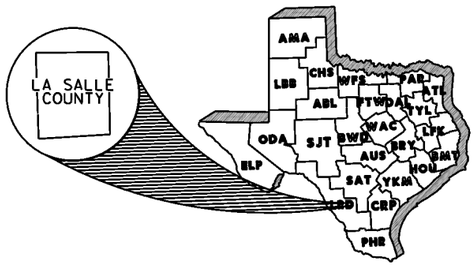
FINAL PLAN

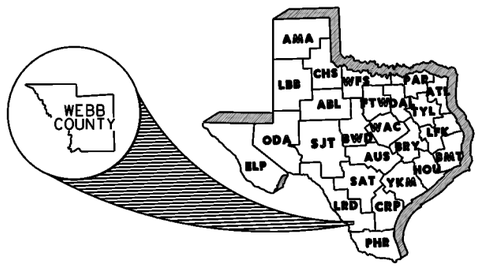
INDEX OF SHEETS

SHEET NO.	DESCRIPTION
SEE SHEET 2	

PROJECT LOCATION REFERENCE

SEE SHEET 3





STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENTS

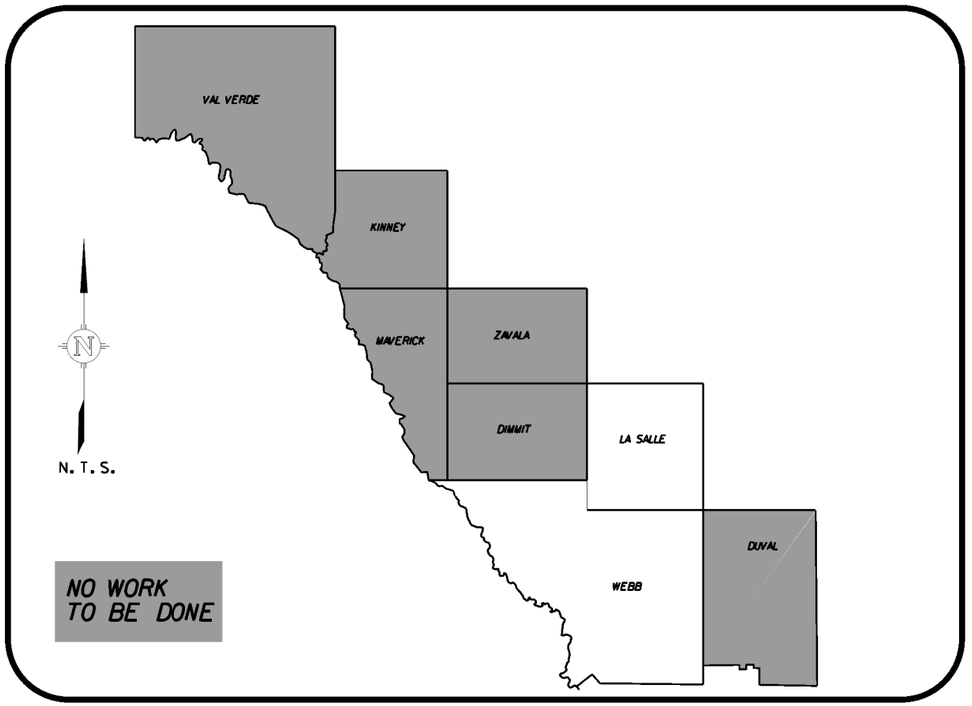
STATE AID PROJECT No. C 922-00-67

VARIOUS
WEBB, ETC.
CSJ:0922-00-067

NET LENGTH OF PROJECT : 0.00 FT = 0.00 MI — ROADWAY = 0.00 FT = 0.00 MILES; BRIDGE = 0.00 FT = 0.00 MILES

CONTROLLING LIMITS: FROM: DISTRICTWIDE
TO:

DISTRICT WIDE INSTALLATION OF DMS SIGNS



EQUATIONS: NONE
EXCEPTIONS: NONE
RAILROAD CROSSINGS: NONE

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

Texas Department of Transportation®

FED.ROAD DIV.NO.	STATE	STATE AID PROJECT NO.	SHEET NO.
6	TEXAS	C 922-00-67	1
STATE DIST.NO.	COUNTY	STATE CONTROL NO.	HIGHWAY NO.
22	WEBB, etc.	0922-00-067	VARIOUS

DESIGN CRITERIA: N/A
ADT (XXXX): N/A
ADT (XXXX): N/A
% TRUCK IN ADT: N/A
FUNCTIONAL CLASS: N/A
DESIGN SPEED: N/A
TDLR REQUIRED YES ____ NO ✓

FINAL PLANS

LETTING DATE:
DATE CONTRACTOR BEGAN WORK:
DATE WORK WAS ACCEPTED:
CONTRACTOR:
TOTAL CONTRACTOR COST:

FINALS AS BUILTS

THE CONSTRUCTION WAS PERFORMED UNDER MY SUPERVISION IN ACCORDANCE WITH THE PLANS AND CONTRACT

AREA ENGINEER

DATE

SUBMITTED FOR LETTING: 3/1/2023
DocuSigned by: Rafael Guzman
DIRECTOR OF TRANSPORTATION OPERATIONS
A54CD9F731724EC...

RECOMMENDED FOR LETTING: 3/1/2023
DocuSigned by:
AREA ENGINEER
A54CD9F731724EC...

RECOMMENDED FOR LETTING: 3/2/2023
DocuSigned by: Roberto Rodriguez III
DIRECTOR OF TRANSPORTATION, PLANNING, & DEVELOPMENT
B6BE1C4D1B6B4A7...

APPROVED FOR LETTING: 3/1/2023
DocuSigned by: E. Guzman Hyatt, P.E.
DISTRICT ENGINEER
A9A9685EGD1E4F7...

STATE OF TEXAS
RAFAEL GUZMAN
106025
LICENSED
PROFESSIONAL ENGINEER

THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY RAFAEL GUZMAN, P.E. 106025, ON 3/1/2023 2023
DocuSigned by: Rafael Guzman
5CB9C1491EA542A...

3/1/2023 AAALDAPE CSJ 0922-00-067*Title*Sheet.dgn

STANDARD SHEETS SPECIFICALLY IDENTIFIED ON THE "INDEX OF SHEETS" HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

DocuSigned by:
6330B0C9730C4A4...
, P.E.

6/13/2023
DATE

STATE OF TEXAS
DENNICE L. GARCIA
114212
LICENSED
PROFESSIONAL ENGINEER

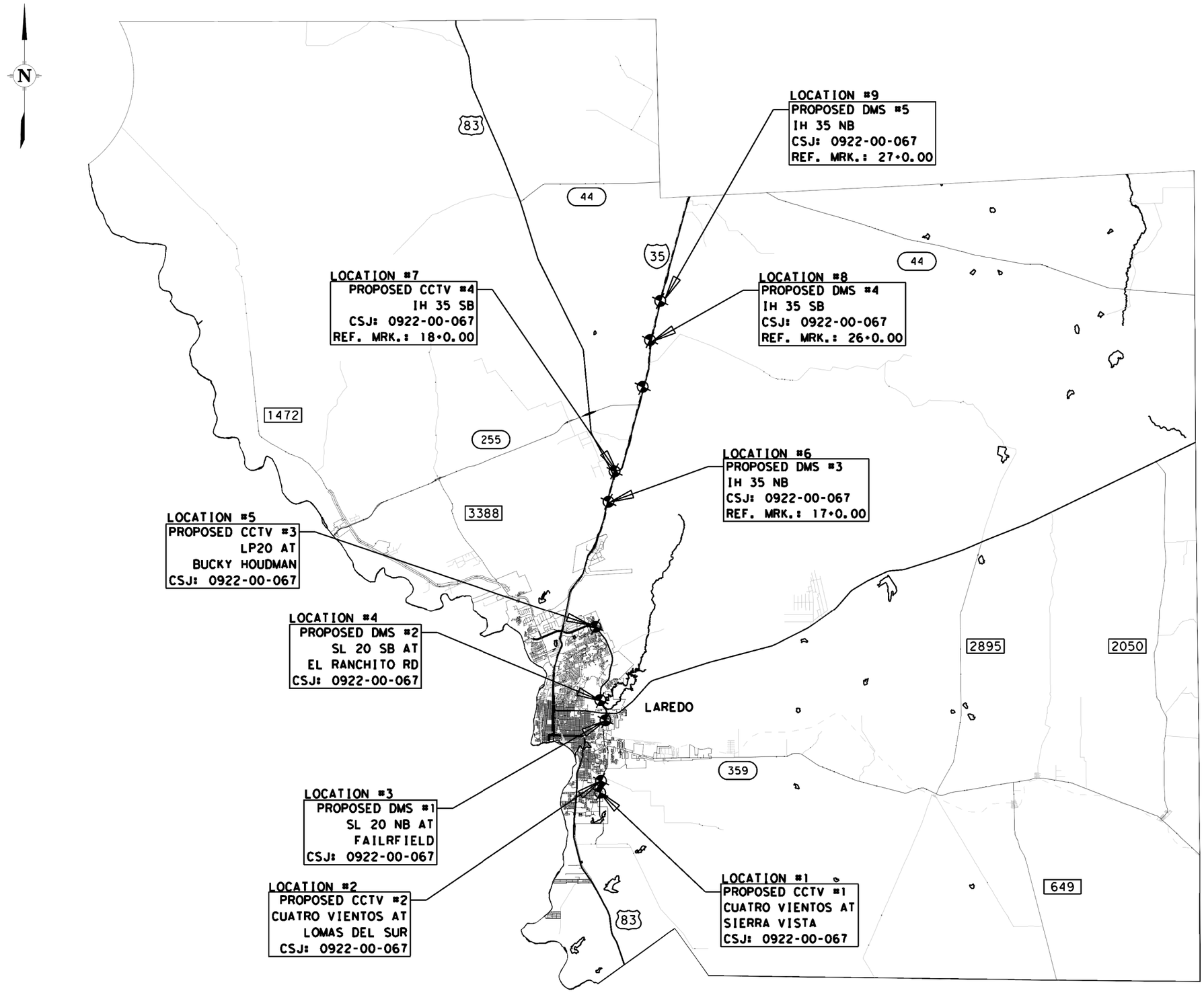
TEXAS DEPARTMENT OF TRANSPORTATION ®

INDEX OF SHEETS

DN:	DW:	STATE	SHEET NUMBER			SHEET NO.
CK: R.G.	CK: R.G.	TEXAS	SHEET 1 OF 1			
FED.RD. DIV.NO. / STATE DIST.NO.	COUNTY	CONTROL	SECTION	JOB	HIGHWAY NO.	2
6 22	WEBB, etc	0922	00	067	Various	

6/13/2023 aaldape CSJ 0922-00-067*Index*Of*Sheets.dgn

WEBB COUNTY



STATE OF TEXAS
RAFAEL GUZMAN
106025
LICENSED
PROFESSIONAL ENGINEER

THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY RAFAEL GUZMAN, P.E. 106025. ON 3/1/2023

DocuSigned by:
Rafael Guzman
3CB9C1481FA342A...

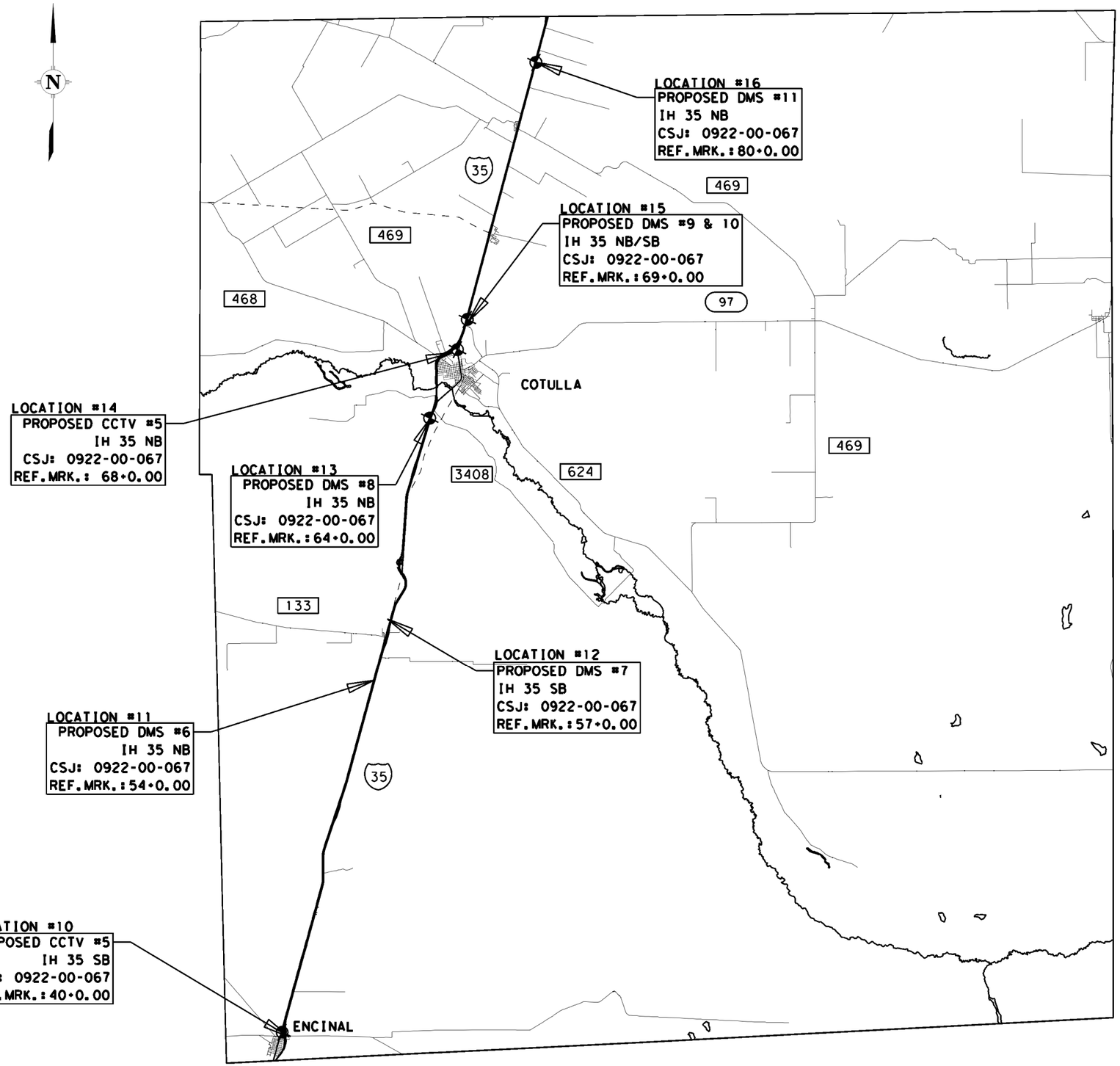
NOT TO SCALE

PROJECT LOCATION MAP

DN:	DW:	STATE	SHEET NUMBER			SHEET NO.
CK: R.G.	CK: R.G.	TEXAS	SHEET 1 OF 2			
FED.RD. DIV.NO.	STATE DIST.NO.	COUNTY	CONTROL	SECTION	JOB	HIGHWAY NO.	3
6	22	WEBB, etc	0922	00	067	Various	

3/1/2023 AAALDAPE CSJ 0922-00-067 Project*Location*Map.dgn

LA SALLE COUNTY



3/1/2023 AALDAPE CSJ 0922-00-067 Project#LocationMap.dgn

NOT TO SCALE

STATE OF TEXAS
RAFAEL GUZMAN
106025
LICENSED
PROFESSIONAL ENGINEER

THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY RAFAEL GUZMAN, P.E. 106025, ON 3/1/2023

DocuSigned by:
Rafael Guzman
5CB9C1491FA542A...

TEXAS DEPARTMENT OF TRANSPORTATION ®

PROJECT LOCATION MAP

DN:	CK: R. G.	DW:	CK: R. G.	STATE	SHEET NUMBER			SHEET NO.
				TEXAS	SHEET 2 OF 2			
FED.RD. DIV.NO.	STATE DIST.NO.	COUNTY		CONTROL	SECTION	JOB	HIGHWAY NO.	4
6	22	WEBB, etc		0922	00	067	Various	

GENERAL NOTES:

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

Project Manager – Rafael.Guzman@txdot.gov

Luis Villarreal – Luis.Villarreal@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 webpage for each project can be accessed by using the dashboard to navigate to the project you are interested in by scrolling or filtering the dashboard using the controls on the left. Hover over the blue hyperlink for the project you want to view the Q&A for and click on the link in the window that pops up.

Item 5 - Control of the Work

The Contractor shall maintain and preserve the integrity of all “existing survey markers” by avoiding the disturbance of such markers, which include all control points (horizontal and/or vertical), stakes, marks, and right-of-way markers. The Department will repair all Contractor disturbed control points, stakes, marks, and right-of-way markers. The cost for any and all repairs to the “existing survey markers” will be deducted from money due or to become due to the Contractor.

Contact the Laredo District Signal Section (956-712-7770) for coordination with TxDOT underground lines and/or facilities.

Prior to construction must call 811 to verify any utilities located within project limits. Contractor will also coordinate with utility owners listed below for any adjustments needed to sanitary sewer manholes, water valves, gas valve, telecommunication, television manhole located within project limits. The utility company is responsible for any adjustment when necessary. The work should be performed in a manner as to not delay construction contractor work activity.

Contractor will make necessary arrangements with the utility owner(s) when utility adjustments are required, as a result of construction activities.

Utility Owner	Phone Number	City/County
TXDOT	956-712-7400	Laredo/Webb
AEP Texas	361-881-5532	Laredo/Webb
AT&T	956-815-4210	Laredo/Webb
Fiberlight LLC	720-344-5577	Laredo/Webb
City of Laredo	956-727-6402	Laredo/Webb

Item 6 - Control of Materials

Contact the project engineer to request material a minimum of one work day prior to pick up. Load material with contract personnel. Store material in a safe location off TxDOT property or Right of Way, unless otherwise approved by the Engineer. Use material furnished by TxDOT only on the TxDOT project(s) intended. Return any unused material as soon as possible.

Item 7 - Legal Relations and Responsibilities

No significant traffic generator events identified.

Roadway closures during the following key dates and/or special events are prohibited (list the dates and events road closures will be prohibited).

Jurisdictional Waters of the United States and Project Specific Locations (PSL) Coordination - This project requires permit(s) with environmental resource agencies. There is a high probability that environmentally sensitive areas will be encountered on contractor designated project specific locations (PSLS) for the project (including but not limited to haul roads, equipment staging areas, parking areas, etc.).
Requirements for Work within Jurisdictional Waters of the United States:
The department has been authorized to perform work within designated areas of the project under U.S. Army Corps of Engineers (USACE) nationwide permit (NWP) #14 and/or #3a and/or #3b.

The contractor will not initiate activities in a project specific location (PSL) associated with a U.S. Army Corps of Engineers (USACE) permit area (i.e. an area where the USACE has jurisdiction) that has not been previously evaluated by the USACE as part of the permitting for this project. Such activities include, but are not limited to, haul roads, equipment staging

areas, borrow and disposal sites. Associated defined here includes materials delivered to or from the PSL. The permit area includes all waters of the U.S. and their associated wetlands affected by activities associated with this project. Special restrictions may be required for such work in these USACE jurisdictional areas. The contractor will be responsible for any and all consultations with the USACE regarding activities, including PSLs, which have not been previously evaluated by the USACE. The Contractor will provide the department with a copy of all consultation(s) or approval(s) from the USACE prior to initiating activities.

The contractor may proceed with activities in PSLs that do not affect a USACE permit area if a self-determination has been made that the PSL is non-jurisdictional or proper USACE clearances have been obtained in jurisdictional areas or have been previously evaluated by the USACE as part of the permit review of this project. The contractor is solely responsible for documenting any determination(s) that their activities do not affect a USACE permit area. The contractor will maintain copies of their determination(s) for review by the department and/or any regulatory agency.

The disturbed area for all project locations in the Contract, and the 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 required authorization from the TCEQ for Contractor PSLs for construction support activities on or off the ROW. When the total area disturbed in the Contract and PSLs within 1 mile of the project limits exceeds 5 acres, the Contractor shall provide a copy of the Contractor Notice of Intent (NOI) for the PSLs to the Engineer and to the local government operating a municipal separate storm sewer system (MS4) if applicable. If the total area of project disturbed areas and PSLs total between 1-acre but less than 5-acres, the Contractor shall post the appropriate Contractor Construction Site Notice for all Contractor PSLs to be in compliance with TCEQ storm water regulations.

In order to expedite the approval process for PSLs or to eliminate or minimize potential impacts to project progress, initiate coordination efforts with the U.S.A.C.E. within 30 days from the date of “authorization to begin work” for all PSLs that are in areas where the USACE has jurisdiction (i.e. USACE permit areas). If this is not done, the contractor waives the right to request any contract time considerations if project progress is impacted and PSL’S approval is still pending.

Requests submitted to the area engineer will be evaluated on this basis and will require documentation showing substantial early coordination efforts to expedite the approval process as herein stated. The request will include a detailed chronological summary status with dates of coordination activities with the resource agencies, including those occurring after the initial coordination, to be reviewed and confirmed by the district’s environmental section.

Project Number: C 922-00-67 **Sheet** 6

County: Webb, Etc. **Control:** 0922-00-067

Highway: Various

For PSLs that fall within USACE permit areas, the Contractor must document and coordinate with the USACE, if required, before any excavation hauled from or embankment hauled into a USACE permit area by either (1) or (2) below.

1. Restricted Use of Materials for Previously Evaluated Permit Areas. The Contractor will document both the project specific location (PSL) and their authorization, and the Contractor will maintain copies for review by the Department and/or any regulatory agency. When an area within the project limits has been evaluated by the USACE as part of the permit process for this project, then:
   a. Suitable excavation of required material in the areas shown on the plans and cross sections as specified in Item 110 is used for permanent or
   b. temporary fill (Item 132, Embankment) within a USACE permit area may be restricted.
   c. Suitable embankment (Item 132) from within the USACE permit area is used as fill within a USACE evaluated area may be restricted; and,
   d. Unsuitable excavation or excess excavation [“Waste”] (Item 110) that is disposed of at an approved location within a USACE evaluated area may be restricted.

2. Contractor Materials from Areas Other than Previously Evaluated Areas. The Contractor will provide the Department with a copy of all USACE coordination or approvals before initiating any activities for an area within the project limits that has not been evaluated by the USACE or for any off-right-of-way locations used for the following, but not limited to, haul roads, equipment staging areas, borrow and disposal sites, including:
   a. Item 132, Embankment, used for temporary or permanent fill within a USACE permit area; and,
   b. Unsuitable excavation or excess excavation [“Waste”] (Item 110, Excavation) that is disposed of outside a USACE evaluated area.

Storm Water Regulations Requirements:
The Contractor shall be responsible for (off ROW) PSLs applicable to the TCEQ Construction General Permit (CGP) requirements and will notify the Engineer of the disturbed acreage within one (1) mile of the project limits. The Contractor shall obtain any required authorization form the TCEQ for any Contractor PSLs for construction support activities on or off ROW.

Item 8 - Prosecution and Progress

Before starting work, provide a sequence of work and estimated progress schedule meeting the requirements of Section 8.5.2, “Progress Schedule.”

No closures will be allowed on the weekends which include the following holidays: January 1, the last Monday in May, July 4, the first Monday in September, the fourth Thursday in November, December 25 and Easter weekend.

Working days will be computed and charged in accordance with Article 8.3.1.4 *(choose one:* 1. Five-Day Workweek, 2. Six-Day Workweek, 3. Seven-Day Workweek, 5. Calendar Day, or 6. Other*)*

Nighttime work will be allowed to be performed, as approved and directed by the Engineer. Refer to the Sequence of Work, Traffic Control Plan, etc. shown in the plans, for other details.

Item 9 - Measurement and Payment

Submit Material on hand (MOH) payment requests at least 5 working days prior to the end of the month for payment on that month's estimate. For out-of-town MOH submit requests at least 10 working days prior to the end of the month.

Item 100 - Preparing Right of Way

Burning of brush will not be permitted.

Do not begin any clearing operations until the trees and areas of vegetation that should not be removed or disturbed by construction activities have been identified. To ensure that these areas are not disturbed, place protection fencing as shown in the plans or as directed/approved by the Engineer.

All right of way clearing operations will be coordinated with the project's SW3P and as directed/approved by the Engineer.

Item 416 - Drilled Shaft Foundations

After drill shaft installation plan is approved by the Engineer, a pre-placement meeting shall be held at least 48 hours before beginning excavation operations.

After drill shaft installation plan is approved by the Engineer, a pre-placement
Meeting shall be held at least 48 hours before beginning excavation operations.

Item 421 - Hydraulic Cement Concrete

Sulfate resistant cement concrete shall be used in all situations for structural elements in contact with the natural ground. These includes, but is not limited to, all reinforced concrete pipe, concrete box culverts, drill shafts, bridge columns, bridge abutments, wingwalls, approach slabs, inlets, manholes, junction boxes, ground boxes and all concrete riprap.

Air entrainment is not required. If concrete is supplied with air entrainment, the concrete must adhere to the requirements of item 421.4.2.4.

Item 500 - Mobilization

"Materials-on-Hand" payments will not be considered in determining percentages used to compute mobilization payments.

Item 502 - Barricades, Signs, and Traffic Handling

Designate, as the Contractor Responsible Person (CRP), an English-speaking employee on-call nights and weekends (or any other time that work is not in progress) with a local address and telephone number for maintenance of signs and barricades. This employee will be located within one (1) hour of traveling time to the project site. Notify the Engineer in writing of the name, address and telephone number of this employee. Furnish this information to local law enforcement officials.

Traffic control required for this project will not be paid for directly, but will be considered subsidiary to the various bid items.

Provide two-way radios in areas where flagmen do not have visual contact with one another or cannot communicate with one another.

Limit lane closures to a maximum of 2 miles. If more than one lane closure location is desired, provide a minimum of a 2 mile passing zone between locations. Provide a separate sign set up for each location.

Ensure equipment not in use, stockpile aggregate, and other working materials are:
A minimum of 30 feet from the edge of the travel lane;
Do not obstruct traffic or sight distance;
Do not interfere with the access from abutting property; or
Do not interfere with roadway drainage.

Erect signs in locations not obstructing the traveling public's view of the normal roadway signing or necessary sight distance at intersections and curves.

During the holiday time frame of December 21st through January 1st, every effort should be taken to ensure that all travel lanes remain open where possible.

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

It is not anticipated that any erosion, sedimentation, or environmental control devices will be needed on this project. However, in the event that such controls are necessary, the SW3P for this project shall consist of the use of any temporary erosion control measures deemed necessary by the Engineer and as provided under this item. Payment for this work will be determined in accordance with Article 4.4, "Changes in the Work".

Item 540 – Metal Beam Guard Fence

Install cast-in place concrete curb Type II in the metal beam guard fence transition (Thrie-Beam Transition). Pre-cast concrete curb will not be allowed.

Item 618 - Conduit

Place conduit in an area not exceeding 2 feet in any direction from a straight line and the depth of the conduit will be 2 feet, except when crossing a roadway, where the depth will not be more than 3 feet or less than 1 foot below the bottom of the base material in the roadway when placed by the jacking or boring method.

Item 624 - Ground Boxes

Do not place ground boxes in driveways or wheelchair ramps. Alternate ground box locations will be as directed. Ground box aprons will have a 2% slope.

Match concrete aprons to proposed rip rap elevations shown on plans.

Item 6028 – Dynamic Message Sign System

Indicate a pickup location or instructions for delivering department issue materials.

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0922-00-067 **DISTRICT** Laredo **COUNTY** Webb
HIGHWAY Various

			CONTROL SECTION JOB		**0922-00-067**	TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00126887**		
			COUNTY		**Webb**		
			HIGHWAY		**Various**		
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	416-6005	DRILL SHAFT (42 IN)	LF	126.000		126.000	
	416-6006	DRILL SHAFT (48 IN)	LF	250.000		250.000	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	5.000		5.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	350.000		350.000	
	540-6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	7.000		7.000	
	544-6006	GDRAIL END TRT(INST)(WOOD POST)(TY III)	EA	7.000		7.000	
	618-6023	CONDT (PVC) (SCH 40) (2")	LF	1,452.000		1,452.000	
	618-6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	1,121.000		1,121.000	
	620-6009	ELEC CONDR (NO.6) BARE	LF	1,145.000		1,145.000	
	620-6010	ELEC CONDR (NO.6) INSULATED	LF	2,230.000		2,230.000	
	620-6011	ELEC CONDR (NO.4) BARE	LF	880.000		880.000	
	620-6012	ELEC CONDR (NO.4) INSULATED	LF	2,640.000		2,640.000	
	620-6015	ELEC CONDR (NO.2) BARE	LF	1,723.000		1,723.000	
	620-6016	ELEC CONDR (NO.2) INSULATED	LF	5,025.000		5,025.000	
	624-6008	GROUND BOX TY C (162911)W/APRON	EA	38.000		38.000	
	628-6131	ELC SRV TY D 120/240 060(NS)GS(N)SP(O)	EA	17.000		17.000	
	650-6028	INS OH SN SUP(30 FT BAL TEE)	EA	10.000		10.000	
	6010-6002	CCTV FIELD EQUIPMENT (DIGITAL)	EA	6.000		6.000	
	6028-6001	INSTALL DMS (POLE MTD CABINET)	EA	10.000		10.000	
	6064-6038	ITS POLE (50 FT)(110 MPH)	EA	6.000		6.000	
	6064-6076	ITS POLE MNT CAB (TY 1)(CONF 2)	EA	6.000		6.000	
	6423-6003	ETHERNET SURGE PROTECTORS	EA	17.000		17.000	
	6423-6004	CELLULAR MODEMS	EA	16.000		16.000	
	06	MATERIAL FURNISHED BY STATE (PARTICIPATING)	LS	1.000		1.000	
	18	EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	

SUMMARY OF QUANTITIES

ITEM NO.	DESC NO.	DESCRIPTION	UNIT	QTY
416	6005	DRILL SHAFT (42 IN)	LF	**126.00**
416	6006	DRILL SHAFT (48 IN)	LF	**250.00**
500	6001	MOBILIZATION	LS	**1.00**
502	6001	BARRICADES, SIGNS, AND TRAFFIC HANDLING	MO	**5.00**
540	6001	MTL W-BEAM GD FEN (TIM POST)	LF	**350.00**
540	6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	**7.00**
544	6006	GUARDRAIL END TRTMNT (INST) (WOOD POST) (TY III)	EA	**7.00**
618	6023	CONDT (PVC) (SCHD 40) (2")	LF	**1452.00**
618	6047	CONDT (PVC) (SCHD 80) (2") (BORE)	LF	**1121.00**
620	6009	ELEC CONDR (NO. 6) BARE	LF	**1145.00**
620	6010	ELEC CONDR (NO. 6) INSULATED	LF	**2230.00**
620	6011	ELEC CONDR (NO. 4) BARE	LF	**880.00**
620	6012	ELEC CONDR (NO. 4) INSULATED	LF	**2640.00**
620	6015	ELEC CONDR (NO. 2) BARE	LF	**1723.00**
620	6016	ELEC CONDR (NO. 2) INSULATED	LF	**5025.00**
624	6008	GROUND BOX TY C (162911) W/APRON	EA	**38.00**
628	6131	ELC SRV TY D 120/240 060 (NS)GS(N)SP(O)	EA	**17.00**
650	6028	INS OH SN SUP (30 FT BAL TEE)	EA	**10.00**
6010	6002	CCTV FIELD EQUIPMENT (DIGITAL)	EA	**6.00**
6028	6001	INSTALL DMS (POLE MTD CABINET)	EA	**10.00**
6064	6038	ITS POLE (50 FT)(110 MPH)	EA	**6.00**
6064	6076	ITS POLE MNT CAB (TY 1)(CONF 2)	EA	**6.00**
6423	6003	INSTALL ETHERNET SURGE PROTECTOR	EA	**17.00**
6423	6004	INSTALL CELLULAR MODEM	EA	**16.00**

5/26/2023 aaldape CSJ 0922-00-067*Summary*of*Quantity*Sheet.dgn

TEXAS DEPARTMENT OF TRANSPORTATION ®

SUMMARY OF QUANTITIES

DN:	CK: R. G.	DW:	CK: R. G.	STATE	SHEET NUMBER			SHEET NO.
				TEXAS	SHEET 1 OF 1			
FED. RD. DIV. NO.	STATE DIST. NO.	COUNTY		CONTROL	SECTION	JOB	HIGHWAY NO.	10
6	22	WEBB, etc		0922	00	067	Various	

MATERIAL FURNISHED BY THE STATE

ITEM NO.	DESC NO.	DESCRIPTION	UNIT	Qty Total
		DYNAMIC MESSAGE SIGN (AMBER LED)/W CABINET	EA	**6.00**
		DYNAMIC MESSAGE SIGN (COLOR LED)/W CABINET	EA	**5.00**
		ETHERNET SURGE PROTECTOR	EA	**17.00**
		CELLULAR MODEM	EA	**16.00**

SUMMARY OF QUANTITIES

DN:	DW:	STATE	SHEET NUMBER			SHEET NO.
CK: R. G.	CK: R. G.	TEXAS	SHEET 1 OF 1			
FED. RD. DIV. NO.	STATE DIST. NO.	COUNTY	CONTROL	SECTION	JOB	HIGHWAY NO.
6	22	WEBB, etc	0922	00	067	Various

SEQUENCE OF CONSTRUCTION

GENERAL INSTRUCTIONS

THE FOLLOWING WORK WILL BE PERFORMED ON THE ROADWAY AND NEAR THE SHOULDER. REFER TO THE TCP PHASES, TCP GENERAL NOTES, AND CORRESPONDING PLAN SHEETS FOR MORE DETAILED INFORMATION.

INSTALL ALL APPLICABLE BARRICADES, SIGNS, AND WORK ZONE MARKINGS IN ACCORDANCE WITH TCP, BC AND WZ TxDOT STANDARD SHEETS FOR TRAFFIC CONTROL SETUP.

INSTALL REQUIRED SW3P MEASURES WITHIN CONSTRUCTION AS DIRECTED BY THE ENGINEER.

GENERAL SEQUENCE OF CONSTRUCTION

PHASE I - INSTALL PROPOSED ELECTRICAL SERVICES.

PHASE II - INSTALL DYNAMIC MESSAGE SIGN AND CCTV CAMERAS.

PHASE III - PERFORM FINAL CLEAN UP.

PHASE I

SET UP TCP(2-1)-18 OR TCP(5-1)-18 AS APPLICABLE.

INSTALL PROPOSED ELECTRICAL SERVICES AS SHOWN IN THE PLANS. COORDINATE WITH UTILITY COMPANY IF NEEDED.

PHASE II

SET UP TCP(2-1)-18 OR TCP(5-1)-18 AS APPLICABLE.

INSTALL PROPOSED DYNAMIC MESSAGE SIGN AND CCTV CAMERAS.

PHASE III

SET UP TCP(1-1a)-18 OR TCP(1-1c)-18 AS APPLICABLE.

PERFORM FINAL CLEAN UP AND REMOVE ALL BARRICADES AS DIRECTED BY THE ENGINEER.

STATE OF TEXAS
RAFAEL GUZMAN
106025
LICENSED
PROFESSIONAL ENGINEER

THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY RAFAEL GUZMAN, P.E. 106025.
ON 3/3/2023

DocuSigned by:
Rafael Guzman
5CB9C1491FA542A...

TEXAS DEPARTMENT OF TRANSPORTATION ®

TCP
SEQUENCE OF CONSTRUCTION

DN: F.R.	DW:	STATE	SHEET NUMBER			SHEET NO.
CK: R.G.	CK:	TEXAS	SHEET 1 OF 1			
FED.RD. DIV.NO.	STATE DIST.NO.	COUNTY	CONTROL	SECTION	JOB	HIGHWAY NO.	12
6	22	WEBB, etc	0922	00	067	Various	

3/1/2023 AAALDAPE TCP-GENNOTESp.dgn

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

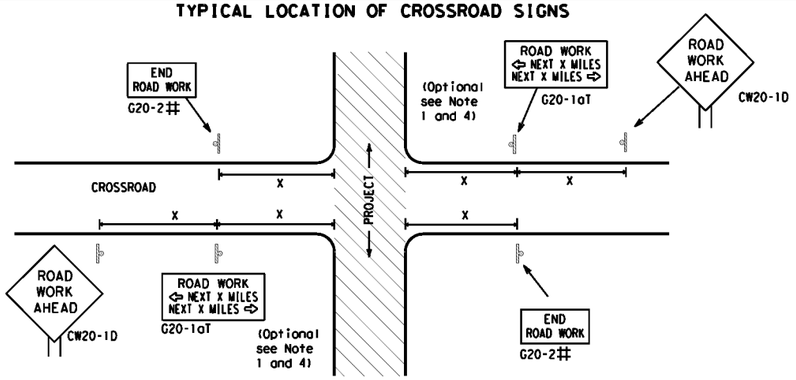
BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	00	067	Various
4-03 7-13	DIST	COUNTY		SHEET NO.
9-07 8-14	22	WEBB, etc		13
5-10 5-21				

DATE: 3/2/2023 10:46:35 AM
FILE: bc-21.dgn

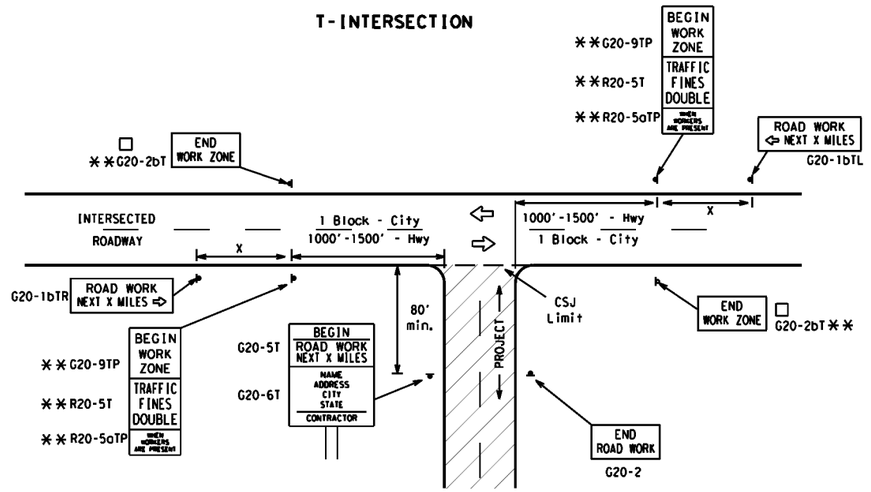
TYPICAL LOCATION OF CROSSROAD SIGNS



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.

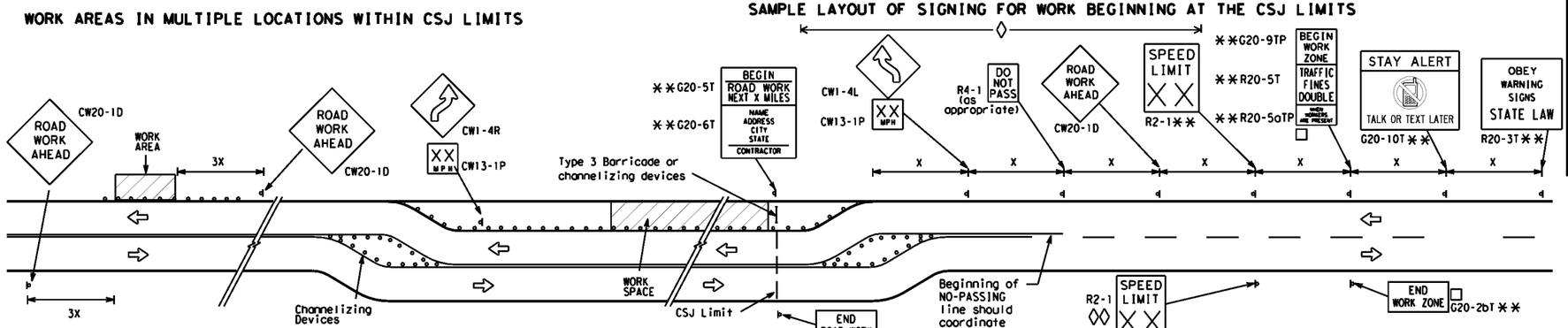
△ Minimum distance from work area to first Advance Warning sign nearest the work area and/or distance between each additional sign.

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.

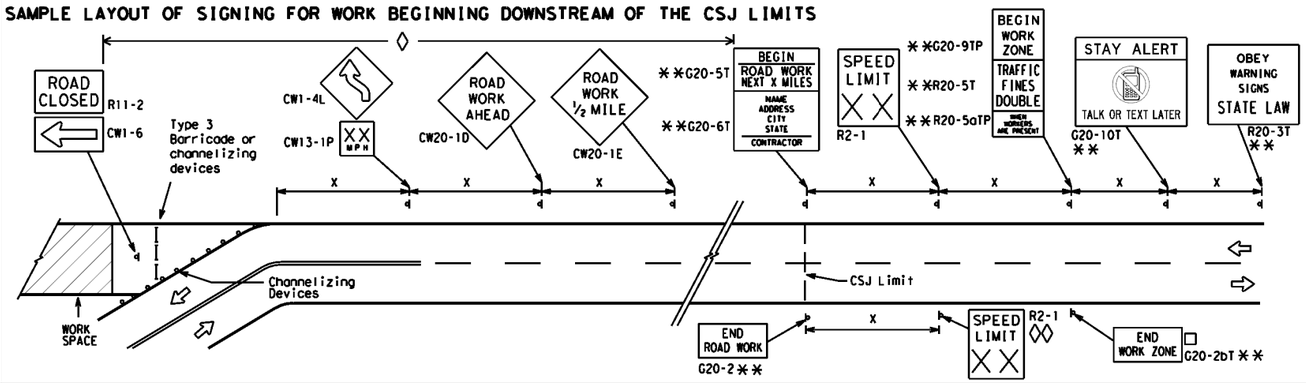
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE 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



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	0922	00	067	Various
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	22	WEBB, etc		14

DATE: 2/24/2023 2:53:06 PM
FILE: bc-21.dgn

DATE: 2/24/2023 2:53:08 PM
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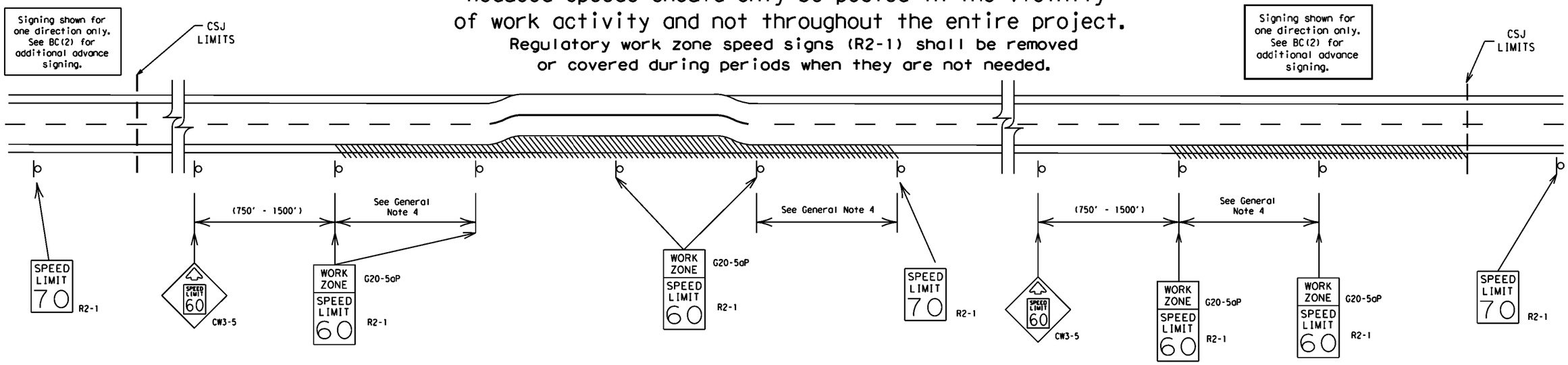
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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.

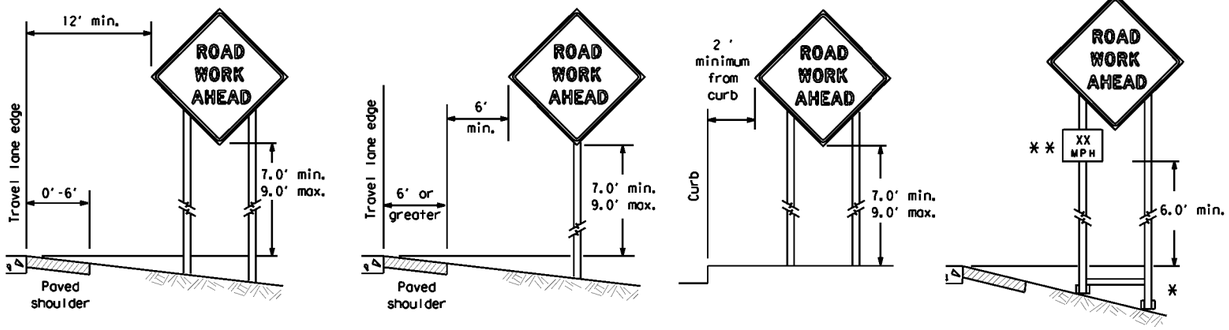
Texas Department of Transportation | Traffic Safety Division Standard

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	0922	00	067	Various
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	22	WEBB, etc		15

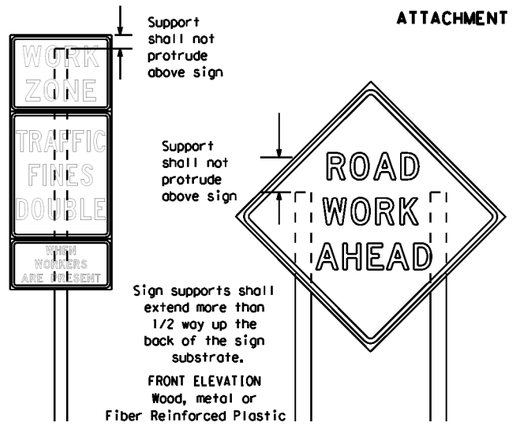
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

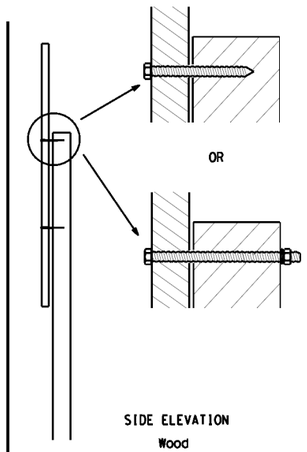


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





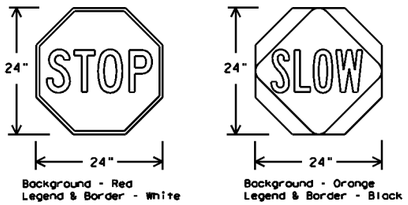
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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.

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.

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 tightness 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_{FL} 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.

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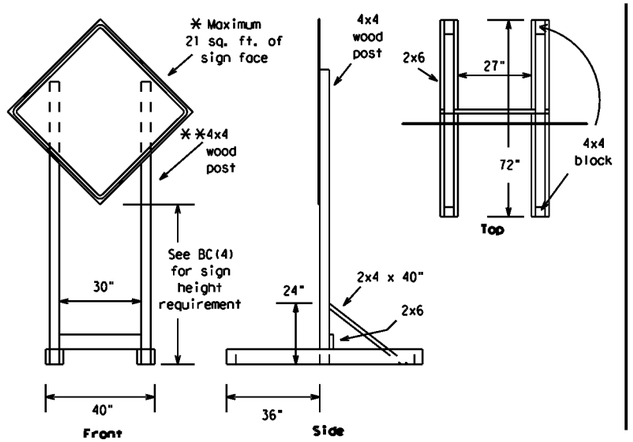
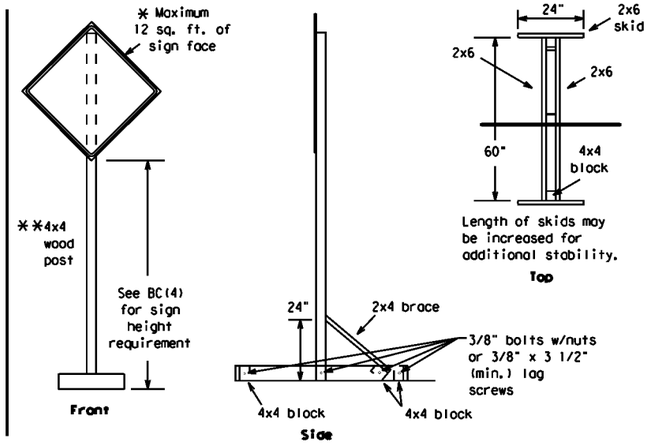
BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	00	067	Various
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	22	WEBB, etc		16

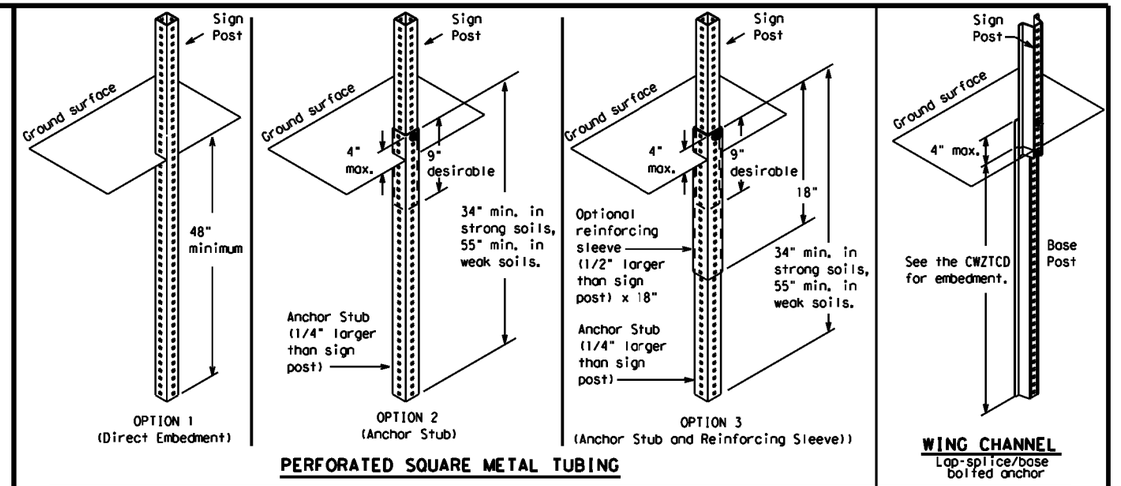
DATE: 2/24/2023 2:53:10 PM
FILE: bc-21.dgn





SKID MOUNTED WOOD SIGN SUPPORTS

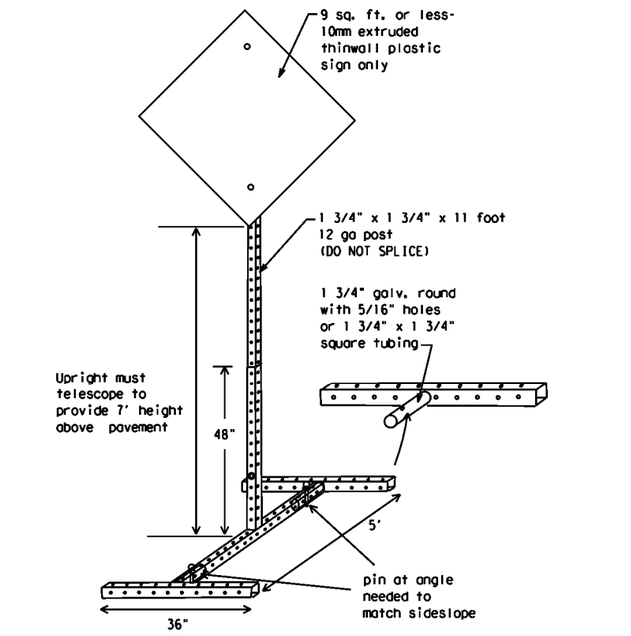
*** LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS**

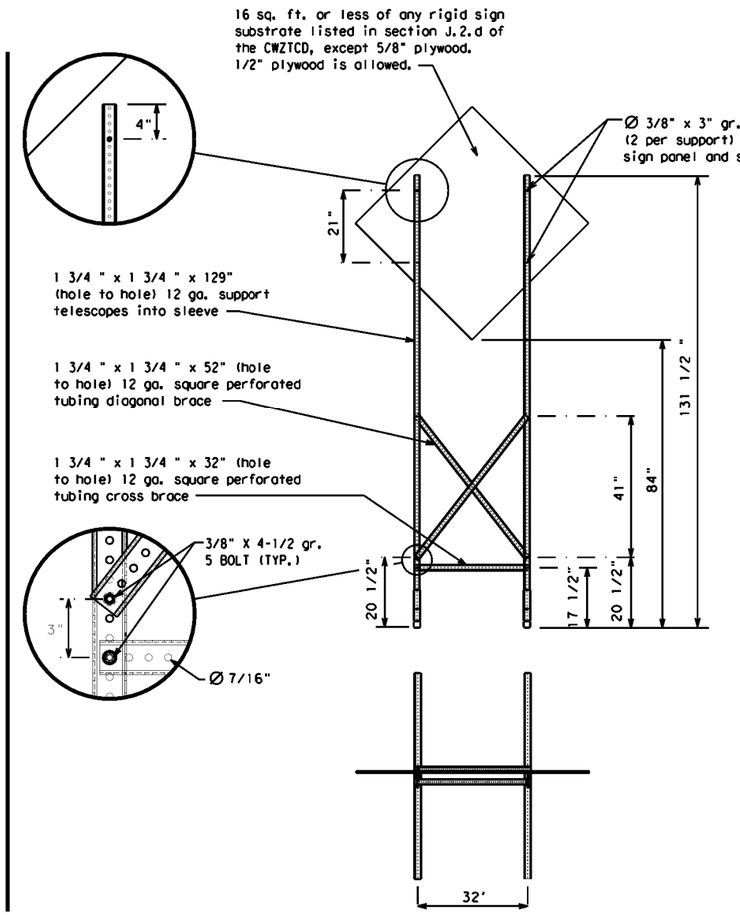


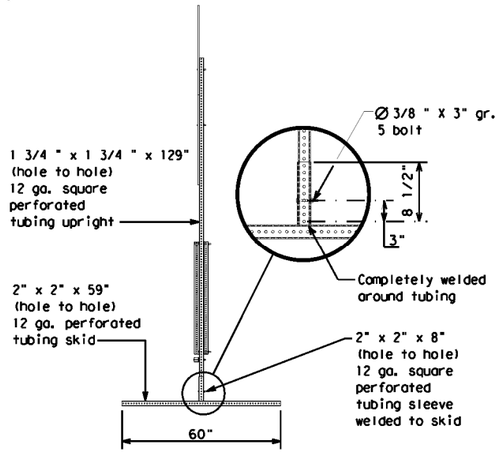
PERFORATED SQUARE METAL TUBING

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.

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BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	00	067	Various
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	22	WEBB, etc		17

DATE: 2/24/2023 2:53:13 PM
FILE: bc-21.dgn

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.

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

FILE:	bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS		0922	00	067	Various
9-07	8-14	DIST	COUNTY		SHEET NO.
7-13	5-21	22	WEBB, etc		18

DATE: 2/24/2023 2:53:16 PM
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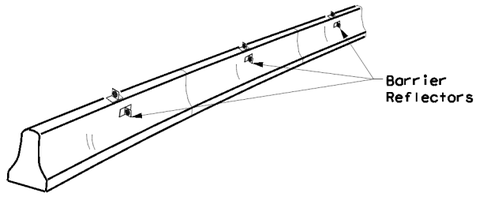
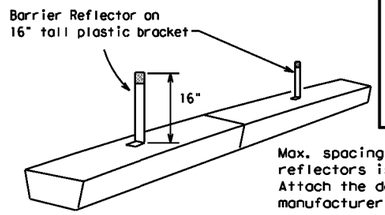
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost of the reflectors shall be considered subsidiary to Item 512.



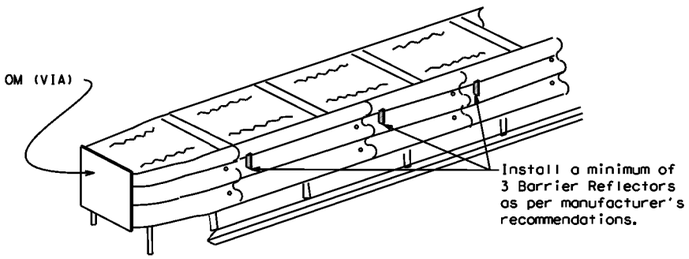
CONCRETE TRAFFIC BARRIER (CTB)

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)



DELINEATION OF END TREATMENTS

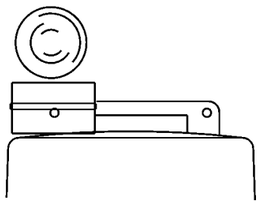
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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.

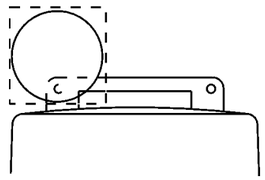
LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

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_{FL} or C_{FL} 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

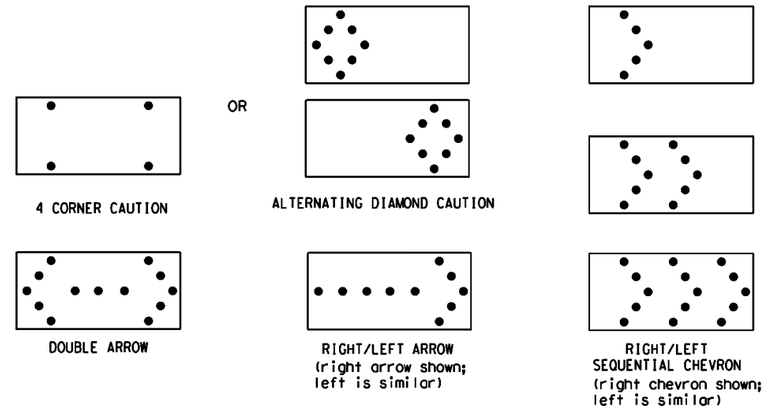
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing 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:



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 an 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

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	00	067	Various
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	22	WEBB, etc		19

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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:

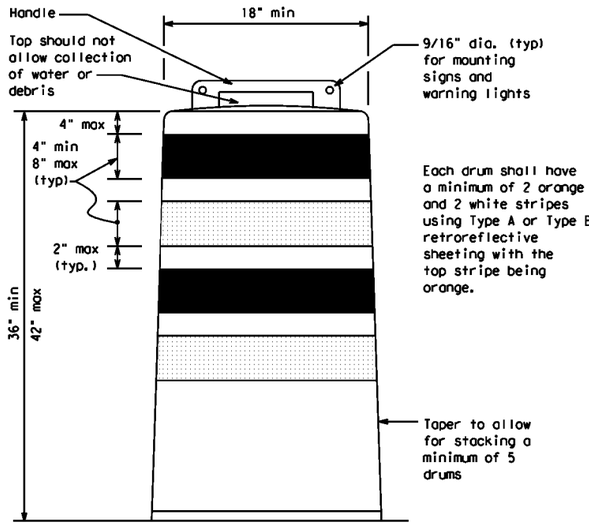
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents 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.

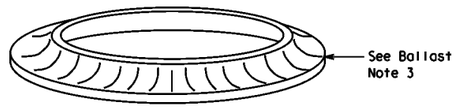
RETROREFLECTIVE SHEETING

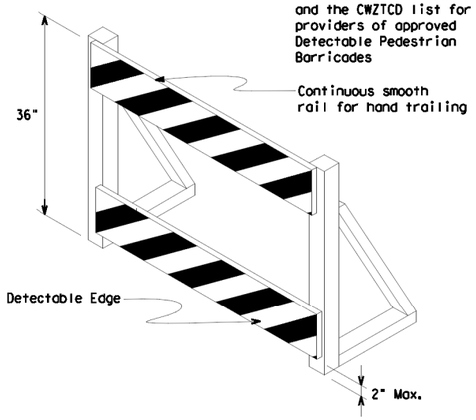
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall 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.

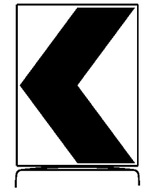




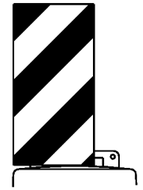


DETECTABLE PEDESTRIAN BARRICADES

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_{FL} or Type C_{FL} Orange 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.

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	00	067	Various
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	22	WEBB, etc		20
7-13				

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DATE: 2/24/2023 2:53:20 PM
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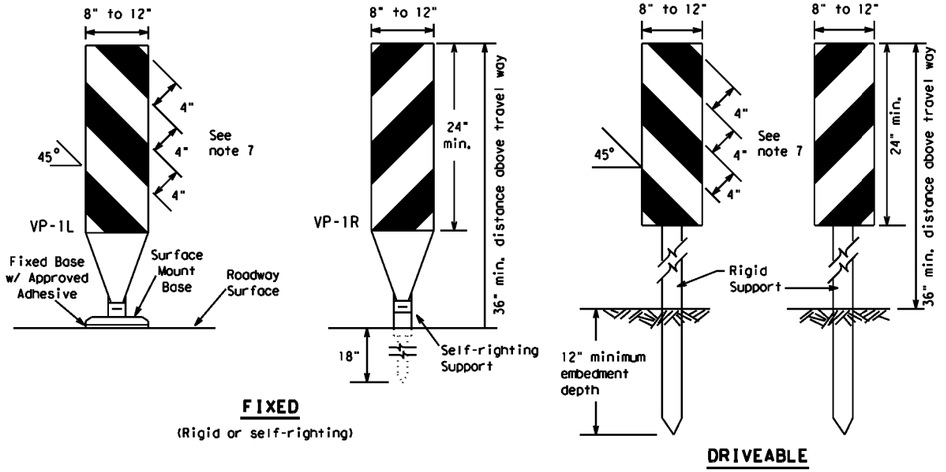
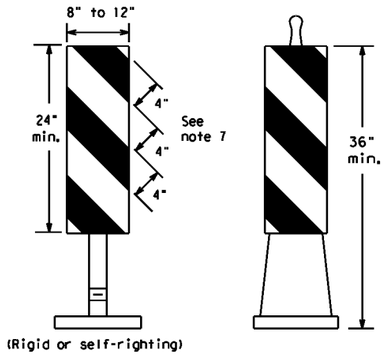


FIXED
(Rigid or self-righting)

DRIVEABLE

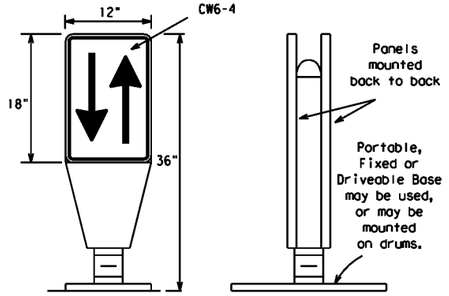


(Rigid or self-righting)

PORTABLE

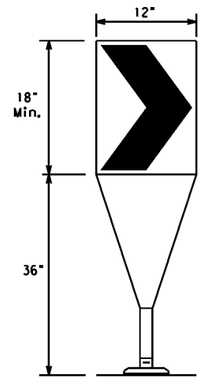
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is 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_{FL} or Type C_{FL} conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



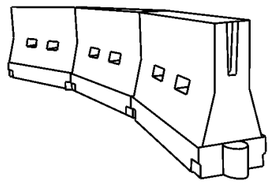
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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_{FL} or Type C_{FL} 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

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	00	067	Various
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	22	WEBB, etc		21

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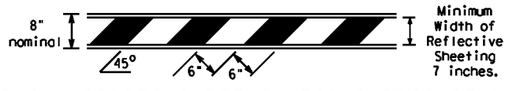
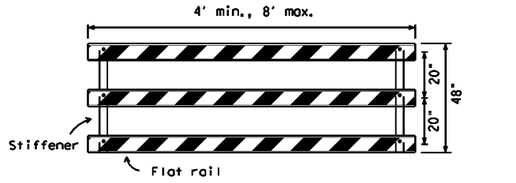
TYPE 3 BARRICADES

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 stocked 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.



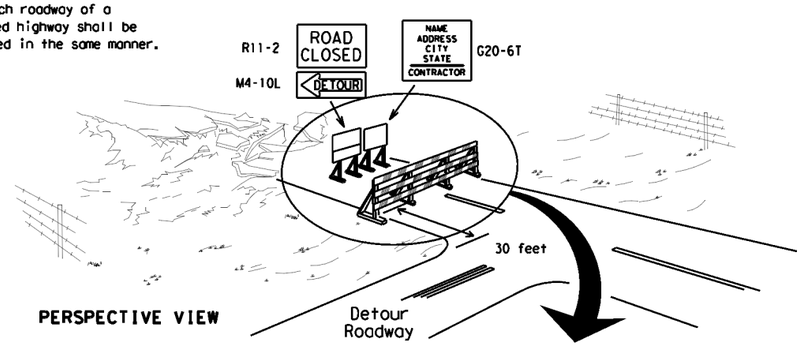
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

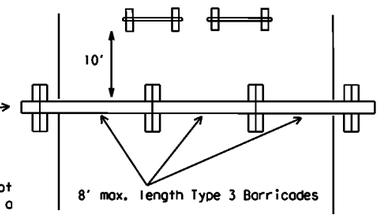
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

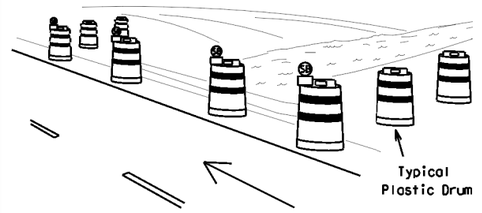
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

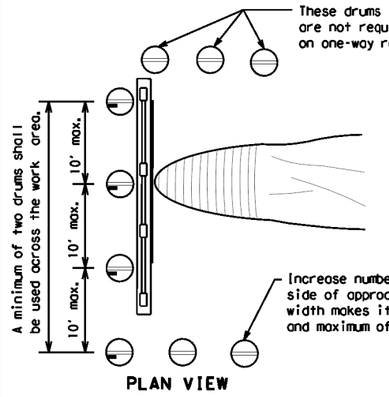
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

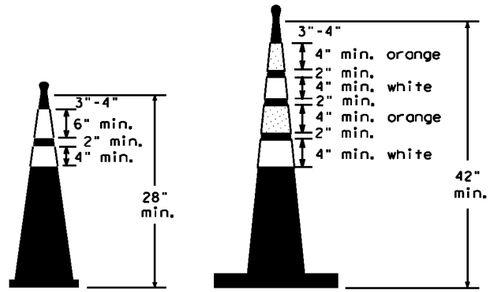
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder 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

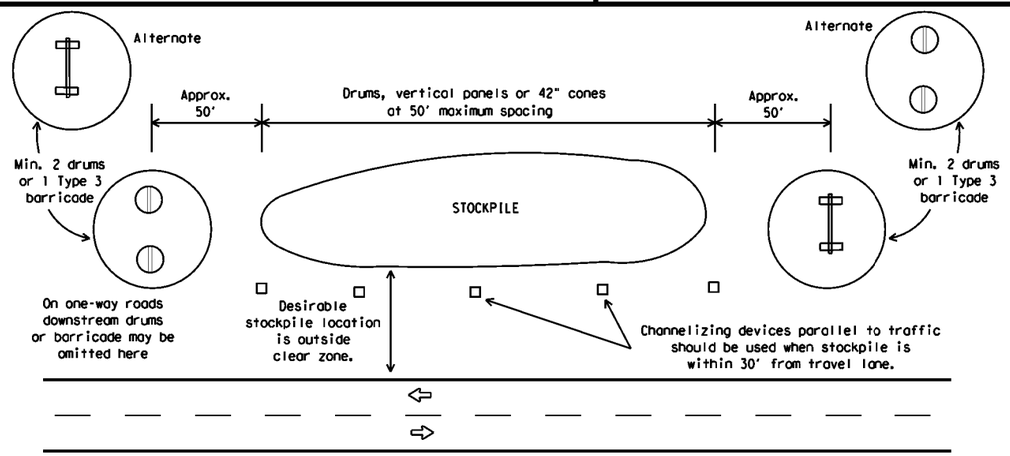
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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

SHEET 10 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 9-07 8-14 7-13 5-21	0922	00	067	Various
	DIST	COUNTY		SHEET NO.
	22	WEBB, etc		22

DATE: 2/24/2023 2:53:25 PM
FILE: bc-21.dgn

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.

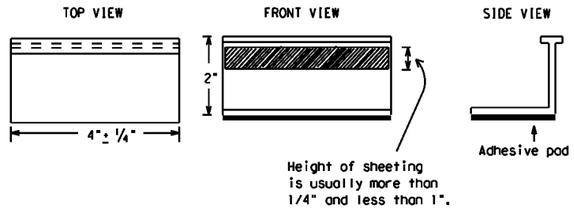
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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).

Texas Department of Transportation

Traffic Safety Division Standard

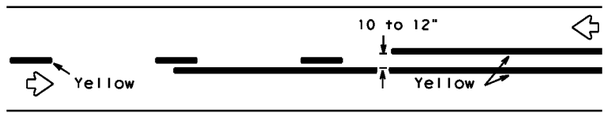
BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

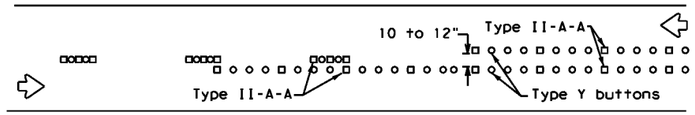
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-98 9-07 5-21 1-02 7-13 11-02 8-14	0922	00	067	Various
	DIST	COUNTY		SHEET NO.
	22	WEBB, etc		23

DATE: 2/24/2023 2:53:26 PM
FILE: bc-21.dgn

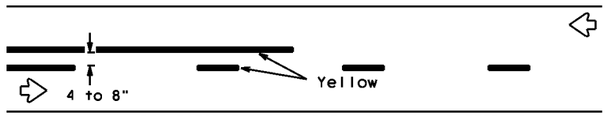
PAVEMENT MARKING PATTERNS



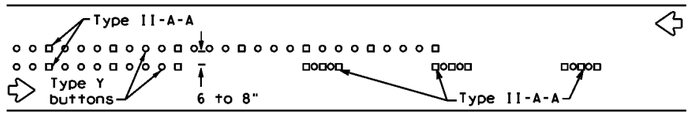
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



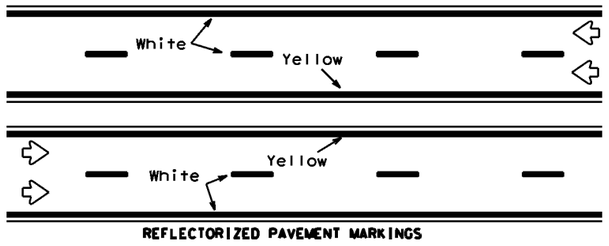
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



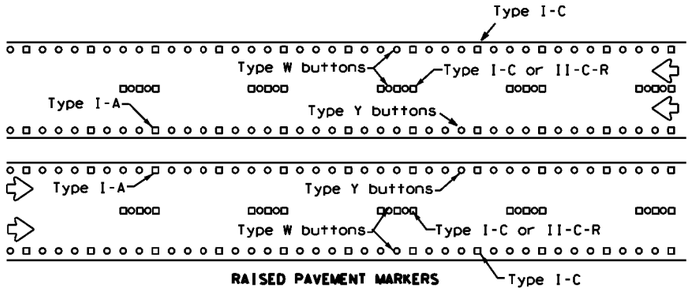
RAISED PAVEMENT MARKERS - PATTERN B

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



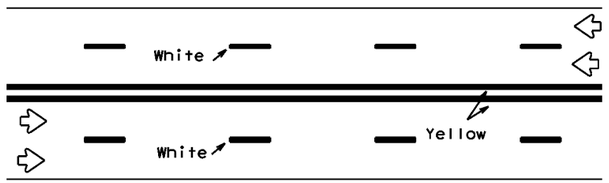
REFLECTORIZED PAVEMENT MARKINGS



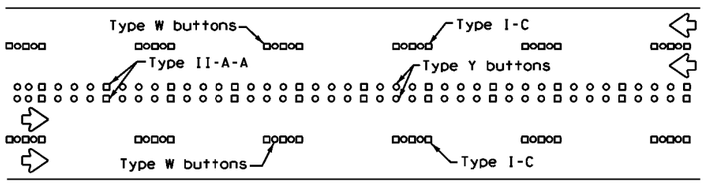
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



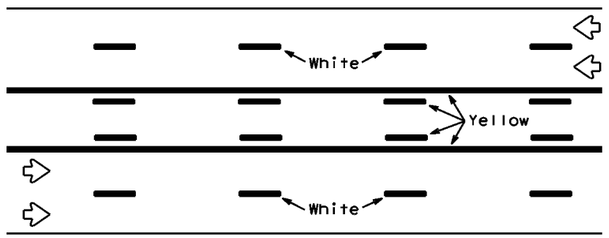
REFLECTORIZED PAVEMENT MARKINGS



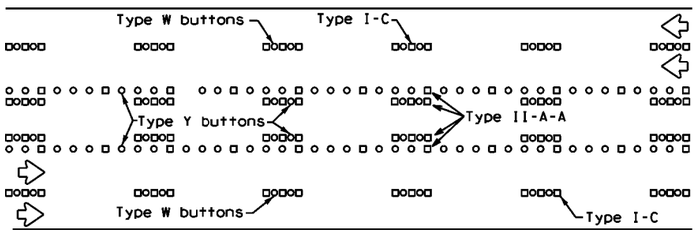
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

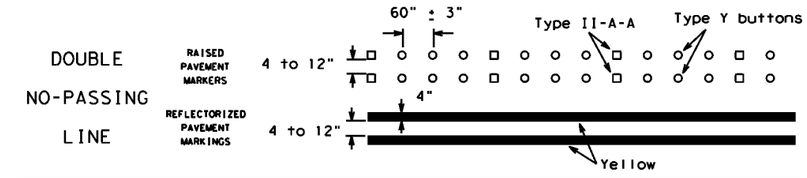
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

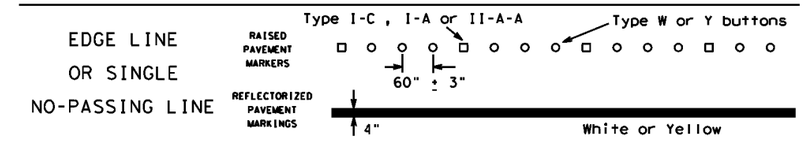
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

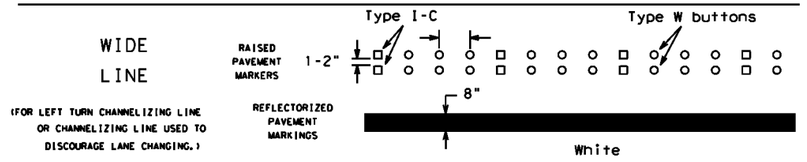


EDGE LINE OR SINGLE NO-PASSING LINE



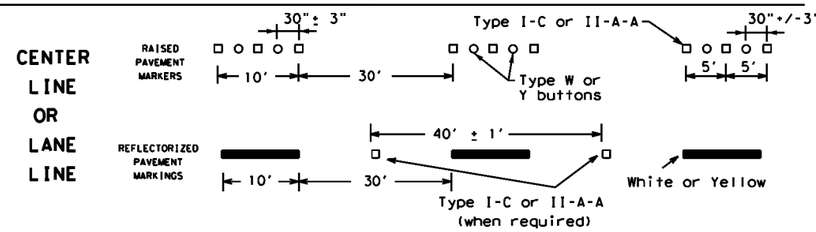
WIDE LINE

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

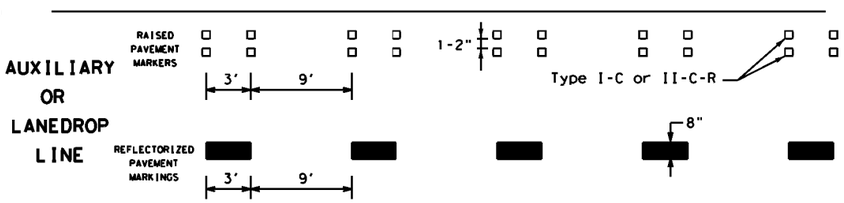


BROKEN LINES

CENTER LINE OR LANE LINE

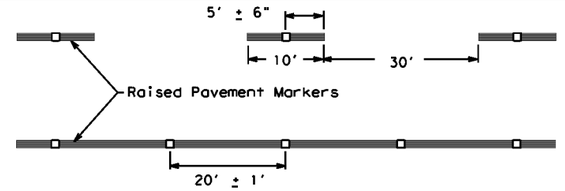


AUXILIARY OR LANEDROP LINE



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	0922	00	067	Various
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	22	WEBB, etc		24

DATE: 2/24/2023 2:53:27 PM
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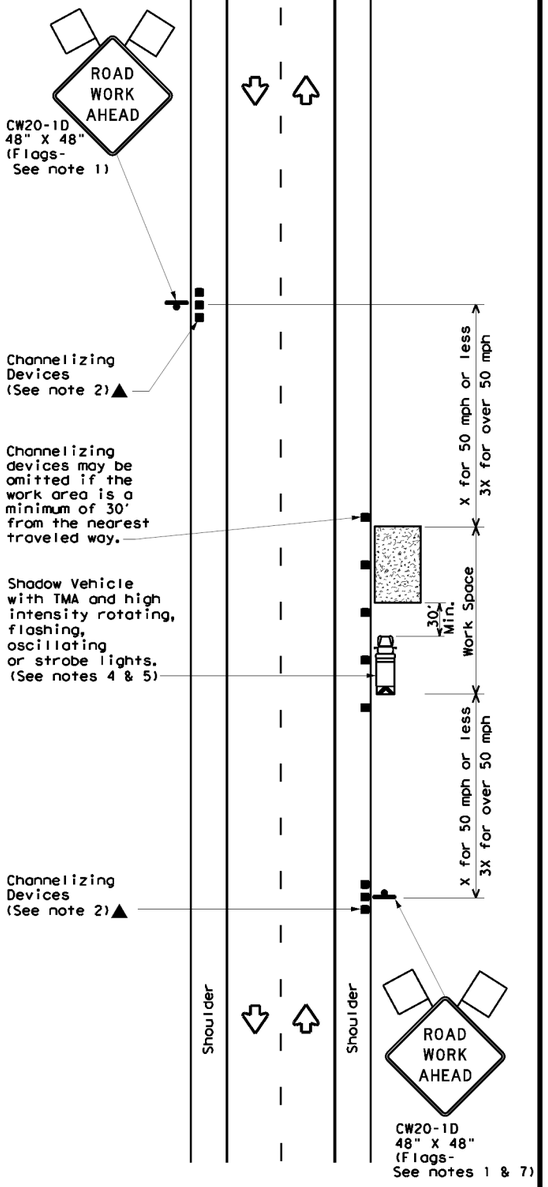
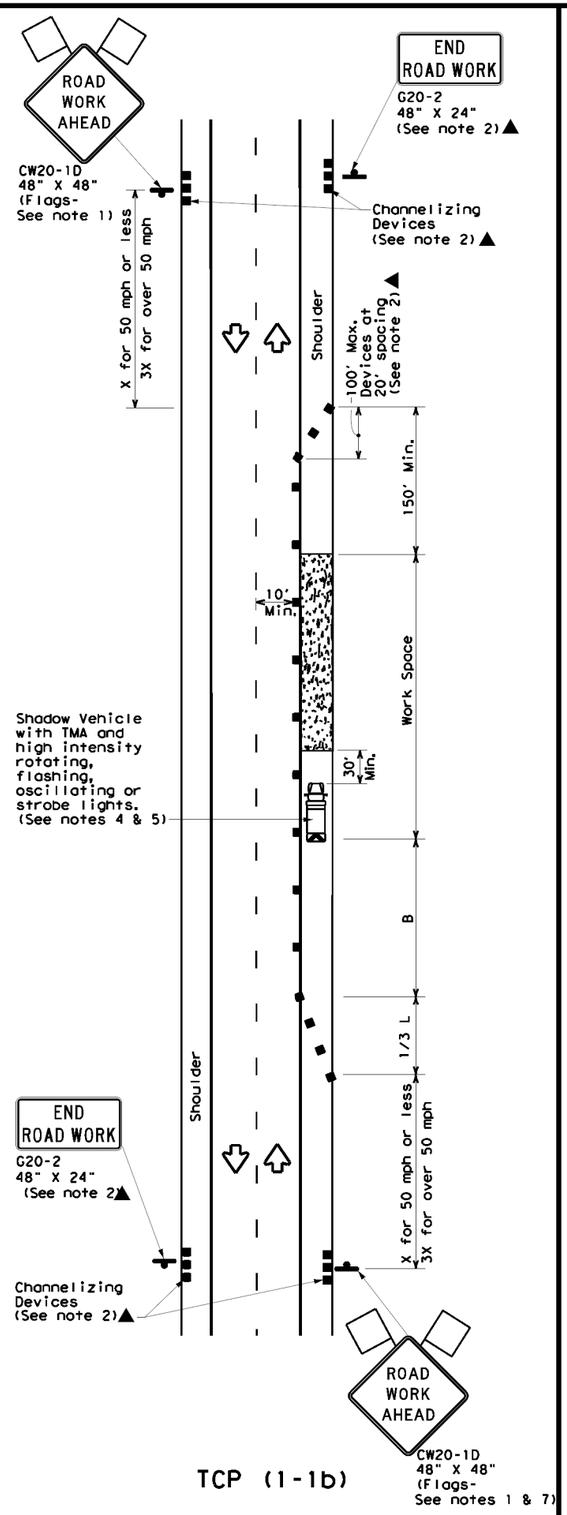


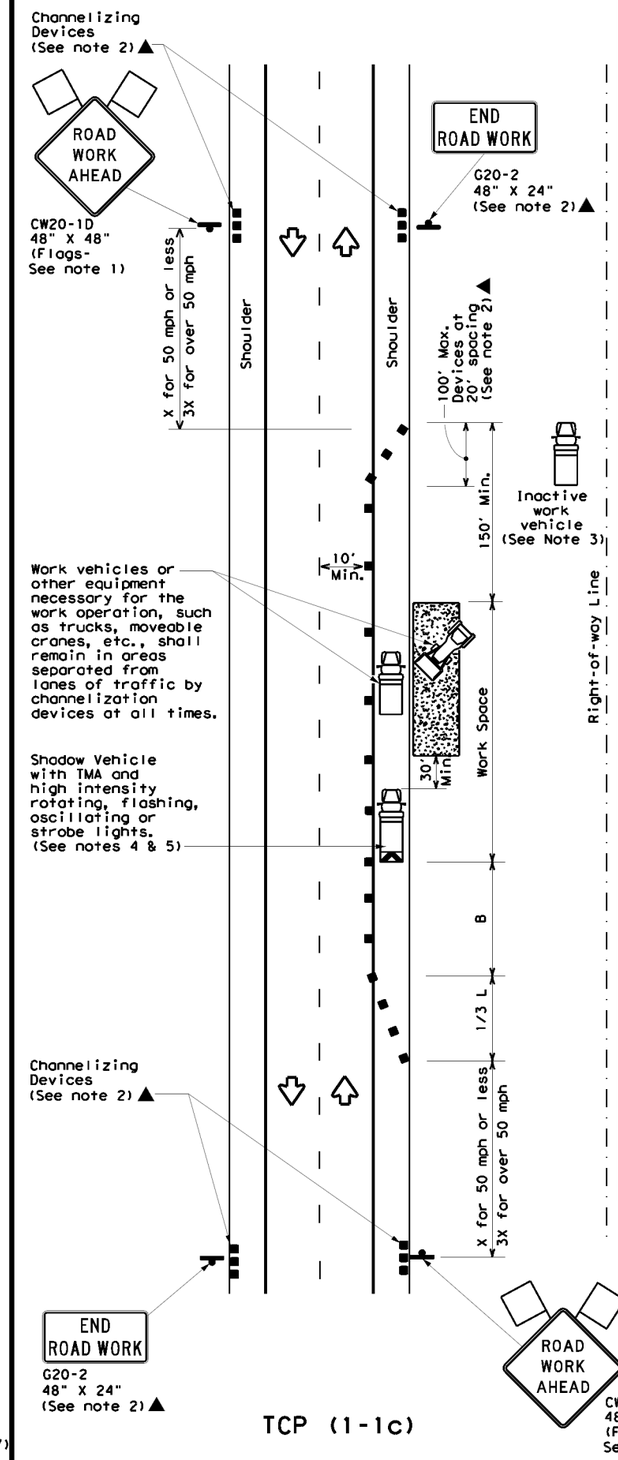
TCP (1-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (1-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (1-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L=WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

* 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
	✓	✓		

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
4. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
5. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.
6. See TCP(5-1)for shoulder work on divided highways, expressways and freeways.
7. CW21-5 "SHOULDER WORK" signs may be used in place of CW20-1D "ROAD WORK AHEAD" signs for shoulder work on conventional roadways.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(1-1)-18

FILE: tcp1-1-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98	0922	00	067	Various
8-95 2-12	DIST	COUNTY		SHEET NO.
1-97 2-18	22	WEBB, etc		25

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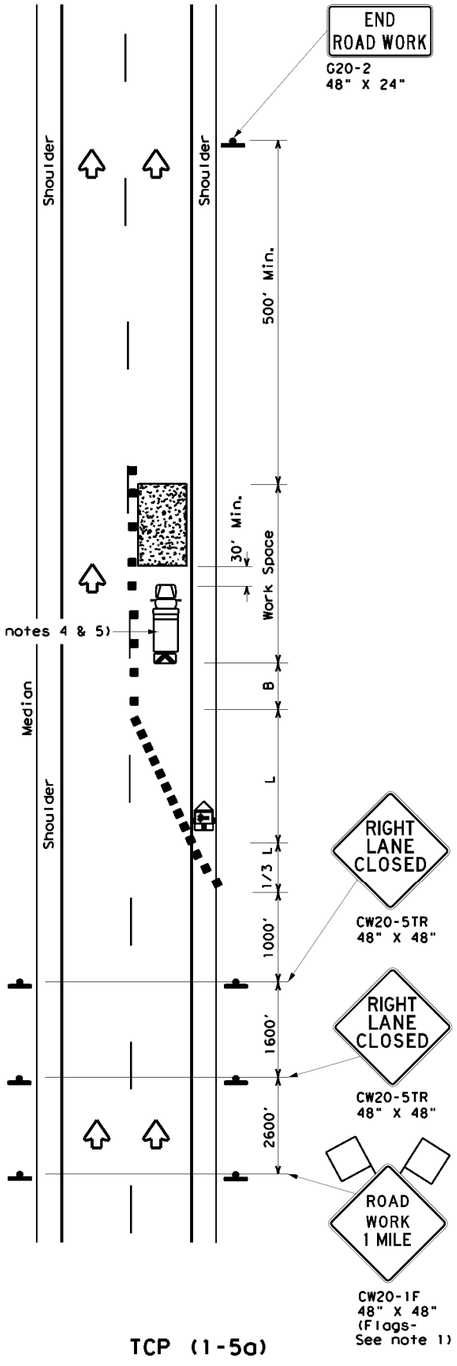
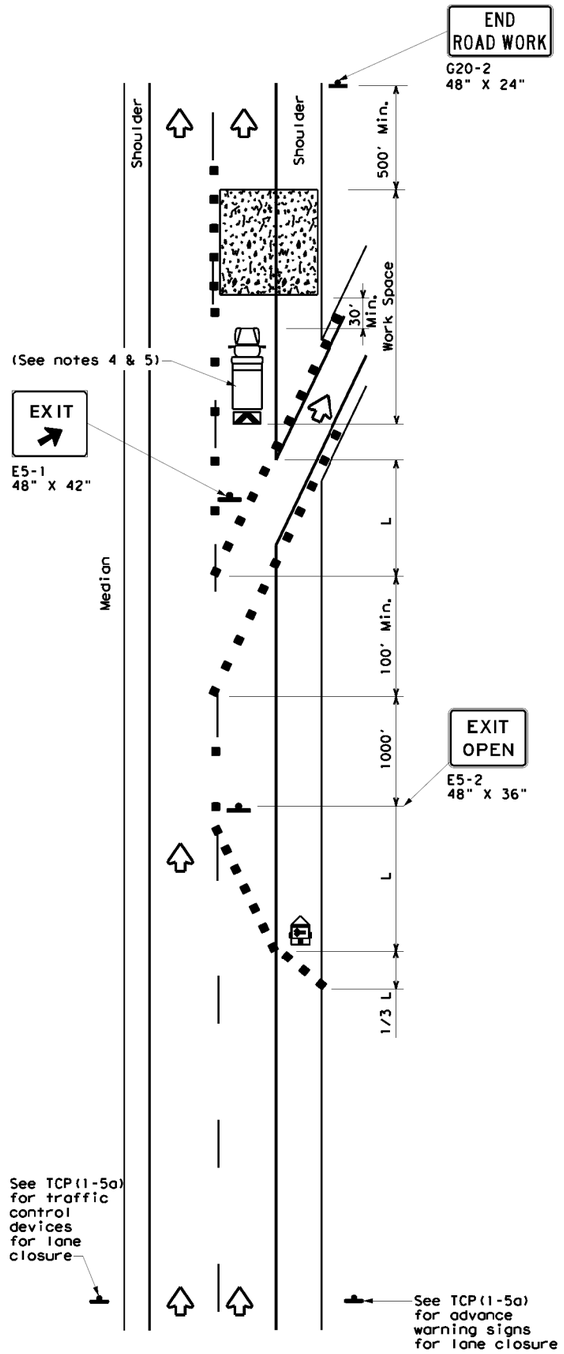


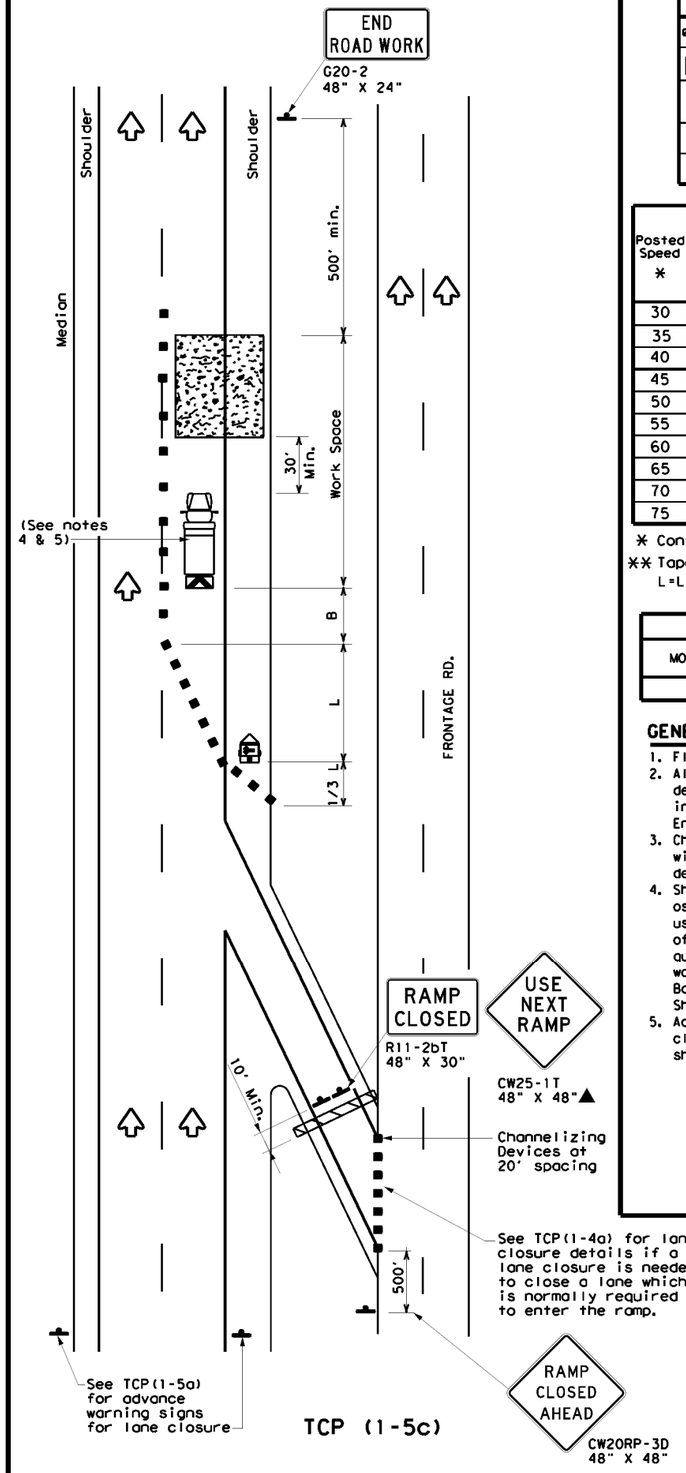
TCP (1-5a)

ONE LANE CLOSURE



TCP (1-5b)

LANE CLOSURE NEAR EXIT RAMPS



TCP (1-5c)

LANE CLOSURE NEAR ENTRANCE RAMPS

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	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L=WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

* 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
		✓		

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. Channelizing devices used to close lanes may be supplemented with the Chevron Alignment Sign placed on every other channelizing device. Chevrons may be attached to plastic drums as per BC Standards.
4. Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
5. Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES FOR DIVIDED HIGHWAYS

TCP(1-5)-18

FILE: tcp1-5-18.dgn	DN:	CK:	DW:	CK:
©TxDOT February 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-18	0922	00	067	Various
	DIST	COUNTY		SHEET NO.
	22	WEBB, etc		26

DATE: 2/24/2023 2:54:01 PM
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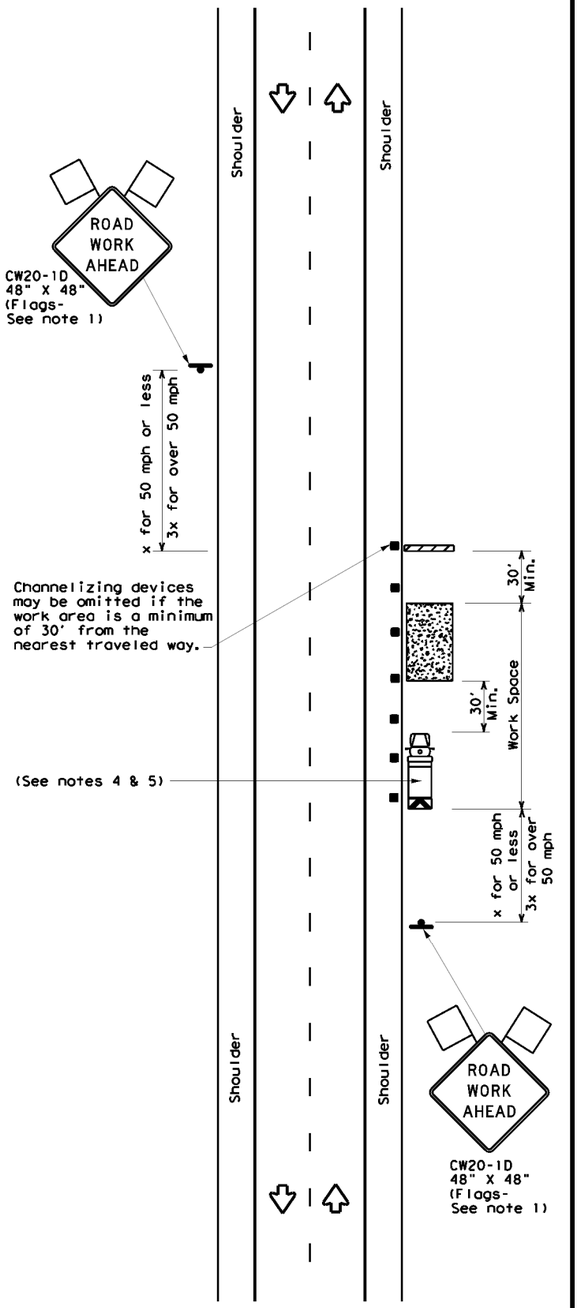
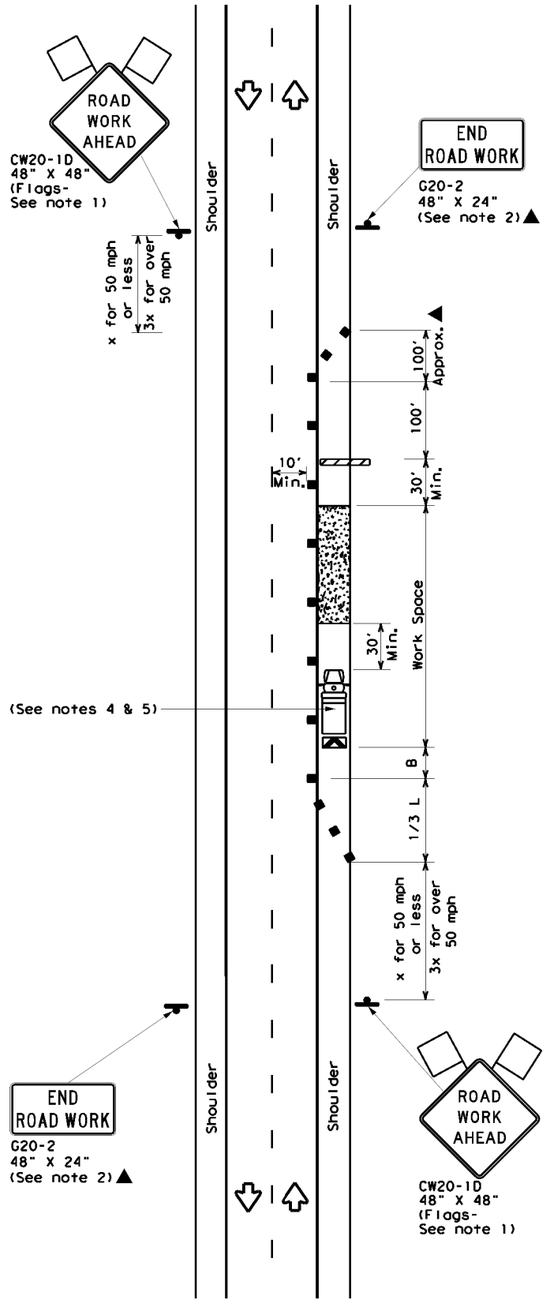


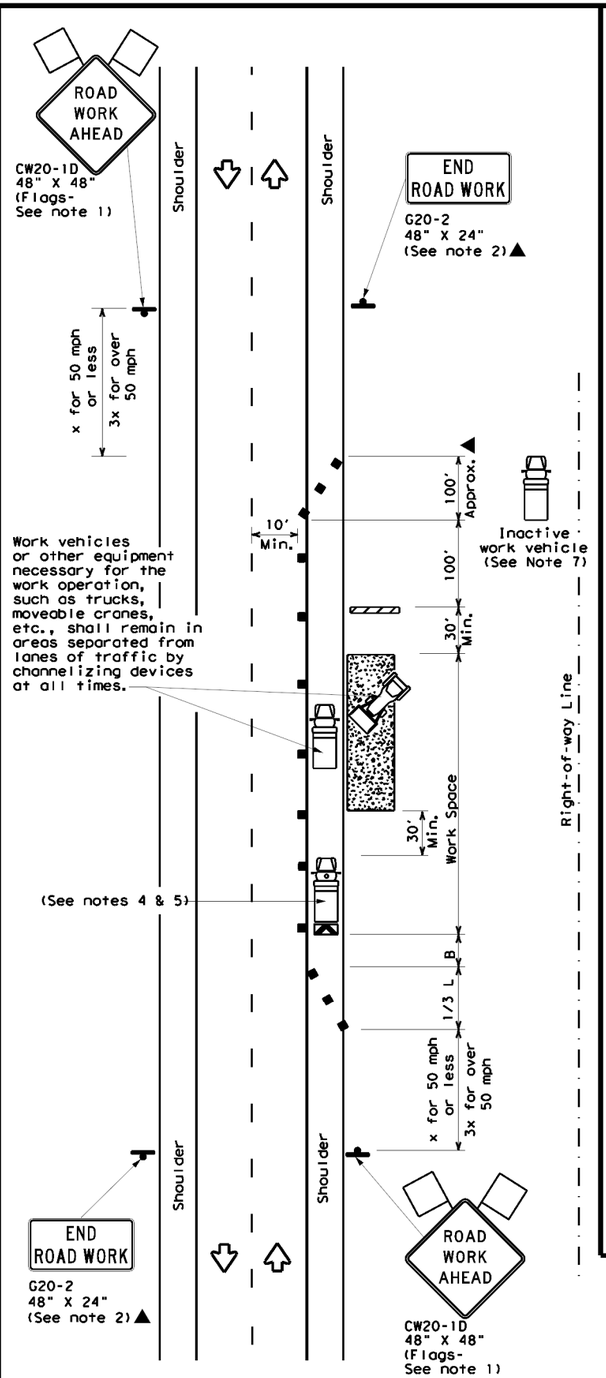
TCP (2-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L=WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

* 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
	✓	✓	✓	✓

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated in the plans, or for routine maintenance work, when approved by the Engineer.
3. Stockpiled material should be placed a minimum of 30 feet from nearest traveled way.
4. Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
5. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.
6. See TCP(5-1) for shoulder work on divided highways, expressways and freeways.
7. Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
8. CW21-5 "SHOULDER WORK" signs may be used in place of CW20-1D "ROAD WORK AHEAD" signs for shoulder work on conventional roadways.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(2-1)-18

FILE: tcp2-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	00	067	Various
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	22	WEBB, etc		27
1-97 2-18				

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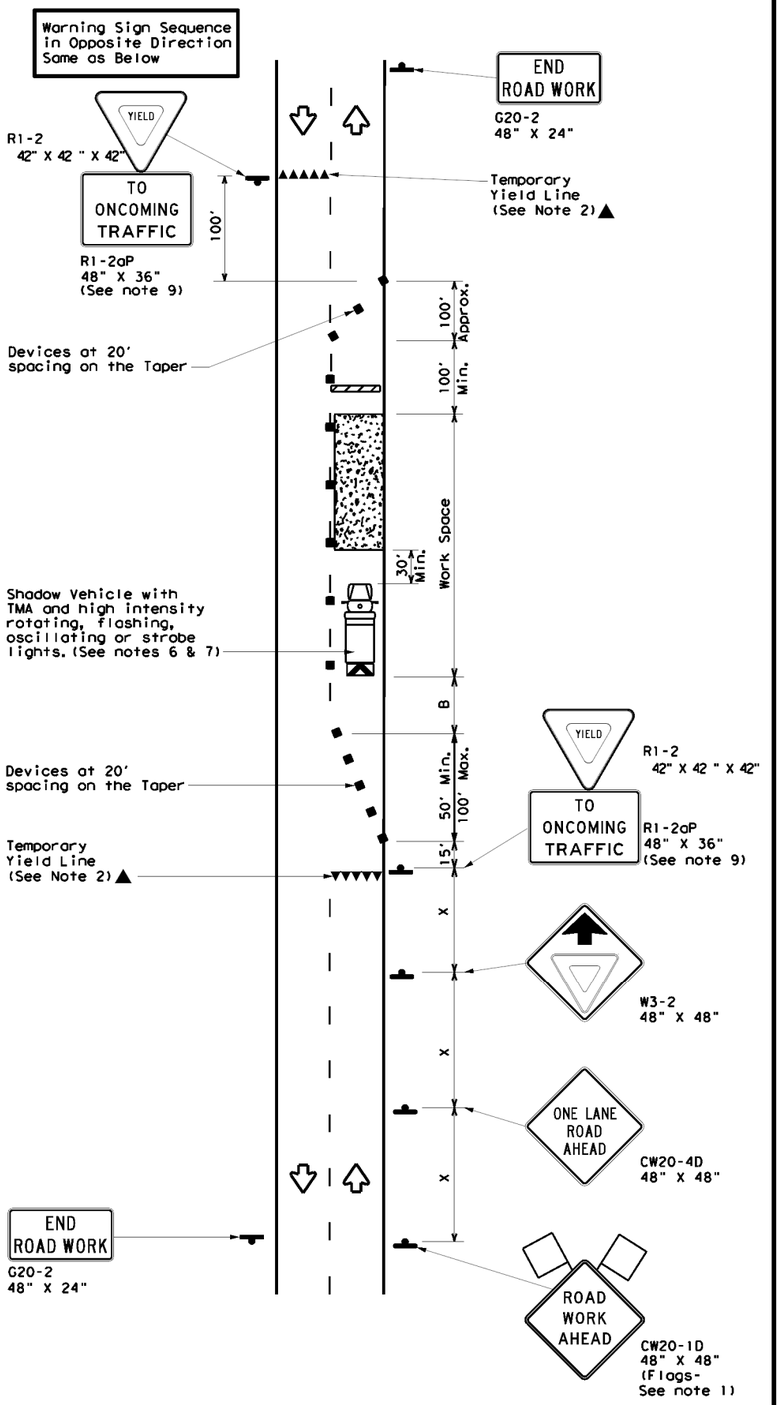
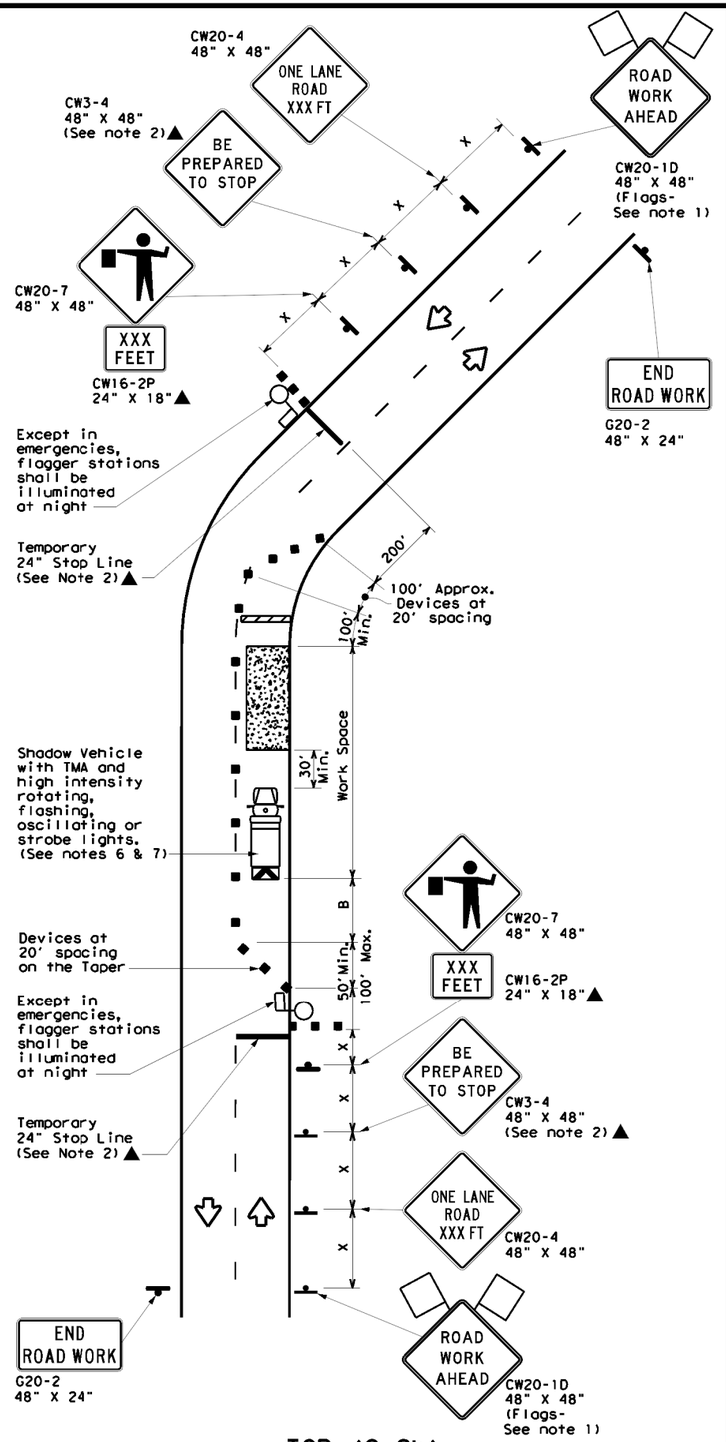


TCP (2-2a)
2-LANE ROADWAY WITHOUT PAVED SHOULDERS
ONE LANE TWO-WAY
CONTROL WITH YIELD SIGNS
(Less than 2000 ADT - See Note 9)



TCP (2-2b)
2-LANE ROADWAY WITHOUT PAVED SHOULDERS
ONE LANE TWO-WAY
CONTROL WITH FLAGGERS

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	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"	Stopping Sight Distance
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'	200'
35		205'	225'	245'	35'	70'	160'	120'	250'
40		265'	295'	320'	40'	80'	240'	155'	305'
45	L=WS	450'	495'	540'	45'	90'	320'	195'	360'
50		500'	550'	600'	50'	100'	400'	240'	425'
55		550'	605'	660'	55'	110'	500'	295'	495'
60		600'	660'	720'	60'	120'	600'	350'	570'
65		650'	715'	780'	65'	130'	700'	410'	645'
70		700'	770'	840'	70'	140'	800'	475'	730'
75		750'	825'	900'	75'	150'	900'	540'	820'

* 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
	✓	✓	✓	

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4 "ONE LANE ROAD XXX FT" sign, but proper sign spacing shall be maintained.
4. Flaggers should use two-way radios or other methods of communication to control traffic.
5. Length of work space should be based on the ability of flaggers to communicate.
6. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
7. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-2a)

8. The R1-2 "YIELD" sign traffic control may be used on projects with approaches that have adequate sight distance. For projects in urban areas, work space should be no longer than one half city block. In rural areas, roadways with less than 2000 ADT, work space should be no longer than 400 feet.
9. The R1-2aP "YIELD TO ONCOMING TRAFFIC" sign shall be placed on a support at a 7 foot minimum mounting height.

TCP (2-2b)

10. Channelizing devices on the center line may be omitted when a pilot car is leading traffic and approved by the Engineer.
11. If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain stopping sight distance to the flagger and a queue of stopped vehicles. (See table above).
12. Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situtations.

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
ONE-LANE TWO-WAY
TRAFFIC CONTROL

TCP(2-2)-18

FILE: tcp2-2-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03 1-97 2-12 4-98 2-18	0922	00	067	Various
	DIST	COUNTY		SHEET NO.
	22	WEBB, etc		28

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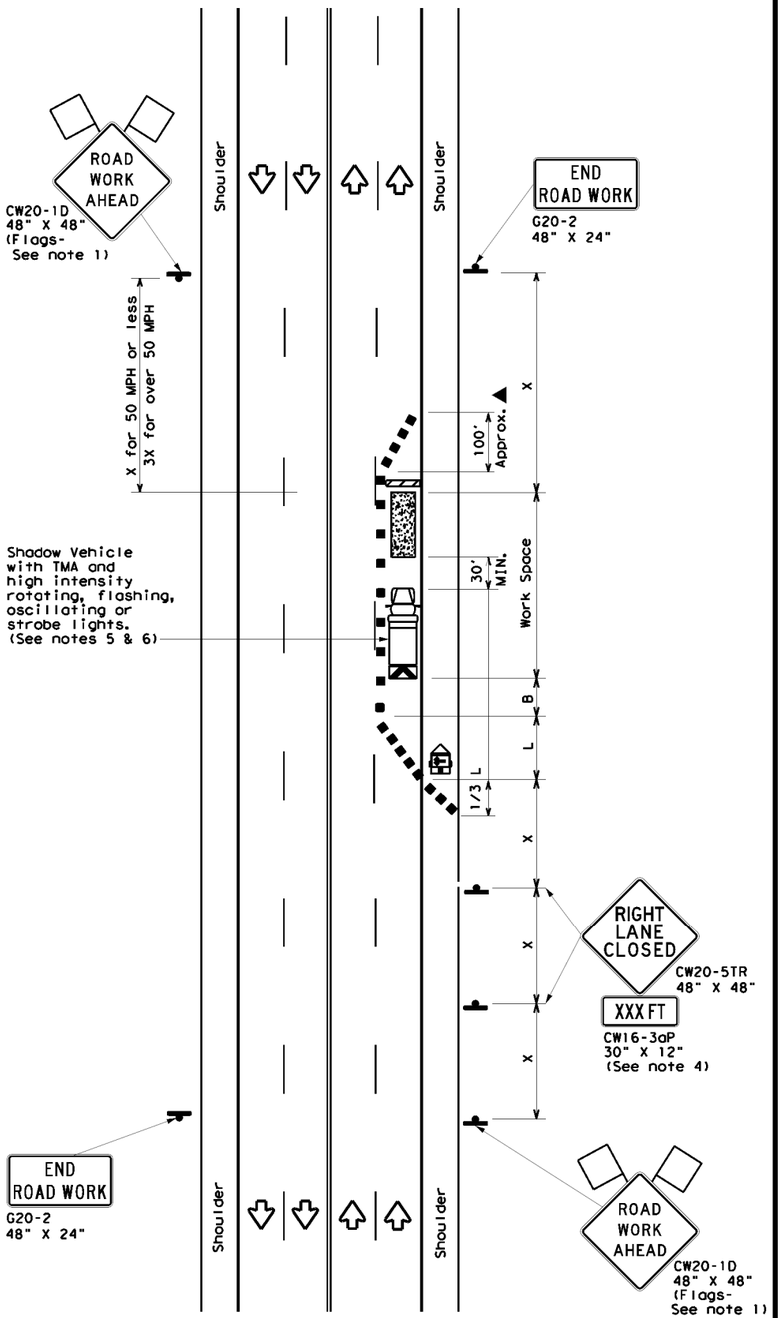
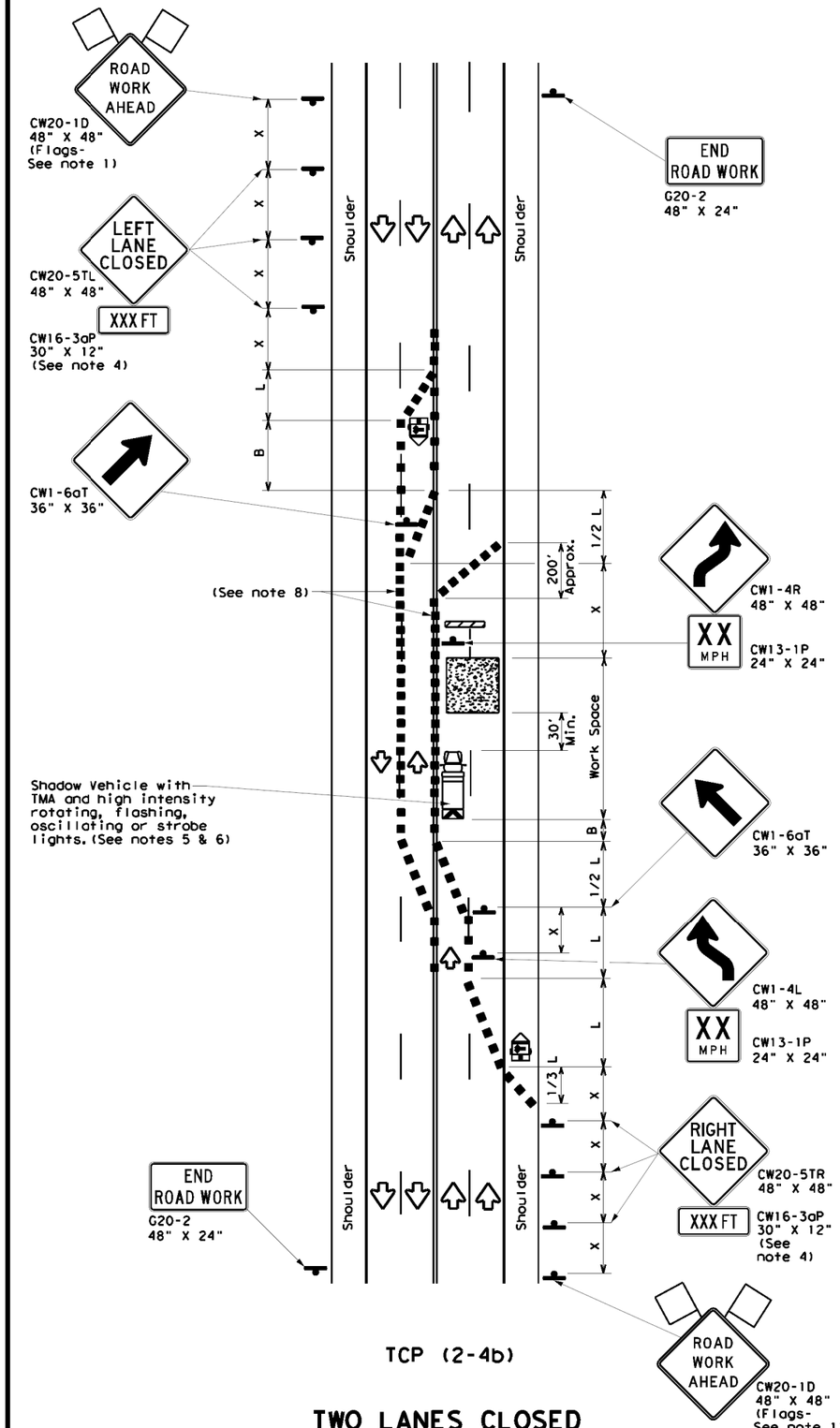


TCP (2-4a)

ONE LANE CLOSED



TCP (2-4b)

TWO LANES 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 ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L=WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

* 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
		✓	✓	

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The downstream taper is optional. When used, it should be 100 feet minimum length per lane.
4. For short term applications, when post mounted signs are not used, the distance legend may be shown on the sign face rather than on a CW16-3aP supplemental plaque.
5. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
6. Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-4a)

7. If this TCP is used for a left lane closure, CW20-5TL "LEFT LANE CLOSED"signs shall be used and channelizing devices shall be placed on the centerline to protect the work space from opposing traffic with the arrow board placed in the closed lane near the end of the merging taper.

TCP (2-4b)

8. For shorter durations where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20' or 15' if posted speeds are 35 mph or slower, and for tangent sections, at 1/2(S) where S is the speed in mph. This tighter devices spacing is intended for the area of conflicting markings, not the entire work zone.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

TCP(2-4)-18

FILE: tcp2-4-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	0922	00	067	Various
1-97 2-12	DIST	COUNTY		SHEET NO.
4-98 2-18	22	WEBB, etc		29

DATE: 2/24/2023 2:54:53 PM
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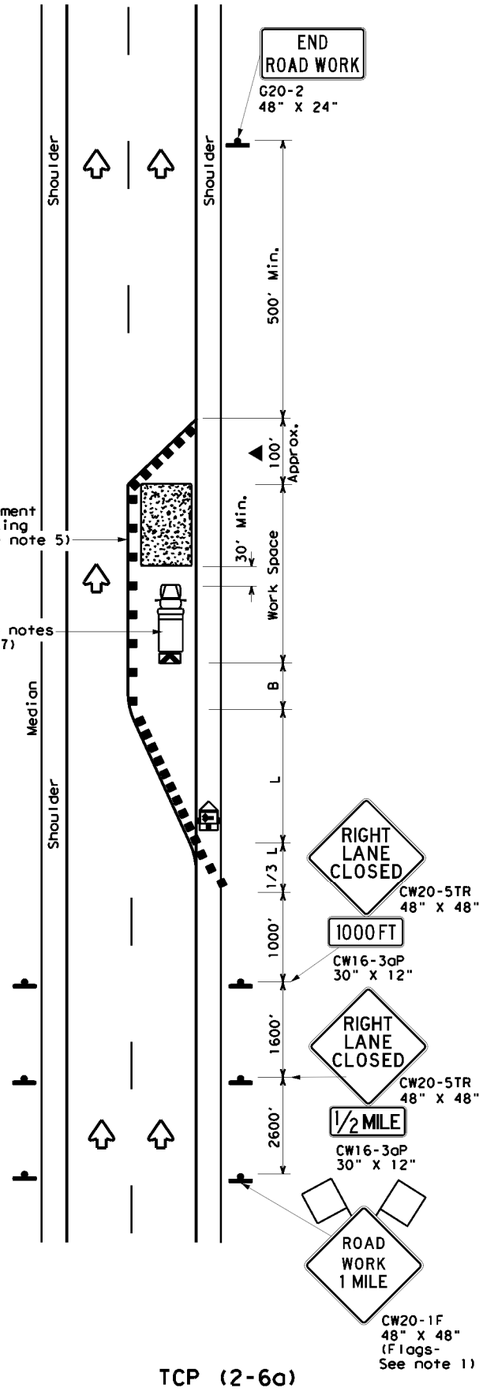
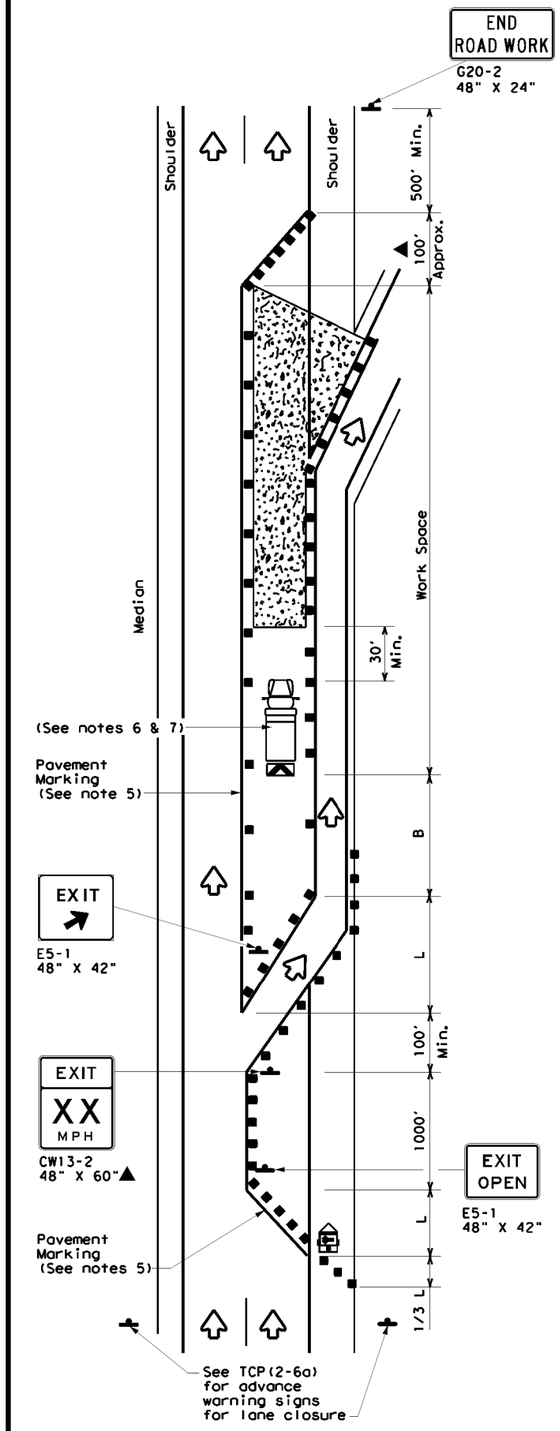


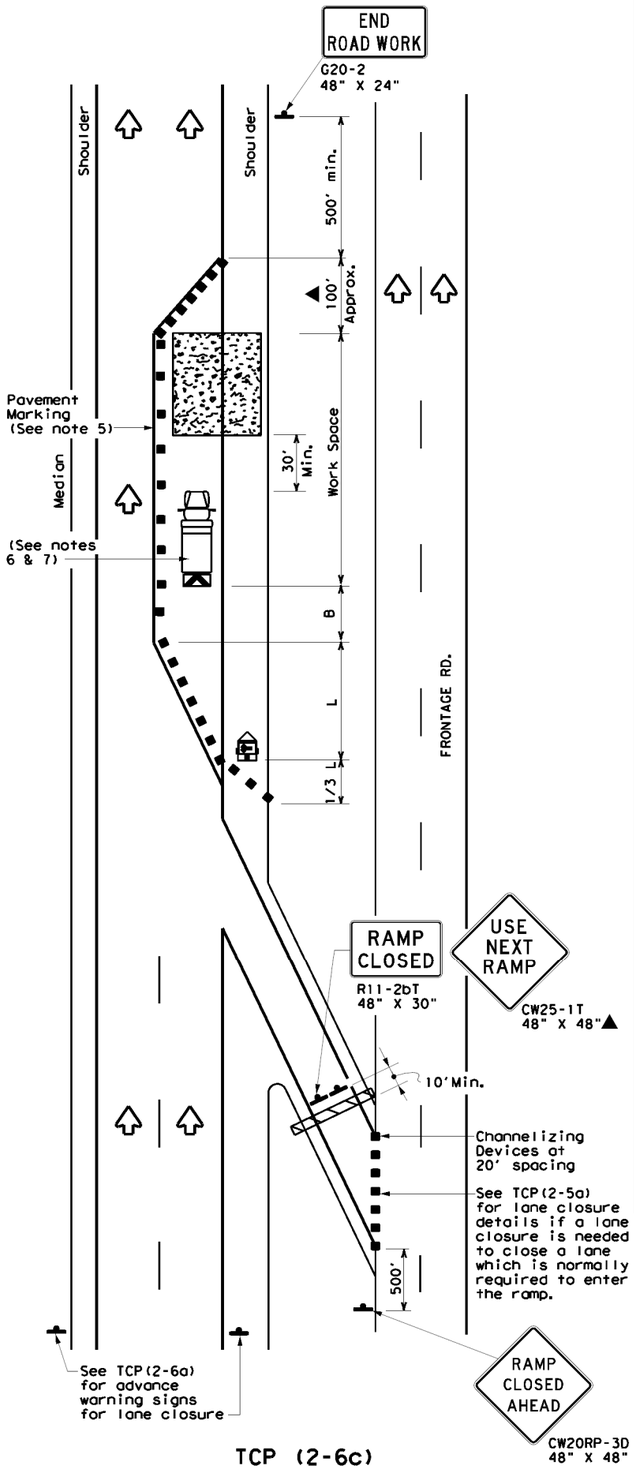
TCP (2-6a)

ONE LANE CLOSURE



TCP (2-6b)

LANE CLOSURE NEAR EXIT RAMPS



TCP (2-6c)

LANE CLOSURE NEAR ENTRANCE RAMPS

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	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L=WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

* 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
			✓	✓

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. Channelizing devices used to close lanes may be supplemented with the Chevron Alignment Sign placed on every other channelizing device. Chevrons may be attached to plastic drums as per BC Standards.
4. Channelizing devices used along the work space or along tangent sections may be supplemented with vertical panels (VP) placed on everyother channelizing device. If night time conditions make it difficult to see at least two VPs, the VPs may be placed on each channelizing device.
5. The placement of pavement markings may be omitted on intermediate-term stationary work zones with the approval of the Engineer.
6. Shadow Vehicle with TMA and high intensity rotating, flashing,oscillating or strobe lights. Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
7. Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON DIVIDED HIGHWAYS

TCP(2-6)-18

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REVISIONS 2-94 4-98 8-95 2-12 1-97 2-18	0922	00	067	Various
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	22	WEBB, etc		30

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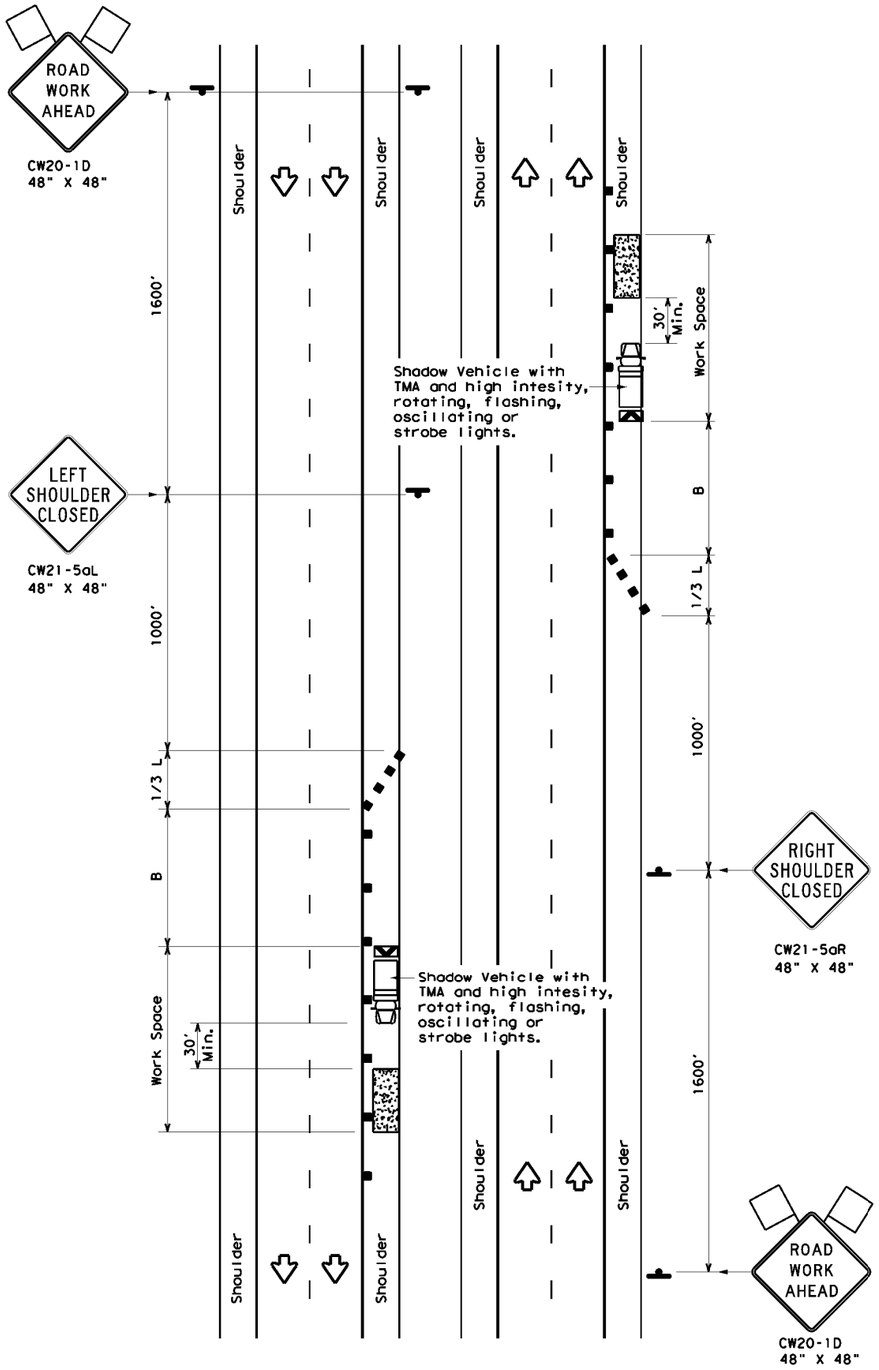
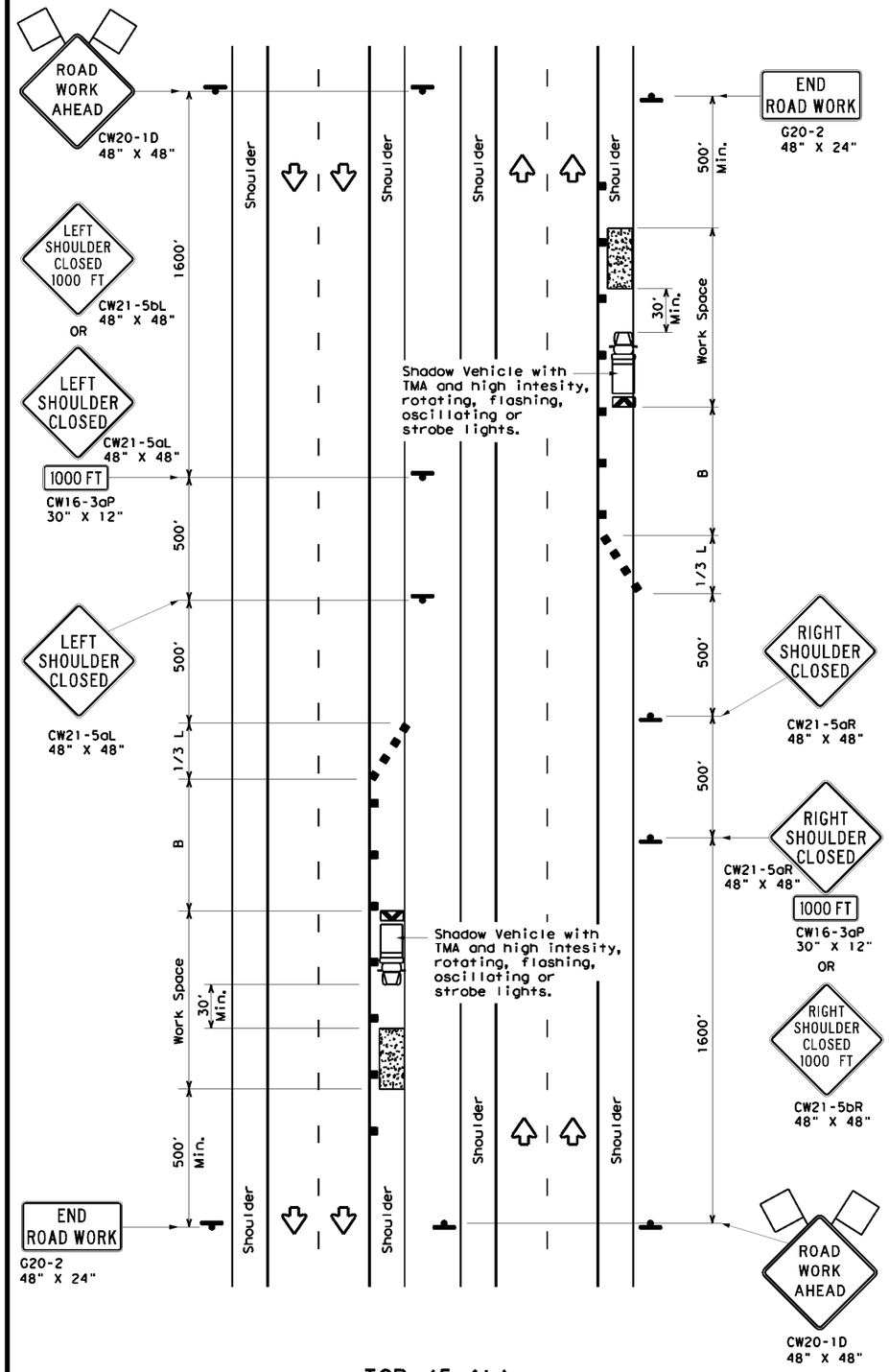


TCP (5-1a)

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 2-18	0922	00	067	Various
	DIST	COUNTY		SHEET NO.
	22	WEBB, etc		31

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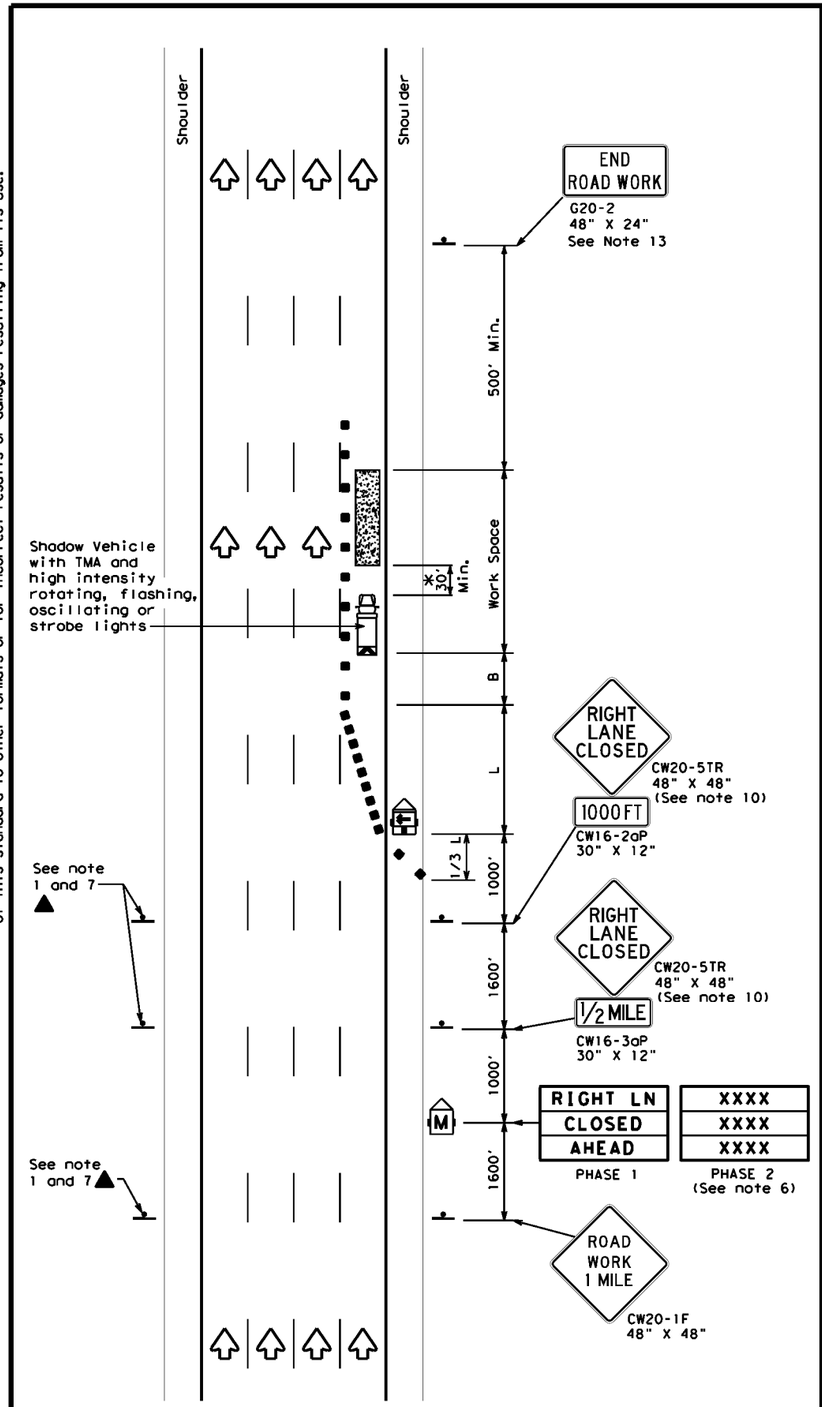
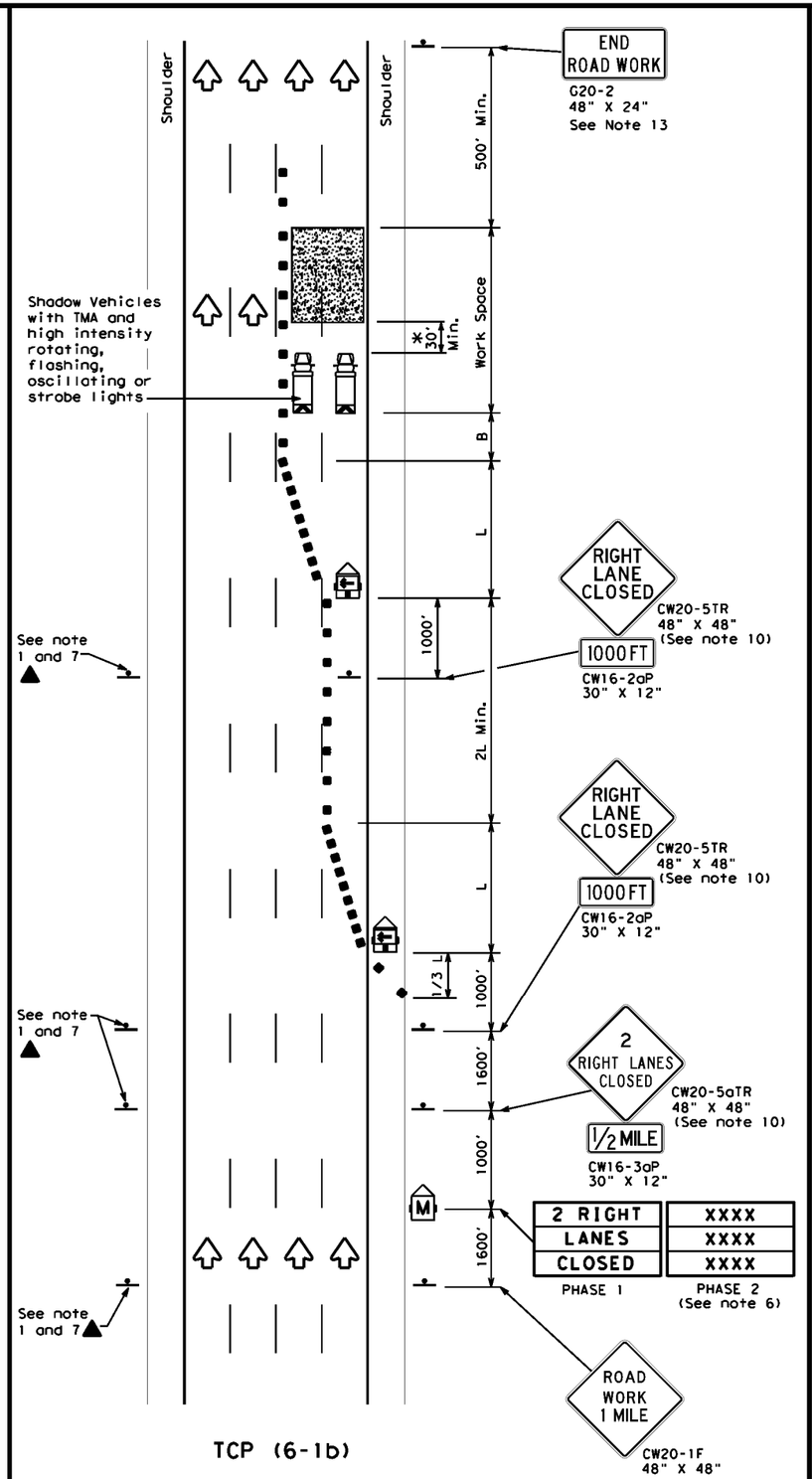


TCP (6-1a)

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 plaque 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	0922	00	067	Various
	DIST	COUNTY		SHEET NO.
	22	WEBB, etc		32

DATE: 2/24/2023 2:55:44 PM
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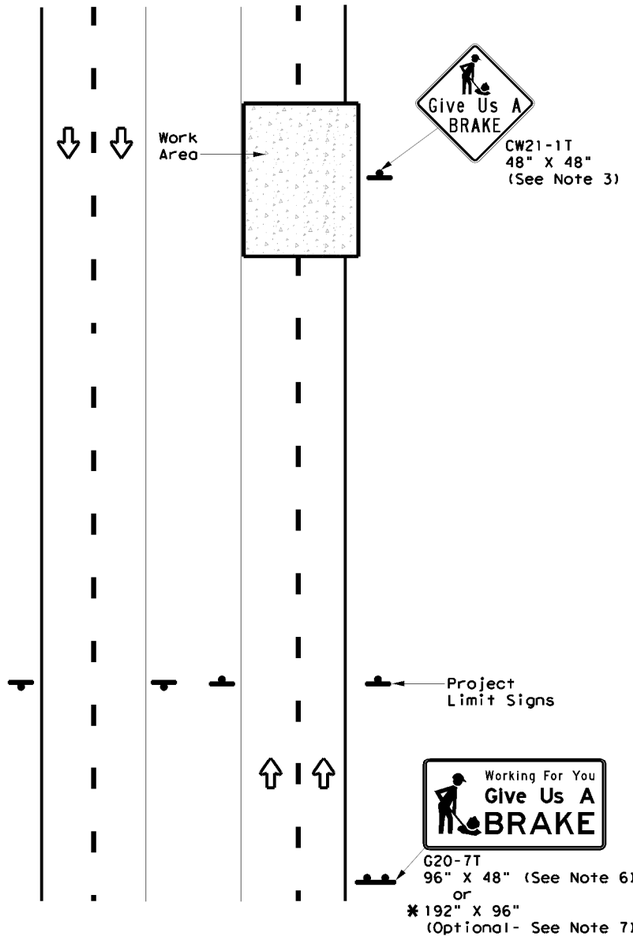
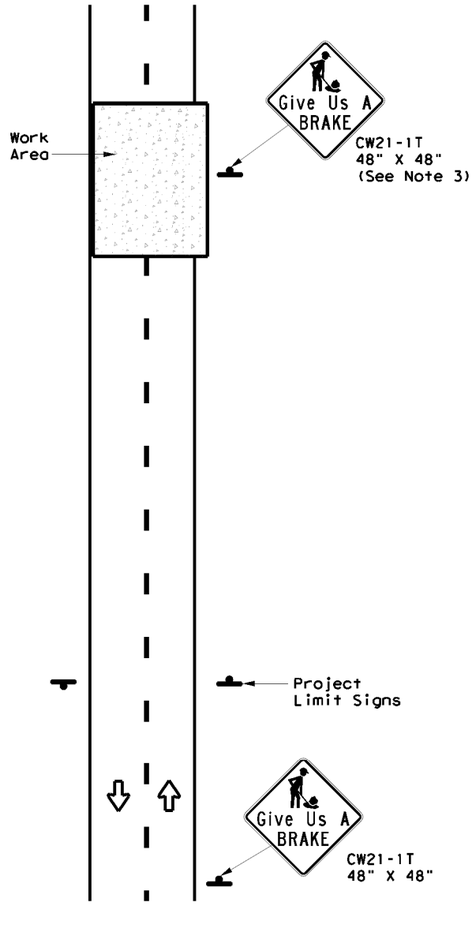


DIVIDED HIGHWAY



UNDIVIDED HIGHWAY

SIGNS ARE SHOWN FOR ONE DIRECTION OF TRAVEL

* When the optional larger WORKING FOR YOU GIVE US A BRAKE (G20-7T) 192" x 96" sign is required, the locations shall be noted elsewhere in the plans.

SUMMARY OF LARGE SIGNS

BACKGROUND COLOR	SIGN DESIGNATION	SIGN	SIGN DIMENSIONS	REFLECTIVE SHEETING	SQ FT	GALVANIZED STRUCTURAL STEEL			DRILLED SHAFT 24" DIA. (LF)
						Size	(LF) ①	(LF) ②	
Orange	G20-7T	Working For You Give Us A BRAKE	96" X 48"	Type B_{FL} or C_{FL}	32	▲	▲	▲	▲
Orange	G20-7T	Working For You Give Us A BRAKE	192" X 96"	Type B_{FL} or C_{FL}	128	W8x18	16	17	12

▲ See Note 6 Below

LEGEND	
	Sign
	Large Sign
	Traffic Flow

DEPARTMENTAL MATERIAL SPECIFICATIONS	
PLYWOOD SIGN BLANKS	DMS-7100
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

COLOR	USAGE	SHEETING MATERIAL
ORANGE	BACKGROUND	TYPE B_{FL} OR TYPE C_{FL}
BLACK	LEGEND & BORDERS	NON-REFLECTIVE ACRYLIC FILM

GENERAL NOTES

1. See BC and SMD sheets for additional sign support details.
2. Sign locations shall be approved by the Engineer.
3. For projects more than two miles in length, Give Us a BRAKE signs should be repeated halfway through the project. The Give Us a Brake (CW21-1T) may be used for this purpose.
4. Work zone speed limits are sometimes used in conjunction with GIVE US A BRAKE signing. See BC(3) for location and spacing of construction speed zone signing when required.
5. Give Us a Brake (CW21-1T) signs and supports shall be considered subsidiary to Item 502, "Barricades, Signs and Traffic Handling."
6. The 96" X 48" Working For You Give Us A BRAKE (G20-7T) may use a 1/2" or 5/8" plywood substrate or 0.125" aluminum sheeting substrate and may be supported by two 4" x 6" wood posts with drilled holes for breakaway as per BC(5) and will be subsidiary to Item 502.
7. The Working For You Give Us A BRAKE (G20-7T) 192" X 96" sign shall be paid for under the following specification items:
   Item 636 - Aluminum Signs
   Item 647 - Large Roadside Sign Supports and Assemblies.
   Item 416 - Drilled Shaft Foundations
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.

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE "GIVE US A BRAKE" SIGNS

WZ(BRK)-13

FILE: wzbrk-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 1995	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	00	067	Various
6-96 5-98 7-13	DIST	COUNTY		SHEET NO.
8-96 3-03	22	WEBB, etc		33

DATE: 2/24/2023 2:56:02 PM
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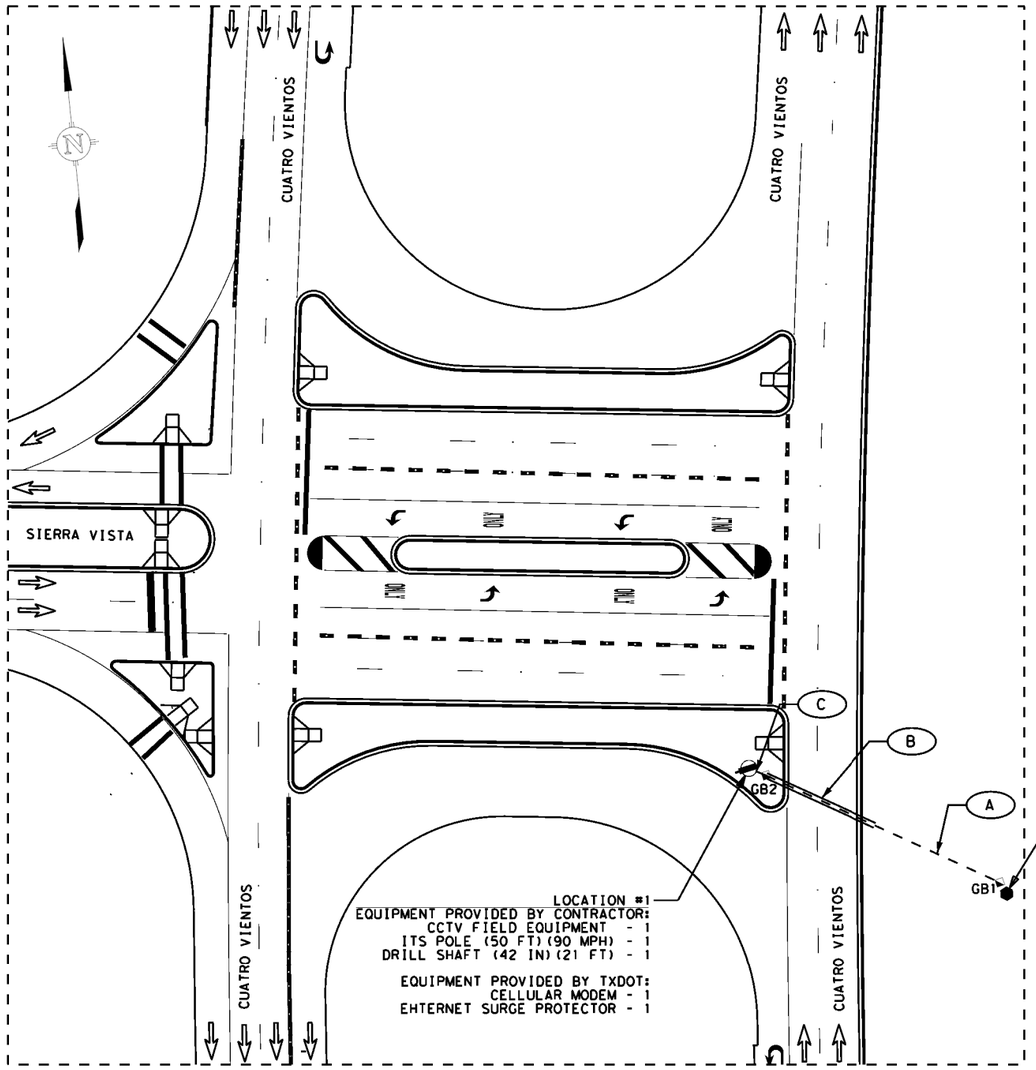
116



LEGEND

- PROPOSED GROUNG BOX
- PROPOSED CONDUIT (TRENCH)
- PROPOSED CCTV CAMERA
- PROPOSED ELECTRICAL SERVICE
- PROPOPOSED CONDUIT (BORE)

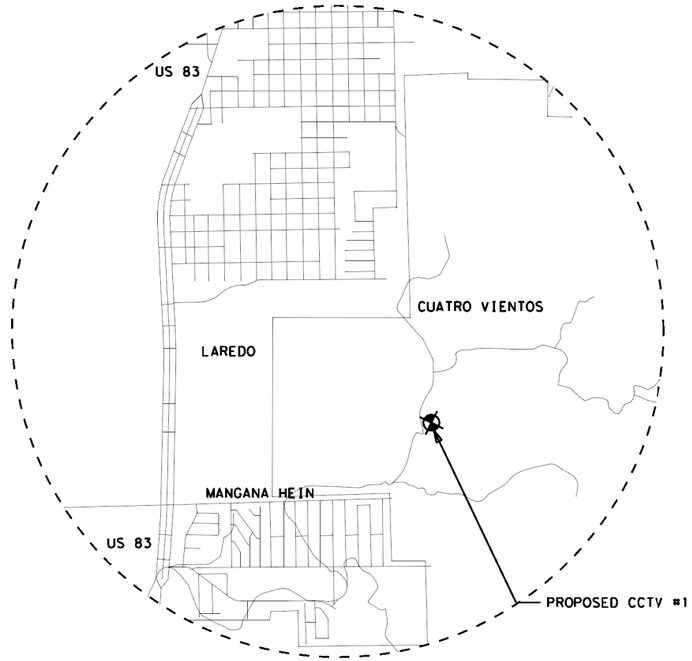
ITEM NO.	DESC NO.	DESCRIPTION	UNIT	QTY
416	6005	DRILL SHAFT (42 IN)	LF	**21.00**
618	6023	CONDT (PVC) (SCHD 40) (2")	LF	**68.00**
618	6047	CONDT (PVC) (SCHD 80) (2") (BORE)	LF	**68.00**
620	6009	ELEC CONDR (NO. 6) BARE	LF	**156.00**
620	6010	ELEC CONDR (NO. 6) INSULATED	LF	**312.00**
624	6008	GROUND BOX TY C (162911) W/APRON	EA	**2.00**
628	6131	ELC SRV TY D 120/240 060 (NS)GS(N)SP(O)	EA	**1.00**
6010	6002	CCTV FIELD EQUIPMENT (DIGITAL)	EA	**1.00**
6064	6038	ITS POLE (50 FT)(110 MPH)	EA	**1.00**
6064	6076	ITS POLE MNT CAB (TY 1)(CONF 2)	EA	**1.00**
6423	6003	INSTALL ETHERNET SURGE PROTECTOR	EA	**1.00**
6423	6004	INSTALL CELLULAR MODEM	EA	**1.00**

ELECTRICAL SCHEDULE TABLE					
DESCRIPTION	RUN NUMBER	A	B	C	TOTAL QTY
	RUN LENGTH (LF)	60	68	8	
POWER	ELEC CONDR (NO. 6) BARE	1	1	1	* 156
	ELEC CONDR (NO. 6) INSULATED	2	2	2	* 312
CONDUIT	CONDT (PVC) (SCHD 40) (2")	1		1	68
	CONDT (PVC) (SCHD 80) (2") (BORE)		1		68

* QUANTITIES INCLUDE CABLE IN CABINET AND GROUND BOXES

NOTES:

1. THE LOCATION FOR THE ITS POLE, ELECTRICAL SERVICE AND CONDUIT RUNS ARE APPROXIMATE, DETERMINE THE EXACT LOCATIONS IN THE FIELD IN COORDINATION WITH THE TRAFFIC OPERATIONS PERSONNEL.
2. VERIFY WITH ALL UTILITY COMPANIES THE EXACT LOCATIONS OF EXISTING UNDERGROUND UTILITIES PRIOR TO ANY CONSTRUCTION TO AVOID CONFLICT OR DAMAGES.
3. CONTRACTOR SHALL INSTALL THE FOLLOWING TXDOT PROVIDED EQUIPMENT IN PROPOSED CCTV CAMERA CABINET: CELLULAR MODEM AND ETHERNET SURGE PROTECTOR.



LOCATION MAP

STATE OF TEXAS
RAFAEL GUZMAN
106025
LICENSED
PROFESSIONAL ENGINEER

THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY RAFAEL GUZMAN, P.E. 106025, ON 5/26/2023

DocuSigned by:
Rafael Guzman
5CB9C1491EA543A...

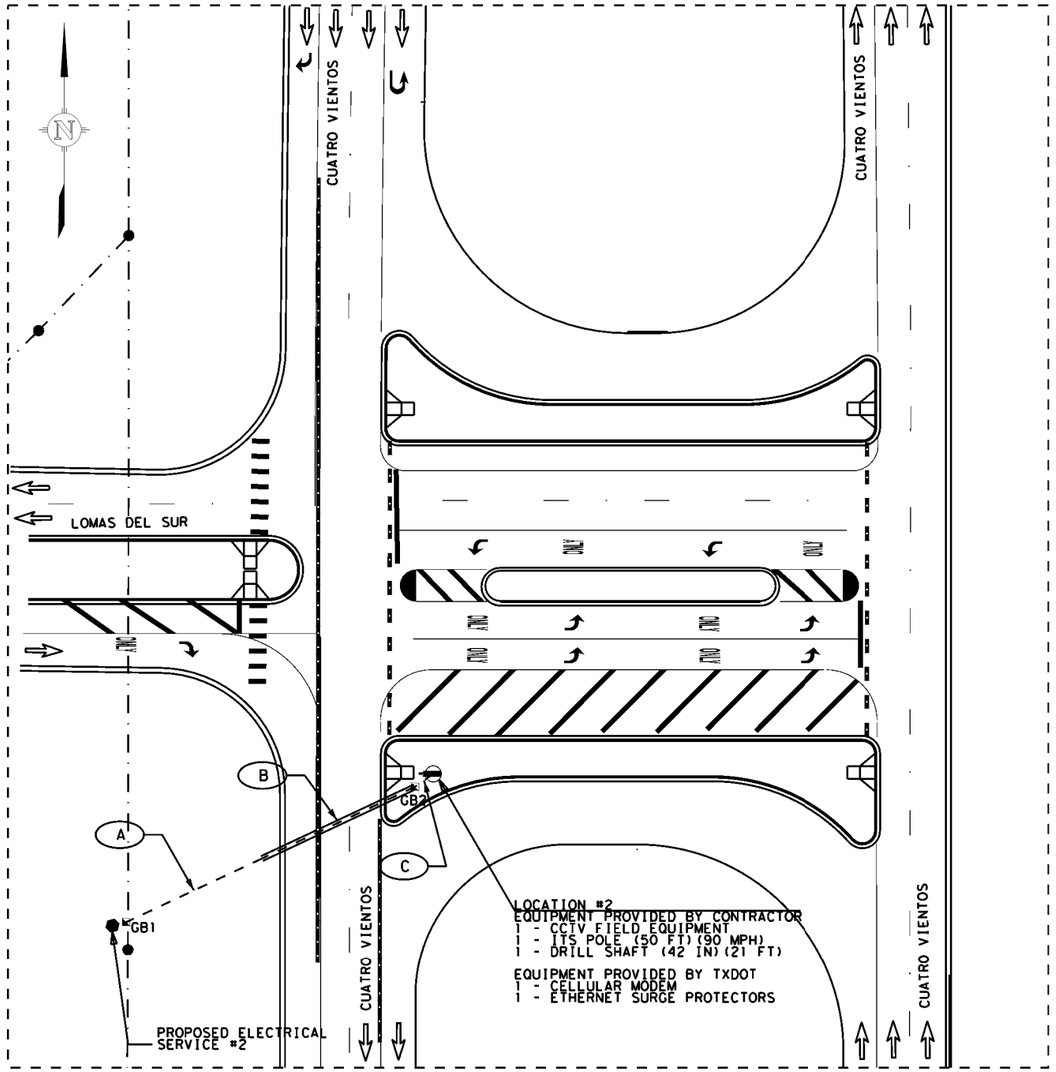
TEXAS DEPARTMENT OF TRANSPORTATION ®

INSTALL CCTV #1 CUATRO VIENTOS AT SIERRA VISTA

DN:	DW:	STATE	SHEET NUMBER			SHEET NO.
CK: R.G.	CK: R.G.	TEXAS	SHEET 1 OF 1			
FED.RD. DIV.NO.	STATE DIST.NO.	COUNTY	CONTROL	SECTION	JOB	HIGHWAY NO.
6	22	WEBB, etc	0922	00	067	Various

34

5/26/2023 aaoldape 0922*00*067*SHEET*CUATRO VIENTOS AT SIERRA VISTA.dgn



LEGEND

- PROPOSED GROUNG BOX
- PROPOSED CONDUIT (TRENCH)
- PROPOSED CCTV CAMERA
- PROPOSED ELECTRICAL SERVICE
- PROPOPOSED CONDUIT (BORE)

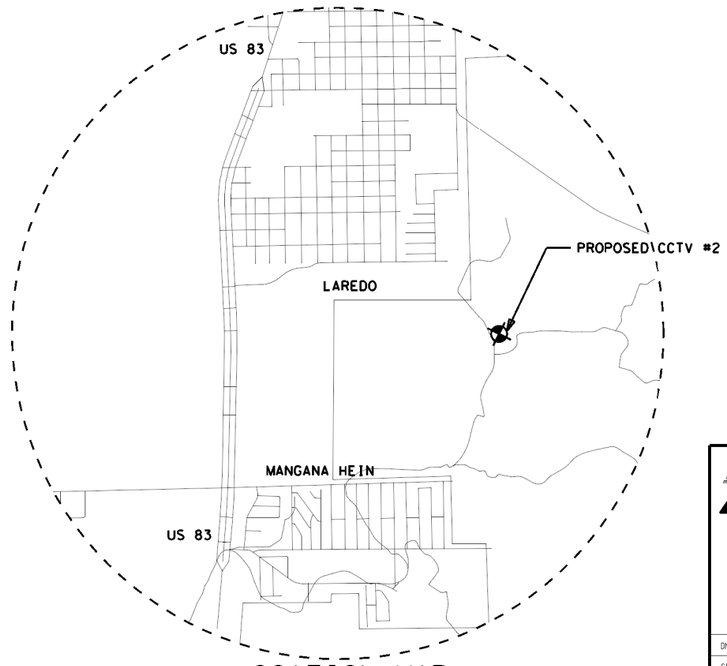
ITEM NO.	DESC NO.	DESCRIPTION	UNIT	QTY
416	6005	DRILL SHAFT (42 IN)	LF	**21.00**
618	6023	CONDT (PVC) (SCHD 40) (2")	LF	**61.00**
618	6047	CONDT (PVC) (SCHD 80) (2") (BORE)	LF	**48.00**
620	6009	ELEC CONDR (NO. 6) BARE	LF	**129.00**
620	6010	ELEC CONDR (NO. 6) INSULATED	LF	**258.00**
624	6008	GROUND BOX TY C (162911) W/APRON	EA	**2.00**
628	6131	ELC SRV TY D 120/240 060 (NS)GS(N)SP(O)	EA	**1.00**
6010	6002	CCTV FIELD EQUIPMENT (DIGITAL)	EA	**1.00**
6064	6038	ITS POLE (50 FT)(110 MPH)	EA	**1.00**
6064	6076	ITS POLE MNT CAB (TY 1)(CONF 2)	EA	**1.00**
6423	6003	INSTALL ETHERNET SURGE PROTECTOR	EA	**1.00**
6423	6004	INSTALL CELLULAR MODEM	EA	**1.00**

ELECTRICAL SCHEDULE TABLE					
DESCRIPTION	RUN NUMBER	A	B	C	TOTAL QTY
	RUN LENGTH (LF)	54	48	7	
POWER	ELEC CONDR (NO. 6) BARE	1	1	1	* 129
	ELEC CONDR (NO. 6) INSULATED	2	2	2	* 258
CONDUIT	CONDT (PVC) (SCHD 40) (2")	1		1	61
	CONDT (PVC) (SCHD 80) (2") (BORE)		1		48

* QUANTITIES INCLUDE CABLE IN CABINET AND GROUND BOXES

NOTES:

1. THE LOCATION FOR THE ITS POLE, ELECTRICAL SERVICE AND CONDUIT RUNS ARE APPROXIMATE, DETERMINE THE EXACT LOCATIONS IN THE FIELD IN COORDINATION WITH THE TRAFFIC OPERATIONS PERSONNEL.
2. VERIFY WITH ALL UTILITY COMPANIES THE EXACT LOCATIONS OF EXISTING UNDERGROUND UTILITIES PRIOR TO ANY CONSTRUCTION TO AVOID CONFLICT OR DAMAGES.
3. CONTRACTOR SHALL INSTALL THE FOLLOWING TXDOT PROVIDED EQUIPMENT IN PROPOSED CCTV CAMERA CABINET: CELLULAR MODEM AND ETHERNET SURGE PROTECTOR.



LOCATION MAP

STATE OF TEXAS
RAFAEL GUZMAN
106025
LICENSED
PROFESSIONAL ENGINEER

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DocuSigned by:
Rafael Guzman
5CB9C1491FA542A...

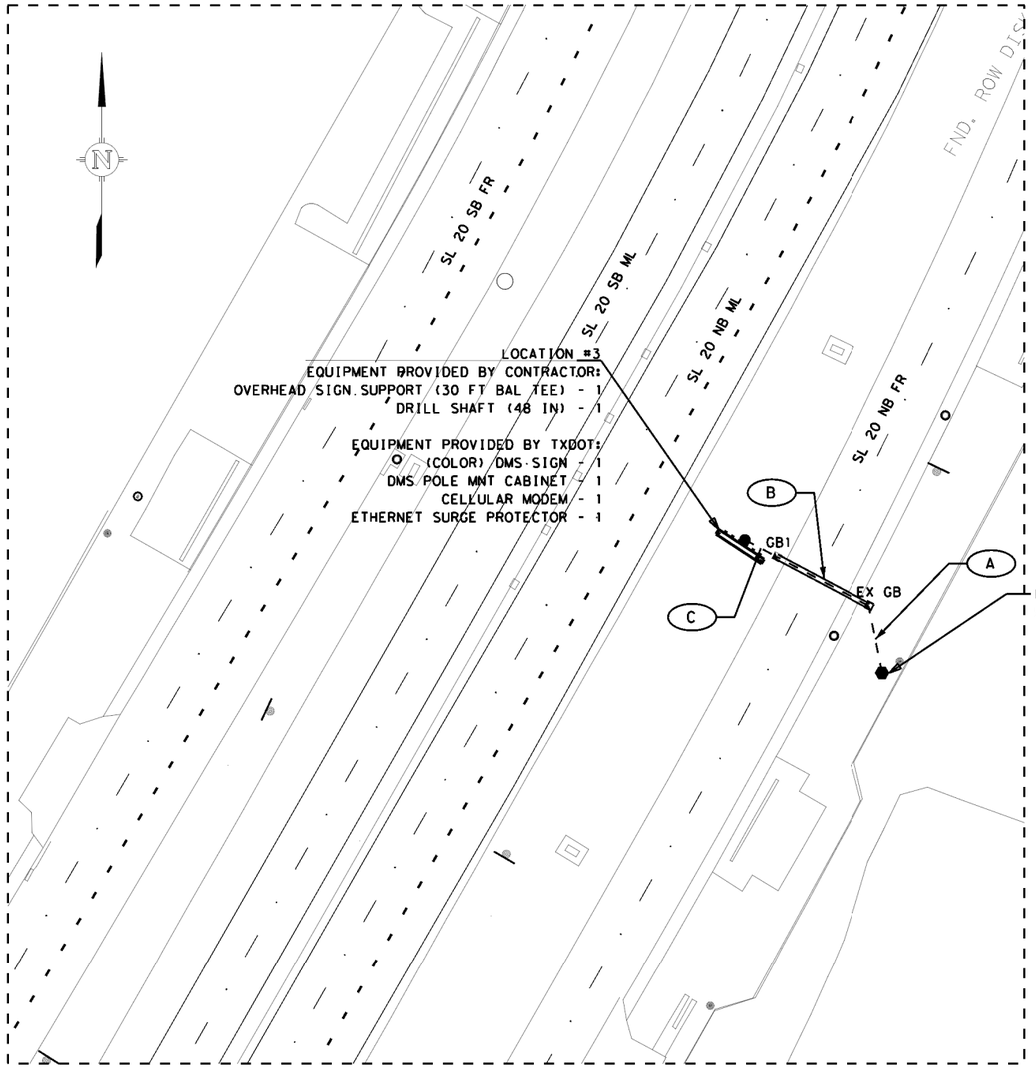
TEXAS DEPARTMENT OF TRANSPORTATION ®

INSTALL CCTV #2 CUATRO VIENTOS AT LOMAS DEL SUR

DN:	CK: R. G.	DW:	CK: R. G.	STATE	SHEET NUMBER			SHEET NO.
FED. RD. DIV. NO.	STATE DIST. NO.	COUNTY		CONTROL	SECTION	JOB	HIGHWAY NO.	
6	22	WEBB, etc		0922	00	067	Various	35

SHEET 1 OF 1

5/26/2023 aoaldape 0922*00*067*SHEET*CUATRO VIENTOS AT LOMAS DEL SUR.dgn



LEGEND

- PROPOSED GROUND BOX
- PROPOSED CONDUIT (TRENCH)
- PROPOSED DMS SIGN, T-MOUNT
- PROPOSED ELECTRICAL SERVICE
- PROPOSED CONDUIT (BORE)

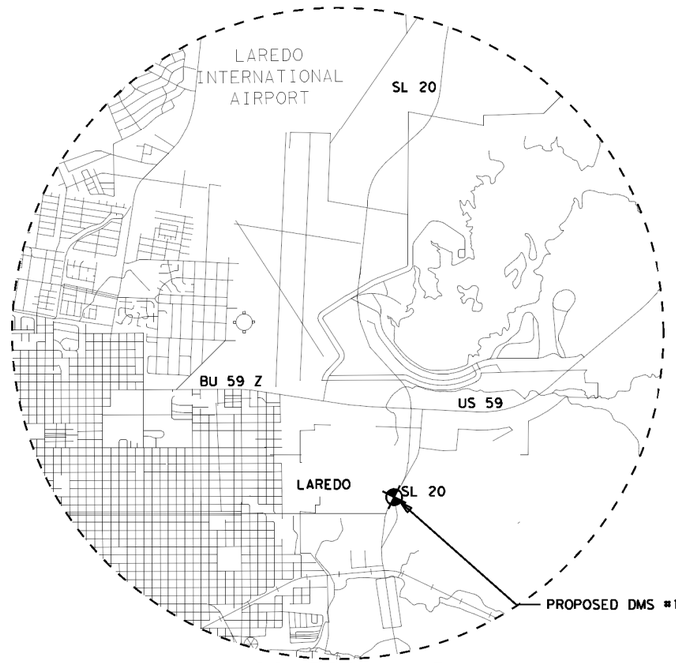
ITEM NO.	DESC NO.	DESCRIPTION	UNIT	QTY
416	6006	DRILL SHAFT (48 IN)	LF	**25.00**
618	6023	CONDT (PVC) (SCHD 40) (2")	LF	**41.00**
618	6047	CONDT (PVC) (SCHD 80) (2") (BORE)	LF	**42.00**
620	6011	ELEC CONDR (NO. 4) BARE	LF	**80.00**
620	6012	ELEC CONDR (NO. 4) INSULATED	LF	**240.00**
620	6015	ELEC CONDR (NO. 2) BARE	LF	**103.00**
620	6016	ELEC CONDR (NO. 2) INSULATED	LF	**309.00**
624	6008	GROUND BOX TY C (162911) W/APRON	EA	**1.00**
628	6131	ELC SRV TY D 120/240 060 (NS)GS(N)SP(O)	EA	**1.00**
650	6028	INS OH SN SUP (30 FT BAL TEE)	EA	**1.00**
6028	6001	INSTALL DMS (POLE MTD CABINET)	EA	**1.00**
6423	6003	INSTALL ETHERNET SURGE PROTECTOR	EA	**1.00**
6423	6004	INSTALL CELLULAR MODEM	EA	**1.00**

ELECTRICAL SCHEDULE TABLE						
DESCRIPTION	RUN NUMBER	A	B	C	POLE	TOTAL QTY
	RUN LENGTH (LF)	27	42	14	60	
POWER	ELEC CONDR (NO. 4) BARE				1	80
	ELEC CONDR (NO. 4) INSULATED				3	240
	ELEC CONDR (NO. 2) BARE	1	1	1		* 103
	ELEC CONDR (NO. 2) INSULATED	3	3	3		* 309
CONDUIT	CONDT (PVC) (SCHD 40) (2")	1		1		41
	CONDT (PVC) (SCHD 80) (2") (BORE)		1			42

* QUANTITIES INCLUDE CABLE IN CABINET AND GROUND BOXES

NOTES:

1. THE LOCATION FOR THE ITS POLE, ELECTRICAL SERVICE AND CONDUIT RUNS ARE APPROXIMATE, DETERMINE THE EXACT LOCATIONS IN THE FIELD IN COORDINATION WITH THE TRAFFIC OPERATIONS PERSONNEL.
2. VERIFY WITH ALL UTILITY COMPANIES THE EXACT LOCATIONS OF EXISTING UNDERGROUND UTILITIES PRIOR TO ANY CONSTRUCTION TO AVOID CONFLICT OR DAMAGES.
3. CONTRACTOR SHALL INSTALL THE FOLLOWING TXDOT PROVIDED EQUIPMENT IN PROPOSED DMS LOCATION: DMS SIGN, DMS POLE MNT CABINET, ETHERNET SURGE PROTECTOR, AND CELLULAR MODEM.



LOCATION MAP

STATE OF TEXAS
RAFAEL GUZMAN
106025
LICENSED
PROFESSIONAL ENGINEER

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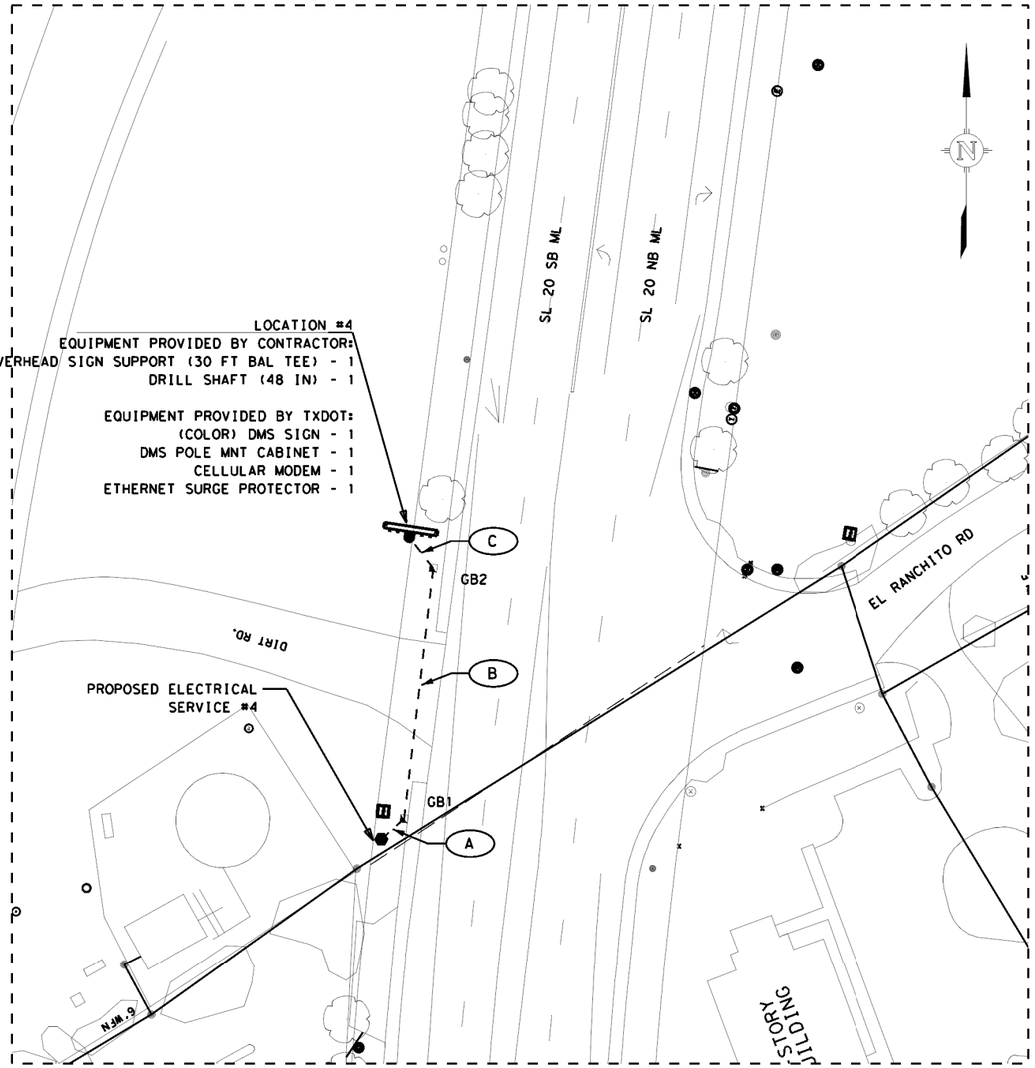
Rafael Guzman
5CB9C1491FA542A...

TEXAS DEPARTMENT OF TRANSPORTATION ®

INSTALL DMS #1
SL 20 NB

DN:	CK: R. G.	DW:	CK: R. G.	STATE	SHEET NUMBER			SHEET NO.
				TEXAS	SHEET 1 OF 1			
FED. RD. DIV. NO.	STATE DIST. NO.	COUNTY		CONTROL	SECTION	JOB	HIGHWAY NO.	
6	22	WEBB, etc		0922	00	067	Various	36

3/1/2023 AALDAPE 0922*00*067*SHEET*SL20NB*.dgn



ELECTRICAL SCHEDULE TABLE						
DESCRIPTION	RUN NUMBER	A	B	C	POLE	TOTAL QTY
	RUN LENGTH (LF)	12	100	15	60	
POWER	ELEC CONDR (NO. 4) BARE				1	* 80
	ELEC CONDR (NO. 4) INSULATED				3	* 240
	ELEC CONDR (NO. 2) BARE	1	1	1		* 147
	ELEC CONDR (NO. 2) INSULATED	3	3	3		* 441
CONDUIT	CONDT (PVC) (SCHD 40) (2")	1	1	1		127
	CONDT (PVC) (SCHD 80) (2") (BORE)					0

* QUANTITIES INCLUDE CABLE IN CABINET AND GROUND BOXES

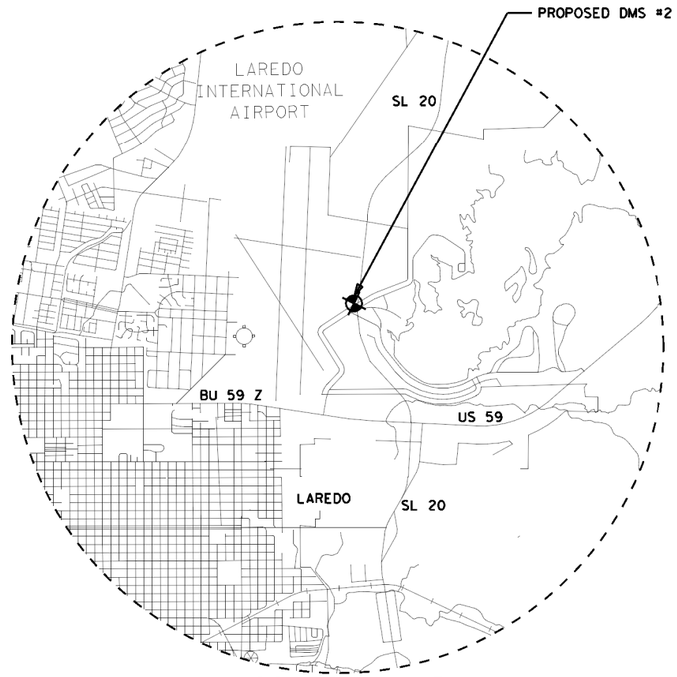
NOTES:

1. THE LOCATION FOR THE ITS POLE, ELECTRICAL SERVICE AND CONDUIT RUNS ARE APPROXIMATE, DETERMINE THE EXACT LOCATIONS IN THE FIELD IN COORDINATION WITH THE TRAFFIC OPERATIONS PERSONNEL.
2. VERIFY WITH ALL UTILITY COMPANIES THE EXACT LOCATIONS OF EXISTING UNDERGROUND UTILITIES PRIOR TO ANY CONSTRUCTION TO AVOID CONFLICT OR DAMAGES.
3. CONTRACTOR SHALL INSTALL THE FOLLOWING TXDOT PROVIDED EQUIPMENT IN PROPOSED DMS LOCATION: DMS SIGN, DMS POLE MNT CABINET, ETHERNET SURGE PROTECTOR, AND CELLULAR MODEM.

LEGEND

- PROPOSED GROUND BOX
- PROPOSED CONDUIT (TRENCH)
- PROPOSED DMS SIGN, T-MOUNT
- PROPOSED ELECTRICAL SERVICE
- PROPOSED CONDUIT (BORE)

ITEM NO.	DESC NO.	DESCRIPTION	UNIT	QTY
416	6006	DRILL SHAFT (48 IN)	LF	25.00
618	6023	CONDT (PVC) (SCHD 40) (2")	LF	127.00
618	6047	CONDT (PVC) (SCHD 80) (2") (BORE)	LF	0.00
620	6011	ELEC CONDR (NO. 4) BARE	LF	80.00
620	6012	ELEC CONDR (NO. 4) INSULATED	LF	240.00
620	6015	ELEC CONDR (NO. 2) BARE	LF	147.00
620	6016	ELEC CONDR (NO. 2) INSULATED	LF	441.00
624	6008	GROUND BOX TY C (162911) W/APRON	EA	2.00
628	6131	ELC SRV TY D 120/240 060 (NS)GS(N)SP(O)	EA	1.00
650	6028	INS OH SN SUP (30 FT BAL TEE)	EA	1.00
6028	6001	INSTALL DMS (POLE MTD CABINET)	EA	1.00
6423	6003	INSTALL ETHERNET SURGE PROTECTOR	EA	1.00
6423	6004	INSTALL CELLULAR MODEM	EA	1.00



LOCATION MAP

STATE OF TEXAS
RAFAEL GUZMAN
106025
LICENSED
PROFESSIONAL ENGINEER

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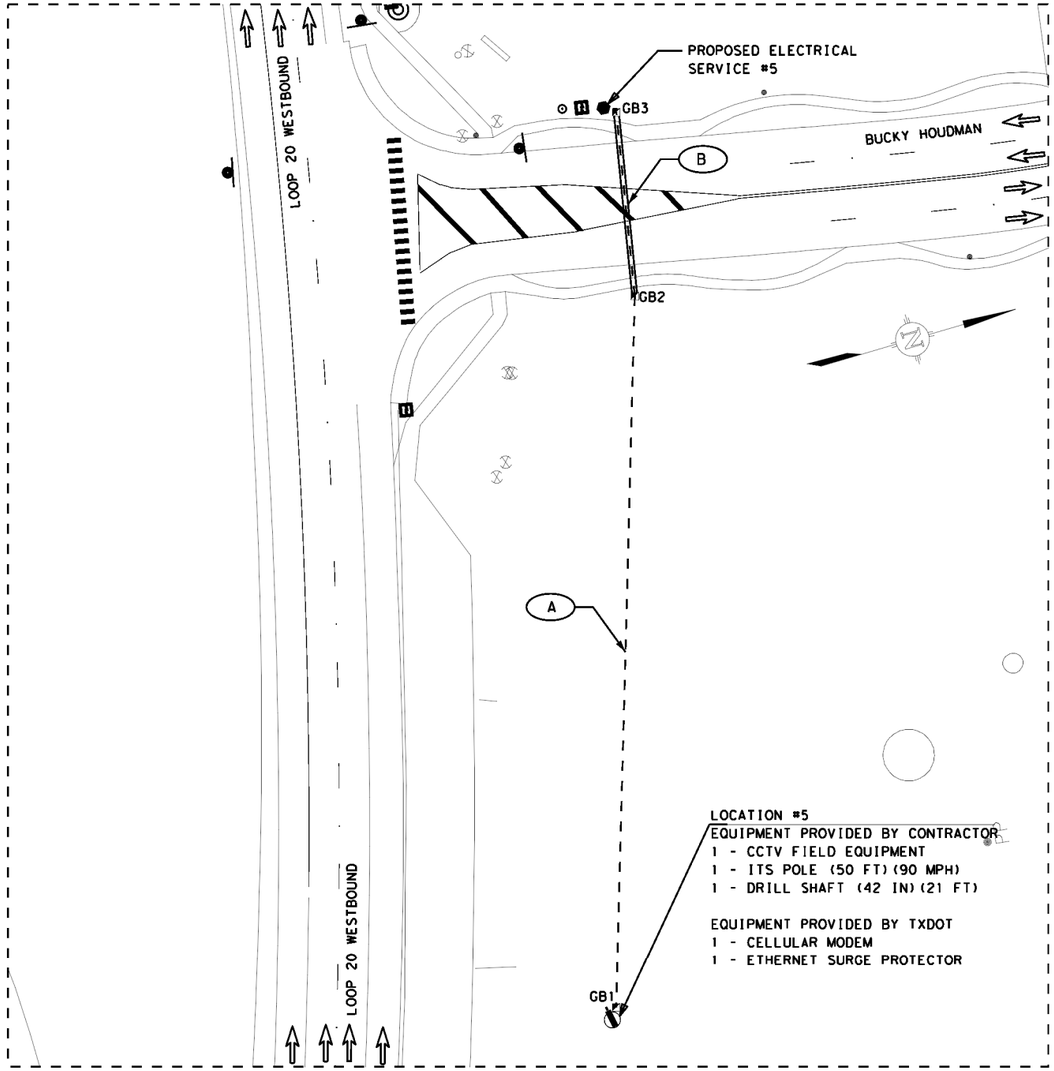
DocuSigned by:
Rafael Guzman
5CB9C1491FA542A...

TEXAS DEPARTMENT OF TRANSPORTATION ®

INSTALL DMS #2
SL 20 SB

DN:	CK: R. G.	DW:	CK: R. G.	STATE	SHEET NUMBER			SHEET NO.
				TEXAS	SHEET 1 OF 1			
FED. RD. DIV. NO.	STATE DIST. NO.	COUNTY		CONTROL	SECTION	JOB	HIGHWAY NO.	37
6	22	WEBB, etc		0922	00	067	Various	

3/1/2023 AAALDAPE 0922*00*067*SHEET*SL20SB*.dgn



LEGEND

- PROPOSED GROUNG BOX
- PROPOSED CONDUIT (TRENCH)
- PROPOSED CCTV CAMERA
- PROPOSED ELECTRICAL SERVICE
- PROPOPOSED CONDUIT (BORE)

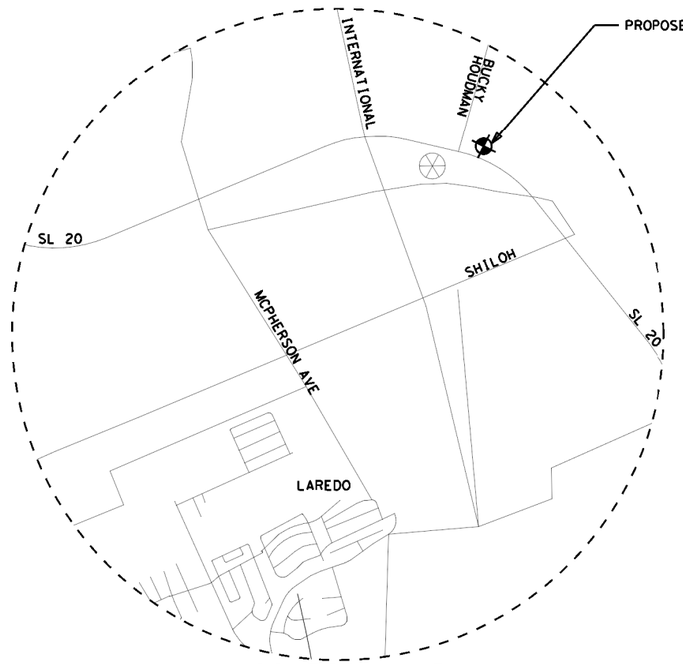
ITEM NO.	DESC NO.	DESCRIPTION	UNIT	QTY
416	6005	DRILL SHAFT (42 IN)	LF	21.00
618	6023	CONDT (PVC) (SCHD 40) (2")	LF	282.00
618	6047	CONDT (PVC) (SCHD 80) (2") (BORE)	LF	70.00
620	6009	ELEC CONDR (NO. 6) BARE	LF	372.00
620	6010	ELEC CONDR (NO. 6) INSULATED	LF	724.00
624	6008	GROUND BOX TY C (162911) W/APRON	EA	3.00
628	6131	ELC SRV TY D 120/240 060 (NS)GS(N)SP(O)	EA	1.00
6010	6002	CCTV FIELD EQUIPMENT (DIGITAL)	EA	1.00
6064	6038	ITS POLE (50 FT)(110 MPH)	EA	1.00
6064	6076	ITS POLE MNT CAB (TY 1)(CONF 2)	EA	1.00
6423	6003	ITS ETHERENT SURGE PROTECTOR	EA	1.00
6423	6004	INSTALL CELLULAR MODEM	EA	1.00

ELECTRICAL SCHEDULE TABLE				
DESCRIPTION	RUN NUMBER	A	B	TOTAL QTY
	RUN LENGTH (LF)	282	70	
POWER	ELEC CONDR (NO. 6) BARE	1	1	* 372
	ELEC CONDR (NO. 6) INSULATED	2	2	* 724
CONDUIT	CONDT (PVC) (SCHD 40) (2")	1		282
	CONDT (PVC) (SCHD 80) (2") (BORE)		1	70

* QUANTITIES INCLUDE CABLE IN CABINET AND GROUND BOXES

NOTES:

1. THE LOCATION FOR THE ITS POLE, ELECTRICAL SERVICE AND CONDUIT RUNS ARE APPROXIMATE, DETERMINE THE EXACT LOCATIONS IN THE FIELD IN COORDINATION WITH THE TRAFFIC OPERATIONS PERSONNEL.
2. VERIFY WITH ALL UTILITY COMPANIES THE EXACT LOCATIONS OF EXISTING UNDERGROUND UTILITIES PRIOR TO ANY CONSTRUCTION TO AVOID CONFLICT OR DAMAGES.
3. CONTRACTOR SHALL INSTALL THE FOLLOWING TXDOT PROVIDED EQUIPMENT IN PROPOSED CCTV CAMERA CABINET: CELLULAR MODEM AND ETHERNET SURGE PROTECTOR.



LOCATION MAP

STATE OF TEXAS
RAFAEL GUZMAN
106025
LICENSED PROFESSIONAL ENGINEER

THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY RAFAEL GUZMAN, P.E. 106025, ON 5/26/2023

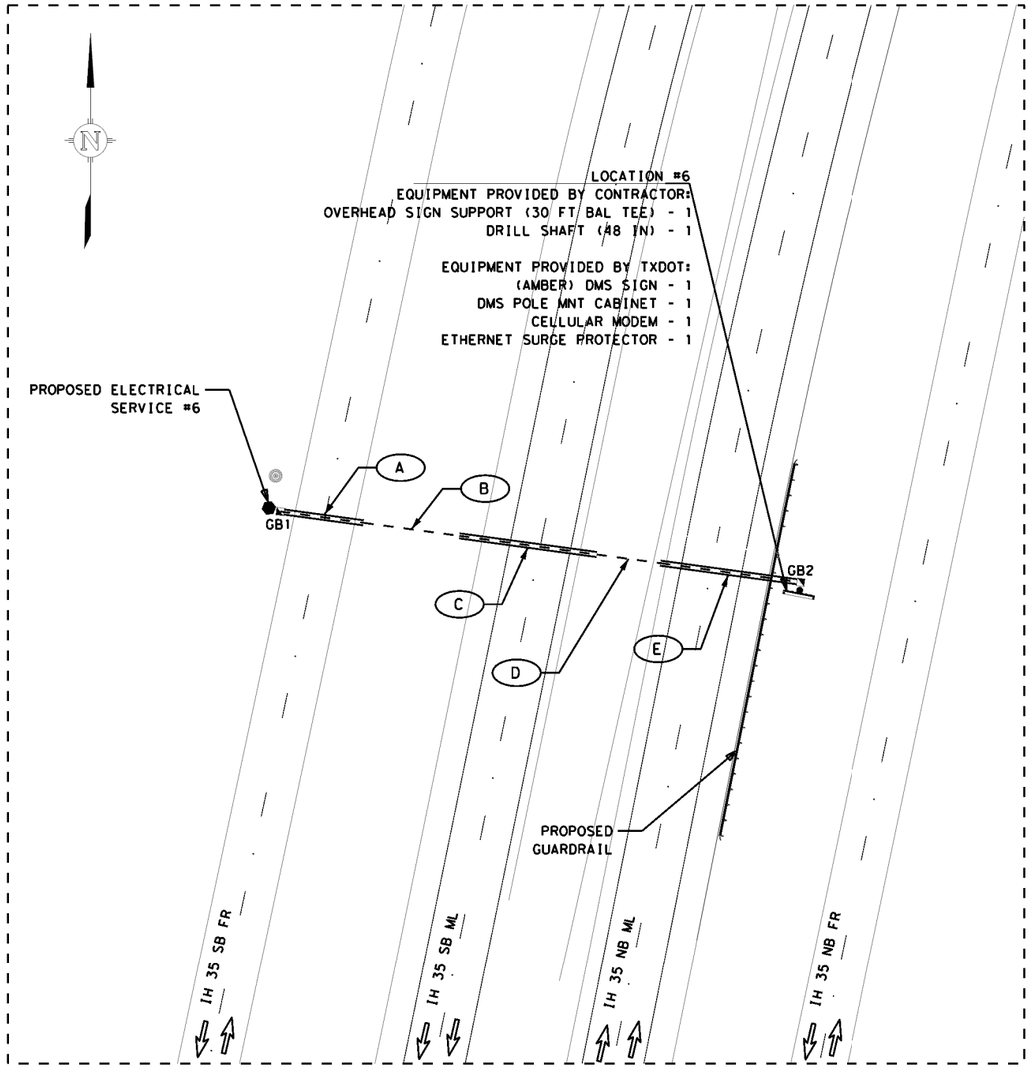
DocuSigned by:
Rafael Guzman
5CB9C149FA542A...

TEXAS DEPARTMENT OF TRANSPORTATION ®

INSTALL CCTV #3 LOOP 20 AT BUCKY HOUDMAN

DN:	DW:	STATE	SHEET NUMBER				SHEET NO.
CK: R. G.	CK: R. G.	TEXAS	SHEET 1 OF 1				
FED. RD. DIV. NO.	STATE DIST. NO.	COUNTY	CONTROL	SECTION	JOB	HIGHWAY NO.	38
6	22	WEBB, etc	0922	00	067	Various	

5/26/2023 aaaldape 0922*00*067*SHEET*LP20 AT BUCKY HOUDMAN.dgn



LEGEND

- PROPOSED GROUND BOX
- PROPOSED CONDUIT (TRENCH)
- PROPOSED DMS SIGN, T-MOUNT
- PROPOSED ELECTRICAL SERVICE
- PROPOSED CONDUIT (BORE)

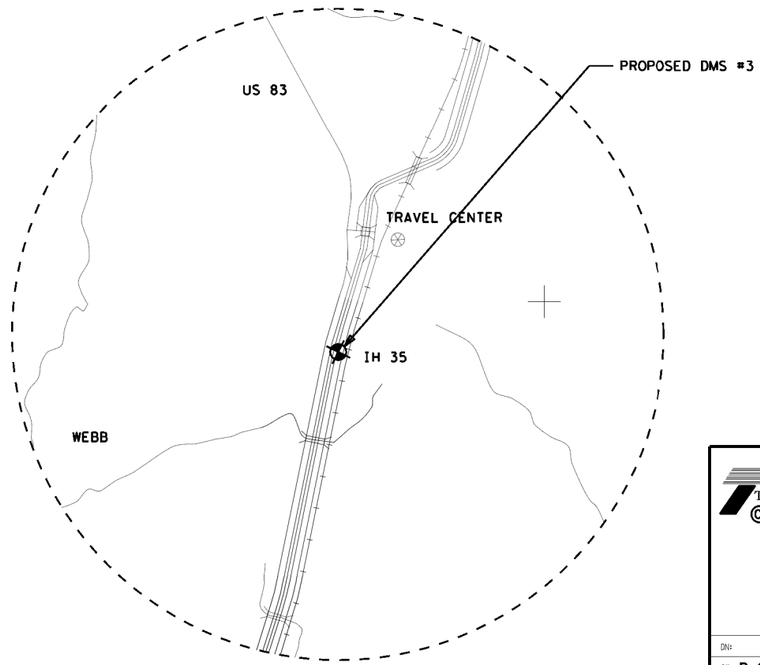
ITEM NO.	DESC NO.	DESCRIPTION	UNIT	QTY
416	6006	DRILL SHAFT (48 IN)	LF	**25.00**
540	6001	MTL W-BEAM GD FEN (TIM POST)	LF	**50.00**
540	6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	**1.00**
544	6006	GUARDRAIL END TRTMNT (INST) (WOOD POST) (TY III)	EA	**1.00**
618	6023	CONDT (PVC) (SCHD 40) (2")	LF	**63.00**
618	6047	CONDT (PVC) (SCHD 80) (2") (BORE)	LF	**167.00**
620	6011	ELEC CONDR (NO. 4) BARE	LF	**80.00**
620	6012	ELEC CONDR (NO. 4) INSULATED	LF	**240.00**
620	6015	ELEC CONDR (NO. 2) BARE	LF	**225.00**
620	6016	ELEC CONDR (NO. 2) INSULATED	LF	**675.00**
624	6008	GROUND BOX TY C (162911) W/APRON	EA	**2.00**
628	6131	ELC SRV TY D 120/240 060 (NS)GS(N)SP(O)	EA	**1.00**
650	6028	INS OH SN SUP (30 FT BAL TEE)	EA	**1.00**
6028	6001	INSTALL DMS (POLE MTD CABINET)	EA	**1.00**
6423	6003	ITS ETHERENT SURGE PROTECTOR	EA	**1.00**
6423	6004	INSTALL CELLULAR MODEM	EA	**1.00**

ELECTRICAL SCHEDULE TABLE

DESCRIPTION	RUN NUMBER	A	B	C	D	E	POLE	TOTAL QTY
	RUN LENGTH (LF)	32	38	55	25	55	60	
POWER	ELEC CONDR (NO. 4) BARE						1	* 80
	ELEC CONDR (NO. 4) INSULATED						3	* 240
	ELEC CONDR (NO. 2) BARE	1	1	1	1	1		* 225
	ELEC CONDR (NO. 2) INSULATED	3	3	3	3	3		* 675
CONDUIT	CONDT (PVC) (SCHD 40) (2")		1		1			63
	CONDT (PVC) (SCHD 80) (2") (BORE)	1		1	1	1		167

NOTES:

1. THE LOCATION FOR THE ITS POLE, ELECTRICAL SERVICE AND CONDUIT RUNS ARE APPROXIMATE, DETERMINE THE EXACT LOCATIONS IN THE FIELD IN COORDINATION WITH THE TRAFFIC OPERATIONS PERSONNEL.
2. VERIFY WITH ALL UTILITY COMPANIES THE EXACT LOCATIONS OF EXISTING UNDERGROUND UTILITIES PRIOR TO ANY CONSTRUCTION TO AVOID CONFLICT OR DAMAGES.
3. CONTRACTOR SHALL INSTALL THE FOLLOWING TXDOT PROVIDED EQUIPMENT IN PROPOSED DMS LOCATION: DMS SIGN, DMS POLE MNT CABINET, ETHERNET SURGE PROTECTOR, AND CELLULAR MODEM.



LOCATION MAP

STATE OF TEXAS
RAFAEL GUZMAN
106025
LICENSED
PROFESSIONAL ENGINEER

THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY RAFAEL GUZMAN, P.E. 106025, ON 5/26/2023

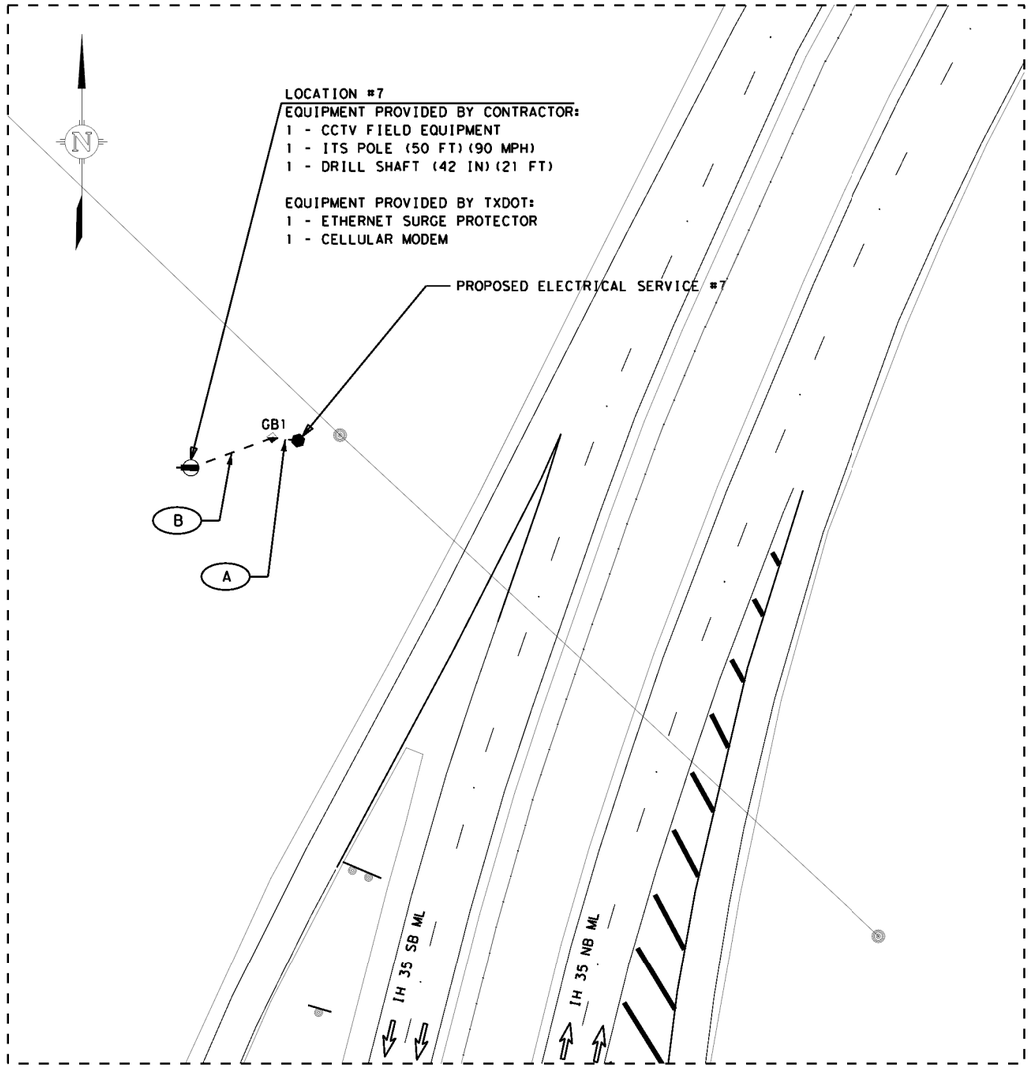
DocuSigned by:
Rafael Guzman
5CB8C1491FA342A...

TEXAS DEPARTMENT OF TRANSPORTATION ®

INSTALL DMS #3
IH35 AT MM 17

DN:	CK: R. G.	DW:	CK: R. G.	STATE	SHEET NUMBER			SHEET NO.
				TEXAS	SHEET 1 OF 1			
FED. RD. DIV. NO.	STATE DIST. NO.	COUNTY		CONTROL	SECTION	JOB	HIGHWAY NO.	
6	22	WEBB, etc		0922	00	067	Various	39

5/26/2023 aaldape 0922*00*067*SHEET*IH35 AT MM 17*18*.dgn



LEGEND

- PROPOSED GROUNG BOX
- PROPOSED CONDUIT (TRENCH)
- PROPOSED CCTV CAMERA
- PROPOSED ELECTRICAL SERVICE
- PROPOPOSED CONDUIT (BORE)

ITEM NO.	DESC NO.	DESCRIPTION	UNIT	QTY
416	6005	DRILL SHAFT (42 IN)	LF	**21.00**
618	6023	CONDT (PVC) (SCHD 40) (2")	LF	**44.00**
618	6047	CONDT (PVC) (SCHD 80) (2") (BORE)	LF	**0.00**
620	6009	ELEC CONDR (NO. 6) BARE	LF	**64.00**
620	6010	ELEC CONDR (NO. 6) INSULATED	LF	**108.00**
624	6008	GROUND BOX TY C (162911) W/APRON	EA	**1.00**
628	6131	ELC SRV TY D 120/240 060 (NS)GS(N)SP(O)	EA	**1.00**
6010	6002	CCTV FIELD EQUIPMENT (DIGITAL)	EA	**1.00**
6064	6038	ITS POLE (50 FT)(110 MPH)	EA	**1.00**
6064	6076	ITS POLE MNT CAB (TY 1)(CONF 2)	EA	**1.00**
6423	6003	ITS ETHERENT SURGE PROTECTOR	EA	**1.00**
6423	6004	INSTALL CELLULAR MODEM	EA	**1.00**

ELECTRICAL SCHEDULE TABLE				
DESCRIPTION	RUN NUMBER	A	B	TOTAL QTY
	RUN LENGTH (LF)	10	34	
POWER	ELEC CONDR (NO. 6) BARE	1	1	* 64
	ELEC CONDR (NO. 6) INSULATED	2	2	* 108
CONDUIT	CONDT (PVC) (SCHD 40) (2")	1	1	44
	CONDT (PVC) (SCHD 80) (2") (BORE)			0

* QUANTITIES INCLUDE CABLE IN CABINET AND GROUND BOXES

NOTES:

1. THE LOCATION FOR THE ITS POLE, ELECTRICAL SERVICE AND CONDUIT RUNS ARE APPROXIMATE, DETERMINE THE EXACT LOCATIONS IN THE FIELD IN COORDINATION WITH THE TRAFFIC OPERATIONS PERSONNEL.
2. VERIFY WITH ALL UTILITY COMPANIES THE EXACT LOCATIONS OF EXISTING UNDERGROUND UTILITIES PRIOR TO ANY CONSTRUCTION TO AVOID CONFLICT OR DAMAGES.
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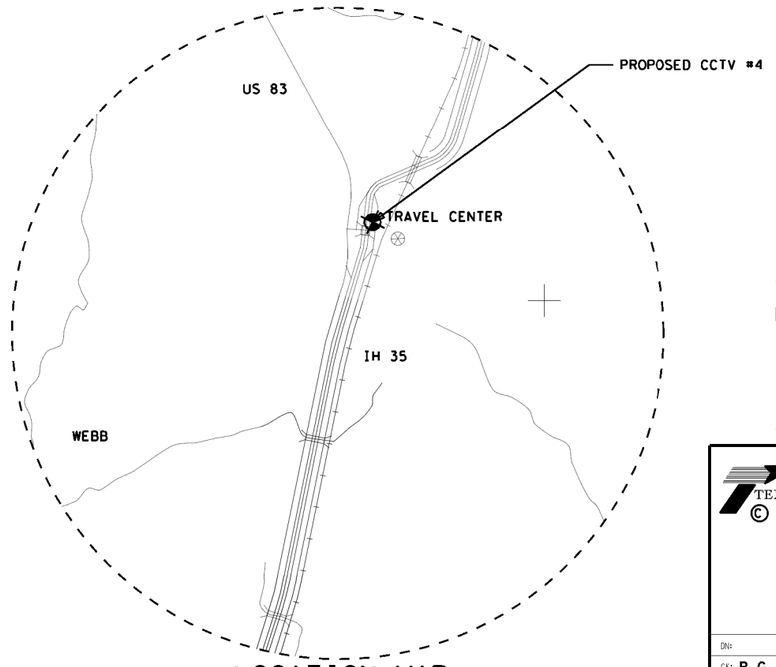

LOCATION MAP

STATE OF TEXAS
RAFAEL GUZMAN
106025
LICENSED
PROFESSIONAL ENGINEER

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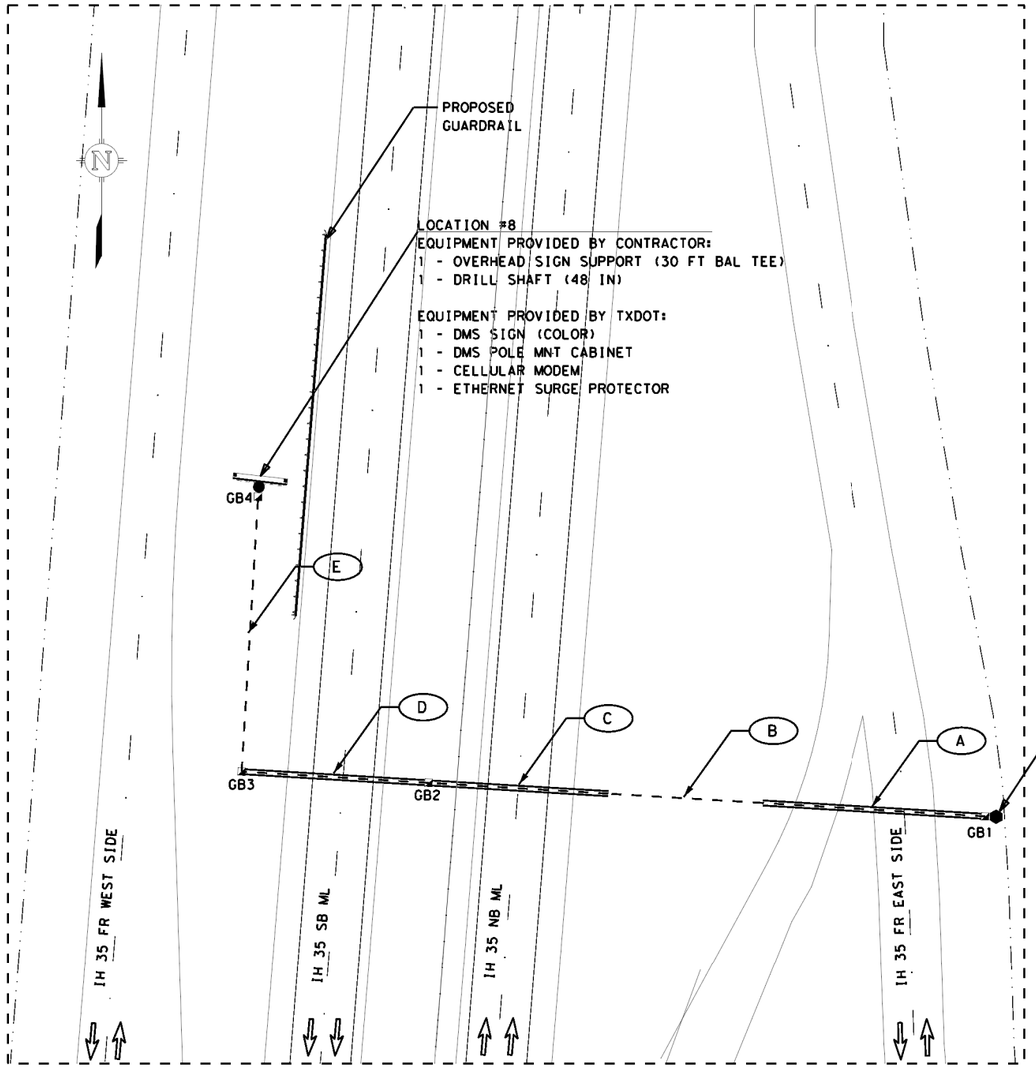
DocuSigned by:
Rafael Guzman
5CB8C1A31FA342A...

TEXAS DEPARTMENT OF TRANSPORTATION ®

INSTALL CCTV #4
IH35 AT MM 18

DN:		DN:	STATE	SHEET NUMBER			SHEET NO.
CK: R. G.		CK: R. G.	TEXAS	SHEET 1 OF 1			
FED. RD. DIV. NO.	STATE DIST. NO.	COUNTY	CONTROL	SECTION	JOB	HIGHWAY NO.	40
6	22	WEBB, etc	0922	00	067	Various	

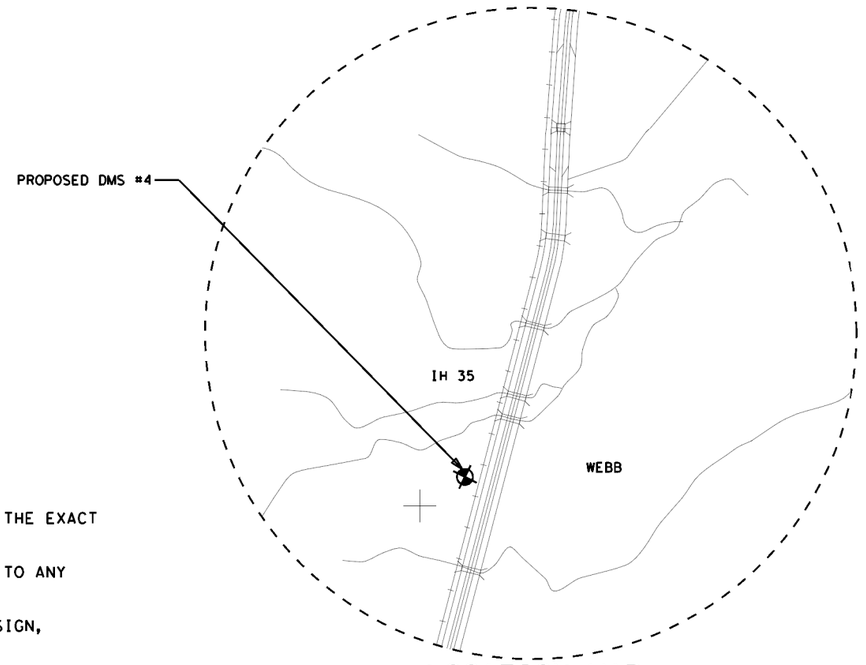
5/26/2023 aaoldape 0922*00*067*SHEET*IH35 AT MM 18*19*.dgn



LEGEND

- PROPOSED GROUND BOX
- PROPOSED CONDUIT (TRENCH)
- PROPOSED DMS SIGN, T-MOUNT
- PROPOSED ELECTRICAL SERVICE
- PROPOSED CONDUIT (BORE)

ITEM NO.	DESC NO.	DESCRIPTION	UNIT	QTY
416	6006	DRILL SHAFT (48 IN)	LF	25.00
540	6001	MTL W-BEAM GD FEN (TIM POST)	LF	50.00
540	6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	1.00
544	6006	GUARDRAIL END TRTMNT (INST) (WOOD POST) (TY III)	EA	1.00
618	6023	CONDT (PVC) (SCHD 40) (2")	LF	169.00
618	6047	CONDT (PVC) (SCHD 80) (2") (BORE)	LF	228.00
620	6011	ELEC CONDR (NO. 4) BARE	LF	80.00
620	6012	ELEC CONDR (NO. 4) INSULATED	LF	240.00
620	6015	ELEC CONDR (NO. 2) BARE	LF	417.00
620	6016	ELEC CONDR (NO. 2) INSULATED	LF	1251.00
624	6008	GROUND BOX TY C (162911) W/APRON	EA	4.00
628	6131	ELC SRV TY D 120/240 060 (NS)GS(N)SP(O)	EA	1.00
650	6028	INS OH SN SUP (30 FT BAL TEE)	EA	1.00
6028	6001	INSTALL DMS (POLE MTD CABINET)	EA	1.00
6423	6003	ITS ETHERENT SURGE PROTECTOR	EA	1.00
6423	6004	INSTALL CELLULAR MODEM	EA	1.00



LOCATION MAP

ELECTRICAL SCHEDULE TABLE								
DESCRIPTION	RUN NUMBER	A	B	C	D	E	POLE	TOTAL QTY
	RUN LENGTH (LF)	87	61	70	71	108	60	
POWER	ELEC CONDR (NO. 4) BARE						1	* 80
	ELEC CONDR (NO. 4) INSULATED						3	* 240
	ELEC CONDR (NO. 2) BARE	1	1	1	1	1		* 417
	ELEC CONDR (NO. 2) INSULATED	3	3	3	3	3		* 1251
CONDUIT	CONDT (PVC) (SCHD 40) (2")		1			1		169
	CONDT (PVC) (SCHD 80) (2") (BORE)	1		1	1			228

NOTES:

1. THE LOCATION FOR THE ITS POLE, ELECTRICAL SERVICE AND CONDUIT RUNS ARE APPROXIMATE, DETERMINE THE EXACT LOCATIONS IN THE FIELD IN COORDINATION WITH THE TRAFFIC OPERATIONS PERSONNEL.
2. VERIFY WITH ALL UTILITY COMPANIES THE EXACT LOCATIONS OF EXISTING UNDERGROUND UTILITIES PRIOR TO ANY CONSTRUCTION TO AVOID CONFLICT OR DAMAGES.
3. CONTRACTOR SHALL INSTALL THE FOLLOWING TXDOT PROVIDED EQUIPMENT IN PROPOSED DMS LOCATION: DMS SIGN, DMS POLE MNT CABINET, ETHERNET SURGE PROTECTOR, AND CELLULAR MODEM.

STATE OF TEXAS
RAFAEL GUZMAN
106025
LICENSED
PROFESSIONAL ENGINEER

THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY RAFAEL GUZMAN, P.E. 106025, ON 5/26/2023

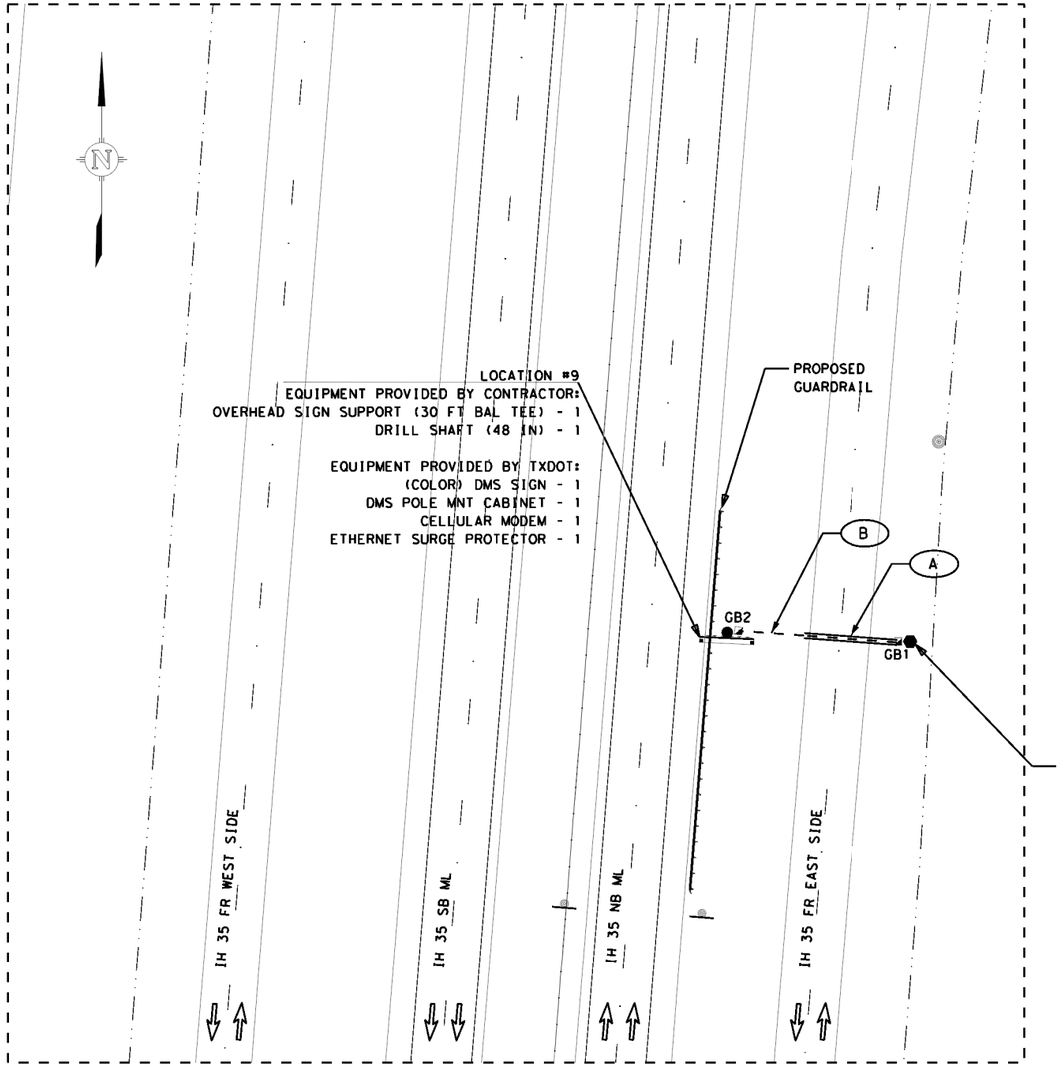
DocuSigned by:
Rafael Guzman
5CB9C1491FA542A...

TEXAS DEPARTMENT OF TRANSPORTATION ®

INSTALL DMS #4
IH35 AT MM 26

DN:	CK: R. G.	DW:	CK: R. G.	STATE	SHEET NUMBER			SHEET NO.
FED. RD. DIV. NO.	STATE DIST. NO.	COUNTY		CONTROL	SECTION	JOB	HIGHWAY NO.	
6	22	WEBB, etc		0922	00	067	Various	41

5/26/2023 aaoldape 0922*00*067*SHEET*IH35 AT MM 26*.dgn



LEGEND

- PROPOSED GROUND BOX
- PROPOSED CONDUIT (TRENCH)
- PROPOSED DMS SIGN, T-MOUNT
- PROPOSED ELECTRICAL SERVICE
- PROPOSED CONDUIT (BORE)

ITEM NO.	DESC NO.	DESCRIPTION	UNIT	QTY
416	6006	DRILL SHAFT (48 IN)	LF	25.00
540	6001	MTL W-BEAM GD FEN (TIM POST)	LF	50.00
540	6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	1.00
544	6006	GUARDRAIL END TRTMNT (INST) (WOOD POST) (TY III)	EA	1.00
618	6023	CONDT (PVC) (SCHD 40) (2")	LF	64.00
618	6047	CONDT (PVC) (SCHD 80) (2") (BORE)	LF	0.00
620	6011	ELEC CONDR (NO. 4) BARE	LF	80.00
620	6012	ELEC CONDR (NO. 4) INSULATED	LF	240.00
620	6015	ELEC CONDR (NO. 2) BARE	LF	84.00
620	6016	ELEC CONDR (NO. 2) INSULATED	LF	148.00
624	6008	GROUND BOX TY C (162911) W/APRON	EA	2.00
628	6131	ELC SRV TY D 120/240 060 (NS)GS(N)SP(O)	EA	1.00
650	6028	INS OH SN SUP (30 FT BAL TEE)	EA	1.00
6028	6001	INSTALL DMS (POLE MTD CABINET)	EA	1.00
6423	6003	ITS ETHERENT SURGE PROTECTOR	EA	1.00
6423	6004	INSTALL CELLULAR MODEM	EA	1.00

ELECTRICAL SCHEDULE TABLE

DESCRIPTION	RUN NUMBER / RUN LENGTH (LF)	A 38	B 26	POLE 60	TOTAL QTY
POWER	ELEC CONDR (NO. 4) BARE			1	* 80
	ELEC CONDR (NO. 4) INSULATED			3	* 240
	ELEC CONDR (NO. 2) BARE	1	1		* 84
	ELEC CONDR (NO. 2) INSULATED	2	2		* 148
CONDUIT	CONDT (PVC) (SCHD 40) (2")	1	1		64
	CONDT (PVC) (SCHD 80) (2") (BORE)				0

NOTES:

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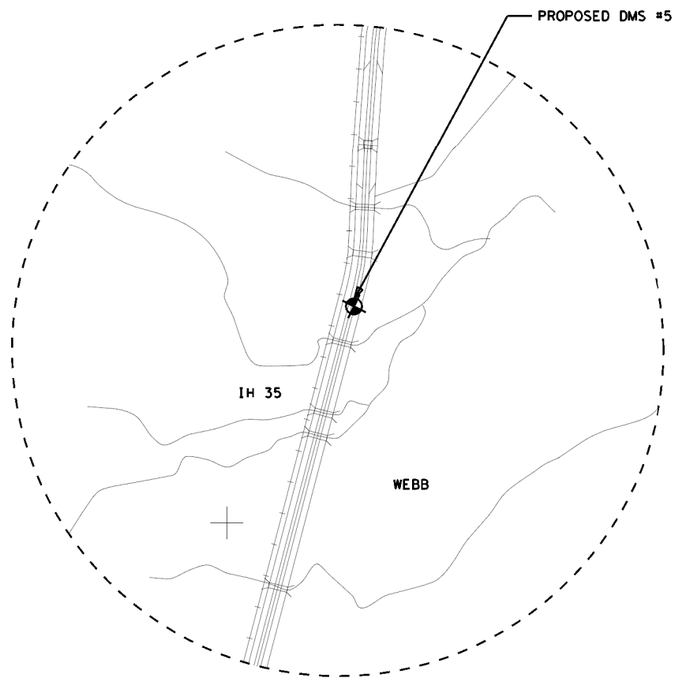


LOCATION MAP

STATE OF TEXAS
RAFAEL GUZMAN
106025
LICENSED
PROFESSIONAL ENGINEER

THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY RAFAEL GUZMAN, P.E. 106025, ON 5/26/2023

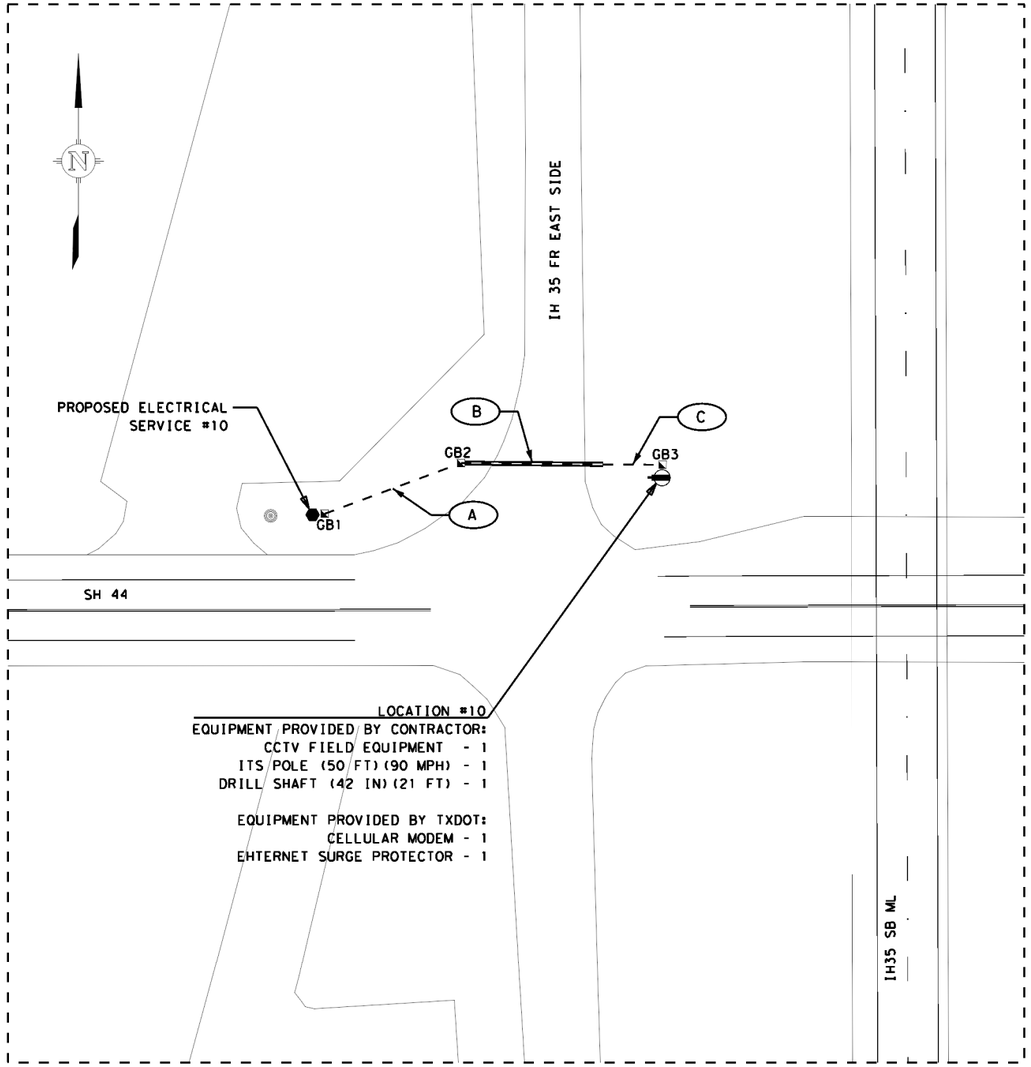
DocuSigned by:
Rafael Guzman
5CB9C1491FA542A...

INSTALL DMS #5
IH35 AT MM 27

DN:	DW:	STATE	SHEET NUMBER			SHEET NO.
CK: R. G.	CK: R. G.	TEXAS	SHEET 1 OF 1			
FED.RD. DIV.NO.	STATE DIST.NO.	COUNTY	CONTROL	SECTION	JOB	HIGHWAY NO.
6	22	WEBB, etc	0922	00	067	Various

42

5/26/2023 aaldape 0922*00*067*SHEET*IH35 AT MM 27*.dgn



LEGEND

- PROPOSED GROUNG BOX
- PROPOSED CONDUIT (TRENCH)
- PROPOSED CCTV CAMERA
- PROPOSED ELECTRICAL SERVICE
- PROPOPOSED CONDUIT (BORE)

ITEM NO.	DESC NO.	DESCRIPTION	UNIT	QTY
416	6005	DRILL SHAFT (42 IN)	LF	**21.00**
618	6023	CONDT (PVC) (SCHD 40) (2")	LF	**24.00**
618	6047	CONDT (PVC) (SCHD 80) (2") (BORE)	LF	**37.00**
620	6009	ELEC CONDR (NO. 6) BARE	LF	**81.00**
620	6010	ELEC CONDR (NO. 6) INSULATED	LF	**162.00**
624	6008	GROUND BOX TY C (162911) W/APRON	EA	**3.00**
628	6131	ELC SRV TY D 120/240 060 (NS)GS(N)SP(O)	EA	**1.00**
6010	6002	CCTV FIELD EQUIPMENT (DIGITAL)	EA	**1.00**
6064	6038	ITS POLE (50 FT)(110 MPH)	EA	**1.00**
6064	6076	ITS POLE MNT CAB (TY 1)(CONF 2)	EA	**1.00**
6423	6003	INSTALL ETHERNET SURGE PROTECTOR	EA	**1.00**
6423	6004	INSTALL CELLULAR MODEM	EA	**1.00**

ELECTRICAL SCHEDULE TABLE

DESCRIPTION	RUN NUMBER / RUN LENGTH (LF)	A 14	B 37	C 10	TOTAL QTY
POWER	ELEC CONDR (NO. 6) BARE	1	1	1	* 81
	ELEC CONDR (NO. 6) INSULATED	2	2	2	* 162
CONDUIT	CONDT (PVC) (SCHD 40) (2")	1		1	24
	CONDT (PVC) (SCHD 80) (2") (BORE)		1		37

* QUANTITIES INCLUDE CABLE IN CABINET AND GROUND BOXES

NOTES:

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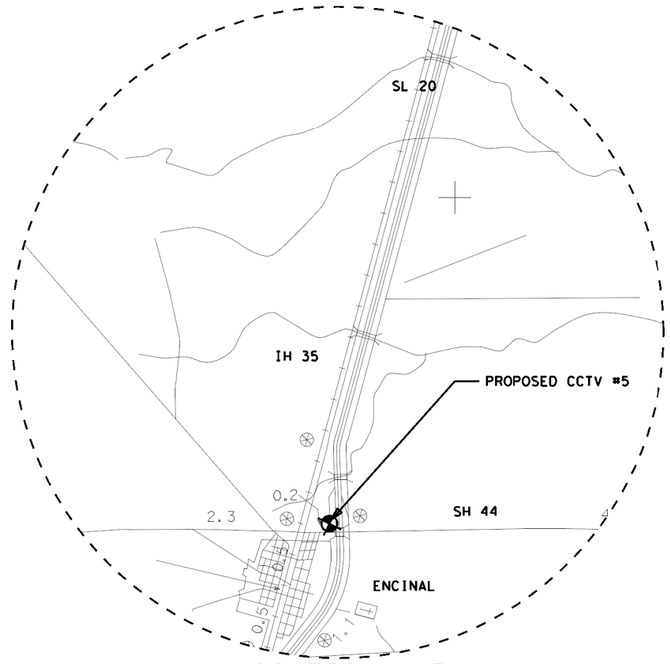

LOCATION MAP

STATE OF TEXAS
RAFAEL GUZMAN
106025
LICENSED
PROFESSIONAL ENGINEER

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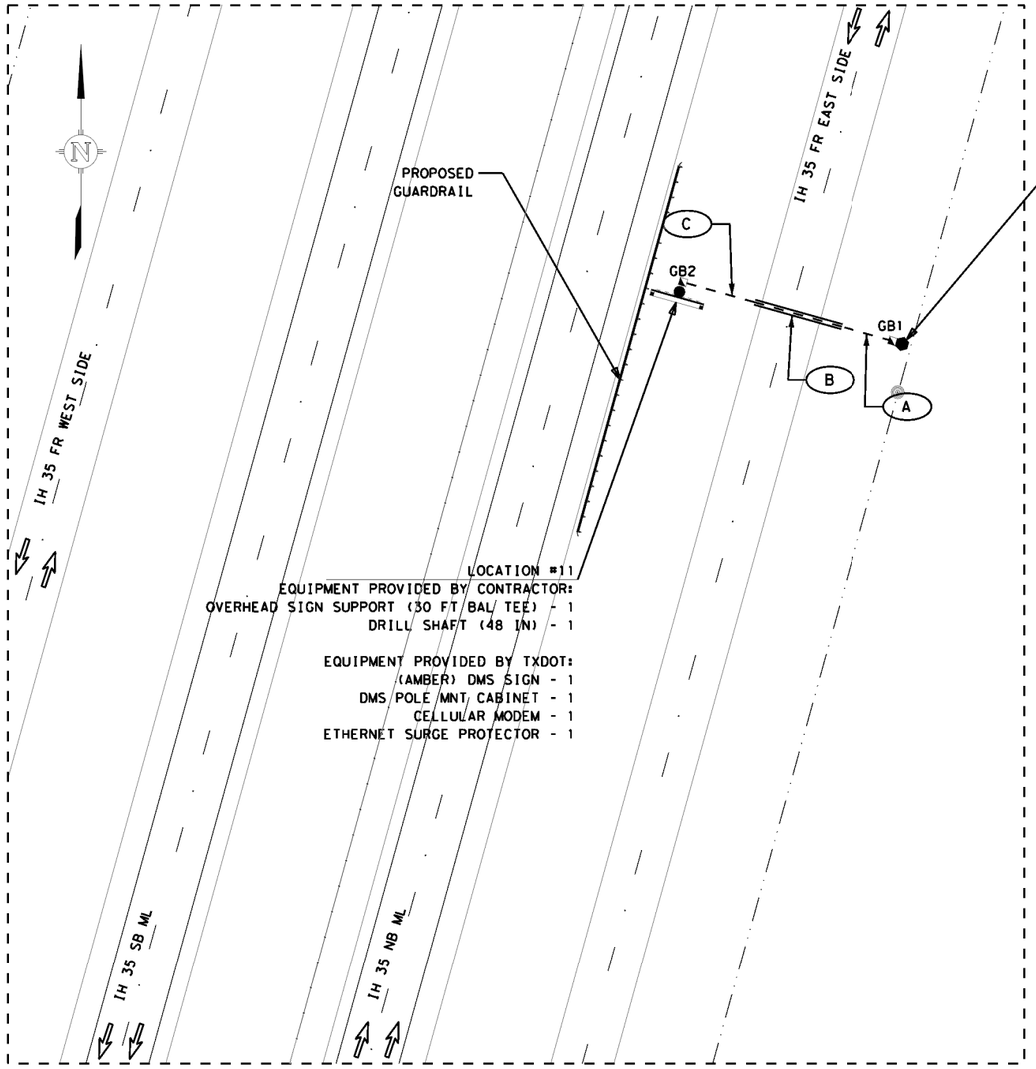
DocuSigned by:
Rafael Guzman
60B0C1481FA542A...

TEXAS DEPARTMENT OF TRANSPORTATION ®

INSTALL CCTV #5
IH 35 AT MM 40

DN:	CK: R. G.	DW:	CK: R. G.	STATE	SHEET NUMBER			SHEET NO.
				TEXAS	SHEET 1 OF 1			
FED. RD. DIV. NO.	STATE DIST. NO.	COUNTY		CONTROL	SECTION	JOB	HIGHWAY NO.	
6	22	WEBB, etc		0922	00	067	Various	43

5/26/2023 aaoldape 0922*00*067*SHEET*IH35 AT MM 40*.dgn



LEGEND

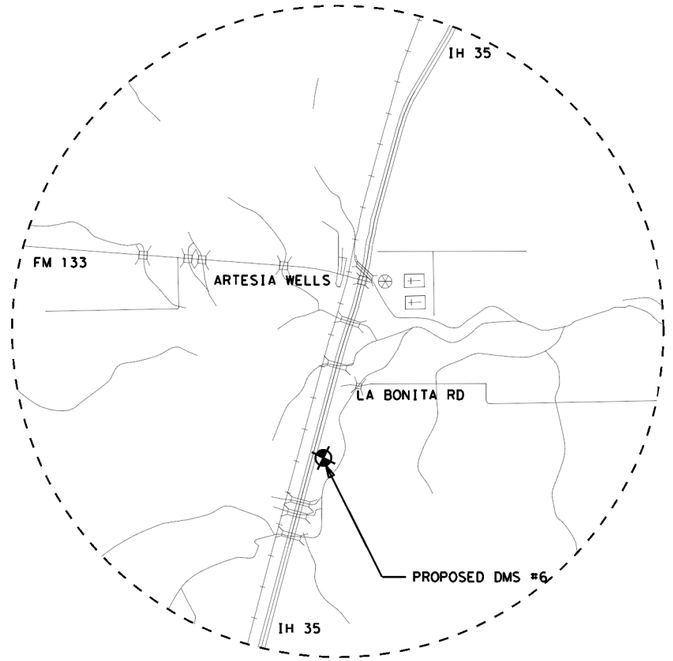
- PROPOSED GROUND BOX
- PROPOSED CONDUIT (TRENCH)
- PROPOSED DMS SIGN, T-MOUNT
- PROPOSED ELECTRICAL SERVICE
- PROPOSED CONDUIT (BORE)

ITEM NO.	DESC NO.	DESCRIPTION	UNIT	QTY
416	6006	DRILL SHAFT (48 IN)	LF	**25.00**
540	6001	MTL W-BEAM GD FEN (TIM POST)	LF	**50.00**
540	6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	**1.00**
544	6006	GUARDRAIL END TRTMNT (INST) (WOOD POST) (TY III)	EA	**1.00**
618	6023	CONDT (PVC) (SCHD 40) (2")	LF	**57.00**
618	6047	CONDT (PVC) (SCHD 80) (2") (BORE)	LF	**30.00**
620	6011	ELEC CONDR (NO. 4) BARE	LF	**80.00**
620	6012	ELEC CONDR (NO. 4) INSULATED	LF	**240.00**
620	6015	ELEC CONDR (NO. 2) BARE	LF	**107.00**
620	6016	ELEC CONDR (NO. 2) INSULATED	LF	**321.00**
624	6008	GROUND BOX TY C (162911) W/APRON	EA	**2.00**
628	6131	ELC SRV TY D 120/240 060 (NS)GS(N)SP(O)	EA	**1.00**
650	6028	INS OH SN SUP (30 FT BAL TEE)	EA	**1.00**
6028	6001	INSTALL DMS (POLE MTD CABINET)	EA	**1.00**
6423	6003	INSTALL ETHERNET SURGE PROTECTOR	EA	**1.00**
6423	6004	INSTALL CELLULAR MODEM	EA	**1.00**

ELECTRICAL SCHEDULE TABLE						
DESCRIPTION	RUN NUMBER	A	B	C	POLE	TOTAL QTY
	RUN LENGTH (LF)	21	36	30	60	
POWER	ELEC CONDR (NO. 4) BARE				1	* 80
	ELEC CONDR (NO. 4) INSULATED				3	* 240
	ELEC CONDR (NO. 2) BARE	1	1	1		* 107
	ELEC CONDR (NO. 2) INSULATED	3	3	3		* 321
CONDUIT	CONDT (PVC) (SCHD 40) (2")	1	1			57
	CONDT (PVC) (SCHD 80) (2") (BORE)			1		30

NOTES:

1. THE LOCATION FOR THE ITS POLE, ELECTRICAL SERVICE AND CONDUIT RUNS ARE APPROXIMATE, DETERMINE THE EXACT LOCATIONS IN THE FIELD IN COORDINATION WITH THE TRAFFIC OPERATIONS PERSONNEL.
2. VERIFY WITH ALL UTILITY COMPANIES THE EXACT LOCATIONS OF EXISTING UNDERGROUND UTILITIES PRIOR TO ANY CONSTRUCTION TO AVOID CONFLICT OR DAMAGES.
3. CONTRACTOR SHALL INSTALL THE FOLLOWING TXDOT PROVIDED EQUIPMENT IN PROPOSED DMS LOCATION: DMS SIGN, DMS POLE MNT CABINET, ETHERNET SURGE PROTECTOR, AND CELLULAR MODEM.



LOCATION MAP

STATE OF TEXAS
RAFAEL GUZMAN
106025
LICENSED
PROFESSIONAL ENGINEER

THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY RAFAEL GUZMAN, P.E. 106025, ON 5/26/2023

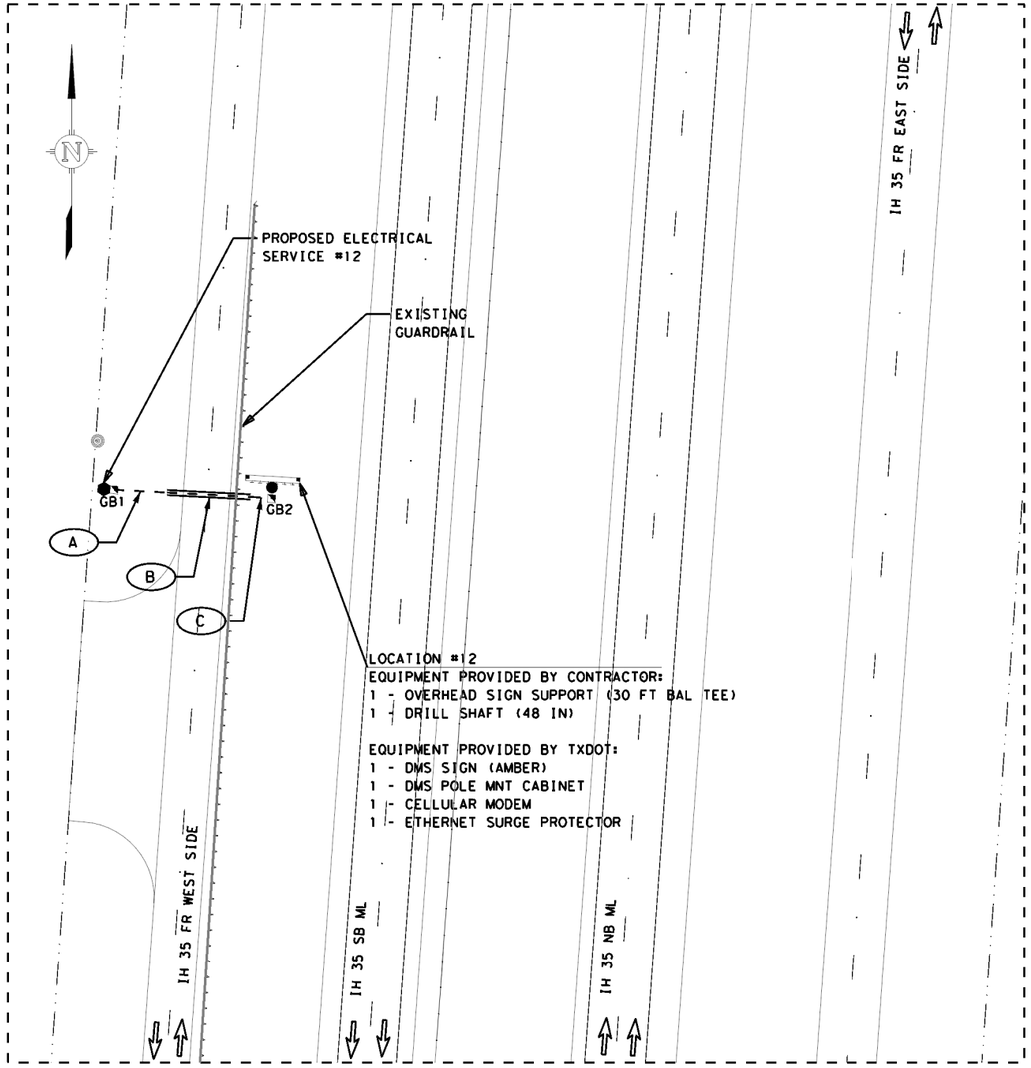
DocuSigned by:
Rafael Guzman
3CB9C1491FA342A...

TEXAS DEPARTMENT OF TRANSPORTATION ®

INSTALL DMS #6
IH 35 AT MM 54

DN:	CK: R. G.	DW:	CK: R. G.	STATE	SHEET NUMBER			SHEET NO.
				TEXAS	SHEET 1 OF 1			
FED. RD. DIV. NO.	STATE DIST. NO.	COUNTY		CONTROL	SECTION	JOB	HIGHWAY NO.	
6	22	WEBB, etc		0922	00	067	Various	44

5/26/2023 aaldape 0922*00*067*SHEET*IH35 AT MM 54*.dgn



ELECTRICAL SCHEDULE TABLE						
DESCRIPTION	RUN NUMBER	A	B	C	POLE	TOTAL QTY
	RUN LENGTH (LF)	21	33	8	60	
POWER	ELEC CONDR (NO. 4) BARE				1	* 80
	ELEC CONDR (NO. 4) INSULATED				3	* 240
	ELEC CONDR (NO. 2) BARE	1	1	1		* 82
	ELEC CONDR (NO. 2) INSULATED	3	3	3		* 246
CONDUIT	CONDT (PVC) (SCHD 40) (2")	1		1		29
	CONDT (PVC) (SCHD 80) (2") (BORE)		1			33

* QUANTITIES INCLUDE CABLE IN CABINET AND GROUND BOXES

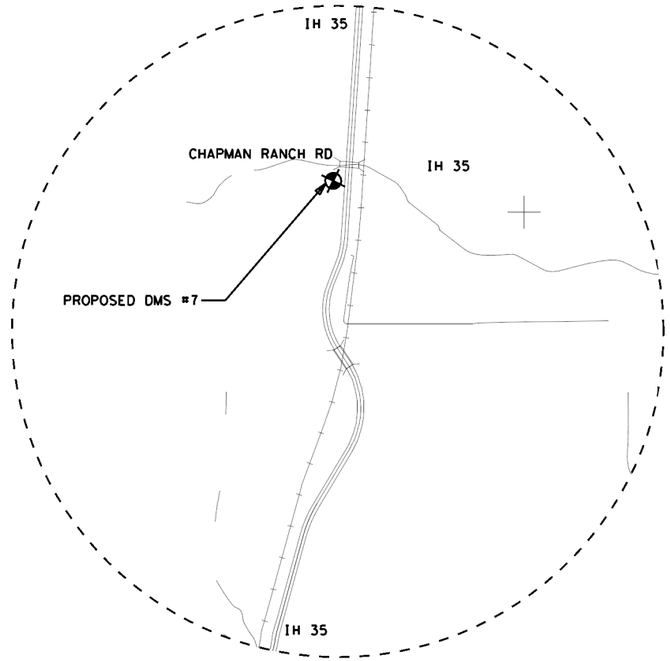
NOTES:

1. THE LOCATION FOR THE ITS POLE, ELECTRICAL SERVICE AND CONDUIT RUNS ARE APPROXIMATE, DETERMINE THE EXACT LOCATIONS IN THE FIELD IN COORDINATION WITH THE TRAFFIC OPERATIONS PERSONNEL.
2. VERIFY WITH ALL UTILITY COMPANIES THE EXACT LOCATIONS OF EXISTING UNDERGROUND UTILITIES PRIOR TO ANY CONSTRUCTION TO AVOID CONFLICT OR DAMAGES.
3. CONTRACTOR SHALL INSTALL THE FOLLOWING TXDOT PROVIDED EQUIPMENT IN PROPOSED DMS LOCATION: DMS SIGN, DMS POLE MNT CABINET, ETHERNET SURGE PROTECTOR, AND CELLULAR MODEM.

LEGEND

- PROPOSED GROUND BOX
- PROPOSED CONDUIT (TRENCH)
- PROPOSED DMS SIGN, T-MOUNT
- PROPOSED ELECTRICAL SERVICE
- PROPOSED CONDUIT (BORE)

ITEM NO.	DESC NO.	DESCRIPTION	UNIT	QTY
416	6006	DRILL SHAFT (48 IN)	LF	**25.00**
618	6023	CONDT (PVC) (SCHD 40) (2")	LF	**29.00**
618	6047	CONDT (PVC) (SCHD 80) (2") (BORE)	LF	**33.00**
620	6011	ELEC CONDR (NO. 4) BARE	LF	**80.00**
620	6012	ELEC CONDR (NO. 4) INSULATED	LF	**240.00**
620	6015	ELEC CONDR (NO. 2) BARE	LF	**82.00**
620	6016	ELEC CONDR (NO. 2) INSULATED	LF	**246.00**
624	6008	GROUND BOX TY C (162911) W/APRON	EA	**2.00**
628	6131	ELC SRV TY D 120/240 060 (NS)GS(N)SP(O)	EA	**1.00**
650	6028	INS OH SN SUP (30 FT BAL TEE)	EA	**1.00**
6028	6001	INSTALL DMS (POLE MTD CABINET)	EA	**1.00**
6423	6003	INSTALL ETHERNET SURGE PROTECTOR	EA	**1.00**
6423	6004	INSTALL CELLULAR MODEM	EA	**1.00**



LOCATION MAP

STATE OF TEXAS
RAFAEL GUZMAN
106025
LICENSED
PROFESSIONAL ENGINEER

THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY RAFAEL GUZMAN, P.E. 106025, ON 3/1/2023

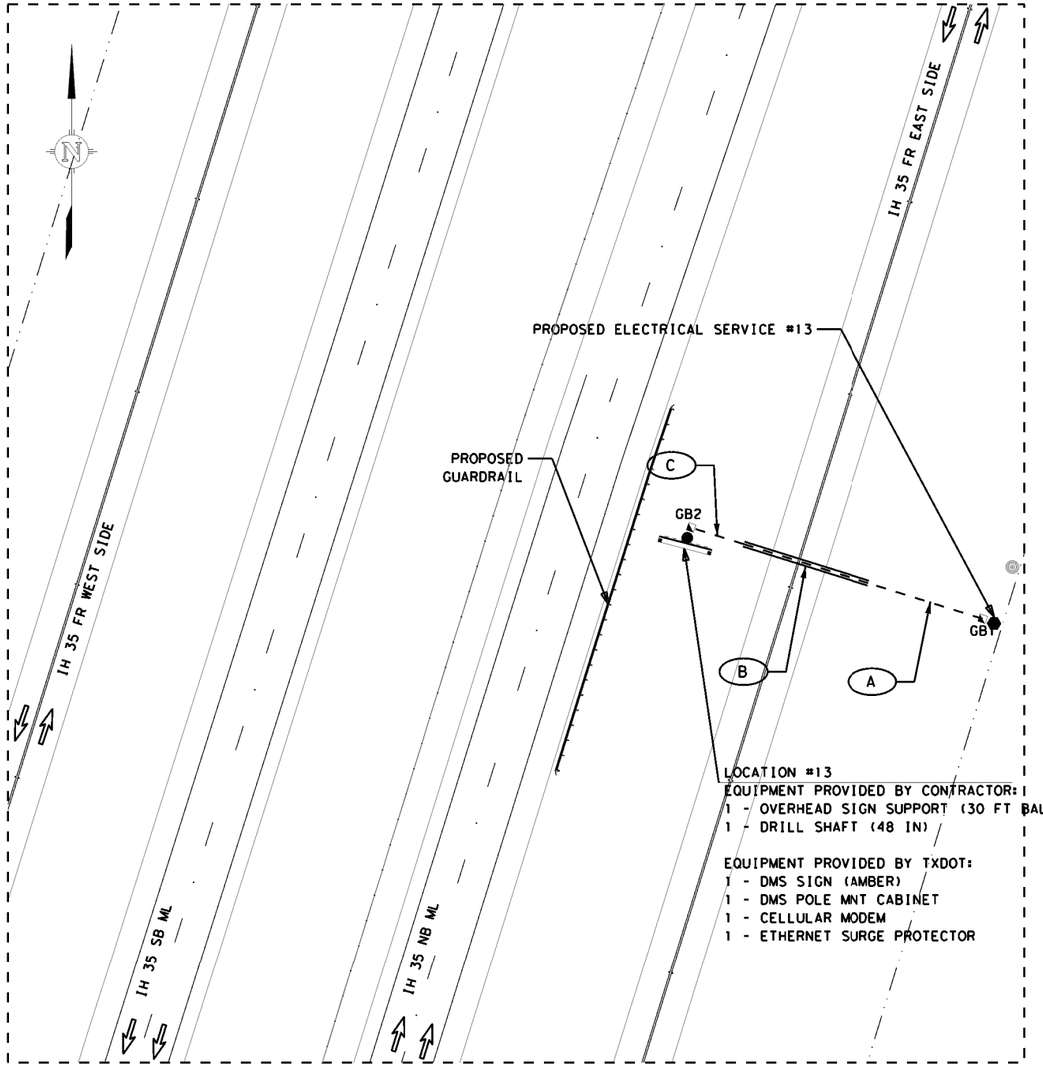
DocuSigned by:
Rafael Guzman
5CB9C1491FA542A...

TEXAS DEPARTMENT OF TRANSPORTATION ®

INSTALL DMS #7
IH 35 AT MM 57

DN:	CK: R. G.	DW:	CK: R. G.	STATE	SHEET NUMBER			SHEET NO.
				TEXAS	SHEET 1 OF 1			
FED. RD. DIV. NO.	STATE DIST. NO.	COUNTY		CONTROL	SECTION	JOB	HIGHWAY NO.	
6	22	WEBB, etc		0922	00	067	Various	45

3/1/2023 AALDAPE 0922*00*067*SHEET*IH35 AT MM 57*.dgn



LEGEND

- PROPOSED GROUND BOX
- PROPOSED CONDUIT (TRENCH)
- PROPOSED DMS SIGN, T-MOUNT
- PROPOSED ELECTRICAL SERVICE
- PROPOSED CONDUIT (BORE)

ITEM NO.	DESC NO.	DESCRIPTION	UNIT	QTY
416	6006	DRILL SHAFT (48 IN)	LF	**25.00**
540	6001	MTL W-BEAM GD FEN (TIM POST)	LF	**50.00**
540	6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	**1.00**
544	6006	GUARDRAIL END TRTMNT (INST) (WOOD POST) (TY III)	EA	**1.00**
618	6023	CONDT (PVC) (SCHD 40) (2")	LF	**99.00**
618	6047	CONDT (PVC) (SCHD 80) (2") (BORE)	LF	**22.00**
620	6011	ELEC CONDR (NO. 4) BARE	LF	**80.00**
620	6012	ELEC CONDR (NO. 4) INSULATED	LF	**240.00**
620	6015	ELEC CONDR (NO. 2) BARE	LF	**141.00**
620	6016	ELEC CONDR (NO. 2) INSULATED	LF	**423.00**
624	6008	GROUND BOX TY C (162911) W/APRON	EA	**2.00**
628	6131	ELC SRV TY D 120/240 060 (NS)GS(N)SP(O)	EA	**1.00**
650	6028	INS OH SN SUP (30 FT BAL TEE)	EA	**1.00**
6028	6001	INSTALL DMS (POLE MTD CABINET)	EA	**1.00**
6423	6003	INSTALL ETHERNET SURGE PROTECTOR	EA	**1.00**
6423	6004	INSTALL CELLULAR MODEM	EA	**1.00**

ELECTRICAL SCHEDULE TABLE							
DESCRIPTION	RUN NUMBER / RUN LENGTH (LF)	A 47	B 52	C 22	POLE 60	TOTAL QTY	
POWER	ELEC CONDR (NO. 4) BARE				1	*	80
	ELEC CONDR (NO. 4) INSULATED				3	*	240
	ELEC CONDR (NO. 2) BARE	1	1	1		*	141
	ELEC CONDR (NO. 2) INSULATED	3	3	3		*	423
CONDUIT	CONDT (PVC) (SCHD 40) (2")	1	1				99
	CONDT (PVC) (SCHD 80) (2") (BORE)			1			22

NOTES:

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2. VERIFY WITH ALL UTILITY COMPANIES THE EXACT LOCATIONS OF EXISTING UNDERGROUND UTILITIES PRIOR TO ANY CONSTRUCTION TO AVOID CONFLICT OR DAMAGES.
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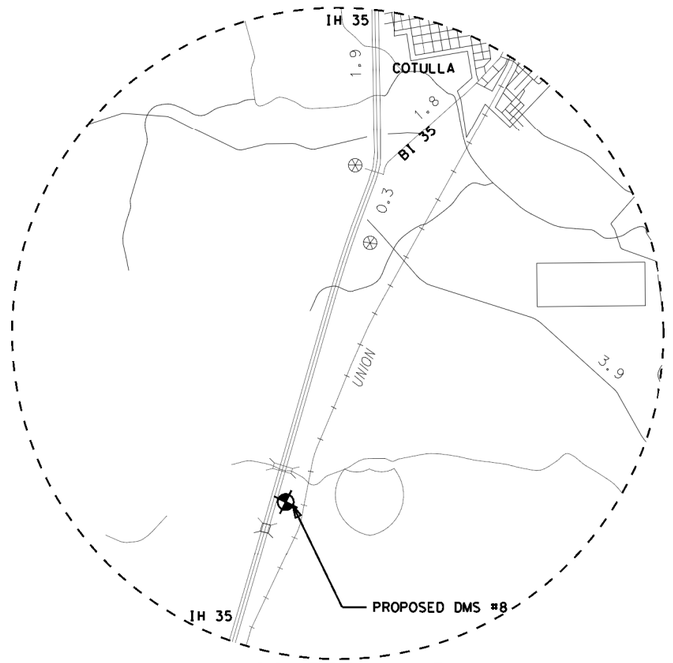


LOCATION MAP

STATE OF TEXAS
RAFAEL GUZMAN
106025
LICENSED
PROFESSIONAL ENGINEER

THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY RAFAEL GUZMAN, P.E. 106025, ON 5/26/2023

DocuSigned by:
Rafael Guzman
5CB9C1491FA542A...

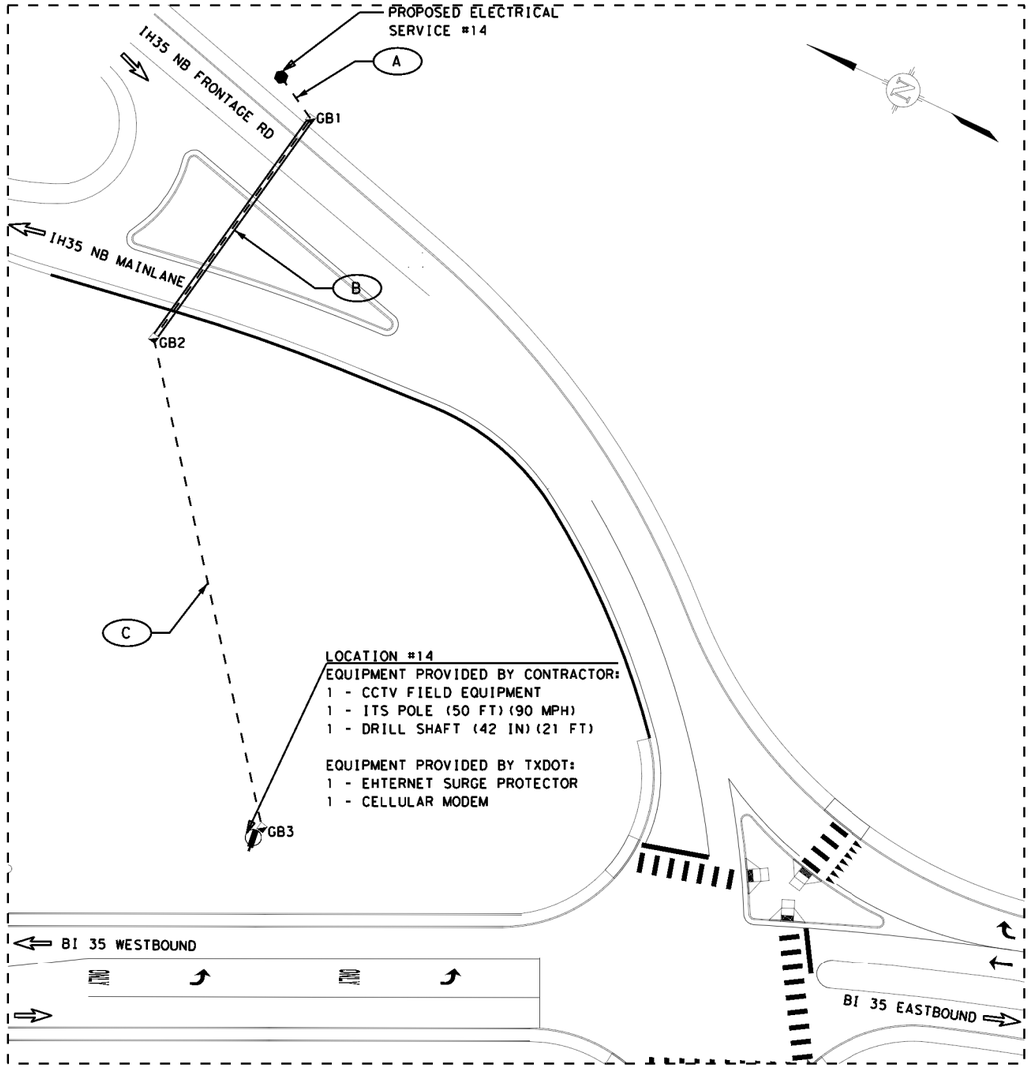
TEXAS DEPARTMENT OF TRANSPORTATION ®

INSTALL DMS #8
IH 35 AT MM 64

DN:	DW:	STATE	SHEET NUMBER			SHEET NO.
CK: R.G.	CK: R.G.	TEXAS	SHEET 1 OF 1			
FED.RD. DIV.NO.	STATE DIST.NO.	COUNTY	CONTROL	SECTION	JOB	HIGHWAY NO.
6	22	WEBB, etc	0922	00	067	Various

46

5/26/2023 aaaldape 0922+00+067*SHEET*IH35 AT MM 64*.dgn



LEGEND

- PROPOSED GROUNG BOX
- PROPOSED CONDUIT (TRENCH)
- PROPOSED CCTV CAMERA
- PROPOSED ELECTRICAL SERVICE
- PROPOPOSED CONDUIT (BORE)

ITEM NO.	DESC NO.	DESCRIPTION	UNIT	QTY
416	6005	DRILL SHAFT (42 IN)	LF	**21.00**
618	6023	CONDT (PVC) (SCHD 40) (2")	LF	**220.00**
618	6047	CONDT (PVC) (SCHD 80) (2") (BORE)	LF	**103.00**
620	6009	ELEC CONDR (NO. 6) BARE	LF	**343.00**
620	6010	ELEC CONDR (NO. 6) INSULATED	LF	**666.00**
624	6008	GROUND BOX TY C (162911) W/APRON	EA	**3.00**
628	6131	ELC SRV TY D 120/240 060 (NS)GS(N)SP(O)	EA	**1.00**
6010	6002	CCTV FIELD EQUIPMENT (DIGITAL)	EA	**1.00**
6064	6038	ITS POLE (50 FT)(110 MPH)	EA	**1.00**
6064	6076	ITS POLE MNT CAB (TY 1)(CONF 2)	EA	**1.00**
6423	6003	INSTALL ETHERNET SURGE PROTECTOR	EA	**1.00**
6423	6004	INSTALL CELLULAR MODEM	EA	**1.00**

ELECTRICAL SCHEDULE TABLE					
DESCRIPTION	RUN NUMBER	A	B	C	TOTAL QTY
	RUN LENGTH (LF)	20	103	200	
POWER	ELEC CONDR (NO. 6) BARE	1	1	1	* 343
	ELEC CONDR (NO. 6) INSULATED	2	2	2	* 666
CONDUIT	CONDT (PVC) (SCHD 40) (2")	1		1	220
	CONDT (PVC) (SCHD 80) (2") (BORE)		1		103

* QUANTITIES INCLUDE CABLE IN CABINET AND GROUND BOXES

NOTES:

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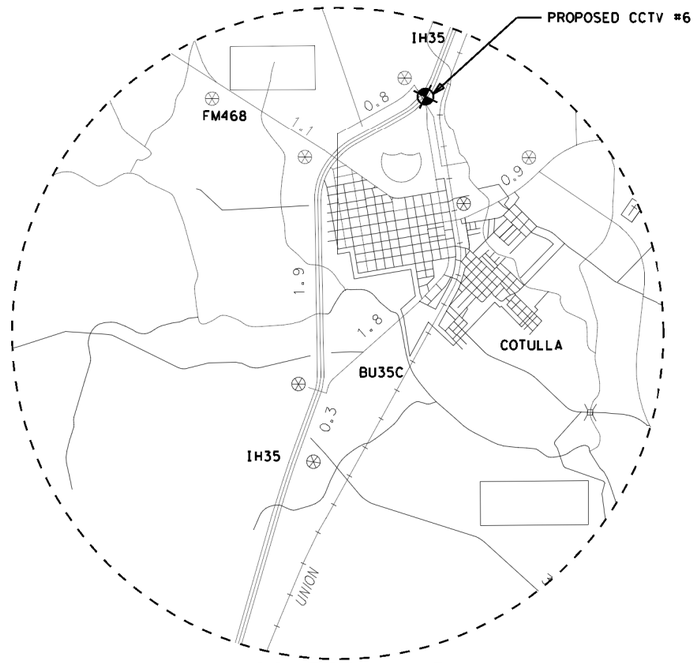
3. CONTRACTOR SHALL INSTALL THE FOLLOWING TXDOT PROVIDED EQUIPMENT IN PROPOSED CCTV CAMERA CABINET: CELLULAR MODEM AND ETHERNET SURGE PROTECTOR.



LOCATION MAP

STATE OF TEXAS
RAFAEL GUZMAN
106025
LICENSED
PROFESSIONAL ENGINEER

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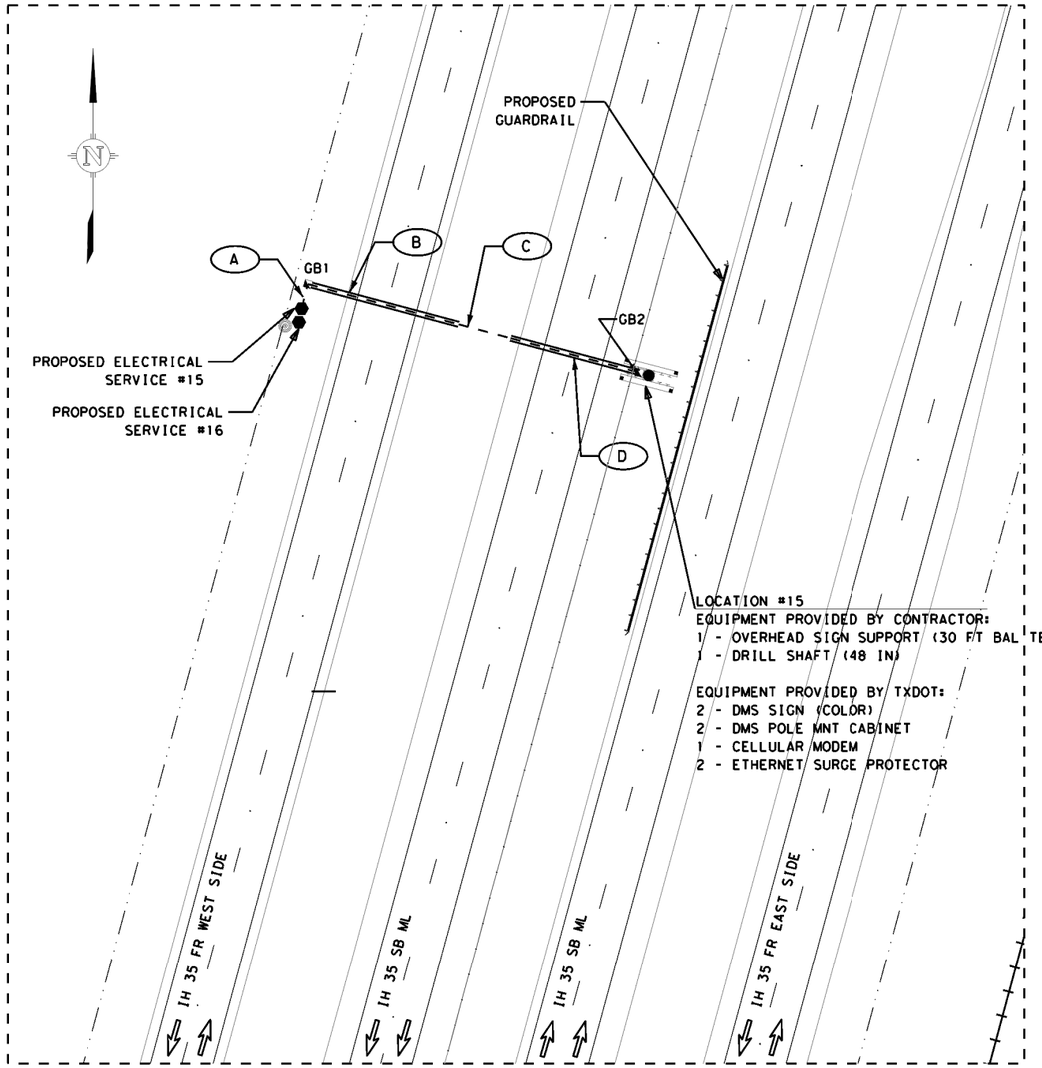
DocuSigned by:
Rafael Guzman
5CB9C1491FA542A...

TEXAS DEPARTMENT OF TRANSPORTATION ®

INSTALL CCTV #6
IH 35 AT BI 35

DN:	CK: R. G.	DW:	CK: R. G.	STATE	SHEET NUMBER			SHEET NO.
				TEXAS	SHEET 1 OF 1			
FED. RD. DIV. NO.	STATE DIST. NO.	COUNTY		CONTROL	SECTION	JOB	HIGHWAY NO.	
6	22	WEBB, etc		0922	00	067	Various	47

5/26/2023 aaldape 0922*00*067*SHEET*IH35 AT MM 68*.dgn



LEGEND

- PROPOSED GROUND BOX
- PROPOSED CONDUIT (TRENCH)
- PROPOSED DMS SIGN, T-MOUNT
- PROPOSED ELECTRICAL SERVICE
- PROPOSED CONDUIT (BORE)

ITEM NO.	DESC NO.	DESCRIPTION	UNIT	QTY
416	6006	DRILL SHAFT (48 IN)	LF	25.00
540	6001	MTL W-BEAM GD FEN (TIM POST)	LF	50.00
540	6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	1.00
544	6006	GUARDRAIL END TRTMNT (INST) (WOOD POST) (TY III)	EA	1.00
618	6023	CONDT (PVC) (SCHD 40) (2")	LF	62.00
618	6047	CONDT (PVC) (SCHD 80) (2") (BORE)	LF	230.00
620	6011	ELEC CONDR (NO. 4) BARE	LF	160.00
620	6012	ELEC CONDR (NO. 4) INSULATED	LF	480.00
620	6015	ELEC CONDR (NO. 2) BARE	LF	312.00
620	6016	ELEC CONDR (NO. 2) INSULATED	LF	896.00
624	6008	GROUND BOX TY C (162911) W/APRON	EA	2.00
628	6131	ELC SRV TY D 120/240 060 (NS)GS(N)SP(O)	EA	2.00
650	6028	INS OH SN SUP (30 FT BAL TEE)	EA	1.00
6028	6001	INSTALL DMS (POLE MTD CABINET)	EA	1.00
6423	6003	INSTALL ETHERNET SURGE PROTECTOR	EA	2.00
6423	6004	INSTALL CELLULAR MODEM	EA	1.00

ELECTRICAL SCHEDULE TABLE							
DESCRIPTION	RUN NUMBER	A	B	C	D	POLE	TOTAL QTY
	RUN LENGTH (LF)	10	62	21	53	60	
POWER	ELEC CONDR (NO. 4) BARE					2	* 160
	ELEC CONDR (NO. 4) INSULATED					6	* 480
	ELEC CONDR (NO. 2) BARE	2	2	2	2		* 312
	ELEC CONDR (NO. 2) INSULATED	6	6	6	6		* 896
CONDUIT	CONDT (PVC) (SCHD 40) (2")	2		2			62
	CONDT (PVC) (SCHD 80) (2") (BORE)		2		2		230

* QUANTITIES INCLUDE CABLE IN CABINET AND GROUND BOXES

NOTES:

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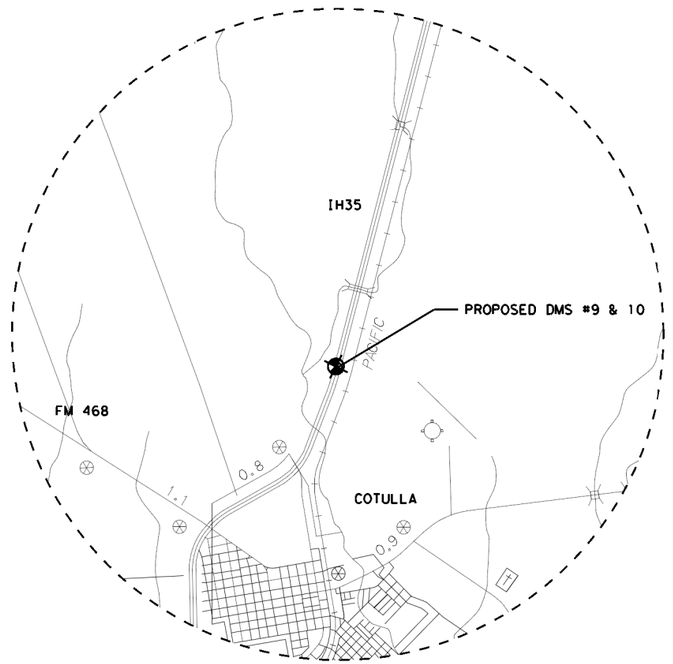


LOCATION MAP

STATE OF TEXAS
RAFAEL GUZMAN
106025
LICENSED
PROFESSIONAL ENGINEER

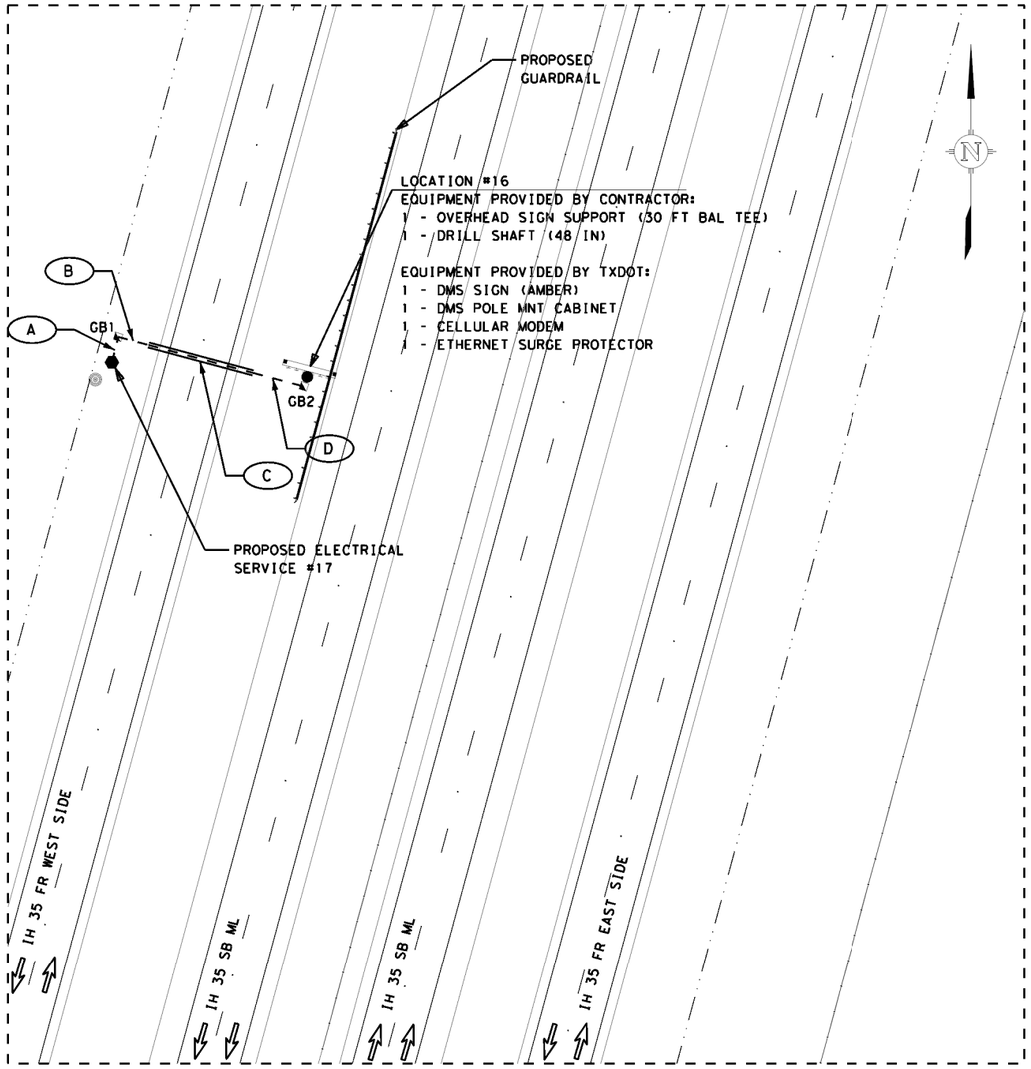
THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY RAFAEL GUZMAN, P.E. 106025, ON 5/26/2023

DocuSigned by: Rafael Guzman
5CB3C1491FA542A...

TEXAS DEPARTMENT OF TRANSPORTATION ®

INSTALL DMS #9 AND 10 IH 35 AT MM 69

DN:	CK: R. G.	DW:	CK: R. G.	STATE	SHEET NUMBER			SHEET NO.
				TEXAS	SHEET 1 OF 1			
FED. RD. DIV. NO.	STATE DIST. NO.	COUNTY		CONTROL	SECTION	JOB	HIGHWAY NO.	
6	22	WEBB, etc		0922	00	067	Various	48



LEGEND

- PROPOSED GROUND BOX
- PROPOSED CONDUIT (TRENCH)
- PROPOSED DMS SIGN, T-MOUNT
- PROPOSED ELECTRICAL SERVICE
- PROPOSED CONDUIT (BORE)

ITEM NO.	DESC NO.	DESCRIPTION	UNIT	QTY
416	6006	DRILL SHAFT (48 IN)	LF	**25.00**
540	6001	MTL W-BEAM GD FEN (TIM POST)	LF	**50.00**
540	6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	**1.00**
544	6006	GUARDRAIL END TRTMNT (INST) (WOOD POST) (TY III)	EA	**1.00**
618	6023	CONDT (PVC) (SCHD 40) (2")	LF	**42.00**
618	6047	CONDT (PVC) (SCHD 80) (2") (BORE)	LF	**43.00**
620	6011	ELEC CONDR (NO. 4) BARE	LF	**80.00**
620	6012	ELEC CONDR (NO. 4) INSULATED	LF	**240.00**
620	6015	ELEC CONDR (NO. 2) BARE	LF	**105.00**
620	6016	ELEC CONDR (NO. 2) INSULATED	LF	**315.00**
624	6008	GROUND BOX TY C (162911) W/APRON	EA	**5.00**
628	6131	ELC SRV TY D 120/240 060 (NS)GS(N)SP(O)	EA	**1.00**
650	6028	INS OH SN SUP (30 FT BAL TEE)	EA	**1.00**
6028	6001	INSTALL DMS (POLE MTD CABINET)	EA	**1.00**
6423	6003	INSTALL ETHERNET SURGE PROTECTOR	EA	**1.00**
6423	6004	INSTALL CELLULAR MODEM	EA	**1.00**

ELECTRICAL SCHEDULE TABLE

DESCRIPTION	RUN NUMBER	A	B	C	D	POLE	TOTAL QTY
	RUN LENGTH (LF)	10	12	43	20	60	
POWER						1	* 80
						3	* 240
	ELEC CONDR (NO. 2) BARE	1	1	1	1		* 105
	ELEC CONDR (NO. 2) INSULATED	3	3	3	3		* 315
CONDUIT	CONDT (PVC) (SCHD 40) (2")	1	1		1		42
	CONDT (PVC) (SCHD 80) (2") (BORE)			1			43

NOTES:

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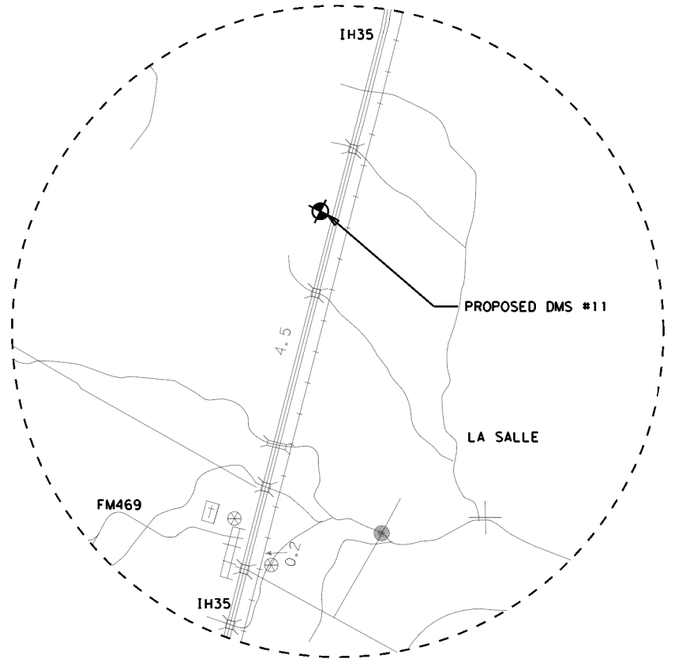

LOCATION MAP

STATE OF TEXAS
RAFAEL GUZMAN
106025
LICENSED
PROFESSIONAL ENGINEER

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DocuSigned by:
Rafael Guzman
5CB9C1491FA542A...

TEXAS DEPARTMENT OF TRANSPORTATION ®

INSTALL DMS #11
IH 35 AT MM 80

DN:	CK: R. G.	DW:	CK: R. G.	STATE	SHEET NUMBER			SHEET NO.
FED. RD. DIV. NO.	STATE DIST. NO.	COUNTY		CONTROL	SECTION	JOB	HIGHWAY NO.	
6	22	WEBB, etc		0922	00	067	Various	49

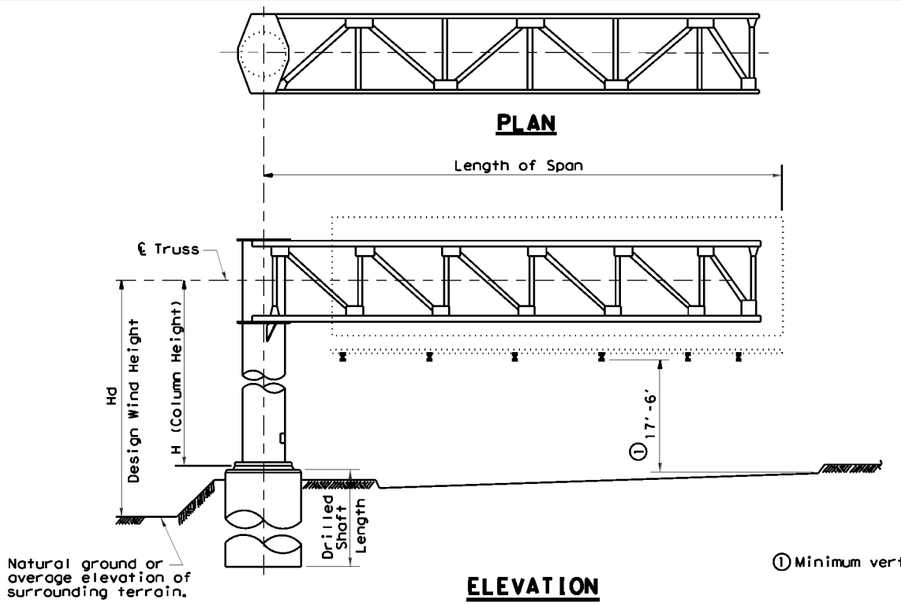
5/26/2023 aaoldape 0922*00*067*SHEET*IH35 AT MM 80*.dgn

Elec. Service ID	Plan Sheet Number	Electrical Service Description	Service *Conduit Size	Service Conductors No./Size	Safety Switch Amps	Main Ckt. Bkr. Pole/Amps	Lighting Contactor Amps	Panelbd/ Loadcenter Amp Rating	Branch Circuit ID	Branch Ckt. Bkr. Pole/Amps	Branch Circuit Amps	KVA Load
ES#1	34	ELC SRV TY D 120/240 060 (NS)SS(N)SP(O)	2"	3/#6	N/A	2P/60	N/A	100	CCTV Camera #1	1P/30	20	2.4
ES#2	35	ELC SRV TY D 120/240 060 (NS)SS(N)SP(O)	2"	3/#6	N/A	2P/60	N/A	100	CCTV Camera #2	1P/30	20	2.4
ES#3	36	ELC SRV TY D 120/240 060 (NS)SS(N)SP(O)	2"	4/#2	N/A	2P/100	N/A	100	DMS #1	2P/100	22	5.28
ES#4	37	ELC SRV TY D 120/240 060 (NS)SS(N)SP(O)	2"	4/#2	N/A	2P/100	N/A	100	DMS #2	2P/100	22	5.28
ES#5	38	ELC SRV TY D 120/240 060 (NS)SS(N)SP(O)	2"	3/#6	N/A	2P/60	N/A	100	CCTV Camera #3	1P/30	20	2.4
ES#6	39	ELC SRV TY D 120/240 060 (NS)SS(N)SP(O)	2"	4/#2	N/A	2P/100	N/A	100	DMS #3	2P/100	22	5.28
ES#7	40	ELC SRV TY D 120/240 060 (NS)SS(N)SP(O)	2"	3/#6	N/A	2P/60	N/A	100	CCTV Camera #4	1P/30	20	2.4
ES#8	41	ELC SRV TY D 120/240 060 (NS)SS(N)SP(O)	2"	4/#2	N/A	2P/100	N/A	100	DMS #4	2P/100	22	5.28
ES#9	42	ELC SRV TY D 120/240 060 (NS)SS(N)SP(O)	2"	4/#2	N/A	2P/100	N/A	100	DMS #5	2P/100	22	5.28
ES#10	43	ELC SRV TY D 120/240 060 (NS)SS(N)SP(O)	2"	3/#6	N/A	2P/60	N/A	100	CCTV Camera #5	1P/30	20	2.4
ES#11	44	ELC SRV TY D 120/240 060 (NS)SS(N)SP(O)	2"	4/#2	N/A	2P/100	N/A	100	DMS #6	2P/100	22	5.28
ES#12	45	ELC SRV TY D 120/240 060 (NS)SS(N)SP(O)	2"	4/#2	N/A	2P/100	N/A	100	DMS #7	2P/100	22	5.28
ES#13	46	ELC SRV TY D 120/240 060 (NS)SS(N)SP(O)	2"	4/#2	N/A	2P/100	N/A	100	DMS #8	2P/100	22	5.28
ES#14	47	ELC SRV TY D 120/240 060 (NS)SS(N)SP(O)	2"	3/#6	N/A	2P/60	N/A	100	CCTV Camera #6	1P/30	20	2.4
ES#15	48	ELC SRV TY D 120/240 060 (NS)SS(N)SP(O)	2"	4/#2	N/A	2P/100	N/A	100	DMS # 9	2P/100	22	5.28
ES#16	48	ELC SRV TY D 120/240 060 (NS)SS(N)SP(O)	2"	4/#2	N/A	2P/100	N/A	100	DMS #10	2P/100	22	5.28
ES#17	49	ELC SRV TY D 120/240 060 (NS)SS(N)SP(O)	2"	4/#2	N/A	2P/100	N/A	100	DMS #11	2P/100	22	5.28

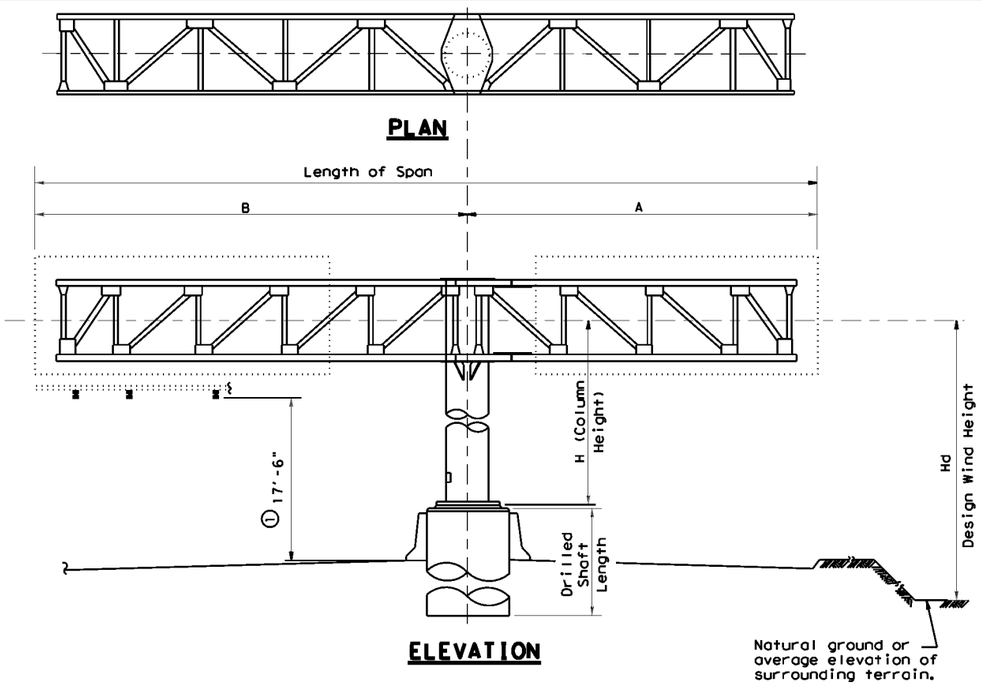
3/1/2023 AAALDAPE CSJ 0922-00-067*Electrical Service Data Sheet.dgn

ELECTRICAL SERVICE DATA SHEET

DN: F.R.	DW:	STATE	SHEET NUMBER			SHEET NO.
CK: R.G.	CK: R.G.	TEXAS	SHEET 1 OF 1			
FED.RD. DIV.NO.	STATE DIST.NO.	COUNTY	CONTROL	SECTION	JOB	HIGHWAY NO.
6	22	WEBB, etc	0922	00	067	Various



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 & Z4I. If Design Wind Height is more than 30', use COSS-Z3 & Z3I. NOTE: In Zone 1 if Design Wind Height is greater than 30' use HCOSS-Z1.

Step 2: Determine tower details from COSS-Z4 & Z4I. 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 ℄ 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 & Z4I.
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 5/16 (HYC) with 2 bolt connection
W. L. Diag. L 3 x 3 x 5/16 (HYC) with 2 bolt connection
D. L. Vert. L 2 x 2 x 5/16 (HYC) with 2 bolt connection
W. L. Strut. L 2 x 2 x 5/16 (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 ℄ 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 5/16 (HYC) with 3 bolt connection at splice
D.L. Diag. L 2 x 2 x 5/16 (HYC) with 2 bolt connection
W.L. Diag. L 3 x 3 x 5/16 (HYC) with 2 bolt connection
D.L. Vert. L 2 x 2 x 5/16 (HYC) with 2 bolt connection
W.L. Strut. L 2 x 2 x 5/16 (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 5/16 (HYC) with 2 bolt connection
W.L. Diag. L 3 x 3 x 5/16 (HYC) with 2 bolt connection
D.L. Vert. L 2 x 2 x 5/16 (HYC) with 2 bolt connection
W.L. Strut. L 2 x 2 x 5/16 (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
0922	00	067	Various

DIST	COUNTY	SHEET NO.
22	WEBB, etc	51

DATE: 3/1/2023 3:35:58 PM
FILE: coss-se.dgn

DISCLAIMER:
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ZONE 1 100 MPH WIND

TOWER HEIGHT (ft)	10' SPAN												15' SPAN											
	TOWER PIPE			ANCHOR BOLTS			BASE PLATE	TRUSS	DESIGN LOADS				TOWER PIPE			ANCHOR BOLTS			BASE PLATE	TRUSS	DESIGN LOADS			
	O.D. (in)	WALL THICK (in)	DEFL ΔH (in)	SIZE DIA (in)	NO.	BOLT CIR DIA	SIZE (in)	DEFL ΔV (in)	SHEAR V (Kips)	TORSION T (K-ft)	MOMENT M (K-ft)		O.D. (in)	WALL THICK (in)	DEFL ΔH (in)	SIZE DIA (in)	NO.	BOLT CIR DIA	SIZE (in)	DEFL ΔV (in)	SHEAR V (Kips)	TORSION T (K-ft)	MOMENT M (K-ft)	
14'	16	0.250	0.108	1 ¼	8	20 ½"	24 x1¼	0.2	5.61	25.29	77.33		16	0.344	0.180	1 ½	8	21"	25 x1¾	0.5	8.43	58.69	118.08	
15'			0.124				24 x1¼		5.64		82.92			0.344	0.206						8.46		126.44	
16'			0.141				24 x1¼		5.66		88.55			0.344	0.235						8.48		134.84	
17'			0.159				24 x1¼		5.69		94.20			0.344	0.265						8.51		143.72	
18'			0.178				24 x1⅜		5.71		99.88			0.375	0.274						8.54		151.73	
19'			0.198				24 x1⅜		5.74		105.58			0.375	0.306	1 ½		21"	25 x1¾		8.56		160.23	
20'			0.220	1 ¼		20 ½"	24 x1½		5.77		111.32			0.406	0.315	1 ¾		21 ½"	26 x1⅛		8.59		168.72	
21'		0.250	0.242	1 ⅜		20 ¾"	24½x1½		5.79		117.09			0.406	0.347				26 x1⅛		8.62		177.32	
22'		0.281	0.238				24½x1⅝		5.82		122.88			0.438	0.354				26 x 2		8.64		185.91	
23'		0.281	0.260				24½x1⅝		5.85		128.70			0.438	0.387				26 x 2		8.67		194.53	
24'		0.281	0.283				24½x1⅝		5.87		134.55			0.469	0.395				26 x 2		8.69		203.18	
25'		0.312	0.279	1 ⅜		20 ¾"	24½x1⅝		5.90		140.42			0.469	0.429				26 x2⅛		8.72		211.85	
26'		0.312	0.302	1 ½		21"	25 x1¾		5.93		146.33			0.500	0.440				26 x2⅛		8.75		220.56	
27'		0.312	0.325				25 x1¾		5.95		152.26			0.500	0.474				26 x2⅛		8.77		229.30	
28'		0.344	0.320				25 x1¾		5.98		158.22			0.531	0.482	1 ¾		21 ½"	26 x2¼		8.80		238.06	
29'		0.344	0.343				25 x1⅞		6.01		164.20			0.531	0.517	2		22"	27 x2¼		8.83		246.85	
30'		0.344	0.367	1 ½		21"	25 x1⅞		6.03		170.21			0.656	0.459	2		22"	27 x2⅜		8.85		255.67	
31'		0.375	0.362	1 ¾		21 ½"	26 x1⅞		6.06		176.25			0.656	0.490	2		22"	27 x2⅜		8.88		264.52	
32'	16	0.375	0.385	1 ¾	8	21 ½"	26 x1⅞	0.2	6.09	25.29	182.32		16	0.656	0.523	2	8	22"	27 x2⅜	0.5	8.91	58.69	273.39	

TOWER HEIGHT (ft)	20' SPAN												25' SPAN												TOWER HEIGHT (ft)
	TOWER PIPE			ANCHOR BOLTS			BASE PLATE	TRUSS	DESIGN LOADS				TOWER PIPE			ANCHOR BOLTS			BASE PLATE	TRUSS	DESIGN LOADS				
	O.D. (in)	WALL THICK (in)	DEFL ΔH (in)	SIZE DIA (in)	NO.	BOLT CIR DIA	SIZE (in)	DEFL ΔV (in)	SHEAR V (Kips)	TORSION T (K-ft)	MOMENT M (K-ft)		O.D. (in)	WALL THICK (in)	DEFL ΔH (in)	SIZE DIA (in)	NO.	BOLT CIR DIA	SIZE (in)	DEFL ΔV (in)	SHEAR V (Kips)	TORSION T (K-ft)	MOMENT M (K-ft)		
14'	20	0.310	0.177	1 ¾	8	25 ⅜"	29¾x1¾	0.6	11.53	107.50	162.73		24	0.310	0.165	1 ¾	8	29 ⅜"	33¾x1½	0.8	14.40	168.25	205.58		14'
15'		0.310	0.203					0.6	11.56		174.09			0.310	0.189				33¾x1½		14.44		219.64		15'
16'		0.310	0.231					0.7	11.59		185.51			0.310	0.215				33¾x1⅝		14.48		233.79		16'
17'		0.344	0.240						11.62		197.01			0.344	0.221				33¾x1⅝		14.52		248.01		17'
18'		0.344	0.269						11.66		208.52			0.344	0.248				33¾x1⅝	0.8	14.56		262.29		18'
19'		0.344	0.300				29¾x1¾		11.69		220.08			0.344	0.276	1 ¾		29 ⅜"	33¾x1¾	0.9	14.60		276.65		19'
20'		0.375	0.306				29¾x1⅞		11.72		231.68			0.344	0.306	2		29 ¾"	34½x1¾		14.64		291.07		20'
21'		0.375	0.337				29¾x1⅞		11.76		243.33			0.375	0.311				34½x1⅞		14.68		305.54		21'
22'		0.406	0.341				29¾x1⅞		11.79		255.00			0.375	0.341				34½x1⅞		14.72		320.07		22'
23'		0.406	0.373	1 ¾		25 ⅜"	29¾x 2	0.7	11.82		266.73			0.375	0.373				34½x 2		14.76		334.66		23'
24'		0.406	0.406	2		25 ¾"	30½x 2	0.8	11.86		278.50			0.406	0.376				34½x 2	0.9	14.80		349.29		24'
25'		0.438	0.410				30½x2⅛		11.89		290.30			0.406	0.408				34½x 2	1.0	14.84		363.98		25'
26'		0.438	0.443				30½x2⅛		11.92		302.15			0.406	0.442				34½x 2		14.88		378.72		26'
27'		0.469	0.449				30½x2⅛		11.96		314.03			0.406	0.476				34½x2⅛		14.92		393.51		27'
28'		0.469	0.483				30½x2¼		11.99		325.95			0.438	0.477	2		29 ¾"	34½x2⅛		14.96		408.34		28'
29'		0.500	0.488				30½x2¼		12.02		337.91			0.438	0.512	2 ¼		30"	35 x2¼		15.00		423.22		29'
30'		0.500	0.523				30½x2¼		12.05		349.90			0.469	0.513				35 x2¼		15.04		438.15		30'
31'		0.531	0.528				30½x2¼		12.09		361.93			0.469	0.548				35 x2¼	1.0	15.08		453.12		31'
32'	20	0.531	0.563	2	8	25 ¾"	30½x2⅜	0.8	12.12	107.50	374.00		24	0.469	0.584	2 ¼	8	30"	35 x2¼	1.1	15.12	168.25	468.13		32'

ZONE 1 100 MPH WIND

TOWER HEIGHT (ft)	30' SPAN												35' SPAN											
	TOWER PIPE			ANCHOR BOLTS			BASE PLATE	TRUSS	DESIGN LOADS				TOWER PIPE			ANCHOR BOLTS			BASE PLATE	TRUSS	DESIGN LOADS			
	O.D. (in)	WALL THICK (in)	DEFL ΔH (in)	SIZE DIA (in)	NO.	BOLT CIR DIA	SIZE (in)	DEFL ΔV (in)	SHEAR V (Kips)	TORSION T (K-ft)	MOMENT M (K-ft)		O.D. (in)	WALL THICK (in)	DEFL ΔH (in)	SIZE DIA (in)	NO.	BOLT CIR DIA	SIZE (in)	DEFL ΔV (in)	SHEAR V (Kips)	TORSION T (K-ft)	MOMENT M (K-ft)	
14'	24	0.375	0.199	2	8	29 ¾"	34½x1¾	1.1	17.16	242.54	249.26		30	0.310	0.178	2	8	35 ¾"	40½x1⅝	1.3	20.11	330.60	296.99	
15'		0.375	0.238				34½x1¾	1.2	17.20		265.80			0.310	0.205				40½x1⅝	1.4	20.16		316.04	
16'		0.406	0.251				34½x1⅞		17.24		282.45			0.310	0.233				40½x1⅝		20.21		335.27	
17'		0.406	0.283				34½x1⅞		17.28		299.21			0.344	0.239				40½x1¾		20.26		354.65	
18'		0.438	0.296				34½x1⅞	1.2	17.32		316.06			0.344	0.268				40½x1¾	1.4	20.31		374.16	
19'		0.438	0.329				34½x 2	1.3	17.36		332.99			0.344	0.299				40½x1¾	1.5	20.36		393.81	
20'		0.438	0.355				34½x 2	1.3	17.40		350.00			0.344	0.331	2		35 ¾"	40½x1¾	1.5	20.41		413.56	
21'		0.467	0.377	2		29 ¾"	34½x 2	1.3	17.44		367.09			0.375	0.336	2 ¼		36"	41 x1⅞	1.5	20.46		433.43	
22'		0.467	0.414	2 ¼		30"	35 x2⅛	1.4	17.48		384.25			0.375	0.369				41 x1⅞	1.6	20.51		453.39	
23'		0.467	0.452				35 x2⅛		17.52		401.47			0.375	0.403				41 x 2	1.6	20.56		473.44	
24'		0.500	0.463				35 x2⅛	1.5	17.56		418.75			0.375	0.439				41 x 2	1.7	20.61		493.59	
25'		0.530	0.475				35 x2¼		17.60		436.09			0.406	0.442				41 x 2		20.66		513.81	
26'		0.530	0.514				35 x2¼	1.4	17.64		453.50			0.406	0.478				41 x 2		20.70		534.12	
27'		0.530	0.554				35 x2¼	1.5	17.68		470.95			0.406	0.512				41 x 2		20.75		554.50	
28'		0.530	0.596				35 x2⅜	1.5	17.72		488.46			0.438	0.514				41 x2⅛		20.80		574.96	
29'		0.562	0.607				35 x2⅜	1.5	17.76		506.03			0.438	0.552				41 x2¼	1.7	20.85		595.49	
30'		0.562	0.649	2 ¼		30"	35 x2⅜	1.6	17.80		523.64			0.438	0.591	2 ¼		36"	41 x2¼	1.8	20.90		616.08	
31'		0.594	0.659	2 ½		30 ½"	36 x2½	1.6	17.84		541.31			0.469	0.591	2 ½		36 ½"	42 x2¼	1.8	20.95		636.75	
32'	24	0.594	0.702	2 ½	8	30 ½"	36 x2½	1.6	17.88	242.54	559.02		30	0.469	0.630	2 ½	8	36 ½"	42 x2¼	1.8	21.00	330.60	657.48	

TOWER HEIGHT (ft)	40' SPAN												TOWER HEIGHT (ft)
	TOWER PIPE			ANCHOR BOLTS			BASE PLATE	TRUSS	DESIGN LOADS				
	O.D. (in)	WALL THICK (in)	DEFL ΔH (in)	SIZE DIA (in)	NO.	BOLT CIR DIA	SIZE (in)	DEFL ΔV (in)	SHEAR V (Kips)	TORSION T (K-ft)	MOMENT M (K-ft)		
14'	30	0.375	0.206	2 ¼	8	36"	41 x1⅞	1.8	22.89	432.38	347.21		14'
15'		0.410	0.219					1.8	22.94		368.40		15'
16'		0.410	0.249					1.8	22.99		389.82		16'
17'		0.410	0.282					1.9	23.04		411.46		17'
18'		0.410	0.316				41 x1⅞	2.0	23.09		433.29		18'
19'		0.440	0.327				41 x 2	2.0	23.14		455.29		19'
20'		0.440	0.362					2.0	23.19		477.44		20'
21'		0.440	0.399					2.1	23.24		499.74		21'
22'		0.440	0.438				41 x 2	2.2	23.29		522.16		22'
23'		0.470	0.531	2 ¼		36"	41 x2⅛	2.2	23.34		544.69		23'
24'		0.470	0.489	2 ½		36 ½"	42 x2⅛	2.2	23.39		567.34		24'
25'		0.470	0.531				42 x2¼	2.3	23.44		590.10		25'
26'		0.500	0.540				42 x2¼		23.49		612.95		26'
27'		0.500	0.582				42 x2¼		23.54		635.89		27'
28'		0.500	0.626				42 x2⅜		23.59		658.93		28'
29'		0.531	0.647				42 x2⅜	2.3	23.64		682.04		29'
30'		0.531	0.692				42 x2⅜	2.4	23.69		705.24		30'
31'		0.562	0.687				42 x2⅜	2.4	23.73		728.52		31'
32'	30	0.562	0.732	2 ½	8	36 ½"	42 x2½	2.4	23.78	432.38	751.87		32'

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.

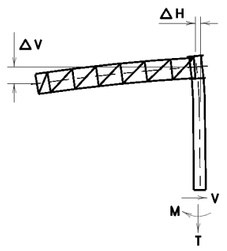
For cantilever truss lengths falling between those shown use sizes called for in the next longer span.

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.



ELEVATION

(SHOWING DESIGN LOADS AND DEAD LOAD DEFLECTIONS)

TRUSS DETAILS

SPAN	10', 15', & 20'	25'	30'	35'	40'
W x D = WIDTH x DEPTH	4.5 x 4.5	4.5 x 4.5	4.5 x 4.5	4.5 x 4.5	4.5 x 4.5
CHORD-①, Unless Otherwise Shown	L 3 x 3 x 5/16 ② [3]	L 3 x 3 x 1/4 ② [4]	L 3 1/2x3 1/2x 1/4 [7]	L 3 1/2x3 1/2x 5/16 [9]	L 3 1/2x3 1/2x 3/8 [8]
DEAD LOAD DIAGONAL-②	L 2 x 2 x 5/16 [2]	L 2 x 2 x 5/16 [2]	L 2 x 2 x 5/16 [2]	L 2 x 2 x 5/16 [2]	L 3 x 2 x 5/16 [2]
WIND LOAD DIAGONAL-②	L 3 x 3 x 5/16 [2]	L 3 x 3 x 5/16 [2]	L 3 x2 1/2x 1/4 [3]	L 3 x 3 x 1/4 [3]	L 3 x 3 x 1/4 [3]
DEAD LOAD VERTICAL-②	L 2 x 2 x 5/16 [2]	L 2 x 2 x 5/16 [2]	L 2 x 2 x 5/16 [2]	L 2 x 2 x 5/16 [2]	L 3 x 2 x 5/16 [2]
WIND LOAD STRUT-②	L 2 x 2 x 5/16 [1]	L 2 x 2 x 5/16 [1]	L 2 x 2 x 5/16 [1]	L 2 x 2 x 5/16 [1]	L 2 1/2x2 1/2x 5/16 [1]
TRUSS DEAD LOAD	42 lb/ft	47 lb/ft	53 lb/ft	60 lb/ft	70 lb/ft
SIZE H. S. BOLTS IN CONNECTION	5/8" DIA	5/8" DIA	5/8" DIA	5/8" DIA	3/4" DIA
NO. & SIZE OF H. S. BOLTS IN CHORD		5 ~ 5/8" DIA or	7 ~ 5/8" DIA or	9 ~ 5/8" DIA or	
ANGLE TO TOWER CONNECTION PLATE	3 ~ 5/8" DIA ea	3 ~ 3/4" DIA ea	5 ~ 3/4" DIA ea	7 ~ 3/4" DIA ea	8 ~ 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".

Texas Department of Transportation
Traffic Operations Division

CANTILEVER OVERHEAD SIGN SUPPORTS

COSS-Z1-10

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

REVISIONS
4-10

CONT	SECT	JOB	HIGHWAY
0922	00	067	Various
DIST	COUNTY		SHEET NO.
22	WEBB, etc		52

DATE: 3/1/2023 3:36:15 PM
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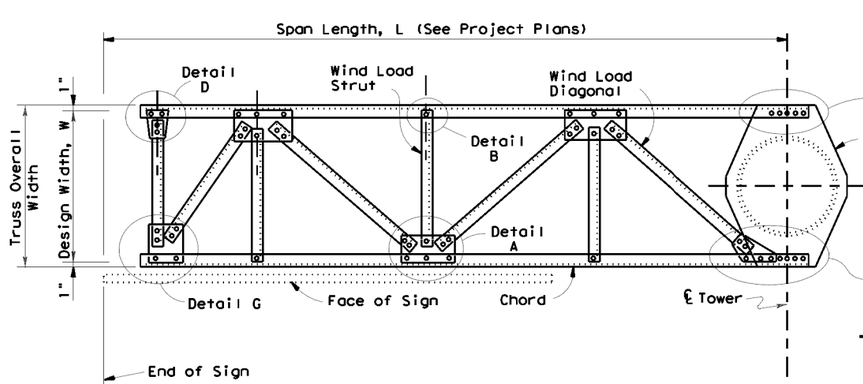
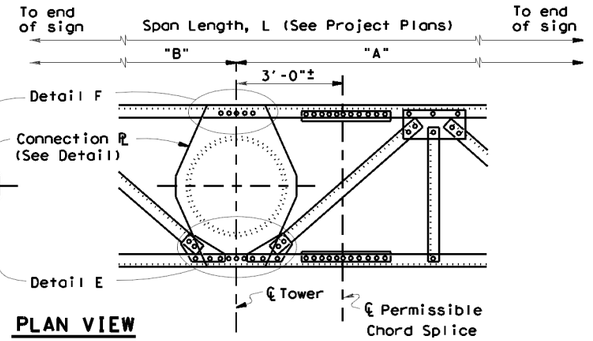


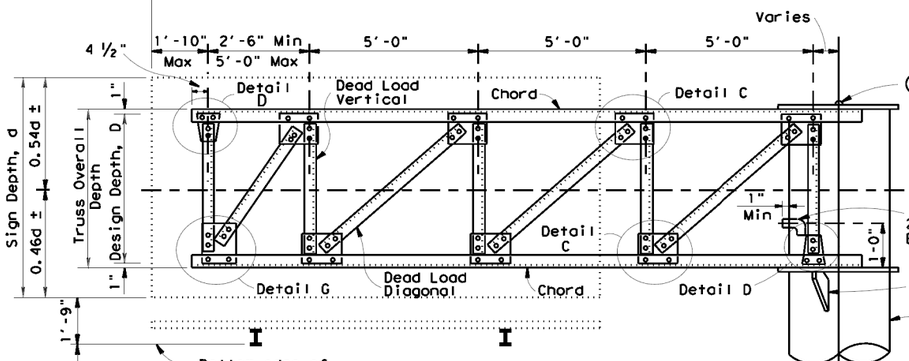


PLAN VIEW

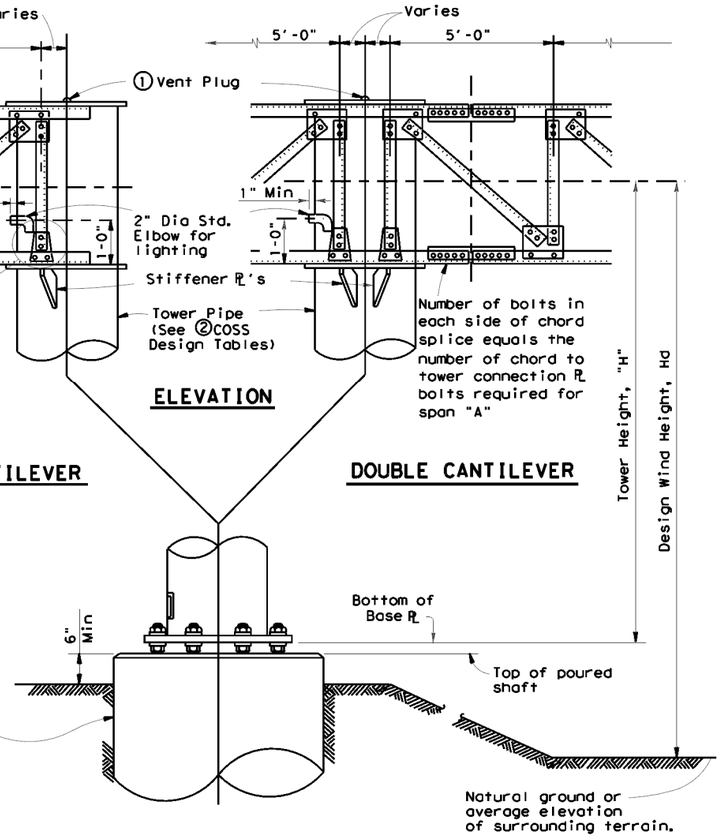
GENERAL NOTES:

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.



SINGLE CANTILEVER



ELEVATION

DOUBLE CANTILEVER

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

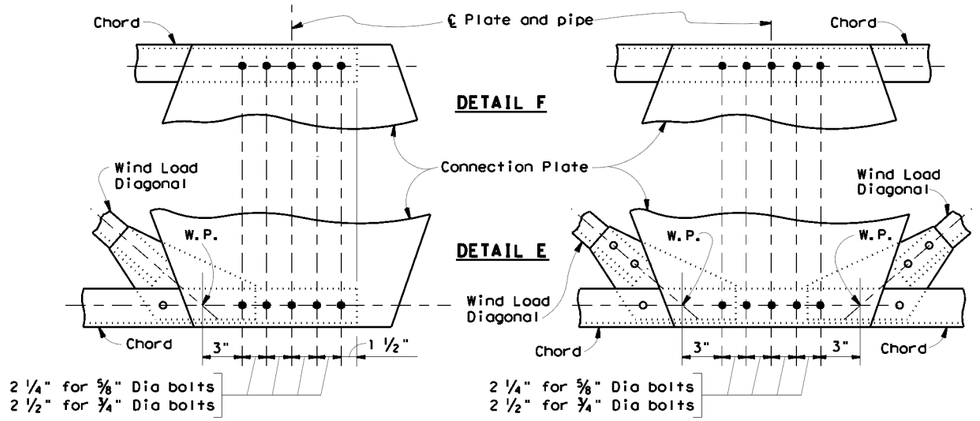
REVISIONS

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

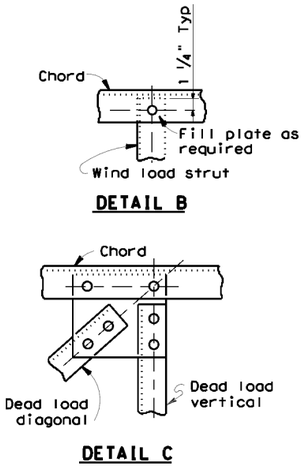
CONT	SECT	JOB	HIGHWAY
0922	00	067	Various

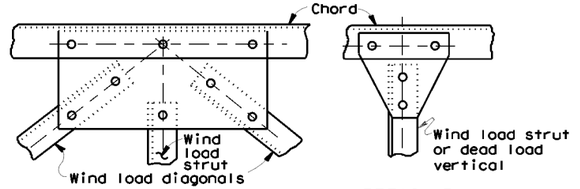
DIST	COUNTY	SHEET NO.
22	WEBB, etc	53

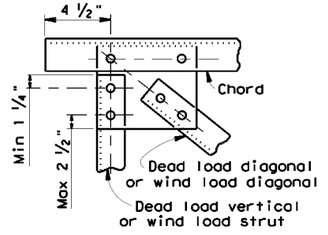
DATE: 3/1/2023 3:36:33 PM
FILE: cossd.dgn



SINGLE CANTILEVER DOUBLE CANTILEVER

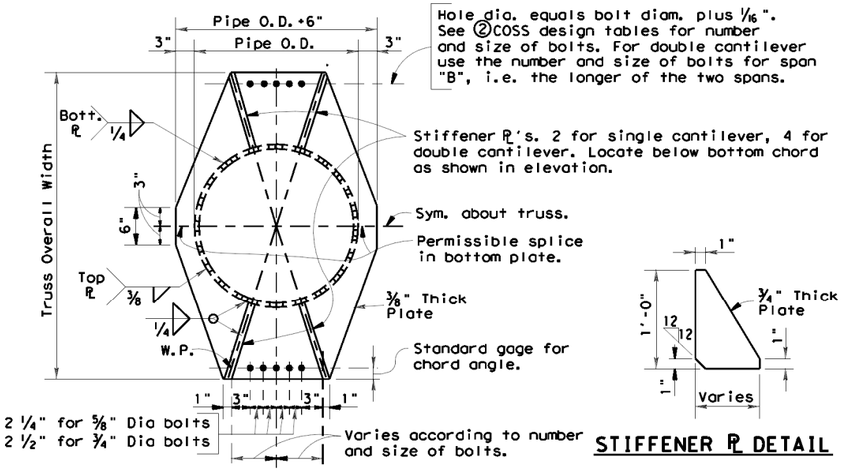






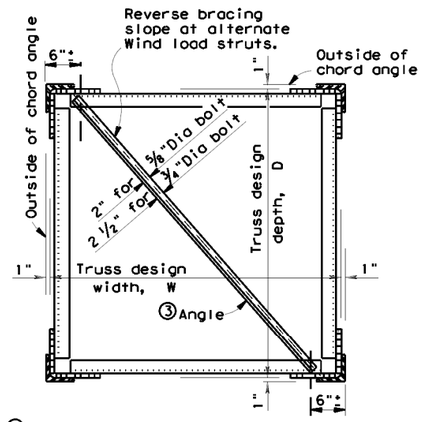
TOTAL NO. OF BOLTS IN DIAG'S. IN JOINT	NUMBER OF BOLTS REQD. IN GUSSET ℄ TO CHORD CONNECTION
0	2
2	2
3	3
4	3
5	4
6	4
8	5
10	6

CONNECTION DETAILS



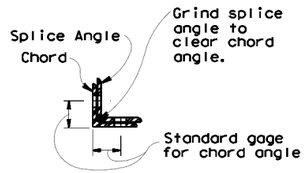
CONNECTION PLATE DETAIL

STIFFENER ℄ DETAIL

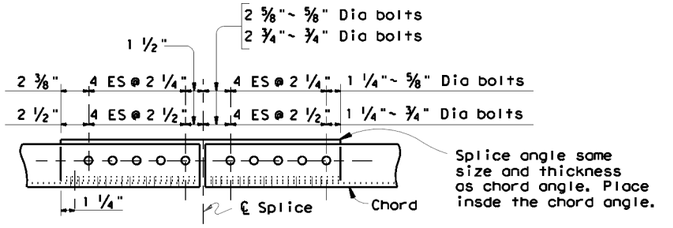


③2" x 2" x ⅜" angle for ⅝" Dia bolts [1]
2½" x 2" x ⅜" angle for ¾" Dia bolts [1]

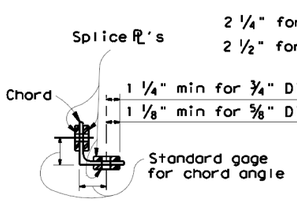
TRUSS SECTION
(DIAGONALS NOT SHOWN)



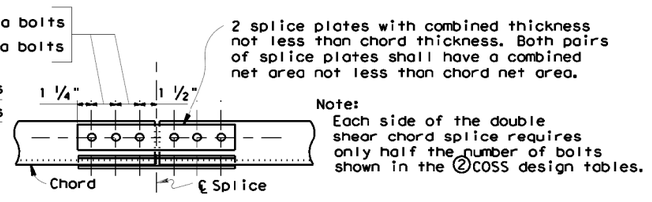
SECTION ON ℄ SPLICE



SINGLE SHEAR CHORD SPLICE

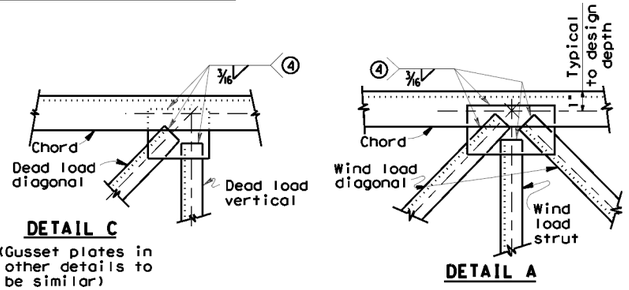


SECTION ON ℄ SPLICE



DOUBLE SHEAR CHORD SPLICE

SPLICE DETAILS



ALTERNATE WELDED CONNECTION DETAILS

④MINIMUM 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
0922	00	067	Various
DIST	COUNTY		SHEET NO.
22	WEBB, etc		54

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FILE: cossd.dgn

Washers shall conform to ASTM F436.

ANCHOR BOLT DIA.	WASHER DIMENSIONS				HOLE IN BASE PLATE
	OUTSIDE DIAMETER	HOLE DIAMETER	THICKNESS		
d			MIN.	MAX.	
1 ½" or less	2d	d + ⅛"	0.136"	0.177"	d + ¼"
1 ¾"	2d - ⅛"	d + ⅛"	0.178"	0.280"	d + 5/16"
2"	2d - ¼"	d + ⅛"	0.178"	0.280"	d + 5/16"
Over 2"	2d - ½"	d + ⅛"	0.240"	0.340"	d + 5/16"

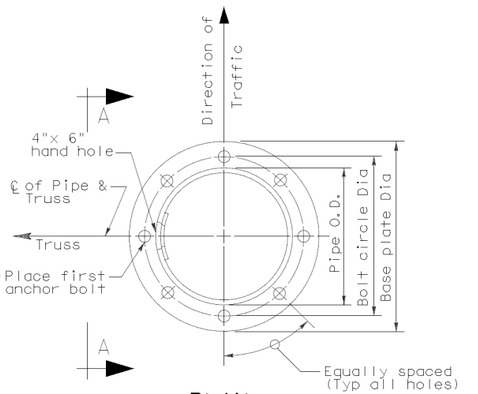
ANCHOR BOLT SIZE				
DIA	BOLT ① LENGTH	THREAD ① LENGTH	PROJECTION LENGTH	GALVAN. ① LENGTH
1 ¼"	2'-11"	5"	5 ¼"	11 ¼"
1 ⅜"	3'-1"	5 ½"	5 ¾"	11 ¾"
1 ½"	3'-4"	6"	6 ¼"	1'-0 ¼"
1 ¾"	3'-10"	7"	7 ¼"	1'-1 ¼"
2"	4'-3"	8"	8 ¼"	1'-2 ¼"
2 ¼"	4'-9"	9"	9 ¼"	1'-3 ¼"
2 ½"	5'-2"	10"	10 ¼"	1'-4 ¼"
2 ¾"	5'-8"	11"	11 ¼"	1'-5 ¼"
3"	6'-1"	1'-0"	1'-0 ¼"	1'-6 ¼"

① Anchor Bolt Fabrication Tolerances:
Bolt Length ~ ±½"
Thread Length ~ ±½"
Galvanized Length ~ -¼"

② Thread lenght applies to upper and lower threads

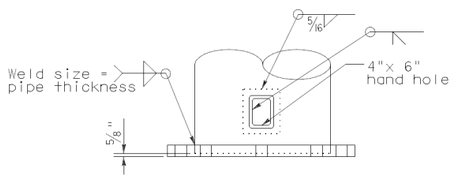
	PIPE OUTSIDE DIAMETER											
	16"			20"			24"			30"		
ANCHOR BOLT SIZE	BOLT CIRCLE DIA	DRILLED SHAFT SIZE	DRILLED SHAFT REINF	BOLT CIRCLE DIA	DRILLED SHAFT SIZE	DRILLED SHAFT REINF	BOLT CIRCLE DIA	DRILLED SHAFT SIZE	DRILLED SHAFT REINF	BOLT CIRCLE DIA	DRILLED SHAFT SIZE	DRILLED SHAFT REINF
1 ¼"Dia x 2'-11"	20 ½"	36" Dia	14-#8 (A)	24 ½"	36" Dia	14-#8 (A)						
1 ⅜"Dia x 3'-1"	20 ¾"	36" Dia	12-#9 (A)	24 ¾"	42" Dia	14-#9 (A)						
1 ½"Dia x 3'-4"	21"	36" Dia	12-#9 (A)	25"	42" Dia	14-#9 (A)	29"	42" Dia	14-#9 (C)			
1 ¾"Dia x 3'-10"	21 ½"	36" Dia	10-#10(A)	25 ⅜"	42" Dia	12-#10(B)	29 ⅜"	48" Dia	16-#10(C)	35 ⅜"	54" Dia	18-#10(C)
2"Dia x 4'-3"	22"	36" Dia	12-#10(A)	25 ¾"	42" Dia	12-#10(B)	29 ¾"	48" Dia	16-#10(C)	35 ¾"	54" Dia	18-#10(C)
2 ¼"Dia x 4'-9"	22 ½"	42" Dia	12-#11(A)	26"	42" Dia	10-#11(B)	30"	48" Dia	14-#11(C)	36"	54" Dia	14-#11(D)
2 ½"Dia x 5'-2"				26 ½"	42" Dia	12-#11(B)	30 ½"	48" Dia	16-#11(C)	36 ½"	54" Dia	16-#11(D)
2 ¾"Dia x 5'-8"							31 ½"	48" Dia	18-#11(D)	37"	54" Dia	20-#11(D)
3"Dia x 6'-1"										37 ½"	54" Dia	24-#11(D)

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 ½" pitch (Grade 60)



PLAN

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

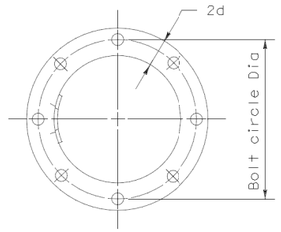


Cut 5" x 7" hole in pipe. Center 4" x 6" hand hole in ⅜" x 8" x 10" back up plate. Provide attachable cover made from section cut from pipe.

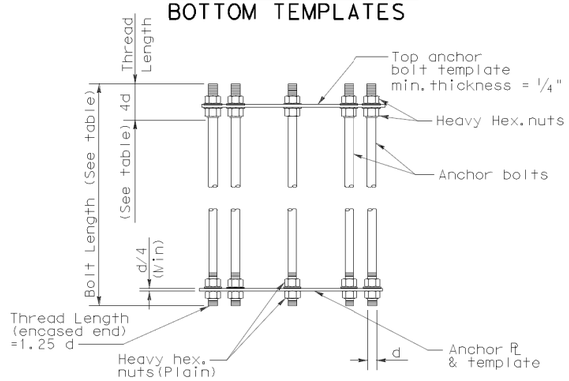
VIEW A-A

③ BASE PLATE & HANDHOLE DETAILS

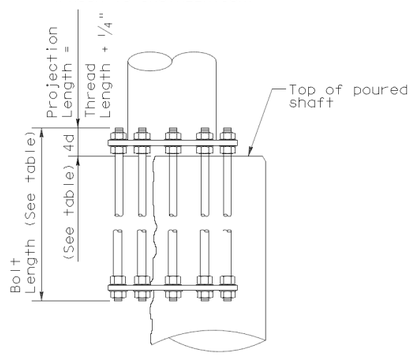
③ See "Cantilever Overhead Sign Support" or "High Level Cantilever Overhead Sign Support" sheets for Diameter and thickness of base plate.



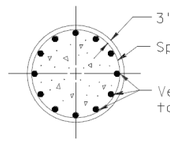
TOP VIEW OF TOP & BOTTOM TEMPLATES



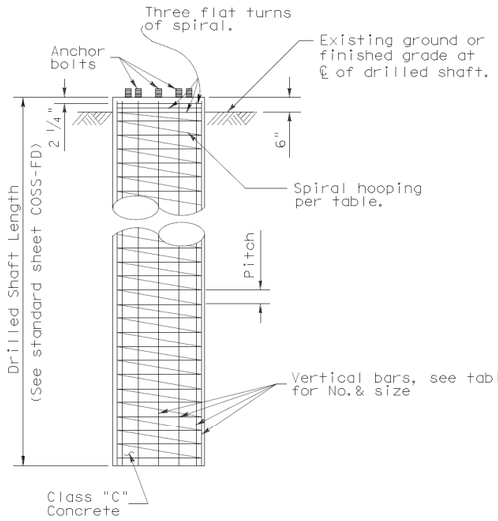
ANCHOR BOLT ASSEMBLY
(PRIOR TO INSTALLATION)



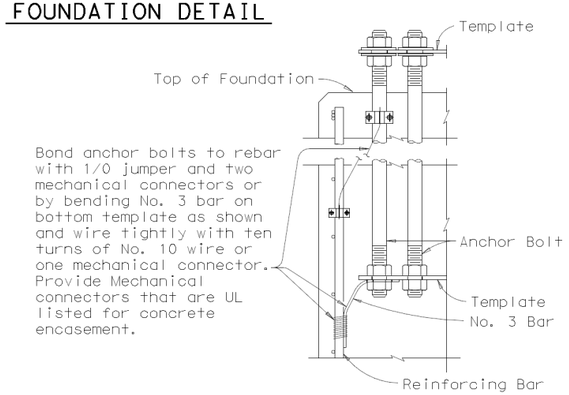
BEARING SEAT ELEVATION



SECTION



FOUNDATION DETAIL



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.

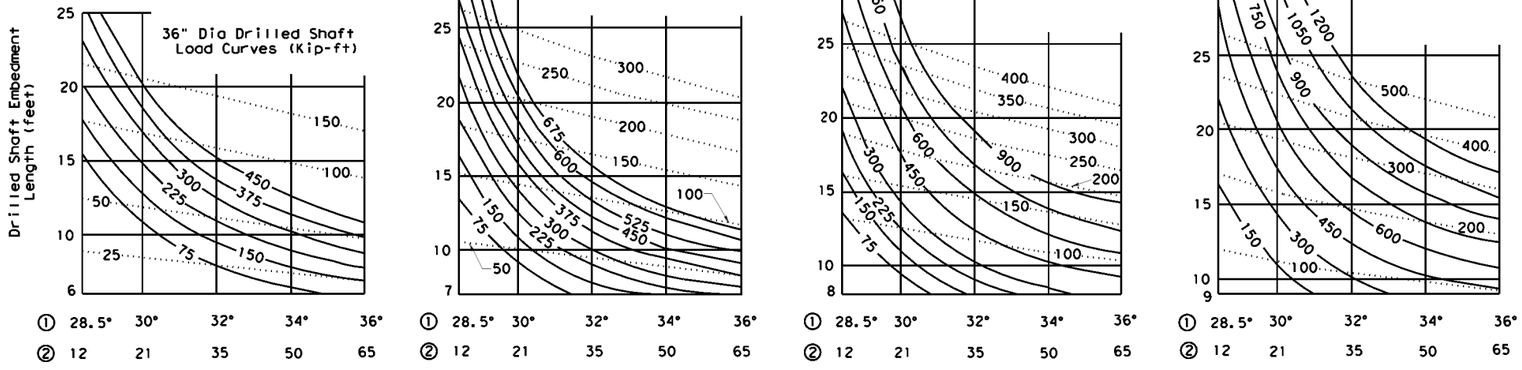
Texas Department of Transportation — Traffic Safety Division Standard

CANTILEVER OVERHEAD SIGN SUPPORT FOUNDATION

COSSF-21

FILE: cossf-21.dgn	DN:	CK:	DW:	CK:
©TxDOT November 2007	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	00	067	Various
8-21	DIST	COUNTY		SHEET NO.
	22	WEBB, etc		55

DATE: 3/1/2023 3:36:54 PM
FILE: cossf-21.dgn



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

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

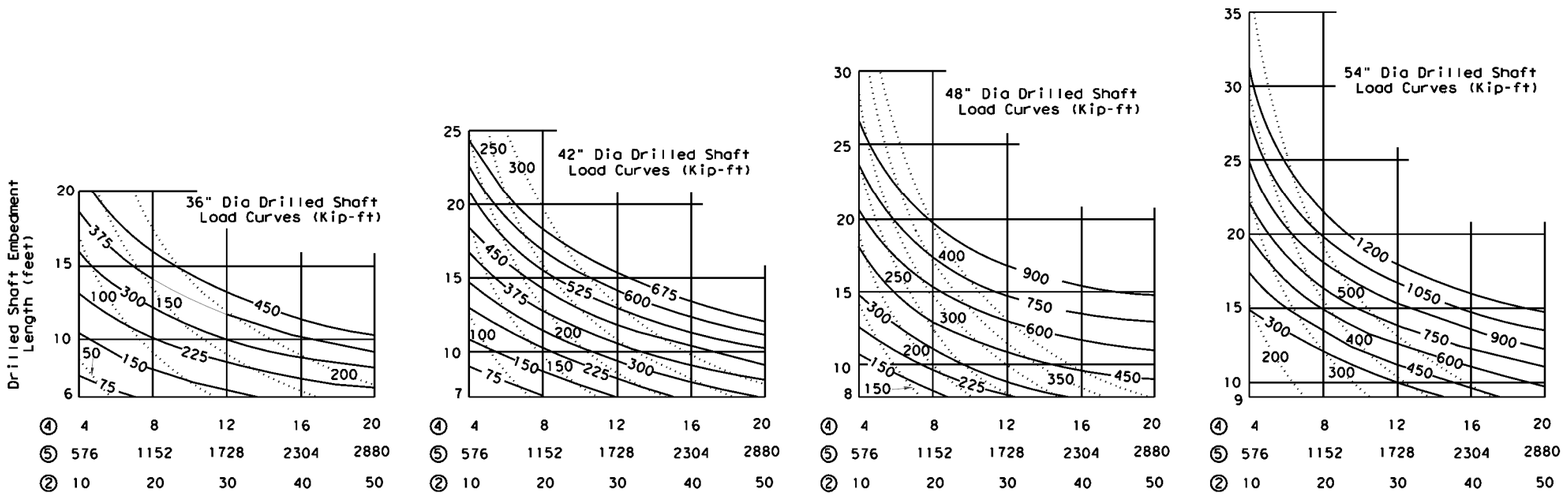
④ C(psi) = Cohesive shear strength of soil (psi)

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

③ SUBMERGED SAND SOIL (COHESIONLESS)

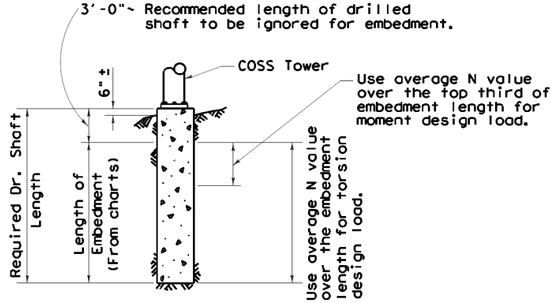
Moment ———
Torsion .....

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
0922	00	067	Various
DIST	COUNTY		SHEET NO.
22	WEBB, etc		56

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FILE: coss-fd.dgn

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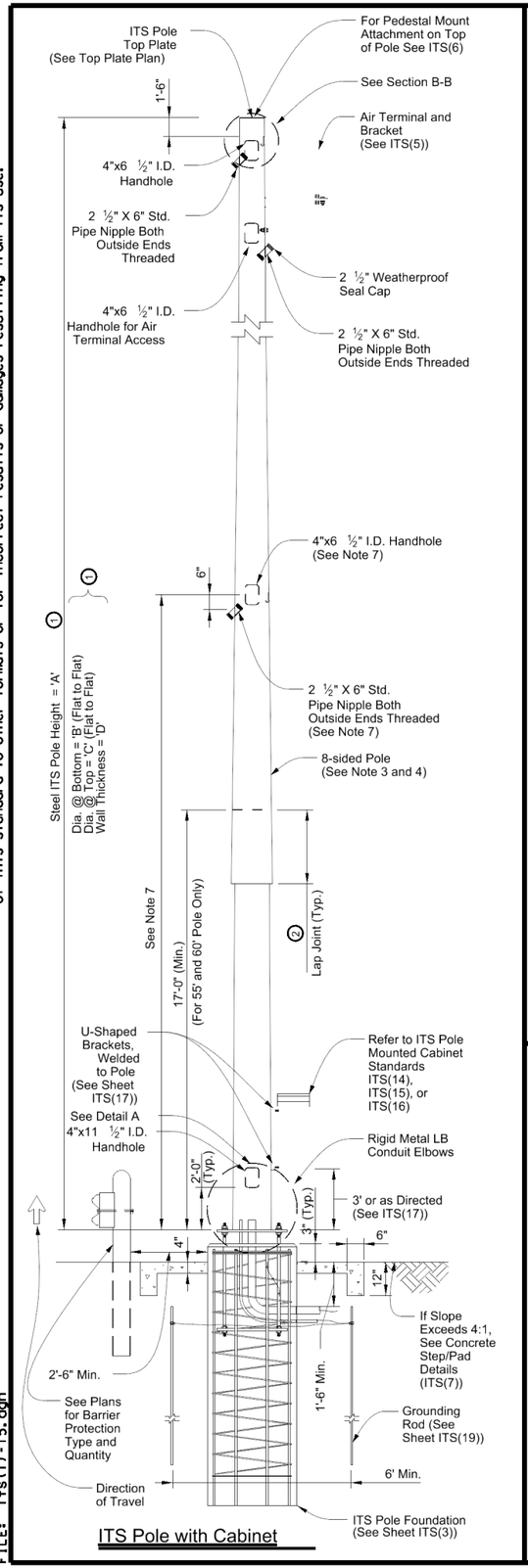
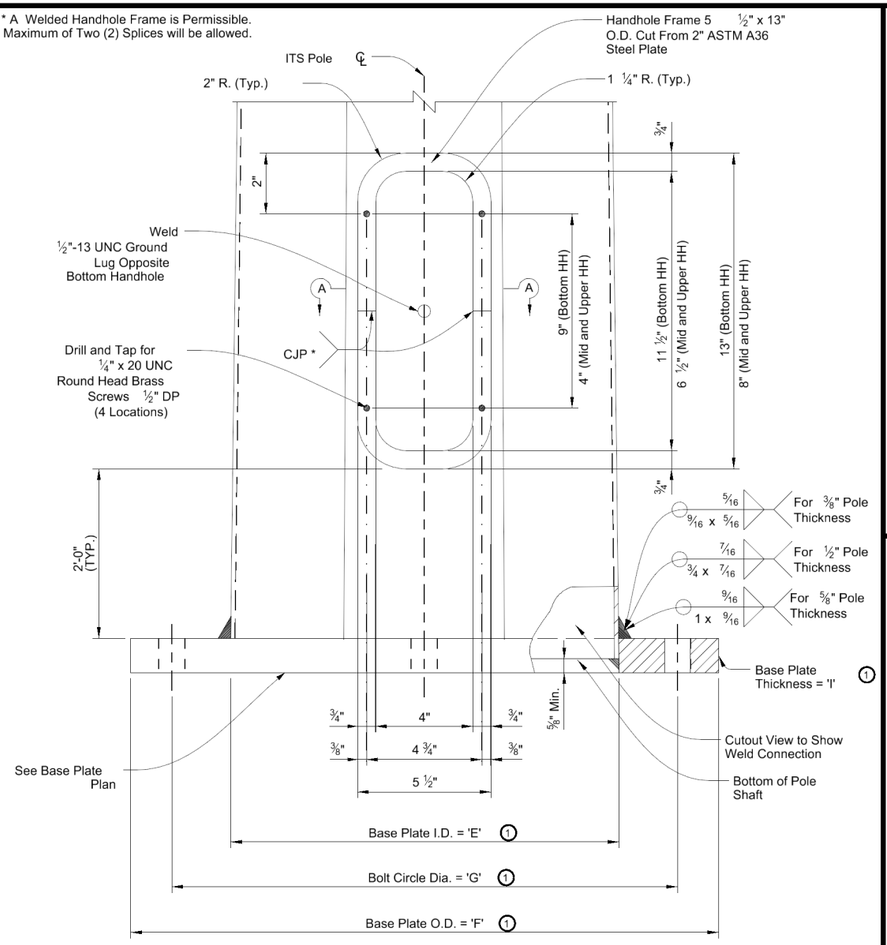
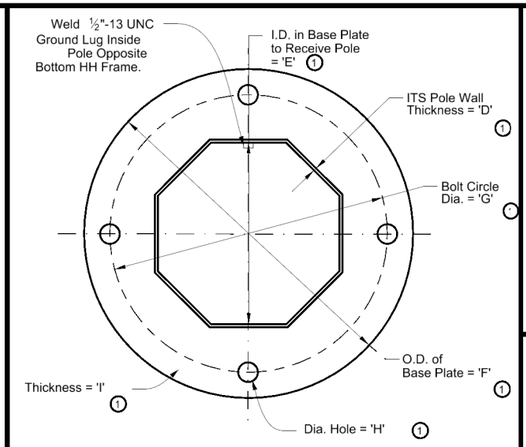


ITS Pole with Cabinet

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

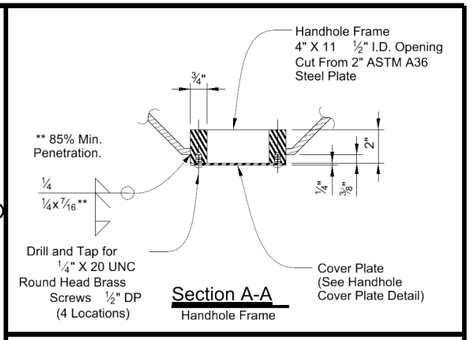


Detail A



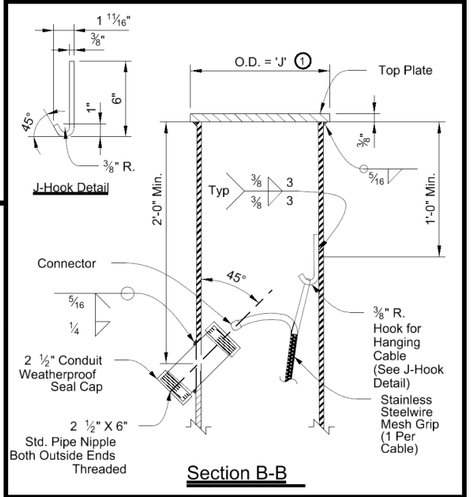
Base Plate Plan

4 Bolt Base Plate (ASTM A36)



Section A-A

Handhole Frame



Section B-B

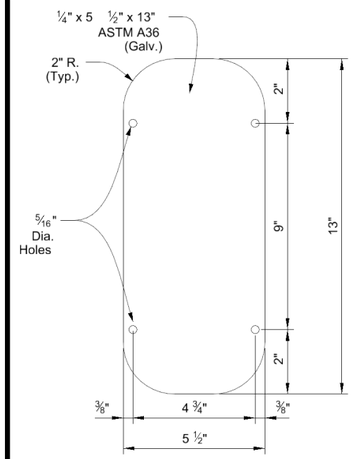
General Notes

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:

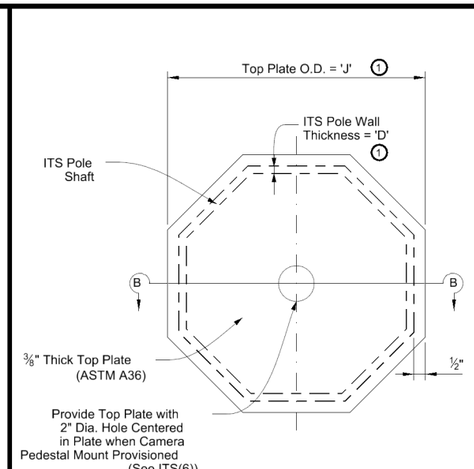
(1) See tables on Sheet ITS(4) for values of dimension variables.

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

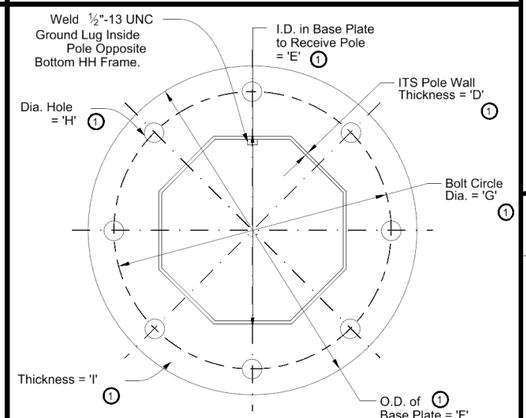


Handhole Cover Plate Detail

(Bottom Handhole)



Top Plate Plan



Base Plate Plan

6 Bolt Base Plate (ASTM A36)

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
©TxDOT June 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	00	067	Various
	DIST	COUNTY		SHEET NO.
	22	WEBB, etc		57

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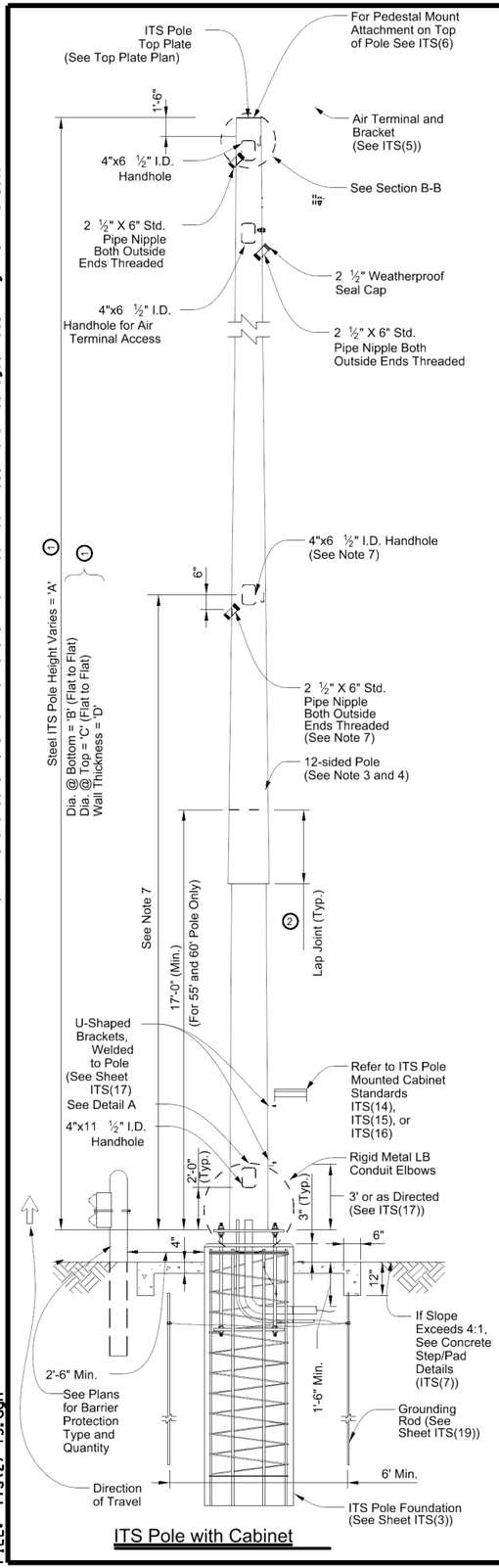
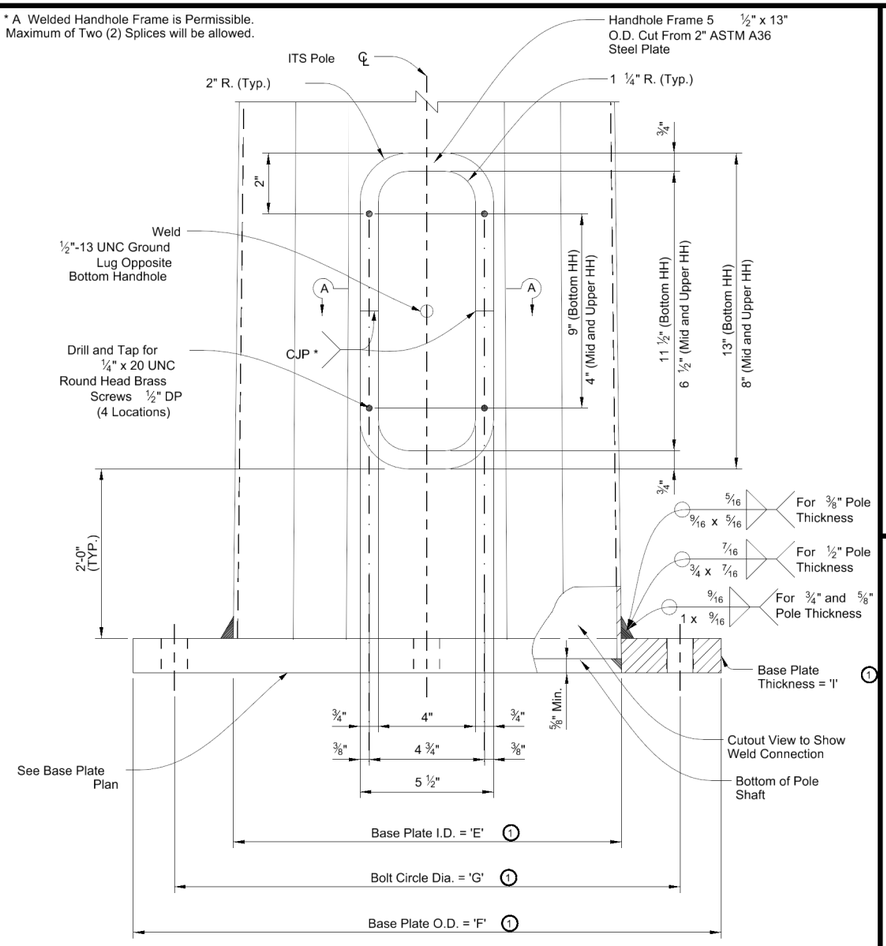
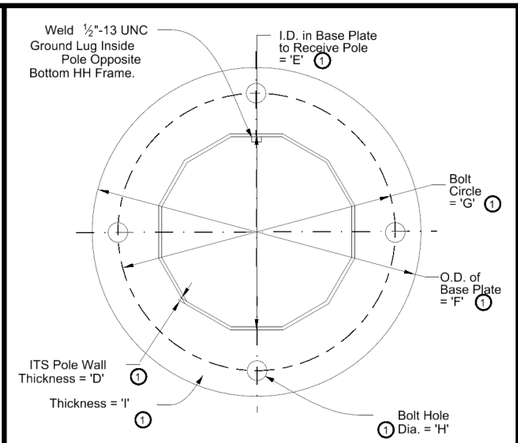


ITS Pole with Cabinet

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

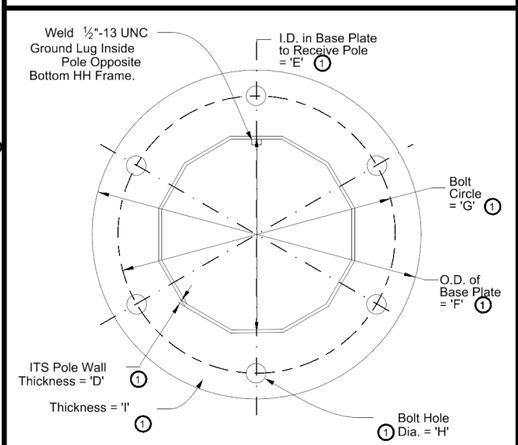


Detail A



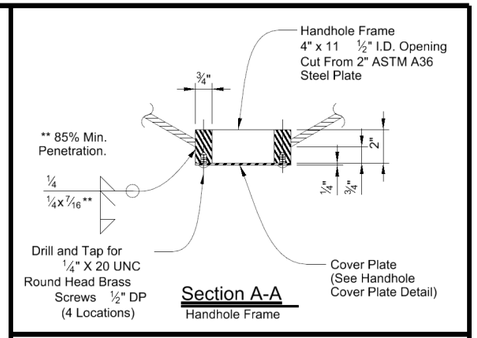
Base Plate Plan

4 Bolt Base Plate (ASTM A36)



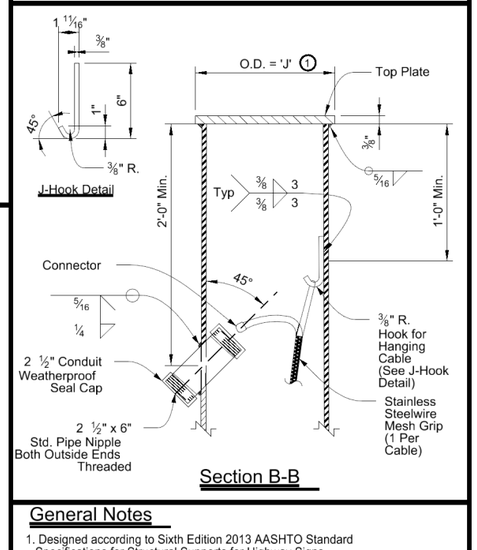
Base Plate Plan

6 Bolt Base Plate (ASTM A36)



Section A-A

Handhole Frame



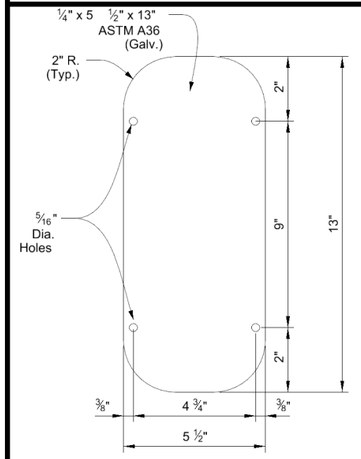
Section B-B

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 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.

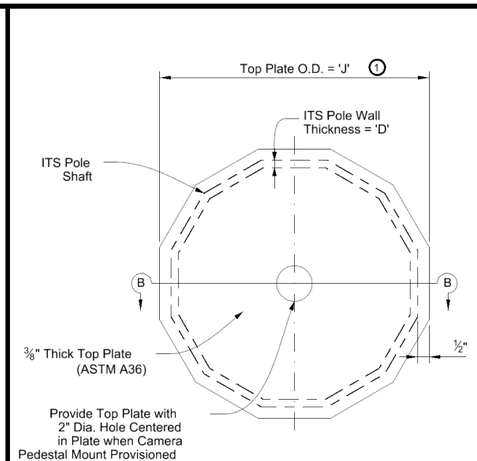
Reference Notes:

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.

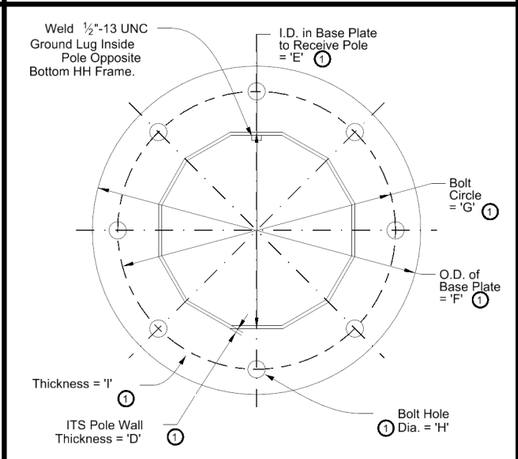


Handhole Cover Plate Detail

(Bottom Handhole)



Top Plate Plan



Base Plate Plan

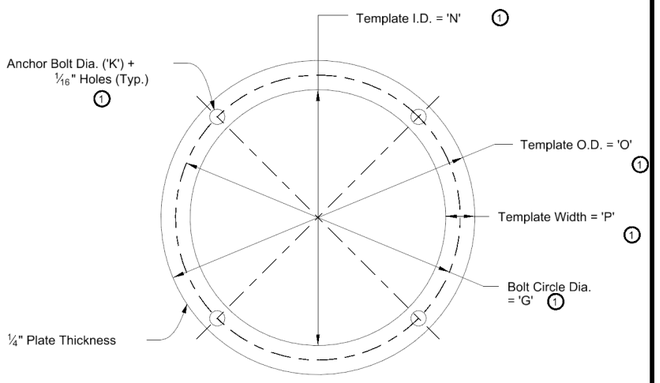
8 Bolt Base Plate (ASTM A36)

Texas Department of Transportation

Traffic Operations Division Standard

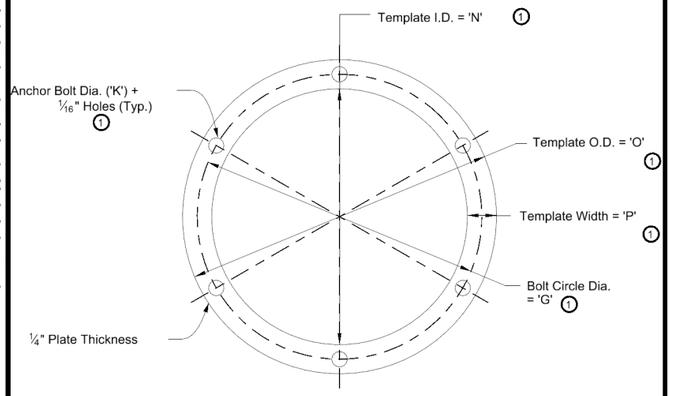
ITS POLE DETAILS DODECAHEDRAL POLE (TWELVE SIDED POLE) (ALTERNATIVE) ITS(2)-15

FILE: its(2)-15.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT June 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	00	067	Various
	DIST	COUNTY		SHEET NO.
	22	WEBB, etc		58



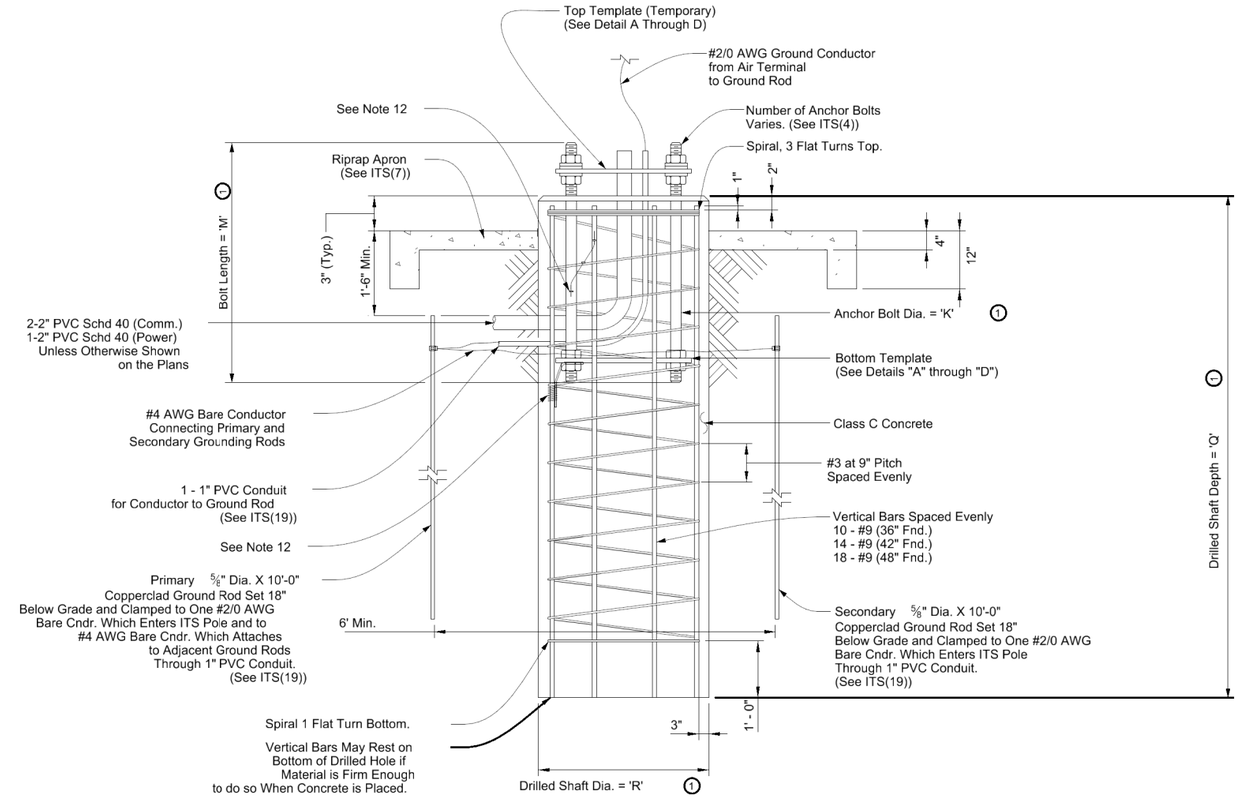
Top and Bottom Template (Four Bolt)

Detail A



Top and Bottom Template (Six Bolt)

Detail B



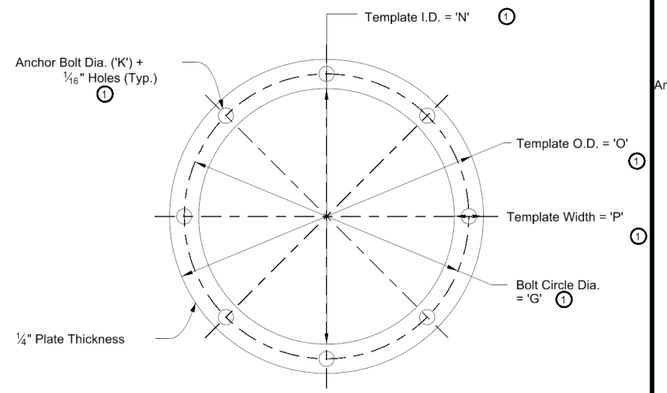
Foundation Details (Typical)

Elevation

Not to Scale

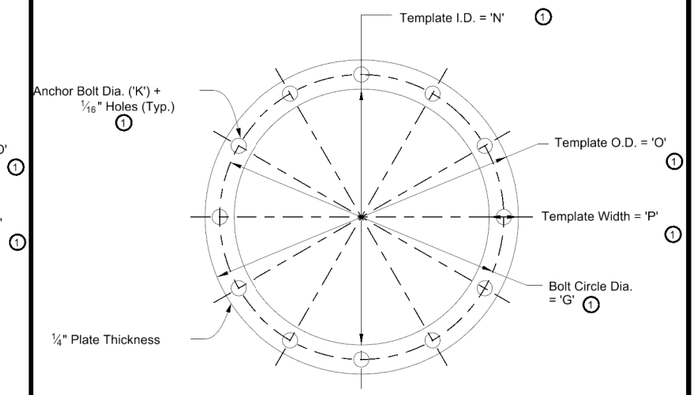
General Notes:

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.



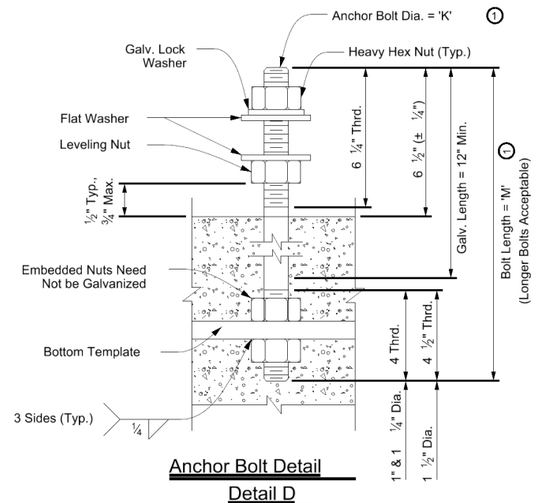
Top and Bottom Template (Eight Bolt)

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 April 2016	0922	00	067	Various
	DIST	COUNTY		SHEET NO.
	22	WEBB, etc		59

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FILE: i-ts(4)-15.dgn

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".

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ITS POLE DESIGN DETAILS DATA LOOKUP TABLE

ITS(4)-15

FILE: i-ts(4)-15.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT June 2015	CONT	SECT	JOB	HIGHWAY
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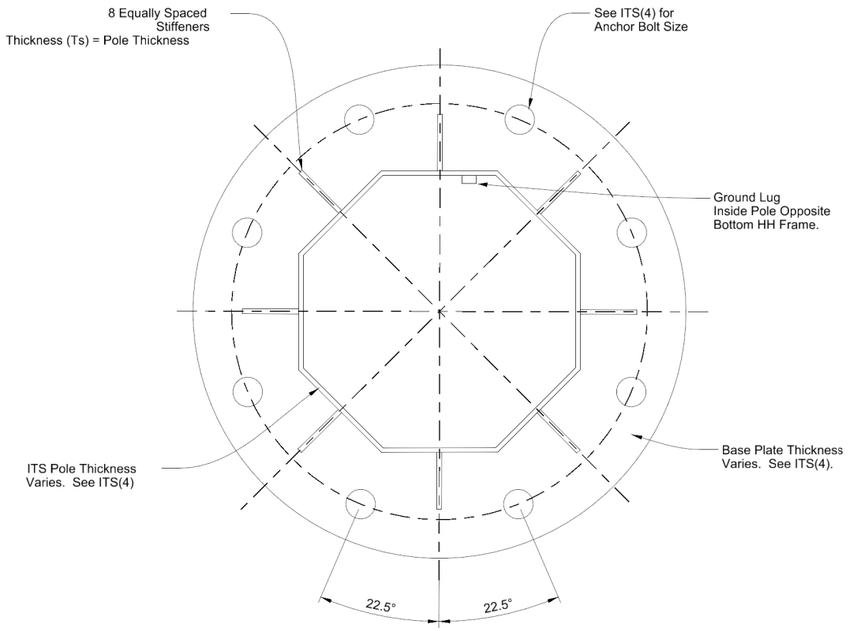
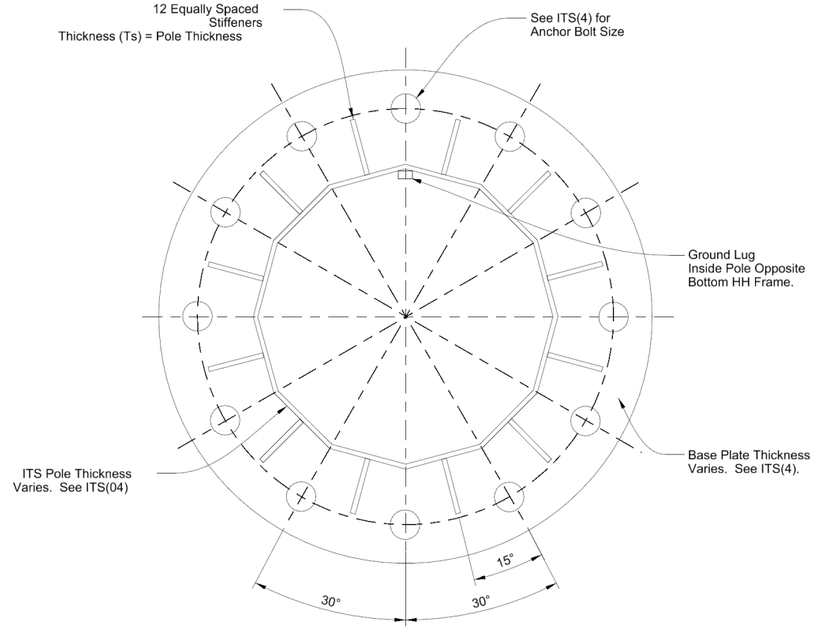


8-sided Pole Base Plate Detail



12-sided Pole Base Plate Detail

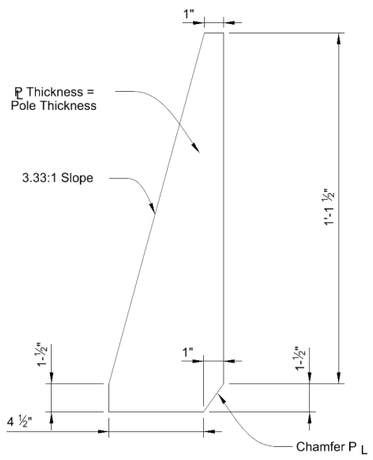
General Notes:

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:

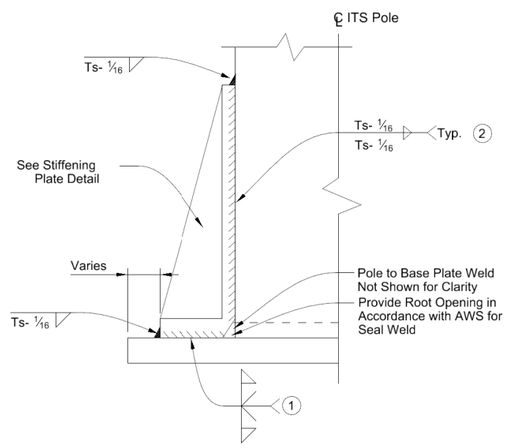
(1) Complete Joint Penetration Weld per AWS

(2) Wrap Fillet Weld Around Tip of Stiffener



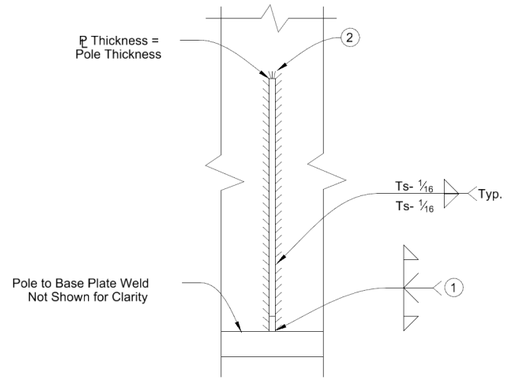
Stiffening Plate Detail

Not to Scale



Stiffening Detail - Elevation View

Not to Scale



Stiffening Detail - Front View

Not to Scale

Texas Department of Transportation

Traffic Operations Division Standard

ITS POLE STIFFENER PLATE DETAILS

ITS(4A)-15

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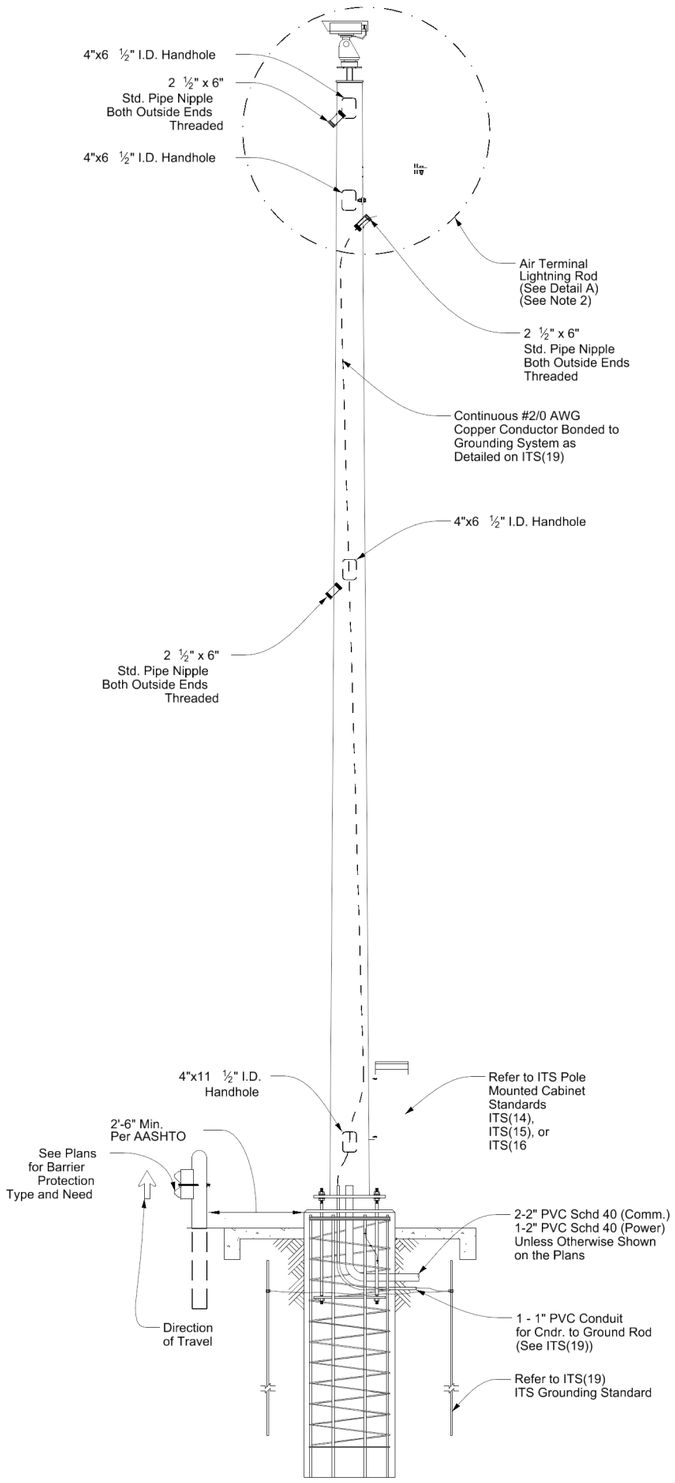
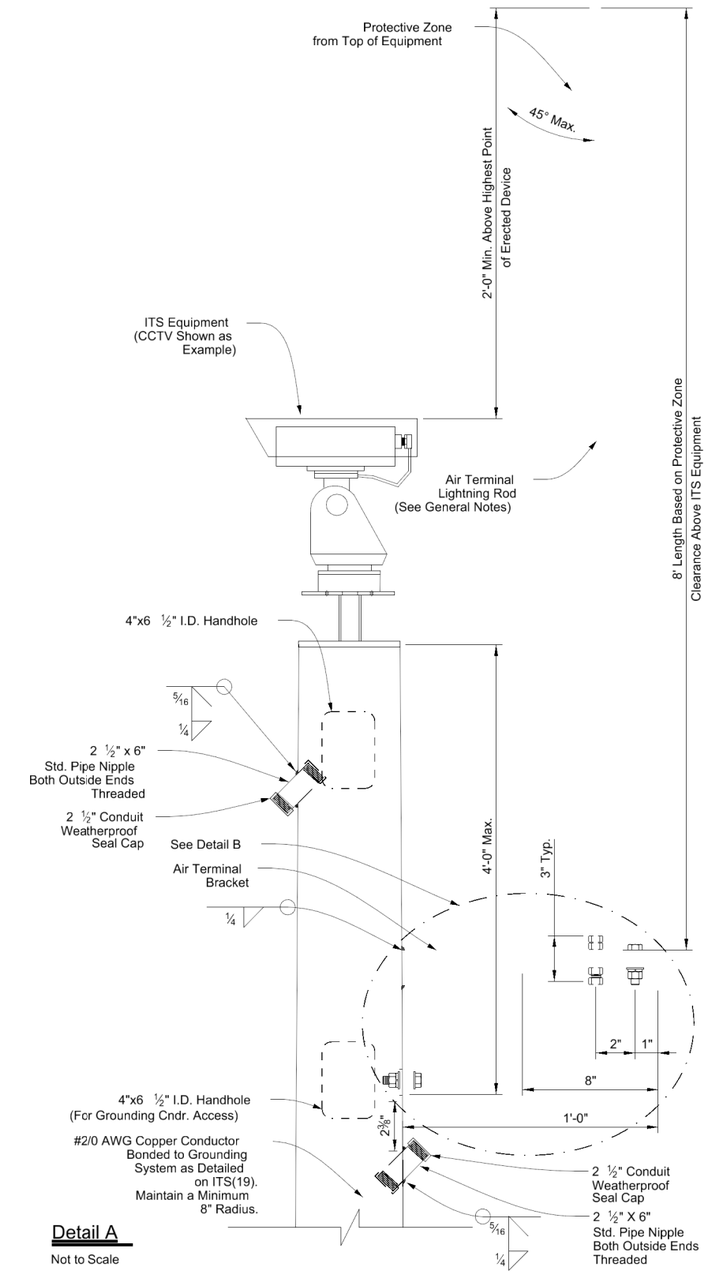


ITS Pole with Cabinet



Detail A

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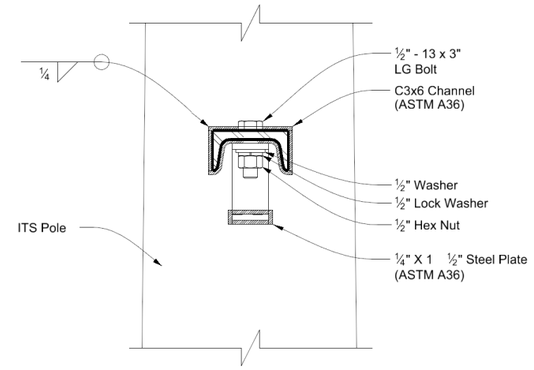

Section A-A

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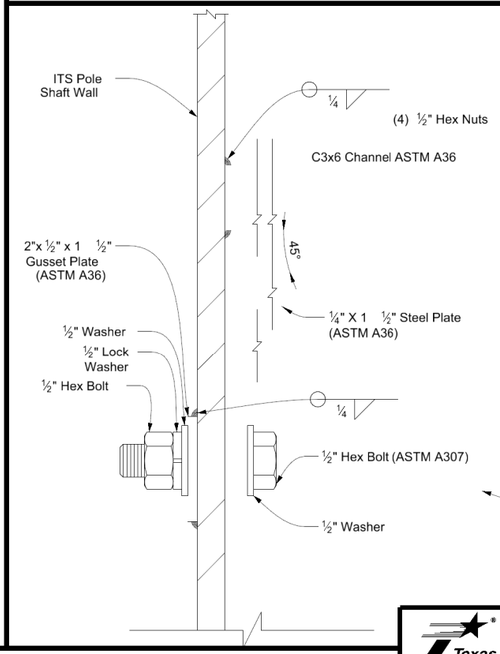

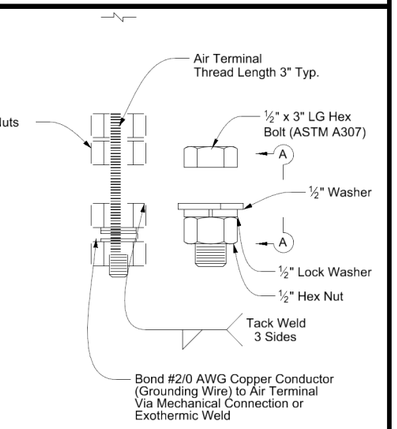

Detail B

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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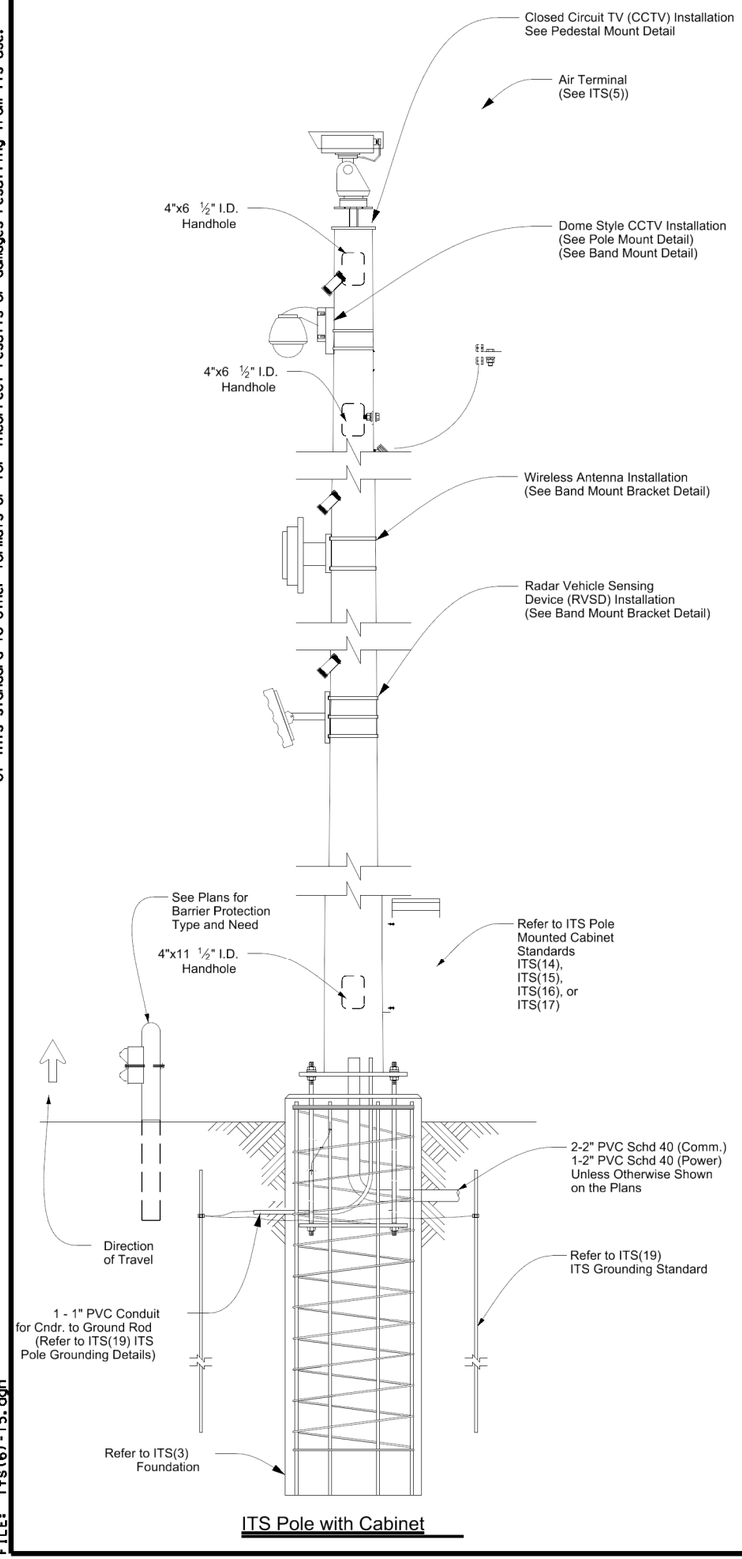
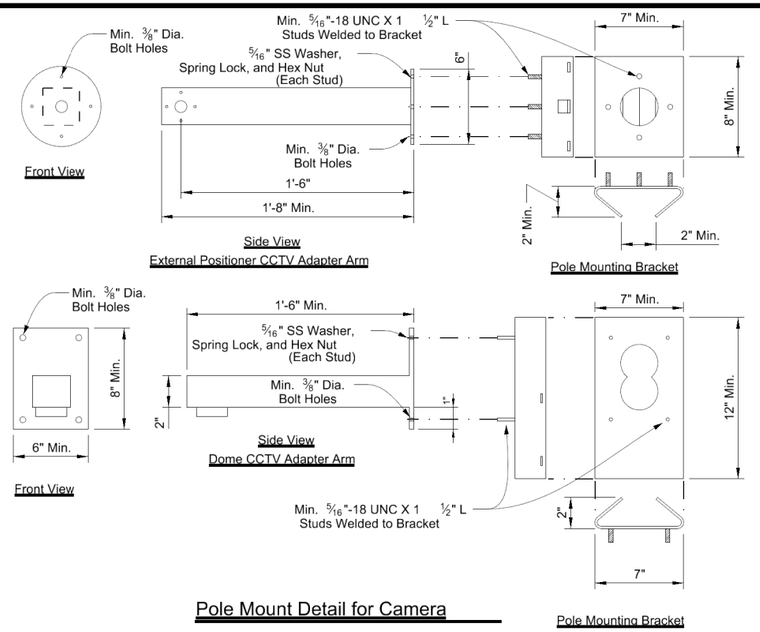
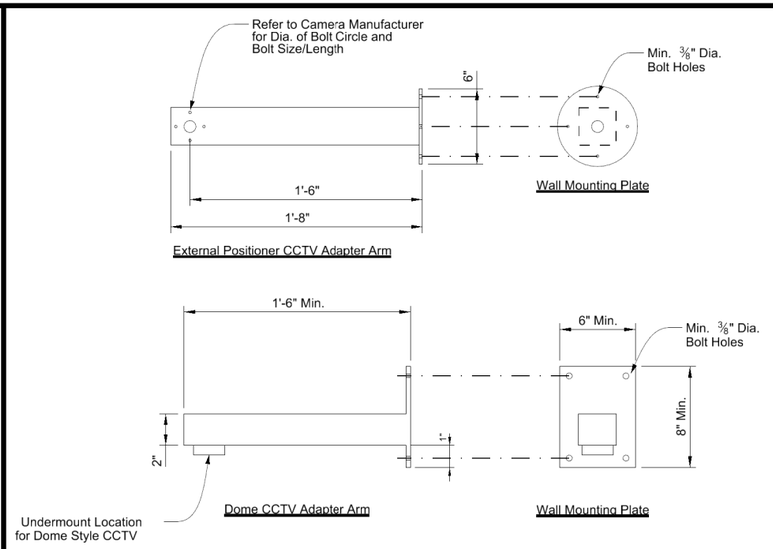


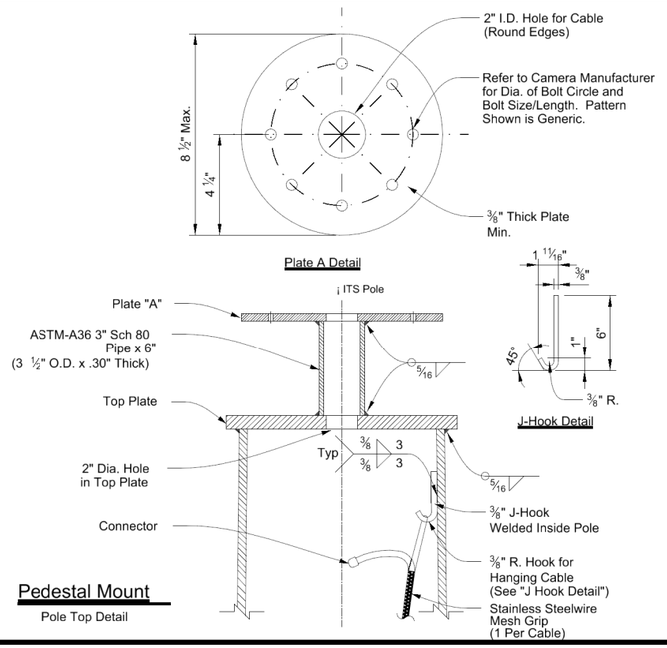
ITS Pole with Cabinet



Pole Mount Detail for Camera

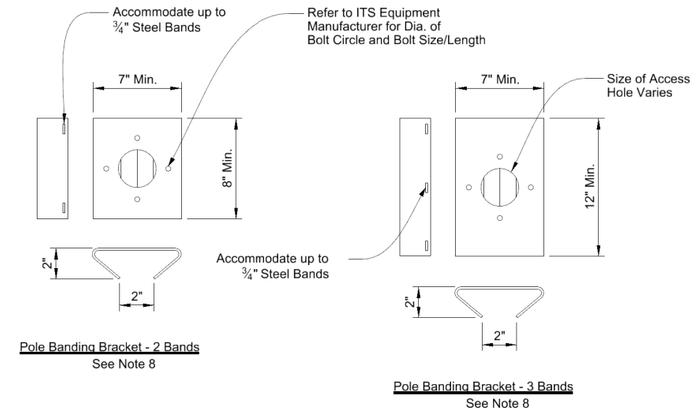


Wall Mount Detail



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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Traffic Operations Division Standard

ITS POLE EQUIPMENT MOUNTING DETAILS

ITS(6)-15

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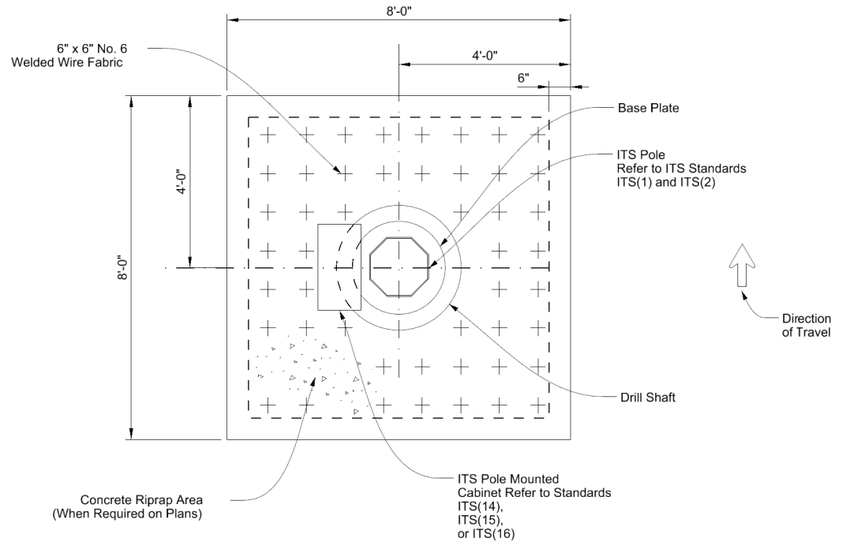
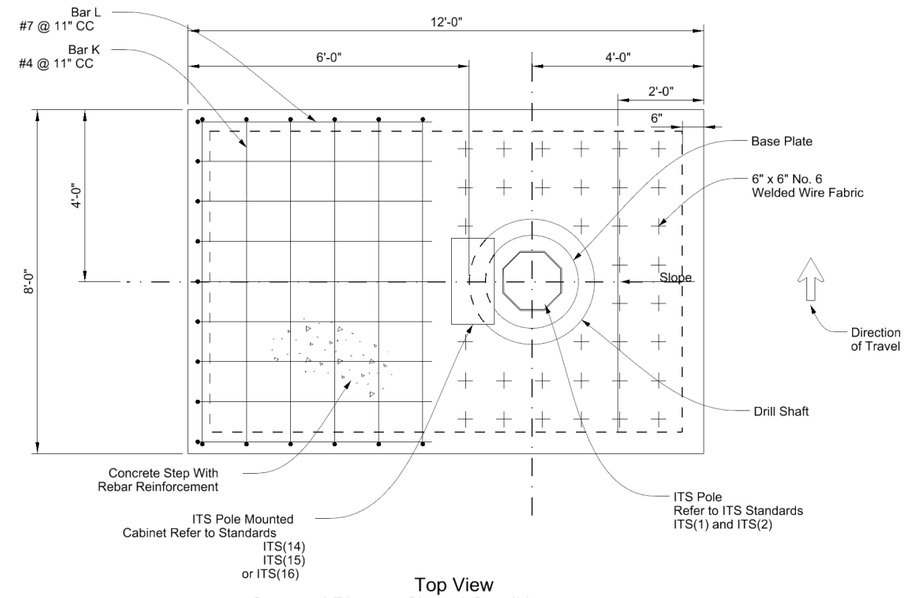


Top View
Riprap - Non-Sloped Conditions



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)

Texas Department of Transportation

Traffic Operations Division Standard

ITS POLE RIPRAP DETAILS

ITS(7)-15

FILE: i+s(7)-15.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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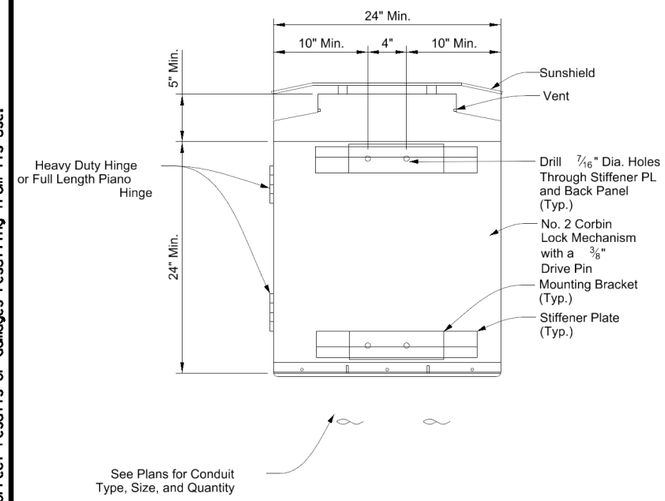
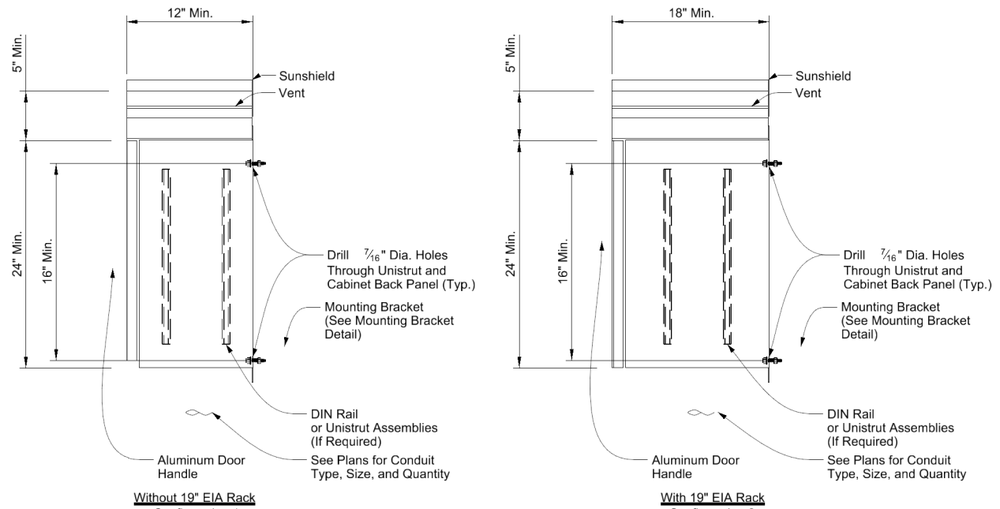


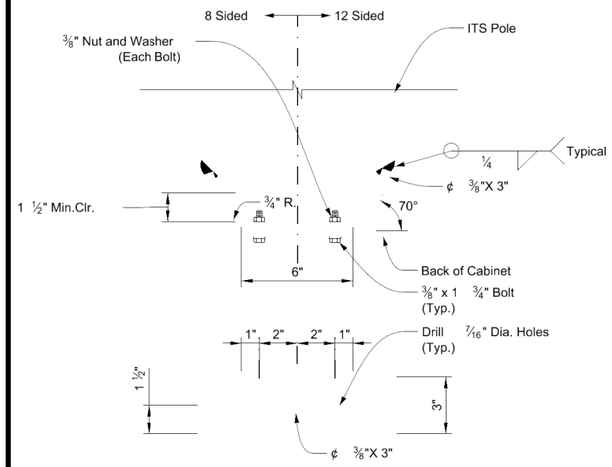
Pole Mounted Cabinet - Type 1 Front View

Not to Scale



Pole Mounted Cabinet - Type 1 Side View

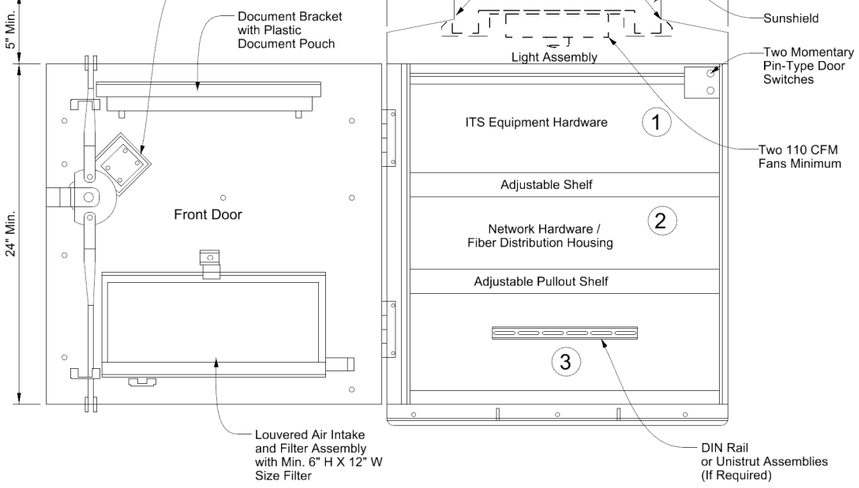
Not to Scale



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

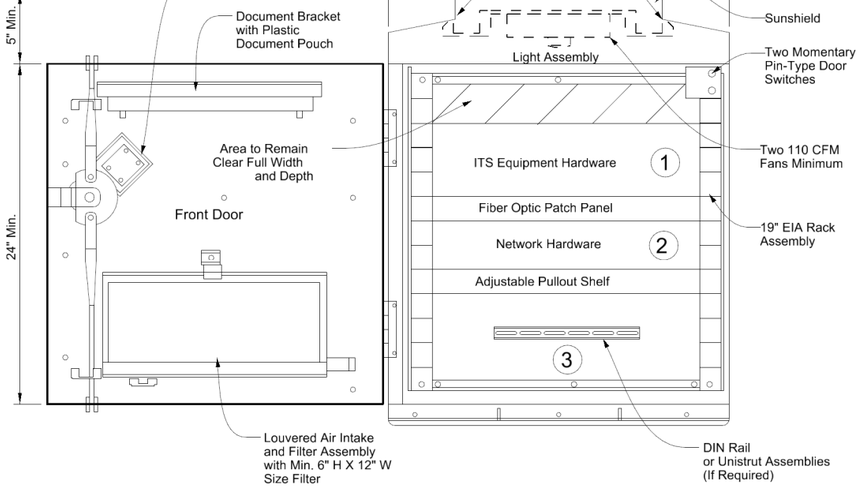
Mounting Bracket Detail

Not to Scale



Interior - Type 1 Without 19" EIA Rack - Front View

Not to Scale



Interior - Type 1 With 19" EIA Rack - Front View

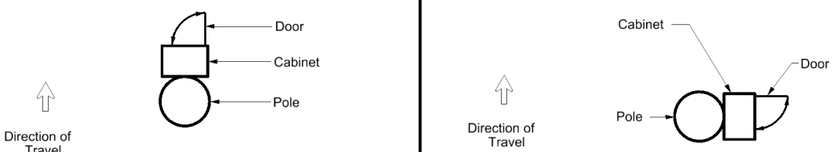
Not to Scale

Typical Equipment Layout Legend

	Example Equipment
1	CCTV Interface Panel, Radar Vehicle Sensing Device (RVSD) Equipment, 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 1 pole mounted cabinet setup. Hardware needed for each Type 1 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(14) 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 1 Cabinet on ITS Pole (Typical)

Not to Scale

Texas Department of Transportation

Traffic Operations Division Standard

ITS POLE MOUNTED CABINET TYPE 1 DETAILS

ITS(14)-15

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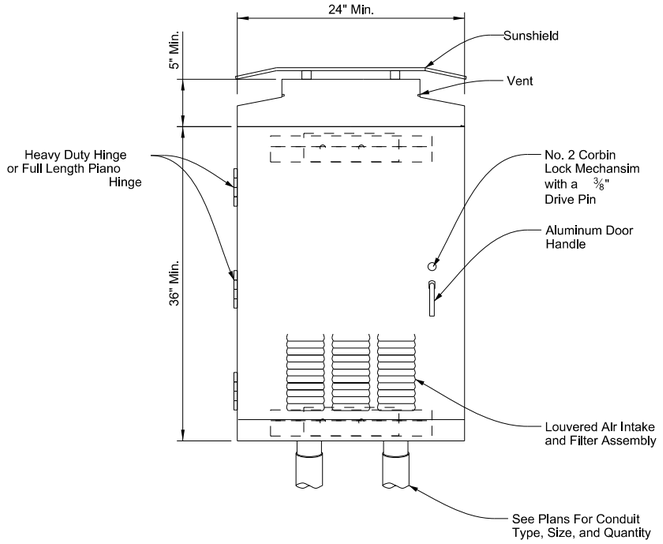
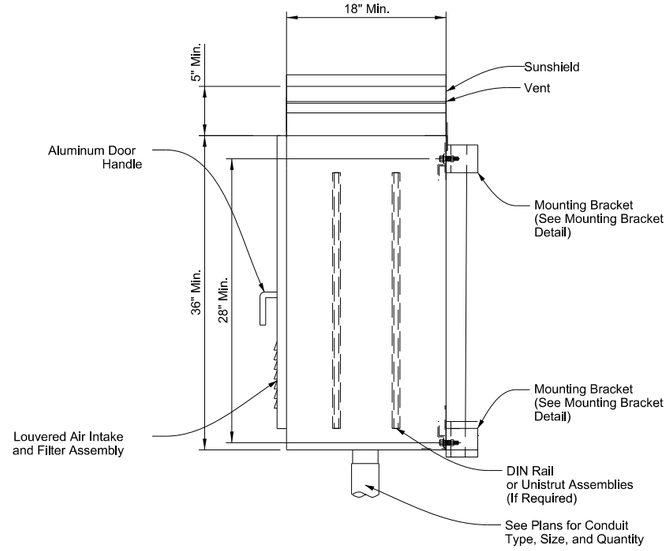


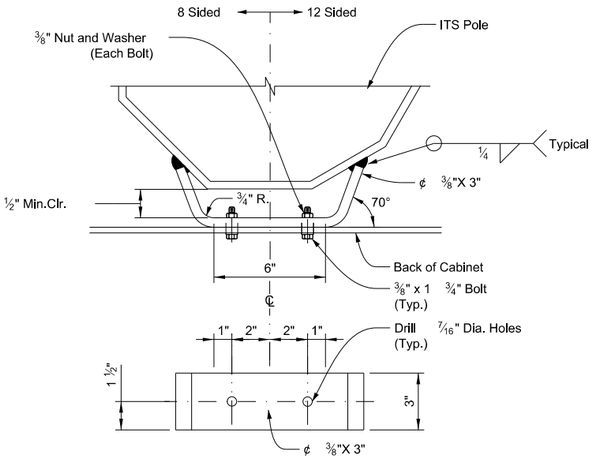
Pole Mounted Cabinet - Type 2 Front View

Not to Scale



Pole Mounted Cabinet - Type 2 Side View

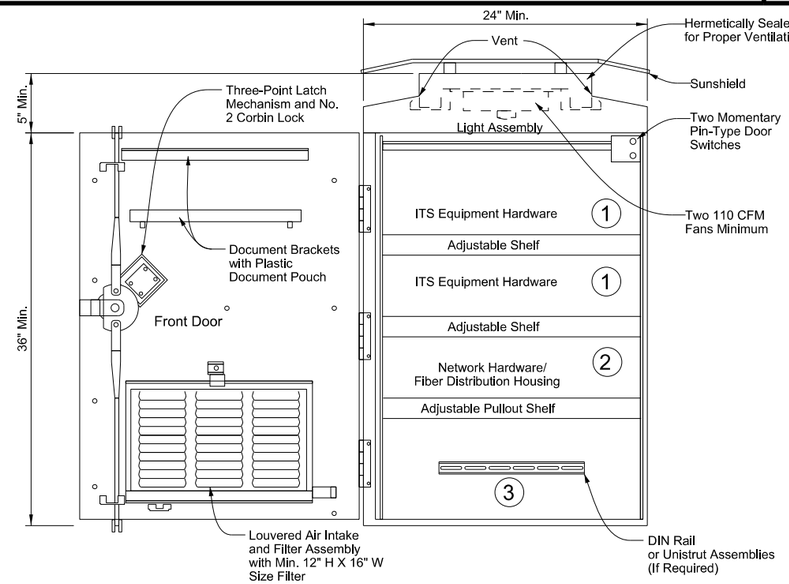
Not to Scale



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

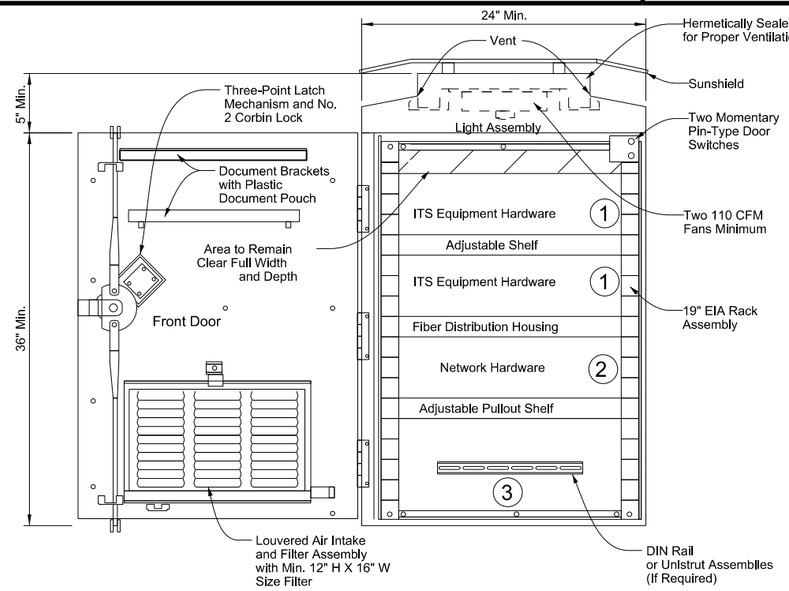
Mounting Bracket Detail

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.

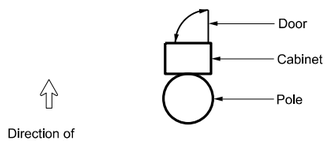
2. Mount cabinet as detailed on ITS(15) or ITS(17). Orientation of cabinet on ITS pole may vary depending on field conditions. Mount the pole mounted cabinet to the backside of the ITS pole, to allow maintenance personnel to access the cabinet while being able to view oncoming traffic.

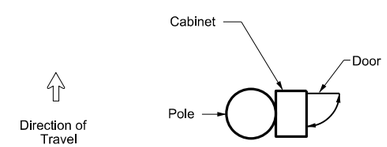
3. For ITS pole sites located on slopes greater than 4H:1V, mount the cabinet to the backside of the ITS pole as detailed on ITS(7). Mounting height to accommodate maintenance pad for easy access.

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

Texas Department of Transportation

Traffic Operations Division Standard

ITS POLE MOUNTED CABINET TYPE 2 DETAILS

ITS(15)-15

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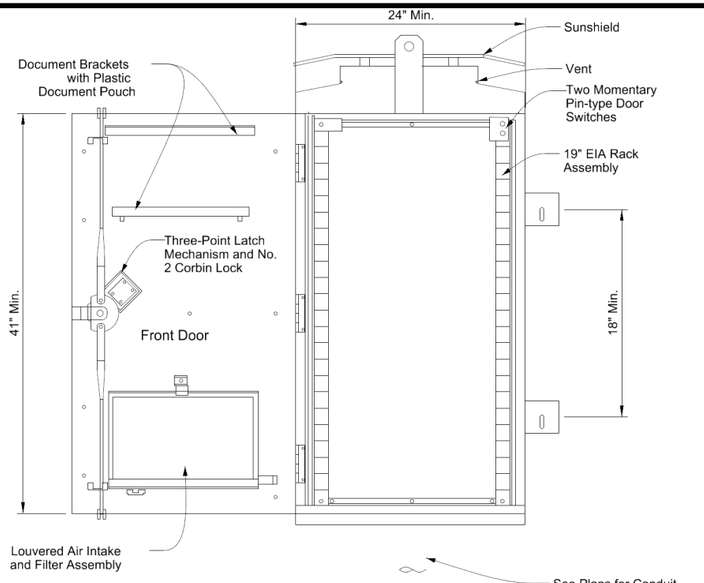
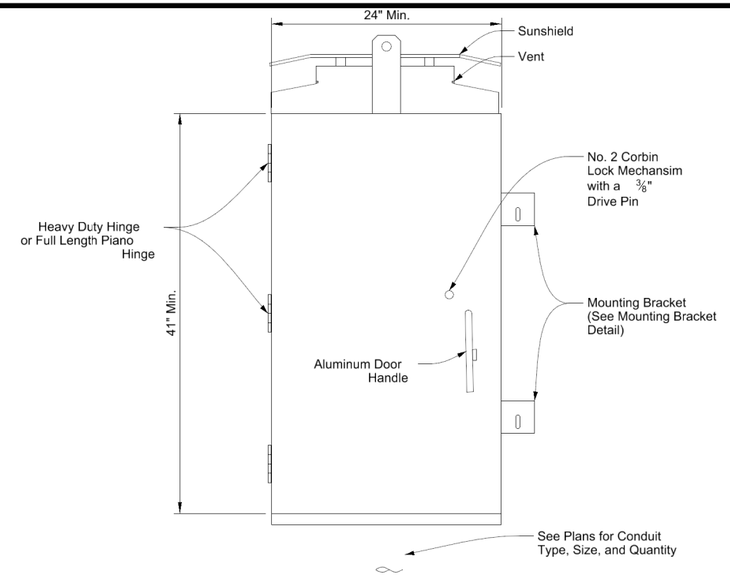


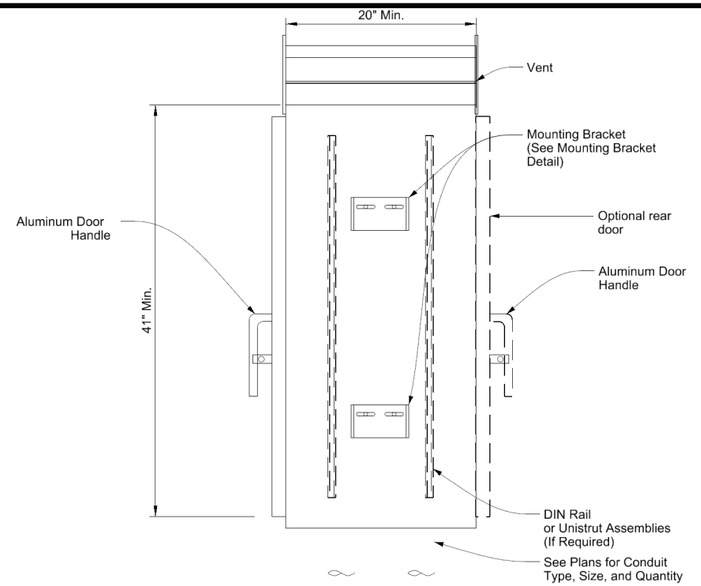
Interior - Type 3 Front View

Not to Scale



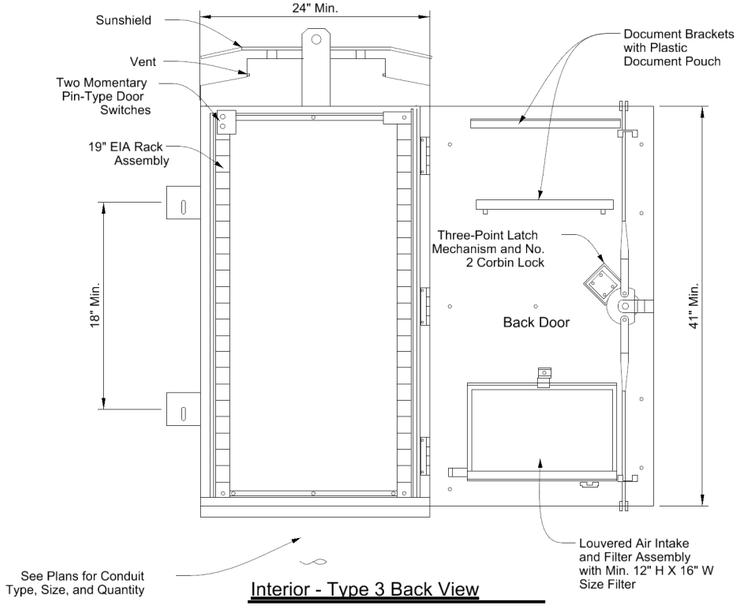
Pole Mounted Cabinet - Type 3 Front View

Not to Scale



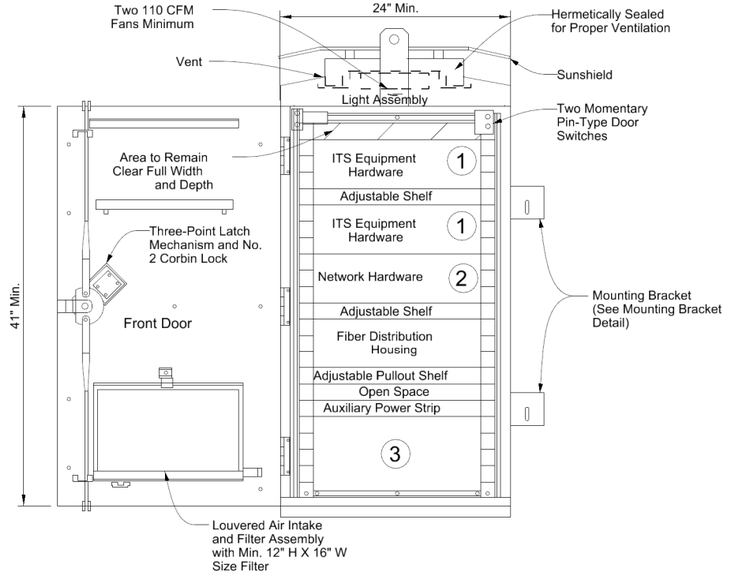
Pole Mounted Cabinet - Type 3 Side View

Not to Scale



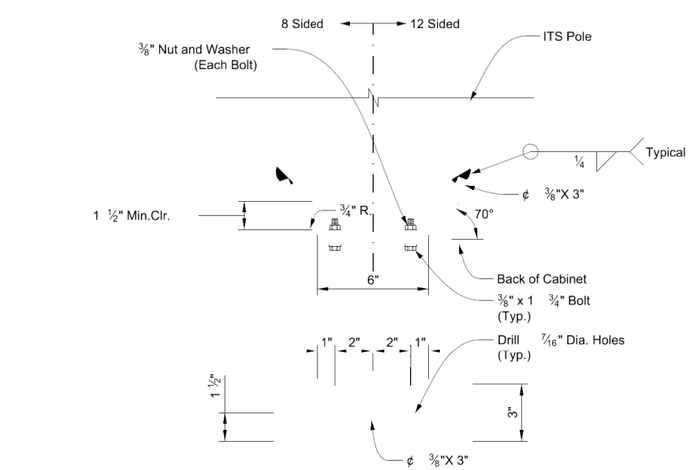
Interior - Type 3 Back View

Not to Scale



Interior - Type 3 With Rack Front View

Not to Scale



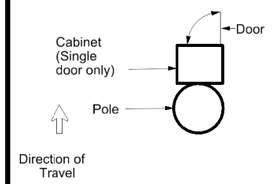
Note:
ITS Pole May be Round, Octagonal (8 Sided), or Dodecahedron (12 Sided).
See ITS(1), and ITS(2) for Details.

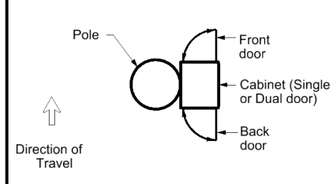
Mounting Bracket Detail

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

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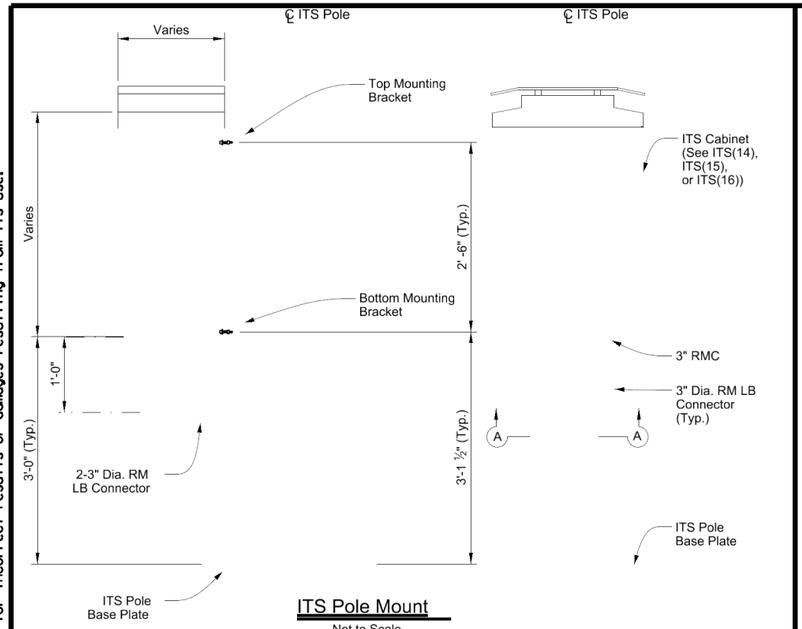
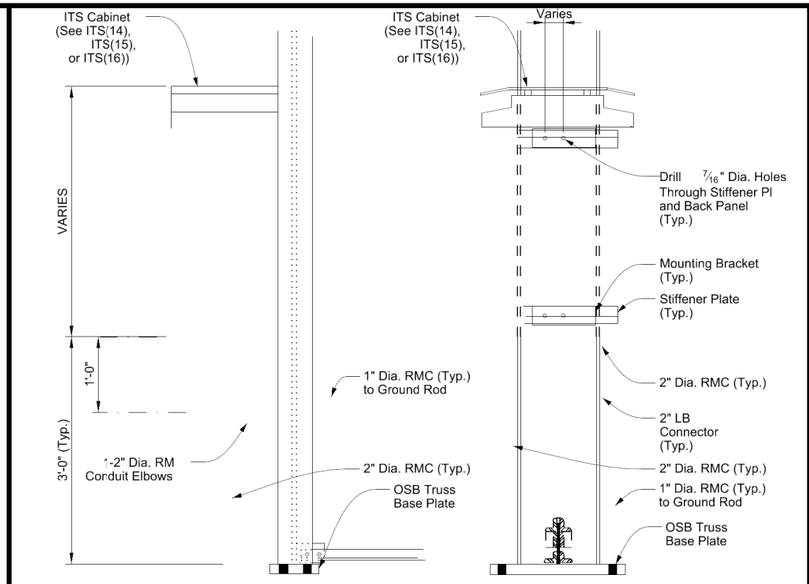
FILE: its(16)-15.dgn



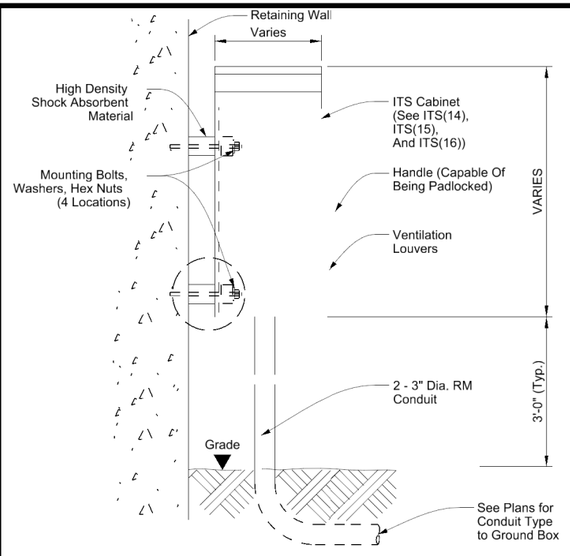
ITS Pole Mount

Not to Scale



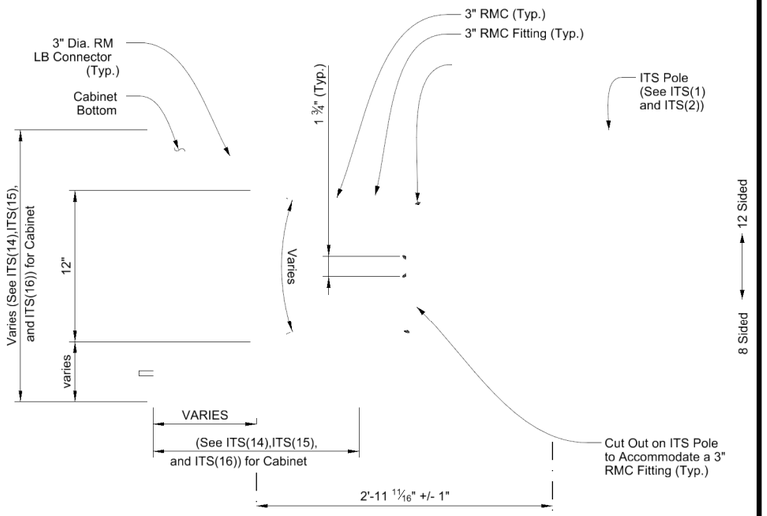
OSB Truss Mount

Not to Scale



Retaining Wall Mount

Not to Scale



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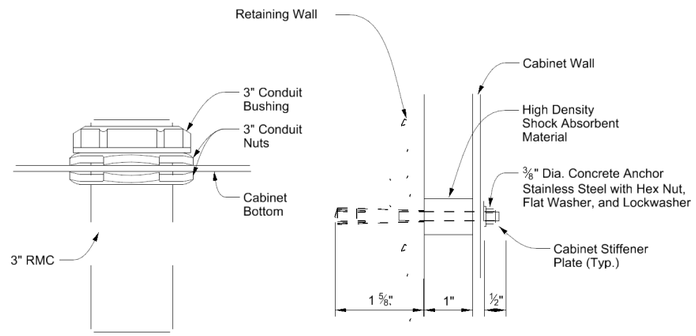

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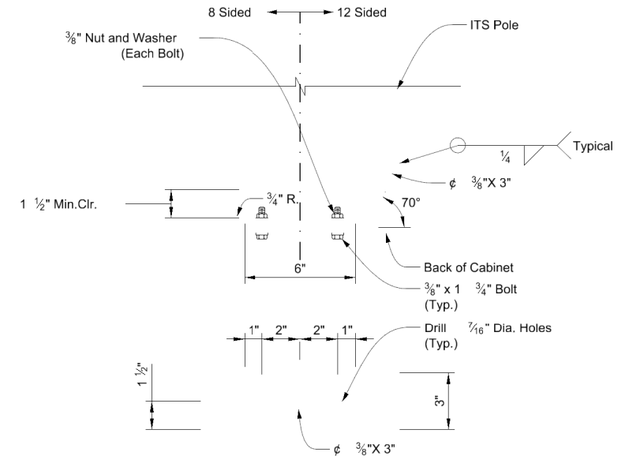

Note:
ITS Pole May be Round, Octagonal (8 Sided), or Dodecahedron (12 Sided).
See ITS(1), and ITS(2) for Details.

Mounting Bracket Detail

Not to Scale

General Notes:

1. 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

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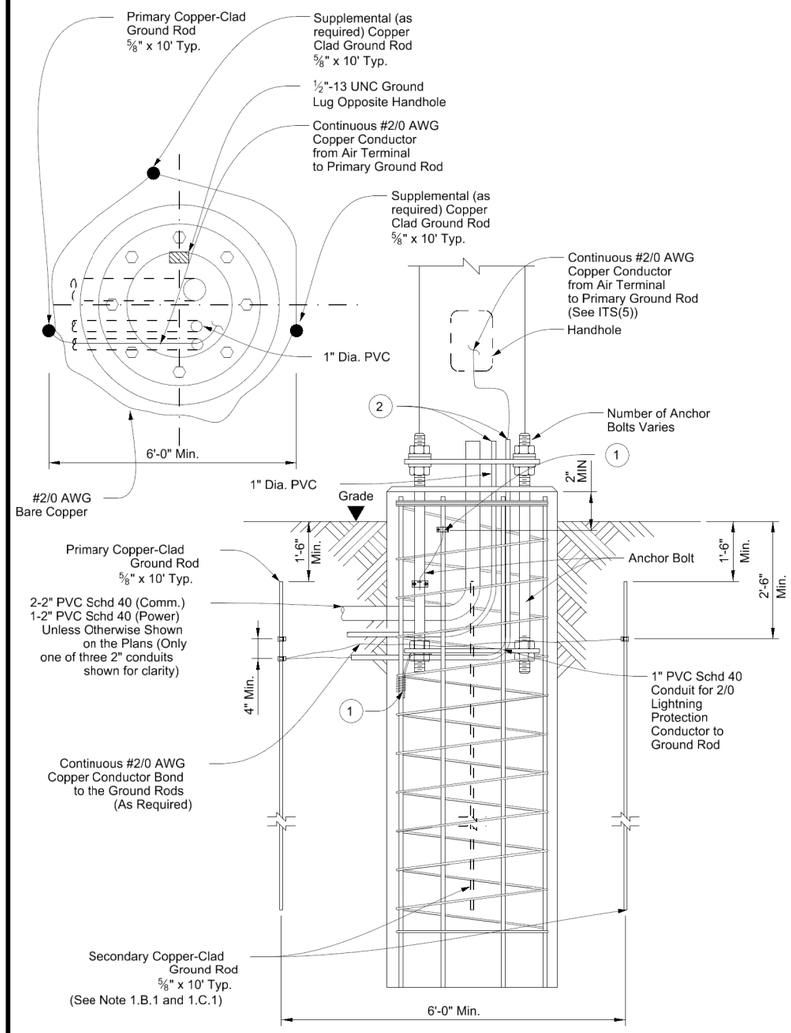
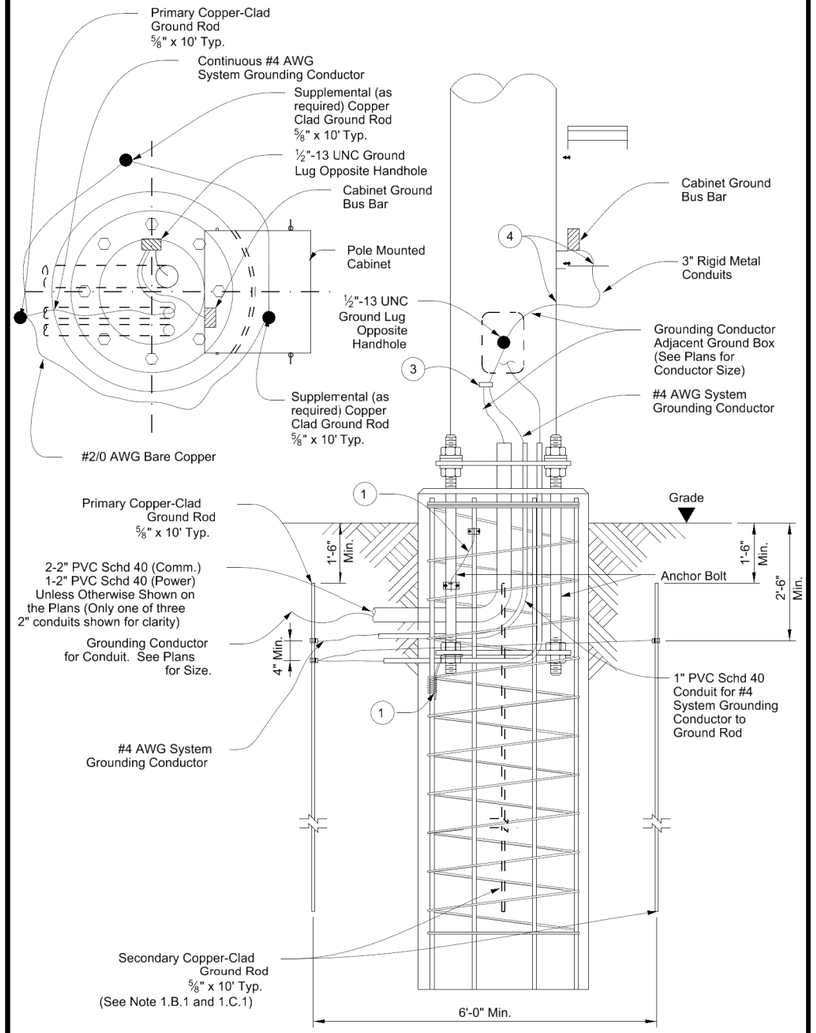
General Notes:

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

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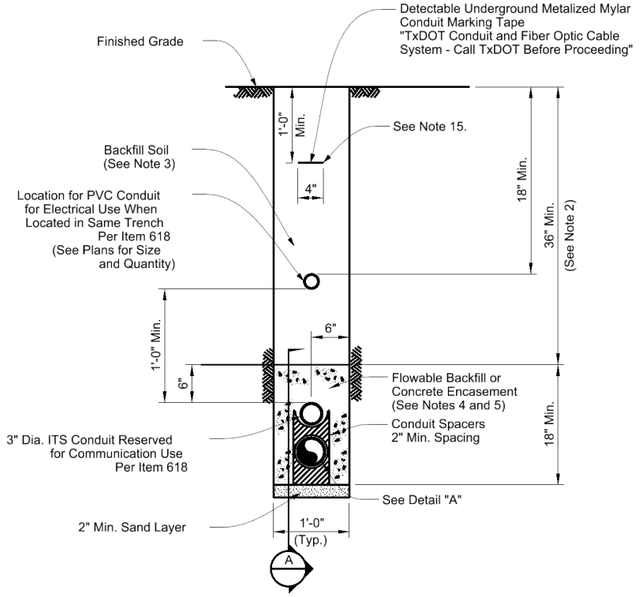
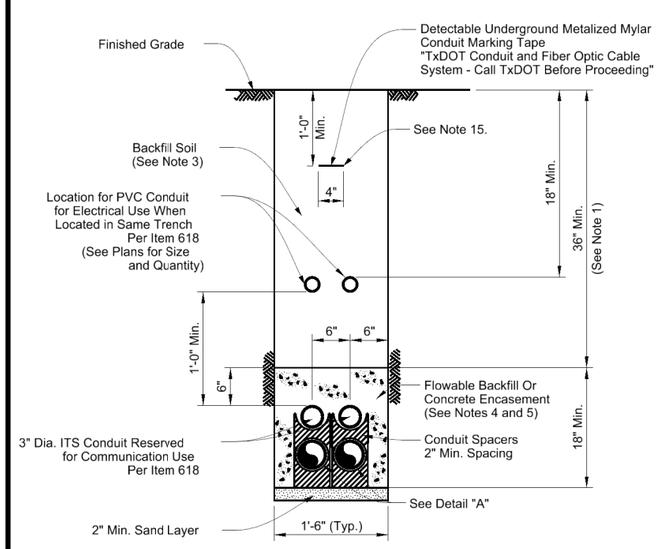


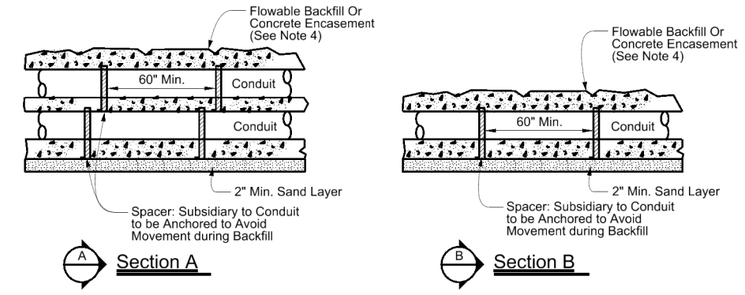
ITS Conduit Backbone Trench Vertical Spacing

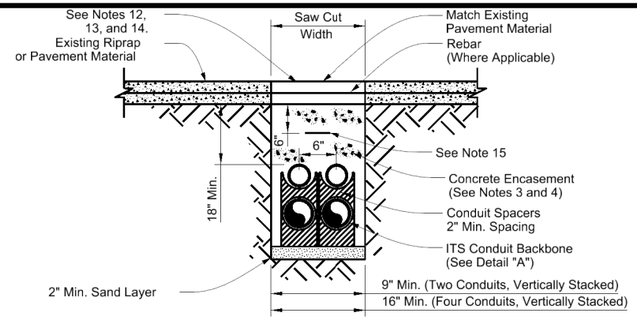
Two Conduit System



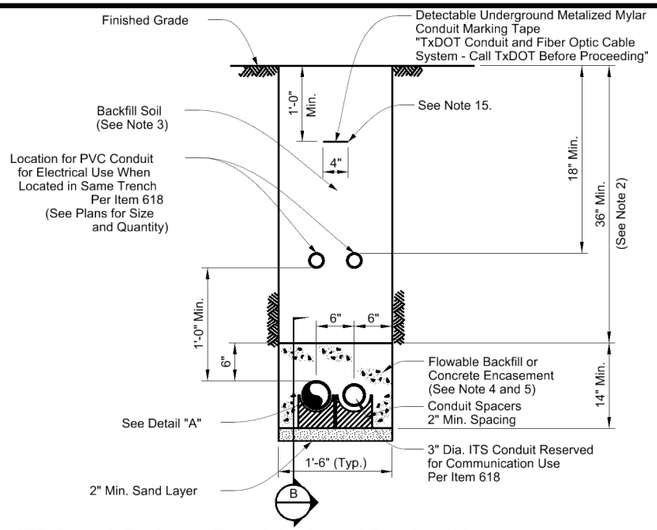
ITS Conduit Backbone Trench Vertical Spacing

Four Conduit System



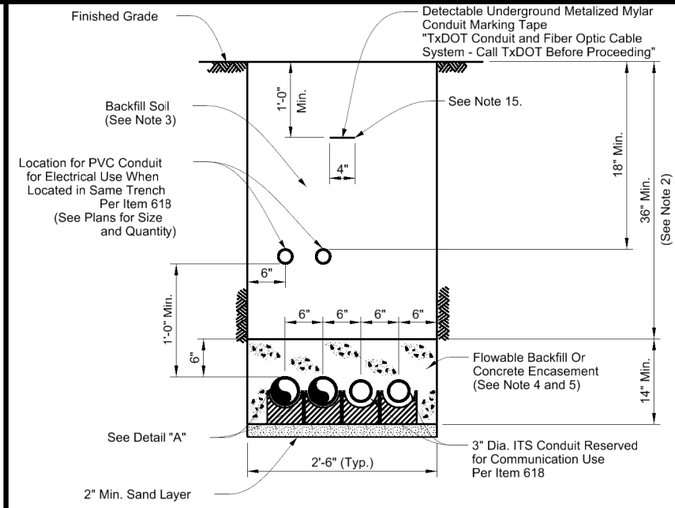


Open Cut Trenching Details



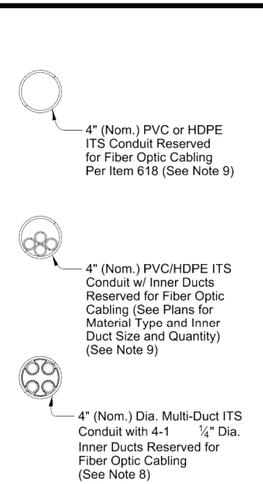
ITS Conduit Backbone Trench Horizontal Spacing (Alternative)

Two Conduit System



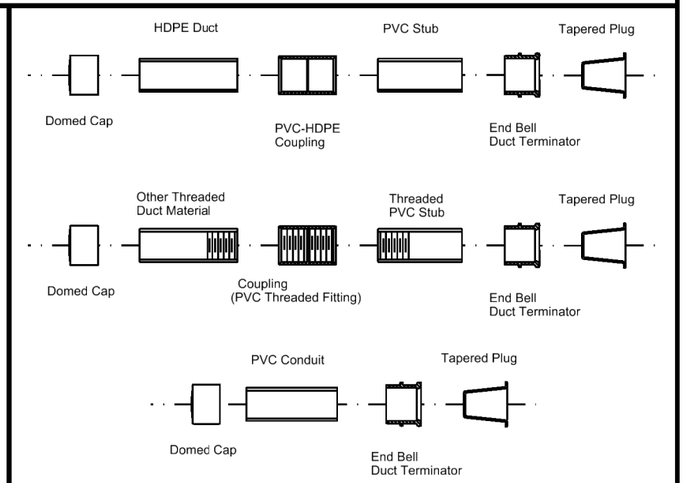
ITS Conduit Backbone Trench Horizontal Spacing (Alternative)

Four Conduit System



Detail "A"

Conduit Types
(See Plans for Type and Quantity)



Typical Conduit Fitting Combinations

2 Conduit and Single Conduit Configuration

SHEET 1 OF 2

General Notes:

1. Construct the ITS conduit backbone system by vertically spacing conduit, unless field constraints, obstructions, or utility conflicts require horizontal spacing of conduits. Both vertical and horizontal spacing configurations have been detailed for contractor information for construction.
2. Install ITS conduit backbone system a minimum of 42 inches from finished grade to the top of the conduit unless otherwise directed or to avoid conflicts or field conditions such as utilities or obstructions. Vary depth of the trench in order to pass over/under any existing utilities. Refer to ITS Conduit Obstruction Crossing Standard ITS(35) for further detail.
3. Perform trench excavation and backfilling in accordance with Item 400, "Excavation and Backfill for Structures."
4. When a trench depth greater than 24 inches can be achieved from the finished grade to the top of ITS conduit, encase the conduits with flowable backfill in accordance with Item 401, "Flowable Backfill." Use Class B concrete as a substitute in accordance with Item 421, "Hydraulic Cement Concrete" at the discretion of the Engineer.
5. When a trench depth of less than 24 inches is required due to field conditions, encase the conduits in Class B concrete in accordance with Item 421, "Hydraulic Cement Concrete."
6. Concrete encasement will be paid for under Special Specification "ITS Multi-Duct Conduit" or as shown on the plans.
7. Provide ITS PVC conduit identified for electrical and communication use in accordance with Item 618, "Conduit."
8. Provide ITS multi-duct conduit identified for fiber optic communication use in accordance with Special Specification "ITS Multi-Duct Conduit."
9. Conduit per Item 618, "Conduit" (See Plans for Material Type and Quantity).
10. Provide a single 1/C #14 insulated wire in conduit runs which have been identified in the plans to carry fiber optic cable. Provide UL listed solid copper wire with orange color low density polyethylene insulation suitable for conduit installation rated for temperature range -20 C to 60 C and a voltage rating of 600V. This wire will serve as a tracer, or locate, wire for locating underground conduit containing fiber optic cabling and will be paid for under Item 620, "Electrical Conductors."
11. Provide a flat pull cord in all empty conduits and innerducts. Provide a pull cord with a tensile strength of 1,250 Lbs. minimum and have foot markings to determine length installed. Pull cord and installation to be subsidiary to various bid items.
12. Remove saw cut width to accommodate conduit installation.
13. Replace rebar as necessary, lapped and tied a minimum of 3 inches to existing rebar.
14. Replace broken pavement materials with similar materials to exact shape, and thickness of existing.
15. Place marking tape a minimum of 1 foot - 0 inches below grade when no other electrical marking tape required, or 8 inches below electrical marking tape when provisioned under Item 618.
16. Provide a 1/C #8 insulated grounding conductor within one inner duct of a pre-assembled multi-duct when no other grounding conductor is provisioned for in the plans.

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Traffic Operations Division Standard

ITS CONDUIT TRENCH DETAILS

ITS(27)-16

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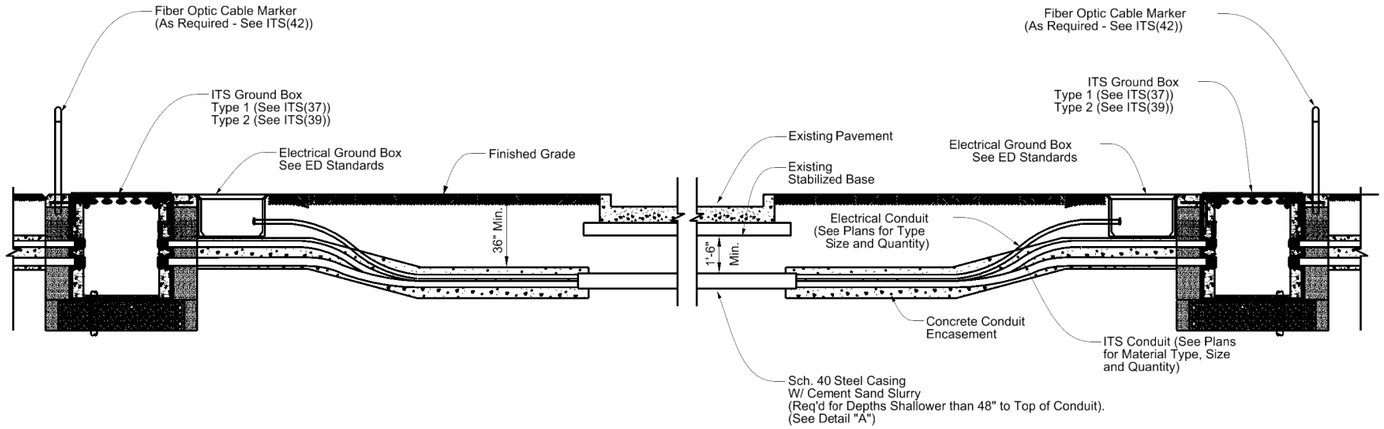
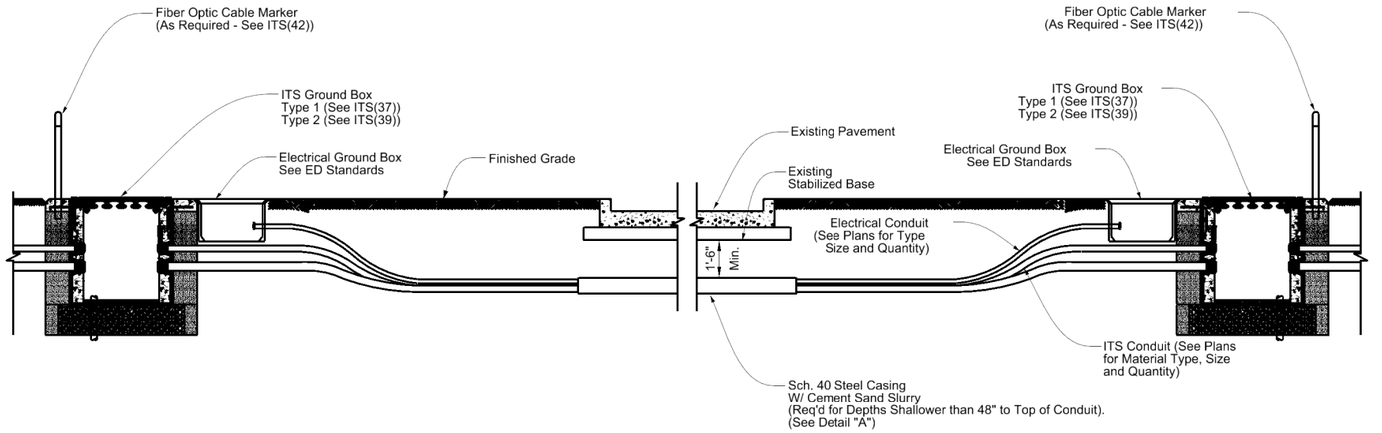
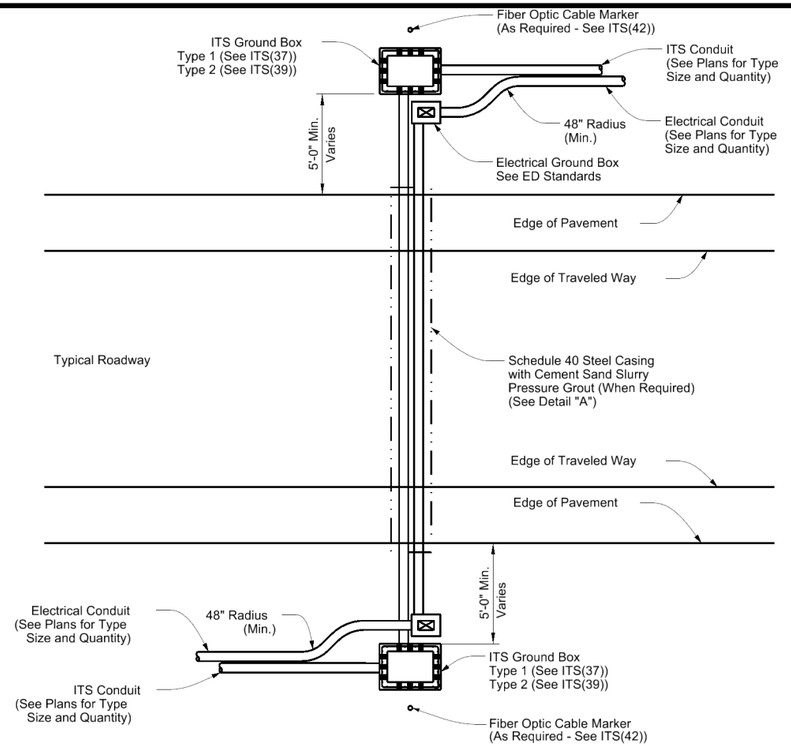


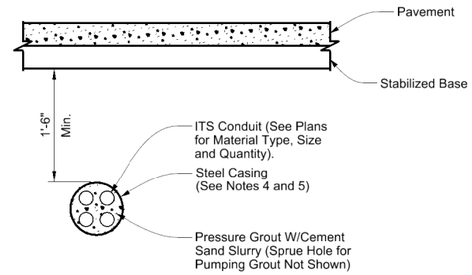
Typical Conduit Installation Jacking
or Boring Beneath Existing Roadway



Typical Conduit Installation Jacking
or Boring Beneath Existing Roadway
(Where Concrete Encasement Not Required)



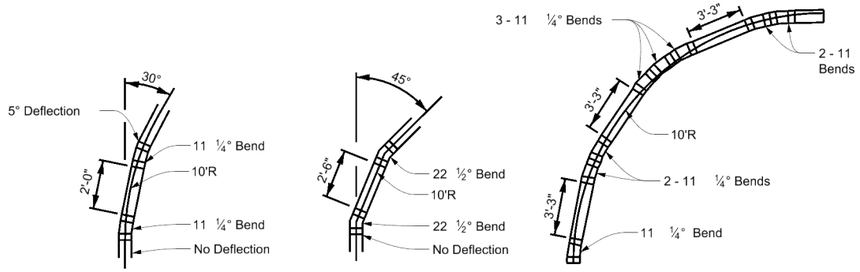
Bore Under Pavement



Steel Casing Detail "A"

General Notes:

1. Typical conduit installation details for jacking or boring beneath existing roadway is diagrammatic in nature. Roadway cross-slopes may vary for each crossing.
2. Jack or bore in accordance with Item 476, "Jacking, Boring, or Tunneling Pipe or Box" except for measurement and payment.
3. Furnishing and installation of pressure grouting will not be paid for directly but considered incidental to Special Specification "ITS Multi-Duct Conduit" or Item 618, "Conduit."
4. When boring under pavement shallower than 48 inches from finished grade to top of conduit, provide Schedule 40 steel casing under pavement to encase the conduit system. Provide steel casing of a size to accommodate ITS conduit and electrical conduit as shown in the plans. Provide a minimum 20 percent void space around all conduits. Steel casing will not be paid for directly but considered incidental to Special Specification, "ITS Multi-Duct Conduit" or Item 618, "Conduit."
5. When a depth greater than 48 inches can be achieved from finished grade to top of conduit, provide Schedule 80 PVC. No steel casing required unless otherwise directed.
6. Ensure all conduit bends are in conformance with the latest edition of the National Electrical Code.
7. Provide GPS coordinate points to the District for all ground boxes installed, and shifts or deviations of the conduit alignment from the plans required to avoid obstructions or utilities. Take GPS coordinate points at the start of the transition, at the point of curvature, and at the end of the transition at the point of tangency. Document the turnout radius and installed depth. Provide GPS coordinate points in NAD83 coordinate system and be accurate to 5 feet.



30° Turnout Detail

45° Turnout Detail

90° Turnout Detail

Provide this arrangement of conduit and fittings or approved equal at all 30°, 45°, and 90° bends, horizontal and vertical, to achieve a nominal 10' conduit radius for pre-assembled multi-duct conduit. See Note 7.

Sheet Details
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SHEET 2 OF 2

Texas Department of Transportation

Traffic Operations Division Standard

ITS CONDUIT BORE AND STEEL CASING DETAILS

ITS(28)-16

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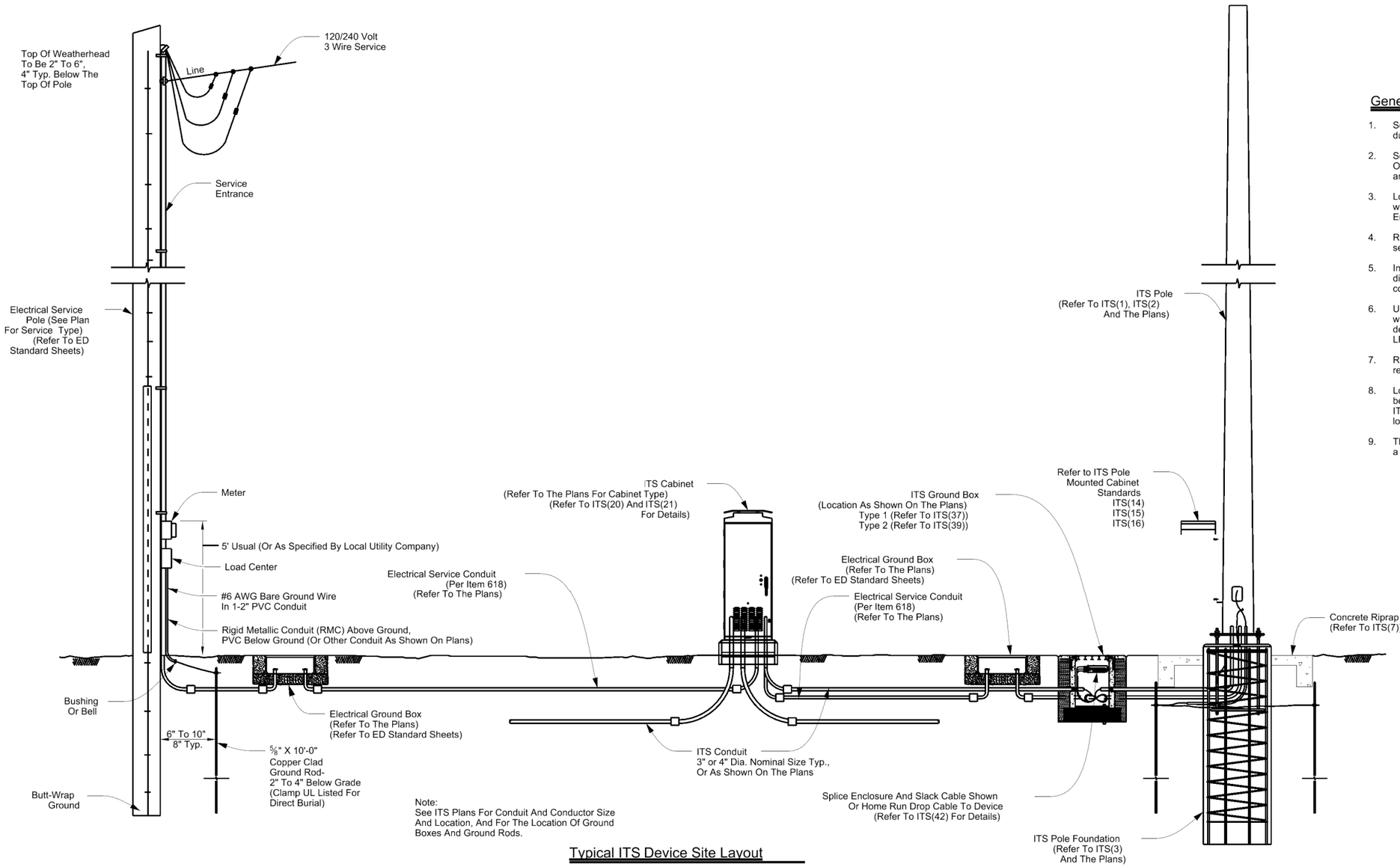

Typical ITS Device Site Layout

General Notes:

1. Seal all ITS communications conduits with waterproof duct plugs and seals.
2. Seal ends of all conduit entries into ITS cabinets with Oakum or other as approved by the District representative and pack with duct sealant.
3. Locate ground boxes for electrical and ITS communications within 5'-0" of cabinet enclosure, or as directed by the Engineer.
4. Refer to ED standard sheets for additional notes regarding electrical service.
5. Install service pole ground rod at alternate location when directed by the engineer. Maintain a minimum of 8'-0" in contact with the earth.
6. Utilize liquidtight flexible metal conduit (LFMC), as required when meter and service enclosure are mounted 90 to 180 degrees to each other. Refer to ED standard sheets for details on LFMC use.
7. Refer to ITS(21), ITS(37) and ITS(39) for details regarding conduit depth and entry into ITS ground boxes.
8. Lock all enclosures and bolt all ground box covers before power is applied to the circuit. Refer to the ITS cabinet references indicated on this sheet for cabinet lock requirements.
9. The detail shown is diagrammatic and is intended to represent a typical layout from electrical service to ITS devices.

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Traffic Operations Division Standard

TYPICAL ITS DEVICE SITE LAYOUT

ITS(36)-16

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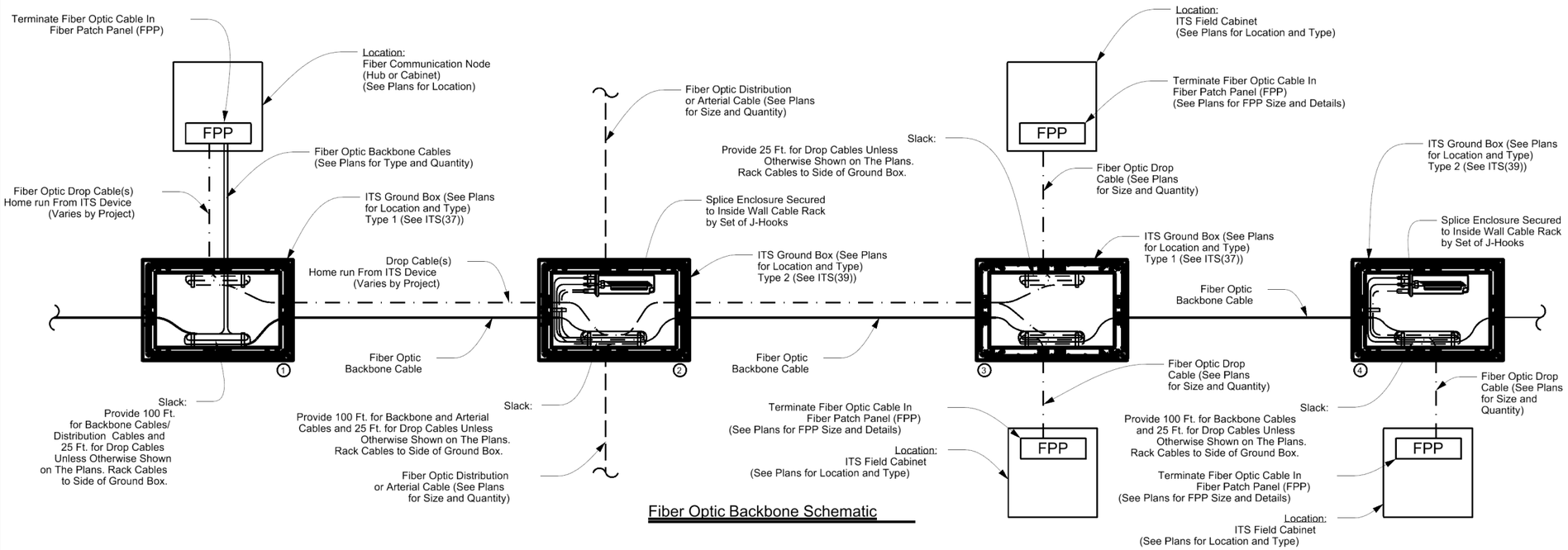
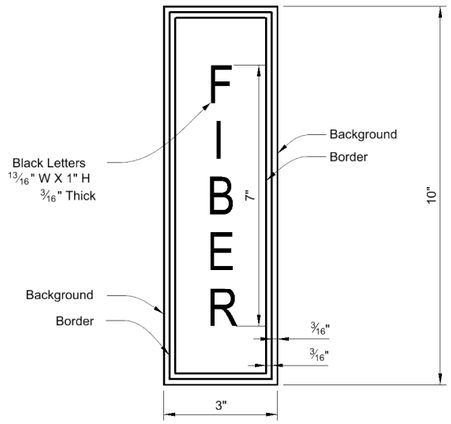
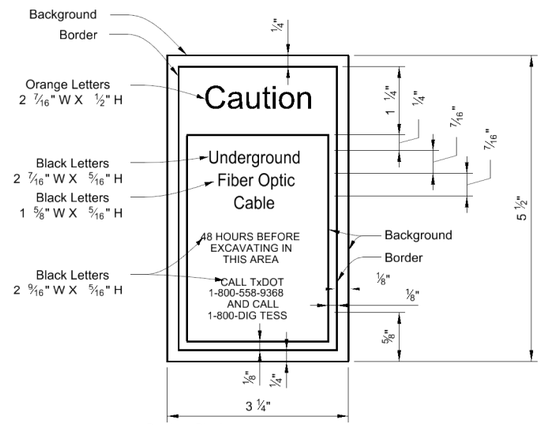


Fiber Optic Backbone Schematic



Border - Black
Background - Orange Reflective

Fiber Decal Details



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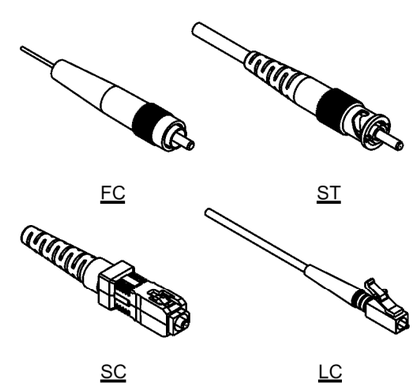
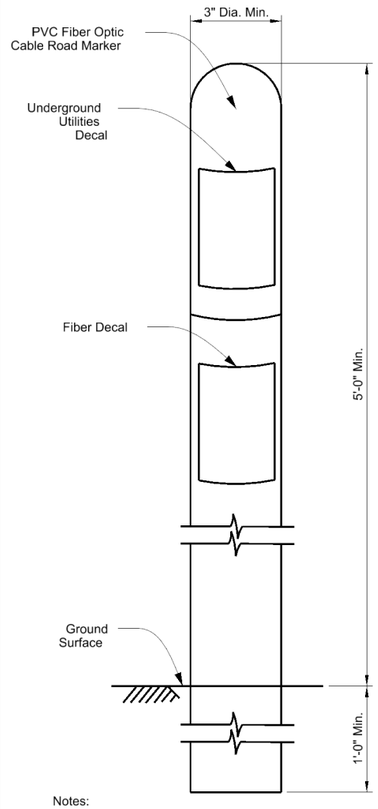
Background - Orange Reflective

Underground Utilities Decal Details



Fiber Optic Connectors

Note - Details are diagrammatic and may vary by manufacturer.



Notes:
1. Space fiber optic cable road markers at maximum 1000' intervals or at significant changes in direction such as a 90 degree turn.
2. Provide all orange fiber optic cable road markers for non-splice locations.
3. Provide orange fiber optic cable road markers with white dome for splice locations.
4. Locate marker within concrete apron of fiber ground box.

Fiber Optic Cable Road Markers

General Notes:

1. The fiber optic backbone schematic shown is diagrammatic only and intended to represent the various fiber optic communication architectures seen across the state and may not show all configurations seen. Connection of ITS field equipment to ITS communication nodes or hubs is achieved through home run drop cables or spliced to the backbone in a splice enclosure. Refer to fiber communication schematic details and fiber termination information shown on the plans for further information.
2. Install a flat pull cord in all empty conduits and inner-ducts identified for communication use. The pull cord must have a tensile strength of 1,250 lbs minimum and have foot markings to determine length installed. Furnish and installation of pull cord will be subsidiary to special specification "ITS Fiber Optic Cable".
3. Color code each type of fiber optic cable to identify the cable as a "backbone" (green or blue), "distribution" (red), or "drop" (orange or yellow).
4. Terminate fibers at fiber patch panel (FPP), also referred to as patch panel, with SC connectors for new installations. When connecting to existing FPP, terminate with FC or ST connectors as shown on the plans. Provide connector adaptors as required to accommodate existing equipment if information is not provided in the plans.
5. Provide a list showing cable number assignments and highway or facility that the cable services.
6. Provide a single 1/C #14 insulated wire in conduit runs which have been identified in the plans to carry fiber optic cable. Provide UL listed solid copper wire with orange color low density polyethylene insulation suitable for conduit installation rated for temperature range -20 C to 60 C and a voltage rating of 600V. This wire will serve as a tracer, or locate, wire for locating underground conduit containing fiber optic cabling and will be paid for under Item 620, "Electrical Conductors."
7. Ensure each cable is marked on the outer jacket with a label detailing the manufacturer's name, the date of manufacturer (month/year), the fiber count (Example: 48F SM or 48 SMF), and sequential length markings at maximum 3 FT increments.

Reference Notes:

1. Fiber architecture at communication node.
2. Fiber architecture for splicing arterial distribution cables.
3. Fiber architecture for home run of drop cables from ITS field equipment cabinets to communication node.
4. Fiber architecture for splicing drop cable from ITS field equipment cabinet.

Sheet Details

Not to Scale

SHEET 1 OF 2

Texas Department of Transportation

Traffic Operations Division Standard

ITS FIBER OPTIC CABLE MISCELLANEOUS DETAILS

ITS(42)-16

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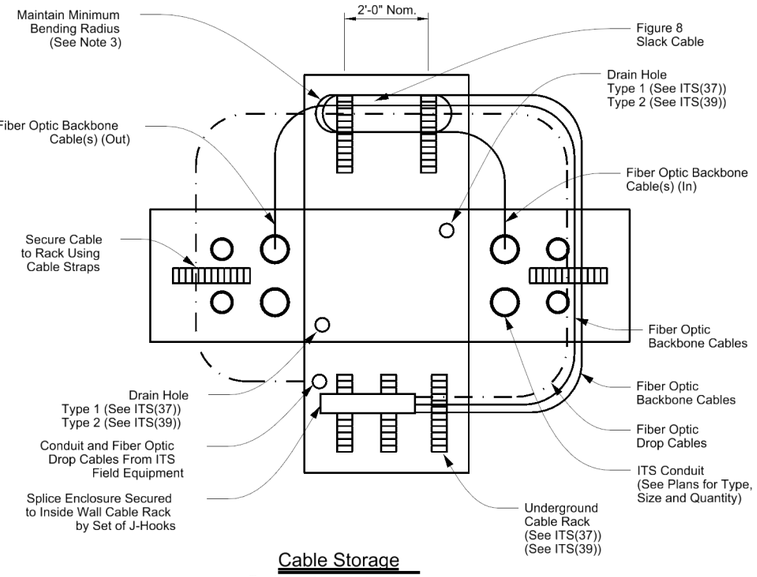
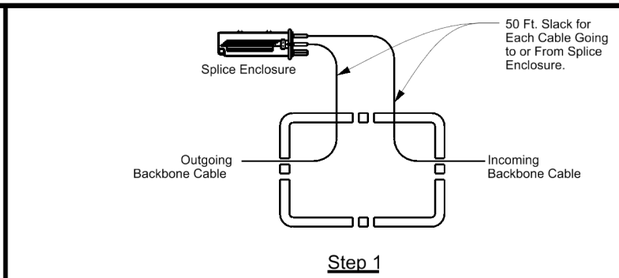
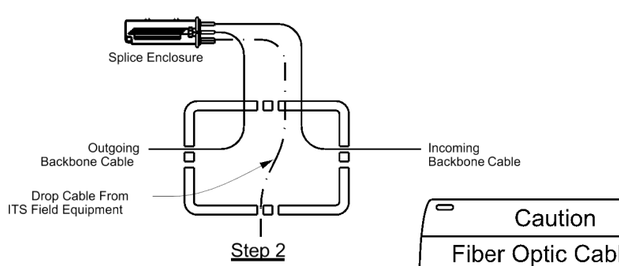


Cable Storage

Top View - Ground Box Walls Folded Down for Clarity



Step 1



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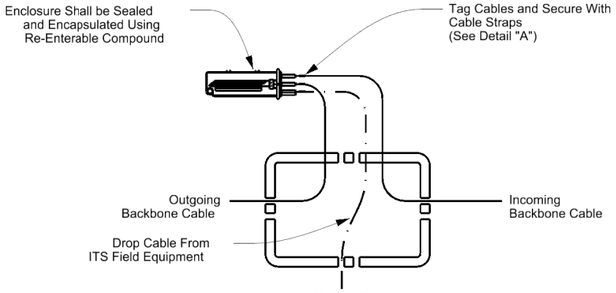

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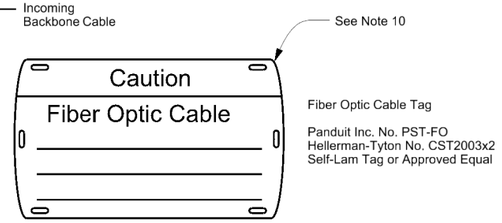
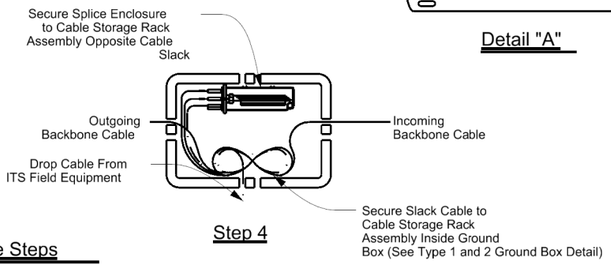


Fiber Optic Cable Tag

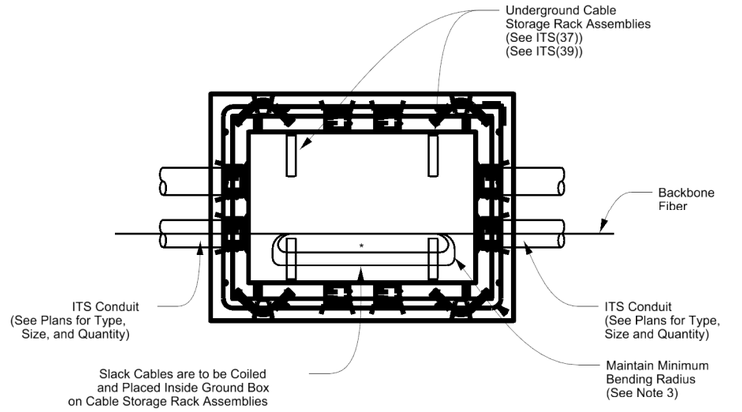
Panduit Inc. No. PST-FO
Hellerman-Tyton No. CST2003x2
Self-Lam Tag or Approved Equal

Detail "A"



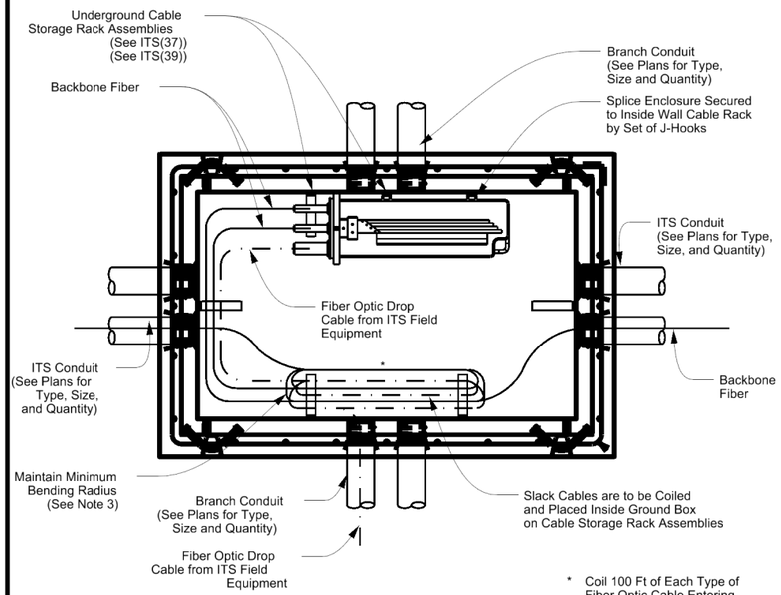
Step 4

Splice Procedure Steps



Type "1" Ground Box

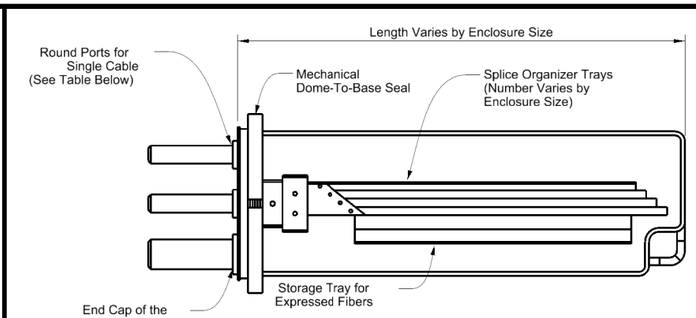
* Coil 25 Ft of Fiber Optic Cable for Slack



Type "2" Ground Box

with Splice

* Coil 100 Ft of Each Type of Fiber Optic Cable Entering the Ground Box



Splice Enclosure Sizes			
Type	No. of Ports	Port Capacity	Fiber Use
1	4	2 - Up to 144 Sm	Backbone
		2 - Up to 48 Sm	Drop
2	6	4 - Up to 144 Sm	Backbone/Arterial
		2 - Up to 48 Sm	Drop
3	8	4 - Up to 144 Sm	Backbone/Arterial
		4 - Up to 48 Sm	Drop

Splice Enclosure Fiber Accommodations

General Notes:

1. Conduit entry points to the Type 1 and Type 2 ground boxes are diagrammatic. Refer to ITS ground box standards, ITS(37) and ITS(39), for more information. Additional conduits may be required as shown on the plans.
2. Type 2 ground boxes are to be used, as shown on the plans, when splice enclosures are required.
3. Maintain a minimum bend radius of 20 times the fiber optic cable diameter during installation, relocation, and removal and a minimum of 10 times the fiber optic cable diameter when in operation.
4. Caulk all conduit around the top of the cable ducts with an engineer approved caulking compound to seal clearance between the cables and ducts. Place conduit plugs in all vacant conduits or inner-ducts.
5. Provide cable straps that will withstand ultra-violet exposure and do not damage cables when tightening.
6. All incidental equipment necessary for the cable installation and mounting of splice enclosure within the ground box will be incidental to Special Specification, "ITS Fiber Optic Cable."
7. Submit all splice locations to the field engineer for approval before beginning work.
8. Provide splice enclosures designed to seal, bond, anchor, and protect fiber optic cable splices. Provide splice enclosures designed to handle mechanical and fusion type splices. Provide splice enclosures with port configurations for the sizes detailed above.
9. Provide splice enclosures designed for underground placement with a sealing system preventing water penetration when submerged under 10 ft. of water.
10. Furnish, install, and secure fiber optic cable tags for each fiber optic cable entering a ground box, ITS field equipment cabinet (ground and pole), and hub building or communication node as detailed above. Provide information including fiber optic type, count, origin, and destination on the cable tag. Use UV resistant tie-wraps for securing the tag to the cable. Provide tie-wraps that do not damage fiber when securing to cable.

Sheet Details
Not to Scale

SHEET 2 OF 2

Texas Department of Transportation

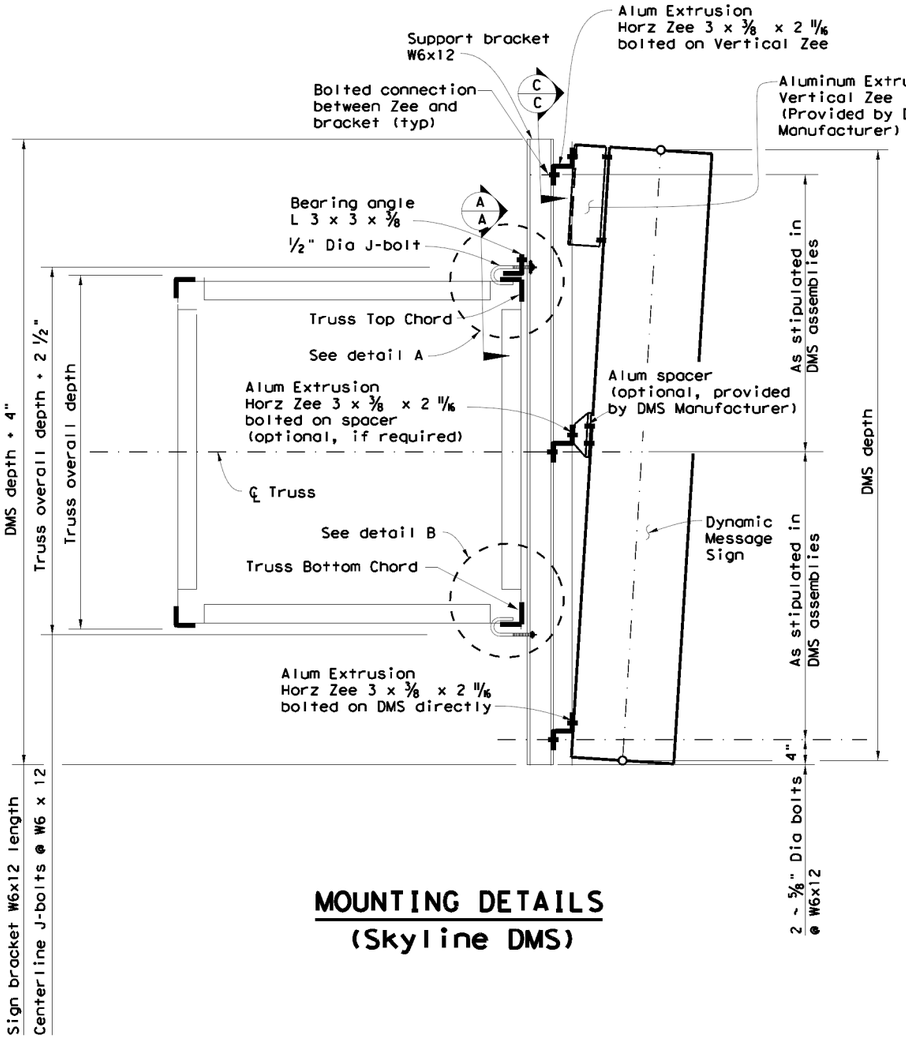
Traffic Operations Division Standard

ITS FIBER OPTIC CABLE MISCELLANEOUS DETAILS

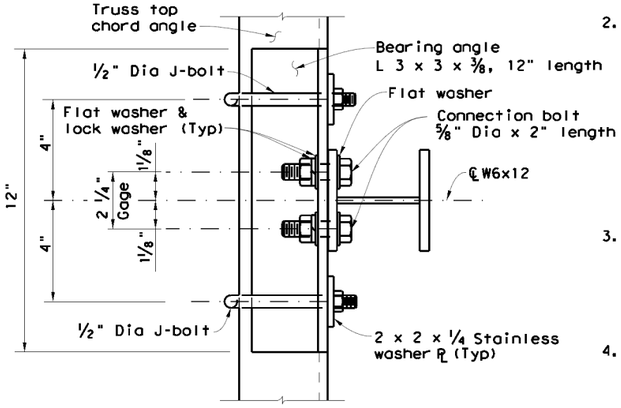
ITS(43)-16

FILE: its(43)-16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT FEBRUARY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	00	067	Various
	DIST	COUNTY		SHEET NO.
	22	WEBB, etc		74

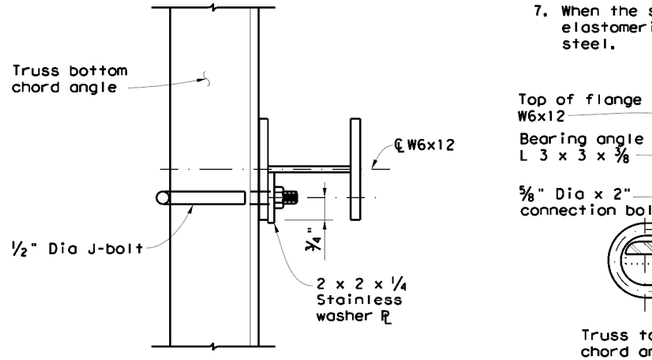
DATE: 3/1/2023 3:43:45 PM
FILE: its(43)-16.dgn



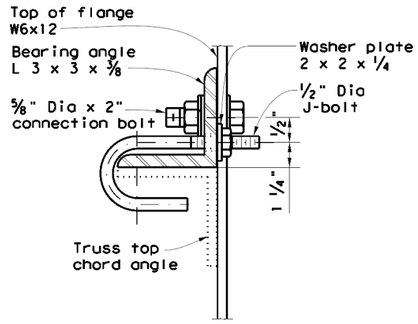
MOUNTING DETAILS
(Skyline DMS)



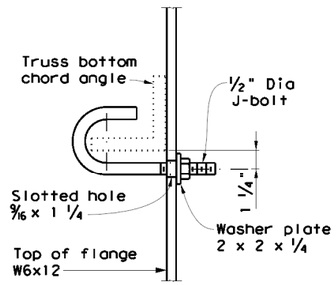
TOP VIEW
TRUSS TOP CONNECTION



TOP VIEW
TRUSS BOTTOM CONNECTION



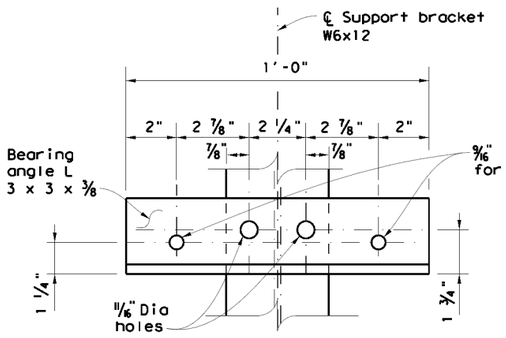
DETAIL A



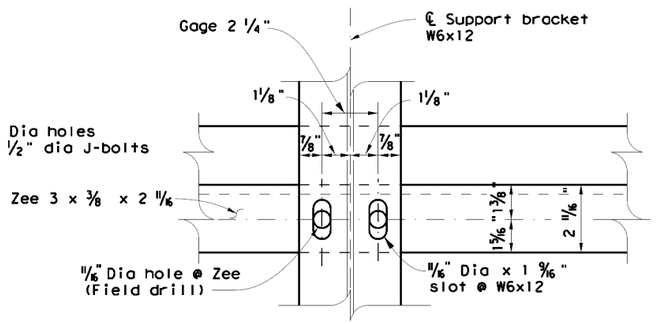
DETAIL B

GENERAL NOTES:

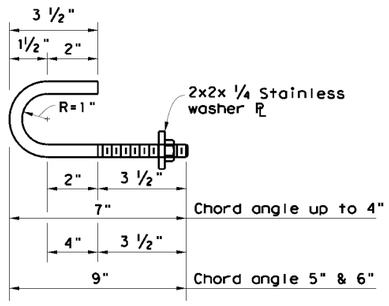
1. Determine the adequacy of the overhead sign support structure to support the dynamic message sign (DMS) prior to attaching the sign to the truss.
2. Designed according to the 1994 edition of the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals 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.



SECTION A-A
(Truss chord angle not shown)



SECTION C-C



½" Dia J-BOLT

Texas Department of Transportation

Traffic Safety Division Standard

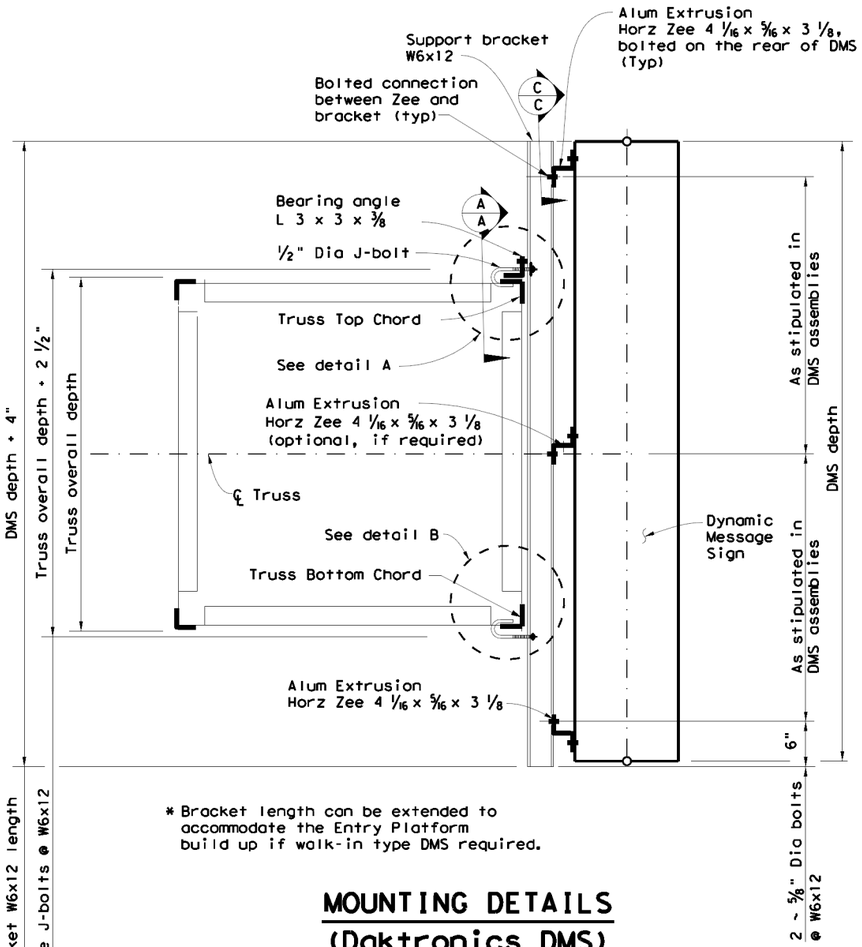
DMS-TO-TRUSS MOUNTING WITH HORIZONTAL ZEE EXTRUSIONS

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	0922	00	067	Various
	DIST	COUNTY		SHEET NO.
	22	WEBB, etc		75

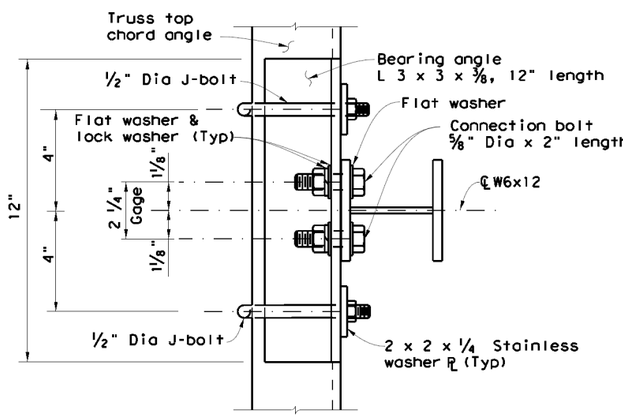
DATE: 3/1/2023 3:44:08 PM
FILE: dms(hz-1)-21.dgn

29F

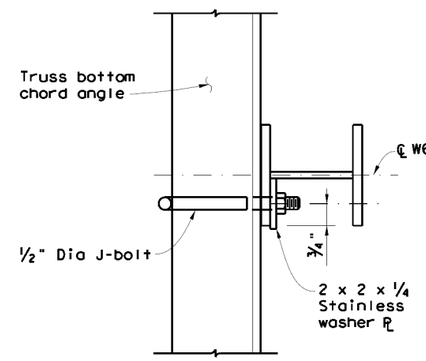


* Bracket length can be extended to accommodate the Entry Platform build up if walk-in type DMS required.

MOUNTING DETAILS (Daktronics DMS)



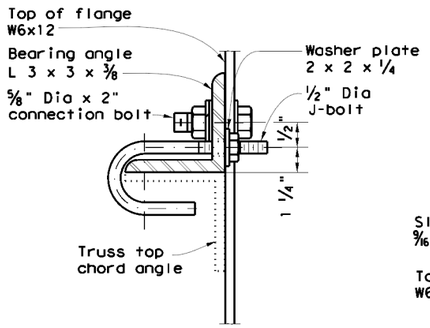
TOP VIEW TRUSS TOP CONNECTION



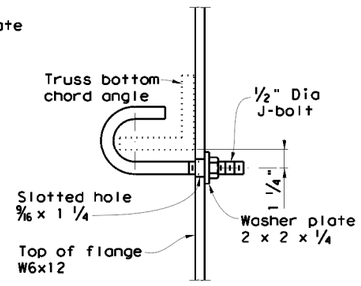
TOP VIEW TRUSS BOTTOM CONNECTION

GENERAL NOTES:

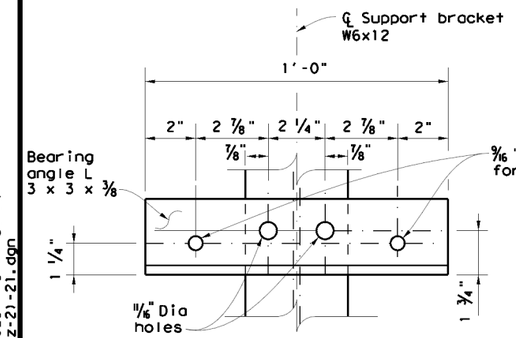
1. Determine the adequacy of the overhead sign support structure to support the dynamic message sign (DMS) prior to attaching the sign to the truss.
2. Designed according to the 1994 edition of the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals 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 1/16 x 5/16 x 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

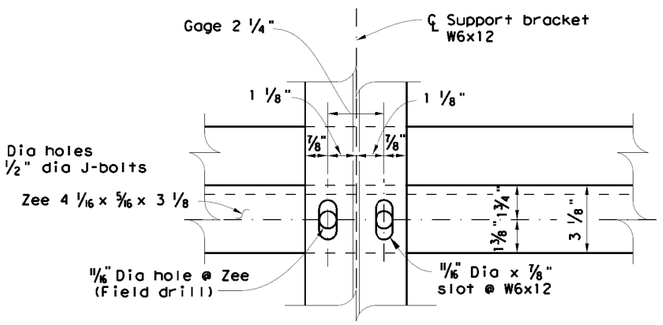


DETAIL B

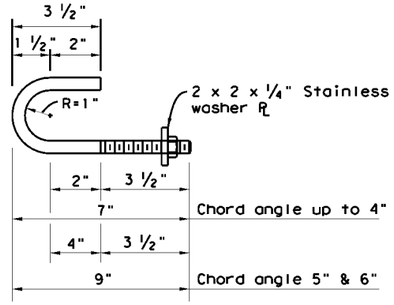


SECTION A-A

(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
©TxDOT February 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	00	067	Various
	DIST	COUNTY		SHEET NO.
	22	WEBB, etc		76

DATE: 3/1/2023 3:44:31 PM
FILE: dms(hz-2)-21.dgn

STORMWATER POLLUTION PRVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with TxDOT policy for projects disturbing less than 1 acre of soil, and not part of a larger common plan of development.

For all projects with any soil disturbing activities, TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office. If no field office is available, then this SWP3 shall be kept at the appropriate TxDOT Area Office.

This SWP3 is consistent with requirements specified in applicable stormwater plans, and the project's environmental permits, issues, and commitments (EPICs).

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):
0922-00-067

1.2 PROJECT LIMITS:
From: DISTRICTWIDE

To: _____

1.3 PROJECT COORDINATES:
BEGIN: (Lat)_____,(Long)_____

END: (Lat)_____,(Long)_____

1.4 TOTAL PROJECT AREA (Acres): N/A

1.5 TOTAL AREA TO BE DISTURBED (Acres): N/A

1.6 NATURE OF CONSTRUCTION ACTIVITY:
INSTALLATION OF DMS SIGNS DISTRICTWIDE

1.7 MAJOR SOIL TYPES:

Soil Type	Description

1.8 PROJECT SPECIFIC LOCATIONS (PSLs):
PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

- ☐ PSLs determined during preconstruction meeting
- ☐ PSLs determined during construction
- ☐ No PSLs planned for construction

Type	Sheet #s

All off-ROW PSLs required by the Contractor are the Contractor's responsibility. The Contractor shall secure all permits required by local, state, federal laws for off-ROW PSLs. The contractor shall provide diagrams, areas of disturbance, acreage, and BMPs for all off-ROW PSLs within one mile of the project.

1.9 CONSTRUCTION ACTIVITIES:
(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.3.)

- ☐ Mobilization
- ☐ Install sediment and erosion controls
- ☐ Blade existing topsoil into windrows, prep ROW, clear and grub
- ☐ Remove existing pavement
- ☐ Grading operations, excavation, and embankment
- ☐ Excavate and prepare subgrade for proposed pavement widening
- ☐ Remove existing culverts, safety end treatments (SETs)
- ☐ Remove existing metal beam guard fence (MBGF), bridge rail
- ☐ Install proposed pavement per plans
- ☐ Install culverts, culvert extensions, SETs
- ☐ Install mow strip, MBGF, bridge rail
- ☐ Place flex base
- ☐ Rework slopes, grade ditches
- ☐ Blade windrowed material back across slopes
- ☐ Revegetation of unpaved areas
- ☐ Achieve site stabilization and remove sediment and erosion control measures
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

1.10 POTENTIAL POLLUTANTS AND SOURCES:

- ☐ Sediment laden stormwater from stormwater conveyance over disturbed area
- ☐ Fuels, oils, and lubricants from construction vehicles, equipment, and storage
- ☐ Solvents, paints, adhesives, etc. from various construction activities
- ☐ Transported soils from offsite vehicle tracking
- ☐ Construction debris and waste from various construction activities
- ☐ Contaminated water from excavation or dewatering pump-out water
- ☐ Sanitary waste from onsite restroom facilities
- ☐ Trash from various construction activities/receptacles
- ☐ Long-term stockpiles of material and waste
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

1.11 RECEIVING WATERS:
Receiving waters must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. Include Segment # for receiving waters.

Tributaries	Classified Waterbody

* Add (*) for impaired waterbodies with pollutant in ().

1.12 ROLES AND RESPONSIBILITIES: TxDOT

- ☒ Development of plans and specifications
- ☒ Perform SWP3 inspections
- ☒ Maintain SWP3 records and update to reflect daily operations
- ☐ Other: _____
- ☐ Other: _____

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

- ☒ Day To Day Operational Control
- ☒ Maintain schedule of major construction activities
- ☒ Install, maintain and modify BMPs
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
			77
STATE	STATE DIST.	COUNTY	
TEXAS	22	WEBB, etc	
CONT.	SECT.	JOB	HIGHWAY NO.
0922	00	067	Various

STORMWATER POLLUTION PRVENTION PLAN (SWP3):

2.0 BEST MANAGEMENT PRACTICES (BMPs) AND CONTROLS, INSPECTION, AND MAINTENANCE

The Contractor shall be the responsible party for implementing the BMPs described herein and for complying with the SWP3 for control of erosion and sedimentation during day-to-day operations. The Contractor shall implement changes to this SWP3 approved by TxDOT within the times specified in this SWP3 or the CGP.

2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:

T / P

- ☐ ☐ Protection of Existing Vegetation
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Soil Retention Blankets
- ☐ ☐ Geotextiles
- ☐ ☐ Mulching/ Hydromulching
- ☐ ☐ Soil Surface Treatments
- ☐ ☐ Temporary Seeding
- ☐ ☐ Permanent Planting, Sodding or Seeding
- ☐ ☐ Biodegradable Erosion Control Logs
- ☐ ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Vertical Tracking
- ☐ ☐ Interceptor Swale
- ☐ ☐ Riprap
- ☐ ☐ Diversion Dike
- ☐ ☐ Temporary Pipe Slope Drain
- ☐ ☐ Embankment for Erosion Control
- ☐ ☐ Paved Flumes
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

2.2 SEDIMENT CONTROL BMPs:

T / P

- ☐ ☐ Biodegradable Erosion Control Logs
- ☐ ☐ Dewatering Controls
- ☐ ☐ Inlet Protection
- ☐ ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Sandbag Berms
- ☐ ☐ Sediment Control Fence
- ☐ ☐ Stabilized Construction Exit
- ☐ ☐ Floating Turbidity Barrier
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Vegetated Filter Strips
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.3 PERMANENT CONTROLS:

(Coordinate post-construction BMPs with appropriate TxDOT maintenance sections.)

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

- ☐ Excess dirt/mud on road removed daily
- ☐ Haul roads dampened for dust control
- ☐ Loaded haul trucks to be covered with tarpaulin
- ☐ Stabilized construction exit
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.5 POLLUTION PREVENTION MEASURES:

- ☐ Chemical Management
- ☐ Concrete and Materials Waste Management
- ☐ Debris and Trash Management
- ☐ Dust Control
- ☐ Sanitary Facilities
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.6 VEGETATED BUFFER ZONES:

Natural vegetated buffers shall be maintained as feasible to protect adjacent surface waters. If vegetated natural buffer zones are not feasible due to site geometry, the appropriate additional sediment control measures have been incorporated into this SWP3.

Type	Stationing	
	From	To

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

- ☒ Fire hydrant flushings
- ☒ Irrigation drainage
- ☒ Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- ☒ Potable water sources
- ☒ Springs
- ☒ Uncontaminated groundwater
- ☒ Water used to wash vehicles or control dust
- ☒ Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

2.8 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3 .

2.9 MAINTENANCE:

Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3.

STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
			78
STATE	STATE DIST.	COUNTY	
TEXAS	22	WEBB, etc	
CONT.	SECT.	JOB	HIGHWAY NO.
0922	00	067	Various

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. The City of Laredo

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. Texas Horned Lizard - The Contractor will avoid harvester ant mound in the selection of PSLs where feasible.
2. Texas Tortoise - The Contractor should cover utility trenches overnight, and should visually inspect all trenches before filling.
3. Reticulated Collared Lizard - This lizard may potentially occur in theproject area. The Contractor shall avoid harming or handling this species.
4. Texas Indigo Snake - This snake may potentially occur in the poject area. The Contractor shall avoid harming or handeling this species.

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: Paints, 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 12-12-2011 (DS)	0922	00	067	Various	
05-07-14 ADDED NOTE SECTION IV.	DIST	COUNTY		SHEET NO.	
01-23-2015 SECTION 1 (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	22	WEBB, etc		79	

DATE: 3/1/2023
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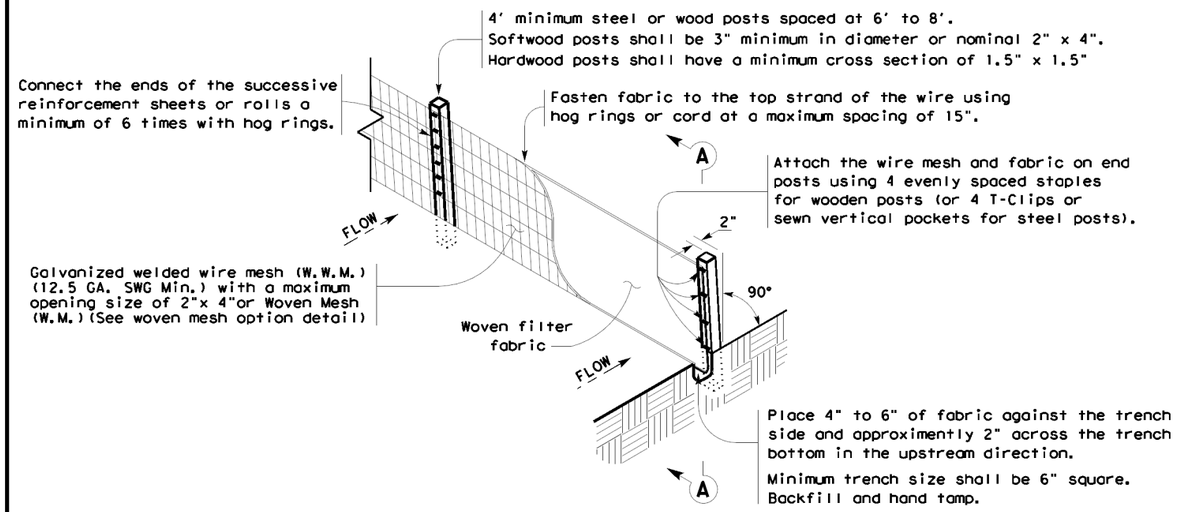
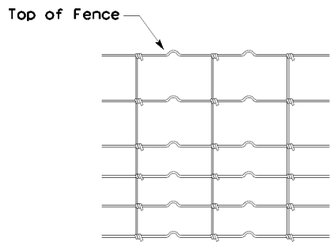
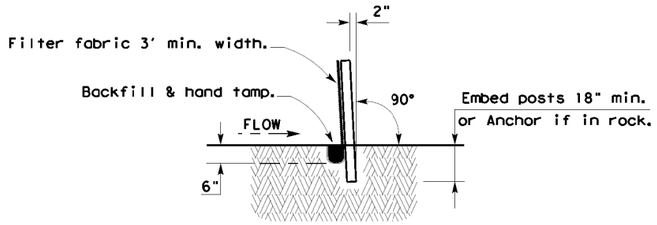


TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

Galvanized hinge joint knot woven mesh (12.5 GA.SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.

SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT^2. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

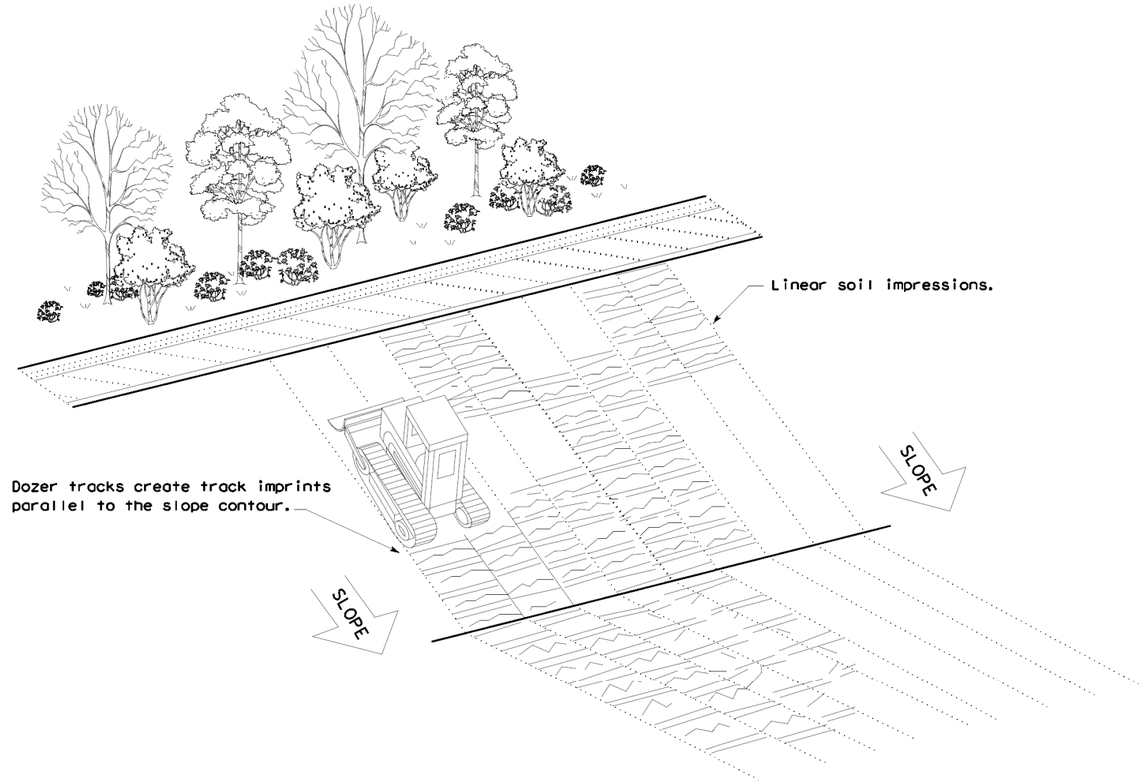
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

EC(1)-16

FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
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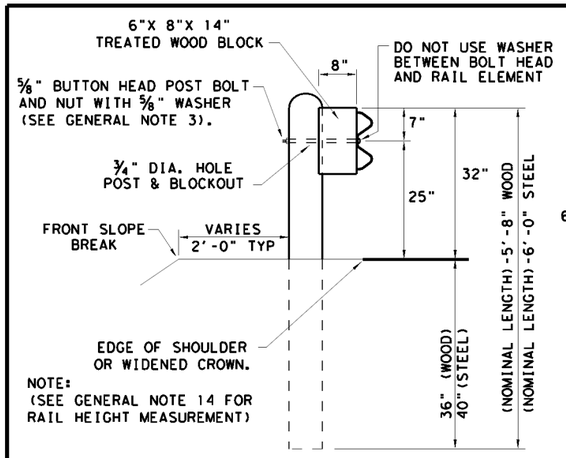
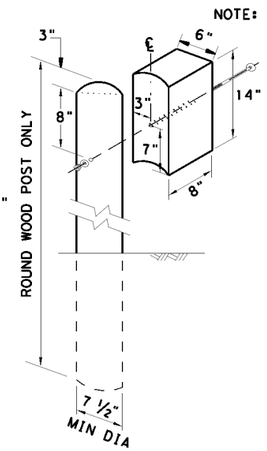
	DIST	COUNTY		SHEET NO.
	22	WEBB, etc		80

30ATP023
ec116.dgn

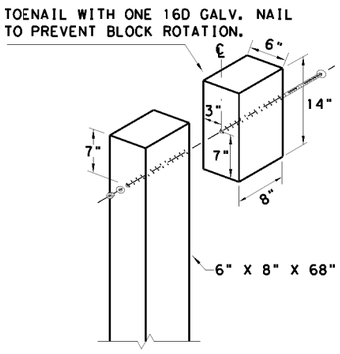


TYPICAL POST PLACEMENT

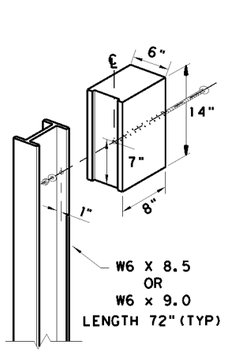


WOOD BLOCK TO ROUND WOOD POST

NOTE: TOENAIL WITH ONE 16D GALV. NAIL TO PREVENT BLOCK ROTATION.

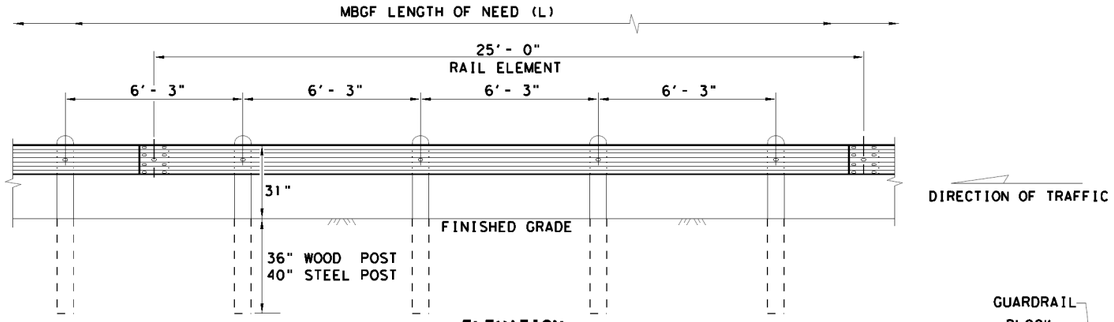


WOOD BLOCK TO RECTANGULAR WOOD POST



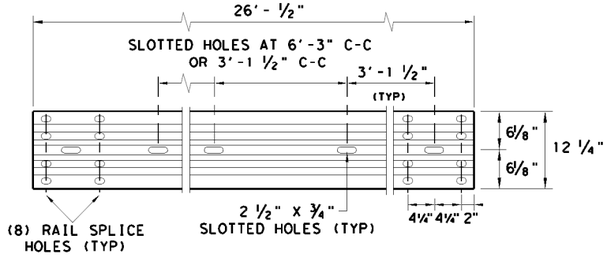
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

NOTE: ** "WOOD" INDICATES DIMENSIONS FOR BOTH ROUND AND RECTANGULAR WOOD POST SYSTEMS.



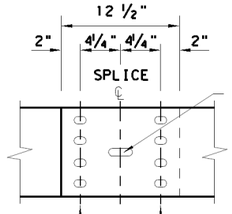
ELEVATION MID-SPAN RAIL SPLICE

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.



MID-SPAN RAIL SPLICE DETAIL

NOTE: GF(31), MID-SPAN RAIL SPLICES ARE REQUIRED WITH 6'-3" POST SPACINGS.

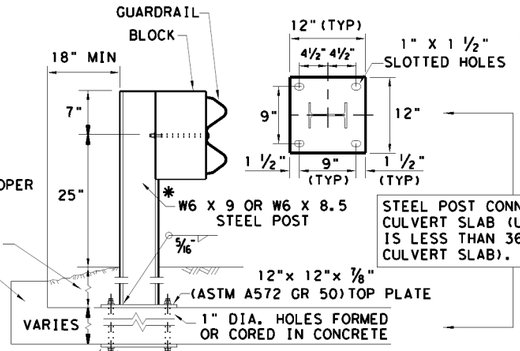
NOTE:
FOUR TYPES OF BUTTON-HEAD GUARD RAIL BOLTS COME WITH A RECCESSED NUT.

SPLICE BOLT LENGTH — VARIES
FBB01 = 1 ¼"
FBB02 = 2"
⅝"

POST & BLOCK LENGTH
FBB03 = 10"
FBB04 = 18"

BUTTON HEAD BOLT

NOTE: SEE GENERAL NOTE 3 FOR SPLICE & POST BOLT DETAILS.



*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'-1 ½" 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
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	00	067	Various
	DIST	COUNTY		SHEET NO.
	22	WEBB, etc		81

DATE: 3/1/2023
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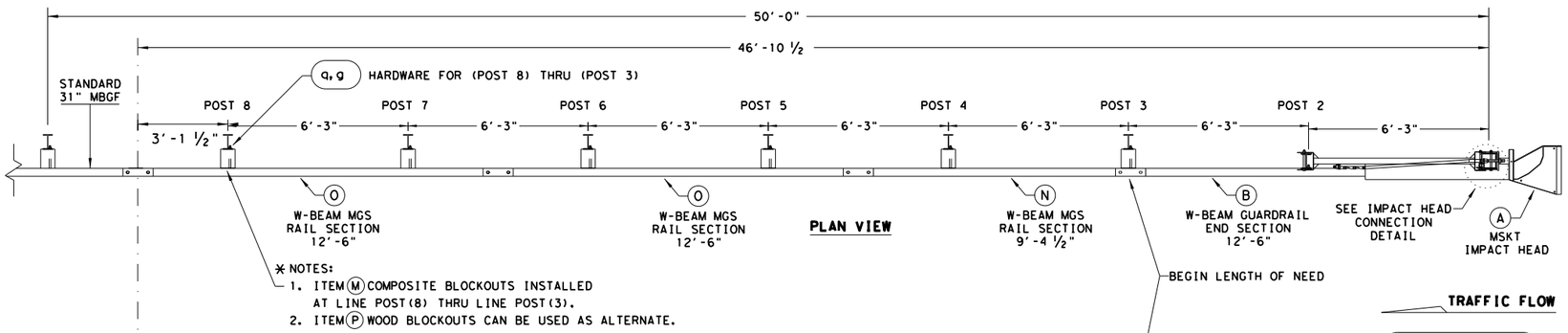
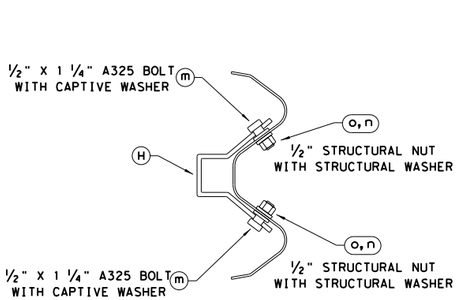
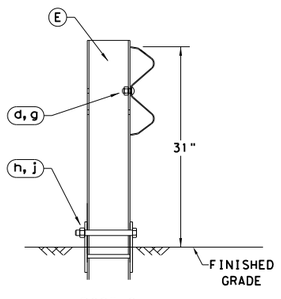


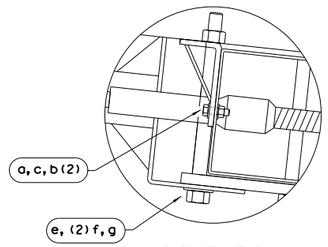
NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.



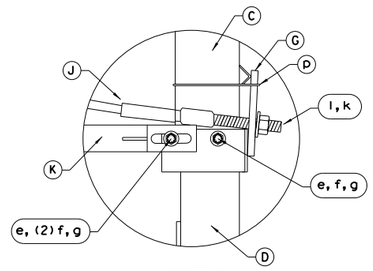
SECTION B-B
ANCHOR BRACKET



POST 2
SECTION A-A



IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL

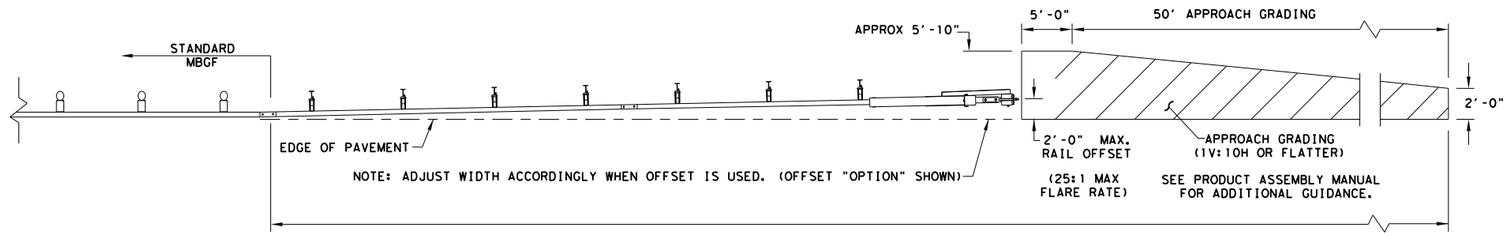
SEE NOTES: *

ALTERNATIVE ITEMS NOT SHOWN. **
* ITEM(P) 8" WOOD-BLOCKOUT
** ITEM(Q) 25'GUARD FENCE PANEL

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 Ga.	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 1 ¼" 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 1 ¼" A325 BOLT WITH CAPTIVE WASHER	SB12A
n	8	½" STRUCTURAL NUTS	N012A
o	8	1 1/16" O.D. x 9/16" 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



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	
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	22	WEBB, etc		82	

DATE: 3/2/2023
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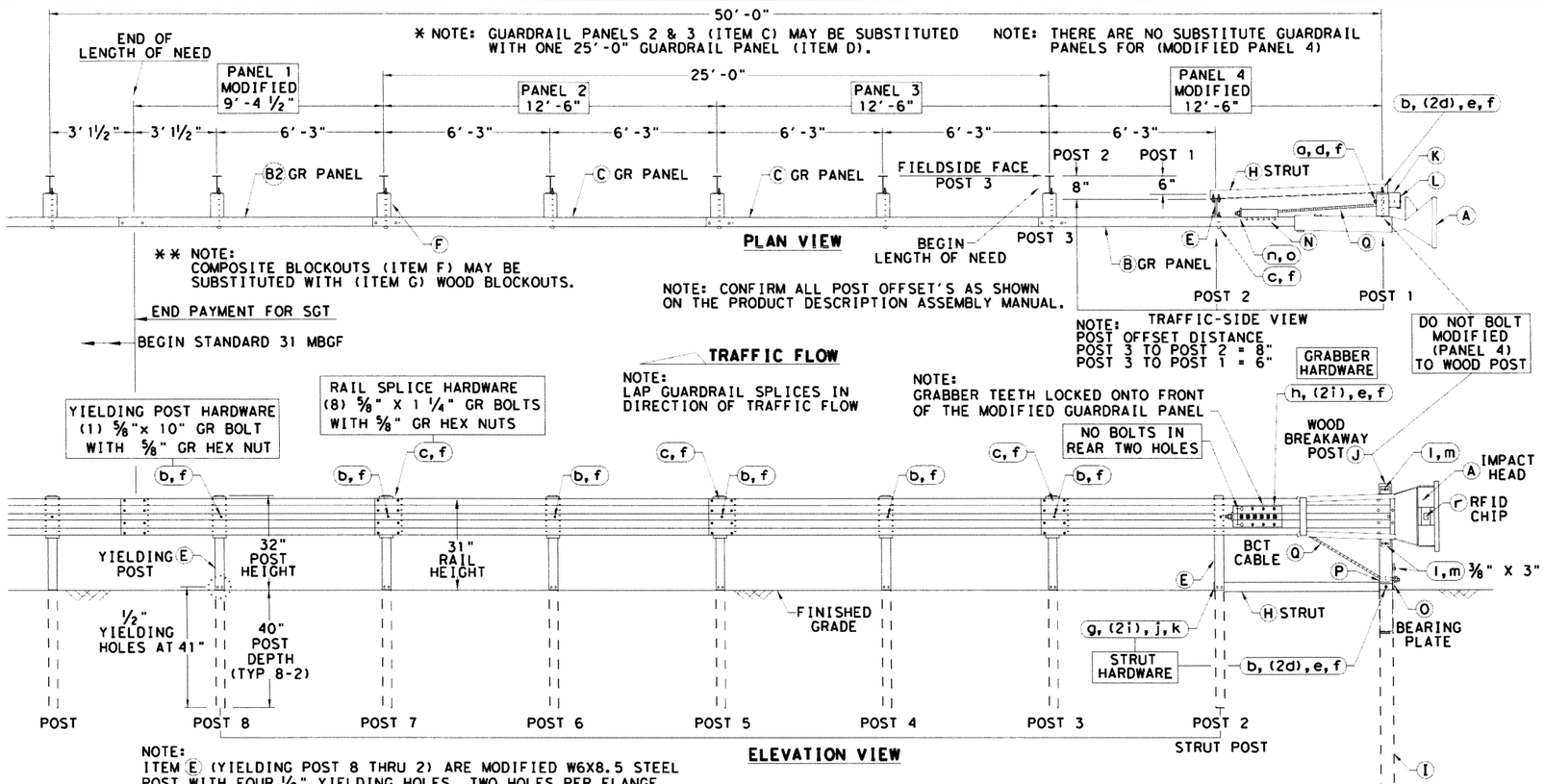
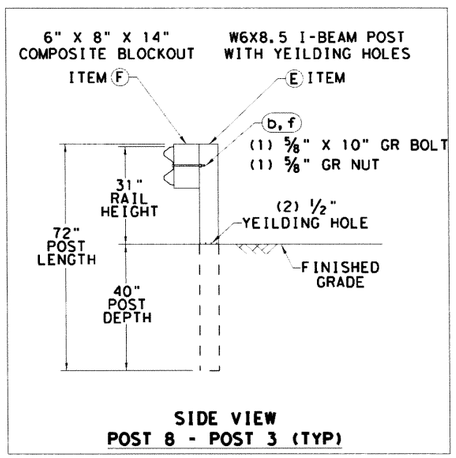


GENERAL NOTES

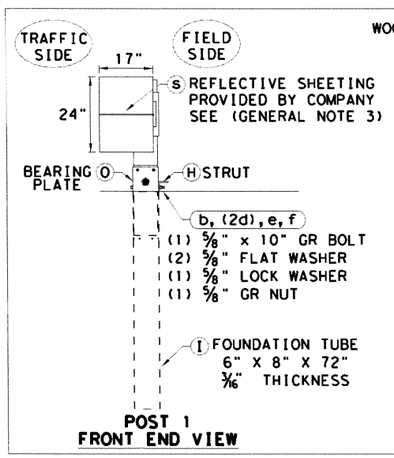
1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL.
3. MANUFACTURER WILL APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" TO THE FACE PLATE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. THE OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
4. THE NOMINAL HEIGHT OF THE GUARDRAIL BEAM IS 31 INCHES WITH A TOLERANCE OF +/- ONE INCH.
5. FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
6. (POST 2 THROUGH POST 8) ARE MODIFIED STEEL-YIELDING POSTS WITH YIELDING HOLES AT GROUND LEVEL. THERE ARE NO SUBSTITUTE POSTS.
7. POSTS SHALL NOT BE SET IN CONCRETE.
8. IF SOLID ROCK IS ENCOUNTERED FOR ANY OF THE POSTS IN THE SYSTEM, CONTACT THE MANUFACTURER FOR SPECIFIC INSTALLATION GUIDANCE.
9. HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
10. A COMPOSITE MATERIAL BLOCKOUT THAT MEETS DMS-7210 REQUIREMENTS MAY BE SUBSTITUTED FOR AN APPROVED WOOD BLOCKOUT. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST (MPL) FOR CERTIFIED PRODUCERS.
11. THE ENTIRE SYSTEM MUST BE INSTALLED IN A STRAIGHT LINE WITHOUT ANY CURVE. HOWEVER, THE SYSTEM CAN BE OFFSET BY TWO FEET AS SHOWN ON THE APPROACH GRADING DETAIL TO HELP OFF-SET THE IMPACT HEAD FROM SHOULDER OF THE ROAD.

ITEM	QTY	MAIN SYSTEM COMPONENTS		ITEM #
A	1	SGET IMPACT HEAD		SIH1A
B	1	MODIFIED GUARDRAIL PANEL 12'-6"	12GA	126SPZGP
B2	1	MODIFIED GUARDRAIL PANEL 9'-4 1/2"	12GA	GP94
C	2	STANDARD GUARDRAIL PANEL 12'-6"	12GA	GP126
D *	1	STANDARD GUARDRAIL PANEL 25'-0"	12GA	GP25
E	7	MODIFIED YIELDING I-BEAM POST W6x8.5		YP6MOD
F	6	COMPOSITE BLOCKOUT 6" X 8" X 14"		CBO8
G **	6	WOOD BLOCKOUT 6" X 8" X 14"		WBO8
H	1	STRUT 3" X 3" X 80" x 1/4" A36 ANGLE		STR80
I	1	FOUNDATION TUBE 6" X 8" X 72" x 3/16"		FNDT6
J	1	WOOD BREAKAWAY POST 5 1/2" x 7 1/2" x 50"		WBRK50
K	1	WOOD STRIKE BLOCK		WSBLK14
L	1	STRIKE PLATE 1/4" A36 BENT PLATE		SPLT8
M	1	REINFORCEMENT PLATE 12 GA. GR55		REPLT17
N	1	GUARDRAIL GRABBER 2 1/2" X 2 1/2" X 16 1/2"		GGR17
O	1	BEARING PLATE 8" X 8 5/8" X 5/8" A36		BPLT8
P	1	PIPE SLEEVE 4 1/4" X 2 3/8" O.D. (2 1/8" I.D.)		PSLV4
Q	1	BCT CABLE 3/4" X 81" LENGTH		CBL81
		SMALL HARDWARE		
a	1	5/8" X 12" GUARDRAIL BOLT 307A HDG		12GRBLT
b	7	5/8" X 10" GUARDRAIL BOLT 307A HDG		10GRBLT
c	33	5/8" X 1 1/4" GR SPLICE BOLTS 307A HDG		1GRBLT
d	3	5/8" FLAT WASHER F436 A325 HDG		58FW436
e	1	5/8" LOCK WASHER HDG		58LW
f	39	5/8" GUARDRAIL HEX NUT HDG		58HN563
g	2	1/2" X 2" STRUT BOLT A325 HDG		2BLT
h	6	1/2" X 1 1/4" PLATE BOLT A325 HDG		125BLT
i	16	1/2" FLAT WASHER F436 A325 HDG		12FWF436
j	8	1/2" LOCK WASHER HDG		12LW
k	8	1/2" HEX NUT A563 HDG		12HN563
l	4	3/8" X 3" HEX LAG SCREW GR5 HDG		38LS
m	4	3/8" FLAT WASHER F436 A325 HDG		38FW844
n	2	1" FLAT WASHER F436 A325 HDG		1FWF436
o	2	1" HEX NUT A563DH HDG		1HN563
p	1	18" TO 24" LONG ZIP TIE RATED 175-200LB		ZPT18
q	1	1 1/2" X 4" SCH-40 PVC PIPE		PSPCR4
r	1	RFID CHIP RATED MIL-STD-810F		RFID810F
s	1	IMPACT HEAD REFLECTIVE SHEETING		RS30M

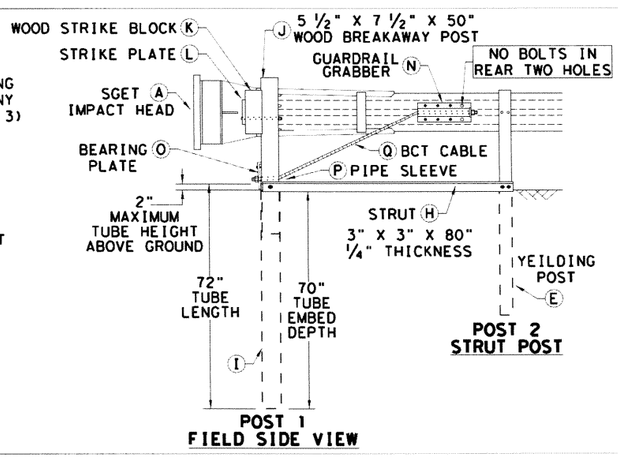
* ALTERNATIVE ITEMS
** NOTE: SEE PLAN VIEW



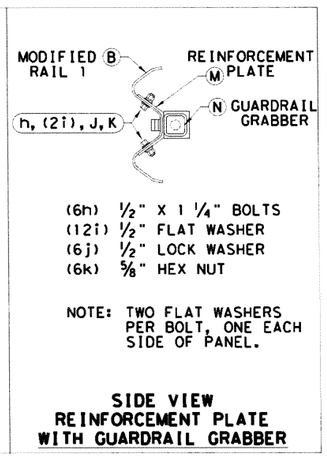
SIDE VIEW
POST 8 - POST 3 (TYP)



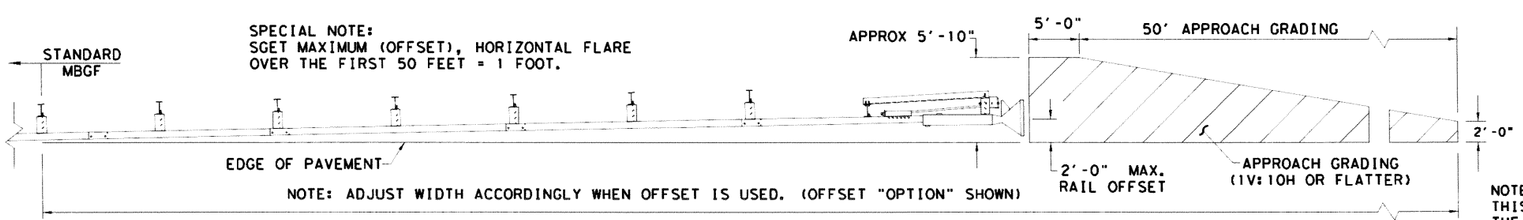
POST 1
FRONT END VIEW



POST 1
FIELD SIDE VIEW



SIDE VIEW
REINFORCEMENT PLATE
WITH GUARDRAIL GRABBER



APPROACH GRADING AT GUARDRAIL END TREATMENTS

NOTE: THIS STANDARD IS A BASIC REPRESENTATION OF THE SGET TERMINAL SYSTEM AND IS NOT INTENDED TO REPLACE THE MANUFACTURER'S ASSEMBLY MANUAL.

Texas Department of Transportation

Design Division Standard

SPIG INDUSTRY, LLC
SINGLE GUARDRAIL TERMINAL
SGET - TL-3 - MASH
SGT(15)31-20

FILE: sgt153120.dgn	DN: TxDOT	CK: KM	DW: VP	CK: VP
©TxDOT: APRIL 2020	CONT	SECT	JOB	HIGHWAY
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DATE: 6/13/2023
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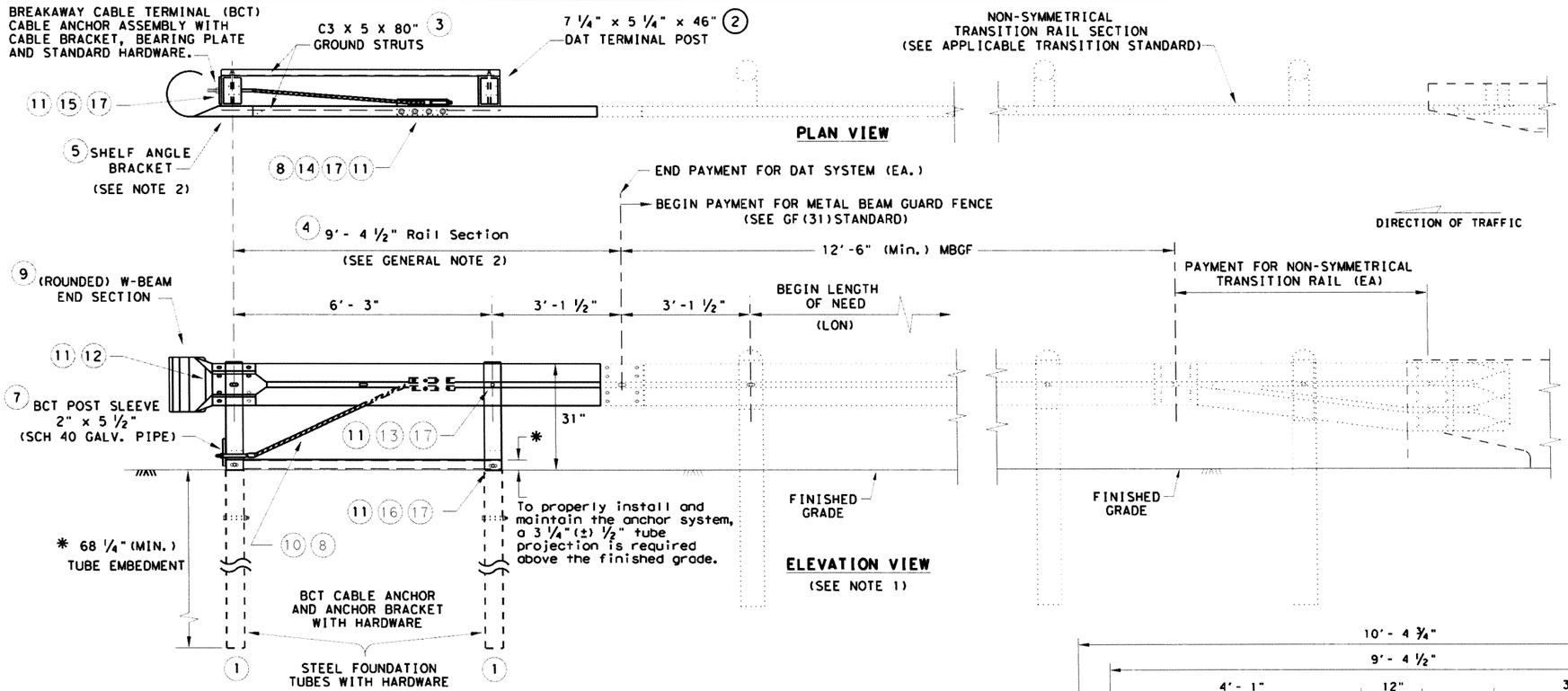


DOWNSTREAM ANCHOR TERMINAL (DAT)

NOTE: ONLY FOR DOWNSTREAM USE, WHEN LOCATED OUTSIDE THE HORIZONTAL CLEARANCE AREA OF OPPOSING TRAFFIC.

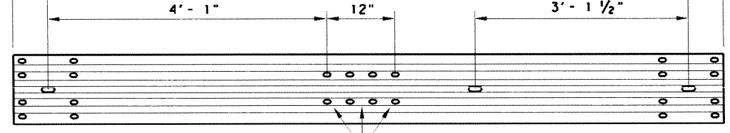
GENERAL NOTES

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.

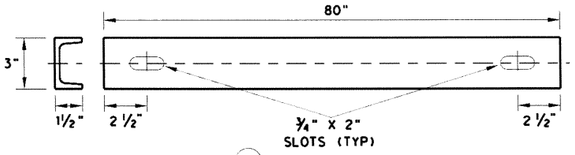
MOW STRIP INSTALLATION

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.

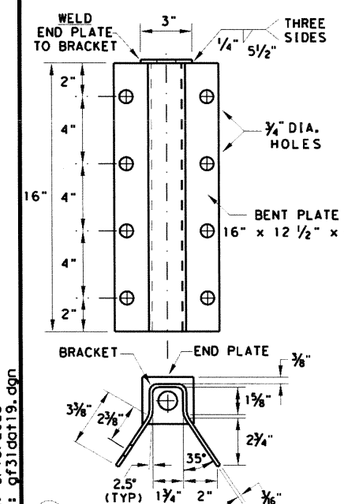
#	(DAT) PARTS LIST	QTY
1	STEEL FOUNDATION TUBE	2
2	DAT TERMINAL POST	2
3	CHANNEL STRUT	2
4	TERMINAL RAIL ELEMENT	1
5	SHELF ANGLE BRACKET	1
6	BCT BEARING PLATE	1
7	BCT POST SLEEVE	1
8	GUARDRAIL ANCHOR BRACKET	1
9	(ROUNDED) W-BEAM END SECTION	1
10	BCT CABLE ANCHOR	1
11	RECESSED NUT, GUARDRAIL	20
12	1 1/4" 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



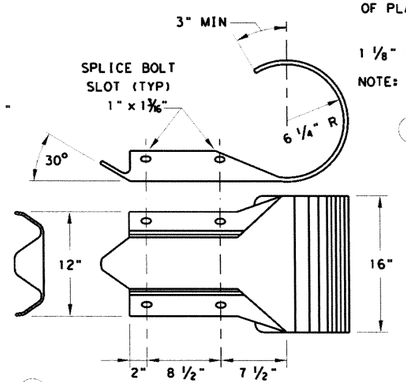
4 TERMINAL RAIL ELEMENT FOR DAT



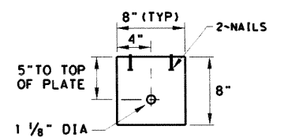
3 CHANNEL STRUT
C3 X 5 X 80", GRADE A36



8 GUARDRAIL ANCHOR BRACKET

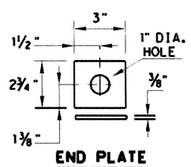


9 W-BEAM END SECTION (ROUNDED) (12 GA.)

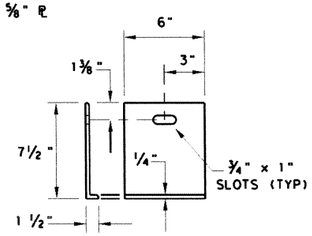


NOTE: DRIVE NAILS AND BEND OVER TO PREVENT PLATE ROTATION

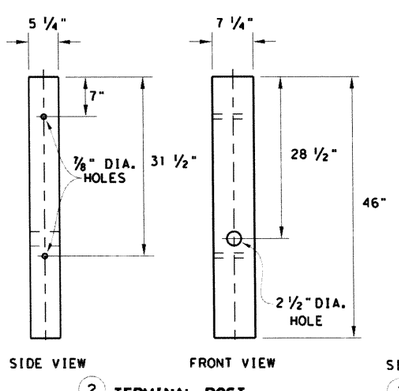
6 BEARING PLATE
8"x 8"x 5/8" ℄



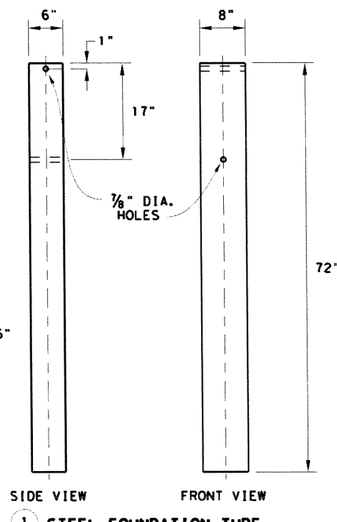
END PLATE



5 SHELF ANGLE BRACKET



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

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
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	00	067	Various
	DIST	COUNTY		SHEET NO.
	22	WEBB, etc		82B

DATE: 6/13/2023
FILE: gf31dat19.dgn

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

FILE:	ed1-14.dgn	DN:	CK:	DW:	CK:
© TxDOT	October 2014	CONT	SECT	JOB	HIGHWAY
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		DIST	COUNTY		SHEET NO.
		22	WEBB, etc		83

DATE: 3/1/2023 3:46:30 PM
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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.

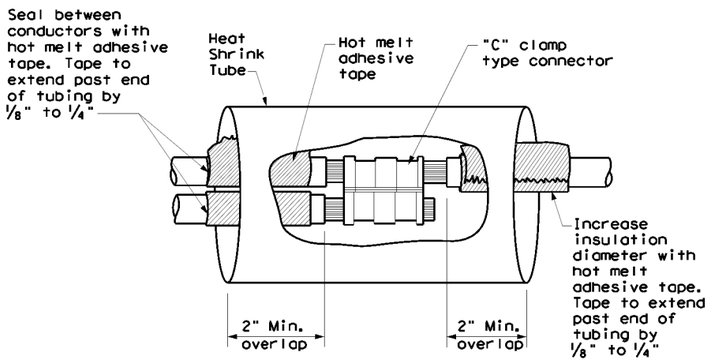
3. Install ground rods so the imprinted part number is at the upper end of the rod.

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

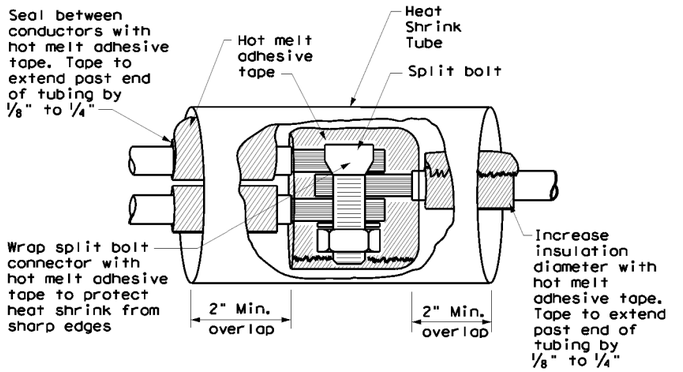
5. Route all conductors as short and straight as possible for connection to lightning protection ground rods. When a bend is required, ensure a minimum radius bend of four inches for these conductors.

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.

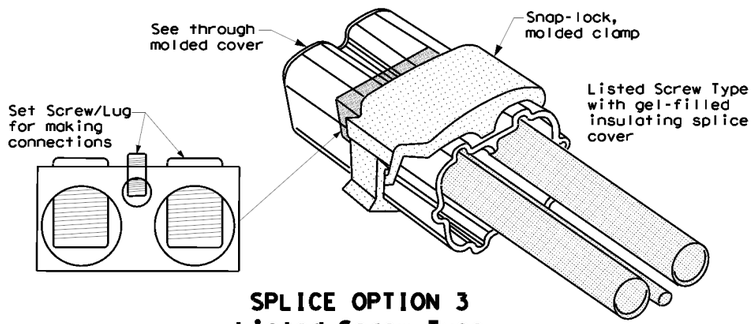
7. Written authorization is required before installing a ground rod in a horizontal trench for rocky soil or a solid rock bottom.



SPLICE OPTION 1
Compression Type



SPLICE OPTION 2
Split Bolt Type



SPLICE OPTION 3
Listed Screw Type

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUCTORS

ED(3)-14

FILE: ed3-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
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71C

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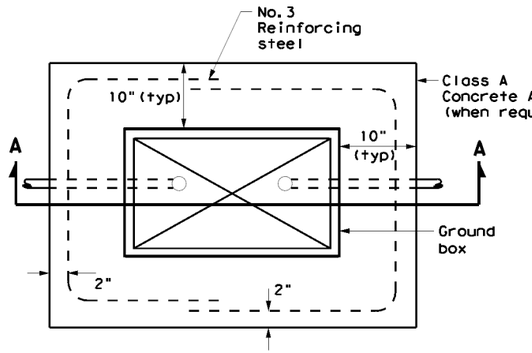
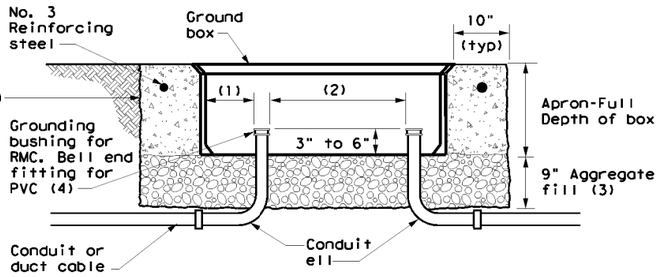


PLAN VIEW



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.

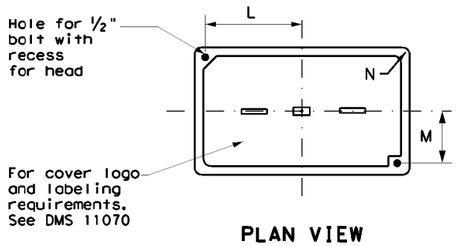
(2) Maintain sufficient space between conduits to allow for proper installation of bushing.

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

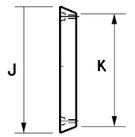
(4) Install a grounding bushing on the upper end of all RMC terminating in a ground box. Ground RMC elbows when any part of the elbow is less than 18 in. below the bottom of the ground box. Install a PVC bushing or bell end fitting on the upper end of all PVC conduits terminating in a ground box.

GROUND 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



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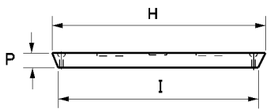

SIDE

GROUND BOX COVER

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.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS
GROUND BOXES

ED(4)-14

FILE: ed4-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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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

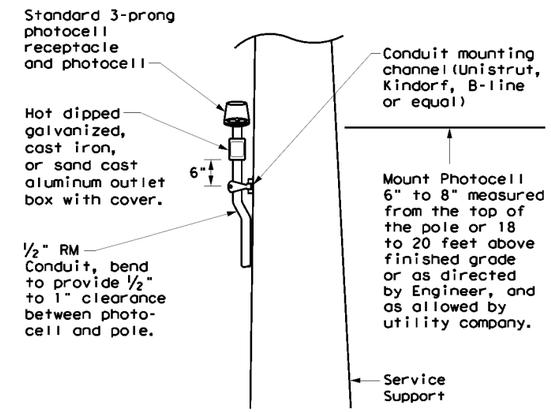
(SS)= Safety Switch Ahead of Meter-Check with Utility
(NS)= No safety Switch Ahead of Meter-Check with Utility

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.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE NOTES & DATA

ED(5)-14

FILE: ed5-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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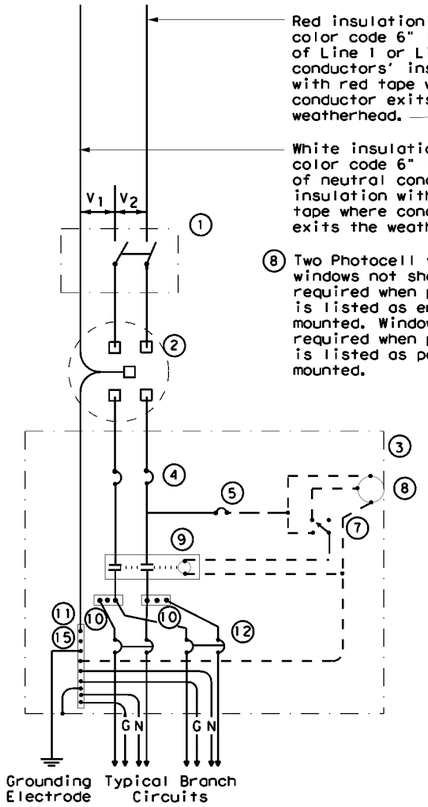
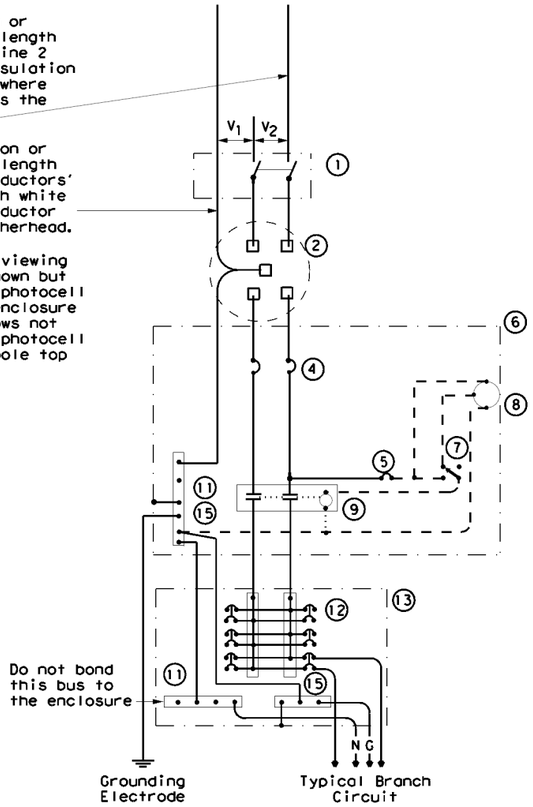
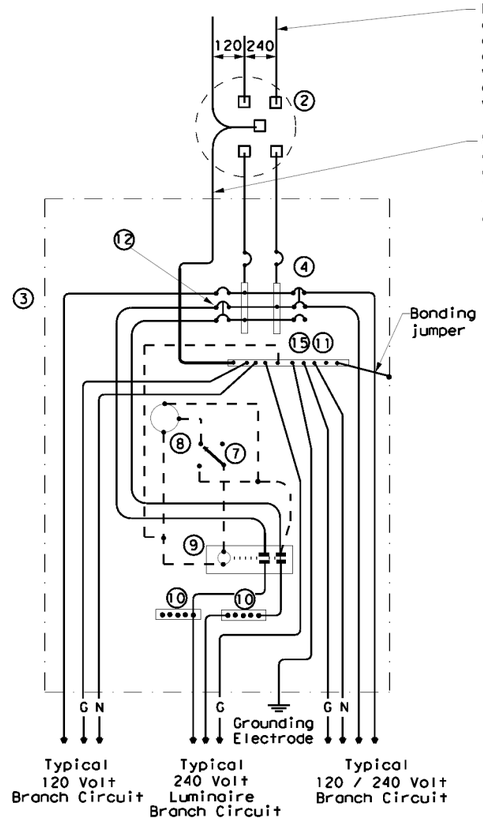


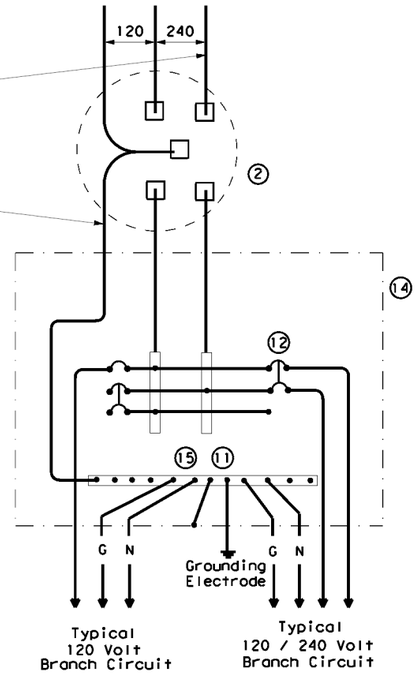
SCHEMATIC TYPE A
THREE WIRE



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

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©TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	00	067	Various
	DIST	COUNTY		SHEET NO.
	22	WEBB, etc		87

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SUPPORT TYPE STEEL POLE (SP) AND STEEL FRAME (SF)

1. Provide steel pole and steel frame supports as per TxDOT Departmental Material Specification (DMS)11080 "Electrical Services." Mount all equipment and conduit on 12 gauge galvanized steel or stainless steel channel strut, 1 ½ in. or 1 ⅝ in. wide by 1 in. up to 3 ¾ in. deep Unistrut, Kindorf, B-line or equal. Bolt or weld all channel and hardware to vertical members as approved. Do not stack channel. File smooth and paint field cut ends of all channel with zinc-rich paint before installing.

2. Provide poles for overhead service with an eyebolt or similar fitting for attachment of the service drop to the pole in conformance with the electric utility provider's specifications.

3. Provide and install galvanized ¾ in. x 18 in. x 4 in. (dia. x length x hook length) anchor bolts for underground service supports. Provide and install galvanized ¾ in. x 56 in. x 4 in. anchor bolts for overhead service supports. Ensure anchor bolts have 3 in of thread, with 3 ¼ in. to 3 ½ in. of the exposed anchor bolt projecting above finished foundation. Provide and install leveling nuts for all anchor bolts.

4. Bond one of the anchor bolts to the rebar cage with 6 AWG bare stranded copper conductor. Use listed mechanical connectors rated for embedment in concrete. See Inset B.

5. Furnish and install rigid metallic ells in all steel pole and steel frame foundations for all conduits entering the service from underground.

6. Use class C concrete for foundations. Ensure reinforcing steel is Grade 60 with 3" of unobstructed concrete cover.

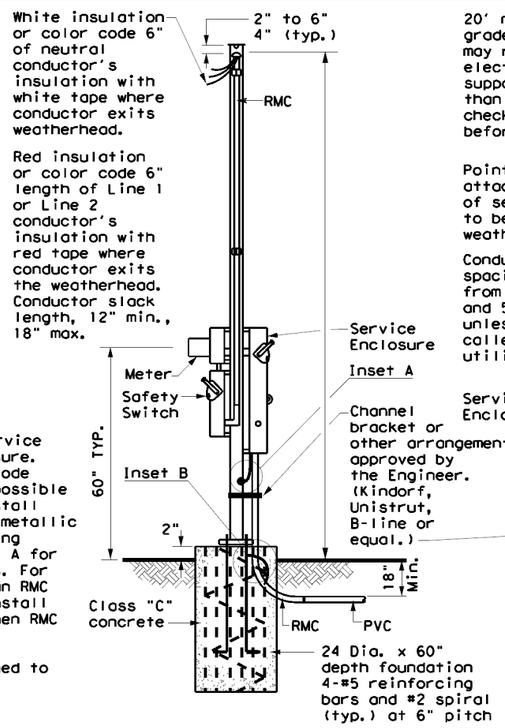
7. Drill and tap steel poles and frames for ½ in. X 13 UNC tank ground fitting. For steel pole service supports, provide and install tank ground fitting 4 in. to 6 in. below electrical service enclosure. Provide properly sized hole through the bottom of the enclosure for the service grounding electrode conductor. Ensure electrical service grounding electrode conductor is as short and straight as possible from the enclosure to the tank ground fitting. For steel frame service supports, provide and install tank ground fitting on steel frame post. Install service grounding electrode conductor in a non-metallic conduit or tubing from the enclosure to the steel frame post. Connect electrical service grounding electrode conductor to the tank ground fitting. See steel frame and steel pole details and Inset A for more information. Size service entrance conduit and branch circuit conduit as shown in the plans. For underground conduit runs from the electrical service, extend RMC from the service enclosure to an RMC elbow, and then connect the schedule type and size of conduit shown in the plans. Provide and install grounding bushings where RMC terminates in the enclosure. Grounding bushings are not required when RMC is fitted into a sealing hub or threaded boss.

8. If Steel pole or frame is painted, bond each separate painted piece with a bonding jumper attached to a tapped hole.

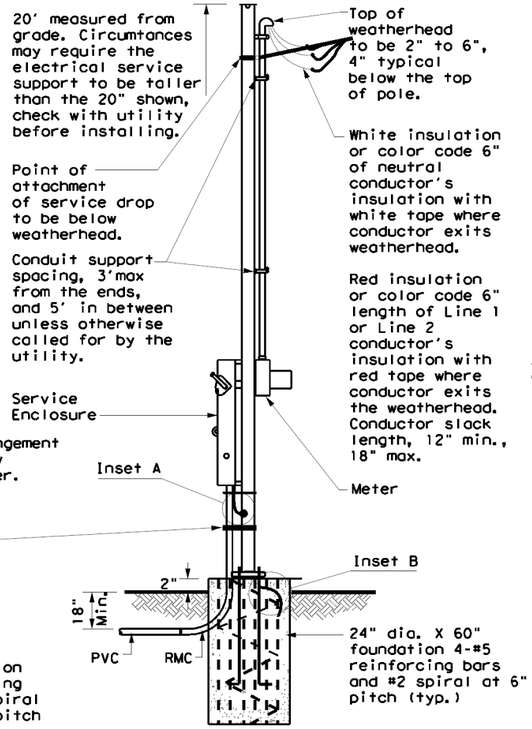
9. Provide ¼" - 20 machine screws for bonding. Do not use sheet metal screws. Remove all non-conductive material at contact points. Terminate bonding jumpers with listed devices. Install minimum size 6 AWG stranded copper bonding jumpers. Make up all threaded bonding connections wrench tight.

10. Avoid contact of the service drop and service entrance conductors with the metal pole to prevent abrasion of the insulated conductors.

11. Shop drawings are not required for service support structure unless specifically stated elsewhere or directed by the Engineer.

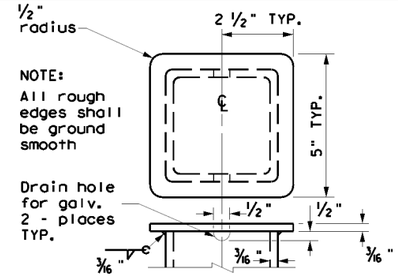


WITH SAFETY SWITCH

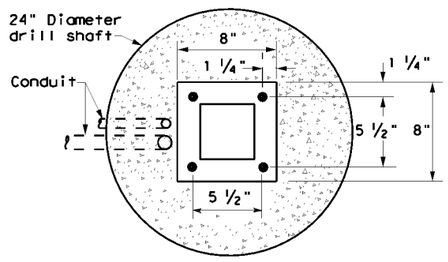


WITHOUT SAFETY SWITCH

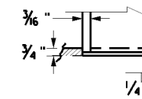
SERVICE SUPPORT TYPE SP (O) - OVERHEAD SERVICE



POLE TOP PLATE

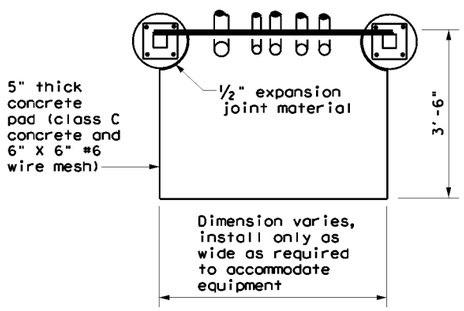


BASE PLATE DETAIL



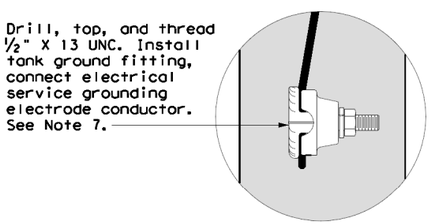
BOTTOM OF POLE

SERVICE SUPPORT TYPE SF & SP



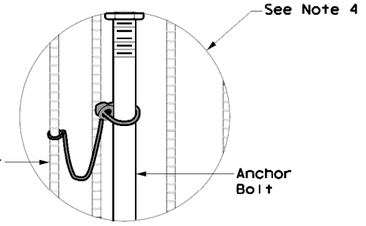
TOP VIEW

SERVICE SUPPORT TY SF (O) & SF (U)

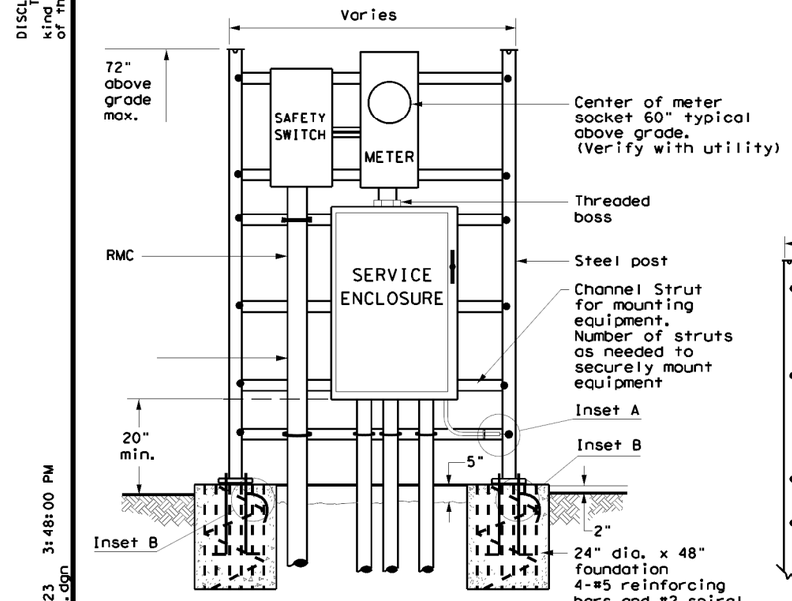


FRONT VIEW

INSET A

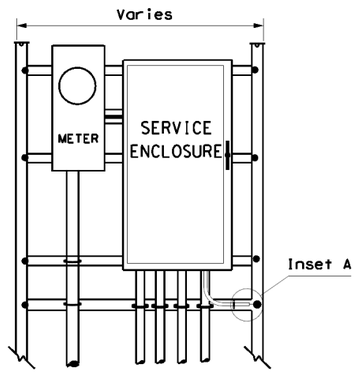


INSET B



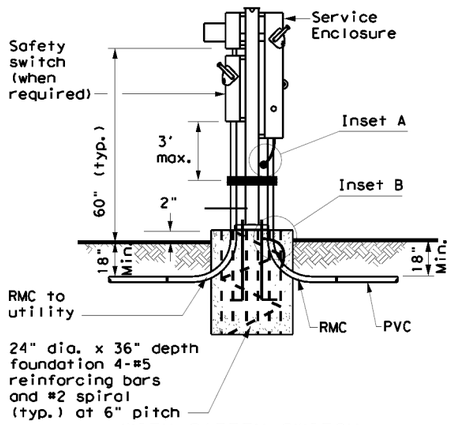
WITH SAFETY SWITCH

FRONT VIEW

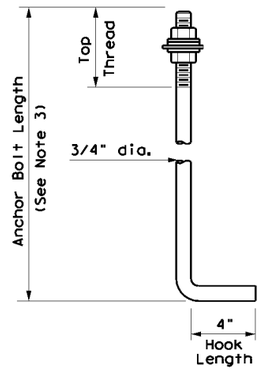


WITHOUT SAFETY SWITCH

SERVICE SUPPORT TYPE SF(U) - UNDERGROUND SERVICE



WITH SAFETY SWITCH



HOOKED ANCHOR DETAIL

SERVICE SUPPORT TYPE SP(U) - UNDERGROUND SERVICE

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE SUPPORT TYPES SF & SP

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REVISIONS	0922	00	067	Various
	DIST	COUNTY		SHEET NO.
	22	WEBB, etc		88

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