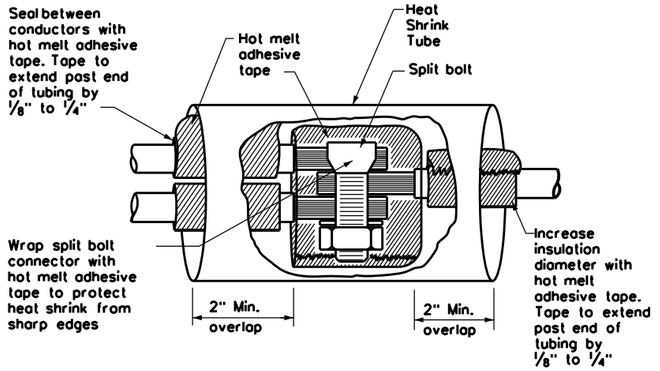
5. Route all conductors as short and straight as possible for connection to lightning protection ground rods. When a bend is required, ensure a minimum radius bend of four inches for these conductors.

6. Unless otherwise called for in the plans, protect grounding electrode conductors with non-metallic conduit. When protecting grounding electrode conductors with metal conduit, provide and install a grounding type bushing and properly sized bonding jumper on each end of the metal conduit.

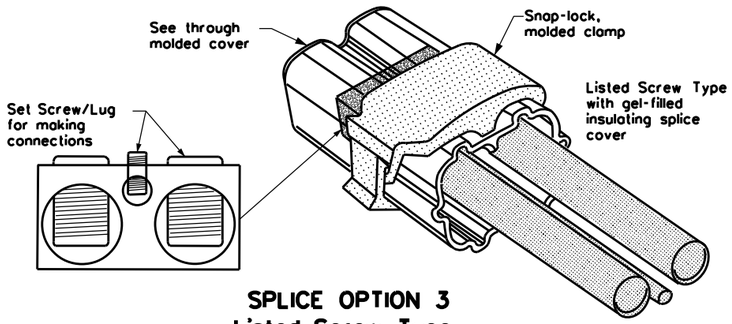
7. Written authorization is required before installing a ground rod in a horizontal trench for rocky soil or a solid rock bottom.



SPLICE OPTION 1
Compression Type



SPLICE OPTION 2
Split Bolt Type



SPLICE OPTION 3
Listed Screw Type

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ELECTRICAL DETAILS
CONDUCTORS

ED(3)-14

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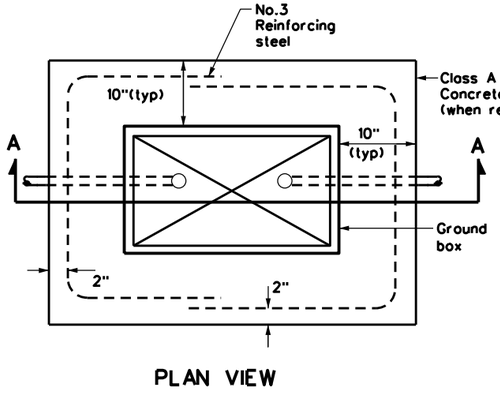
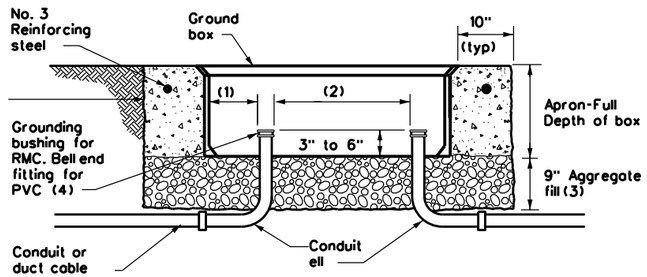


PLAN VIEW



SECTION A - A

APRON FOR GROUND BOX

(1) Uniformly space ends of conduits within the ground box. Position ends of conduits so that ground box walls do not interfere with the installation of grounding bushings or bell end fittings.

(2) Maintain sufficient space between conduits to allow for proper installation of bushing.

(3) Place aggregate under the box, not in the box. Aggregate should not encroach on the interior volume of the box.

(4) Install a grounding bushing on the upper end of all RMC terminating in a ground box. Ground RMC elbows when any part of the elbow is less than 18 in. below the bottom of the ground box. Install a PVC bushing or bell end fitting on the upper end of all PVC conduits terminating in a ground box.

GROUND BOXES

A. MATERIALS

1. Provide polymer concrete ground boxes measuring 16x30x24 in. (WxLxD) or smaller in accordance with Departmental Material Specification (DMS) 11070 "Ground Boxes" and Item 624 "Ground Boxes."

2. Provide Type A, B, C, D, and E ground boxes as shown in the plans, and as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 624.

3. Ensure ground box cover is correctly labeled in accordance with DMS 11070.

4. Provide larger ground boxes in accordance with Item 624 and as shown in the plans.

B. CONSTRUCTION METHODS

1. Remove all gravel and dirt from conduit. Cap all conduits prior to placing aggregate and setting ground box. Provide Grade 3 or 4 coarse aggregate as shown on Table 2 of Item 302 "Aggregates for Surface Treatments." Ensure aggregate bed is in place and at least 9 inches deep, prior to setting the ground box. Install ground box on top of aggregate.

2. Cast ground box aprons in place. Reinforcing steel may be field bent. Ensure the depth of concrete for the apron extends from finished grade to the top of the aggregate bed under the box. Ground box aprons, including concrete and reinforcing steel, are subsidiary to ground boxes when called for by descriptive code.

3. Keep bolt holes in the box clear of dirt. Bolt covers down when not working in ground boxes.

4. Install all conduits and ells in a neat and workmanlike manner. Uniformly space conduits so grounding bushings and bell end fittings can easily be installed.

5. Temporarily seal all conduits in the ground box until conductors are installed.

6. Permanently seal conduits immediately after the completion of conductor installation and pull tests. Permanently seal the ends of all conduits with duct seal, expandable foam, or other method as approved. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a sealant.

7. When a ground rod is present in a ground box, bond all equipment grounding conductors together and to the ground rod with listed connectors.

8. When a type B or D ground box is stacked to meet volume requirements, it is allowable to cut an appropriately sized hole for conduit entry in the side wall at least 18 inches below grade.

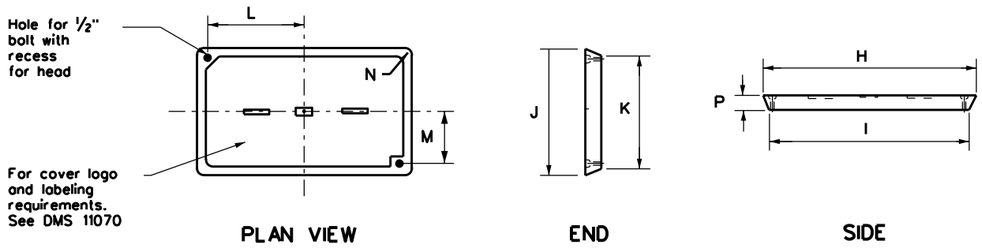
9. If an existing ground box in the contract has a metal cover, bond the cover to the equipment grounding conductor with a 3 ft. long stranded bonding jumper the same size as the grounding conductor. The bonding jumper is subsidiary to various bid items. Verify existing ground boxes with metal covers are shown on the plans, with notes fully describing the work required.

10. If other ground boxes with metal covers are within the project limits but are not part of the contract, the Engineer may direct the Contractor to bond the metal covers, identifying the specific boxes in writing. This work will be paid for separately.

11. Bond metal ground box covers to the grounding conductor with a tank ground type lug.

GROUND BOX DIMENSIONS	
TYPE	OUTSIDE DIMENSIONS (INCHES) (Width x Length X Depth)
A	12 X 23 X 11
B	12 X 23 X 22
C	16 X 29 X 11
D	16 X 29 X 22
E	12 X 23 X 17

GROUND BOX COVER DIMENSIONS								
TYPE	DIMENSIONS (INCHES)							
	H	I	J	K	L	M	N	P
A, B & E	23 1/4	23	13 3/4	13 1/2	9 7/8	5 1/8	1 3/8	2
C & D	30 1/2	30 1/4	17 1/2	17 1/4	13 1/4	6 3/4	1 3/8	2



PLAN VIEW | END | SIDE

GROUND BOX COVER

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Traffic Operations Division Standard

ELECTRICAL DETAILS GROUND BOXES

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ELECTRICAL SERVICES NOTES

1. Provide new materials. Ensure installation and materials comply with the applicable provisions of the National Electrical Code (NEC) and National Electrical Manufacturers Association (NEMA) standards. Ensure material is Underwriters Laboratories (UL) listed. Provide and install electrical service conduits, conductors, disconnects, contactors, circuit breaker panels, and branch circuit breakers as shown on the Electrical Service Data chart in the plans. Faulty fabrication or poor workmanship in material, equipment, or installation is justification for rejection. Where manufacturers provide warranties and guarantees as a customary trade practice, furnish these to the State.

2. Provide electrical services in accordance with Electrical Details standard sheets, Departmental Material Specification (DMS) 11080 "Electrical Services," DMS 11081 "Electrical Services-Type A," DMS 11082 "Electrical Services-Type C," DMS 11083 "Electrical Services-Type D," DMS 11084 "Electrical Services-Type T," DMS 11085 "Electrical Services-Pedestal (PS)", and Item 628 "Electrical Services" of the Standard Specifications. Provide electrical service types A, C, and D, as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 628. Provide other service types as detailed on the plans.

3. Provide all work, materials, services, and any incidentals needed to install a complete electrical service as specified in the plans.

4. Coordinate with the Engineer and the utility provider for metering and compliance with utility requirements. Primary line extensions, connection charges, meter charges, and other charges by the utility company to provide power to the location are paid for in accordance with Item 628. Get approval for the costs associated with these charges prior to engaging the utility company to do the work. Consult with the utility provider to determine costs and requirements, and coordinate the work as approved.

5. The enclosure manufacturer will provide Master Lock Type 2 with brass tumblers keyed "2195 for all custom electrical enclosures. Installing Contractor is to provide Master Lock "2195 Type 2 with brass tumblers for "off the shelf" enclosures. Master Lock "2195 keys and locks become property of the State. Unless otherwise approved, do not energize electrical service equipment until locks are installed.

6. Enclosures with external disconnects that de-energize all equipment inside the enclosure do not need a dead front trim. Protect incoming line terminations from incidental contact as required by the NEC.

7. When galvanized is specified for nuts, screws, bolts or miscellaneous hardware, stainless steel may be used.

8. Provide wiring and electrical components rated for 75° C. Provide red, black, and white colored XHHW service entrance conductors of minimum size 6 American Wire Gauge (AWG). Identify size 6 AWG conductors by continuous color jacket. Identify electrical conductors sized 4 AWG and larger by continuous color jacket or by colored tape. Mark at least 6 inches of the conductor's insulation with half laps of colored tape, when identifying conductors. Ensure each service entrance conductor exits through a separately bushed non-metallic opening in the weatherhead. The lengths of the conductors outside the weatherhead are to be 12 inches minimum, 18 inches maximum, or as required by utility.

9. All electrical service conduit and conductors attached to the electrical service including the riser or the elbow below ground are subsidiary to the electrical service. For an underground utility feed, all service conduit and conductors after the elbow, including service conduit and conductors for the utility pole riser when furnished by the Contractor, will be paid for separately.

10. Provide rigid metal conduit (RMC) for all conduits on service, except for the ½ in. PVC conduit containing the electrical service grounding electrode conductor. Size the service entrance conduit as shown in the plans. Ensure conduit for branch circuit entry to enclosure is the same size as that shown on the layout sheets for branch circuit conduit. Extend all rigid metal conduits a minimum of 6 inches underground and then couple to the type and schedule of the conduit shown on the layout for that particular branch circuit. Install a grounding bushing on the RMC where it terminates in the service enclosure.

11. Use of liquidtight flexible metal conduit (LFMC) is allowed between the meter and service enclosure when they are mounted 90 to 180 degrees to each other. Size the LFMC the same size as service entrance conduit. LFMC must not exceed 3 feet in length. Strap LFMC within 1 foot of each end. LFMC less than 12 inches in length need not be strapped. Each end of LFMC must have a grounding bushing or be terminated with a grounding fitting. The LFMC must contain a grounded (neutral) conductor. Ensure any bend in LFMC never exceeds 180 degrees. A pull test is required on all installed conductors, with at least six inches of free conductor movement demonstrated to the satisfaction of the Engineer.

12. Ensure all mounting hardware and installation details of services conform to utility company specifications.

13. For all electrical service enclosures listed under Item 628 on the MPL, the UL 508 enclosure manufacturers will prepare and submit a schematic drawing unique to each service. Before shipment to the job site, place the applicable laminated schematic drawings and the laminated plan sheet showing the electrical service data chart used to build the enclosure in the enclosure's data pocket. The installing contractor will copy and laminate the actual project plan sheets detailing all equipment and branch circuits supplied by that service. The laminated plan sheets are to be placed in the service enclosure's document pocket. Reduce 11 in. x 17 in. plan sheets to 8 ½ in. x 11 in. before laminating. If the installation differs from the plan sheets, the installing contractor is to redline plan sheets before laminating.

14. When providing an "Off The Shelf" Type D or Type T service, provide laminated plan sheets detailing equipment and branch circuits supplied by that service. Reduce 11 in. x 17 in. plan sheets to 8 ½ in. x 11 in before laminating. Deliver these drawings before completion of the work to the Engineer, instead of placing in enclosure that has no door pocket.

15. Do not install conduit in the back wall of a service enclosure where it would penetrate the equipment mounting panel inside the enclosure. Provide grounding bushings on all metal conduits, and terminate bonding jumpers to grounding bus. Grounding bushings are not required when the end of the metal conduit is fitted with a conduit sealing hub or threaded boss, such as a meter base hub.

SERVICE ASSEMBLY ENCLOSURE

1. Provide threaded hub for all conduit entries into the top of enclosure.

2. Type galvanized steel (GS) enclosures may be used for Type C panelboards and for Type D and T services that do not use an enclosure mounted photocell or lighting contactor. Provide GS enclosures in accordance with DMS 11080, 11082, 11083, and 11084.

3. Provide aluminum (AL) and stainless steel (SS) enclosures for Types A, C, and D in accordance with DMS 11080, 11081, 11082, 11083, and 11084. Do not paint stainless steel.

4. Provide pedestal service (PS) enclosures in accordance with ED(9) and DMS 11080 and 11085. Do not provide GS pedestal services. If GS is shown in the PS descriptive code, provide an AL enclosure.

MAIN DISCONNECT & BRANCH CIRCUIT BREAKERS

1. Field drill flange-mounted remote operator handle if needed, to ensure handle is lockable in both the "On" and "Off" positions.

2. When the utility company provides a transformer larger than 50 KVA, verify that the available fault current is less than the circuit breaker's ampere interrupting capacity (AIC) rating and provide documentation from the electric utility provider to the Engineer.

PHOTOELECTRIC CONTROL

1. Provide photocell as listed on the MPL. Move, adjust, or shield the photocell from stray or ambient night time light to ensure proper operation. Mount photocell facing north when practical. Mount top of pole photocells as shown on Top Mounted Photocell Detail.

* ELECTRICAL SERVICE DATA

Elec. Service ID	Plan Sheet Number	Electrical Service Description	Service Conduit * * Size	Service Conductors No./Size	Safety Switch Amps	Main Ckt. Bkr. Pole/Amps	Two-Pole Contractor Amps	Panelbd/ Loadcenter Amp Rating	Branch Circuit ID	Branch Ckt. Bkr. Pole/Amps	Branch Circuit Amps	KVA Load
SB 183	289	ELC SRV TY A 240/480 100(SS)AL(E)SF(U)	2"	3/*2	100	2P/100	100	N/A	Lighting NB	2P/40	26	28.1
									Lighting SB	2P/40	25	
									Underpass	1P/20	15	
NB Access	30	ELC SRV TY D 120/240 060(NS)SS(E)TS(O)	1 ¼"	3/*6	N/A	2P/60		100	Sig. Controller	1P/30	23	5.3
							30		Luminaires	2P/20	9	
									CCTV	1P/20	3	
2nd & Main	58	ELC SRV TY T 120/240 000(NS)GS(N)SP(O)	1 ¼"	3/*6	N/A	N/A	N/A	70	Flashing Beacon 1	1P/20	4	1.0
									Flashing Beacon 2	1P/20	4	

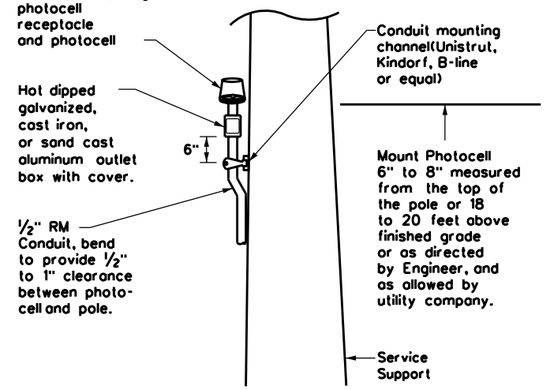
* Example only, not for construction. All new electrical services must have electrical service data chart specific to that service as shown in the plans.

* * Verify service conduit size with utility. Size may change due to utility meter requirements. Ensure conduit size meets the National Electrical Code.

EXPLANATION OF ELECTRICAL SERVICE DESCRIPTIVE CODE

ELEC SERV TY X XXX/XXX XXX (XX) XX (X) XX (X)

- Schematic Type
- Service Voltage V / V
- Disconnect Amp Rating
  000 indicates main lug only/
  Typically Type T
- (SS)* Safety Switch Ahead of Meter-Check with Utility
- (NS)* No safety Switch Ahead of Meter-Check with Utility
- Enclosure Type
  - GS* Galvanized steel("off the shelf")
  - SS* Stainless steel(Custom Enclosure)See MPL
  - AL* Aluminum (Custom Enclosure)See MPL
- Photocell Mounting Location
  - (E)* Inside Service/Enclosure Mounted
  - (T)* Top of pole
  - (L)* Luminaire mounted
  - (N)* None/No Photocell or Lighting Contactor Required
- Service Support Type
  - GC* Granite concrete
  - OC* Other concrete
  - TP* Timber pole
  - SP* Steel pole
  - SF* Steel frame
  - OT* Pole by others or paid for separately
  - EX* Existing pole
  - TS* Service on traffic signal pole
  - PS* Pedestal Service
- O* Overhead Service Feed from Utility
- U* Underground Service Feed from Utility



TOP MOUNTED PHOTOCELL

Install conduit strap maximum 3 feet from box. 5 foot maximum spacing between straps supporting conduit.

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ELECTRICAL DETAILS SERVICE NOTES & DATA

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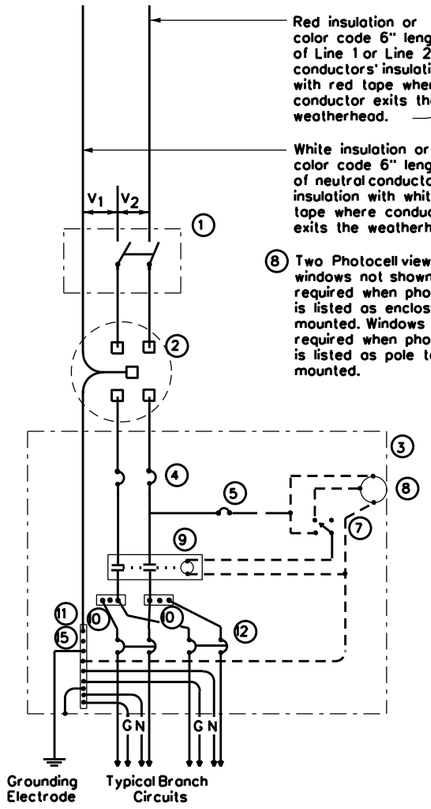
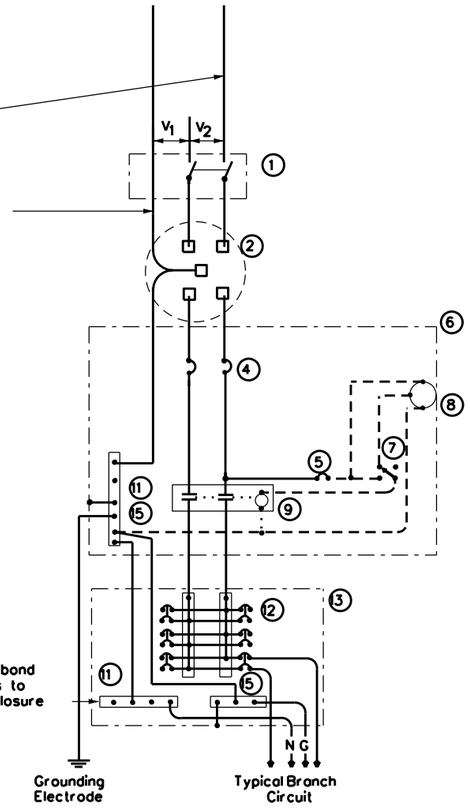
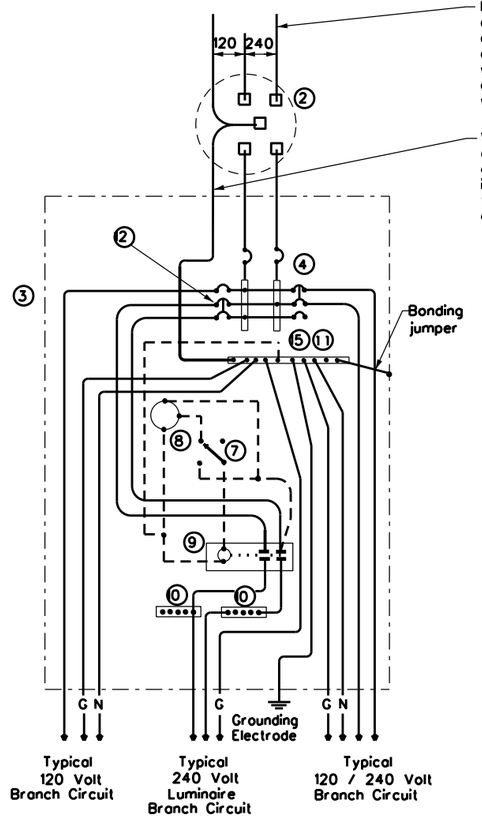


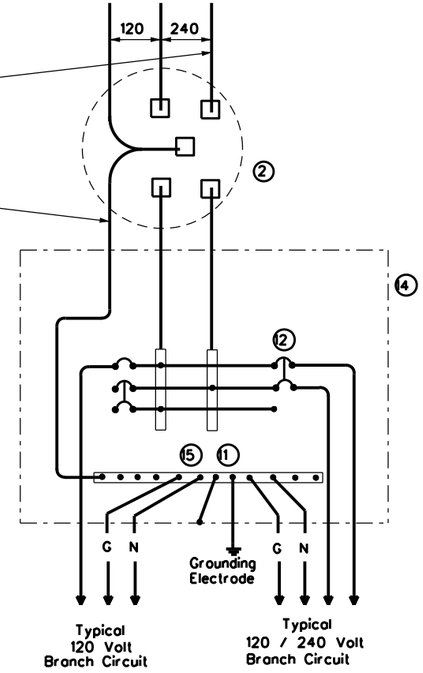
SCHEMATIC TYPE A
THREE WIRE



SCHEMATIC TYPE C
THREE WIRE



SCHEMATIC TYPE D - CUSTOM
120/240 VOLTS - THREE WIRE



SCHEMATIC TYPE T
120/240 VOLTS - THREE WIRE

Galvanized steel-"Buy Off The Shelf" only. When required install photocell top of the pole or on luminaire only, no lighting contractor will be installed.

WIRING LEGEND	
———	Power Wiring
- - - - -	Control Wiring
—N—	Neutral Conductor
—G—	Equipment grounding conductor-always required

SCHEMATIC LEGEND	
1	Safety Switch (when required)
2	Meter (when required-verify with electric utility provider)
3	Service Assembly Enclosure
4	Main Disconnect Breaker (See Electrical Service Data)
5	Circuit Breaker, 15 Amp (Control Circuit)
6	Auxiliary Enclosure
7	Control Station ("H-O-A" Switch)
8	Photo Electric Control (enclosure-mounted shown)
9	Lighting Contactor
10	Power Distribution Terminal Blocks
11	Neutral Bus
12	Branch Circuit Breaker (See Electrical Service Data)
13	Separate Circuit Breaker Panelboard
14	Load Center
15	Ground Bus

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE ENCLOSURE AND NOTES

ED(6)-14

FILE: ed6-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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PEDESTAL SERVICE NOTES

1. Manufacture pedestal electrical services in accordance with Departmental Material Specifications (DMS)11080 "Electrical Services", 11085 "Electrical Services-Pedestal (PS)" and Item 628 "Electrical Services. "Provide pedestal electrical services as listed on the Material Producers list (MPL) on the Department's web site under "Roadway Illumination and Electrical Supplies," Item 628. Ensure all mounting hardware and installation details of services meet utility company specifications. Contact the local utility company for approval of pedestal details prior to installing the electrical pedestal service. Submit any changes required by the utility company prior to manufacturing the pedestal enclosure.

2. When a meter socket is required, provide a socket with a minimum 100 amp rating that complies with local utility requirements.

3. Provide Class A or C concrete for pedestal service foundations in accordance with Item 420, "Concrete Substructures," except that concrete will not be paid for directly but is considered subsidiary to Item 628.

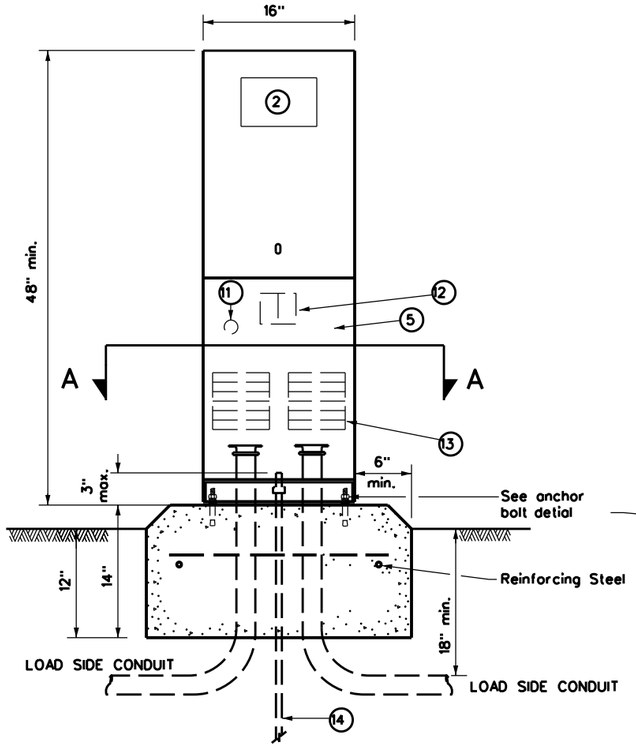
4. Provide #4 reinforcing steel for foundations in accordance with Item 440, "Reinforcement for Concrete."

5. Install ½ in. X 2 1/16 in. minimum length concrete single expansion type anchors for mounting pedestal enclosure to foundation. Anchor location to match mounting holes in each corner of enclosure. Secure each of the four corners of the pedestal enclosure to the anchors in the foundation with a ½ in. galvanized or stainless steel machine thread bolt, a properly sized locknut and a flat washer.

6. Finish top of concrete foundation in a neat and workmanlike manner. If leveling washers are used, ensure no more than ⅛ in. gap at any corner. Do not exceed a maximum dip or rise in the foundation of ⅛ in. per foot. When properly installed, ensure the top of the service enclosure is level front to back and side to side within ¼ in. Repair rocking or movement of the service enclosure at no additional cost to the department.

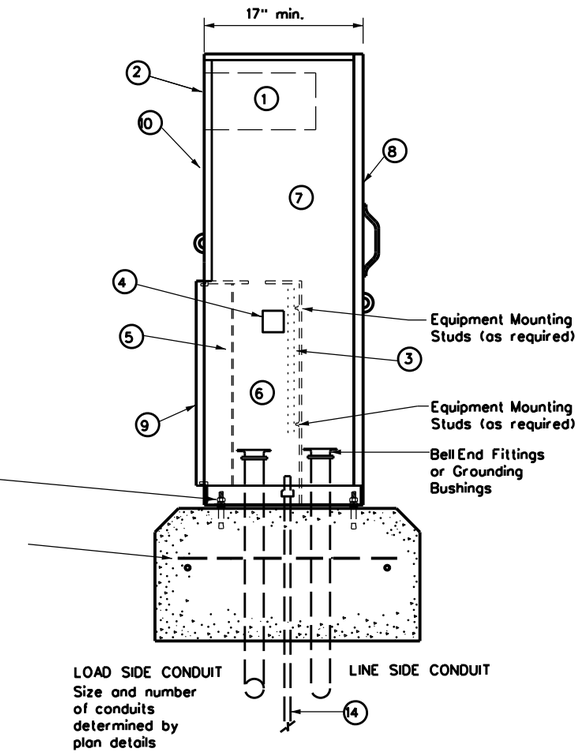
7. Do not use liquidtight flexible metal conduit (LFMC) on pedestal type services.

8. Ensure all elbows in the foundation are sized as per utility provider's conduit requirements for underground conduit and feeders. PVC extensions may be installed provided the ends of the rigid metal conduits are more than 2 in. below the top of the concrete foundation. Where extension conduits are metal, grounding bushings must be installed with a bonding jumper properly terminated.

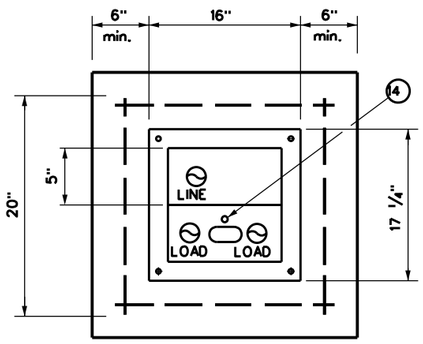


FRONT VIEW

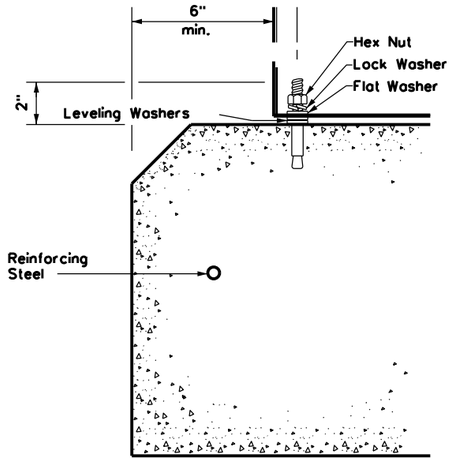
TYPE C shown, TYPE A similar except that TYPE A shall have individual circuit breakers (CB) mounted on an equipment mounting panel. CB Handles shall protrude through hinged deadfront trim.



SIDE VIEW



SECTION A-A



ANCHOR BOLT DETAIL

LEGEND	
1	Meter Socket, (when required)
2	Meter Socket Window, (when required)
3	Equipment Mounting Panel
4	Photo Electric Control Window, (When required)
5	Hinged Deadfront Trim
6	Load Side Conduit Trim
7	Line Side Conduit Area
8	Utility Access Door, with handle
9	Pedestal Door
10	Hinged Meter Access
11	Control Station (H-O-A Switch)
12	Main Disconnect
13	Branch Circuit Breakers
14	Copper Clad Ground Rod - 5/8" X 10'

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS
ELECTRICAL SERVICE SUPPORT
PEDESTAL SERVICE TYPE PS

ED(9)-14

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TIMBER POLE(TP)SERVICE SUPPORT NOTES

1. Ensure electrical service support is a class 5 treated timber pole as per Item 627 "Treated Timber Poles." Embed timber pole to depth required in Item 627.
2. Conduit and electrical conductors attached to the electrical service pole and underground within 12 in. of service pole are not paid for directly but are subsidiary to the electrial service.
3. Install pole-top mounted photocell (T) on north side of pole, or in service enclosure (E) as required. See Electrical Service Data chart in plan set.
4. Gain pole as required to provide flat surface for each channel. Gain timber pole to 5/8 in. max. depth and 1 7/8 in. max. height. Gain pole in a neat and workmanlike manner.
5. Mount meter and service equipment on stainless steel or galvanized channel (Unistrut, Kindorf, or equal). Provide channel sized 1 in. to 3 3/4 in. maximum depth, and 1 1/2 in. to 1 5/8 in. maximum width. File smooth the cut ends of galvanized channel and paint with zinc rich paint before installing on pole. Secure each channel section to timber pole with two galvanized or SS lag bolts, 1/4 in. minimum diameter by 1 1/2 in. minimum length. Use a galvanized or SS flat washer on each lag bolt. Do not stock channel.
6. When excess length must be trimmed from poles, trim from the top end only.

(1) Class 5 pole, height as required

(2) Service drop from utility company (attached below weatherhead)

(3) Service conduit (RMC)and service entrance conductors - One Red, One Black, One White (See Electrical Service Data)

(4) Safety switch (when required)

(5) Meter (when required)

(6) Service enclosure

(7) 6 AWG bare grounding electrode conductor in 1/2 in. PVC to ground rod - extend 1/2 in. PVC 6 in. underground.

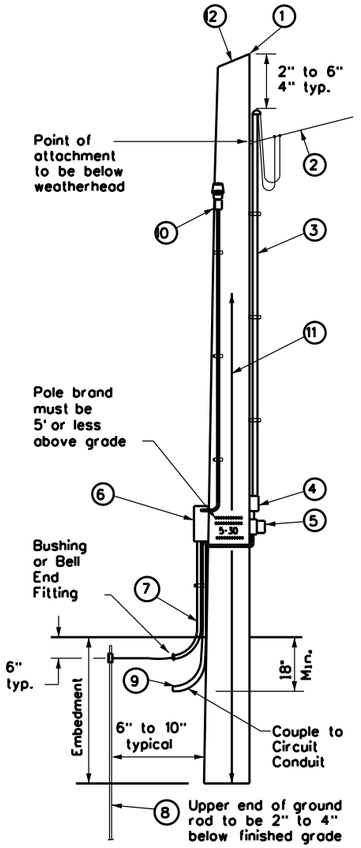
(8) 5/8 in. x 8 ft. Copper clad ground rod - drive ground rod to a depth of 2 in. to 4 in. below grade.

(9) RMC same size as branch circuit conduit.

(10) See pole-top mounted photocell detail on ED(5).

(11) When required by the serving utility provide bare 6 AWG copper conductor. Run wire from pole top to butt wrap or copper butt plate. Protect conductor with non-conductive material to a height of 8 ft. above finished grade.

(12) When required by utility, cut top of pole at an angle to enhance rain run off.

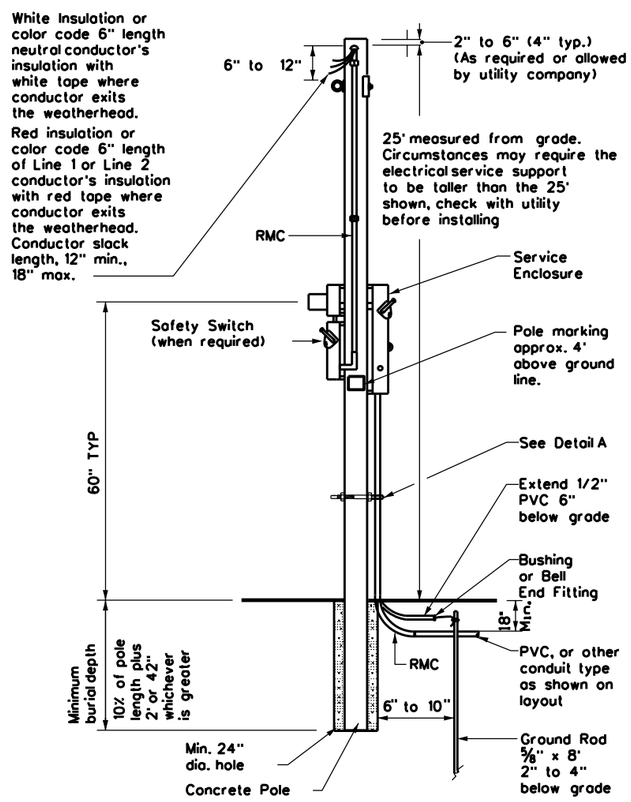


SERVICE SUPPORT TYPE TP (O)

GRANITE CONCRETE(GC)& OTHER CONCRETE(OC)NOTES

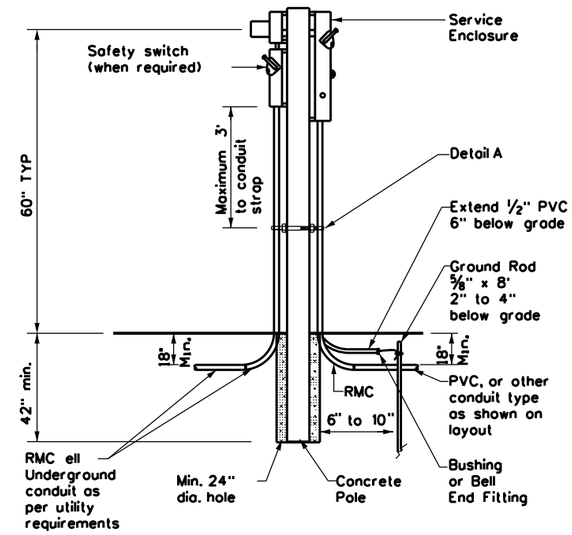
Ensure electrical service support structures bid as type Granite Concrete (GC) or Other Concrete (OC) meet the following requirements.

1. Provide GC and OC poles that meet the requirements of DMS 11080 "Electrical Services."
2. Provide prestressed concrete poles suitable for direct embedment into the ground without special foundations.
3. Verify poles are marked as required on DMS 11080. Location of marking should be approximately 4' above final grade. Use the two-point pickup locations when handling pole in horizontal position, and one-point pickup location for use in raising the pole to a vertical position. These marks are small but conspicuous.
4. Embed poles 42 in. or 10% of the length plus 2 ft., whichever is greater.
5. Ensure all installation details of services are in accordance with utility company specifications.
6. Install a one point rack or eye bolt bracket 6 inches to 12 inches below the weatherhead as an overhead service drop anchoring point for the electric utility.
7. Furnish and install galvanized or stainless steel channel strut 1 1/2 in. or 1 5/8 in. wide by 1 in. up to 3 3/4 in. deep (Unistrut, Kindorf, B-line or equal). Attach channel strut with stainless steel concrete anchors (max. 1" depth), square U-bolts or back to back channel strut with long bolts, or other secure mounting as approved by the Engineer. Ensure bolts are galvanized in accordance with ASTM A153. Do not stock channel struts.
8. Backfill the holes thoroughly by tamping in 6 in. lifts. After tamping to grade, place additional backfill material in a 6 inch high cone around the pole to allow for settling. Use material equal in composition and density to the surrounding area. Backfilling will not be paid for directly but is subsidiary to various bid items.



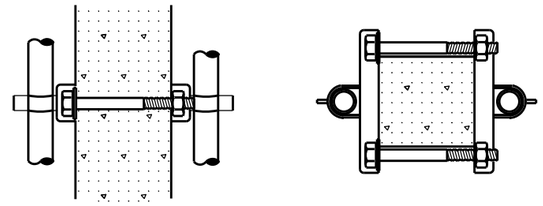
CONCRETE SERVICE SUPPORT

Overhead(O)



CONCRETE SERVICE SUPPORT

Underground(U)



Side View

Top View

DETAIL A

See Note 7. Before installing channel that has been cut, file sharp edges and paint with zinc-rich paint. Ensure there is no paint splatter on the pole.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE SUPPORT TYPES GC, OC, & TP

ED(10)-14

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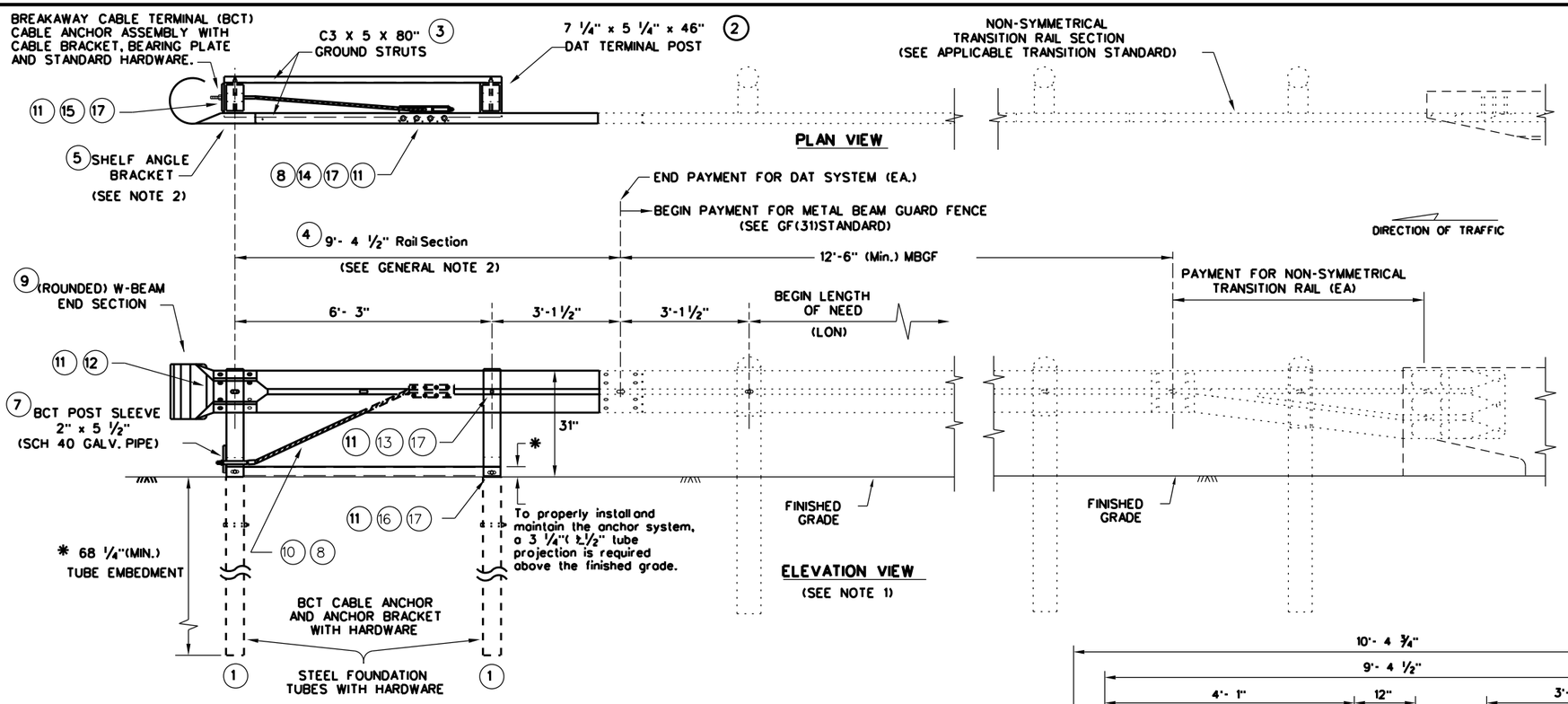


DOWNSTREAM ANCHOR TERMINAL (DAT)

NOTE: ONLY FOR DOWNSTREAM USE, WHEN LOCATED OUTSIDE THE HORIZONTAL CLEARANCE AREA OF OPPOSING TRAFFIC.

GENERAL NOTES

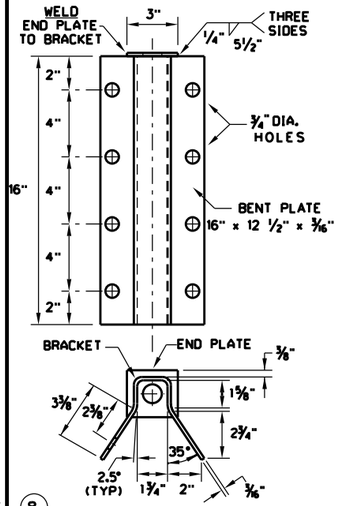
1. THE DETAIL SHOWN IS THE MINIMUM LENGTH OF NEED (LON) FOR A DOWNSTREAM ANCHOR TERMINAL (DAT) CONNECTED TO A CONCRETE RAIL.
2. THE RAIL SECTION AT THE END POST IS SUPPORTED BY THE SHELF ANGLE BRACKET. THE RAIL ELEMENT IS NOT ATTACHED TO THE END POST.
3. THE FOUNDATION TUBES SHALL NOT PROJECT MORE THAN 3 3/4" ABOVE THE FINISHED GRADE.
4. ALL HARDWARE FOR DAT SHALL BE ASTM A307 UNLESS OTHERWISE SHOWN.
5. REFER TO GF(31) SHEET FOR TERMINAL CONNECTION DETAILS.

MOW STRIP INSTALLATION

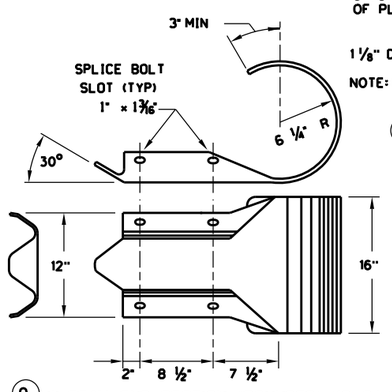
IF A MOW STRIP IS REQUIRED WITH THE DAT INSTALLATION THE LEAVE-OUT AREA AROUND THE STEEL FOUNDATION TUBES AND THE TWO CHANNEL STRUTS MAY BE OMITTED. THIS WILL REQUIRE A FULL POUR AT THE FOUNDATION TUBES.

•	(DAT) PARTS LIST	QTY
(1)	STEEL FOUNDATION TUBE	2
(2)	DAT TERMINAL POST	2
(3)	CHANNEL STRUT	2
(4)	TERMINAL RAIL ELEMENT	1
(5)	SHELF ANGLE BRACKET	1
(6)	BCT BEARING PLATE	1
(7)	BCT POST SLEEVE	1
(8)	GUARDRAIL ANCHOR BRACKET	1
(9)	(ROUNDED)W-BEAM END SECTION	1
(10)	BCT CABLE ANCHOR	1
(11)	RECESSED NUT, GUARDRAIL	20
(12)	1 1/4" BUTTON HEAD BOLT	4
(13)	10" BUTTON HEAD BOLT	2
(14)	5/8" X 2" HEX HEAD BOLT	8
(15)	5/8" X 8" HEX HEAD BOLT	4
(16)	5/8" X 10" HEX HEAD BOLT	2
(17)	5/8" FLAT WASHER	18

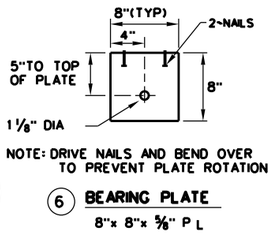
(4) TERMINAL RAIL ELEMENT FOR DAT



(8) GUARDRAIL ANCHOR BRACKET

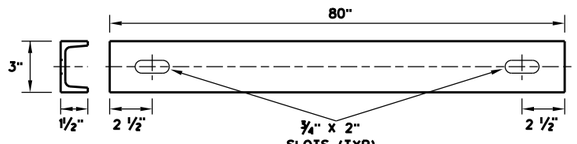


(9) W-BEAM END SECTION (ROUNDED) (12 GA.)

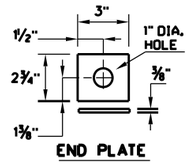


NOTE: DRIVE NAILS AND BEND OVER TO PREVENT PLATE ROTATION

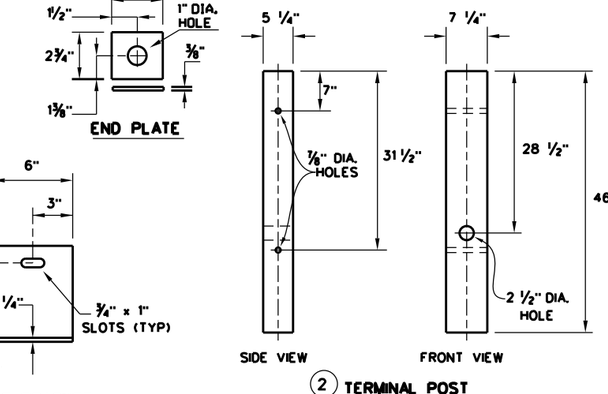
(6) BEARING PLATE
8"x 8"x 5/8" PL



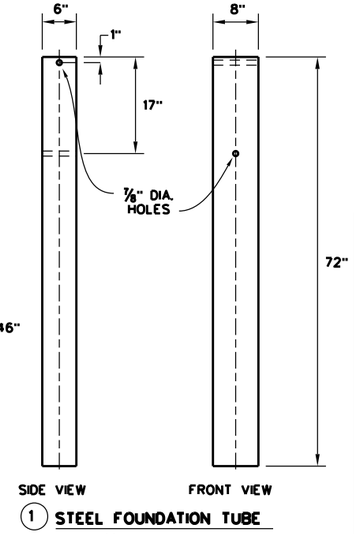
(3) CHANNEL STRUT
C3 X 5 X 80", GRADE A36



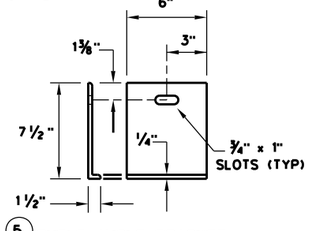
END PLATE



(2) TERMINAL POST
7 1/4"x 5 1/4"x 46" WOOD POST



(1) STEEL FOUNDATION TUBE
6"x 8"x 1/8" x 72" STEEL TUBE



(5) SHELF ANGLE BRACKET

Texas Department of Transportation

Design Division Standard

METAL BEAM GUARD FENCE
(DOWNSTREAM ANCHOR TERMINAL)
TL-3 MASH COMPLIANT
GF(31)DAT-19

FILE: gf31dat19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
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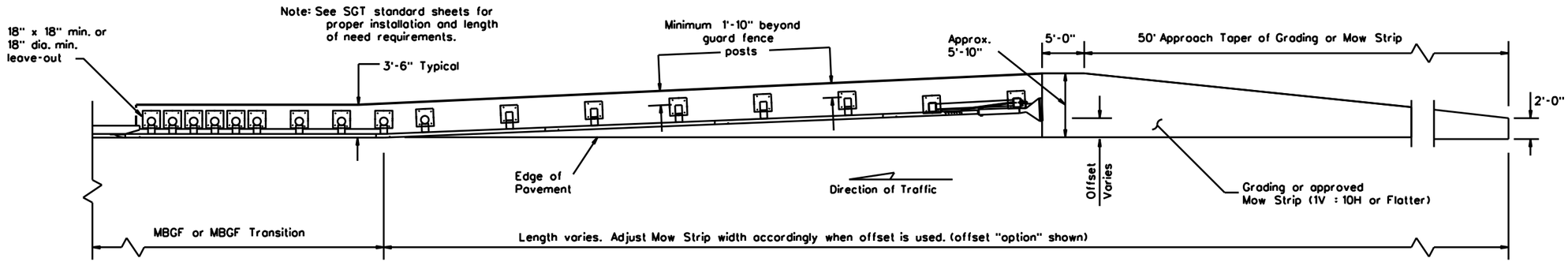
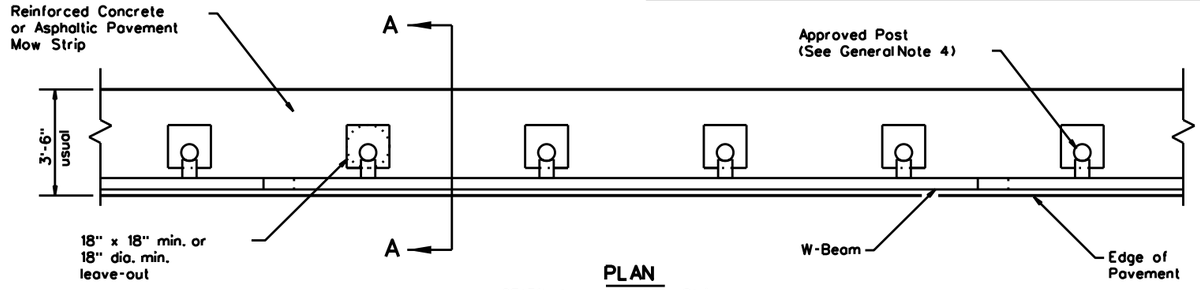
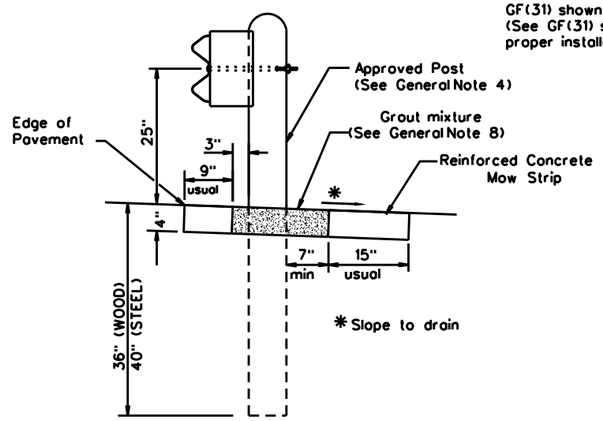


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



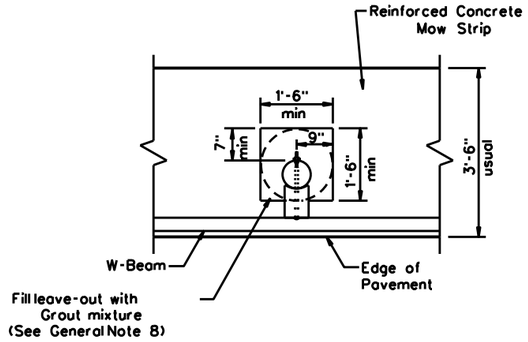
PLAN

GF(31) shown with Mow Strip
(See GF(31) standard sheet for proper installation)



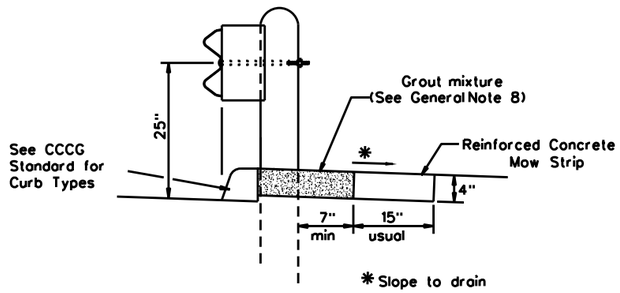
SECTION A-A

Typical



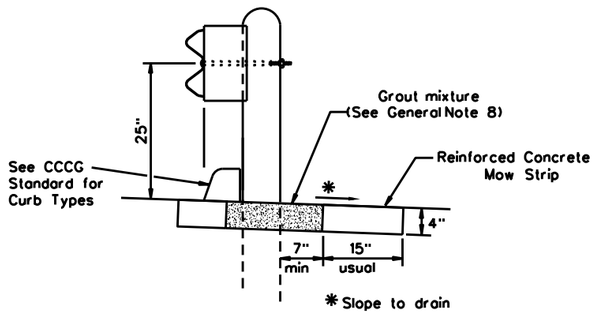
MOW STRIP DETAIL

Reinforced Concrete Mow Strip with 18" x 18" Square or 18" Dia. minimum leave-out.



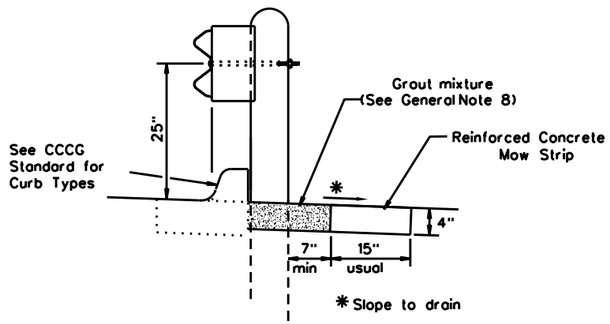
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

Note: Site Condition(s)

Site conditions may exist where grading is required for the proper installation of metal guard fence and end treatments.

Approach grading or mow strip may be decreased or eliminated, as directed by the Engineer.

GENERAL NOTES

1. This mow strip design is for use with metal beam guard fence, guard fence transitions, and guard fence end treatments. See applicable GF(31) MBGF or GF(31) Transition Standard sheet for additional information.
2. Mow strips shall be reinforced concrete with (wire mesh or synthetic fiber), as shown on the plans and will be paid for under the pertinent bid item. Reinforced concrete shall be placed in accordance with Item 432, "Riprap." The use of the synthetic fiber in lieu of steel reinforcing is acceptable, provided the fiber producer is on the Department Material Producer List (MPL), maintained by TxDOT, Construction Division.
3. The leave-out behind the post shall be a minimum of 7".
4. Only steel (W6 x 8.5 or W6 x 9.0), or 7 ½" Dia. round wood posts are acceptable for use in the mow strip. See GF(31) Standard for additional details.
5. Other curb placement options may be used. Curbs are not considered part of the mow strip and will be paid for under other pertinent bid item.
6. Thickness of the mow strip will be 4".
7. The limits of payment for reinforced concrete will include leave-outs for the posts.
8. The leave-outs shall be filled with a Grout mixture consisting of: 2719 pounds sand, 188 pounds Type I or II cement, and 550 pounds of water per cubic yard, with a 28-day compressive strength of approximately 230 psi or less. Provide grout with a consistency that will flow into and completely fill all voids. Due to auger size, larger leave-out dimensions are acceptable from both an impact performance and maintenance repair standpoint (Suggested Maximum leave-out of 20"). Payment for furnishing and placing the grout mixture will be subsidiary to the pay item of riprap mow strip.

Texas Department of Transportation

Design Division Standard

METAL BEAM GUARD FENCE (MOW STRIP) TL-3 MASH COMPLIANT

GF(31)MS-19

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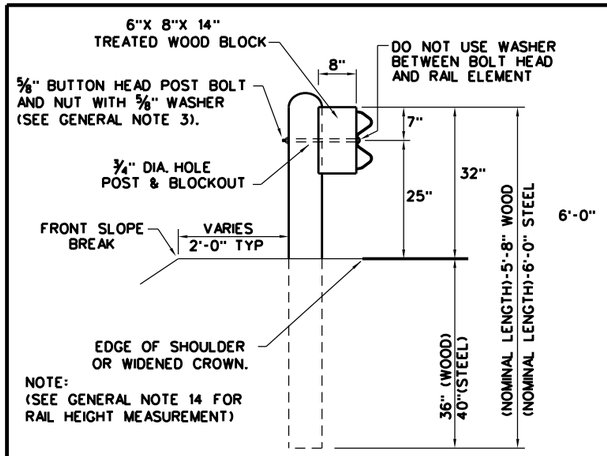
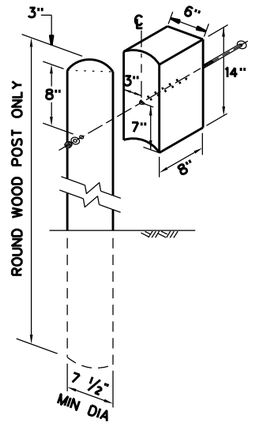
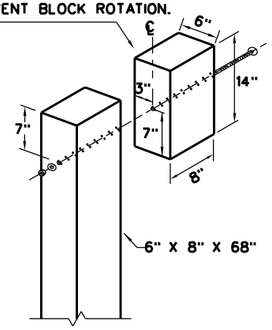


TYPICAL POST PLACEMENT

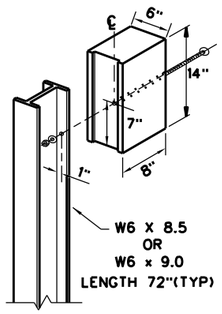


WOOD BLOCK TO ROUND WOOD POST

NOTE: TOENAIL WITH ONE 16D GALV. NAIL TO PREVENT BLOCK ROTATION.

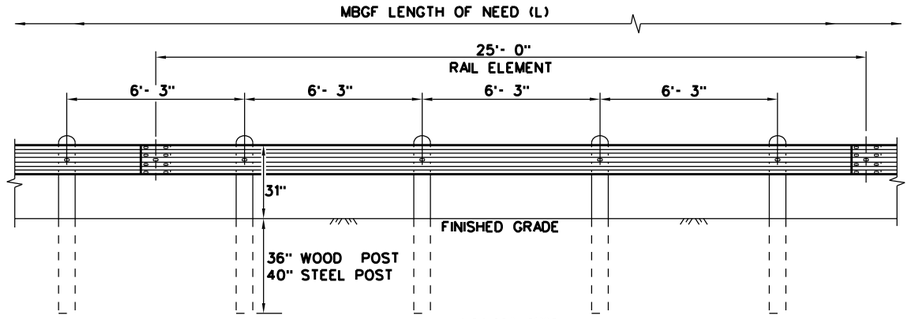


WOOD BLOCK TO RECTANGULAR WOOD POST



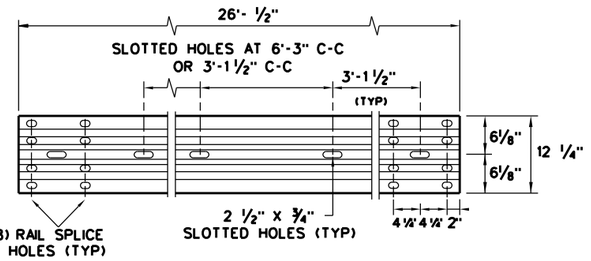
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

NOTE: * "WOOD" INDICATES DIMENSIONS FOR BOTH ROUND AND RECTANGULAR WOOD POST SYSTEMS.



ELEVATION MID-SPAN RAIL SPLICE

SHOWING A 25'- 0" SECTION OF W-BEAM RAIL. (SEE GENERAL NOTE 2)



ELEVATION 25'- 0"(NOM.) W-BEAM SECTION

NOTES: SEE GENERAL NOTE 2 FOR ALLOWABLE RAIL TYPES.
SEE RAIL SPLICE DETAIL FOR REQUIRED HARDWARE.

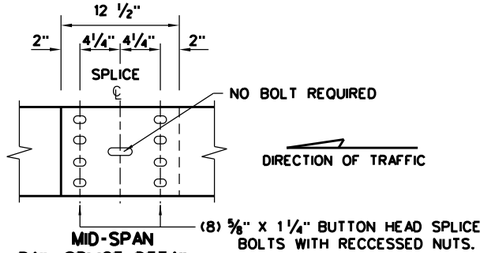
NOTE:
FOUR TYPES OF BUTTON-HEAD GUARD RAIL BOLTS COME WITH A RECCESSED NUT.

SPLICE BOLT LENGTH — VARIES
FBB01 - 1¼"
FBB02 - 2"
⅝"

POST & BLOCK LENGTH
FBB03 - 10"
FBB04 - 18"

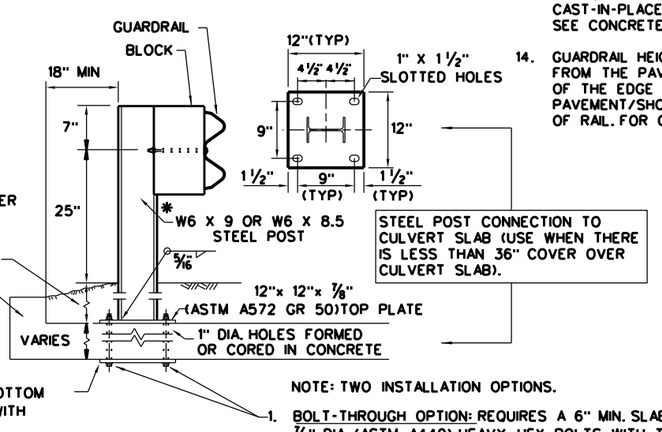
BUTTON HEAD BOLT

NOTE: SEE GENERAL NOTE 3 FOR SPLICE & POST BOLT DETAILS.



MID-SPAN RAIL SPLICE DETAIL

NOTE: GF(31), MID-SPAN RAIL SPLICES ARE REQUIRED WITH 6'-3" POST SPACINGS.



* POST(S) MAY REQUIRE FIELD MODIFICATION TO ENSURE PROPER GUARDRAIL HEIGHT.

STEEL POST CONNECTION TO CULVERT SLAB (USE WHEN THERE IS LESS THAN 36" COVER OVER CULVERT SLAB).

LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

1. BOLT-THROUGH OPTION: REQUIRES A 6" MIN. SLAB THICKNESS. ⅞" DIA (ASTM A449) HEAVY HEX BOLTS WITH TWO HARDENED WASHER EACH AND HEAVY HEX NUTS.
   NOTE: BOLT LENGTH = SLAB PLUS 2 ¼" MIN.

2. EPOXY ANCHOR OPTION: THIS OPTION MAY ONLY BE USED IF THE CULVERT SLAB IS 9" MIN. THICK. THREADED ANCHOR RODS MUST BE ⅞" DIA. ASTM A449 OR A193 GRADE B7 WITH HEAVY HEX NUT, AND ONE HARDENED WASHER EACH. EMBED ANCHOR RODS 6" WITH HILTI HIT RE 500 EPOXY ADHESIVE. OTHER TYPE III CLASS C EPOXY ADHESIVES MEETING THE REQUIREMENTS OF DMS-6100, "EPOXIES AND ADHESIVES", MAY BE USED IF IT CAN BE DEMONSTRATED THAT THEY MEET OR EXCEED THE STRENGTH OF HILTI HIT RE 500 WITH THE SAME EMBEDMENT DEPTH AND THREADED ROD DIA. FOLLOW THE MANUFACTURER'S REQUIREMENTS FOR INSTALLING EPOXIED THREADED RODS. EXTEND RODS ¼" MIN. BEYOND NUT.

NOTE: CULVERTS OF 25 FT. OR LESS, SEE GF(31)LS STANDARD FOR "LONG SPAN" OPTION.

NOTE: TRANSISTIONS TO BRIDGE RAILS OR TRAFFIC BARRIERS.
SEE GF(31)TL3 TR STANDARD FOR HIGH-SPEED TL-3 TRANSITIONS.
SEE GF(31)TL2 TR STANDARD FOR LOW-SPEED TL-2 TRANSITIONS.

GENERAL NOTES

1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540,"METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 25'- 0", OR 12'- 6" (NOM.) LENGTHS. RAIL ELEMENTS MAY HAVE SLOTTED HOLES AT 3'-1½" C-C OR 6'-3" C-C. A SPECIAL LENGTH OF RAIL MAY BE MANUFACTURED TO ACCOMMODATE THE DOWNSTREAM ANCHOR TERMINAL (DAT) AND THE TRANSITION SECTIONS OF GUARDRAIL.
3. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND ⅝" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
4. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445,"GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
5. CROWN SHALL BE WIDENED TO ACCOMMODATE THE METAL BEAM GUARD FENCE.
6. THE LATERAL APPROACH TO THE GUARD FENCE, SHALL HAVE A MAXIMUM SLOPE OF 1V:10H.
7. IF SHOWN ELSEWHERE IN THE PLANS OR AS DIRECTED BY THE ENGINEER, THE GUARD FENCE MAY BE FLARED AT A RATE OF 25:1 OR FLATTER.
8. UNLESS OTHERWISE SHOWN IN THE PLANS, GUARD FENCE PLACED IN THE VICINITY OF CURBS SHALL BE POSITIONED SO THAT THE FACE OF CURB IS LOCATED DIRECTLY BELOW OR BEHIND THE FACE OF THE RAIL. RAIL PLACED OVER CURBS SHALL BE INSTALLED SO THAT THE POST BOLT IS LOCATED APPROXIMATELY 25 INCHES ABOVE THE GUTTER PAN OR EDGE OF SHOULDER.
9. APPLICATIONS IN SOLID ROCK ARE ONLY ALLOWED WITH STEEL POSTS. IF SOLID ROCK IS ENCOUNTERED WITHIN 0 TO 18" OF THE FINISHED GRADE, DRILL A 24" DIA. HOLE, 24" INTO THE ROCK. IF SOLID ROCK IS ENCOUNTERED BELOW 18", DRILL A 12" DIA. HOLE, 12" INTO THE ROCK OR TO THE STANDARD EMBEDMENT DEPTH, WHICHEVER MAYBE LESS. ANY EXCESS POST LENGTH, AFTER MEETING THESE DEPTHS, MAY BE FIELD CUT TO ENSURE PROPER GUARDRAIL MOUNTING HEIGHT. BACKFILL WITH COARSE AGGREGATE MATERIAL.
10. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
11. SPECIAL FABRICATION WILL BE REQUIRED AT INSTALLATION LOCATIONS HAVING A CURVATURE OF LESS THAN 150 FT. RADIUS.
12. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210,"COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. THE CONSTRUCTION DIVISION, TXDOT MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210 ONLY PRODUCERS ON THE MPL MAY FURNISH COMPOSITE MATERIAL BLOCKS.
13. FOR THE LOW FILL CULVERT OPTION, POSTS LOCATED PARTIALLY OR WHOLLY BETWEEN PRECAST BOX CULVERT UNITS, THE USE OF A CAST-IN-PLACE CONCRETE CLOSURE BETWEEN BOXES IS REQUIRED. THE LENGTH OF THE CAST-IN-PLACE CONCRETE CLOSURE SHALL ACCOMMODATE THE PLACEMENT OF THE LOW FILL CULVERT OPTION. SEE CONCRETE CLOSURE DETAILS ON BRIDGE STANDARD SCP-MD.
14. GUARDRAIL HEIGHT MEASUREMENT: WHEN THE GUARDRAIL IS LOCATED ABOVE PAVEMENT, MEASURE THE HEIGHT FROM THE PAVEMENT TO THE TOP OF THE W-BEAM RAIL. WHEN THE GUARDRAIL IS LOCATED UP TO 2 FT. OFF OF THE EDGE OF PAVEMENT OR FOR A PAVEMENT OVERLAY, USE A 10-FOOT STRAIGHTEDGE TO EXTEND THE PAVEMENT/SHOULDER SLOPE TO THE BACK OF RAIL, MEASURE FROM THE BOTTOM OF STRAIGHTEDGE TO THE TOP OF RAIL. FOR GUARDRAIL LOCATED DOWN A 10:1 SLOPE, MEASURE FROM THE NOMINAL TERRAIN.

Texas Department of Transportation

Design Division Standard

METAL BEAM GUARD FENCE
TL-3 MASH COMPLIANT
GF(31)-19

FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
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	ODA	DISTRICTWIDE		91

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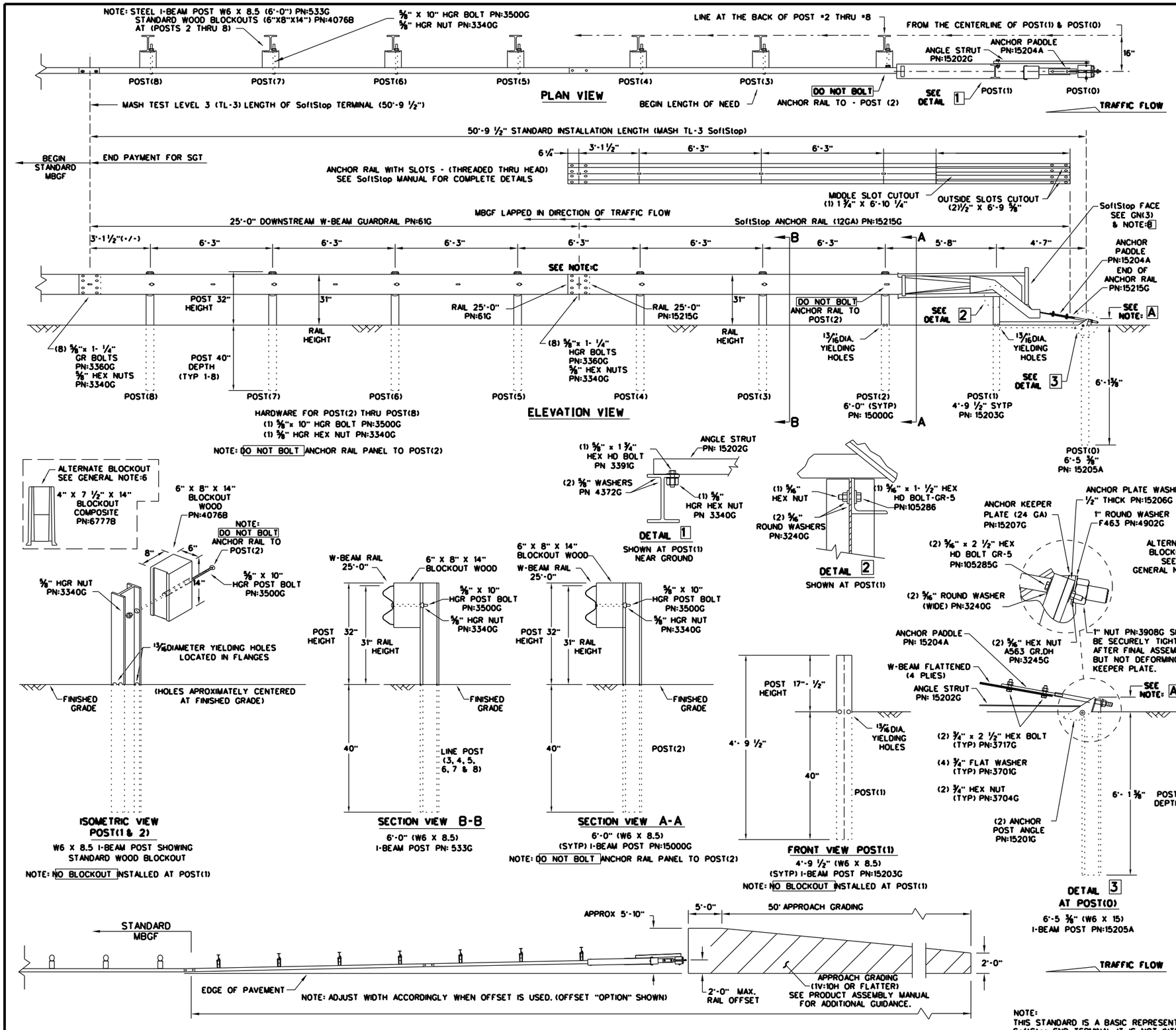

GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: TRINITY HIGHWAY AT 1(888)323-6374. 2525 N. STEMMONS FREEWAY, DALLAS, TX 75207
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE: SoftStop END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL. PN:6202378
3. APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" ON THE FRONT FACE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
4. FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
5. HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445,"GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
6. A COMPOSITE MATERIAL BLOCKOUT THAT MEETS THE REQUIREMENTS OF DMS-7210, MAY BE SUBSTITUTED FOR BLOCKOUTS OF SIMILAR DIMENSIONS. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST (MPL) FOR CERTIFIED PRODUCERS.
7. IF SOLID ROCK IS ENCOUNTERED SEE THE MANUFACTURER'S INSTALLATION MANUAL AND REFER TO THE LATEST ROADWAY MBGF STANDARD FOR INSTALLATION GUIDANCE.
8. POSTS SHALL NOT BE SET IN CONCRETE.
9. IT IS ACCEPTABLE TO INSTALL THE SoftStop IMPACT HEAD PARALLEL TO THE GRADE LINE OR WITH AN UPWARD TILT.
10. DO NOT ATTACH THE SoftStop SYSTEM DIRECTLY TO A RIGID BARRIER.
11. UNDER NO CIRCUMSTANCES SHALL THE GUARDRAIL WITHIN THE SoftStop SYSTEM BE CURVED.
12. A FLARE RATE OF UP TO 25:1 MAY BE USED TO PREVENT THE TERMINAL HEAD FROM ENCROACHING ON THE SHOULDER. THE FLARE MAY BE DECREASED OR ELIMINATED FOR SPECIFIC INSTALLATIONS, IF DIRECTED BY THE ENGINEER.

NOTE:A	THE INSTALLATION HEIGHT OF FULLY ASSEMBLED ANCHOR POST WILL VARY FROM 3-¾" MIN. TO 4" MAX. ABOVE FINISHED GRADE.
NOTE:B	PART PN:58528 RIGHT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING) PART PN:58518 LEFT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING)
NOTE:C	W-BEAM SPLICE LOCATED BETWEEN LINE POST(4)AND LINE POST(5) GUARDRAIL PANEL 25'-0" PN:61G ANCHOR RAIL 25'-0" PN:15215G LAP GUARDRAIL IN DIRECTION OF TRAFFIC FLOW.

PART	QTY	MAIN SYSTEM COMPONENTS
6202378	1	PRODUCT DESCRIPTION ASSEMBLY MANUAL (LATEST REV.)
15208A	1	SoftStop HEAD (SEE MANUAL FOR RIGHT-LEFT APPROACH)
15215G	1	SoftStop ANCHOR RAIL (12GA) WITH CUTOUT SLOTS
61G	1	SoftStop DOWNSTREAM W-BEAM RAIL (12GA) (25'- 0")
15205A	1	POST #0 - ANCHOR POST (6'- 5 ⅜")
15203G	1	POST #1 - (SYTP) (4'- 9 ½")
15000G	1	POST #2 - (SYTP) (6'- 0")
533G	6	POST #3 THRU #8 - I-BEAM (W6 x 8.5) (6'- 0")
4076B	7	BLOCKOUT - WOOD (ROUTED) (6" x 8" x 14")
6777B	7	BLOCKOUT - COMPOSITE (4" x 7 ½" x 14")
15204A	1	ANCHOR PADDLE
15207G	1	ANCHOR KEEPER PLATE (24 GA)
15206G	1	ANCHOR PLATE WASHER (½" THICK)
15201G	2	ANCHOR POST ANGLE (10" LONG)
15202G	1	ANGLE STRUT
		HARDWARE
4902G	1	1" ROUND WASHER F436
3908G	1	1" HEAVY HEX NUT A563 GR.DH
3717G	2	¾" x 2 ½" HEX BOLT A325
3701G	4	¾" ROUND WASHER F436
3704G	2	¾" HEAVY HEX NUT A563 GR.DH
3360G	16	⅝" x 1 ¼" W-BEAM RAIL SPLICE BOLTS HGR
3340G	25	⅝" W-BEAM RAIL SPLICE NUTS HGR
3500G	7	⅝" x 10" HGR POST BOLT A307
3391G	1	⅝" x 1 ¾" HEX HD BOLT A325
4489G	1	⅝" x 9" HEX HD BOLT A325
4372G	4	⅝" WASHER F436
105285G	2	⅝" x 2 ½" HEX HD BOLT GR-5
105286G	1	⅝" x 1 ½" HEX HD BOLT GR-5
3240G	6	⅝" ROUND WASHER (WIDE)
3245G	3	⅝" HEX NUT A563 GR.DH
5852B	1	HIGH INTENSITY REFLECTIVE SHEETING - SEE NOTE:B

NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE SoftStop END TERMINAL, IT IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

Texas Department of Transportation

Design Division Standard

TRINITY HIGHWAY
SOFTSTOP END TERMINAL
MASH - TL-3
SGT(10S)31-16

FILE: sgt10s3116	DN: TxDOT	CK: KM	DW: VP	CK: MB/VP
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
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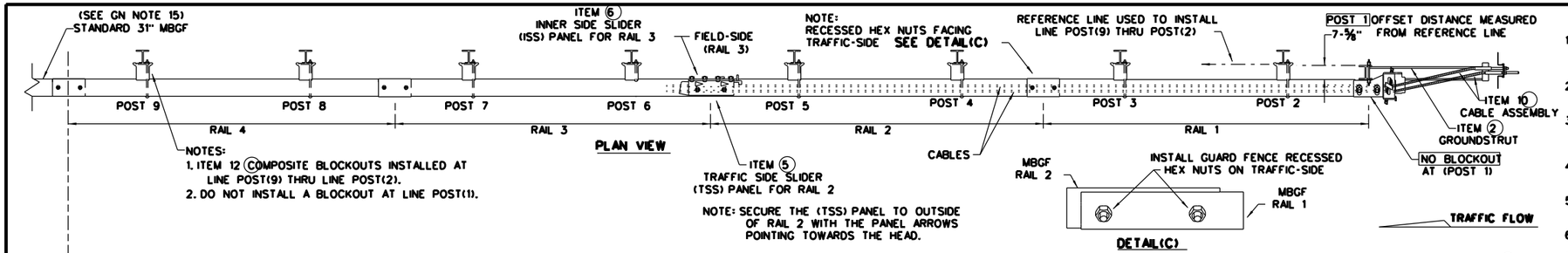
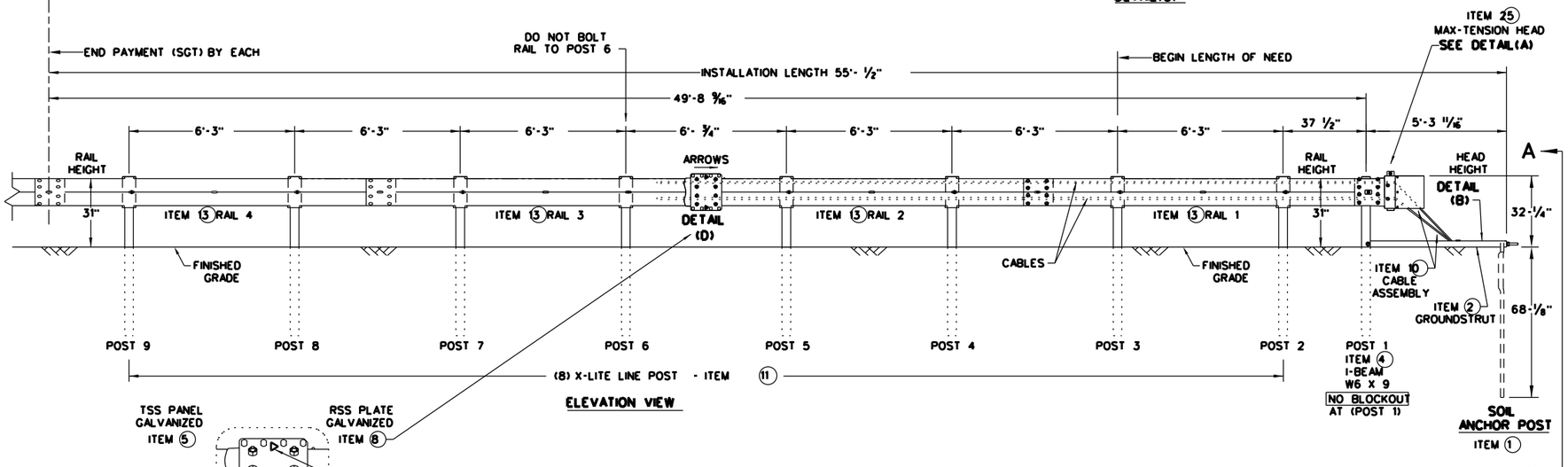
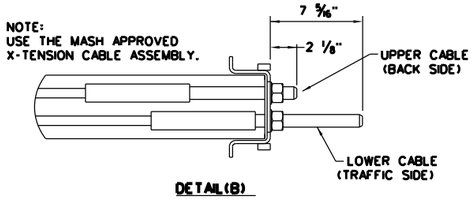
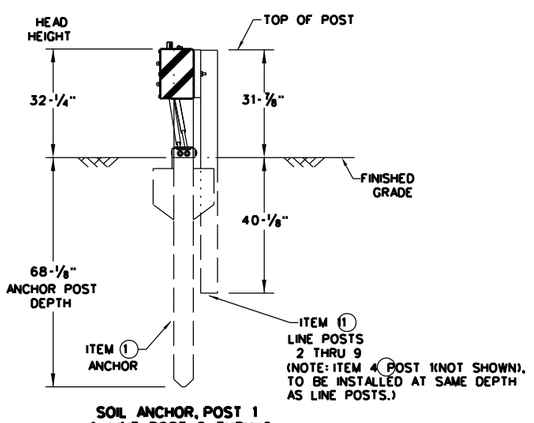
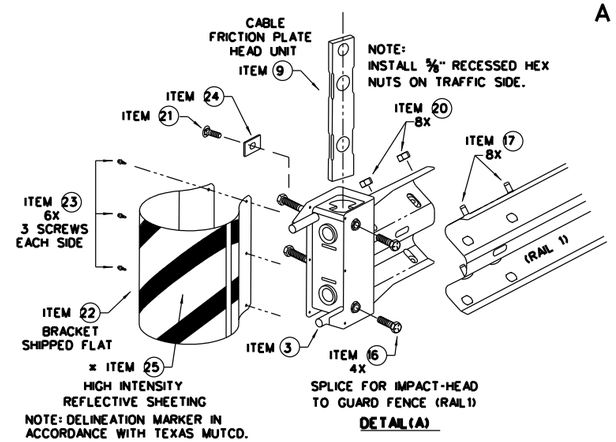










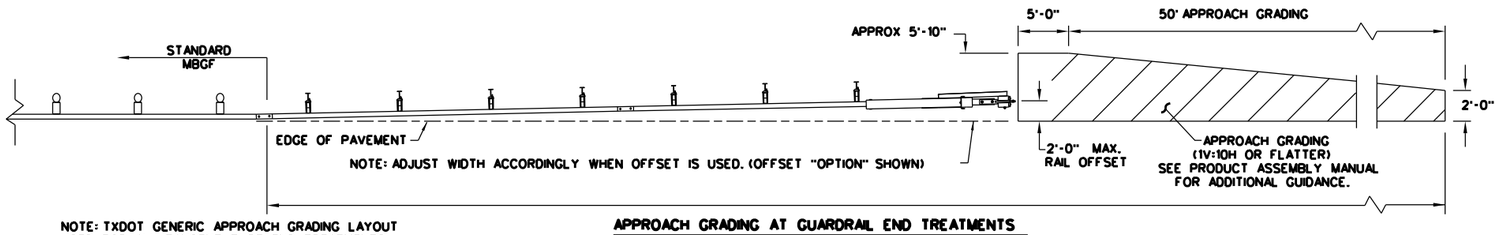
GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: LINDSAY TRANSPORTATION SOLUTIONS (LTS) - BARRIER SYSTEMS, INC. AT (707) 374-6800
2. FOR INSTALLATION, REPAIR, & MAINTENANCE REFER TO THE: MAX-TENSION INSTALLATION INSTRUCTION MANUAL. P/N MANMAX REV D (ECN 3516).
3. APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" ON THE FRONT FACE OF THE DEVICE PER MANUFACTURE'S RECOMMENDATIONS. OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
4. FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
5. ALL STEEL COMPONENTS ARE GALVANIZED PER ASTM A123 OR EQUIVALENT UNLESS OTHERWISE STATED.
6. SYSTEM SHOWN USING STEEL WIDE FLANGE POST WITH COMPOSITE BLOCKOUTS.
7. COMPOSITE MATERIAL BLOCKOUT THAT MEETS THE REQUIREMENTS OF DMS-7210, MAY BE SUBSTITUTED FOR BLOCKOUTS SIMILAR DIMENSIONS. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST(MPL)FOR CERTIFIED PRODUCERS.
8. REFER TO INSTALLATION MANUAL FOR SPECIFIC PANEL LAPPING GUIDANCE.
9. IF SOLID ROCK IS ENCOUNTERED SEE THE MANUFACTURER'S INSTALLATION MANUAL FOR INSTALLATION GUIDANCE.
10. POSTS SHALL NOT BE SET IN CONCRETE.
11. A DRIVING CAP WITH A TIMBER OR PLASTIC INSERT SHALL BE USED WHEN DRIVING POST TO PREVENT DAMAGE TO THE GALVANIZING ON TOP OF THE POST.
12. MAX-TENSION SYSTEM SHALL NEVER BE INSTALLED WITHIN A CURVED SECTION OF GUARDRAIL.
13. IF A DELINEATION MARKER IS REQUIRED, MARKER SHALL BE IN ACCORDANCE WITH TEXAS MUTCD.
14. THE SYSTEM IS SHOWN WITH 12'-6" MBGF PANELS, 25'-0" MBGF PANELS ARE ALSO ALLOWED.
15. A MINIMUM OF 12'-6" OF 12GA. MBGF IS REQUIRED IMMEDIATELY DOWNSTREAM OF THE MAX-TENSION SYSTEM.

ITEM #	PART NUMBER	DESCRIPTION	QTY
1	BSI-1610060-00	SOIL ANCHOR - GALVANIZED	1
2	BSI-1610061-00	GROUND STRUT - GALVANIZED	1
3	BSI-1610062-00	MAX-TENSION IMPACT HEAD	1
4	BSI-1610063-00	W6x9 I-BEAM POST 6FT.-GALVANIZED	1
5	BSI-1610064-00	TSS PANEL - TRAFFIC SIDE SLIDER	1
6	BSI-1610065-00	ISS PANEL - INNER SIDE SLIDER	1
7	BSI-1610066-00	TOOTH - GEOMET	1
8	BSI-1610067-00	RSS PLATE - REAR SIDE SLIDER	1
9	8061058	CABLE FRICTION PLATE - HEAD UNIT	1
10	BSI-1610069-00	CABLE ASSEMBLY - MASH X-TENSION	2
11	BSI-1012078-00	X-LITE LINE POST-GALVANIZED	8
12	8090534	8" W-BEAM COMPOSITE-BLOCKOUT XT110	8
13	BSI-4004386	12'-6" W-BEAM GUARD FENCE PANELS 12GA.	4
14	BSI-1102027-00	X-LITE SQUARE WASHER	1
15	BSI-2001886	⅝" X 7" THREAD BOLT HH (GR.5)GEOMET	1
16	BSI-2001885	¾" X 3" ALL-THREAD BOLT HH (GR.5)GEOMET	4
17	4001115	⅝" X 1¼" GUARD FENCE BOLTS (GR.2)MGAL	48
18	2001840	⅝" X 10" GUARD FENCE BOLTS MGAL	8
19	2001636	⅝" WASHER F436 STRUCTURAL MGAL	2
20	4001116	⅝" RECESSED GUARD FENCE NUT (GR.2)MGAL	59
21	BSI-2001888	⅝" X 2" ALL THREAD BOLT (GR.5)GEOMET	1
22	BSI-1701063-00	DELINEATION MOUNTING (BRACKET)	1
23	BSI-2001887	¼" X ¾" SCREW SD HH 410SS	7
24	4002051	GUARDRAIL WASHER RECT AASHTO FWR03	1
x 25	SEE NOTE BELOW	HIGH INTENSITY REFLECTIVE SHEETING	1
x x 26	4002337	8" W-BEAM TIMBER-BLOCKOUT, PDB01B	8
x x 27	BSI-4004431	25' W-BEAM GUARDRAIL PANEL,8-SPACE,12GA.	2
28	MANMAX Rev-(D)	MAX-TENSION INSTALLATION INSTRUCTIONS	1

x TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.

x x ALTERNATIVE ITEMS NOT SHOWN.
ITEM(26) 8" WOOD-BLOCKOUTS
ITEM(27) 25'GUARD FENCE PANELS



TRAFFIC FLOW

NOTE:
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Texas Department of Transportation

Design Division Standard

MAX-TENSION END TERMINAL
MASH - TL-3

SGT(11S)31-18

FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL	
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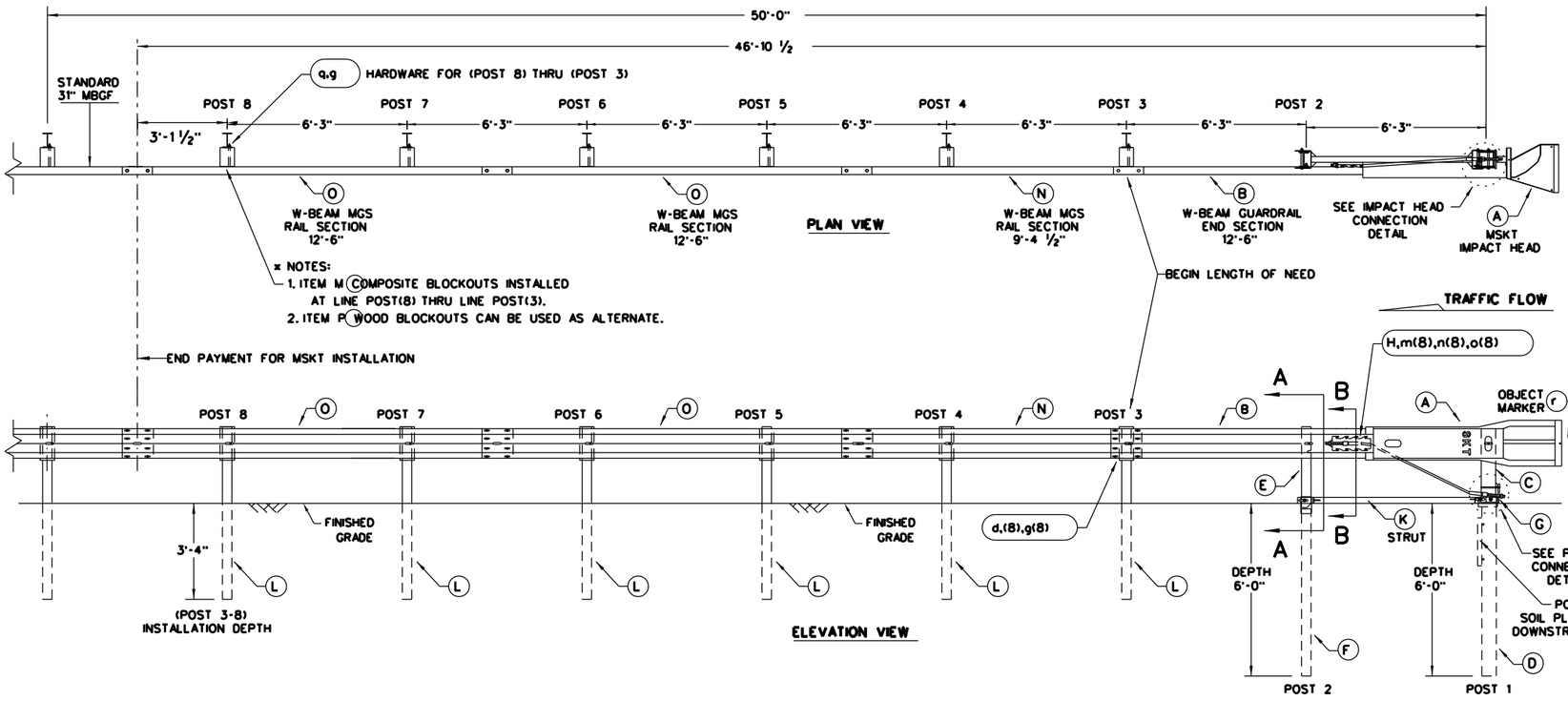


NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.

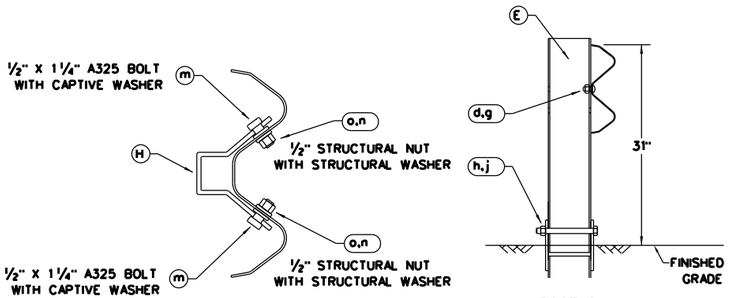
GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: ROAD SYSTEMS, INC. (432)263-2435. 3616 OLD HOWARD COUNTY AIRPORT, BIG SPRING, TX 79720
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE: MSKT END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL (PUBLICATION-062717).
3. APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" ON THE FRONT FACE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
4. FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
5. HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
6. SYSTEM SHOWN USING STEEL WIDE FLANGE POSTS WITH COMPOSITE BLOCKOUTS.
7. A COMPOSITE MATERIAL BLOCKOUTS THAT MEETS THE REQUIREMENTS OF DMS-7210, MAY BE SUBSTITUTED FOR BLOCKOUTS OF SIMILAR DIMENSIONS. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST (MPL) FOR CERTIFIED PRODUCERS.
8. IF SOLID ROCK IS ENCOUNTERED IN THE AREA OF (POST 1) AND / OR (POST 2) CONTACT THE MANUFACTURER, & REFER TO THE LATEST ROADWAY MBGF STANDARD FOR INSTALLATION GUIDANCE.
9. POSTS SHALL NOT BE SET IN CONCRETE.
10. SYSTEM MUST BE ATTACHED TO STANDARD 31" MBGF.
11. UNDER NO CIRCUMSTANCES SHALL THE GUARDRAIL WITHIN THE MSKT SYSTEM BE CURVED.
12. A FLARE RATE OF UP TO 25:1 MAY BE USED TO PREVENT THE TERMINAL HEAD FROM ENCROACHING ON THE SHOULDER. THE FLARE MAY BE DECREASED OR ELIMINATED FOR SPECIFIC INSTALLATIONS, IF DIRECTED BY THE ENGINEER.
13. THE SYSTEM IS SHOWN WITH TWO 12'-6" MBGF PANELS, ONE 25'-0" MBGF PANEL IS ALSO ALLOWED IN THEIR PLACE.
14. A DRIVING CAP WITH A TIMBER OR PLASTIC INSERT SHALL BE USED WHEN DRIVING POSTS 3-8 TO PREVENT DAMAGE TO THE GALVANIZING ON TOP OF THE POST. SPECIAL DRIVING CAP TO BE USED ON LOWER POSTS 1 & 2 TO PREVENT DAMAGE TO THE WELDED PLATES.

ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM NUMBERS
A	1	MSKT IMPACT HEAD	MS3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Go.	SF1303
C	1	POST 1 - TOP (6" X 6" X ⅛" TUBE)	MTPHP1A
D	1	POST 1 - BOTTOM (6' W6X15)	MTPHP1B
E	1	POST 2 - ASSEMBLY TOP	UHP2A
F	1	POST 2 - ASSEMBLY BOTTOM (6' W6X9)	HP2B
G	1	BEARING PLATE	E750
H	1	CABLE ANCHOR BOX	S760
J	1	BCT CABLE ANCHOR ASSEMBLY	E770
K	1	GROUND STRUT	MS785
L	6	W6x9 OR W6x8.5 STEEL POST	P621
M	6	COMPOSITE BLOCKOUTS	CBSP-14
N	1	W-BEAM MGS RAIL SECTION (9'-4 ½")	G12025
O	2	W-BEAM MGS RAIL SECTION (12'-6")	G1203A
P	6	WOOD BLOCKOUT 6" X 8" X 14"	P675
Q	1	W-BEAM MGS RAIL SECTION (25'-0")	G1209
SMALL HARDWARE			
a	2	⅝" x 1" HEX BOLT (GRD 5)	B5160104A
b	4	⅝" WASHER	W0516
c	2	⅝" HEX NUT	N0516
d	25	⅝" Dia. x 1¼" SPLICE BOLT (POST 2)	B580122
e	2	⅝" Dia. x 9" HEX BOLT (GRD A449)	B580904A
f	3	⅝" WASHER	W050
g	33	⅝" Dia. H.G.R NUT	N050
h	1	¾" Dia. x 8 ½" HEX BOLT (GRD A449)	B340854A
j	1	¾" Dia. HEX NUT	N030
k	2	1 ANCHOR CABLE HEX NUT	N100
l	2	1 ANCHOR CABLE WASHER	W100
m	8	½" x 1¼" A325 BOLT WITH CAPTIVE WASHER	SB12A
n	8	½" STRUCTURAL NUTS	N012A
o	8	1 ⅛" O.D. x ⅝" I.D. STRUCTURAL WASHERS	W012A
p	1	BEARING PLATE RETAINER TIE	CT-100ST
q	6	⅝" x 10" H.G.R. BOLT	B581002
r	1	OBJECT MARKER 18" X 18"	E3151

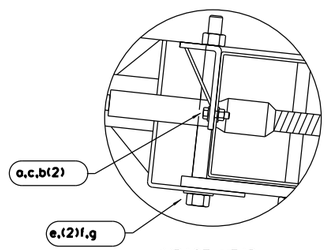
SEE NOTES: *

ALTERNATIVE ITEMS NOT SHOWN. * *
* ITEM(P) 8" WOOD-BLOCKOUT
* * ITEM(Q) 25'GUARD FENCE PANEL

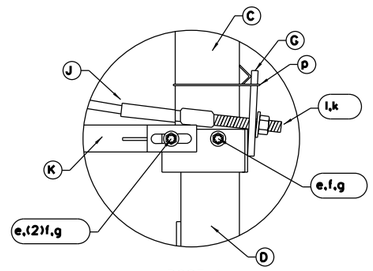


SECTION B-B
ANCHOR BRACKET

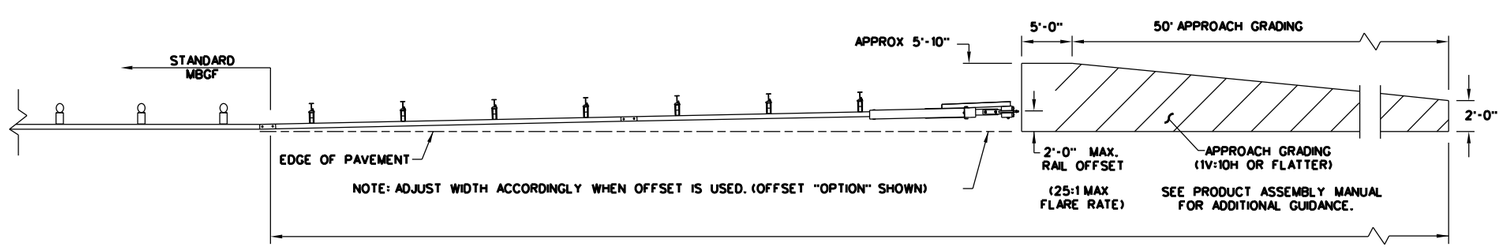
POST 2
SECTION A-A



IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL



APPROACH GRADING AT GUARDRAIL END TREATMENTS

TRAFFIC FLOW

NOTE: TXDOT GENERIC APPROACH GRADING LAYOUT USED FOR ALL TANGENT TYPE END TREATMENTS.

NOTE: THIS STANDARD IS A BASIC REPRESENTATION OF THE MSKT END TERMINAL, IT IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

Texas Department of Transportation

Design Division Standard

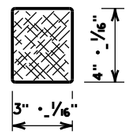
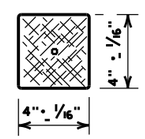
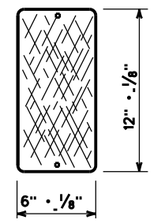
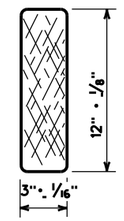
SINGLE GUARDRAIL TERMINAL

MSKT-MASH-TL-3

SGT(12S)31-18

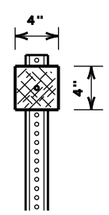
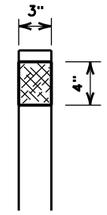
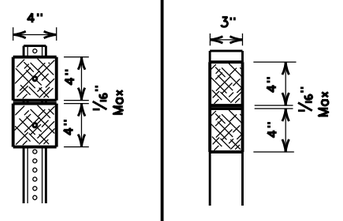
FILE: sgt12s3118.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CL	
© TxDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0906	00	268	VARIOUS	
	DIST	COUNTY		SHEET NO.	
	ODA	DISTRICTWIDE		94	

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			

NOTE
1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx).
2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.

DELINEATORS

	SINGLE		DOUBLE	
DEVICE				
	1-Size 2 reflector unit	1-Size 1 reflector unit	2-Size 2 reflector units	2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

D & OM DESCRIPTIVE CODES

INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX)

NUMBER OF REFLECTORS
- S = Single
- D = Double

COLOR OF REFLECTORS
- W = White
- Y = Yellow
- R = Red

REFLECTOR UNIT SIZE
1 or 2

TYPE OF POST OR DELINEATOR
- WC = Wing Channel Post
- YFLX = Yellow Flexible Post
- WFLX = White Flexible Post
- BRF = Barrier Reflector

TYPE OF MOUNT
- GND = Embedded (drivable or set in concrete)
- CTB = Concrete Barrier Mount
- GF1 or GF2 = Guard Fence Attachment
- SRF = Surface Mount

DIRECTION
If Required
- BI = Bi-Directional
- BR = Bi-Directional with red on back

INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)

TYPE OF OBJECT MARKER
1, 2, 3, or 4

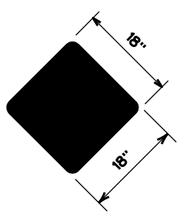
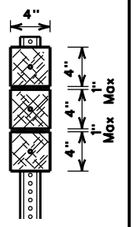
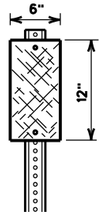
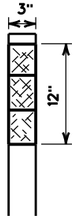
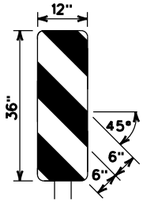
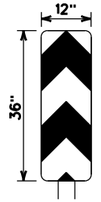
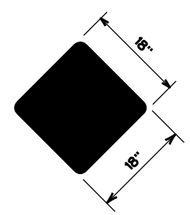
NUMBER OF REFLECTORS OR DIRECTION
- X = 3-Size 2 reflector units (Type 2 only)
- Y = 1-Size 3 reflector unit (Type 2 only)
- Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
- L = Left Side (Type 3 Object Marker only)
- R = Right Side (Type 3 Object Marker only)
- C = Center (Type 3 Object Marker only)

TYPE OF POST
- WC = Wing Channel Post
- WFLX = White Flexible Post
- TWT = Thin Walled Tubing

TYPE OF MOUNT
- GND = Embedded (drivable)
- SRF = Surface Mount
- WAS = Wedge Anchor Steel
- WAP = Wedge Anchor Plastic

DIRECTION
If Required
- BI = Bi-Directional

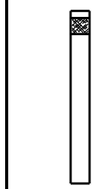
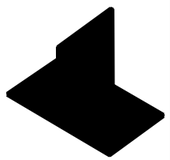
OBJECT MARKERS

	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE								
		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B or C Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B or C Sheeting			Red -Type B or C Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

DEPARTMENTAL MATERIAL SPECIFICATIONS

FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

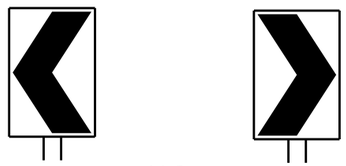
BARRIER REFLECTORS (BRF)

	GF1	GF2	CTB
DEVICE			

1. Barrier reflectors shall meet the requirements of DMS 8600.
2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.

SHEETING	Yellow, White, Red
NOTE	1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.

CHEVRONS

DEVICE	 W1-8			
SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	

NOTE
1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies).
2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).

ONE DIRECTION LARGE ARROW

DEVICE	 W1-6	
SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	

NOTE:
Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

DATE:
FILE:

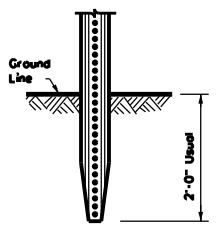
FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0906	00	268	VARIOUS
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	0DA	ECTOR		95

20A

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

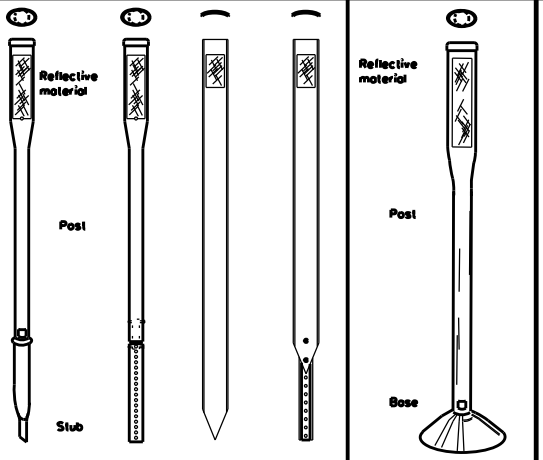


NOTES

1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only.
2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.

FLEXIBLE POSTS (YFLX, WFLX)

GND | SRF



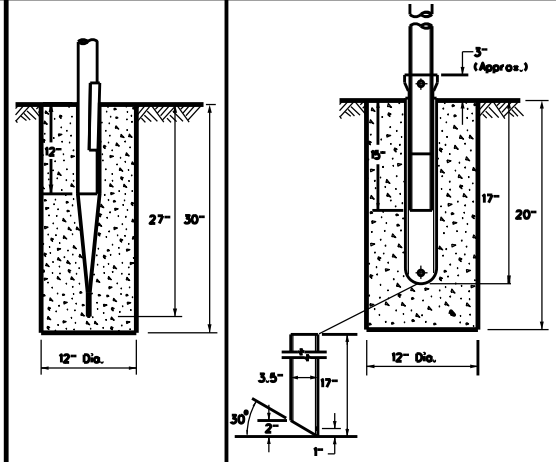
EMBEDDED | SURFACE MOUNT

NOTES

1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.
4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline or median use, the flexible posts shall be yellow.

WEDGE ANCHOR SYSTEMS

WAS | WAP



STEEL | PLASTIC

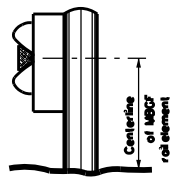
NOTE

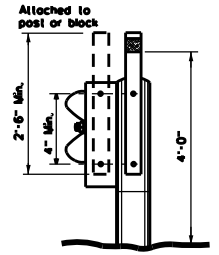
1. Install per manufacturer's recommendations.

TYPE OF BARRIER MOUNTS

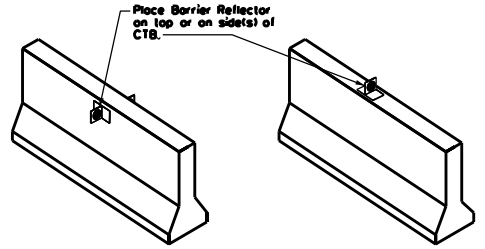
GUARD FENCE ATTACHMENT

GF1 | GF2





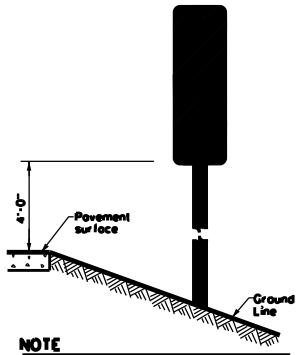
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

1. Place delineators on a section of roadway at a consistent distance from the edge of pavement.
2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction.
3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible.
4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation.
5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface.
6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.

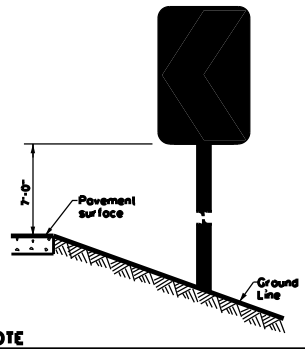
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

Mounting at 4 feet to the bottom of the chevron is permitted for chevrons that will not exceed a height of 6'-6" to the top of the chevron (sizes 24" x 30" and smaller)

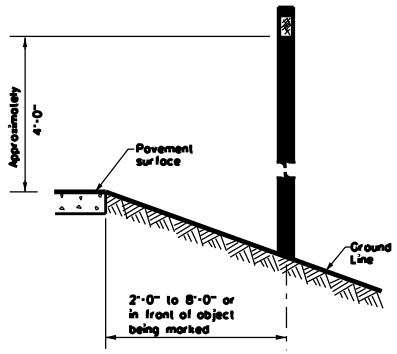
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

Chevrons 30" x 36" and larger shall be mounted at a height of 7' to the bottom of the chevron. Chevron sign and ONE DIRECTION LARGE ARROW sign (W1-9T) shall be installed per SMD standard sheets and paid under item 644.

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0906	00	268	VARIOUS
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	ODA	ECTOR		96

208

DATE:
FILE:

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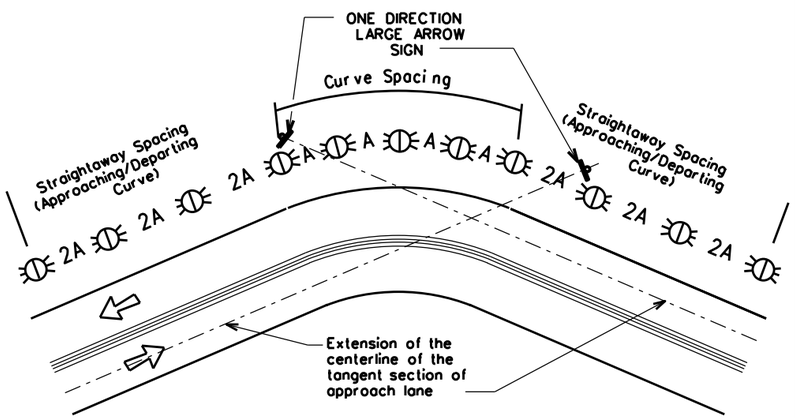
DATE:
FILE:

MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

Amount by which Advisory Speed is less than Posted Speed	Curve Advisory Speed	
	Turn (30 MPH or less)	Curve (35 MPH or more)
5 MPH & 10 MPH	• RPMs	• RPMs
15 MPH & 20 MPH	• RPMs and One Direction Large Arrow sign	• RPMs and Chevrons: or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons.
25 MPH & more	• RPMs and Chevrons: or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons	• RPMs and Chevrons

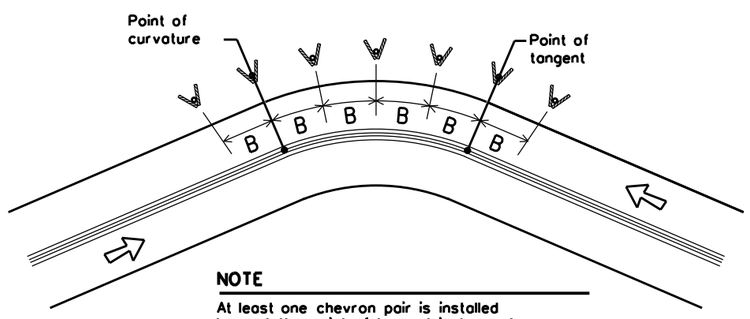
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

ONE DIRECTION LARGE ARROW (W1-6) sign should be located at approximately and perpendicular to the extension of the centerline of the tangent section of approach lane.

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

At least one chevron pair is installed beyond the point of tangent in tangent section.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

Degree of Curve	FEET			
	Radius of Curve	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
		A	2A	B
1	5730	225	450	—
2	2865	160	320	—
3	1910	130	260	200
4	1433	110	220	160
5	1146	100	200	160
6	955	90	180	160
7	819	85	170	160
8	716	75	150	160
9	637	75	150	120
10	573	70	140	120
11	521	65	130	120
12	478	60	120	120
13	441	60	120	120
14	409	55	110	80
15	382	55	110	80
16	358	55	110	80
19	302	50	100	80
23	249	40	80	80
29	198	35	70	40
38	151	30	60	40
57	101	20	40	40

Curve delineator approach and departure spacing should include 3 delineators spaced at 2A. This spacing should be used during design preparation or when the degree of curve is known.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

Advisory Speed (MPH)	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
	A	2xA	B
65	130	260	200
60	110	220	160
55	100	200	160
50	85	170	160
45	75	150	120
40	70	140	120
35	60	120	120
30	55	110	80
25	50	100	80
20	40	80	80
15	35	70	40

If the degree of curve is not known, delineator spacing may be determined based on the Advisory Speed of the curve. Use the delineator curve spacing for each Advisory Speed (MPH).

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

CONDITION	REQUIRED TREATMENT	MINIMUM SPACING
Frwy./Exp. Tangent	RPMs	See PM-series and FPM-series standard sheets
Frwy./Exp. Curve	Single delineators on right side	See delineator spacing table
Frwy/Exp.Ramp	Single delineators on at least one side of ramp (should be on outside of curves) (see Detail 3 on D&OM(4))	100 feet on ramp tangents Use delineator spacing table for ramp curves ("straightway spacing" does not apply to ramp curves)
Acceleration/Deceleration Lane	Double delineators (see Detail 3 on D&OM(4))	100 feet (See Detail 3 on D & OM (4))
Truck Escape Ramp	Single red delineators on both sides	50 feet
Bridge Rail (steel or concrete)and Metal Beam Guard Fence	Bi-Directional Delineators when undivided with one lane each direction Single Delineators when multiple lanes each direction	Equal spacing (100'max) but not less than 3 delineators
Concrete Traffic Barrier (CTB) or Steel Traffic Barrier	Barrier reflectors matching the color of the edge line	Equal spacing 100' max
Cable Barrier	Reflectors matching the color of the edge line	Every 5th cable barrier post (up to 100'max)
Guard Rail Terminus/Impact Head	Divided highway - Object marker on approach end Undivided 2-lane highways - Object marker on approach and departure end	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5) and D & OM (6)
Bridges with no Approach Rail	Type 3 Object Marker (OM-3) at end of rail and 3 single delineators approaching rail	See D & OM(5)
Reduced Width Approaches to Bridge Rail	Type 2 and Type 3 Object Markers (OM-3) and 3 single delineators approaching bridge	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5)
Culverts without MBGF	Type 2 Object Markers	See Detail 2 on D & OM(4)
Crossovers	Double yellow delineators and RPMs	See Detail 1 on D & OM (4)
Pavement Narrowing (lane merge) on Freeways/Expressway	Single delineators adjacent to affected lane for full length of transition	100 feet

NOTES

1. Unless indicated otherwise, the delineator or barrier reflector color shall conform to the color of the pavement edge line on the side of the road where the delineators or barrier reflectors are placed.
2. Barrier reflectors may be used to replace required delineators.
3. Single red delineators may be mounted on the back side of delineator posts for wrong way driver applications

LEGEND	
	Bi-directional Delineator
	Delineator
	Sign

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-20

FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0906	00	268	VARIOUS
3-15 8-15	DIST	COUNTY		SHEET NO.
8-15 7-20	ODA	ECTOR		97

20C

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DATE:
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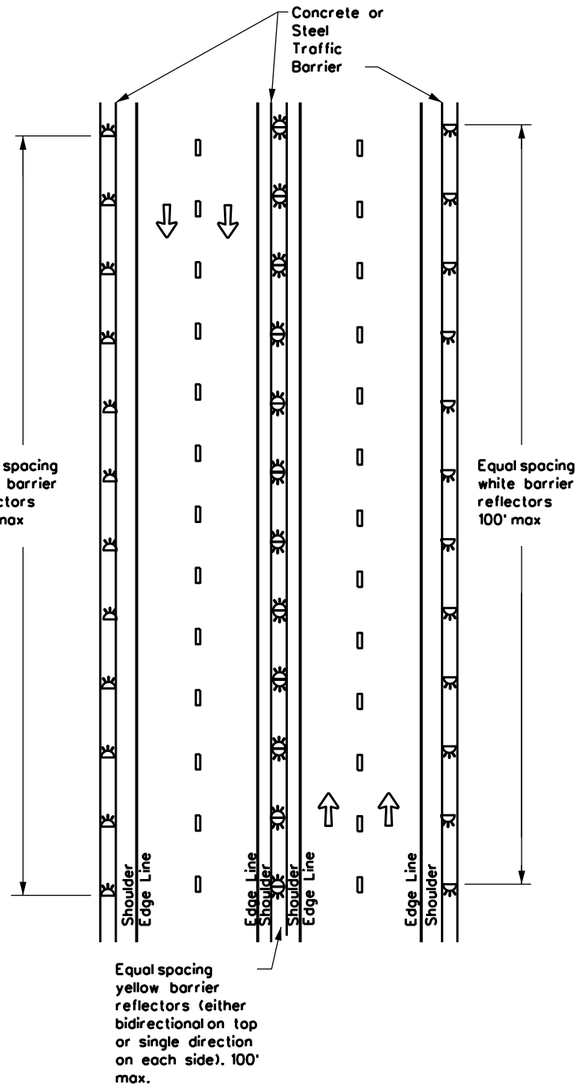
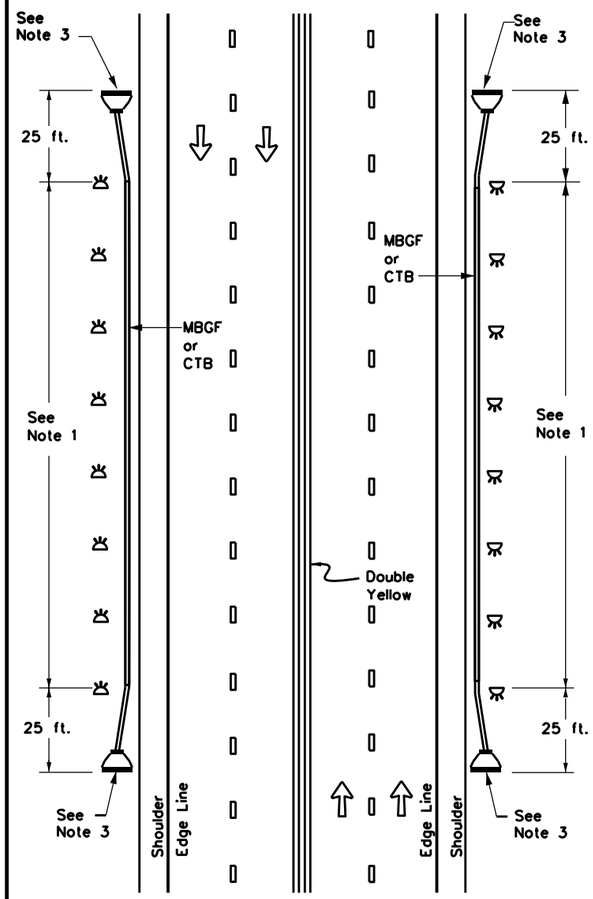
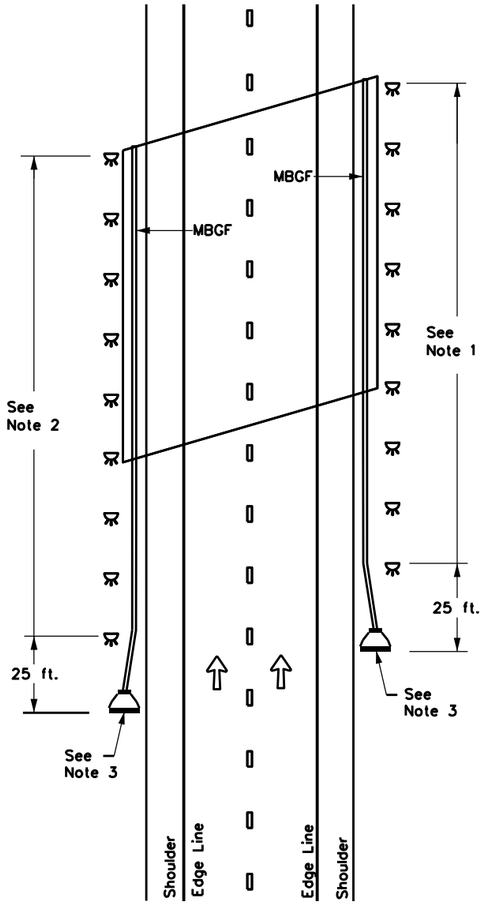
CONTINUOUS CONCRETE OR STEEL BARRIER



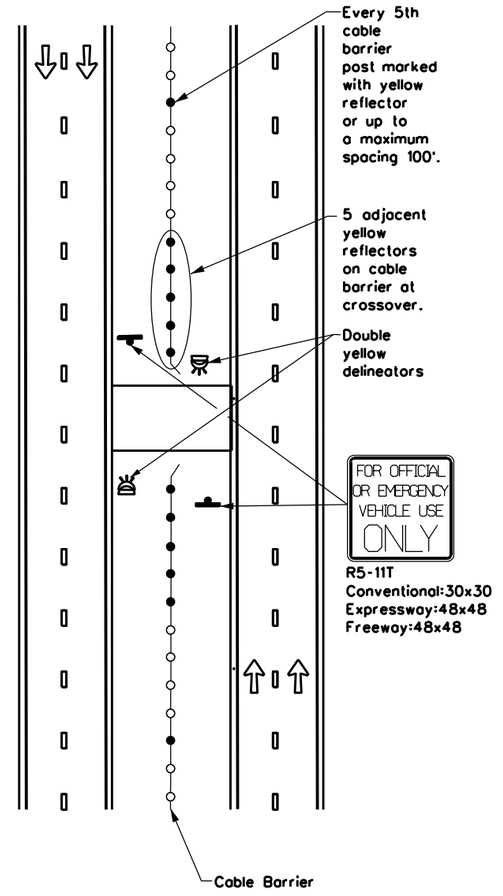
MULTI-LANE UNDIVIDED, TWO-WAY ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



DIVIDED ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



EMERGENCY CROSSOVER



NOTES

1. Equal spacing (100' max), but not less than 3 single directional white barrier reflectors or delineators. On Continuos Barrier, equal spacing (100' max.)
2. Equal spacing (100' max), but not less than 3 single directional yellow barrier reflectors or delineators.
3. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3)in front of the terminal end.

LEGEND

	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(6)-20

FILE: dom6-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0906	00	268	VARIOUS
7-20	DIST	COUNTY		SHEET NO.
	ODA	ECTOR		98

20F

STORM WATER POLLUTION PREVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with TPDES General Permit TXR150000. The operator, The Texas Department of Transportation ensures that Project specifications provide that adequate BMPs have been developed for this project. The contractor shall be the party responsible for implementing the BMPs described herein. The contractor shall implement changes approved by the Project Engineer to the SWP3 within the times specified in the SWP3 or the TPDES General Permit. Operators affected by modifications to specifications will be notified in a timely manner.

1.SITE OR PROJECT DESCRIPTION:

NATURE OF THE CONSTRUCTION ACTIVITY: SEE TITLE SHEET

POTENTIAL POLLUTANTS AND SOURCES:

Sediment laden storm water	*Storm water conveyance over disturbed areas*
Fuels,oils,and lubricants	*Construction vehicles and storage areas*
Transported soil	*Off site vehicle tracking*
Construction debris and waste	*Various construction activities*
Sanitary waste	*Restroom facilities*
Trash	*Construction site and Receptacles*

SEQUENCE OF ACTIVITIES THAT WILL DISTURB SOILS:

1. *Drilling operations to prepare for the erection of various ITS poles.*
2. *Trenching operations while setting conduit and electrical equipment.*
3. *Installing guardrails.*

AREAS:

TOTAL AREA OF PROJECT: 27.00 ACRES

TOTAL AREA OF SOIL DISTURBANCE: 02.43 ACRES

TOTAL AREA OFF-SITE:

DATA DESCRIBING THE SOIL: *Soil consists of nearly level Faskin-Duoro association, and nearly level Kimbrough-Stegall association.*

GENERAL LOCATION MAP: SEE TITLE SHEET

DETAILED SITE MAP: SEE SWP3 SITE MAP/S SHEET/S

THE LOCATION AND DESCRIPTION OF CONCRETE AND ASPHALT PLANTS:

Supporting Concrete Plant Facilities shall be located off site. See note DEDICATED CONCRETE PLANTS.

Supporting Asphalt Plant Facilities shall be located off site. See note DEDICATED ASPHALT PLANTS.

NAME OF RECEIVING WATERS: *Storm Water from this project will flow to various tributaries then into the Upper Pecos River, which is segment number 2311 of the Rio Grande Basin.*

A COPY OF TPDES CGP TXR150000 IS INCLUDED IN THE SWP3 FILE.

REMARKS: *None.*

401 WATER QUALITY CERTIFICATION: YES ____ **NO** X ____

2.BEST MANAGEMENT PRACTICES (BMPs):

EROSION AND SEDIMENT CONTROLS: Erosion and sediment controls have been designed to retain sediment on-site. Controls shall be utilized to reduce off site transport of suspended sediments and pollutants if it is necessary to pump water from the site. Control measures shall be installed per specifications or as directed. Sediment must be removed from controls per the plan requirements or manufacturers recommendations, but no later than the time that design capacity has been reduced by 50%. If sediment escapes the site, accumulations will be removed to minimize further negative effects. Controls will be developed to limit the off site transportation of litter, construction debris, and construction materials.

INTERIM(INT), PERMANENT(PER), AND 401 CERTIFICATION BMP'S:

EROSION CONTROLS:	401	INT	PER
☐ *Blankets and Matting*			
☐ *Sod*			
☐ *Preserve Existing Vegetation*			
☐ *Soil Stabilization*			
☐ *Permanent Vegetation*			
☒ *Erosion Control Logs*		X	
☐ *No Sediment Controls are Required.*			

SEDIMENT CONTROLS:	401	INT	PER
☐ *Silt Fence*			
☐ *Rock Berm*			
☐ *Buffer Zones*			
☐ *Vegetative Filter Strips*			
☐ *Ditch Block*			
☐ *Erosion Control Logs*			
☐ *No Sediment Controls are Required.*			

POST CONSTRUCTION TSS CONTROL (401 CERTIFICATION ONLY):

- ☐ *Vegetation Lined Drainage Ditch*
- ☐ *Retention/Irrigation*
- ☐ *Erosion Control Compost*
- ☐ *Grassy Swales*
- ☐ *Vegetative Filter Strips*
- ☐ *No Post Construction TSS Control Required.*

SEQUENCE OR SCHEDULE OF IMPLEMENTATION:

1. *Install erosion control logs.*
2. *Complete drilling and trenching operations within the area.*
3. *Remove erosion control logs.*
4.
5.
6.
7.
8.

The dates of major grading activities, when construction activities temporarily or permanently cease on a portion of the site, and when stabilization practices are initiated, are available in the project diary or SWP3. Stabilization measures must be initiated as soon as practicable in portions of the site where construction has temporarily or permanently ceased. The Odessa District is located in a semi-arid area and the 14 and 21 day requirements are not applicable except, as directed by the Engineer.

3.STRUCTURAL CONTROL PRACTICES:

Structural control practices for this project are listed elsewhere herein.

4.PERMANENT STORM WATER CONTROLS:

Structural control practices installed during construction will be maintained and inspected after construction has ceased on the site and until final stabilization is attained. Unless specified in the plans, after project acceptance TxDOT will assume maintenance responsibilities for the controls and measures. Other permanent controls include existing and proposed:riprap at culvert inlets and outlets,diversion dikes, swales, retaining walls, and other similar devices.

5.OTHER CONTROLS:

OFF-SITE VEHICLE TRACKING OF SEDIMENTS AND THE GENERATION OF DUST: The off site vehicle tracking of sediments shall be minimized by removal of excess dirt from the road and at entrances to the work site. Stabilized Construction Entrances and Exits shall be constructed per the plans or as directed by the Project Engineer. The generation of dust will be minimized as directed by the Project Engineer by dampening haul roads and covering haul trucks with a tarpaulin.

CONSTRUCTION AND WASTE MATERIALS: The contractor will maintain a clean, orderly construction site. Construction waste including trash, rubble, scrap and vegetation shall be disposed of in lidded dumpsters or in a manner approved by the Project Engineer. Disposal methods must meet Federal, State, and Local waste management guidelines. No construction waste will be buried or burned on site. Spoils disposal, material storage, and materials resulting from the destruction of existing roads and structures shall be stored in areas designated by the Project Engineer and protected from run-off. All waterways shall be cleared of temporary embankment, temporary bridges, matting, false work, piling, debris, or other obstructions placed during construction operations, that are not part of the finished work, as soon as practicable. All excess soil generated by the construction will be collected and disposed of by the contractor. Disposal areas, stockpiles, and haul roads shall be constructed in a manner that will minimize and control the amount of sediment that may enter receiving waters. Disposal areas shall not be located in any wetland, water body, or stream bed.

POLLUTANT SOURCES FROM AREAS OTHER THAN CONSTRUCTION: Staging areas and vehicle maintenance areas shall be located and constructed in a manner to minimize the runoff of pollutants. If potential pollutant sources are identified after the start of construction, controls and measures shall be implemented as directed by the Project Engineer.

5.OTHER CONTROLS (CONT):

DEDICATED ASPHALT PLANTS: Asphalt or asphaltic material for this project will be produced off site. If the project requires a dedicated asphalt plant and the plant within 1 mile of the project limits it will be considered an off site PSL. Consideration shall be given to on site plant and storage facilities and measures implemented as directed by the Project Engineer.

DEDICATED CONCRETE PLANTS: Cement or Concrete material for this project will be produced off site. If the project requires a dedicated concrete plant and the plant is within 1 mile of the project limits it will be considered an off site PSL. Consideration shall be given to on site plant and storage facilities and measures implemented as directed by the Project Engineer. Concrete trucks shall be washed or washed out in locations designated by the Project Engineer. The locations shall be protected by a berm sufficient to contain all waste and wash water. Wash water shall not be allowed to enter any storm drainage system or waterway. The residual material and contaminated soil shall be collected and disposed of in accordance with Federal, State, and Local guidelines. Staging areas and vehicle maintenance areas shall be located and constructed in a manner to minimize the runoff of pollutants.

HAZARDOUS MATERIALS AND SPILL REPORTING: The contractor shall take appropriate measures to prevent, minimize, and control the spillage or leakage of hazardous materials and any associated wastes on site and in maintenance and staging areas. hazardous materials shall include but are not limited to paints, acids, solvents, asphalt products, chemical additives, curing compounds, oils, fuels, and lubricants. Hazardous materials shall not be stored, accumulated, or transported in open containers subject to precipitation or spillage, but shall be stored, accumulated, or transported in closed containers of the type recommended by the manufacturer. In the event of a spill the Project Engineer should be contacted immediately. All spills shall be immediately cleaned and any contaminated soil removed and disposed of in accordance with Local, State, and Federal laws. Fuel tanks shall be protected by a secondary containment, such as a lined berm, capable of containing 1.5 times the capacity of the tank, or as approved by the Project Engineer.

OFF SITE PSLs: All off site project specific locations including dedicated asphalt plants, concrete plants, or utility installations, required by the contractor, are the contractor's responsibility. The contractor shall secure all permits required by local, state, or federal laws for off site PSLs. The contractor shall provide diagrams and areas of disturbance for all PSL's within 1 mile of the project.

SANITARY FACILITIES: All sanitary or septic wastes that are generated onsite shall be treated and disposed of in accordance with state and local regulations. Raw sewage or septage shall not be discharged or buried on site. Precaution shall be taken to prevent illicit discharges to storm water. Licensed waste management contractors shall be required to dispose of sanitary waste. Porta johns will be required for the laboratory and construction site or as directed by the Project Engineer.

VELOCITY DISSIPATION DEVICES: Velocity dissipation devices shall be placed at discharge locations and along the length of any outfall channel as shown in the plans or as directed by the Project Engineer to provide a non-erosive flow velocity from the structure to a watercourse so that the natural physical and biological characteristics and functions are maintained and protected.

6.APPROVED STATE AND LOCAL PLANS:

This SWP3 is consistent with requirements specified in applicable sediment and erosion site plans or site permits, or storm water management site plans or permits approved by federal, state, or local officials.

7.MAINTENANCE:

Control measures shall be properly installed according to specifications. If inspections or other information indicates a control has been installed, used, or is performing inadequately, the contractor must replace or modify the control as soon as practicable after discovery. Control measures shall be maintained in effective operating condition. If inspections determine that BMPs are not operating effectively maintenance will be performed as necessary to continue the effectiveness of the controls. Maintenance must be accomplished as soon as practicable. Controls adjacent to creeks, culverts, bridges, and water crossings shall have priority. Controls that have been disabled, run over, removed, or otherwise rendered ineffective must be corrected immediately upon discovery.

8.INSPECTION OF CONTROLS:

A TxDOT inspector will inspect disturbed areas of the site that have not been finally stabilized, areas used for storage of materials that are exposed to precipitation, and structural controls for evidence of, or the potential for, pollutants entering the drainage system. Sediment and erosion controls measures identified in the SWP3 will be inspected to ensure that they are operating correctly. Locations where vehicles enter or exit the site will be inspected for evidence of off-site vehicle tracking. Inspections will be conducted every month and within 24 hours after the end of a storm event of 0.5 inches or greater. The SWP3 will be modified based on the result of these inspections. Revisions will be completed within 7 Calendar days following the inspection. Revised implementation schedules will be described in the SWP3 and implemented as soon as practicable. Rain gages will be maintained on site for the duration of the project. Reports summarizing the scope of the inspections are included in the SWP3 file.

9.NON-STORM WATER COMPONENTS:

The contractor shall be required to implement appropriate pollution prevention controls and measures for all eligible non-storm water components of the discharge as approved and directed by the Project Engineer.

STATE OF TEXAS
SAUL ROMERO, JR.
118987
LICENSED
PROFESSIONAL ENGINEER

9/15/2023

Saul Romero, P.E.

SWP3 NOTES

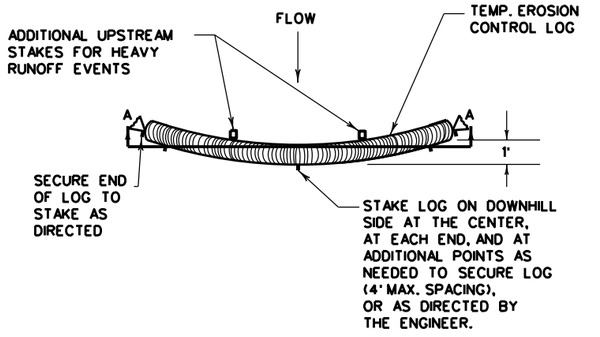
Texas Department of Transportation

REV: 10-25-16

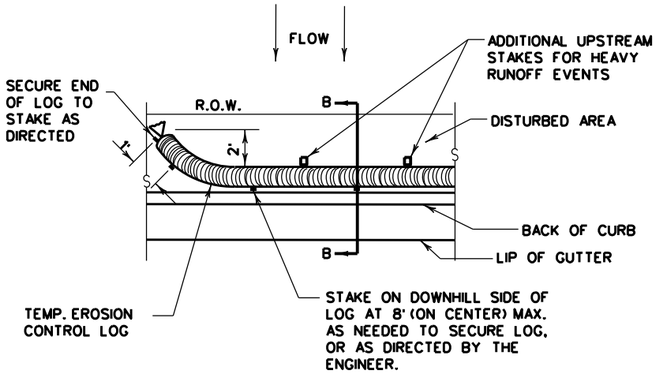
FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			99
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	DISTRICTWIDE	
CONT.	SECT.	JOB	HIGHWAY NO.
0906	00	268	VARIOUS

SWP3 Notes.dgn

DATE:
FILE:



PLAN VIEW



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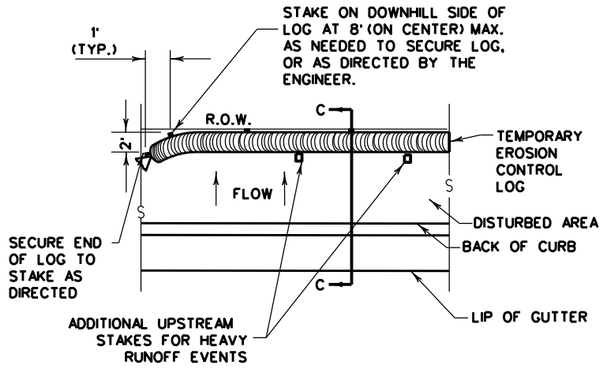

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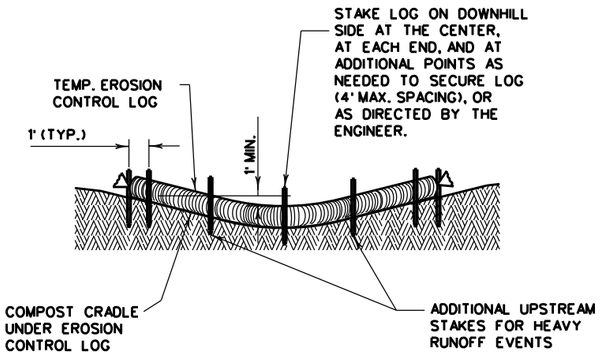
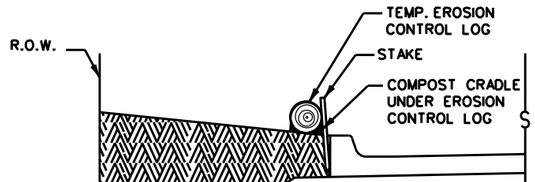


SECTION A-A

EROSION CONTROL LOG DAM

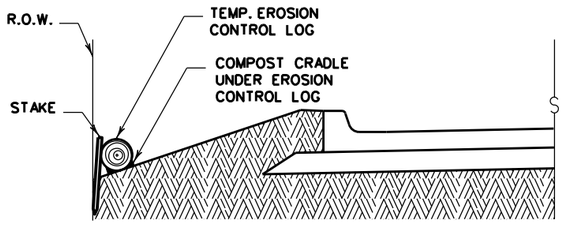
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

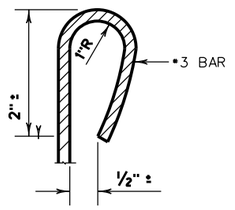
CL-BOC



SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



REBAR STAKE DETAIL

LEGEND

- CL-D — EROSION CONTROL LOG DAM
- CL-BOC — EROSION CONTROL LOG AT BACK OF CURB
- CL-ROW — EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
- CL-SST — EROSION CONTROL LOGS ON SLOPES STAKE AND TRENCHING ANCHORING
- CL-SSL — EROSION CONTROL LOGS ON SLOPES STAKE AND LASHING ANCHORING
- CL-DI — EROSION CONTROL LOG AT DROP INLET
- CL-CI — EROSION CONTROL LOG AT CURB INLET
- CL-GI — EROSION CONTROL LOG AT CURB & GRATE INLET

GENERAL NOTES:

1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE OR PHOTODEGRADABLE CONTAINMENT MESH ONLY WHERE LOG WILL REMAIN IN PLACE AS PART OF A VEGETATIVE SYSTEM. FOR TEMPORARY INSTALLATIONS, USE RECYCLABLE CONTAINMENT MESH.
4. FILL LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE THE MINIMUM COMPACTED DIAMETER SPECIFIED IN THE PLANS WITHOUT EXCESSIVE DEFORMATION.
5. STAKES SHALL BE 2" X 2" WOOD OR •3 REBAR, 2'-4' LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG, OR AS DIRECTED BY THE ENGINEER.
6. DO NOT PLACE STAKES THROUGH CONTAINMENT MESH.
7. COMPOST CRADLE MATERIAL IS INCIDENTAL & WILL NOT BE PAID FOR SEPARATELY.
8. SANDBAGS USED AS ANCHORS SHALL BE PLACED ON TOP OF LOGS & SHALL BE OF SUFFICIENT SIZE TO HOLD LOGS IN PLACE.
9. TURN THE ENDS OF EACH ROW OF LOGS UPSLOPE TO PREVENT RUNOFF FROM FLOWING AROUND THE LOG.
10. FOR HEAVY RUNOFF EVENTS, ADDITIONAL UPSTREAM STAKES MAY BE NECESSARY TO KEEP LOG FROM FOLDING IN ON ITSELF.

SEDIMENT BASIN & TRAP USAGE GUIDELINES

An erosion control log sediment trap may be used to filter sediment out of runoff draining from an unstabilized area.

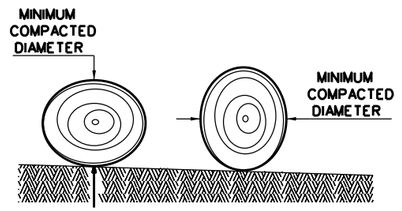
Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Control logs should be placed in the following locations:

1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets or drain inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way
5. Just before the drainage leaves the construction limits where drainage flows away from the project.

The logs should be cleaned when the sediment has accumulated to a depth of 1/2 the log diameter.

Cleaning and removal of accumulated sediment deposits is incidental and will not be paid for separately.



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

SHEET 1 OF 3

Texas Department of Transportation

Design Division Standard

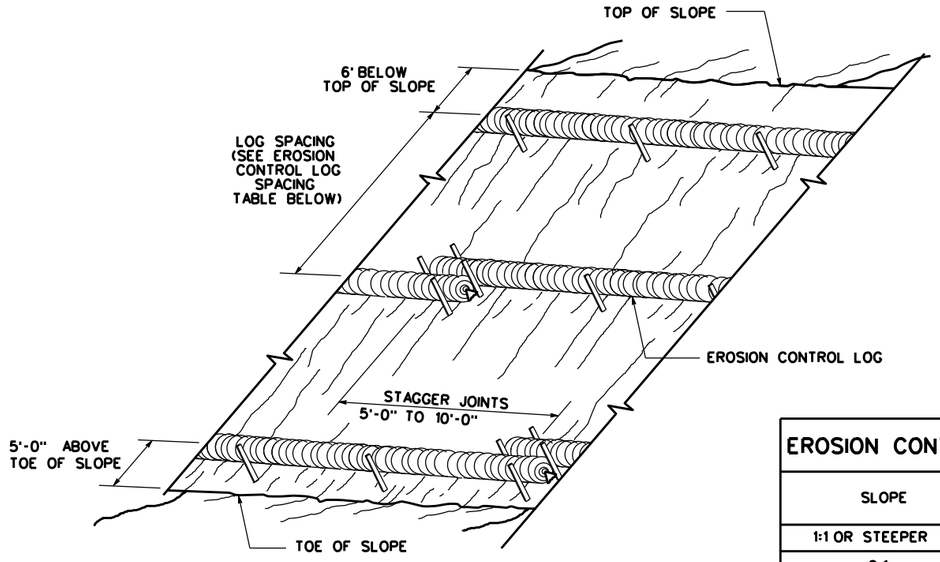
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

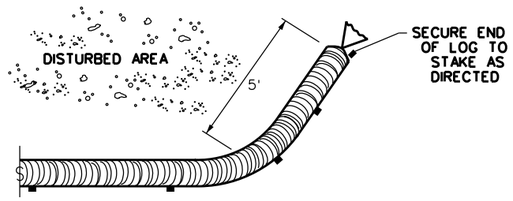
FILE: ec916	DN: TxDOT		CK: KM	DW: LS/PT		CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0906	00	268		VARIOUS	
	DIST	COUNTY				SHEET NO.
	ODA	DISTRICTWIDE				100

DATE:
FILE:



EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

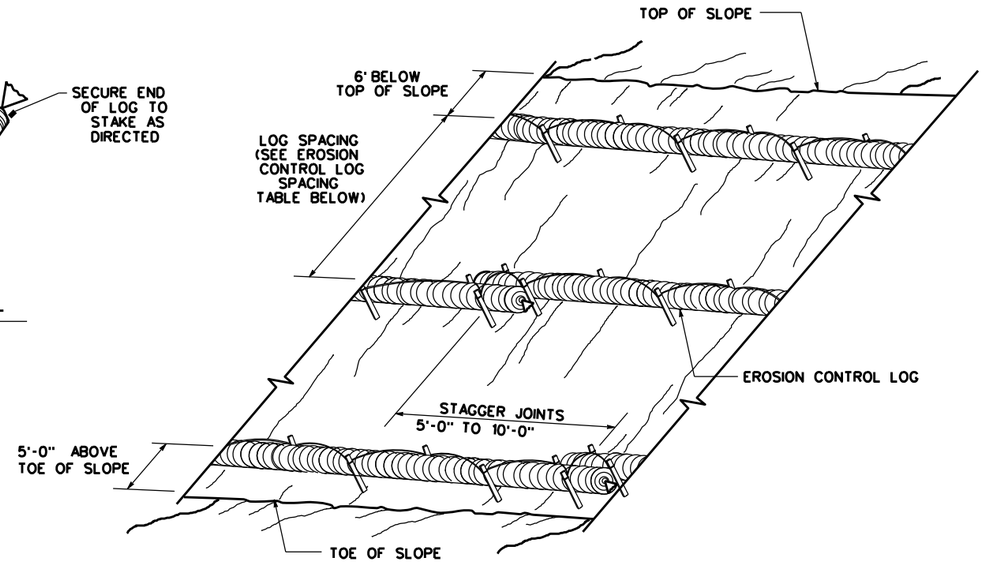
CL-SST



END SECTION RAP DETAIL

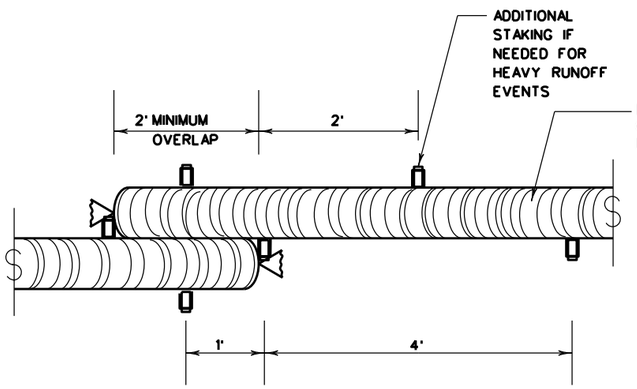
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

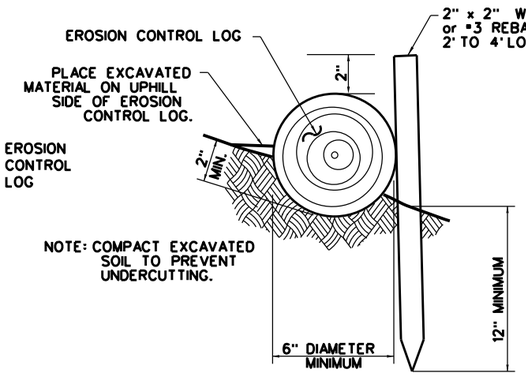
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER:
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

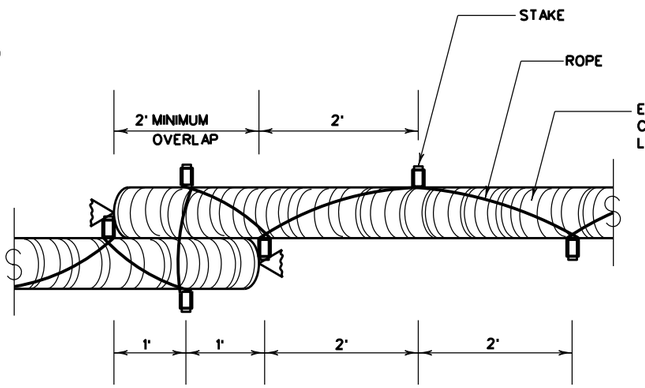


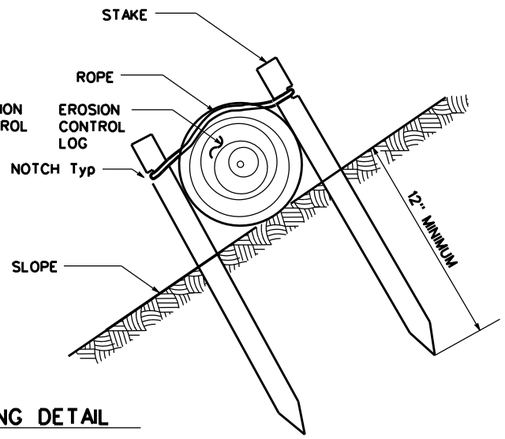


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

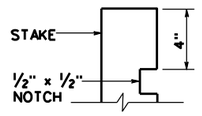
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

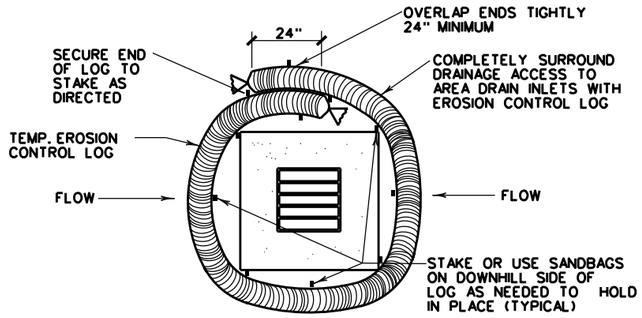
Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
EROSION CONTROL LOG
EC(9)-16

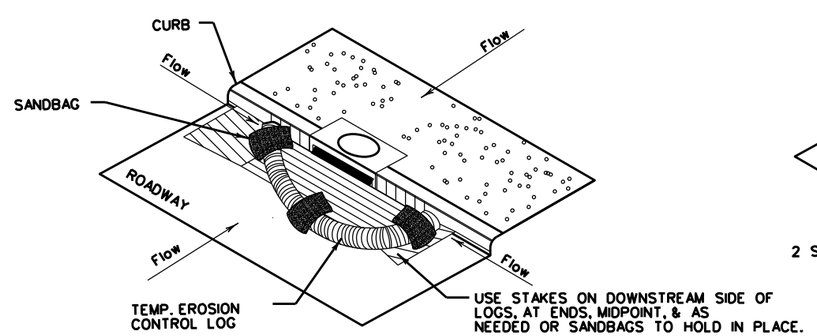
FILE: ec116	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0906	00	268	VARIOUS
	DIST	COUNTY		SHEET NO.
	ODA	DISTRICTWIDE		101

DATE:
FILE:



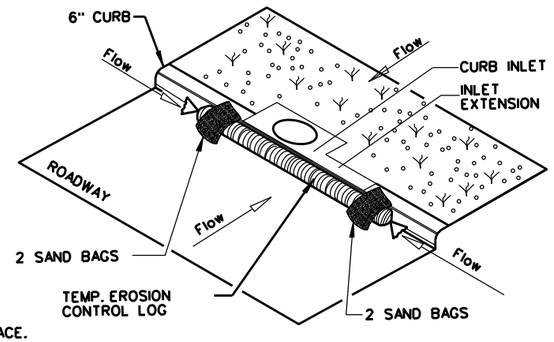
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

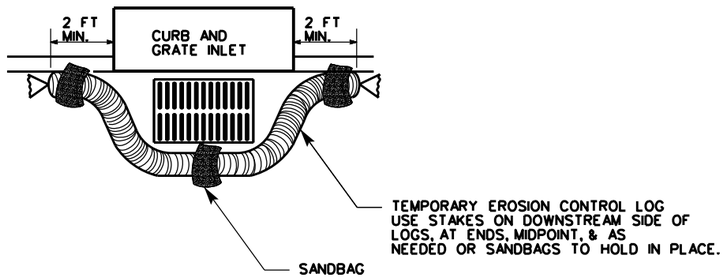
CL-CI



EROSION CONTROL LOG AT CURB INLET

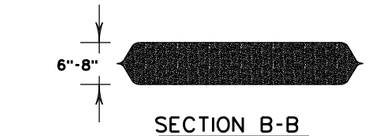
CL-CI

NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.

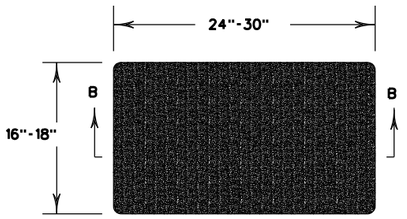


EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI



SECTION B-B



SANDBAG DETAIL

SHEET 3 OF 3

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT		CK: KM	DW: LS/PT		CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0906	00	268		VARIOUS	
	DIST	COUNTY				SHEET NO.
	ODA	DISTRICTWIDE				102

DATE:
FILE:

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

TPDES TXR 150000: Stormwater Discharge Permit or Construction General Permit required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506.

List MS4 Operator(s) that may receive discharges from this project. They may need to be notified prior to construction activities.

1.

2.

☒ No Action Required ☐ Required Action

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000

2. Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.

3. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.

4. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas.

The Contractor must adhere to all of the terms and conditions associated with the following permit(s):

☒ No Permit Required

☐ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)

☐ Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)

☐ Individual 404 Permit Required

☐ Other Nationwide Permit Required: NWP= _____

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices planned to control erosion, sedimentation and post-project TSS.

1.

2.

3.

4.

The elevation of the ordinary high water marks of any areas requiring work to be performed in the waters of the US requiring the use of a nationwide permit can be found on the Bridge Layouts.

Best Management Practices:

Erosion	Sedimentation	Post-Construction TSS
☐ Temporary Vegetation	☐ Silt Fence	☐ Vegetative Filter Strips
☐ Blankets/Matting	☐ Rock Berm	☐ Retention/Irrigation Systems
☐ Mulch	☐ Triangular Filter Dike	☐ Extended Detention Basin
☐ Sodding	☐ Sand Bag Berm	☐ Constructed Wetlands
☐ Interceptor Swale	☐ Straw Bale Dike	☐ Wet Basin
☐ Diversion Dike	☐ Brush Berms	☐ Erosion Control Compost
☐ Erosion Control Compost	☐ Erosion Control Compost	☐ Mulch Filter Berm and Socks
☐ Mulch Filter Berm and Socks	☐ Mulch Filter Berm and Socks	☐ Compost Filter Berm and Socks
☐ Compost Filter Berm and Socks	☐ Compost Filter Berm and Socks	☐ Vegetation Lined Ditches
	☐ Stone Outlet Sediment Traps	☐ Sand Filter Systems
	☐ Sediment Basins	☐ Grassy Swales

III. CULTURAL RESOURCES

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately.

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical.
Contractor must adhere to Construction Specification Requirements Specs 162, 164, 192, 193, 506, 730, 751, 752 in order to comply with requirements for invasive species, beneficial landscaping, and tree/brush removal commitments.

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS.

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

If any of the listed species are observed, cease work in the immediate area, do not disturb species or habitat and contact the Engineer immediately. The work may not remove active nests from bridges and other structures during nesting season of the birds associated with the nests. If caves or sinkholes are discovered, cease work in the immediate area, and contact the Engineer immediately.

LIST OF ABBREVIATIONS

BMP: Best Management Practice	SPCC: Spill Prevention Control and Countermeasure
CGP: Construction General Permit	SW3P: Storm Water Pollution Prevention Plan
DSHS: Texas Department of State Health Services	PCN: Pre-Construction Notification
FHWA: Federal Highway Administration	PSL: Project Specific Location
MOA: Memorandum of Agreement	TCEQ: Texas Commission on Environmental Quality
MOU: Memorandum of Understanding	TPDES: Texas Pollutant Discharge Elimination System
MS4: Municipal Separate Stormwater Sewer System	TPWD: Texas Parks and Wildlife Department
MBTA: Migratory Bird Treaty Act	TxDOT: Texas Department of Transportation
NOT: Notice of Termination	T&E: Threatened and Endangered Species
NWP: Nationwide Permit	USACE: U.S. Army Corps of Engineers
NOI: Notice of Intent	USFWS: U.S. Fish and Wildlife Service

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used.

Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Points, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act.

Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:

- Dead or distressed vegetation (not identified as normal)
- Trash piles, drums, canister, barrels, etc.
- Undesirable smells or odors
- Evidence of leaching or seepage of substances

Does the project involve any bridge class structure rehabilitation or replacements (bridge class structures not including box culverts)?

☐ Yes ☒ No

If "No", then no further action is required.
If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

Are the results of the asbestos inspection positive (is asbestos present)?

☐ Yes ☒ No

If "Yes", then TxDOT must retain a DSHS licensed asbestos consultant to assist with the notification, develop abatement/mitigation procedures, and perform management activities as necessary. The notification form to DSHS must be postmarked at least 15 working days prior to scheduled demolition.

If "No", then TxDOT is still required to notify DSHS 15 working days prior to any scheduled demolition.

In either case, the Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and asbestos consultant in order to minimize construction delays and subsequent claims.

Any other evidence indicating possible hazardous materials or contamination discovered on site. Hazardous Materials or Contamination Issues Specific to this Project:

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

VII. OTHER ENVIRONMENTAL ISSUES

(includes regional issues such as Edwards Aquifer District, etc.)

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

Texas Department of Transportation

Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0906	00	268	VARIOUS
12-12-2011 (DS)	DIST	COUNTY		SHEET NO.
05-07-14 ADDED NOTE SECTION IV.				
01-23-2015 SECTION I CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	ODA	DISTRICTWIDE		103