CONT	SECT	JOB	HIGHWAY
0914	00	459	VA
DIST	COUNTY		SHEET NO.
AUS	TRAVIS.		1

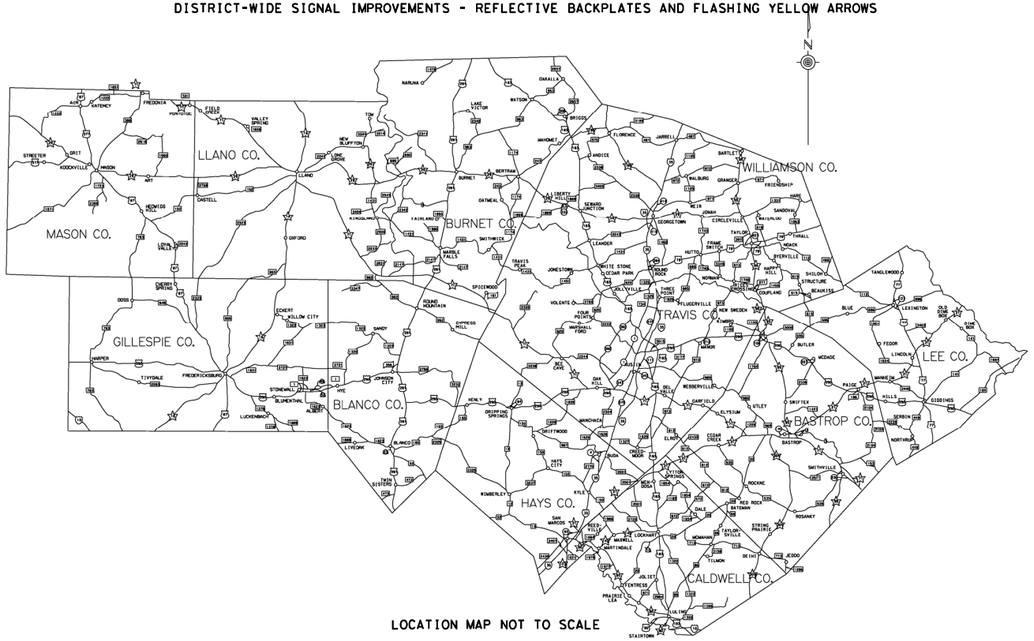
STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENTS

FEDERAL AID PROJECT NUMBER
STP 2024(597)VRU
CSJ: 0914-00-459

TRAVIS COUNTY
VARIOUS ROADWAYS
Length: 15.84 FT = 0.003 MI

LIMITS: VARIOUS LOCATIONS DISTRICTWIDE
FOR THE CONSTRUCTION OF SAFETY IMPROVEMENTS CONSISTING OF
DISTRICT-WIDE SIGNAL IMPROVEMENTS - REFLECTIVE BACKPLATES AND FLASHING YELLOW ARROWS



LOCATION MAP NOT TO SCALE

EXCEPTIONS: NONE
EQUATIONS: NONE
RAILROAD CROSSINGS: NONE

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION ON NOVEMBER 1, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL-AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, OCTOBER 23, 2023).

DESIGN SPEED -

45 MPH *

* FOR HSIP ELEMENTS ONLY

TRAFFIC DATA -

N/A

FINAL PLANS

DATE OF LETTING:
DATE WORK BEGAN:
DATE WORK COMPLETED AND ACCEPTED:
FINAL CONTRACT COST: $
CONTRACTOR:
LIST OF APPROVED CHANGE ORDERS:

I CERTIFY THAT THIS PROJECT WAS CONSTRUCTED IN SUBSTANTIAL COMPLIANCE WITH THE FINAL AS-BUILT PLANS AND SPECIFICATIONS.

AREA ENGINEER P.E. DATE

RECOMMENDED FOR LETTING: 11/1/2023

DocuSigned by: Susana Ceballos P.E.
E1816167B5C7414...
DISTRICT DESIGN ENGINEER

SUBMITTED FOR LETTING: 11/3/2023

DocuSigned by: Jason R Carness P.E.
8FD2437873B54C4...
AREA ENGINEER

APPROVED FOR LETTING: 11/3/2023

DocuSigned by: Heather Kelly-Ngo
8912AF18F45A416...
DIRECTOR OF TRANSPORTATION PLANNING & DEVELOPMENT

Texas Department of Transportation

DATE: 10/17/2023 1:55:08 PM
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GENERAL

TRAFFIC CONTROL PLAN STANDARDS

TRAFFIC SIGNAL STANDARDS

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE HAVE BEEN SELECTED BY ME OR UNDER MY SUPERVISION AND ARE APPLICABLE TO THIS PROJECT.

A. Catherine Reid P.E. 9/20/2023

A. CATHERINE REID, P.E. DATE

STATE OF TEXAS
A. CATHERINE REID
129394
LICENSED
PROFESSIONAL ENGINEER

GUNDA CORPORATION
Engineers, Planners & Managers
11750 Katy Freeway, Suite 300
Houston, Texas 77079
713.541.3530 • www.gundacorp.com
TBPE Registration Number: F-3531

Austin District Maintenance Office

Texas Department of Transportation

INDEX OF SHEETS

CONT	SECT	JOB	HIGHWAY
0914	00	459	VA
DIST	COUNTY		SHEET NO.
AUS	TRAVIS, ETC.		2

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FILE: 459_02_INDEX.dgn

GENERAL NOTES: Version: November 30, 2023

GENERAL
Contractor questions and requests for documents on this project are to be addressed to the following individual(s):
Traffic Office Cory.Jucius@txdot.gov
Traffic Office Mahendran.Thivakaran@txdot.gov

Questions and requests for documents will be accepted via the Letting Pre-Bid Q&A web page. All questions and any corresponding responses that are generated will be posted through the same 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

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

Work under this contract shall consist of **DISTRICT-WIDE SIGNAL IMPROVEMENTS - REFLECTIVE BACKPLATES AND FLASHING YELLOW ARROWS** at various locations districtwide (Austin District).

References to manufacturer's trade name or catalog numbers are for the purpose of identification only. Similar materials from other manufacturers are permitted if they are of equal quality, comply with the specifications for this project, and are approved.

If work is performed at Contractor's option, when inclement weather is impending, and the work is damaged by subsequent precipitation, the Contractor is responsible for all costs associated with replacing the work, if required.

Furnish all materials, tools, and labor required to provide complete all specified work in accordance with the plans and specifications. Furnished materials will be new un-depreciated stock.

Equip all construction equipment used in roadway work with highly visible omnidirectional flashing warning lights.

Intelligent Transportation Systems (ITS) Infrastructure may exist within the limits of this project and that the system must remain operational throughout construction. The exact location of ITS Infrastructure is not known. Contact the TxDOT Area Engineer's or Inspection Team's Office for the location(s) at least 72 hours before commencing any work that might affect present ITS Infrastructure. In the event of system damage, notify TxDOT/CTECC at (512) 974-0883 within one hour of occurrence. Refer to Item 6000 for additional details.

County: Travis, Etc. **Sheet: 3**
Highway: VA **Control:** 0914-00-459

Keep the roadway free of debris and sediment caused by construction activities. Dispose of all material in accordance with federal, state, and local regulations. This work is subsidiary.

Damage to existing pipes and SET's due to Contractor operations will be repaired at Contractor's expense.

All locations used for storing construction equipment, materials, and stockpiles of any type, within the right of way, will be as directed. Use of right of way for these purposes will be restricted to those locations where driver sight distance to businesses and side street intersections is not obstructed and at other locations where an unsightly appearance will not exist. The Contractor will not have exclusive use of right of way but will cooperate in the use of the right of way with the city/county and various public utility companies as required.

During evacuation periods for Hurricane events the Contractor will cooperate with Department for the restricting of Lane Closures and arranging for Traffic Control to facilitate Coastal Evacuation Efforts.

ITEM 6 - CONTROL OF MATERIALS
For Federally Funded Contracts, comply with the latest provisions of Build America, Buy America Act (BABA Act) of the Bipartisan Infrastructure Law, by submitting an original of the TxDOT Construction Material Buy America Certification Form for all items classified as construction materials. This form is not required for materials classified as a manufactured product. Refer to the Buy America Material Classification Sheet, located at the following link, for clarification on material categorization. Buy America material classification sheet (txdot.gov)

ITEM 7 – LEGAL RELATIONS AND RESPONSIBILITIES
Roadway closures during key dates and/or special events are prohibited. See notes for Item 502 for the key dates and/or special events.

Refer to the Environmental Permits, Issues and Commitments (EPIC) plan sheets for additional requirements and permits.

Perform maintenance of vehicles or equipment at designated maintenance sites. Keep a spill kit on-site during fueling and maintenance. This work is subsidiary.

Law Enforcement Personnel.
Submit charge summary and invoices using the Department forms.

Patrol vehicles must be clearly marked to correspond with the officer's agency and equipped with appropriate lights to identify them as law enforcement. For patrol vehicles not owned by a law enforcement agency, markings will be retroreflective and legible from 100 ft. from both sides and the rear of the vehicle. Lights will be high intensity and visible from all angles.

No payment will be made for law enforcement personnel needed for moving equipment or payment for drive time to/from the event site. A minimum number of hours is not guaranteed.

Payment is for work performed. If the Contractor has a field office, provide an office location for a supervisory officer when event requires a supervising officer. This work is subsidiary.

A maximum combined rate of $70 per hour for the law enforcement personnel and the patrol vehicle will be allowed. Any scheduling fee is subsidiary per Standard Specification 502.4.2.

Cancel law enforcement personnel when the event is canceled. Cancellation, minimums or "show up" fees will not be paid when cancellation is made 12 hours prior to beginning of the event. Failure to cancel within 12 hours will not be cause for payment for cancellation, minimums, or "show up" time. Payment of actual "show up" time to the event site due to cancellation will be on a case-by-case basis at a maximum of 2 hours per officer.

Alterations to the cancellation and maximum rate must be approved by the Engineer or pre-determined by official policy of the officers governing authority.

ITEM 8 – PROSECUTION AND PROGRESS
Working days will be charged in accordance with 8.3.1.4, "Standard Workweek." Submit two weeks look ahead schedule every Monday.

ITEM 502 - BARRICADES, SIGNS, AND TRAFFIC HANDLING
Monday through Friday, roadway closure will be allowed between 9:00 AM and 3:00 PM or 8:00 PM to 5:00 AM or approved by the engineer.

No closures will be allowed on the weekends, working day prior, and working day after the National Holidays defined in the Standard Specifications, Good Friday, and Easter weekend.
No closures will be allowed 1 P.M. to 11 P.M. the Sunday of the Super Bowl.

Time charges will not be suspended during the large and special events listed below. These events are provided in the contract to allow scheduling of work around these lane closure restrictions.

All lanes will be open by noon of the day before the large events listed in below table. No closures will be allowed on Friday and the weekends for projects within 20 miles of these large events:

Table 4 (Large Events)

Event	City	Dates
Formula 1 @ COTA	Austin	Annually (See Event Website)
Moto GP @ COTA	Austin	Annually (See Event Website)
ACL Fest	Austin	Annually (See Event Website)
SXSW	Austin	Annually (See Event Website)
ROT Rally	Bastrop	Annually (See Event Website)
UT Football Games	Austin	Annually (See Event Website)
Sales Tax Holiday	All	Annually (See Event Website)
Rodeo Austin	Austin	Annually (See Event Website)

All lanes will be open by noon of the day before the special events listed in below table. No closures will be allowed on Friday and the weekends for projects within 10 miles of these special events:

Table 5 (Special Events)

Event	City	Dates
Wiener Dog Races	Buda	April 29-30, 2023
Founders Day Festival	Dripping Springs	April 28-30, 2023
Christmas on Mercer	Dripping Springs	Dec 2, 2023
Christmas Nights of FBG Lights	Fredericksburg	Nov 21, 2023
Lady of Guadalupe Procession	Fredericksburg	Dec 12, 2023
Eaker BBQ Competition	Fredericksburg	March 10, 2024
Founders Day Ceremony	Fredericksburg	2nd Weekend in May
Crawfish Festival	Fredericksburg	Saturday before Memorial Day
Red Poppy Festival	Georgetown	April 26-28, 2024
Wine and Music Festival	Georgetown	Last Saturday of September
Fair and Rodeo	Liberty Hill	May 18, 2023
Lakefest Boat Races	Marble Falls	June 10-11, 2023
Pie in the Sky	Kyle	Sept 1-2, 2023
Texas State Graduation Fall	San Marcos	TBD
Texas State Graduation Spring	San Marcos	TBD

All the large and special events listed in the above tables occur annually. Coordinate with the Department and review the city/event website to plan around the future events.

No closures will be allowed during the upcoming eclipses on October 14, 2023, and April 8, 2024. All lanes will be open from noon October 12th to noon October 15th. All lanes will be open from noon April 5th to noon April 9th. Time charges will not be suspended during this event.

Consider inclement weather prior to implementing the lane closures. Do not set up traffic control when the pavement is wet.

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 ENV CONTROLS
There is no SW3P summary sheet as this project is just for traffic signal improvements.

ITEMS 600s & 6000s – ITS, TOLLING, LIGHTING, SIGNING, MARKINGS, AND SIGNALS
Meet the requirements of the NEC, Texas MUTCD, TxDOT standards, and TxDOT Standard Specifications. Notify the Engineer if existing elements to remain do not meet code or specification.

Contractor shall provide all service, equipment and material required to provide a functional item and interface with existing equipment and software.

For signal shop contact Robert Bolin (Robert.Bolin@txdot.gov)

Prior to relief of maintenance, a 30-day Test Period is required for signals and ITS equipment in accordance with Item 680.3.1.8. Response time to reported trouble calls shall be less than 2 hours. Complete repairs within 24 hours. Notify the Engineer and maintain a logbook in the controller cabinet of each trouble call. Do not clear the error log in the conflict monitor without approval.

Maintain the existing ITS equipment and HUB buildings operational during construction. ITS downtime is allowed from 12A to 4A. Downtime is restricted to one time per HUB or equipment.

Definitions of abbreviations used to designate ITS equipment, material, etc. can be provided by the Engineer.

ITEM 682 – VEHICLE AND PEDESTRIAN SIGNAL HEADS
Traffic signal heads will be aluminum unless otherwise shown on the plans. Back plates will be black aluminum with retroreflective borders.

New stainless steel screws shall be used to secure the backplate to the signal head.

Anti-seize compatible with aluminum shall be applied to all screws holding the backplate to the signal head.

Notify engineer if existing hardware breaks inside the signal head preventing removal. Contractor shall make reasonable attempts to extract the broken portion such as penetrating lubricant and vise-grips, subsidiary to pertinent items. If broken portion cannot be removed the engineer will determine if replacing the signal head is warranted. Payment signal head replacement will be made separately under item 682.

Use the four-point mounting system (TY A) for signal heads, except in cases of skewed or vertical heads when (TY B) will be used.

Removal of any existing signal head that is to be replaced shall be considered subsidiary to that bid item.

ITEM 684 – TRAFFIC SIGNAL CABLES
For Type A cables, cables meeting the requirements of IMSA 19-1 can be substituted for IMSA 20-1. For all types of cables, an increase of one size larger wire diameter and thickness can be

substituted for plan size without additional cost to the Department. For example, 12 AWG can be substituted for 14 AWG.

For each cable run, coil an extra 2 ft. of cable in each steel pole and 5 ft. in the controller cabinet. Provide a separate multi-conductor signal cable (14 AWG) inside pedestal poles and mast-arm signal poles from the terminal strip to each signal head as shown on the plans.

ITEM 6001 – PORTABLE CHANGEABLE MESSAGE SIGN
Engineer may request portable changeable message sign based on the lane closure impacts to the public. Provide the quantity of portable changeable message sign and duration as determined by the engineer.

ITEM 6185 – TRUCK MOUNTED ATTENUATOR AND TRAILER ATTENUATOR
The TMA/TA used for installation/removal of traffic control for a work area will be subsidiary to the TMA/TA used to perform the work.

The contractor will be responsible for determining if one or more operations will be ongoing at the same time to determine the total number of TMA/TA required for the work. TMA/TAs paid by the day is full compensation for all worksite locations during an entire day.

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0914-00-459 **DISTRICT** Austin **COUNTY** Travis
HIGHWAY Various

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0914-00-459**			
		PROJECT ID		**A00177074**			
		COUNTY		**Travis**			
		HIGHWAY		**Various**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	11.000		11.000	
	636-6001	ALUMINUM SIGNS (TY A)	SF	3,034.500		3,034.500	
	682-6001	VEH SIG SEC (12")LED(GRN)	EA	115.000		115.000	
	682-6002	VEH SIG SEC (12")LED(GRN ARW)	EA	283.000		283.000	
	682-6003	VEH SIG SEC (12")LED(YEL)	EA	115.000		115.000	
	682-6004	VEH SIG SEC (12")LED(YEL ARW)	EA	566.000		566.000	
	682-6005	VEH SIG SEC (12")LED(RED)	EA	115.000		115.000	
	682-6006	VEH SIG SEC (12")LED(RED ARW)	EA	283.000		283.000	
	682-6013	VEH SIG SEC(12")LED(YEL ARW)(LENS ONLY)	EA	12.000		12.000	
	682-6015	VEH SIG SEC(12")LED(RED ARW)(LENS ONLY)	EA	6.000		6.000	
	682-6049	BACKPLATE W/REFL BRDR(4 SEC)	EA	290.000		290.000	
	682-6050	BACKPLATE W/REFL BRDR(5 SEC)	EA	1.000		1.000	
	682-6057	RETROFIT REFL BRDR SHEETING (3 SEC)	EA	2,932.000		2,932.000	
	682-6058	RETROFIT REFL BRDR SHEETING (4 SEC)	EA	358.000		358.000	
	682-6059	RETROFIT REFL BRDR SHEETING (5 SEC)	EA	97.000		97.000	
	682-6060	BACKPLATE W/REFL BRDR(3 SEC)	EA	144.000		144.000	
	684-6031	TRF SIG CBL (TY A)(14 AWG)(5 CONDR)	LF	1,725.000		1,725.000	
	690-6011	INSTALL OF CABLES	LF	1,725.000		1,725.000	
	690-6024	REMOVAL OF SIGNAL HEAD ASSM	EA	283.000		283.000	
	690-6027	REMOVAL OF SIGNAL RELATED SIGNS	EA	289.000		289.000	
	690-6139	REPL VEH SIG TUNNEL VISOR (12")	EA	13.000		13.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	708.000		708.000	
	6185-6002	TMA (STATIONARY)	DAY	168.000		168.000	
	18	SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	
		EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	
		LAW ENFORCEMENT: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	

SUMMARY OF TRAFFIC SIGNAL ITEMS

LOCATION	500 6001 MOBILIZATION	502 6001 BARRICADES, SIGNS AND TRAFFIC HANDLING	636 6001 ALUMINUM SIGNS (TY A)	682 6001 VEH SIG SEC (12") LED (GRN)	682 6002 VEH SIG SEC (12") LED (GRN ARW)	682 6003 VEH SIG SEC (12") LED (YEL)	682 6004 VEH SIG SEC (12") LED (YEL ARW)	682 6005 VEH SIG SEC (12") LED (RED)	682 6006 VEH SIG SEC (12") LED (RED ARW)	682 6013 VEH SIG SEC (12") LED (YEL ARW) (LENS ONLY)	682 6015 VEH SIG SEC (12") LED (RED ARW) (LENS ONLY)	682 6049 BACKPLATE W/REFL BRDR (4 SEC)	682 6050 BACKPLATE W/REFL BRDR (5 SEC)	682 6057 RETROFIT REFL BRDR SHEETING (3 SEC)	682 6058 RETROFIT REFL BRDR SHEETING (4 SEC)	682 6059 RETROFIT REFL BRDR SHEETING (5 SEC)	682 6060 BACKPLATE W/REFL BRDR (3 SEC)	684 6031 TRF SIG CBL (TY A) (14 AWG) (5 CONDR)	690 6011 INSTALL OF CABLES	690 6024 REMOVAL OF SIGNAL HEAD ASSM	690 6027 REMOVAL OF SIGNAL RELATED SIGNS	690 6139 REPL VEH SIG TUNNEL VISOR (12")	6001 6002 PORTABLE CHANGEABLE MESSAGE SIGN	6185 6002 TMA (STATIONARY)
	LS	MO	SF	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	LF	LF	EA	EA	EA	EA	DAY
2, SH 16 @ SH 29			21		2		4		2			2		6	2					2	2		2	
3, SH 16 @ RM 152 (MAIN STREET)			21	2	2	2	4	2	2			2		4			2	30	30	2	2		2	
4, SH 16 @ SANDSTONE STREET	0	0	21	2	2	2	4	2	2			2		6			2	30	30	2	2		2	0
5, SH 16 @ OLLIE STREET	0	0												8									2	0
7, SH 29 @ RM 1431	0	0												6	4								2	0
8, RM 1431 @ RM 2545	0	0	21		2		4		2			2		8						2	2		2	0
9, RM 1431 @ RM 2900	0	0												7	4								2	0
10, RM 1431 @ FM 2342	0	0	10.5	1	1	1	2	1	1			1		5			1	15	15	1	1		2	0
11, RM 1431 @ PHILIPS RANCH (HA BARNETT DR)	0	0	21		2		4		2			2		7	2		1			2	2		2	0
12, RM 1431 @ PRAIRIE CREEK RD	0	0												5	2								2	0
13, RM 1431 @ VALLEY VIEW LN (CR 416)	0	0	10.5		1		2		1			1		6						1	1		2	0
14, RM 1431 @ FM 1980	0	0	10.5		1		2		1			1		6						1	1		2	0
15, RM 1431 @ AVENUE U	0	0	21	2	2	2	4	2	2			2		7			2	30	30	2	2		2	0
16, RM 1431 @ AVENUE Q (NORTHWOOD)	0	0	21	2	2	2	4	2	2			2		4	2		2	30	30	2	2		2	0
17, RM 1431 @ HEB DRIVEWAY	0	0												6	4								2	0
18, RM 1431 @ AVENUE N (BLUEBONNET)	0	0												6	4								2	0
19, RM 1431 @ MUSTANG DR	0	0	10.5		1		2		1			1		7						1	1		2	0
21, SH 71 @ FM 2147	0	0												6	2								2	0
22, RM 2147 @ DUTCH LEMING	0	0	10.5	1	1	1	2	1	1			1		5			1	15	15	1	1		2	0
24, US 281 @ MAX STARKE DAM RD	0	0	21		2		4		2			2		9	2					2	2		2	0
25, US 281 @ 2ND STREET	0	0	21		2		4		2			2		8						2	2		2	0
26, US 281 @ 3RD STREET	0	0	21		2		4		2			2		8						2	2		2	0
27, US 281 @ 6TH STREET	0	0	21		2		4		2			2		8						2	2		2	0
28, US 281 @ 7TH STREET	0	0	21		2		4		2			2		8						2	2		2	0
29, US 281 @ RM 1431	0	0	21		2		4		2			2		8	2					2	2		2	0
30, US 281 @ MISSION HILLS / MORMAN MILL	0	0	21		2		4		2			2		6	2					2	2		2	0
31, US 281 @ LANTANA	0	0	21		2		4		2			2		8						2	2		2	0
32, US 281 @ COMMERCE ST	0	0												8	2								2	0
33, US 281 @ STATE ST (COLT)	0	0	21		2		4		2			2		8						2	2		2	0
34, US 281 @ NATURE HEIGHTS DRIVE	0	0	21		2		4		2			2		8						2	2		2	0
35, US 281 @ RESOURCE PKWY	0	0												8	4	2							2	0
36, US 281 @ RM 1855	0	0												8	1								2	0
38, US 281 @ OAK VISTA BLVD/ DEL SPRINGS BLVD	0	0												6	1	1							2	0
39, US 281 @ CR 340A	0	0												9	2								2	0
40, US 281 @ HOUSTON CLINTON DRIVE	0	0												9	2								2	0
41, US 281 @ PECAN STREET	0	0												10									2	0
42, US 281 @ JACKSON STREET	0	0												10									2	0
43, US 281 @ SH 29	0	0												8	4								2	0
44, US 281 @ RM 963 (EAST GRAVES ST)	0	0												5	1	1							2	0
45, US 281 @ GREEN MILE (CR 108)	0	0												8	2								2	0
47, SH 29 @ FM 3509	0	0												7	1								2	0
48, SH 29 @ PIERCE ST	0	0	21		2		4		2			2		8						2	2		2	0
49, SH 29 @ RHOMBERG	0	0	21	2	2	2	4	2	2			2		6			2	30	30	2	2		2	0
50, SH 29 @ HILL ST	0	0	21		2		4		2			2		8			1			2	2		2	0
51, SH 29 @ RM 243 / RM 1174 / GRANGE STREET	0	0	21		2		4		2			2		8						2	2		2	0
52, SH 29 @ LIBERTY HILL HS	0	0	10.5	1	1	1	2	1	1			1		5		1	1	15	15	1	1		2	0
SHEET 1 SUBTOTAL	**0**	**0**	**504**	**13**	**48**	**13**	**96**	**13**	**48**	**0**	**0**	**48**	**0**	**325**	**52**	**5**	**15**	**195**	**195**	**48**	**48**	**0**	**92**	**0**

NOTE: REMOVAL OF ANY EXISTING SIGNAL HEAD THAT IS TO BE REPLACED SHALL BE CONSIDERED SUBSIDIARY TO THAT BID ITEM.

GUNDA CORPORATION
Engineers, Planners & Managers
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Houston, Texas 77079
713.541.3530 • www.gundacorp.com
TBPE Registration Number: F-3531

Austin District Maintenance Office

Texas Department of Transportation

QUANTITY SUMMARY

SHEET 1 OF 8

CONT	SECT	JOB	HIGHWAY
0914	00	459	VA
DIST	COUNTY		SHEET NO.
AUS	TRAVIS, ETC.		5

DATE: 9/15/2023 9:56:19 AM
FILE: 459_04_QUANTITY.dgn

SUMMARY OF TRAFFIC SIGNAL ITEMS

LOCATION	500 6001 MOBILIZATION	502 6001 BARRICADES, SIGNS AND TRAFFIC HANDLING	636 6001 ALUMINUM SIGNS (TY A)	682 6001 VEH SIG SEC (12") LED (GRN)	682 6002 VEH SIG SEC (12") LED (GRN ARW)	682 6003 VEH SIG SEC (12") LED (YEL)	682 6004 VEH SIG SEC (12") LED (YEL ARW)	682 6005 VEH SIG SEC (12") LED (RED)	682 6006 VEH SIG SEC (12") LED (RED ARW)	682 6013 VEH SIG SEC (12") LED (YEL ARW) (LENS ONLY)	682 6015 VEH SIG SEC (12") LED (RED ARW) (LENS ONLY)	682 6049 BACKPLATE W/REFL BRDR (4 SEC)	682 6050 BACKPLATE W/REFL BRDR (5 SEC)	682 6057 RETROFIT REFL BRDR SHEETING (3 SEC)	682 6058 RETROFIT REFL BRDR SHEETING (4 SEC)	682 6059 RETROFIT REFL BRDR SHEETING (5 SEC)	682 6060 BACKPLATE W/REFL BRDR (3 SEC)	684 6031 TRF SIG CBL (TY A) (14 AWG) (5 CONDR)	690 6011 INSTALL OF CABLES	690 6024 REMOVAL OF SIGNAL HEAD ASSM	690 6027 REMOVAL OF SIGNAL RELATED SIGNS	690 6139 REPL VEH SIG TUNNEL VISOR (12")	6001 6002 PORTABLE CHANGEABLE MESSAGE SIGN	6185 6002 TMA (STATIONARY)
	LS	MO	SF	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	LF	LF	EA	EA	EA	EA	DAY
55, SH 29 @ BRONCO BLVD	0	0												6	4								2	0
56, SH 29 @ RM 1869	0	0	21	2	2	2	4	2	2			2		6	2		2	30	30	2	2		2	0
57, SH 29 @ LIBERTY HILL JR HS	0	0	10.5	1	1	1	2	1	1			1		5	2	1	1	15	15	1	1		2	0
61, US 183A @ RM 2243	0	0	21		2		4		2			2		15						2	2		2	0
108, US 183 @ SH 29	0	0												19									2	0
109, US 183 @ WHITEWING DR / LARKSPUR	0	0	21	2	2	2	4	2	2			2		12			2	30	30	2	2		2	0
118, RM 1431 @ PARK DR/ JONESTOWN ST	0	0												12	2								2	0
119, RM 1431 @ NAMELESS ROAD	0	0	10.5		1		2		1			1		8						1	1		2	0
120, RM 1431 @ TRAVISSO PKWY	0	0												10	4								2	0
121, RM 1431 @ TRAILS END RD	0	0												10									2	0
122, RM 1431 @ SAM BASS	0	0	21	2	2	2	4	2	2			2		12		2	2	30	30	2	2		2	0
123, RM 1431 @ ROYAL VISTA BLVD	0	0												6		1							2	0
125, RM 1431 @ MAYFIELD RANCH BLVD	0	0												7									2	0
126, RM 1431 @ SENDERO SPRINGS	0	0												8	2								2	0
127, RM 1431 @ STONE OAK DRIVE	0	0	21	2	2	2	4	2	2			2		8			2	30	30	2	2		2	0
129, RM 620 @ QUINLAN PARK	0	0												9		2							2	0
130, RM 620 @ COMANCHE TRAIL	0	0												8		1							2	0
131, RM 620 @ STEINER RANCH BLVD	0	0												6	1	1							2	0
134, RM 620 @ CORNERWOOD DRIVE	0	0	21		2		4		2			2	1	6	2	1				2	2		2	0
135, RM 620 @ GREAT OAKS DR	0	0	21		2		4		2			2		10		4				2	2		2	0
136, RM 620 @ O'CONNOR	0	0												16		3							2	0
137, RM 620 @ OAKLANDS DR	0	0												11		1							2	0
138, SH 45 @ RM 620	0	0	10.5		1		2		1			1		11	2					1	1		2	0
139, SH 45 @ O'CONNER	0	0	10.5		1		2		1			1		12						1	1		2	0
140, SH 45 @ MCNEIL RD	0	0												7	1		3						2	0
144, FM 1660 @ COCKRILL	0	0												8	4								2	0
145, FM 1660 @ LIMMER LOOP	0	0	21	2	2	2	4	2	2			2		5	2		2	30	30	2	2		2	0
146, FM 1660 @ CR 136/MAGER LN	0	0												9	2								2	0
147, FM 1660 @ CARL STERN	0	0	42	4	4	4	8	4	4			4		4			4	60	60	4	4		2	0
148, FM 1660 @ CR 137	0	0												8	1								2	0
149, FM 685 @ CARL STERN DR	0	0												12									2	0
151, FM 685 @ RIVERWALK DR	0	0												8									2	0
152, FM 685 @ GREAT WESTERN DR	0	0												10									2	0
153, SH 130 @ STAR RANCH/ FM 685 (CHRIS KELLEY)	0	0	10.5	1	1	1	2	1	1			1		10	1		2	15	15	1	1		2	0
154, SH 130 @ US 79	0	0												16			1						2	0
155, US 79 @ FM 685	0	0												13	2								2	0
156, US 79 @ EXCHANGE BOULEVARD	0	0	10.5		1		2		1			1		6						1	1		2	0
158, US 79 @ FM 1660 NORTH	0	0	21		2		4		2			2		6	2					2	2		2	0
159, US 79 @ FM 1660 SOUTH	0	0	10.5		1		2		1			1		6						1	1		2	0
160, US 79 @ FM 973	0	0												10	2								2	0
161, US 79 @ CR 424 (BOUNDS)	0	0												6	4								2	0
162, FM 397 @ LAKE DR	0	0												8								1	2	0
163, FM 397 @ MALLARD LN	0	0												6									2	0
164, FM 397 @ NORTH DR	0	0	21	2	2	2	4	2	2			2		6			2	30	30	2	2		2	0
165, FM 397 @ BILL PICKETT TRL	0	0	21		2		4		2			2		8						2	2		2	0
166, SH 95 @ CHANDLER RD	0	0	10.5	1	1	1	2	1	1			1		6		1	1	15	15	1	1		2	0
SHEET 2 SUBTOTAL	**0**	**0**	**357**	**19**	**34**	**19**	**68**	**19**	**34**	**0**	**0**	**34**	**1**	**411**	**42**	**18**	**24**	**285**	**285**	**34**	**34**	**1**	**92**	**0**

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Austin District Maintenance Office

Texas Department of Transportation

QUANTITY SUMMARY

SHEET 2 OF 8

CONT	SECT	JOB	HIGHWAY
0914	00	459	VA
DIST	COUNTY		SHEET NO.
AUS	TRAVIS, ETC.		6

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SUMMARY OF TRAFFIC SIGNAL ITEMS

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	LS	MO	SF	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	LF	LF	EA	EA	EA	EA	DAY
167, SH 95 @ FM 397	0	0	10.5		1		2		1			1		6	1					1	1		2	0
168, SH 95 @ T.H. JOHNSON	0	0												7	1	1							2	0
169, SH 95 @ MALLARD LANE	0	0	10.5	1	1	1	2	1	1			1		5		1	1	15	15	1	1		2	0
170, SH 95 @ LAKE DRIVE	0	0												8	2								2	0
171, SH 95 @ 7TH STREET	0	0												8									2	0
172, SH 95 @ 5TH STREET	0	0												8									2	0
173, SH 95 @ 4TH STREET	0	0												8									2	0
174, SH 95 @ 3RD STREET	0	0												8									2	0
175, SH 95 @ 2ND STREET	0	0	10.5							2	1			11							1		2	0
176, SH 95 @ FM 112 (WALNUT)	0	0	10.5							2	1			11							1		2	0
177, SH 16 @ FRIENDSHIP / FM 2093	0	0	42		4		8		4			4		8			2			4	4		2	0
178, SH 16 @ MILAM STREET	0	0	42		4		8		4			4		8						4	4		2	0
179, SH 16 @ HIGHWAY STREET	0	0	21		2		4		2			2		9						2	2		2	0
180, SH 16 @ WINDCREST ST	0	0	21		2		4		2			2		9						2	2		2	0
181, SH 16 @ LIVE OAK STREET	0	0	10.5		1		2		1			1		8						1	1		2	0
182, SH 16 @ UFER STREET	0	0	10.5		1		2		1			1		5		1				1	1		2	0
183, SH 16 @ CREEK STREET	0	0	21		2		4		2			2		8						2	2		2	0
184, SH 16 @ SAN ANTONIO STREET	0	0	21		2		4		2			2		8						2	2		2	0
185, SH 16 @ AUSTIN STREET	0	0												8									2	0
186, SH 16 @ TRAVIS STREET	0	0												8									2	0
187, US 87 @ US 290 NORTH	0	0	10.5	1	1	1	2	1	1			1		9			1	15	15	1	1		2	0
188, US 87 @ MILAM STREET	0	0	42		4		8		4			4		8						4	4		2	0
189, US 87 @ ORANGE STREET	0	0	21							4	2			10							2		2	0
190, US 87 @ CROCKETT STREET	0	0	21							4	2			10							2		2	0
191, US 87 @ SH 16 SB (ADAMS STREET)	0	0	42		4		8		4			4		8						4	4		2	0
192, US 87 @ SH 16 NB (LLANO STREET)	0	0	21		2		4		2			2		8						2	2		2	0
193, US 87 @ LINCOLN STREET	0	0	21		2		4		2			2		8						2	2		2	0
194, US 87 @ US 290 SOUTH (WASHINGTON ST)	0	0												7	2	1							2	0
195, US 87 @ HIGHWAY STREET	0	0	21	2	2	2	4	2	2			2		6			2	30	30	2	2		2	0
196, US 87 @ FRIENDSHIP LANE	0	0	42		4		8		4			4		8						4	4		2	0
197, US 290 @ ELK STREET	0	0												8									2	0
198, US 290 @ RM 1631 (OLIVE STREET)	0	0												8									2	0
199, US 290 @ HIGHWAY ST./GOEHMANN LN.	0	0	21	2	2	2	4	2	2			2		6			2	30	30	2	2		2	0
200, US 290 @ WALMART / FREDERICKSBURG	0	0	21		2		4		2			2		9						2	2		2	0
201, US 290 @ FRIENDSHIP LANE	0	0	10.5		1		2		1			1		8						1	1		2	0
202, US 290 @ HERITAGE HILLS	0	0	21	2	2	2	4	2	2			2		7		1	2	30	30	2	2		2	0
203, US 290 @ FM 1376	0	0	10.5	1	1	1	2	1	1			1		5			1	15	15	1	1		2	0
204, SH 71 @ SP 191	0	0												9	1								2	0
205, US 290 @ NUGENT AVENUE	0	0												8									2	0
207, US 281 @ RM 1623	0	0	21		2		4		2			2		8						2	2		2	0
208, US 281 @ BLANCO AVE	0	0	21		2		4		2			2		9						2	2		2	0
210, SH 45 @ CR 172	0	0												12	2								2	0
211, FM 1325 @ NORTHRIDGE DRIVE	0	0	21		2		4		2			2		8						2	2		2	0
212, FM 1325 @ CR 172 / QUICK HILL ROAD	0	0	21		2		4		2			2		7	1	2				2	2		2	0
213, FM 1325 @ SHORELINE DRIVE	0	0	42		4		8		4			4		8						4	4		2	0
214, SL 1 @ MERRILLTOWN	0	0	10.5		1		2		1			1		13		3				1	1		2	0
SHEET 3 SUBTOTAL	**0**	**0**	**693**	**9**	**60**	**9**	**120**	**9**	**60**	**12**	**6**	**60**	**0**	**374**	**10**	**10**	**11**	**135**	**135**	**60**	**66**	**0**	**92**	**0**

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QUANTITY SUMMARY

CONT	SECT	JOB	HIGHWAY
0914	00	459	VA
DIST	COUNTY		SHEET NO.
AUS	TRAVIS, ETC.		7

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	LS	MO	SF	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	LF	LF	EA	EA	EA	EA	DAY
215, SL 1 @ WELLS BRANCH PKWY	0	0	21		2		4		2			2		14						2	2		2	0
216, SL 1 @ SCOFIELD RIDGE PKWY	0	0	10.5		1		2		1			1		11						1	1		2	0
217, IH 35 @ GRAND AVENUE PKWY	0	0												16	2								2	0
218, SS 1825 @ GRAND AVE PKWY	0	0												6	1								2	0
219, FM 1825 @ SPUR 1825 / VISION DRIVE	0	0												8	2								2	0
233, SH 130 @ FM 734	0	0												14									2	0
234, SH 130 @ US 290	0	0												22									2	0
235, SH 130 @ FM 973	0	0	31.5		3		6		3			3		13						3	3		2	0
236, SH 130 @ FM 969	0	0	21	2	2	2	4	2	2			2		10			2	30	30	2	2	3	2	0
237, SH 130 @ SH 71	0	0												22									2	0
238, SH 71 @ FM 973	0	0												27									2	0
239, SH 71 @ ROSS ROAD	0	0												8	2							4	2	0
240, SH 71 @ KELLAM RD	0	0												9	2								2	0
241, FM 969 @ IMPERIAL DR	0	0												10	2							1	2	0
242, FM 969 @ BLUE BLUFF RD	0	0												10	2								2	0
243, FM 969 @ FM 973	0	0												7	4								2	0
244, FM 969 @ GILBERT LANE	0	0	10.5	1	1	1	2	1	1			1		8	2	1	1	15	15	1	1		2	0
245, FM 969 @ HOUND DOG TRL	0	0	21	2	2	2	4	2	2			2		7			2	30	30	2	2		2	0
246, FM 969 @ HUNTERS BEND RD / DELTA POST DR	0	0	21		2		4		2			2		6	2	2				2	2		2	0
248, FM 3177 @ HOG EYE RD	0	0	21	2	2	2	4	2	2			2		6			2	30	30	2	2		2	0
249, FM 3177 @ DECKER MIDDLE SCHOOL	0	0												5	2								2	0
250, FM 3177 @ DAFFAN LN	0	0												7	1								2	0
251, US 290 @ TUSCANY WAY	0	0												18	2								2	0
252, US 290 @ FM 734 (PARMER)	0	0												17	3								2	0
253, US 290 @ GREGG-MANOR	0	0	21	2	2	2	4	2	2			2		6	2		2	30	30	2	2		2	0
254, US 290 @ LEXINGTON	0	0	10.5		1		2		1			1		8	2	2				1	1		2	0
256, FM 973 @ BRENHAM ST	0	0												6									2	0
257, SL 212 @ FM 973/PARSONS (OLD HWY 20)	0	0												2									2	0
258, SL 212 @ OLD HWY 20	0	0												5	1								2	0
259, US 290 @ SHADOW GLEN BLVD	0	0												8									2	0
260, US 290 @ FM 973	0	0												10	2								2	0
261, FM 973 @ SHADOWGLEN TRACE/ SUNCREST RD	0	0												6	4								2	0
264, US 290 @ GEORGE BUSH STREET	0	0												7	2	1							2	0
265, US 290 @ BOIS D ARC LN	0	0												8									2	0
266, US 290 @ OLD KIMBRO	0	0												10	2								2	0
267, US 290 @ RED ELM PKWY	0	0												8	2								2	0
268, US 290 @ WESTERN SKY BLVD	0	0												9									2	0
269, US 290 @ COUNTY LINE RD	0	0												8	2								2	0
271, FM 1100 @ COUNTY LINE ROAD (SCHOOL SIDE)	0	0	10.5	1	1	1	2	1	1			1		5			1	15	15	1	1		2	0
272, SH 71 @ PALEFACE RANCH RD CR404	0	0												6									2	0
273, SH 71 @ RM 2322 (PACE BEND)	0	0												7	1								2	0
274, SH 71 @ CYPRESS CREEK RANCH BLVD	0	0												9	1								2	0
275, SH 71 @ BOB WIRE RD	0	0												8	2								2	0
276, SH 71 @ BEE CREEK ROAD	0	0												16		2							2	0
277, SH 71 @ PEDERNALES SUMMIT PKWY	0	0												9	1								2	0
278, SH 71 @ SERENE HILLS/SWEETWATER	0	0												13		3							2	0
SHEET 4 SUBTOTAL	**0**	**0**	**200**	**10**	**19**	**10**	**38**	**10**	**19**	**0**	**0**	**19**	**0**	**455**	**53**	**11**	**10**	**150**	**150**	**19**	**19**	**8**	**92**	**0**

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DIST	COUNTY		SHEET NO.
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	LS	MO	SF	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	LF	LF	EA	EA	EA	EA	DAY
286, SH 71 @ SOUTHWEST PKWY	0	0												10									2	0
287, SH 71 @ THOMAS SPRING ROAD	0	0	21		2		4		2			2		12						2	2		2	0
288, US 290 @ OLD BEE CAVES RD	0	0												6	3								2	0
289, US 290 @ EL REY BLVD	0	0	10.5		1		2		1			1		6	2					1	1		2	0
290, US 290 @ SCENIC BROOK DRIVE	0	0	10.5		1		2		1			1		6						1	1		2	0
291, US 290 @ CIRCLE DRIVE EAST	0	0												12									2	0
292, US 290 @ CIRCLE DRIVE WEST	0	0	21	2	2	2	4	2	2			2		8	2		2	30	30	2	2		2	0
293, US 290 @ FITZHUGH ROAD	0	0	21		2		4		2			2		8						2	2		2	0
294, US 290 @ NUTTY BROWN ROAD	0	0	21		2		4		2			2		7	2					2	2		2	0
295, US 290 @ LEDGE STONE DR	0	0												8	2								2	0
296, US 290 @ BELTERRA DR / HERITAGE OAKS DR	0	0	21		2		4		2			2		7		2				2	2		2	0
297, US 290 @ SAWYER RANCH RD / POLO CLUB DR	0	0	21		2		4		2			2		15						2	2		2	0
298, US 290 @ TRAUTWEIN RD	0	0												9	1								2	0
299, US 290 @ SUNSET CANYON DRIVE	0	0	21		2		4		2			2		10						2	2		2	0
300, US 290 @ CANYONWOOD DR	0	0	21		2		4		2			2		10						2	2		2	0
301, US 290 @ HAYS COUNTRY ACRES RD	0	0												10	2	2							2	0
302, US 290 @ ROB SHELTON	0	0	21	2	2	2	4	2	2			2		6	2		2	30	30	2	2		2	0
303, US 290 @ RM 12	0	0												8	4	2							2	0
304, US 290 @ SPORTSPLEX DRIVE	0	0												7	4								2	0
305, US 290 @ MIGHTY TIGER	0	0												5	1	1							2	0
306, US 290 @ ROGER HANKS PKWY	0	0												1	4		5						2	0
307, US 290 @ MEADOW OAKS DR	0	0												6	4								2	0
308, US 290 @ BELL SPRINGS	0	0												8	2								2	0
310, RM 12 @ RM 150	0	0												10	2								2	0
311, RM 12 @ SPORTS PARK RD	0	0	10.5	1	1	1	2	1	1			1		8	3		1	15	15	1	1		2	0
312, RM 12 @ MERCER ST. (LP 64)	0	0												8									2	0
313, RM 12 @ DRIPPING SPRINGS ELEM SCHOOL	0	0	21		2		4		2			2		8	2					2	2		2	0
314, RM 12 @ FITZHUGH RD	0	0												10									2	0
316, RM 620 @ HUDSON BEND ROAD	0	0												8	4								2	0
317, RM 620 @ GENERAL WILLIAMSON DRIVE	0	0	10.5	1	1	1	2	1	1			1		8			1	15	15	1	1		2	0
318, RM 620 @ OAKGROVE BLVD	0	0												6	4							1	2	0
319, RM 620 @ DEBBA DRIVE	0	0	21		2		4		2			2		6	2					2	2		2	0
320, RM 620 @ KOLLMEYER DRIVE	0	0	10.5		1		2		1			1		5		1				1	1		2	0
321, RM 620 @ CLARA VAN	0	0	31.5	3	3	3	6	3	3			3		5		2	3	45	45	3	3		2	0
322, RM 620 @ LAKEWAY BLVD	0	0	21		2		4		2			2		6	2	2				2	2		2	0
323, RM 620 @ DAVE DR	0	0												6	1								2	0
324, RM 620 @ GLEN HEATHER DR	0	0	21	2	2	2	4	2	2			2		9		1	2	30	30	2	2		2	0
325, RM 620 @ LOHMANS CROSSING ROAD	0	0	21	3	2	3	4	3	2			2		8	2		3	45	45	2	2		2	0
326, RM 620 @ LOHMANS SPUR	0	0	21		2		4		2			2		8	2					2	2		2	0
327, RM 620 @ FLINT ROCK RD	0	0												12	1								2	0
328, RM 620 @ SPILLMAN LOOP / HONEYCREEK COURT	0	0	21		2		4		2			2		8	2	2				2	2		2	0
329, RM 620 @ ARIA DRIVE / CAVALIER DRIVE	0	0	10.5		1		2		1			1		8	2	1	1			1	1		2	0
335, RM 2244 @ W SENNA HILLS DR	0	0												10	1								2	0
336, RM 2244 @ CREEKS EDGE PKWY	0	0	10.5	1	1	1	2	1	1			1		5		1	1	15	15	1	1		2	0
337, RM 2244 @ PATTERSON DR	0	0	10.5	1	1	1	2	1	1			1		7			1	15	15	1	1		2	0
338, RM 2244 @ CUERNAVACA DR	0	0												8	2	2							2	0
SHEET 5 SUBTOTAL	**0**	**0**	**452**	**16**	**43**	**16**	**86**	**16**	**43**	**0**	**0**	**43**	**0**	**362**	**67**	**19**	**22**	**240**	**240**	**43**	**43**	**1**	**92**	**0**

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Austin District Maintenance Office

Texas Department of Transportation

QUANTITY SUMMARY

SHEET 5 OF 8

CONT	SECT	JOB	HIGHWAY
0914	00	459	VA
DIST	COUNTY		SHEET NO.
AUS	TRAVIS, ETC.		9

DATE: 9/15/2023 9:56:21 AM
FILE: 459_04_QUANTITY.dgn

SUMMARY OF TRAFFIC SIGNAL ITEMS

LOCATION	500 6001 MOBILIZATION	502 6001 BARRICADES, SIGNS AND TRAFFIC HANDLING	636 6001 ALUMINUM SIGNS (TY A)	682 6001 VEH SIG SEC (12") LED(GRN)	682 6002 VEH SIG SEC (12") LED(GRN ARW)	682 6003 VEH SIG SEC (12") LED(YEL)	682 6004 VEH SIG SEC (12") LED(YEL ARW)	682 6005 VEH SIG SEC (12") LED(RED)	682 6006 VEH SIG SEC (12")LED(RED ARW)	682 6013 VEH SIG SEC(12")LED(YEL ARW) (LENS ONLY)	682 6015 VEH SIG SEC(12")LED(RED ARW) (LENS ONLY)	682 6049 BACKPLATE W/REFL BRDR(4 SEC)	682 6050 BACKPLATE W/REFL BRDR(5 SEC)	682 6057 RETROFIT REFL BRDR SHEETING (3 SEC)	682 6058 RETROFIT REFL BRDR SHEETING (4 SEC)	682 6059 RETROFIT REFL BRDR SHEETING (5 SEC)	682 6060 BACKPLATE W/REFL BRDR(3 SEC)	684 6031 TRF SIG CBL (TYA) (14 AWG) (5 CONDR)	690 6011 INSTALL OF CABLES	690 6024 REMOVAL OF SIGNAL HEAD ASSM	690 6027 REMOVAL OF SIGNAL RELATED SIGNS	690 6139 REPL VEH SIG TUNNEL VISOR (12")	6001 6002 PORTABLE CHANGEABLE MESSAGE SIGN	6185 6002 TMA (STATIONARY)
	LS	MO	SF	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	LF	LF	EA	EA	EA	EA	DAY
339, RM 2244 @ MARLY WAY	0	0	10.5		1		2		1			1		8		1				1	1		2	0
340, RM 2244 @ WESTON LN S	0	0												10	2								2	0
341, RM 2244 @ BARTON CREEK BLVD	0	0	10.5	1	1	1	2	1	1			1		7		2	1	15	15	1	1		2	0
342, RM 2244 @ ROB ROY	0	0	10.5	1	1	1	2	1	1			1		6	1		1	15	15	1	1		2	0
343, RM 2244 @ DIMENSIONAL PLACE	0	0												12									2	0
344, RM 2244 @ CASTLE RIDGE ROAD	0	0												7	1	1							2	0
345, RM 2244 @ THE VILLAGE AT WESTLAKE	0	0	10.5		1		2		1			1		9						1	1		2	0
346, RM 2244 @ REDBUD TRAIL	0	0	21		2		4		2			2		8		1				2	2		2	0
347, RM 2244 @ THE HILLS DRIVEWAY	0	0	10.5	1	1	1	2	1	1			1		4		1	1	15	15	1	1		2	0
348, RM 2244 @ CAMP CRAFT RD	0	0	10.5	1	1	1	2	1	1			1		5		2	1	15	15	1	1		2	0
349, RM 2244 @ WESTLAKE DRIVE	0	0	21	1	2	1	4	1	2			2		9			1	15	15	2	2		2	0
350, RM 2244 @ WESTBANK DRIVE	0	0	21	2	2	2	4	2	2			2		9			2	30	30	2	2		2	0
351, RM 2244 @ BEAVER TRAIL / WESTWOOD TERRACE	0	0	21	2	2	2	4	2	2			2		8			2	30	30	2	2		2	0
352, RM 2244 @ WALSH TARLTON	0	0	42		4		8		4			4		6		1	1			4	4		2	0
353, RM 2244 @ ROLLINGWOOD DR	0	0	21	2	2	2	4	2	2			2		7			2	30	30	2	2		2	0
354, RM 2244 @ EDGEGROVE	0	0												10	3								2	0
357, SL 360 @ RM 2244	0	0												18									2	0
358, SL 360 @ LAS CIMAS PARKWAY	0	0										1		8	1		2					2	2	0
359, SL 360 @ LOST CREEK BLVD	0	0												10	2								2	0
360, SL 360 @ WESTBANK DRIVE	0	0												10	2	3							2	0
361, FM 1826 @ SLAUGHTER LN	0	0	10.5	1	1	1	2	1	1			1		7			1	15	15	1	1		2	0
362, SH 45 @ FM 1826	0	0												7									2	0
363, FM 1826 @ NUTTY BROWN	0	0	31.5	3	3	3	6	3	3			3		5			3	45	45	3	3		2	0
364, FM 1826 @ DARDEN HILL RD / CR 162	0	0												7									2	0
367, RM 967 @ CARPENTER HILL ELEM	0	0	10.5		1		2		1			1		5		2				1	1		2	0
368, RM 967 @ SHOTS PKWY (JOHNSON HIGH SCHOOL)	0	0												8	2								2	0
369, RM 967 @ BUDA SPORTSPLEX	0	0	10.5		1		2		1			1		6						1	1		2	0
370, FM 1626 @ BLISS SPILLAR ROAD	0	0	21		2		4		2			2		9						2	2		2	0
373, FM 1626 @ TWIN CREEK ROAD	0	0	10.5	1	1	1	2	1	1			1		4		1	1	15	15	1	1		2	0
374, FM 1626 @ S 1ST ST	0	0												7	3								2	0
375, FM 2304 @ FRATE BARKER ROAD	0	0												5	1	1							2	0
376, FM 2304 @ RAVENSCROFT DR	0	0										4					10						2	0
377, SH 21 @ FM 535	0	0												9	2								2	0
378, SH 21 @ VOSS PKWY	0	0												9	1								2	0
379, SH 21 @ FM 1209	0	0												8	2								2	0
380, SH 71 @ TUCKER HILL LN	0	0												10	2								2	0
381, SH 71 @ POPE BEND RD	0	0												10	2								2	0
382, SH 71 @ FM 1209	0	0												10	2								2	0
383, SH 71 @ SH 304	0	0	10.5	1	1	1	2	1	1			1		12	1		1	15	15	1	1		2	0
384, SH 304 @ HOME DEPOT WAY/ AGNES ST- 4TH LEG	0	0												8	4								2	0
385, SH 304 @ HUNTERS POINT DR	0	0												7	4								2	0
386, SH 71 @ HASLER BLVD	0	0												12	2								2	0
387, SL 150 @ ESKEW STREET	0	0	31.5	3	3	3	6	3	3			3		5			3	45	45	3	3		2	0
388, SL 150 @ MAIN STREET	0	0	21	2	2	2	4	2	2			2		6			2	30	30	2	2		2	0
389, SL 150 @ PECAN STREET	0	0	21	2	2	2	4	2	2			2		6			2	30	30	2	2		2	0
390, SH 21 @ JACKSON (SH 95)	0	0												12									2	0
SHEET 6 SUBTOTAL	**0**	**0**	**389**	**24**	**37**	**24**	**74**	**24**	**37**	**0**	**0**	**42**	**0**	**365**	**40**	**16**	**37**	**360**	**360**	**37**	**37**	**2**	**92**	**0**

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QUANTITY SUMMARY

CONT	SECT	JOB	HIGHWAY
0914	00	459	VA
DIST	COUNTY		SHEET NO.
AUS	TRAVIS, ETC.		10

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SUMMARY OF TRAFFIC SIGNAL ITEMS

LOCATION	500 6001 MOBILIZATION	502 6001 BARRICADES, SIGNS AND TRAFFIC HANDLING	636 6001 ALUMINUM SIGNS (TY A)	682 6001 VEH SIG SEC (12") LED(GRN)	682 6002 VEH SIG SEC (12") LED(GRN ARW)	682 6003 VEH SIG SEC (12") LED(YEL)	682 6004 VEH SIG SEC (12") LED(YEL ARW)	682 6005 VEH SIG SEC (12") LED(RED)	682 6006 VEH SIG SEC (12")LED(RED ARW)	682 6013 VEH SIG SEC(12")LED(YEL ARW) (LENS ONLY)	682 6015 VEH SIG SEC(12")LED(RED ARW) (LENS ONLY)	682 6049 BACKPLATE W/REFL BRDR(4 SEC)	682 6050 BACKPLATE W/REFL BRDR(5 SEC)	682 6057 RETROFIT REFL BRDR SHEETING (3 SEC)	682 6058 RETROFIT REFL BRDR SHEETING (4 SEC)	682 6059 RETROFIT REFL BRDR SHEETING (5 SEC)	682 6060 BACKPLATE W/REFL BRDR(3 SEC)	684 6031 TRF SIG CBL (TY A)(14 AWG)(5 CONDR)	690 6011 INSTALL OF CABLES	690 6024 REMOVAL OF SIGNAL HEAD ASSM	690 6027 REMOVAL OF SIGNAL RELATED SIGNS	690 6139 REPL VEH SIG TUNNEL VISOR (12")	6001 6002 PORTABLE CHANGEABLE MESSAGE SIGN	6185 6002 TMA (STATIONARY)
	LS	MO	SF	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	LF	LF	EA	EA	EA	EA	DAY
391, SH 21 @ LP 150	0	0	21		2		4		2			2		11						2	2		2	0
392, SH 71 @ TAHITIAN DRIVE	0	0	21	2	2	2	4	2	2			2		12			2	30	30	2	2		2	0
393, SH 71 @ SH 21	0	0												15	2								2	0
394, SH 95 @ HAWTHORNE	0	0	21	2	2	2	4	2	2			2		5	2		2	30	30	2	2		2	0
395, SH 95 @ FM 1441	0	0												7									2	0
397, SH 95 @ PERSHING	0	0												5	1	1							2	0
398, US 290 @ SH 95 S	0	0												6	4								2	0
399, US 290 @ SL 109/ HARRIS ST	0	0												7	4								2	0
400, US 290 @ 11TH STREET	0	0												8	2								2	0
401, US 290 @ SH 95 N (SARATOGA FARMS BLVD)	0	0												12		2							2	0
402, SH 95 @ FM 1100	0	0	21	1	2	1	4	1	2			2		6		1	1	15	15	2	2		2	0
403, SL 109 @ FM 3000	0	0												8									2	0
404, SL 230 @ MAIN STREET	0	0												8									2	0
405, SH 95 @ SL 230	0	0	10.5		1		2		1			1		8						1	1		2	0
406, SH 95 @ FM 535	0	0												8	3								2	0
407, US 290 @ FM 2336	0	0												8	2								2	0
408, US 290 @ SH 21	0	0	21	2	2	2	4	2	2			2		14			2	30	30	2	2		2	0
409, US 290 @ US 77 (MAIN STREET)	0	0												8	4								2	0
410, US 290 @ LEON STREET	0	0												8	2								2	0
411, US 290 @ FM 141 (ORANGE STREET)	0	0												8	2								2	0
412, US 290 @ WALMART / GIDDINGS	0	0												8	1								2	0
413, US 290 @ BLUEBONNET COOP (CEFCO)	0	0												8	2								2	0
414, US 290 @ JAMES A TURMAN ROAD/ CR 226	0	0	21	2	2	2	4	2	2			2		4	3	1	2	30	30	2	2		2	0
415, US 77 @ RM 2440 (INDEPENDENCE ST)	0	0	21		2		4		2			2		6	2					2	2		2	0
417, FM 973 @ PEARCE LANE	0	0	10.5		1		2		1			1		6						1	1		2	0
418, FM 973 @ BURLESON ROAD	0	0												11	4								2	0
420, US 183 @ FM 812 (DG COLLINS ROAD)	0	0												9	2								2	0
421, US 183 @ WILLIAM CANNON DR / FM 1625	0	0												9		1							2	0
422, US 183 @ MCKENZIE RD	0	0												9	4								2	0
423, US 183 @ FM 973	0	0												8									2	0
424, US 183 @ FM 1327	0	0	10.5	1	1	1	2	1	1			1		7			1	15	15	1	1		2	0
426, FM 1327 @ FM 1625	0	0												10	2								2	0
427, FM 1327 @ TURNERSVILLE ROAD N	0	0												7		1							2	0
428, IH 35 @ LP 4 (MAIN STREET)	0	0												16	2								2	0
429, IH 35 @ FM 2001	0	0	21		2		4		2			2		15						2	2		2	0
439, SH 21 @ RM 150	0	0	10.5	1	1	1	2	1	1			1		6			2	15	15	1	1		2	0
440, SH 21 @ FM 2720 (OLD LOCKHART RD)	0	0												8	1							1	2	0
443, SH 21 @ FM 2001	0	0												6	1								2	0
444, SH 130 @ SH 21	0	0												14	2								2	0
445, SH 21 @ FM 1854	0	0												8	2								2	0
446, FM 2001 @ WINDY HILL RD	0	0	10.5	1	1	1	2	1	1			1		9			1	15	15	1	1		2	0
447, RM 967 @ LP 4 (MAIN ST)	0	0												6	1								2	0
448, RM 967 @ REMUDA TRAIL/ GARLIC CREEK	0	0												8	2								2	0
449, FM 1626 @ FM 967	0	0												12	4	3							2	0
450, FM 1626 @ OYSTER CREEK	0	0												5	1	1							2	0
459, RM 2325 @ VALLEY SPRINGS RD	0	0												8	2								2	0
SHEET 7 SUBTOTAL	**0**	**0**	**221**	**12**	**21**	**12**	**42**	**12**	**21**	**0**	**0**	**21**	**0**	**395**	**66**	**11**	**13**	**180**	**180**	**21**	**21**	**1**	**92**	**0**

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QUANTITY SUMMARY

CONT	SECT	JOB	HIGHWAY
0914	00	459	VA
DIST	COUNTY		SHEET NO.
AUS	TRAVIS, ETC.		11

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SUMMARY OF TRAFFIC SIGNAL ITEMS

LOCATION	500 6001 MOBILIZATION	502 6001 BARRICADES, SIGNS AND TRAFFIC HANDLING	636 6001 ALUMINUM SIGNS (TY A)	682 6001 VEH SIG SEC (12") LED (GRN)	682 6002 VEH SIG SEC (12") LED (GRN ARW)	682 6003 VEH SIG SEC (12") LED (YEL)	682 6004 VEH SIG SEC (12") LED (YEL ARW)	682 6005 VEH SIG SEC (12") LED (RED)	682 6006 VEH SIG SEC (12") LED (RED ARW)	682 6013 VEH SIG SEC (12") LED (YEL ARW) (LENS ONLY)	682 6015 VEH SIG SEC (12") LED (RED ARW) (LENS ONLY)	682 6049 BACKPLATE W/REFL BRDR (4 SEC)	682 6050 BACKPLATE W/REFL BRDR (5 SEC)	682 6057 RETROFIT REFL BRDR SHEETING (3 SEC)	682 6058 RETROFIT REFL BRDR SHEETING (4 SEC)	682 6059 RETROFIT REFL BRDR SHEETING (5 SEC)	682 6060 BACKPLATE W/REFL BRDR (3 SEC)	684 6031 TRF SIG CBL (TY A) (14 AWG) (5 CONDR)	690 6011 INSTALL OF CABLES	690 6024 REMOVAL OF SIGNAL HEAD ASSM	690 6027 REMOVAL OF SIGNAL RELATED SIGNS	690 6139 REPL VEH SIG TUNNEL VISOR (12")	6001 6002 PORTABLE CHANGEABLE MESSAGE SIGN	6185 6002 TMA (STATIONARY)
	LS	MO	SF	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	LF	LF	EA	EA	EA	EA	DAY
460, RM 2325 @ JACOBS WELL RD	0	0												7	1	1							2	0
461, RM 2325 @ CARNEY LANE	0	0												9									2	0
462, RM 2325 @ GREEN ACRES DRIVE	0	0												8	1								2	0
463, RM 12 @ WOODCREEK DR/ WINTERS MILL	0	0												4	1								2	0
464, RM 12 @ RM 2325	0	0	21		2		4		2			2		6	2						2	2	2	0
465, RM 12 @ RIVER ROAD	0	0	10.5		1		2		1			1		7	2						1	1	2	0
467, RM 12 @ CR 1492	0	0												7	1								2	0
468, RM 12 @ RM 32	0	0												9									2	0
470, SH 123 @ RM 12 WONDER WORLD	0	0	21		2		4		2			2		14							2	2	2	0
471, SH 123 @ FM 110 (EBFR & WBFR)	0	0												12	2								2	0
472, FM 621 @ CR 266 (OLD BASTROP HWY)	0	0												8	2								2	0
473, SH 80 @ FM 1984	0	0												9	4								2	0
474, SH 80 @ SH 142	0	0	21		2		4		2			2		8							2	2	2	0
477, US 183 @ BUCEE'S DRIVE	0	0												9									2	0
478, US 183 @ IH 10	0	0										2		15									2	0
479, US 183 @ BEST WESTERN	0	0												14	2								2	0
480, US 183 @ US 90	0	0												4	4								2	0
481, US 183 @ SH 80 (AUSTIN ST)	0	0												7		1							2	0
482, US 183 @ WALMART DRIVEWAY IN LOCKHART	0	0												6	1								2	0
483, US 183 @ MLK JR INDUSTRIAL BLVD	0	0												5	4	1							2	0
484, US 183 @ CIVIC CENTER	0	0	21	2	2	2	4	2	2			2		6			2	30	30	2	2		2	0
485, US 183 @ FM 20 WEST	0	0	21	2	2	2	4	2	2			2		6			2	30	30	2	2		2	0
486, US 183 @ FM 20 EAST	0	0	21	2	2	2	4	2	2			2		6			2	30	30	2	2		2	0
487, FM 20 @ MEDINA ST	0	0												8									2	0
488, FM 20 @ GUADALUPE ST	0	0												4		2							2	0
489, US 183 @ HICKORY ST	0	0	21	2	2	2	4	2	2			2		6			2	30	30	2	2		2	0
490, US 183 @ PRAIRIE LEA ST	0	0	21	2	2	2	4	2	2			2		6			2	30	30	2	2		2	0
491, US 183 @ SH 142 (SAN ANTONIO)	0	0	21	2	2	2	4	2	2			2		6			2	30	30	2	2		2	0
492, US 183 @ FM 672 (FLORES STREET)	0	0	21		2		4		2			2		8							2	2	2	0
493, US 183 @ FM 2001	0	0												7	1								2	0
494, SH 142 @ BLANCO STREET	0	0												8									2	0
495, SH 142 @ MOCKINGBIRD	0	0												6		2							2	0
SHEET 8 SUBTOTAL	**0**	**0**	**221**	**12**	**21**	**12**	**42**	**12**	**21**	**0**	**0**	**23**	**0**	**245**	**28**	**7**	**12**	**180**	**180**	**21**	**21**	**0**	**64**	**0**
PROJECTWIDE	1	11																						168
PROJECTWIDE SUBTOTAL	**1**	**11**																						**168**
PROJECT TOTALS	**1**	**11**	**3035**	**115**	**283**	**115**	**566**	**115**	**283**	**12**	**6**	**290**	**1**	**2932**	**358**	**97**	**144**	**1725**	**1725**	**283**	**289**	**13**	**708**	**168**

NOTE: REMOVAL OF ANY EXISTING SIGNAL HEAD THAT IS TO BE REPLACED SHALL BE CONSIDERED SUBSIDIARY TO THAT BID ITEM.

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Austin District Maintenance Office

Texas Department of Transportation

QUANTITY SUMMARY

CONT	SECT	JOB	HIGHWAY
0914	00	459	VA
DIST	COUNTY		SHEET NO.
AUS	TRAVIS, ETC.		12

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LOCATION	CORRIDOR	CROSS STREET	LATITUDE	LONGITUDE	NB BACKPLATE UPGRADES	NB LEFT TURN UPGRADES	SB BACKPLATE UPGRADES	SB LEFT TURN UPGRADES	EB BACKPLATE UPGRADES	EB LEFT TURN UPGRADES	WB BACKPLATE UPGRADES	WB LEFT TURN UPGRADES	N/EB (INTERNAL) BACKPLATE UPGRADES	N/EB (INTERNAL) LEFT TURN UPGRADES	S/WB (INTERNAL) BACKPLATE UPGRADES	S/WB (INTERNAL) LEFT TURN UPGRADES
2, SH 16 @ SH 29	SH 16	SH 29	30.75936	-98.67533	2 - Retrofit		2 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA				
3, SH 16 @ RM 152 (MAIN STREET)	SH 16	RM 152 (MAIN STREET)	30.75021	-98.67617	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	2 - Retrofit							
4, SH 16 @ SANDSTONE STREET	SH 16	SANDSTONE STREET	30.74916	-98.67578	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	2 - Retrofit		2 - Retrofit					
5, SH 16 @ OLLIE STREET	SH 16	OLLIE STREET	30.74343	-98.67575	2 - Retrofit		2 - Retrofit		2 - Retrofit		2 - Retrofit					
7, SH 29 @ RM 1431	SH 29	RM 1431	30.73338	-98.46575	2 - Retrofit		2 - Retrofit		3 - Retrofit		3 - Retrofit					
8, RM 1431 @ RM 2545	RM 1431	RM 2545	30.66676	-98.45056	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit		2 - Retrofit					
9, RM 1431 @ RM 2900	RM 1431	RM 2900	30.65929	-98.44395	3 - Retrofit		2 - Retrofit		3 - Retrofit		3 - Retrofit					
10, RM 1431 @ FM 2342	RM 1431	FM 2342	30.65715	-98.42596			2 - Retrofit		1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	2 - Retrofit					
11, RM 1431 @ PHILIPS RANCH (HA BARNETT DR)	RM 1431	PHILIPS RANCH (HA BARNETT DR)	30.60547	-98.37119	3 - Retrofit		2 - Retrofit; 1 - Add		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA				
12, RM 1431 @ PRAIRIE CREEK RD	RM 1431	PRAIRIE CREEK RD	30.60331	-98.35969	2 - Retrofit				2 - Retrofit		3 - Retrofit					
13, RM 1431 @ VALLEY VIEW LN (CR 416)	RM 1431	VALLEY VIEW LN (CR 416)	30.60155	-98.34734	2 - Retrofit				2 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA				
14, RM 1431 @ FM 1980	RM 1431	FM 1980	30.59393	-98.30757			2 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit					
15, RM 1431 @ AVENUE U	RM 1431	AVENUE U	30.58511	-98.28650	2 - Retrofit		2 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal				
16, RM 1431 @ AVENUE Q (NORTHWOOD)	RM 1431	AVENUE Q (NORTHWOOD)	30.58282	-98.28159	2 - Retrofit		2 - Retrofit		1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal				
17, RM 1431 @ HEB DRIVEWAY	RM 1431	HEB DRIVEWAY	30.58157	-98.27973	2 - Retrofit		2 - Retrofit		3 - Retrofit		3 - Retrofit					
18, RM 1431 @ AVENUE N (BLUEBONNET)	RM 1431	AVENUE N (BLUEBONNET)	30.58090	-98.27843	2 - Retrofit		2 - Retrofit		3 - Retrofit		3 - Retrofit					
19, RM 1431 @ MUSTANG DR	RM 1431	MUSTANG DR	30.57692	-98.25790			2 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	3 - Retrofit					
21, SH 71 @ FM 2147	SH 71	FM 2147	30.51968	-98.40957			2 - Retrofit		4 - Retrofit		2 - Retrofit					
22, RM 2147 @ DUTCH LEMING	RM 2147	DUTCH LEMING	30.54899	-98.32283			2 - Retrofit		1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	2 - Retrofit					
24, US 281 @ MAX STARKE DAM RD	US 281	MAX STARKE DAM RD	30.55612	-98.27372	3 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	4 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit		2 - Retrofit					
25, US 281 @ 2ND STREET	US 281	2ND STREET	30.57026	-98.27614	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit		2 - Retrofit					
26, US 281 @ 3RD STREET	US 281	3RD STREET	30.57137	-98.27595	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit		2 - Retrofit					
27, US 281 @ 6TH STREET	US 281	6TH STREET	30.57406	-98.27434	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit		2 - Retrofit					

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Austin District Maintenance Office

Texas Department of Transportation

LOCATION SUMMARY

SHEET 1 OF 14

CONT	SECT	JOB	HIGHWAY
0914	00	459	VA
DIST	COUNTY		SHEET NO.
AUS	TRAVIS, ETC.		13

LOCATION	CORRIDOR	CROSS STREET	LATITUDE	LONGITUDE	NB BACKPLATE UPGRADES	NB LEFT TURN UPGRADES	SB BACKPLATE UPGRADES	SB LEFT TURN UPGRADES	EB BACKPLATE UPGRADES	EB LEFT TURN UPGRADES	WB BACKPLATE UPGRADES	WB LEFT TURN UPGRADES	N/EB (INTERNAL) BACKPLATE UPGRADES	N/EB (INTERNAL) LEFT TURN UPGRADES	S/WB (INTERNAL) BACKPLATE UPGRADES	S/WB (INTERNAL) LEFT TURN UPGRADES
28, US 281 @ 7TH STREET	US 281	7TH STREET	30.57510	-98.27398	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit		2 - Retrofit					
29, US 281 @ RM 1431	US 281	RM 1431	30.57831	-98.27313	3 - Retrofit		3 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA				
30, US 281 @ MISSION HILLS / MORMAN MILL	US 281	MISSION HILLS / MORMAN MILL	30.58171	-98.27325	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit		2 - Retrofit					
31, US 281 @ LANTANA	US 281	LANTANA	30.58867	-98.27329	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit		2 - Retrofit					
32, US 281 @ COMMERCE ST	US 281	COMMERCE ST	30.59148	-98.27291	3 - Retrofit		3 - Retrofit		2 - Retrofit		2 - Retrofit					
33, US 281 @ STATE ST (COLT)	US 281	STATE ST (COLT)	30.59415	-98.27167	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit		2 - Retrofit					
34, US 281 @ NATURE HEIGHTS DRIVE	US 281	NATURE HEIGHTS DRIVE	30.59941	-98.26916	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit		2 - Retrofit					
35, US 281 @ RESOURCE PKWY	US 281	RESOURCE PKWY	30.61921	-98.26649	5 - Retrofit		5 - Retrofit		2 - Retrofit		2 - Retrofit					
36, US 281 @ RM 1855	US 281	RM 1855	30.64114	-98.26055	4 - Retrofit		3 - Retrofit		2 - Retrofit							
38, US 281 @ OAK VISTA BLVD/ DEL SPRINGS BLVD	US 281	OAK VISTA BLVD/ DEL SPRINGS BLVD	30.72832	-98.24024	3 - Retrofit		3 - Retrofit		2 - Retrofit							
39, US 281 @ CR 340A	US 281	CR 340A	30.73197	-98.23827	3 - Retrofit		3 - Retrofit		2 - Retrofit		3 - Retrofit					
40, US 281 @ HOUSTON CLINTON DRIVE	US 281	HOUSTON CLINTON DRIVE	30.74451	-98.23185	3 - Retrofit		3 - Retrofit		3 - Retrofit		2 - Retrofit					
41, US 281 @ PECAN STREET	US 281	PECAN STREET	30.75240	-98.22767	3 - Retrofit		3 - Retrofit		2 - Retrofit		2 - Retrofit					
42, US 281 @ JACKSON STREET	US 281	JACKSON STREET	30.75641	-98.22817	3 - Retrofit		3 - Retrofit		2 - Retrofit		2 - Retrofit					
43, US 281 @ SH 29	US 281	SH 29	30.75841	-98.22897	3 - Retrofit		3 - Retrofit		3 - Retrofit		3 - Retrofit					
44, US 281 @ RM 963 (EAST GRAVES ST)	US 281	RM 963 (EAST GRAVES ST)	30.76782	-98.23134	2 - Retrofit		3 - Retrofit				2 - Retrofit					
45, US 281 @ GREEN MILE (CR 108)	US 281	GREEN MILE (CR 108)	30.77880	-98.23372	3 - Retrofit		3 - Retrofit		2 - Retrofit		2 - Retrofit					
47, SH 29 @ FM 3509	SH 29	FM 3509	30.76077	-98.26243	2 - Retrofit				3 - Retrofit		3 - Retrofit					
48, SH 29 @ PIERCE ST	SH 29	PIERCE ST	30.75862	-98.22683	2 - Retrofit		2 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA				
49, SH 29 @ RHOMBERG	SH 29	RHOMBERG	30.75950	-98.22105	2 - Retrofit		2 - Retrofit		1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal				
50, SH 29 @ HILL ST	SH 29	HILL ST	30.76005	-98.21838	2 - Retrofit		2 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit; 1 - Add	Upgrade Left Turn Signal & Sign to FYA				
51, SH 29 @ RM 243 / RM 1174 / GRANGE STREET	SH 29	RM 243 / RM 1174 / GRANGE STREET	30.74423	-98.05538	2 - Retrofit		2 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA				
52, SH 29 @ LIBERTY HILL HS	SH 29	LIBERTY HILL HS	30.68061	-97.95431			2 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	2 - Retrofit					
55, SH 29 @ BRONCO BLVD	SH 29	BRONCO BLVD	30.67172	-97.91834	2 - Retrofit		2 - Retrofit		3 - Retrofit		3 - Retrofit					
56, SH 29 @ RM 1869	SH 29	RM 1869	30.66789	-97.91150	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	3 - Retrofit		3 - Retrofit					
57, SH 29 @ LIBERTY HILL JR HS	SH 29	LIBERTY HILL JR HS	30.66340	-97.90246	2 - Retrofit		2 - Retrofit		3 - Retrofit		1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal				
61, US 183A @ RM 2243	US 183A	RM 2243	30.58287	-97.83594	3 - Retrofit		3 - Retrofit		2 - Retrofit		3 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA
108, US 183 @ SH 29	US 183	SH 29	30.65403	-97.87697	4 - Retrofit		3 - Retrofit		3 - Retrofit		3 - Retrofit		3 - Retrofit		3 - Retrofit	

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LOCATION SUMMARY

CONT	SECT	JOB	HIGHWAY
0914	00	459	VA
DIST	COUNTY		SHEET NO.
AUS	TRAVIS, ETC.		14

LOCATION	CORRIDOR	CROSS STREET	LATITUDE	LONGITUDE	NB BACKPLATE UPGRADES	NB LEFT TURN UPGRADES	SB BACKPLATE UPGRADES	SB LEFT TURN UPGRADES	EB BACKPLATE UPGRADES	EB LEFT TURN UPGRADES	WB BACKPLATE UPGRADES	WB LEFT TURN UPGRADES	N/EB (INTERNAL) BACKPLATE UPGRADES	N/EB (INTERNAL) LEFT TURN UPGRADES	S/WB (INTERNAL) BACKPLATE UPGRADES	S/WB (INTERNAL) LEFT TURN UPGRADES
109, US 183 @ WHITEWING DR / LARKSPUR	US 183	WHITEWING DR / LARKSPUR	30.62801	-97.86373	3 - Retrofit		3 - Retrofit		2 - Retrofit		2 - Retrofit		1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal
118, RM 1431 @ PARK DR/ JONESTOWN ST	RM 1431	PARK DR/ JONESTOWN ST	30.49252	-97.92363	4 - Retrofit		4 - Retrofit		3 - Retrofit		3 - Retrofit					
119, RM 1431 @ NAMELESS ROAD	RM 1431	NAMELESS ROAD	30.51131	-97.91150	3 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	3 - Retrofit		2 - Retrofit							
120, RM 1431 @ TRAVISSO PKWY	RM 1431	TRAVISSO PKWY	30.51907	-97.90250	2 - Retrofit		3 - Retrofit		4 - Retrofit		5 - Retrofit					
121, RM 1431 @ TRAILS END RD	RM 1431	TRAILS END RD	30.51216	-97.88527	2 - Retrofit				4 - Retrofit		4 - Retrofit					
122, RM 1431 @ SAM BASS	RM 1431	SAM BASS	30.54450	-97.76036	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	7 - Retrofit		5 - Retrofit					
123, RM 1431 @ ROYAL VISTA BLVD	RM 1431	ROYAL VISTA BLVD	30.54544	-97.75632			2 - Retrofit		3 - Retrofit		2 - Retrofit					
125, RM 1431 @ MAYFIELD RANCH BLVD	RM 1431	MAYFIELD RANCH BLVD	30.54893	-97.74213			2 - Retrofit		3 - Retrofit		2 - Retrofit					
126, RM 1431 @ SENDERO SPRINGS	RM 1431	SENDERO SPRINGS	30.55011	-97.73803	2 - Retrofit		2 - Retrofit		3 - Retrofit		3 - Retrofit					
127, RM 1431 @ STONE OAK DRIVE	RM 1431	STONE OAK DRIVE	30.55206	-97.73279	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	3 - Retrofit		3 - Retrofit					
129, RM 620 @ QUINLAN PARK	RM 620	QUINLAN PARK	30.38962	-97.88201	3 - Retrofit				3 - Retrofit		5 - Retrofit					
130, RM 620 @ COMANCHE TRAIL	RM 620	COMANCHE TRAIL	30.39424	-97.86890			3 - Retrofit		3 - Retrofit		3 - Retrofit					
131, RM 620 @ STEINER RANCH BLVD	RM 620	STEINER RANCH BLVD	30.39467	-97.86643	2 - Retrofit				2 - Retrofit		4 - Retrofit					
134, RM 620 @ CORNERWOOD DRIVE	RM 620	CORNERWOOD DRIVE	30.48778	-97.73019	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit; 1 - Add	Upgrade Left Turn Signal & Sign to FYA	3 - Retrofit		2 - Retrofit					
135, RM 620 @ GREAT OAKS DR	RM 620	GREAT OAKS DR	30.49370	-97.72532	3 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	3 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	4 - Retrofit		4 - Retrofit					
136, RM 620 @ O'CONNOR	RM 620	O'CONNOR	30.49918	-97.72135	5 - Retrofit		6 - Retrofit		4 - Retrofit		4 - Retrofit					
137, RM 620 @ OAKLANDS DR	RM 620	OAKLANDS DR	30.51138	-97.70720			3 - Retrofit		4 - Retrofit		5 - Retrofit					
138, SH 45 @ RM 620	SH 45	RM 620	30.48129	-97.74312			4 - Retrofit		3 - Retrofit		2 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	
139, SH 45 @ O'CONNER	SH 45	O'CONNER	30.48034	-97.71881			3 - Retrofit		3 - Retrofit		2 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	
140, SH 45 @ MCNEIL RD	SH 45	MCNEIL RD	30.47718	-97.70580	1 - Retrofit; 1 - Add		1 - Retrofit; 1 - Add		2 - Retrofit				2 - Retrofit; 1 - Add		2 - Retrofit	
144, FM 1660 @ COCKRILL	FM 1660	COCKRILL	30.56261	-97.54350	3 - Retrofit		3 - Retrofit		3 - Retrofit		3 - Retrofit					
145, FM 1660 @ LIMMER LOOP	FM 1660	LIMMER LOOP	30.55862	-97.54431	3 - Retrofit		2 - Retrofit		1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal				
146, FM 1660 @ CR 136/MAGER LN	FM 1660	CR 136/MAGER LN	30.55169	-97.54479	2 - Retrofit		3 - Retrofit		3 - Retrofit		3 - Retrofit					
147, FM 1660 @ CARL STERN	FM 1660	CARL STERN	30.53296	-97.54378	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal				
148, FM 1660 @ CR 137	FM 1660	CR 137	30.52018	-97.54359	2 - Retrofit				3 - Retrofit		4 - Retrofit					
149, FM 685 @ CARL STERN DR	FM 685	CARL STERN DR	30.53494	-97.56396	3 - Retrofit		3 - Retrofit		3 - Retrofit		3 - Retrofit					
151, FM 685 @ RIVERWALK DR	FM 685	RIVERWALK DR	30.52528	-97.56725	3 - Retrofit		3 - Retrofit				2 - Retrofit					
152, FM 685 @ GREAT WESTERN DR	FM 685	GREAT WESTERN DR	30.52056	-97.57018	3 - Retrofit		3 - Retrofit		2 - Retrofit		2 - Retrofit					

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Texas Department of Transportation

LOCATION SUMMARY

CONT	SECT	JOB	HIGHWAY
0914	00	459	VA
DIST	COUNTY		SHEET NO.
AUS	TRAVIS, ETC.		15

LOCATION	CORRIDOR	CROSS STREET	LATITUDE	LONGITUDE	NB BACKPLATE UPGRADES	NB LEFT TURN UPGRADES	SB BACKPLATE UPGRADES	SB LEFT TURN UPGRADES	EB BACKPLATE UPGRADES	EB LEFT TURN UPGRADES	WB BACKPLATE UPGRADES	WB LEFT TURN UPGRADES	N/EB (INTERNAL) BACKPLATE UPGRADES	N/EB (INTERNAL) LEFT TURN UPGRADES	S/WB (INTERNAL) BACKPLATE UPGRADES	S/WB (INTERNAL) LEFT TURN UPGRADES
153, SH 130 @ STAR RANCH/ FM 685 (CHRIS KELLEY)	SH 130	STAR RANCH/ FM 685 (CHRIS KELLEY)	30.51346	-97.57576	2 - Retrofit		2 - Retrofit		2 - Retrofit		3 - Retrofit		1 - Add	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	2 - Retrofit	
154, SH 130 @ US 79	SH 130	US 79	30.53872	-97.57640	4 - Retrofit; 1 - Add		4 - Retrofit		2 - Retrofit		2 - Retrofit		2 - Retrofit		2 - Retrofit	
155, US 79 @ FM 685	US 79	FM 685	30.54010	-97.56252	4 - Retrofit		4 - Retrofit		3 - Retrofit		4 - Retrofit					
156, US 79 @ EXCHANGE BOULEVARD	US 79	EXCHANGE BOULEVARD	30.54164	-97.55540			2 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit					
158, US 79 @ FM 1660 NORTH	US 79	FM 1660 NORTH	30.54321	-97.54650	2 - Retrofit		2 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA				
159, US 79 @ FM 1660 SOUTH	US 79	FM 1660 SOUTH	30.54380	-97.54223	2 - Retrofit				2 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA				
160, US 79 @ FM 973	US 79	FM 973	30.55324	-97.42690	2 - Retrofit		2 - Retrofit		4 - Retrofit		4 - Retrofit					
161, US 79 @ CR 424 (BOUNDS)	US 79	CR 424 (BOUNDS)	30.59150	-97.29699	2 - Retrofit		2 - Retrofit		3 - Retrofit		3 - Retrofit					
162, FM 397 @ LAKE DR	FM 397	LAKE DR	30.57430	-97.43938	2 - Retrofit		2 - Retrofit		2 - Retrofit		2 - Retrofit					
163, FM 397 @ MALLARD LN	FM 397	MALLARD LN	30.58398	-97.44107	2 - Retrofit		2 - Retrofit				2 - Retrofit					
164, FM 397 @ NORTH DR	FM 397	NORTH DR	30.59613	-97.43311	2 - Retrofit		2 - Retrofit		1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal				
165, FM 397 @ BILL PICKETT TRL	FM 397	BILL PICKETT TRL	30.59844	-97.42540	2 - Retrofit		2 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA				
166, SH 95 @ CHANDLER RD	SH 95	CHANDLER RD	30.61559	-97.42265	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	3 - Retrofit		2 - Retrofit							
167, SH 95 @ FM 397	SH 95	FM 397	30.60121	-97.41710	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit		3 - Retrofit							
168, SH 95 @ T.H. JOHNSON	SH 95	T.H. JOHNSON	30.59622	-97.41483	3 - Retrofit		2 - Retrofit		2 - Retrofit		2 - Retrofit					
169, SH 95 @ MALLARD LANE	SH 95	MALLARD LANE	30.59284	-97.41305	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	3 - Retrofit		2 - Retrofit							
170, SH 95 @ LAKE DRIVE	SH 95	LAKE DRIVE	30.58326	-97.41110	3 - Retrofit		3 - Retrofit		2 - Retrofit		2 - Retrofit					
171, SH 95 @ 7TH STREET	SH 95	7TH STREET	30.57358	-97.40986	2 - Retrofit		2 - Retrofit		2 - Retrofit		2 - Retrofit					
172, SH 95 @ 5TH STREET	SH 95	5TH STREET	30.57150	-97.41008	2 - Retrofit		2 - Retrofit		2 - Retrofit		2 - Retrofit					
173, SH 95 @ 4TH STREET	SH 95	4TH STREET	30.57085	-97.40960	2 - Retrofit		2 - Retrofit		2 - Retrofit		2 - Retrofit					
174, SH 95 @ 3RD STREET	SH 95	3RD STREET	30.56964	-97.40942	2 - Retrofit		2 - Retrofit		2 - Retrofit		2 - Retrofit					
175, SH 95 @ 2ND STREET	SH 95	2ND STREET	30.56881	-97.40971	4 - Retrofit		3 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit		2 - Retrofit					
176, SH 95 @ FM 112 (WALNUT)	SH 95	FM 112 (WALNUT)	30.56482	-97.40873	3 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	4 - Retrofit		2 - Retrofit		2 - Retrofit					
177, SH 16 @ FRIENDSHIP / FM 2093	SH 16	FRIENDSHIP / FM 2093	30.25155	-98.89459	2 - Retrofit; 1 - Add	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit; 1 - Add	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA				
178, SH 16 @ MILAM STREET	SH 16	MILAM STREET	30.26048	-98.88360	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA				
179, SH 16 @ HIGHWAY STREET	SH 16	HIGHWAY STREET	30.26212	-98.88044	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit		3 - Retrofit					
180, SH 16 @ WINDCREST ST	SH 16	WINDCREST ST	30.26412	-98.87861	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	3 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit		2 - Retrofit					

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TBPE Registration Number: F-3531

Austin District Maintenance Office

Texas Department of Transportation

LOCATION SUMMARY

SHEET 4 OF 14

CONT	SECT	JOB	HIGHWAY
0914	00	459	VA
DIST	COUNTY		SHEET NO.
AUS	TRAVIS, ETC.		16

LOCATION	CORRIDOR	CROSS STREET	LATITUDE	LONGITUDE	NB BACKPLATE UPGRADES	NB LEFT TURN UPGRADES	SB BACKPLATE UPGRADES	SB LEFT TURN UPGRADES	EB BACKPLATE UPGRADES	EB LEFT TURN UPGRADES	WB BACKPLATE UPGRADES	WB LEFT TURN UPGRADES	N/EB (INTERNAL) BACKPLATE UPGRADES	N/EB (INTERNAL) LEFT TURN UPGRADES	S/WB (INTERNAL) BACKPLATE UPGRADES	S/WB (INTERNAL) LEFT TURN UPGRADES
181, SH 16 @ LIVE OAK STREET	SH 16	LIVE OAK STREET	30.26818	-98.87852	3 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	3 - Retrofit		2 - Retrofit							
182, SH 16 @ UFER STREET	SH 16	UFER STREET	30.27192	-98.87541	2 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA			2 - Retrofit					
183, SH 16 @ CREEK STREET	SH 16	CREEK STREET	30.27291	-98.87455	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit		2 - Retrofit					
184, SH 16 @ SAN ANTONIO STREET	SH 16	SAN ANTONIO STREET	30.27401	-98.87356	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit		2 - Retrofit					
185, SH 16 @ AUSTIN STREET	SH 16	AUSTIN STREET	30.27495	-98.86959	2 - Retrofit		2 - Retrofit		2 - Retrofit		2 - Retrofit					
186, SH 16 @ TRAVIS STREET	SH 16	TRAVIS STREET	30.27654	-98.86817	2 - Retrofit		2 - Retrofit		2 - Retrofit		2 - Retrofit					
187, US 87 @ US 290 NORTH	US 87	US 290 NORTH	30.28530	-98.88710			3 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	4 - Retrofit					
188, US 87 @ MILAM STREET	US 87	MILAM STREET	30.27898	-98.87744	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA				
189, US 87 @ ORANGE STREET	US 87	ORANGE STREET	30.27779	-98.87578	2 - Retrofit		2 - Retrofit		3 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	3 - Retrofit	Upgrade Left Turn Signal & Sign to FYA				
190, US 87 @ CROCKETT STREET	US 87	CROCKETT STREET	30.27659	-98.87402	2 - Retrofit		2 - Retrofit		3 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	3 - Retrofit	Upgrade Left Turn Signal & Sign to FYA				
191, US 87 @ SH 16 SB (ADAMS STREET)	US 87	SH 16 SB (ADAMS STREET)	30.27519	-98.87207	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA				
192, US 87 @ SH 16 NB (LLANO STREET)	US 87	SH 16 NB (LLANO STREET)	30.27399	-98.87039	2 - Retrofit		2 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA				
193, US 87 @ LINCOLN STREET	US 87	LINCOLN STREET	30.27250	-98.86900	2 - Retrofit		2 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA				
194, US 87 @ US 290 SOUTH (WASHINGTON ST)	US 87	US 290 SOUTH (WASHINGTON ST)	30.27150	-98.86703	2 - Retrofit		2 - Retrofit		3 - Retrofit		3 - Retrofit					
195, US 87 @ HIGHWAY STREET	US 87	HIGHWAY STREET	30.26205	-98.87150	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	2 - Retrofit		2 - Retrofit					
196, US 87 @ FRIENDSHIP LANE	US 87	FRIENDSHIP LANE	30.25595	-98.87140	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA				
197, US 290 @ ELK STREET	US 290	ELK STREET	30.27025	-98.86582	2 - Retrofit		2 - Retrofit		2 - Retrofit		2 - Retrofit					
198, US 290 @ RM 1631 (OLIVE STREET)	US 290	RM 1631 (OLIVE STREET)	30.26645	-98.86034	2 - Retrofit		2 - Retrofit		2 - Retrofit		2 - Retrofit					
199, US 290 @ HIGHWAY ST./GOEHMANN LN.	US 290	HIGHWAY ST./GOEHMANN LN.	30.26175	-98.85623	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	2 - Retrofit		2 - Retrofit					
200, US 290 @ WALMART / FREDERICKSBURG	US 290	WALMART / FREDERICKSBURG	30.25737	-98.85160	2 - Retrofit		2 - Retrofit		3 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA				
201, US 290 @ FRIENDSHIP LANE	US 290	FRIENDSHIP LANE	30.25402	-98.84891	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	3 - Retrofit		3 - Retrofit							
202, US 290 @ HERITAGE HILLS	US 290	HERITAGE HILLS	30.24784	-98.84686	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	2 - Retrofit		2 - Retrofit					
203, US 290 @ FM 1376	US 290	FM 1376	30.22508	-98.80385	2 - Retrofit				2 - Retrofit		1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal				

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LOCATION SUMMARY

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0914	00	459	VA
DIST	COUNTY		SHEET NO.
AUS	TRAVIS, ETC.		17

LOCATION	CORRIDOR	CROSS STREET	LATITUDE	LONGITUDE	NB BACKPLATE UPGRADES	NB LEFT TURN UPGRADES	SB BACKPLATE UPGRADES	SB LEFT TURN UPGRADES	EB BACKPLATE UPGRADES	EB LEFT TURN UPGRADES	WB BACKPLATE UPGRADES	WB LEFT TURN UPGRADES	N/EB (INTERNAL) BACKPLATE UPGRADES	N/EB (INTERNAL) LEFT TURN UPGRADES	S/WB (INTERNAL) BACKPLATE UPGRADES	S/WB (INTERNAL) LEFT TURN UPGRADES
204, SH 71 @ SP 191	SH 71	SP 191	30.46147	-98.15892	2 - Retrofit		3 - Retrofit		3 - Retrofit		2 - Retrofit					
205, US 290 @ NUGENT AVENUE	US 290	NUGENT AVENUE	30.27683	-98.41208	2 - Retrofit		2 - Retrofit		2 - Retrofit		2 - Retrofit					
207, US 281 @ RM 1623	US 281	RM 1623	30.09792	-98.42235	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit		2 - Retrofit					
208, US 281 @ BLANCO AVE	US 281	BLANCO AVE	30.08812	-98.42074	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	3 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit		2 - Retrofit					
210, SH 45 @ CR 172	SH 45	CR 172	30.47783	-97.69428	2 - Retrofit		2 - Retrofit		2 - Retrofit		2 - Retrofit		3 - Retrofit		3 - Retrofit	
211, FM 1325 @ NORTHRIDGE DRIVE	FM 1325	NORTHRIDGE DRIVE	30.47509	-97.68742	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit		2 - Retrofit					
212, FM 1325 @ CR 172 / QUICK HILL ROAD	FM 1325	CR 172 / QUICK HILL ROAD	30.47224	-97.69095	3 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit		3 - Retrofit					
213, FM 1325 @ SHORELINE DRIVE	FM 1325	SHORELINE DRIVE	30.46085	-97.69452	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA				
214, SL 1 @ MERRILLTOWN	SL 1	MERRILLTOWN	30.44955	-97.69643	2 - Retrofit		6 - Retrofit		2 - Retrofit		2 - Retrofit		2 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA
215, SL 1 @ WELLS BRANCH PKWY	SL 1	WELLS BRANCH PKWY	30.44013	-97.69840	3 - Retrofit		3 - Retrofit		2 - Retrofit		2 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA
216, SL 1 @ SCOFIELD RIDGE PKWY	SL 1	SCOFIELD RIDGE PKWY	30.43056	-97.70088	2 - Retrofit		3 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit				2 - Retrofit	
217, IH 35 @ GRAND AVENUE PKWY	IH 35	GRAND AVENUE PKWY	30.45596	-97.66582	3 - Retrofit		3 - Retrofit		3 - Retrofit		3 - Retrofit		3 - Retrofit		3 - Retrofit	
218, SS 1825 @ GRAND AVE PKWY	SS 1825	GRAND AVE PKWY	30.45610	-97.66454	2 - Retrofit				2 - Retrofit		3 - Retrofit					
219, FM 1825 @ SPUR 1825 / VISION DRIVE	FM 1825	SPUR 1825 / VISION DRIVE	30.44869	-97.66131	3 - Retrofit		3 - Retrofit		2 - Retrofit		2 - Retrofit					
233, SH 130 @ FM 734	SH 130	FM 734	30.35221	-97.59237	2 - Retrofit		2 - Retrofit		2 - Retrofit		2 - Retrofit		3 - Retrofit		3 - Retrofit	
234, SH 130 @ US 290	SH 130	US 290	30.34003	-97.59170	6 - Retrofit		4 - Retrofit		3 - Retrofit		3 - Retrofit		3 - Retrofit		3 - Retrofit	
235, SH 130 @ FM 973	SH 130	FM 973	30.28799	-97.57664	2 - Retrofit		2 - Retrofit		2 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	3 - Retrofit	Upgrade Left Turn Signal & Sign to FYA
236, SH 130 @ FM 969	SH 130	FM 969	30.25374	-97.60398	2 - Retrofit		2 - Retrofit		2 - Retrofit		2 - Retrofit		1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal
237, SH 130 @ SH 71	SH 130	SH 71	30.19469	-97.62479	5 - Retrofit		5 - Retrofit		3 - Retrofit		3 - Retrofit		3 - Retrofit		3 - Retrofit	
238, SH 71 @ FM 973	SH 71	FM 973	30.20314	-97.63983	4 - Retrofit		4 - Retrofit		5 - Retrofit		4 - Retrofit		5 - Retrofit		5 - Retrofit	
239, SH 71 @ ROSS ROAD	SH 71	ROSS ROAD	30.18608	-97.60937	2 - Retrofit		2 - Retrofit		3 - Retrofit		3 - Retrofit					
240, SH 71 @ KELLAM RD	SH 71	KELLAM RD	30.18743	-97.59757	2 - Retrofit		2 - Retrofit		4 - Retrofit		3 - Retrofit					
241, FM 969 @ IMPERIAL DR	FM 969	IMPERIAL DR	30.26694	-97.62539	2 - Retrofit		2 - Retrofit		4 - Retrofit		4 - Retrofit					
242, FM 969 @ BLUE BLUFF RD	FM 969	BLUE BLUFF RD	30.26288	-97.62134	2 - Retrofit		3 - Retrofit		3 - Retrofit		4 - Retrofit					
243, FM 969 @ FM 973	FM 969	FM 973	30.25756	-97.61187	2 - Retrofit		3 - Retrofit		3 - Retrofit		3 - Retrofit					
244, FM 969 @ GILBERT LANE	FM 969	GILBERT LANE	30.25130	-97.59553	2 - Retrofit		4 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	3 - Retrofit					
245, FM 969 @ HOUND DOG TRL	FM 969	HOUND DOG TRL	30.24963	-97.58761	2 - Retrofit		2 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal				
246, FM 969 @ HUNTERS BEND RD / DELTA POST DR	FM 969	HUNTERS BEND RD / DELTA POST DR	30.24762	-97.58319	2 - Retrofit		2 - Retrofit		3 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	3 - Retrofit	Upgrade Left Turn Signal & Sign to FYA				
248, FM 3177 @ HOG EYE RD	FM 3177	HOG EYE RD	30.28603	-97.63151	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	2 - Retrofit		2 - Retrofit					

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0914	00	459	VA
DIST	COUNTY		SHEET NO.
AUS	TRAVIS, ETC.		18

LOCATION	CORRIDOR	CROSS STREET	LATITUDE	LONGITUDE	NB BACKPLATE UPGRADES	NB LEFT TURN UPGRADES	SB BACKPLATE UPGRADES	SB LEFT TURN UPGRADES	EB BACKPLATE UPGRADES	EB LEFT TURN UPGRADES	WB BACKPLATE UPGRADES	WB LEFT TURN UPGRADES	N/EB (INTERNAL) BACKPLATE UPGRADES	N/EB (INTERNAL) LEFT TURN UPGRADES	S/WB (INTERNAL) BACKPLATE UPGRADES	S/WB (INTERNAL) LEFT TURN UPGRADES
249, FM 3177 @ DECKER MIDDLE SCHOOL	FM 3177	DECKER MIDDLE SCHOOL	30.30811	-97.61730	3 - Retrofit		2 - Retrofit		2 - Retrofit							
250, FM 3177 @ DAFFAN LN	FM 3177	DAFFAN LN	30.31175	-97.61476	4 - Retrofit		2 - Retrofit		2 - Retrofit							
251, US 290 @ TUSCANY WAY	US 290	TUSCANY WAY	30.32840	-97.65959	3 - Retrofit		2 - Retrofit		5 - Retrofit		4 - Retrofit		3 - Retrofit		3 - Retrofit	
252, US 290 @ FM 734 (PARMER)	US 290	FM 734 (PARMER)	30.34419	-97.58008	3 - Retrofit		3 - Retrofit		4 - Retrofit		4 - Retrofit		3 - Retrofit		3 - Retrofit	
253, US 290 @ GREGG-MANOR	US 290	GREGG-MANOR	30.34832	-97.56267	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	3 - Retrofit		3 - Retrofit					
254, US 290 @ LEXINGTON	US 290	LEXINGTON	30.34907	-97.55624	4 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	3 - Retrofit		3 - Retrofit					
256, FM 973 @ BRENHAM ST	FM 973	BRENHAM ST	30.33751	-97.55870	1 - Retrofit		1 - Retrofit		2 - Retrofit		2 - Retrofit					
257, SL 212 @ FM 973/PARSONS (OLD HWY 20)	SL 212	FM 973/PARSONS (OLD HWY 20)	30.34096	-97.55782	1 - Retrofit		1 - Retrofit									
258, SL 212 @ OLD HWY 20	SL 212	OLD HWY 20	30.34350	-97.54253			2 - Retrofit		2 - Retrofit		2 - Retrofit					
259, US 290 @ SHADOW GLEN BLVD	US 290	SHADOW GLEN BLVD	30.34886	-97.54641			2 - Retrofit		3 - Retrofit		3 - Retrofit					
260, US 290 @ FM 973	US 290	FM 973	30.34906	-97.53849	2 - Retrofit		2 - Retrofit		4 - Retrofit		4 - Retrofit					
261, FM 973 @ SHADOWGLEN TRACE/ SUNCREST RD	FM 973	SHADOWGLEN TRACE/ SUNCREST RD	30.35960	-97.53283	3 - Retrofit		3 - Retrofit		2 - Retrofit		2 - Retrofit					
264, US 290 @ GEORGE BUSH STREET	US 290	GEORGE BUSH STREET	30.34928	-97.52593	2 - Retrofit		2 - Retrofit		3 - Retrofit		3 - Retrofit					
265, US 290 @ BOIS D ARC LN	US 290	BOIS D ARC LN	30.34960	-97.51889			2 - Retrofit		3 - Retrofit		3 - Retrofit					
266, US 290 @ OLD KIMBRO	US 290	OLD KIMBRO	30.35026	-97.50047	2 - Retrofit		2 - Retrofit		4 - Retrofit		4 - Retrofit					
267, US 290 @ RED ELM PKWY	US 290	RED ELM PKWY	30.35168	-97.43363	2 - Retrofit		2 - Retrofit		3 - Retrofit		3 - Retrofit					
268, US 290 @ WESTERN SKY BLVD	US 290	WESTERN SKY BLVD	30.35198	-97.42276			3 - Retrofit		3 - Retrofit		3 - Retrofit					
269, US 290 @ COUNTY LINE RD	US 290	COUNTY LINE RD	30.35181	-97.41207	2 - Retrofit		2 - Retrofit		3 - Retrofit		3 - Retrofit					
271, FM 1100 @ COUNTY LINE ROAD (SCHOOL SIDE)	FM 1100	COUNTY LINE ROAD (SCHOOL SIDE)	30.36359	-97.40457			2 - Retrofit		1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	2 - Retrofit					
272, SH 71 @ PALEFACE RANCH RD CR404	SH 71	PALEFACE RANCH RD CR404	30.40899	-98.10726	2 - Retrofit		2 - Retrofit				2 - Retrofit					
273, SH 71 @ RM 2322 (PACE BEND)	SH 71	RM 2322 (PACE BEND)	30.38560	-98.08624	3 - Retrofit		3 - Retrofit				2 - Retrofit					
274, SH 71 @ CYPRESS CREEK RANCH BLVD	SH 71	CYPRESS CREEK RANCH BLVD	30.36069	-98.06906	3 - Retrofit		4 - Retrofit		3 - Retrofit							
275, SH 71 @ BOB WIRE RD	SH 71	BOB WIRE RD	30.35227	-98.06371	3 - Retrofit		3 - Retrofit		2 - Retrofit		2 - Retrofit					
276, SH 71 @ BEE CREEK ROAD	SH 71	BEE CREEK ROAD	30.33188	-98.02464	5 - Retrofit		4 - Retrofit		4 - Retrofit		5 - Retrofit					
277, SH 71 @ PEDERNALES SUMMIT PKWY	SH 71	PEDERNALES SUMMIT PKWY	30.32937	-98.02021	4 - Retrofit		3 - Retrofit		3 - Retrofit							
278, SH 71 @ SERENE HILLS/SWEETWATER	SH 71	SERENE HILLS/SWEETWATER	30.31999	-98.00700	5 - Retrofit		4 - Retrofit		3 - Retrofit		4 - Retrofit					
286, SH 71 @ SOUTHWEST PKWY	SH 71	SOUTHWEST PKWY	30.27509	-97.91428	3 - Retrofit		5 - Retrofit				2 - Retrofit					
287, SH 71 @ THOMAS SPRING ROAD	SH 71	THOMAS SPRING ROAD	30.25988	-97.90736	4 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	4 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit		2 - Retrofit					
288, US 290 @ OLD BEE CAVES RD	US 290	OLD BEE CAVES RD	30.23417	-97.87115			3 - Retrofit		3 - Retrofit		3 - Retrofit					
289, US 290 @ EL REY BLVD	US 290	EL REY BLVD	30.23026	-97.89596	2 - Retrofit		2 - Retrofit		2 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA				
290, US 290 @ SCENIC BROOK DRIVE	US 290	SCENIC BROOK DRIVE	30.23244	-97.90192			2 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit					
291, US 290 @ CIRCLE DRIVE EAST	US 290	CIRCLE DRIVE EAST	30.23440	-97.91088	2 - Retrofit		2 - Retrofit		4 - Retrofit		4 - Retrofit					
292, US 290 @ CIRCLE DRIVE WEST	US 290	CIRCLE DRIVE WEST	30.22364	-97.95321	2 - Retrofit		4 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal				
293, US 290 @ FITZHUGH ROAD	US 290	FITZHUGH ROAD	30.22200	-97.95560	2 - Retrofit		2 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA				

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LOCATION SUMMARY

CONT	SECT	JOB	HIGHWAY
0914	00	459	VA
DIST	COUNTY		SHEET NO.
AUS	TRAVIS, ETC.		19

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LOCATION	CORRIDOR	CROSS STREET	LATITUDE	LONGITUDE	NB BACKPLATE UPGRADES	NB LEFT TURN UPGRADES	SB BACKPLATE UPGRADES	SB LEFT TURN UPGRADES	EB BACKPLATE UPGRADES	EB LEFT TURN UPGRADES	WB BACKPLATE UPGRADES	WB LEFT TURN UPGRADES	N/EB (INTERNAL) BACKPLATE UPGRADES	N/EB (INTERNAL) LEFT TURN UPGRADES	S/WB (INTERNAL) BACKPLATE UPGRADES	S/WB (INTERNAL) LEFT TURN UPGRADES
294, US 290 @ NUTTY BROWN ROAD	US 290	NUTTY BROWN ROAD	30.20849	-97.97318	2 - Retrofit		2 - Retrofit		3 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA				
295, US 290 @ LEDGE STONE DR	US 290	LEDGE STONE DR	30.20624	-97.97877	2 - Retrofit		2 - Retrofit		3 - Retrofit		3 - Retrofit					
296, US 290 @ BELTERRA DR / HERITAGE OAKS DR	US 290	BELTERRA DR / HERITAGE OAKS DR	30.20257	-97.98517	2 - Retrofit		2 - Retrofit		3 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA				
297, US 290 @ SAWYER RANCH RD / POLO CLUB DR	US 290	SAWYER RANCH RD / POLO CLUB DR	30.19696	-97.99766	4 - Retrofit		3 - Retrofit		4 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	4 - Retrofit	Upgrade Left Turn Signal & Sign to FYA				
298, US 290 @ TRAUTWEIN RD	US 290	TRAUTWEIN RD	30.19698	-98.01271			3 - Retrofit		4 - Retrofit		3 - Retrofit					
299, US 290 @ SUNSET CANYON DRIVE	US 290	SUNSET CANYON DRIVE	30.19710	-98.01945	2 - Retrofit		2 - Retrofit		3 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	3 - Retrofit	Upgrade Left Turn Signal & Sign to FYA				
300, US 290 @ CANYONWOOD DR	US 290	CANYONWOOD DR	30.19471	-98.02996	2 - Retrofit		2 - Retrofit		3 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	3 - Retrofit	Upgrade Left Turn Signal & Sign to FYA				
301, US 290 @ HAYS COUNTRY ACRES RD	US 290	HAYS COUNTRY ACRES RD	30.19416	-98.04363	2 - Retrofit		2 - Retrofit		5 - Retrofit		5 - Retrofit					
302, US 290 @ ROB SHELTON	US 290	ROB SHELTON	30.19170	-98.08310	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	3 - Retrofit		3 - Retrofit					
303, US 290 @ RM 12	US 290	RM 12	30.19181	-98.08738	3 - Retrofit		3 - Retrofit		4 - Retrofit		4 - Retrofit					
304, US 290 @ SPORTSPLEX DRIVE	US 290	SPORTSPLEX DRIVE	30.19205	-98.09682	2 - Retrofit		2 - Retrofit		4 - Retrofit		3 - Retrofit					
305, US 290 @ MIGHTY TIGER	US 290	MIGHTY TIGER	30.19469	-98.10216			2 - Retrofit		3 - Retrofit		2 - Retrofit					
306, US 290 @ ROGER HANKS PKWY	US 290	ROGER HANKS PKWY	30.19710	-98.10533	1 - Retrofit; 1 - Add		1 - Retrofit; 1 - Add		2 - Retrofit; 1 - Add		1 - Retrofit; 2 - Add					
307, US 290 @ MEADOW OAKS DR	US 290	MEADOW OAKS DR	30.20194	-98.11141	2 - Retrofit		2 - Retrofit		3 - Retrofit		3 - Retrofit					
308, US 290 @ BELL SPRINGS	US 290	BELL SPRINGS	30.20483	-98.11845	2 - Retrofit		2 - Retrofit		3 - Retrofit		3 - Retrofit					
310, RM 12 @ RM 150	RM 12	RM 150	30.16792	-98.08678	3 - Retrofit		4 - Retrofit		2 - Retrofit		3 - Retrofit					
311, RM 12 @ SPORTS PARK RD	RM 12	SPORTS PARK RD	30.18530	-98.08634	3 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	4 - Retrofit		2 - Retrofit					
312, RM 12 @ MERCER ST. (LP 64)	RM 12	MERCER ST. (LP 64)	30.19280	-98.08736	2 - Retrofit		2 - Retrofit		2 - Retrofit		2 - Retrofit					
313, RM 12 @ DRIPPING SPRINGS ELEM SCHOOL	RM 12	DRIPPING SPRINGS ELEM SCHOOL	30.21570	-98.08388	3 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	3 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit		2 - Retrofit					
314, RM 12 @ FITZHUGH RD	RM 12	FITZHUGH RD	30.24957	-98.05791	2 - Retrofit		3 - Retrofit		3 - Retrofit		2 - Retrofit					
316, RM 620 @ HUDSON BEND ROAD	RM 620	HUDSON BEND ROAD	30.39750	-97.92873	2 - Retrofit		2 - Retrofit		4 - Retrofit		4 - Retrofit					
317, RM 620 @ GENERAL WILLIAMSON DRIVE	RM 620	GENERAL WILLIAMSON DRIVE	30.39300	-97.93520	2 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	2 - Retrofit		2 - Retrofit					
318, RM 620 @ OAKGROVE BLVD	RM 620	OAKGROVE BLVD	30.38062	-97.94488	3 - Retrofit		3 - Retrofit		2 - Retrofit		2 - Retrofit					
319, RM 620 @ DEBBA DRIVE	RM 620	DEBBA DRIVE	30.37702	-97.94635	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit		2 - Retrofit					
320, RM 620 @ KOLLMEYER DRIVE	RM 620	KOLLMEYER DRIVE	30.37235	-97.94750	2 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA			2 - Retrofit					
321, RM 620 @ CLARA VAN	RM 620	CLARA VAN	30.36489	-97.95168	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	2 - Retrofit					
322, RM 620 @ LAKEWAY BLVD	RM 620	LAKEWAY BLVD	30.35404	-97.96183	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	3 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	3 - Retrofit		2 - Retrofit					
323, RM 620 @ DAVE DR	RM 620	DAVE DR	30.35209	-97.96288	2 - Retrofit		3 - Retrofit		2 - Retrofit							

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LOCATION SUMMARY

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0914	00	459	VA
DIST	COUNTY		SHEET NO.
AUS	TRAVIS, ETC.		20

LOCATION	CORRIDOR	CROSS STREET	LATITUDE	LONGITUDE	NB BACKPLATE UPGRADES	NB LEFT TURN UPGRADES	SB BACKPLATE UPGRADES	SB LEFT TURN UPGRADES	EB BACKPLATE UPGRADES	EB LEFT TURN UPGRADES	WB BACKPLATE UPGRADES	WB LEFT TURN UPGRADES	N/EB (INTERNAL) BACKPLATE UPGRADES	N/EB (INTERNAL) LEFT TURN UPGRADES	S/WB (INTERNAL) BACKPLATE UPGRADES	S/WB (INTERNAL) LEFT TURN UPGRADES
324, RM 620 @ GLEN HEATHER DR	RM 620	GLEN HEATHER DR	30.34494	-97.96596	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	3 - Retrofit		3 - Retrofit					
325, RM 620 @ LOHMANS CROSSING ROAD	RM 620	LOHMANS CROSSING ROAD	30.34077	-97.96899	3 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	3 - Retrofit		2 - Retrofit					
326, RM 620 @ LOHMANS SPUR	RM 620	LOHMANS SPUR	30.33903	-97.96995	3 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	3 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit		2 - Retrofit					
327, RM 620 @ FLINT ROCK RD	RM 620	FLINT ROCK RD	30.33435	-97.96911	3 - Retrofit		4 - Retrofit		3 - Retrofit		3 - Retrofit					
328, RM 620 @ SPILLMAN LOOP / HONEYCREEK COURT	RM 620	SPILLMAN LOOP / HONEYCREEK COURT	30.33018	-97.96692	3 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	3 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	4 - Retrofit		2 - Retrofit					
329, RM 620 @ ARIA DRIVE / CAVALIER DRIVE	RM 620	ARIA DRIVE / CAVALIER DRIVE	30.32782	-97.96429	4 - Retrofit; 1 - Add		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	3 - Retrofit		2 - Retrofit					
335, RM 2244 @ W SENNA HILLS DR	RM 2244	W SENNA HILLS DR	30.30819	-97.90513	2 - Retrofit		2 - Retrofit		4 - Retrofit		3 - Retrofit					
336, RM 2244 @ CREEKS EDGE PKWY	RM 2244	CREEKS EDGE PKWY	30.30814	-97.89352	2 - Retrofit				2 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal				
337, RM 2244 @ PATTERSON DR	RM 2244	PATTERSON DR	30.31306	-97.88177	2 - Retrofit				3 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal				
338, RM 2244 @ CUERNAVACA DR	RM 2244	CUERNAVACA DR	30.31665	-97.87242	2 - Retrofit		3 - Retrofit		3 - Retrofit		4 - Retrofit					
339, RM 2244 @ MARLY WAY	RM 2244	MARLY WAY	30.31789	-97.86137			2 - Retrofit		3 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	4 - Retrofit					
340, RM 2244 @ WESTON LN S	RM 2244	WESTON LN S	30.30994	-97.84556	2 - Retrofit		2 - Retrofit		4 - Retrofit		4 - Retrofit					
341, RM 2244 @ BARTON CREEK BLVD	RM 2244	BARTON CREEK BLVD	30.30447	-97.84092	3 - Retrofit				4 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal				
342, RM 2244 @ ROB ROY	RM 2244	ROB ROY	30.29979	-97.83850			2 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	3 - Retrofit					
343, RM 2244 @ DIMENSIONAL PLACE	RM 2244	DIMENSIONAL PLACE	30.29686	-97.83225	2 - Retrofit		2 - Retrofit		4 - Retrofit		4 - Retrofit					
344, RM 2244 @ CASTLE RIDGE ROAD	RM 2244	CASTLE RIDGE ROAD	30.29580	-97.82945	2 - Retrofit				3 - Retrofit		4 - Retrofit					
345, RM 2244 @ THE VILLAGE AT WESTLAKE	RM 2244	THE VILLAGE AT WESTLAKE	30.29423	-97.82450			2 - Retrofit		4 - Retrofit		3 - Retrofit	Upgrade Left Turn Signal & Sign to FYA				
346, RM 2244 @ REDBUD TRAIL	RM 2244	REDBUD TRAIL	30.29262	-97.82263	2 - Retrofit		2 - Retrofit		3 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA				
347, RM 2244 @ THE HILLS DRIVEWAY	RM 2244	THE HILLS DRIVEWAY	30.28755	-97.81534	2 - Retrofit				2 - Retrofit		1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal				
348, RM 2244 @ CAMP CRAFT RD	RM 2244	CAMP CRAFT RD	30.28273	-97.81046	2 - Retrofit				3 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal				

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0914	00	459	VA
DIST	COUNTY		SHEET NO.
AUS	TRAVIS, ETC.		21

LOCATION	CORRIDOR	CROSS STREET	LATITUDE	LONGITUDE	NB BACKPLATE UPGRADES	NB LEFT TURN UPGRADES	SB BACKPLATE UPGRADES	SB LEFT TURN UPGRADES	EB BACKPLATE UPGRADES	EB LEFT TURN UPGRADES	WB BACKPLATE UPGRADES	WB LEFT TURN UPGRADES	N/EB (INTERNAL) BACKPLATE UPGRADES	N/EB (INTERNAL) LEFT TURN UPGRADES	S/WB (INTERNAL) BACKPLATE UPGRADES	S/WB (INTERNAL) LEFT TURN UPGRADES
349, RM 2244 @ WESTLAKE DRIVE	RM 2244	WESTLAKE DRIVE	30.28156	-97.80850	2 - Retrofit		2 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	3 - Retrofit	Upgrade Left Turn Signal & Sign to FYA				
350, RM 2244 @ WESTBANK DRIVE	RM 2244	WESTBANK DRIVE	30.28015	-97.80726	3 - Retrofit		2 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal				
351, RM 2244 @ BEAVER TRAIL / WESTWOOD TERRACE	RM 2244	BEAVER TRAIL / WESTWOOD TERRACE	30.27866	-97.80600	2 - Retrofit		2 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal				
352, RM 2244 @ WALSH TARLTON	RM 2244	WALSH TARLTON	30.27422	-97.80051	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	1 - Retrofit; 1 - Add	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA				
353, RM 2244 @ ROLLINGWOOD DR	RM 2244	ROLLINGWOOD DR	30.27292	-97.79844	2 - Retrofit		3 - Retrofit		1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal				
354, RM 2244 @ EDGEGROVE	RM 2244	EDGEGROVE	30.27146	-97.78849	3 - Retrofit		3 - Retrofit		3 - Retrofit		4 - Retrofit					
357, SL 360 @ RM 2244	SL 360	RM 2244	30.29542	-97.82786	2 - Retrofit		2 - Retrofit		3 - Retrofit		3 - Retrofit		4 - Retrofit		4 - Retrofit	
358, SL 360 @ LAS CIMAS PARKWAY	SL 360	LAS CIMAS PARKWAY	30.29085	-97.82831	3 - Retrofit; 1 - Add		3 - Retrofit; 1 - Add		2 - Retrofit		1 - Retrofit; 1 - Add					
359, SL 360 @ LOST CREEK BLVD	SL 360	LOST CREEK BLVD	30.28389	-97.82472	4 - Retrofit		4 - Retrofit		2 - Retrofit		2 - Retrofit					
360, SL 360 @ WESTBANK DRIVE	SL 360	WESTBANK DRIVE	30.27727	-97.81968	4 - Retrofit		5 - Retrofit		3 - Retrofit		3 - Retrofit					
361, FM 1826 @ SLAUGHTER LN	FM 1826	SLAUGHTER LN	30.21854	-97.89414	3 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal			2 - Retrofit					
362, SH 45 @ FM 1826	SH 45	FM 1826	30.19244	-97.92514			3 - Retrofit				2 - Retrofit		2 - Retrofit			
363, FM 1826 @ NUTTY BROWN	FM 1826	NUTTY BROWN	30.16181	-97.95267	2 - Retrofit		1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal				
364, FM 1826 @ DARDEN HILL RD / CR 162	FM 1826	DARDEN HILL RD / CR 162	30.14668	-97.98641			2 - Retrofit		3 - Retrofit		2 - Retrofit					
367, RM 967 @ CARPENTER HILL ELEM	RM 967	CARPENTER HILL ELEM	30.09576	-97.89743			2 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	3 - Retrofit					
368, RM 967 @ SHOTS PKWY (JOHNSON HIGH SCHOOL)	RM 967	SHOTS PKWY (JOHNSON HIGH SCHOOL)	30.09574	-97.89452			3 - Retrofit		3 - Retrofit		4 - Retrofit					
369, RM 967 @ BUDA SPORTSPLEX	RM 967	BUDA SPORTSPLEX	30.09649	-97.87969			2 - Retrofit		1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	3 - Retrofit					
370, FM 1626 @ BLISS SPILLAR ROAD	FM 1626	BLISS SPILLAR ROAD	30.13465	-97.85334	2 - Retrofit		2 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	3 - Retrofit	Upgrade Left Turn Signal & Sign to FYA				
373, FM 1626 @ TWIN CREEK ROAD	FM 1626	TWIN CREEK ROAD	30.14068	-97.82868	2 - Retrofit				2 - Retrofit		1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal				
374, FM 1626 @ S 1ST ST	FM 1626	S 1ST ST	30.14353	-97.80485	2 - Retrofit		2 - Retrofit		3 - Retrofit		3 - Retrofit					
375, FM 2304 @ FRATE BARKER ROAD	FM 2304	FRATE BARKER ROAD	30.15006	-97.83302	3 - Retrofit		2 - Retrofit		2 - Retrofit							
376, FM 2304 @ RAVENSCROFT DR	FM 2304	RAVENSCROFT DR	30.15731	-97.83320	4 - Add		4 - Add		3 - Add		3 - Add					
377, SH 21 @ FM 535	SH 21	FM 535	30.08612	-97.50115	2 - Retrofit		3 - Retrofit		3 - Retrofit		3 - Retrofit					
378, SH 21 @ VOSS PKWY	SH 21	VOSS PKWY	30.09208	-97.47843	2 - Retrofit		2 - Retrofit		4 - Retrofit		2 - Retrofit					
379, SH 21 @ FM 1209	SH 21	FM 1209	30.11012	-97.43650	2 - Retrofit		2 - Retrofit		3 - Retrofit		3 - Retrofit					
380, SH 71 @ TUCKER HILL LN	SH 71	TUCKER HILL LN	30.17481	-97.52689	2 - Retrofit		2 - Retrofit		4 - Retrofit		4 - Retrofit					

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AUS	TRAVIS, ETC.		22

LOCATION	CORRIDOR	CROSS STREET	LATITUDE	LONGITUDE	NB BACKPLATE UPGRADES	NB LEFT TURN UPGRADES	SB BACKPLATE UPGRADES	SB LEFT TURN UPGRADES	EB BACKPLATE UPGRADES	EB LEFT TURN UPGRADES	WB BACKPLATE UPGRADES	WB LEFT TURN UPGRADES	N/EB (INTERNAL) BACKPLATE UPGRADES	N/EB (INTERNAL) LEFT TURN UPGRADES	S/WB (INTERNAL) BACKPLATE UPGRADES	S/WB (INTERNAL) LEFT TURN UPGRADES
381, SH 71 @ POPE BEND RD	SH 71	POPE BEND RD	30.14137	-97.47177	2 - Retrofit		2 - Retrofit		4 - Retrofit		4 - Retrofit					
382, SH 71 @ FM 1209	SH 71	FM 1209	30.12277	-97.43299	2 - Retrofit		3 - Retrofit		4 - Retrofit		3 - Retrofit					
383, SH 71 @ SH 304	SH 71	SH 304	30.11155	-97.35040	2 - Retrofit		2 - Retrofit		3 - Retrofit		3 - Retrofit		2 - Retrofit		1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal
384, SH 304 @ HOME DEPOT WAY/ AGNES ST- 4TH LEG	SH 304	HOME DEPOT WAY/ AGNES ST- 4TH LEG	30.10766	-97.35115	3 - Retrofit		3 - Retrofit		3 - Retrofit		3 - Retrofit					
385, SH 304 @ HUNTERS POINT DR	SH 304	HUNTERS POINT DR	30.10293	-97.35221	3 - Retrofit		4 - Retrofit		2 - Retrofit		2 - Retrofit					
386, SH 71 @ HASLER BLVD	SH 71	HASLER BLVD	30.10682	-97.33460	2 - Retrofit		2 - Retrofit		3 - Retrofit		3 - Retrofit		2 - Retrofit		2 - Retrofit	
387, SL 150 @ ESKEW STREET	SL 150	ESKEW STREET	30.10771	-97.32736	2 - Retrofit		1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal				
388, SL 150 @ MAIN STREET	SL 150	MAIN STREET	30.11047	-97.32016	2 - Retrofit		2 - Retrofit		1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal				
389, SL 150 @ PECAN STREET	SL 150	PECAN STREET	30.11071	-97.31761	2 - Retrofit		2 - Retrofit		1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal				
390, SH 21 @ JACKSON (SH 95)	SH 21	JACKSON (SH 95)	30.11049	-97.30775	3 - Retrofit		3 - Retrofit		3 - Retrofit		3 - Retrofit					
391, SH 21 @ LP 150	SH 21	LP 150	30.11088	-97.29440	3 - Retrofit		2 - Retrofit		3 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	3 - Retrofit	Upgrade Left Turn Signal & Sign to FYA				
392, SH 71 @ TAHITIAN DRIVE	SH 71	TAHITIAN DRIVE	30.10283	-97.28441	2 - Retrofit		2 - Retrofit		3 - Retrofit		3 - Retrofit		1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal
393, SH 71 @ SH 21	SH 71	SH 21	30.10553	-97.30762	2 - Retrofit		2 - Retrofit		4 - Retrofit		3 - Retrofit		3 - Retrofit		3 - Retrofit	
394, SH 95 @ HAWTHORNE	SH 95	HAWTHORNE	30.12117	-97.30929	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	2 - Retrofit		2 - Retrofit					
395, SH 95 @ FM 1441	SH 95	FM 1441	30.15816	-97.31844	3 - Retrofit		2 - Retrofit				2 - Retrofit					
397, SH 95 @ PERSHING	SH 95	PERSHING	30.20215	-97.31329	2 - Retrofit		3 - Retrofit				2 - Retrofit					
398, US 290 @ SH 95 S	US 290	SH 95 S	30.33462	-97.36154	2 - Retrofit		2 - Retrofit		3 - Retrofit		3 - Retrofit					
399, US 290 @ SL 109/ HARRIS ST	US 290	SL 109/ HARRIS ST	30.33753	-97.37035	4 - Retrofit		2 - Retrofit		3 - Retrofit		2 - Retrofit					
400, US 290 @ 11TH STREET	US 290	11TH STREET	30.34716	-97.38308	2 - Retrofit		2 - Retrofit		3 - Retrofit		3 - Retrofit					
401, US 290 @ SH 95 N (SARATOGA FARMS BLVD)	US 290	SH 95 N (SARATOGA FARMS BLVD)	30.35061	-97.38670	2 - Retrofit		2 - Retrofit		3 - Retrofit		3 - Retrofit		2 - Retrofit		2 - Retrofit	
402, SH 95 @ FM 1100	SH 95	FM 1100	30.35558	-97.38411	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	2 - Retrofit		2 - Retrofit					
403, SL 109 @ FM 3000	SL 109	FM 3000	30.34931	-97.37125	2 - Retrofit		2 - Retrofit		2 - Retrofit		2 - Retrofit					
404, SL 230 @ MAIN STREET	SL 230	MAIN STREET	30.00861	-97.15972	2 - Retrofit		2 - Retrofit		2 - Retrofit		2 - Retrofit					
405, SH 95 @ SL 230	SH 95	SL 230	30.01008	-97.16360	2 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit		2 - Retrofit					
406, SH 95 @ FM 535	SH 95	FM 535	29.99782	-97.16760	3 - Retrofit		3 - Retrofit		2 - Retrofit		3 - Retrofit					
407, US 290 @ FM 2336	US 290	FM 2336	30.27930	-97.24253	3 - Retrofit		3 - Retrofit		2 - Retrofit		2 - Retrofit					

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Texas Department of Transportation

LOCATION SUMMARY

CONT	SECT	JOB	HIGHWAY
0914	00	459	VA
DIST	COUNTY		SHEET NO.
AUS	TRAVIS, ETC.		23

LOCATION	CORRIDOR	CROSS STREET	LATITUDE	LONGITUDE	NB BACKPLATE UPGRADES	NB LEFT TURN UPGRADES	SB BACKPLATE UPGRADES	SB LEFT TURN UPGRADES	EB BACKPLATE UPGRADES	EB LEFT TURN UPGRADES	WB BACKPLATE UPGRADES	WB LEFT TURN UPGRADES	N/EB (INTERNAL) BACKPLATE UPGRADES	N/EB (INTERNAL) LEFT TURN UPGRADES	S/WB (INTERNAL) BACKPLATE UPGRADES	S/WB (INTERNAL) LEFT TURN UPGRADES
408, US 290 @ SH 21	US 290	SH 21	30.21350	-97.14279	3 - Retrofit		3 - Retrofit		2 - Retrofit		2 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal
409, US 290 @ US 77 (MAIN STREET)	US 290	US 77 (MAIN STREET)	30.18262	-96.93726	3 - Retrofit		3 - Retrofit		3 - Retrofit		3 - Retrofit					
410, US 290 @ LEON STREET	US 290	LEON STREET	30.18270	-96.93531	2 - Retrofit		2 - Retrofit		3 - Retrofit		3 - Retrofit					
411, US 290 @ FM 141 (ORANGE STREET)	US 290	FM 141 (ORANGE STREET)	30.18144	-96.93028	2 - Retrofit		2 - Retrofit		3 - Retrofit		3 - Retrofit					
412, US 290 @ WALMART / GIDDINGS	US 290	WALMART / GIDDINGS	30.17918	-96.91434	2 - Retrofit		2 - Retrofit		2 - Retrofit		3 - Retrofit					
413, US 290 @ BLUEBONNET COOP (CEFCO)	US 290	BLUEBONNET COOP (CEFCO)	30.17807	-96.90730	2 - Retrofit		2 - Retrofit		3 - Retrofit		3 - Retrofit					
414, US 290 @ JAMES A TURMAN ROAD/ CR 226	US 290	JAMES A TURMAN ROAD/ CR 226	30.17663	-96.89918	3 - Retrofit		2 - Retrofit		1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal				
415, US 77 @ RM 2440 (INDEPENDENCE ST)	US 77	RM 2440 (INDEPENDENCE ST)	30.18943	-96.93594	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit		2 - Retrofit					
417, FM 973 @ PEARCE LANE	FM 973	PEARCE LANE	30.18068	-97.64644	2 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA			2 - Retrofit					
418, FM 973 @ BURLESON ROAD	FM 973	BURLESON ROAD	30.16742	-97.65894	4 - Retrofit		3 - Retrofit		4 - Retrofit		4 - Retrofit					
420, US 183 @ FM 812 (DG COLLINS ROAD)	US 183	FM 812 (DG COLLINS ROAD)	30.16454	-97.69320	3 - Retrofit		3 - Retrofit		3 - Retrofit		2 - Retrofit					
421, US 183 @ WILLIAM CANNON DR / FM 1625	US 183	WILLIAM CANNON DR / FM 1625	30.14947	-97.69709	3 - Retrofit		4 - Retrofit		3 - Retrofit							
422, US 183 @ MCKENZIE RD	US 183	MCKENZIE RD	30.14419	-97.69692	4 - Retrofit		4 - Retrofit		3 - Retrofit		2 - Retrofit					
423, US 183 @ FM 973	US 183	FM 973	30.11556	-97.69493	2 - Retrofit		3 - Retrofit				3 - Retrofit					
424, US 183 @ FM 1327	US 183	FM 1327	30.09355	-97.69421	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	3 - Retrofit		2 - Retrofit							
426, FM 1327 @ FM 1625	FM 1327	FM 1625	30.09026	-97.73463	2 - Retrofit		2 - Retrofit		4 - Retrofit		4 - Retrofit					
427, FM 1327 @ TURNERSVILLE ROAD N	FM 1327	TURNERSVILLE ROAD N	30.11278	-97.78232	2 - Retrofit				2 - Retrofit		4 - Retrofit					
428, IH 35 @ LP 4 (MAIN STREET)	IH 35	LP 4 (MAIN STREET)	30.08927	-97.81939	4 - Retrofit		3 - Retrofit		3 - Retrofit		2 - Retrofit		3 - Retrofit		3 - Retrofit	
429, IH 35 @ FM 2001	IH 35	FM 2001	30.07888	-97.82336	4 - Retrofit		3 - Retrofit		2 - Retrofit		2 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA
439, SH 21 @ RM 150	SH 21	RM 150	29.93441	-97.81831			2 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	2 - Retrofit; 1 - Add					
440, SH 21 @ FM 2720 (OLD LOCKHART RD)	SH 21	FM 2720 (OLD LOCKHART RD)	29.94732	-97.79608	3 - Retrofit		4 - Retrofit				2 - Retrofit					
443, SH 21 @ FM 2001	SH 21	FM 2001	30.00912	-97.72863			2 - Retrofit		3 - Retrofit		2 - Retrofit					
444, SH 130 @ SH 21	SH 130	SH 21	30.02751	-97.68809	2 - Retrofit		2 - Retrofit		3 - Retrofit		3 - Retrofit		3 - Retrofit		3 - Retrofit	
445, SH 21 @ FM 1854	SH 21	FM 1854	30.03044	-97.67418	2 - Retrofit		2 - Retrofit		3 - Retrofit		3 - Retrofit					
446, FM 2001 @ WINDY HILL RD	FM 2001	WINDY HILL RD	30.04537	-97.80283	2 - Retrofit		2 - Retrofit		3 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal				
447, RM 967 @ LP 4 (MAIN ST)	RM 967	LP 4 (MAIN ST)	30.08172	-97.84291	3 - Retrofit		2 - Retrofit		2 - Retrofit							
448, RM 967 @ REMUDA TRAIL/ GARLIC CREEK	RM 967	REMUDA TRAIL/ GARLIC CREEK	30.10070	-97.85871	2 - Retrofit		2 - Retrofit		3 - Retrofit		3 - Retrofit					
449, FM 1626 @ FM 967	FM 1626	FM 967	30.09736	-97.87497	5 - Retrofit		5 - Retrofit		4 - Retrofit		5 - Retrofit					
450, FM 1626 @ OYSTER CREEK	FM 1626	OYSTER CREEK	30.09138	-97.87467	2 - Retrofit		3 - Retrofit				2 - Retrofit					
459, RM 2325 @ VALLEY SPRINGS RD	RM 2325	VALLEY SPRINGS RD	30.01970	-98.13860	2 - Retrofit		2 - Retrofit		3 - Retrofit		3 - Retrofit					
460, RM 2325 @ JACOBS WELL RD	RM 2325	JACOBS WELL RD	30.01941	-98.13041			3 - Retrofit		4 - Retrofit		2 - Retrofit					
461, RM 2325 @ CARNEY LANE	RM 2325	CARNEY LANE	30.00652	-98.11564	3 - Retrofit				3 - Retrofit		3 - Retrofit					
462, RM 2325 @ GREEN ACRES DRIVE	RM 2325	GREEN ACRES DRIVE	30.00260	-98.10522	2 - Retrofit		2 - Retrofit		2 - Retrofit		3 - Retrofit					

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Texas Department of Transportation

LOCATION SUMMARY

CONT	SECT	JOB	HIGHWAY
0914	00	459	VA
DIST	COUNTY		SHEET NO.
AUS	TRAVIS, ETC.		24

LOCATION	CORRIDOR	CROSS STREET	LATITUDE	LONGITUDE	NB BACKPLATE UPGRADES	NB LEFT TURN UPGRADES	SB BACKPLATE UPGRADES	SB LEFT TURN UPGRADES	EB BACKPLATE UPGRADES	EB LEFT TURN UPGRADES	WB BACKPLATE UPGRADES	WB LEFT TURN UPGRADES	N/EB (INTERNAL) BACKPLATE UPGRADES	N/EB (INTERNAL) LEFT TURN UPGRADES	S/WB (INTERNAL) BACKPLATE UPGRADES	S/WB (INTERNAL) LEFT TURN UPGRADES
463, RM 12 @ WOODCREEK DR/ WINTERS MILL	RM 12	WOODCREEK DR/ WINTERS MILL	30.02746	-98.10125			2 - Retrofit		1 - Retrofit		2 - Retrofit					
464, RM 12 @ RM 2325	RM 12	RM 2325	29.99974	-98.10133	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit		2 - Retrofit					
465, RM 12 @ RIVER ROAD	RM 12	RIVER ROAD	29.99756	-98.09902	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	3 - Retrofit		2 - Retrofit		2 - Retrofit					
467, RM 12 @ CR 1492	RM 12	CR 1492	29.97386	-98.09279	3 - Retrofit		3 - Retrofit		2 - Retrofit							
468, RM 12 @ RM 32	RM 12	RM 32	29.94277	-98.09240	4 - Retrofit		3 - Retrofit		2 - Retrofit							
470, SH 123 @ RM 12 WONDER WORLD	SH 123	RM 12 WONDER WORLD	29.84631	-97.94116	2 - Retrofit		2 - Retrofit		3 - Retrofit		3 - Retrofit		2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA
471, SH 123 @ FM 110 (EBFR & WBFR)	SH 123	FM 110 (EBFR & WBFR)	29.83016	-97.94239	2 - Retrofit		2 - Retrofit		2 - Retrofit		2 - Retrofit		3 - Retrofit		3 - Retrofit	
472, FM 621 @ CR 266 (OLD BASTROP HWY)	FM 621	CR 266 (OLD BASTROP HWY)	29.84229	-97.91318	2 - Retrofit		2 - Retrofit		3 - Retrofit		3 - Retrofit					
473, SH 80 @ FM 1984	SH 80	FM 1984	29.86318	-97.86823	3 - Retrofit		3 - Retrofit		3 - Retrofit		4 - Retrofit					
474, SH 80 @ SH 142	SH 80	SH 142	29.84572	-97.84135	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit		2 - Retrofit					
477, US 183 @ BUCEE'S DRIVE	US 183	BUCEE'S DRIVE	29.65048	-97.59104	4 - Retrofit		3 - Retrofit		2 - Retrofit							
478, US 183 @ IH 10	US 183	IH 10	29.65343	-97.59280	2 - Retrofit		2 - Retrofit		1 - Retrofit; 1 - Add		3 - Retrofit; 1 - Add		4 - Retrofit		3 - Retrofit	
479, US 183 @ BEST WESTERN	US 183	BEST WESTERN	29.65446	-97.59616	2 - Retrofit		2 - Retrofit		4 - Retrofit		4 - Retrofit		2 - Retrofit		2 - Retrofit	
480, US 183 @ US 90	US 183	US 90	29.68016	-97.64750	2 - Retrofit		2 - Retrofit		2 - Retrofit		2 - Retrofit					
481, US 183 @ SH 80 (AUSTIN ST)	US 183	SH 80 (AUSTIN ST)	29.68325	-97.64749	2 - Retrofit		2 - Retrofit		2 - Retrofit		2 - Retrofit					
482, US 183 @ WALMART DRIVEWAY IN LOCKHART	US 183	WALMART DRIVEWAY IN LOCKHART	29.85736	-97.66833	2 - Retrofit		3 - Retrofit				2 - Retrofit					
483, US 183 @ MLK JR INDUSTRIAL BLVD	US 183	MLK JR INDUSTRIAL BLVD	29.86155	-97.66848	3 - Retrofit		3 - Retrofit		2 - Retrofit		2 - Retrofit					
484, US 183 @ CIVIC CENTER	US 183	CIVIC CENTER	29.86348	-97.66842	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	2 - Retrofit		2 - Retrofit					
485, US 183 @ FM 20 WEST	US 183	FM 20 WEST	29.87087	-97.66862	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	2 - Retrofit		2 - Retrofit					
486, US 183 @ FM 20 EAST	US 183	FM 20 EAST	29.87240	-97.66907	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	2 - Retrofit		2 - Retrofit					
487, FM 20 @ MEDINA ST	FM 20	MEDINA ST	29.86871	-97.67649	2 - Retrofit		2 - Retrofit		2 - Retrofit		2 - Retrofit					
488, FM 20 @ GUADALUPE ST	FM 20	GUADALUPE ST	29.87111	-97.67180			2 - Retrofit		2 - Retrofit		2 - Retrofit					
489, US 183 @ HICKORY ST	US 183	HICKORY ST	29.88044	-97.66959	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	2 - Retrofit		2 - Retrofit					
490, US 183 @ PRAIRIE LEA ST	US 183	PRAIRIE LEA ST	29.88341	-97.66986	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	2 - Retrofit		2 - Retrofit					
491, US 183 @ SH 142 (SAN ANTONIO)	US 183	SH 142 (SAN ANTONIO)	29.88484	-97.67025	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	1 - Retrofit	Upgrade Left Turn Signal & Sign to FYA; Add RYG Through Signal	2 - Retrofit		2 - Retrofit					
492, US 183 @ FM 672 (FLORES STREET)	US 183	FM 672 (FLORES STREET)	29.89206	-97.67156	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit	Upgrade Left Turn Signal & Sign to FYA	2 - Retrofit		2 - Retrofit					
493, US 183 @ FM 2001	US 183	FM 2001	29.89785	-97.67738	3 - Retrofit		2 - Retrofit		3 - Retrofit							
494, SH 142 @ BLANCO STREET	SH 142	BLANCO STREET	29.88446	-97.67440	2 - Retrofit		2 - Retrofit		2 - Retrofit		2 - Retrofit					

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LOCATION SUMMARY

CONT	SECT	JOB	HIGHWAY
0914	00	459	VA
DIST	COUNTY		SHEET NO.
AUS	TRAVIS, ETC.		25

LOCATION	CORRIDOR	CROSS STREET	LATITUDE	LONGITUDE	NB BACKPLATE UPGRADES	NB LEFT TURN UPGRADES	SB BACKPLATE UPGRADES	SB LEFT TURN UPGRADES	EB BACKPLATE UPGRADES	EB LEFT TURN UPGRADES	WB BACKPLATE UPGRADES	WB LEFT TURN UPGRADES	N/EB (INTERNAL) BACKPLATE UPGRADES	N/EB (INTERNAL) LEFT TURN UPGRADES	S/WB (INTERNAL) BACKPLATE UPGRADES	S/WB (INTERNAL) LEFT TURN UPGRADES
495, SH 142 @ MOCKINGBIRD	SH 142	MOCKINGBIRD	29.88282	-97.69609	2 - Retrofit		2 - Retrofit		2 - Retrofit		2 - Retrofit					

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LOCATION SUMMARY

SHEET 14 OF 14

CONT	SECT	JOB	HIGHWAY
0914	00	459	VA
DIST	COUNTY		SHEET NO.
AUS	TRAVIS, ETC.		26

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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

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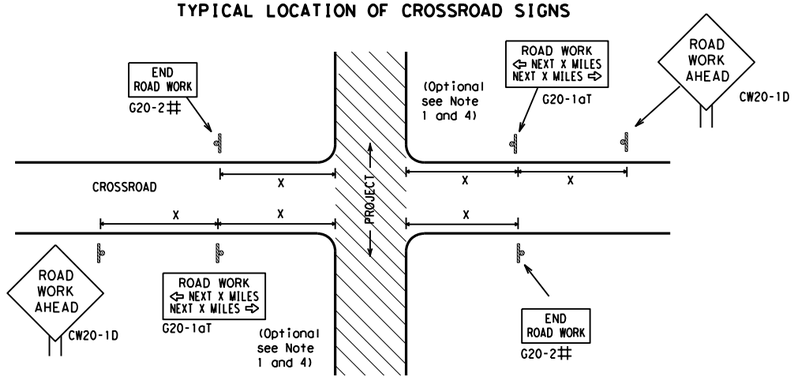
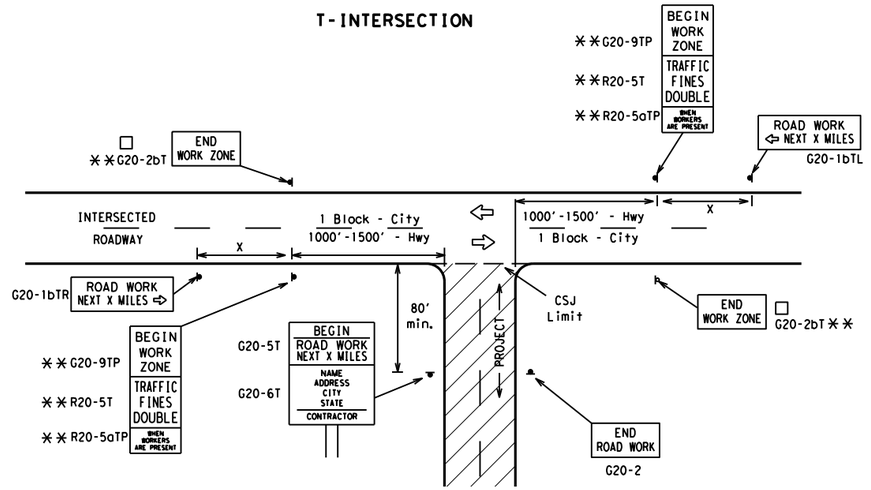
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

TYPICAL CONSTRUCTION WARNING SIGN SIZE AND SPACING[1,5,6]

SIZE

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

SPACING

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

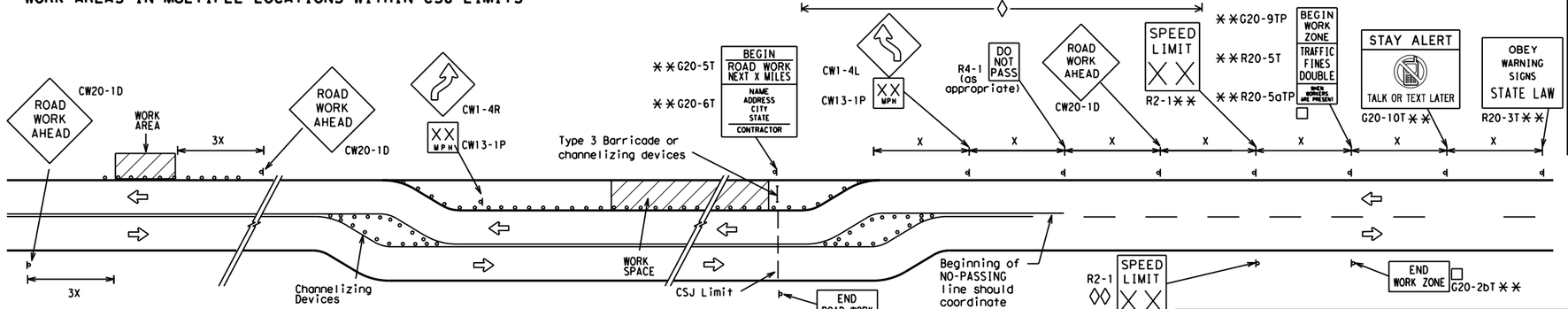
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

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

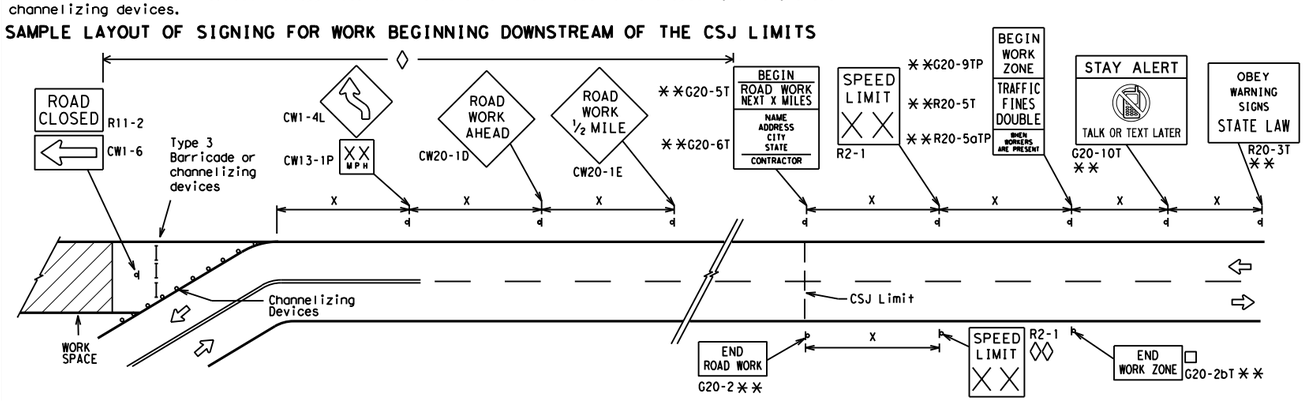
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS

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

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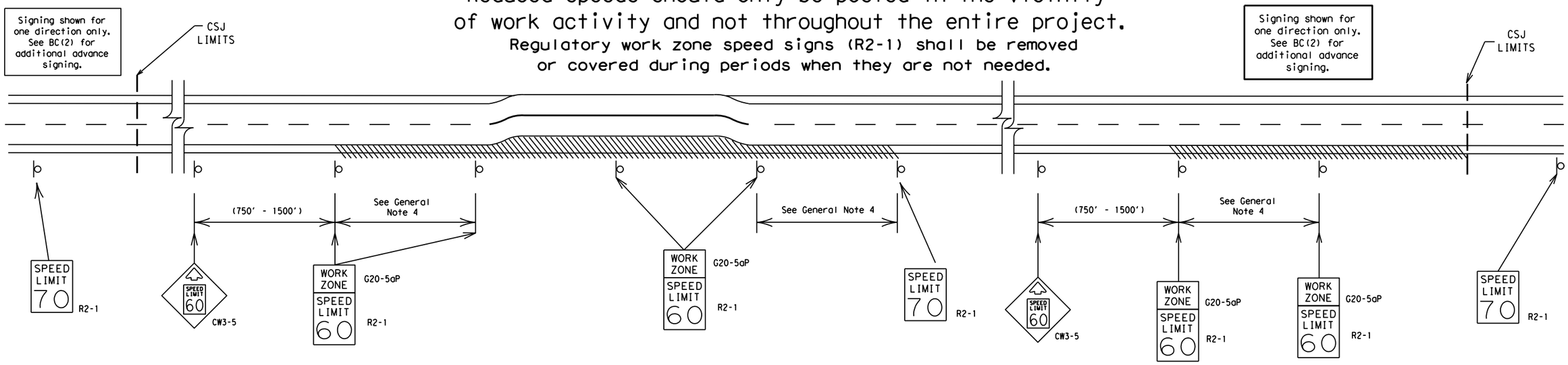
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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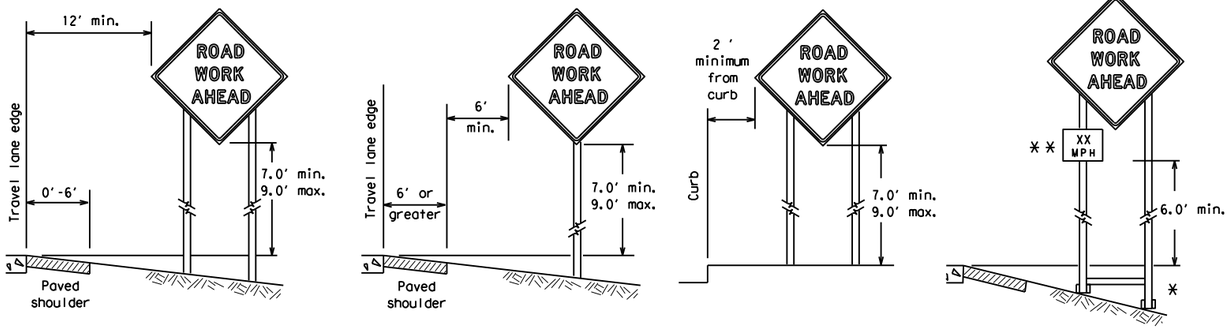
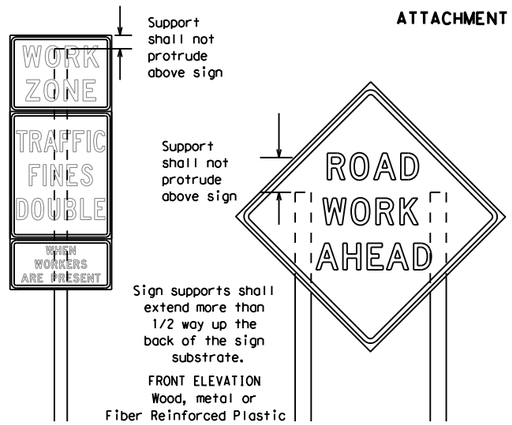
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

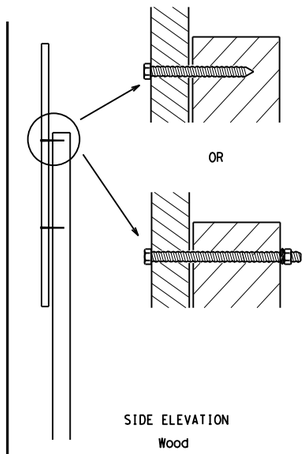


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

** 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





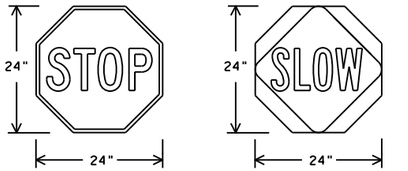
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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.

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

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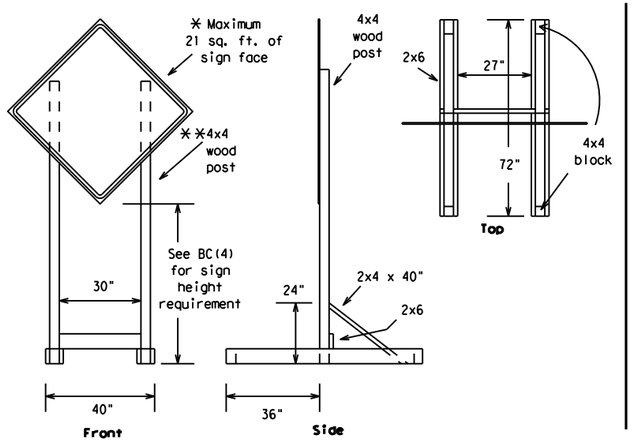
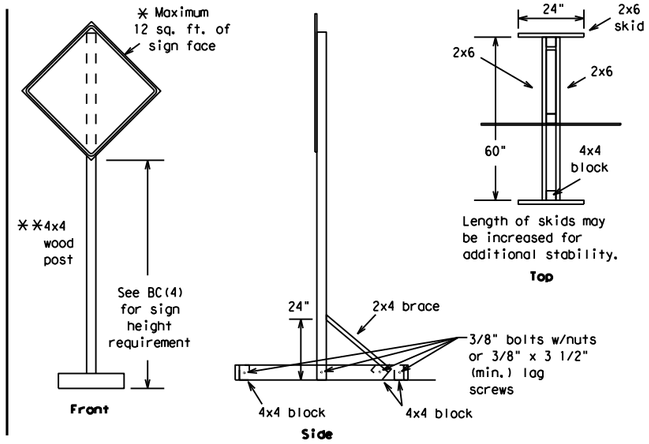
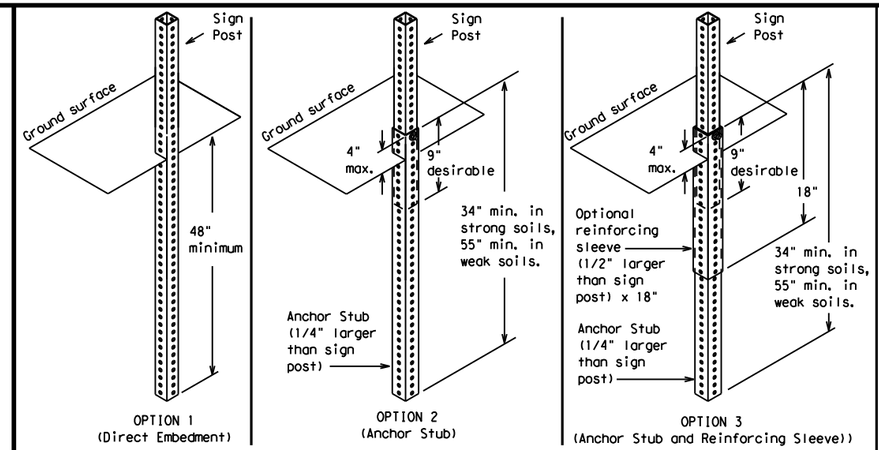




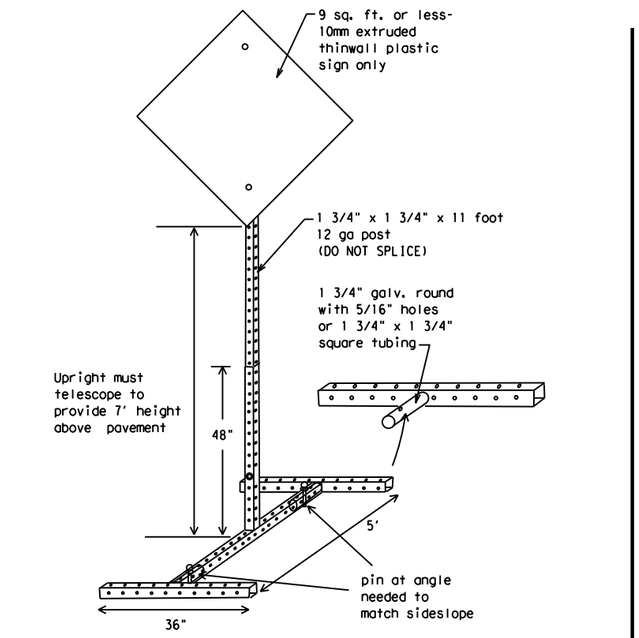
SKID MOUNTED WOOD SIGN SUPPORTS

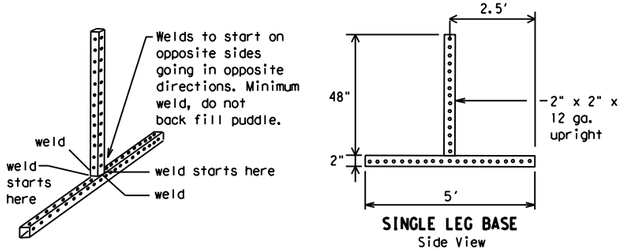
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

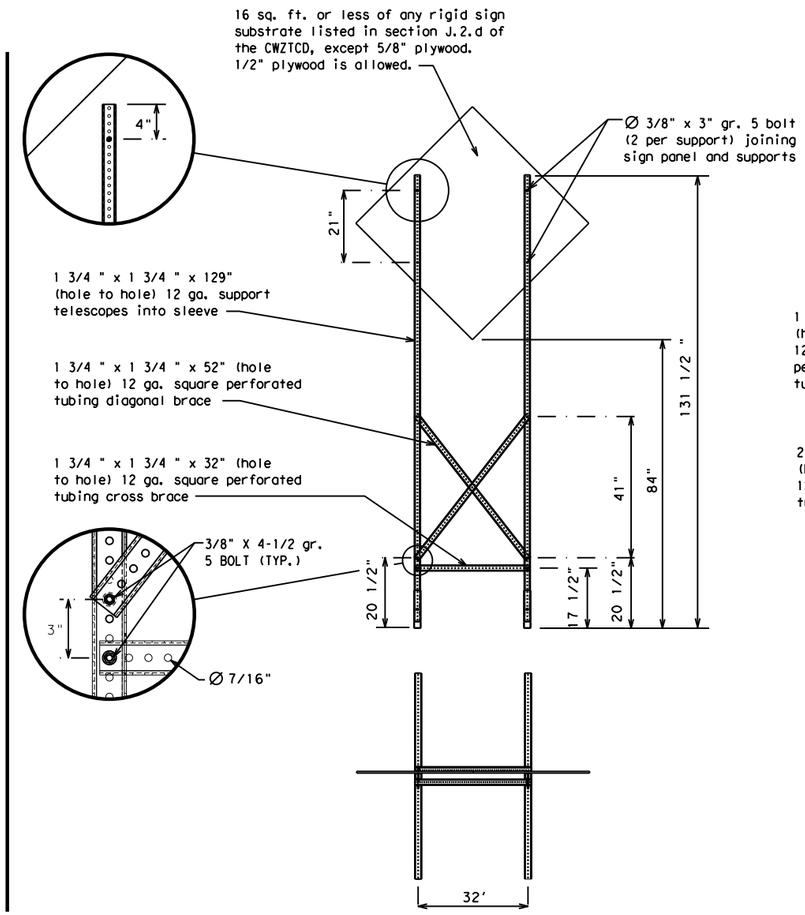


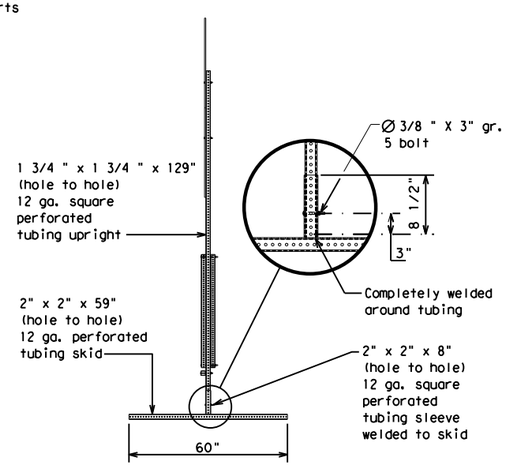
GROUND MOUNTED SIGN SUPPORTS

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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Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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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	0914	00	459	VA
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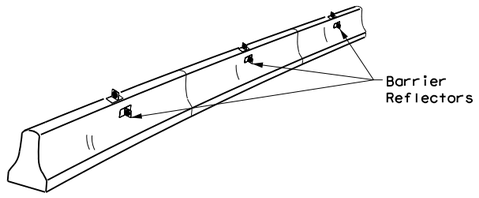
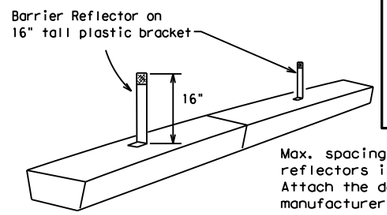
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost of the reflectors shall be considered subsidiary to Item 512.



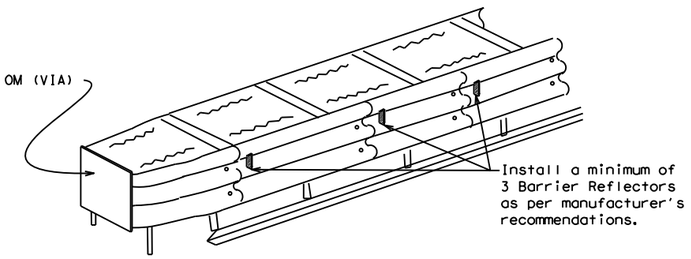
CONCRETE TRAFFIC BARRIER (CTB)

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

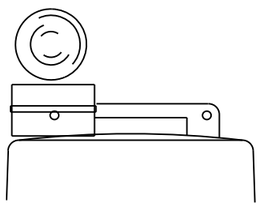
LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

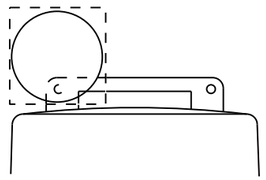
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

1. Warning lights shall meet the requirements of the TMUTCD.
2. Warning lights shall NOT be installed on barricades.
3. Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "FL". The Type A Warning Lights shall not be used with signs manufactured with Type B_{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

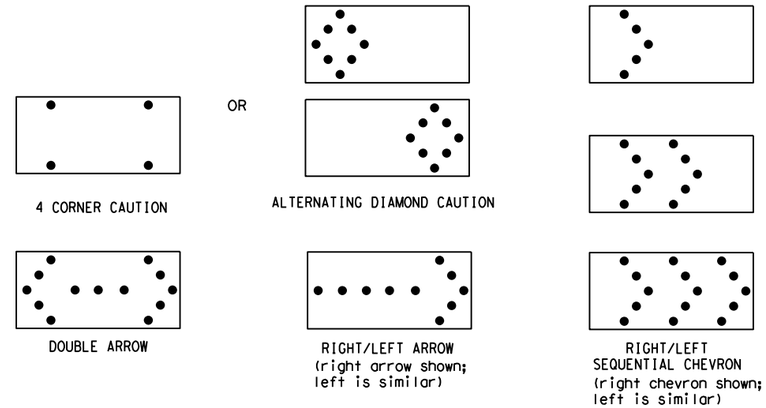
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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	0914	00	459	VA
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	AUS	TRAVIS, ETC.		33

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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:

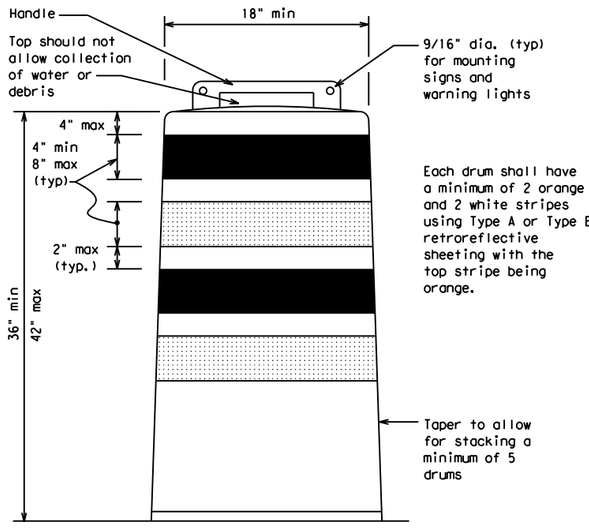
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

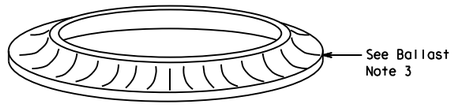
RETROREFLECTIVE SHEETING

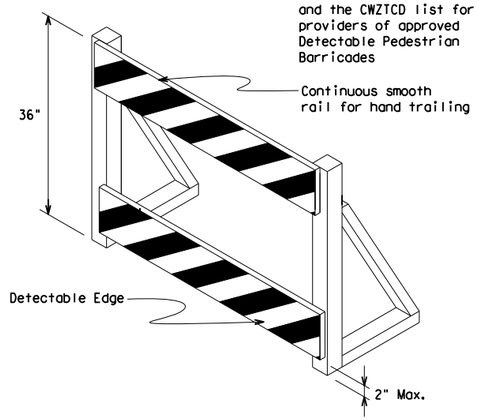
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

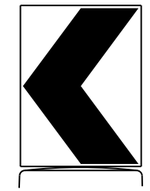




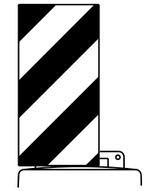


DETECTABLE PEDESTRIAN BARRICADES

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.

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BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

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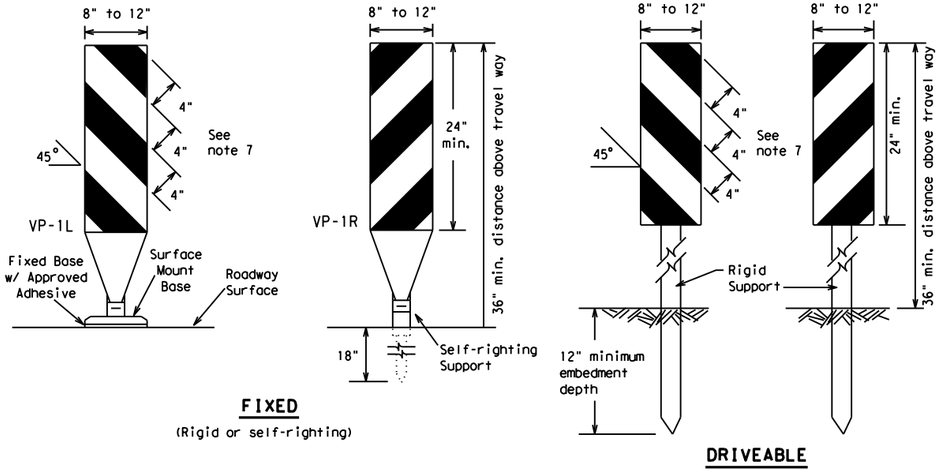
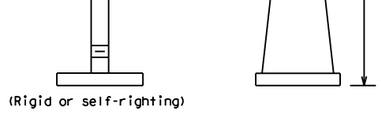


FIXED
(Rigid or self-righting)

DRIVEABLE

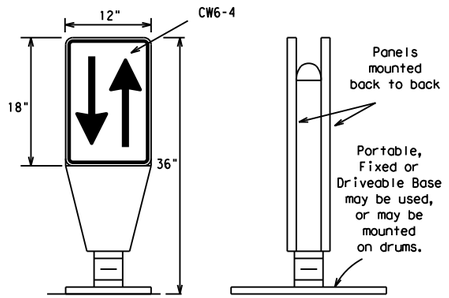


(Rigid or self-righting)

PORTABLE

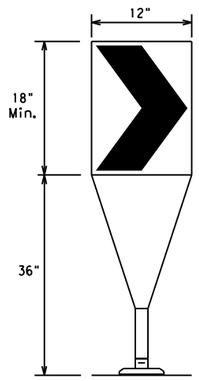
VERTICAL PANELS (VPs)

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.



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)



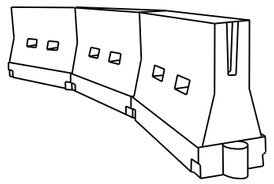
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

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BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

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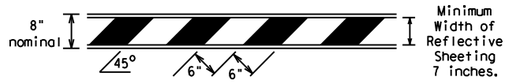
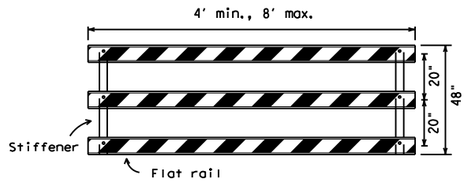
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



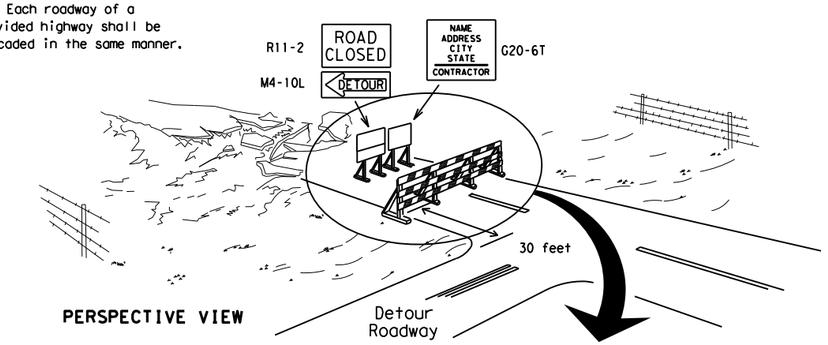
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

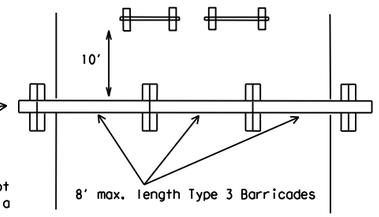
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

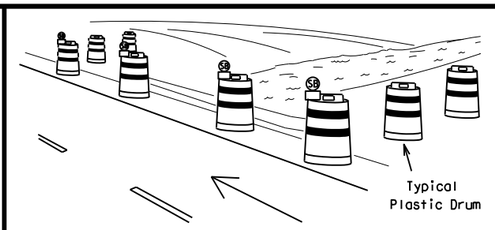
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

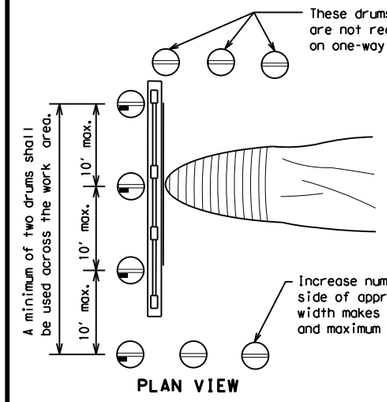
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

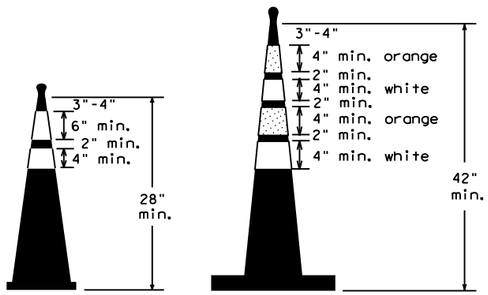
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



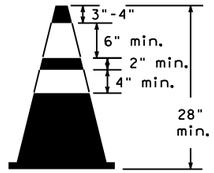
LEGEND	
	Plastic drum
	Plastic drum with steady burn light or yellow warning reflector
SB	Steady burn warning light or yellow warning reflector

PLAN VIEW

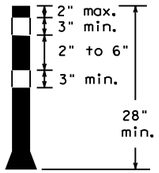
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones



One-Piece cones

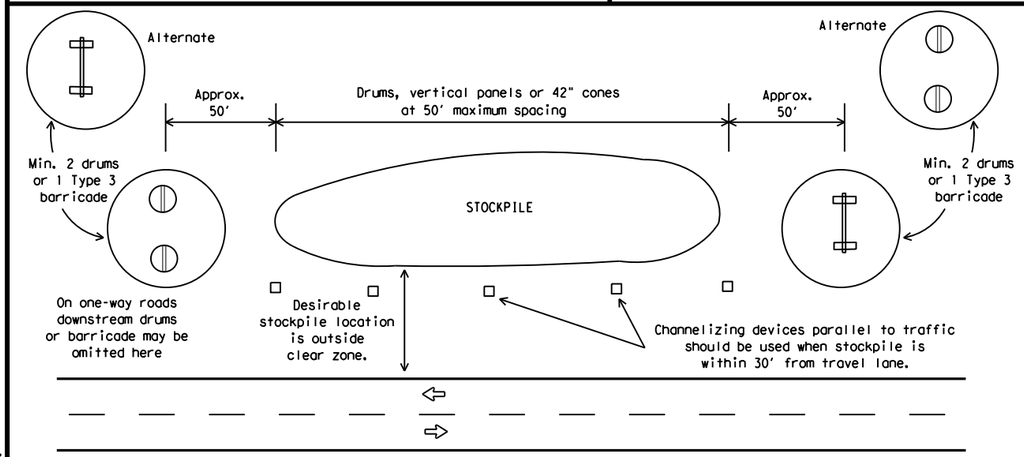


Tubular Marker

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

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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

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BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

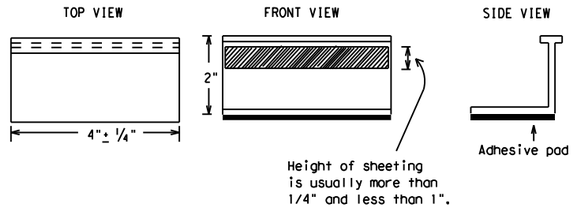
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

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	0914	00	459	VA
	DIST	COUNTY		SHEET NO.
	AUS	TRAVIS, ETC.		37

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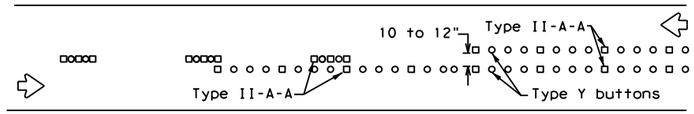
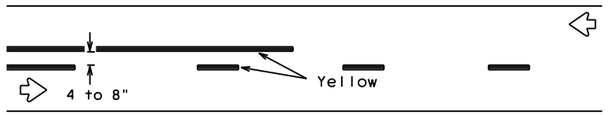
PAVEMENT MARKING PATTERNS

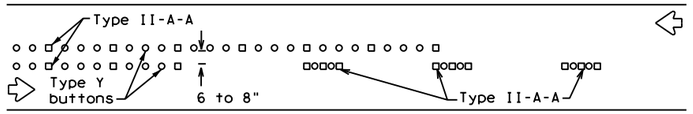
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



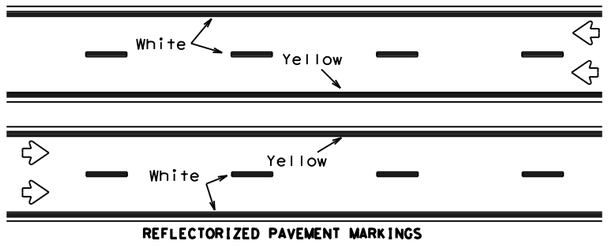
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



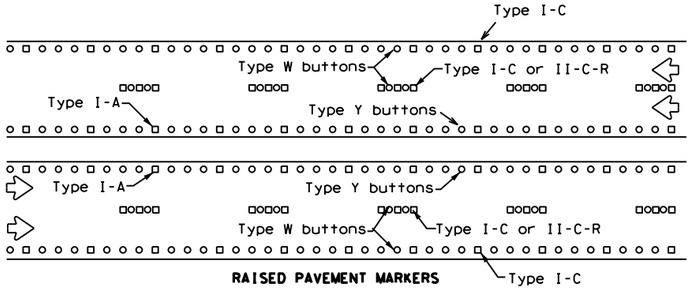
RAISED PAVEMENT MARKERS - PATTERN B

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

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



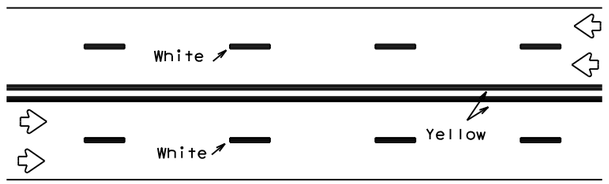
REFLECTORIZED PAVEMENT MARKINGS



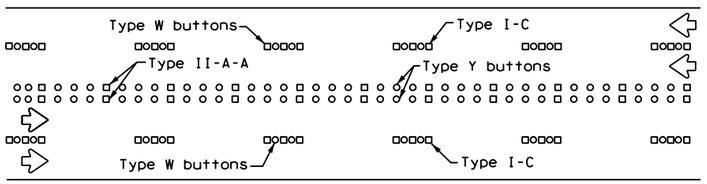
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



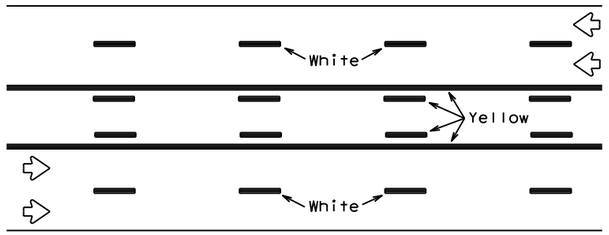
REFLECTORIZED PAVEMENT MARKINGS



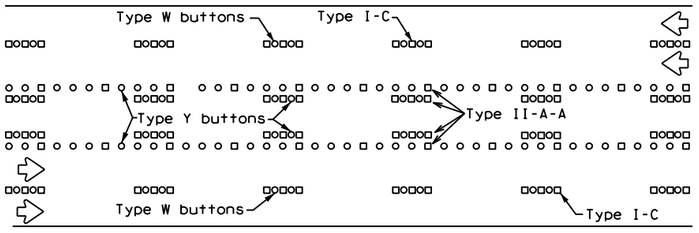
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

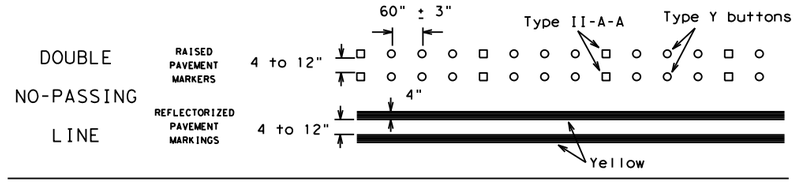
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

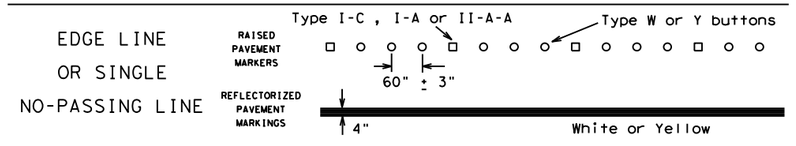
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

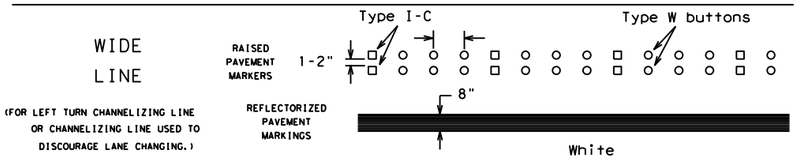


EDGE LINE OR SINGLE NO-PASSING LINE



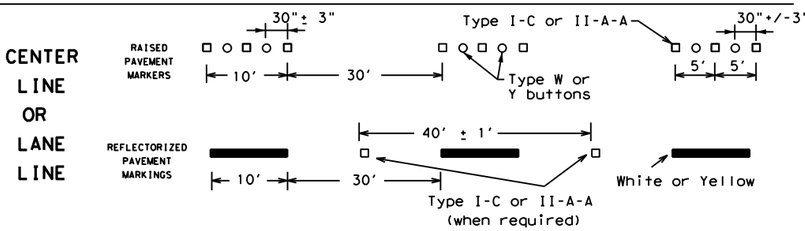
WIDE LINE

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

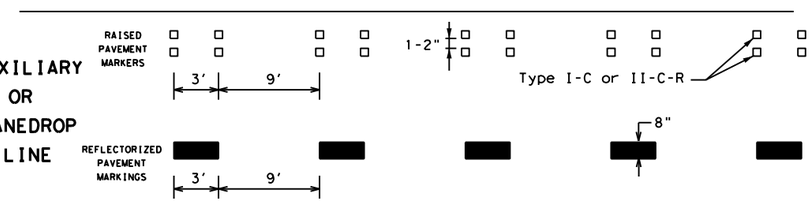


BROKEN LINES

CENTER LINE OR LANE LINE

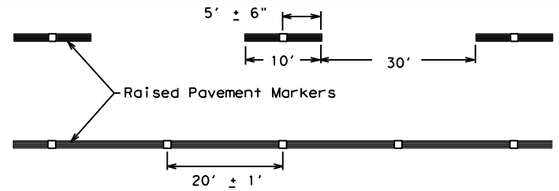


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	0914	00	459	VA
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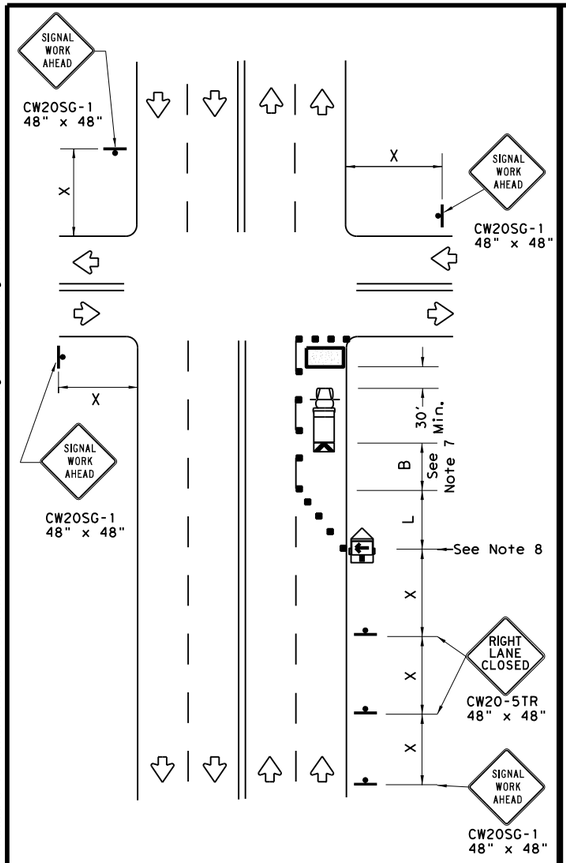
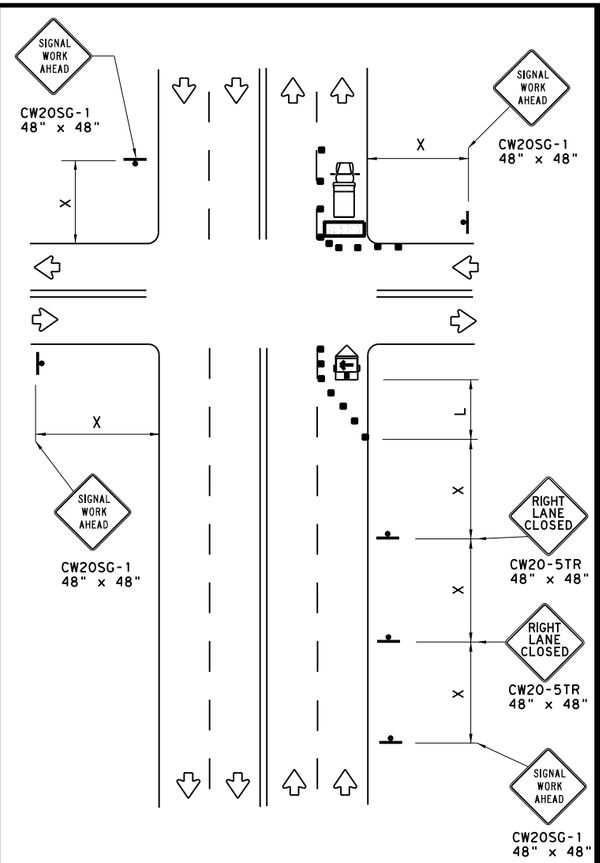


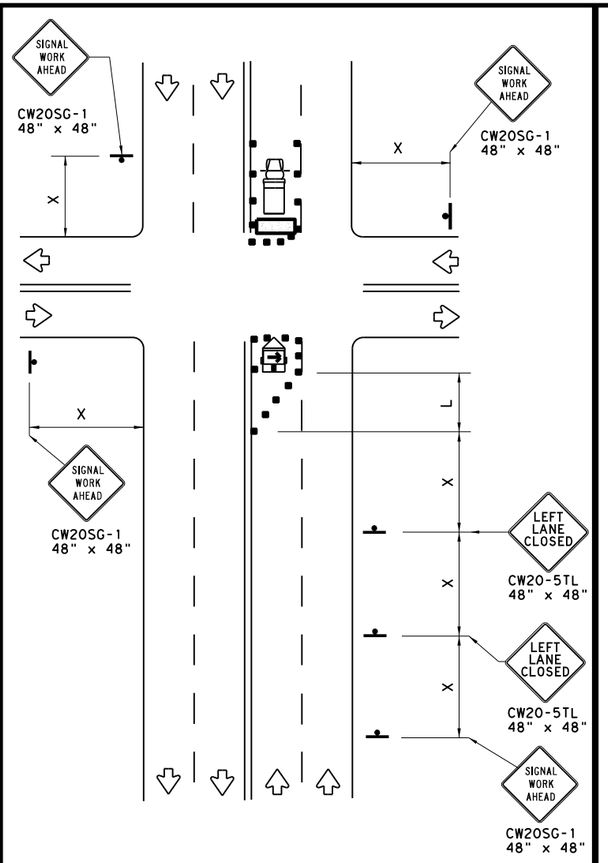
NEAR SIDE LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY



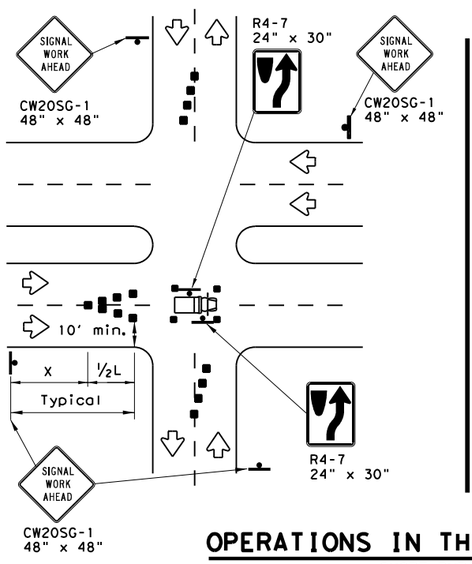
FAR SIDE RIGHT LANE CLOSURE

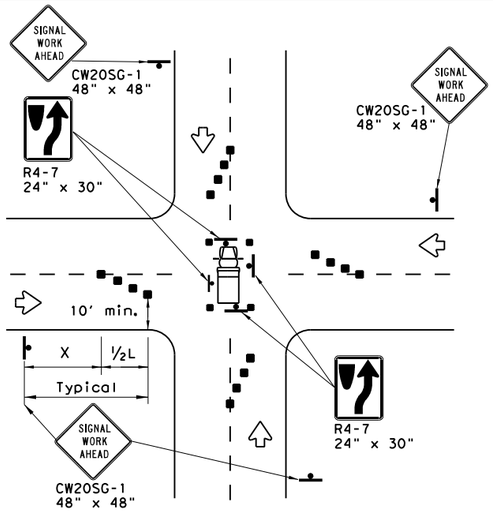
SHORT DURATION OR SHORT TERM STATIONARY



FAR SIDE LEFT LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY





OPERATIONS IN THE INTERSECTION

SHORT DURATION

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)

WORKERS IN BUCKET TRUCKS SHALL NOT WORK ABOVE OPEN LANES OF TRAFFIC.

GENERAL NOTES

1. The minimum size channelizing device is the 28" cone. 42" Two-piece cones, drums, vertical panels or barricades will be required when the device must be left unattended at night.
2. Obstructions or hazards at the work area shall be clearly marked and delineated at all times.
3. Flaggers and Flagger Symbol (CW20-7) signs may be required according to field conditions.
4. Vehicles parked in roadway shall be equipped with at least two high intensity rotating, flashing, oscillating or strobe type lights.
5. High level warning devices (flag trees) may be used at corners of the vehicle.
6. When work operations are performed on existing signals, the signals may be placed in flashing red mode when approved by the engineer. If existing signals do not have power, All-Way Stop (R1-1 and R1-3P) signs may be implemented when approved by the engineer.
7. For Short-Term Stationary work the buffer space "B" from the above table should be used if field conditions permit. For Short Duration (less than 1 hour) any buffer space provided will enhance the safety of the setup.
8. The arrow board at this location may be omitted for Short Duration work if the work vehicle has an arrow board in operation. As an option, the arrow board may be placed at the end of the taper in the closed lane if space is not available at the beginning of the taper.
9. Signs and devices for the NEAR SIDE LANE CLOSURE may be altered for a left lane closure by using a LEFT LANE CLOSED (CW20-5TL) and adding channelizing devices on the centerline to protect the work space from opposing traffic.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC SIGNAL WORK TYPICAL DETAILS

WZ(BTS-1)-13

FILE: wzbts-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	00	459	VA
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4-98 3-03	AUS	TRAVIS, ETC.		39

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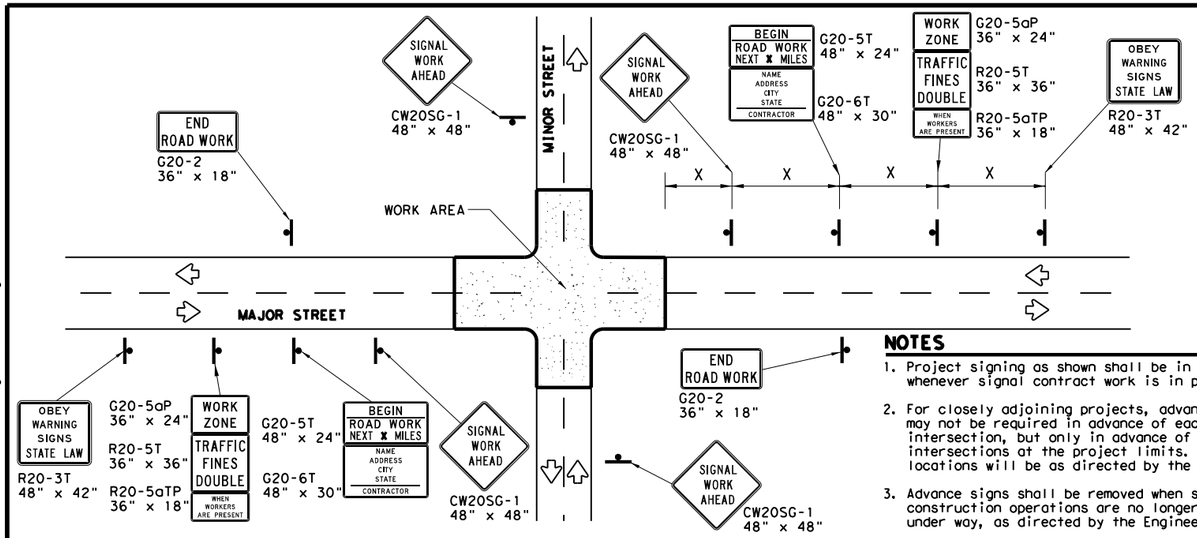


TYPICAL ADVANCE SIGNAL PROJECT SIGNING

FOR LONG TERM and INTERMEDIATE-TERM STATIONARY WORK OPERATIONS

NOTES

1. Project signing as shown shall be in place whenever signal contract work is in progress.
2. For closely adjoining projects, advance signing may not be required in advance of each intersection, but only in advance of the intersections at the project limits. Actual locations will be as directed by the Engineer.
3. Advance signs shall be removed when signal construction operations are no longer under way, as directed by the Engineer.
4. Warning sign spacing shown is typical for both directions.
5. See the Table on sheet 1 of 2 for Typical warning sign spacing.

GENERAL NOTES FOR WORK ZONE SIGNS

1. Signs shall be installed and maintained in a straight and plumb condition.
2. Wooden sign posts shall be painted white.
3. Barricades shall NOT be used as sign supports.
4. Nails shall NOT be used to attach signs to any support.
5. All signs shall be installed in accordance with the plans or as directed by the Engineer.
6. The Contractor shall furnish the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SHSD).
7. The Contractor shall furnish sign supports and substrates listed in the "Compliant Work Zone Traffic Control Device List" (CWZTCD), installed as per the manufacturer's recommendations.
8. Temporary signs that have damaged or cracked substrates and/or damaged or marred reflective sheeting shall be replaced as directed by the Engineer.
9. 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".
10. Damaged wood posts shall be replaced. Splicing wood posts will not be allowed.

DURATION OF WORK

1. Work zone durations are defined in Part 6, Section 6G.02 of the Texas Manual on Uniform Traffic Control Devices (TMUTCD).

SIGN MOUNTING HEIGHT

1. Sign height of Long-term/Intermediate-term warning signs shall be as shown on Figure 6F-1 of the TMUTCD.
2. Sign height of Short-term/Short Duration warning signs shall be as shown on Figure 6F-2 of the TMUTCD.
3. Regulatory signs shall be mounted at least 7 feet, but not more than 9 feet, above the paved surface regardless of work duration.

REMOVING OR COVERING

1. When sign messages may be confusing or do not apply, the signs shall be removed or completely covered, unless otherwise approved by the Engineer.
2. 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. Burlap, or heavy materials such as plywood or aluminum shall not be used to cover signs.
3. Duct tape or other adhesive material shall NOT be affixed to a sign face.
4. Signs and anchor stubs shall be removed and holes back filled upon completion of the work.

REFLECTIVE SHEETING

1. All signs shall be retroreflective and constructed of sheeting meeting the requirements of the DMS and color usage table shown on this sheet.

SIGN SUPPORT WEIGHTS

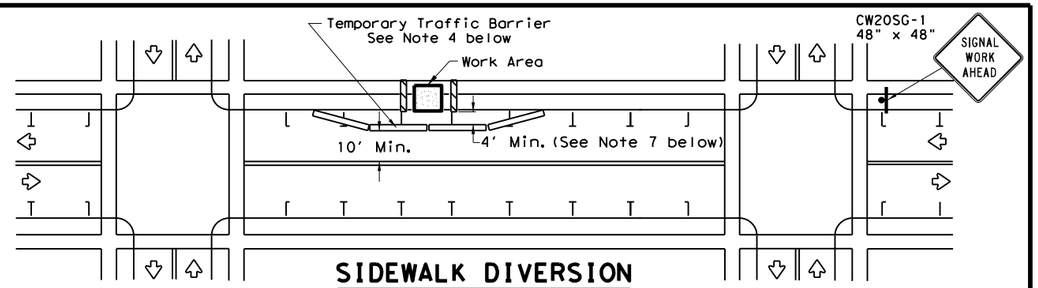
1. Weights used to keep signs from turning over should be sandbags filled with dry, cohesionless material.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects will not be permitted for use as sign support 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 fastners. 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.

LEGEND	
	Sign
	Channelizing Devices
	Type 3 Barricade

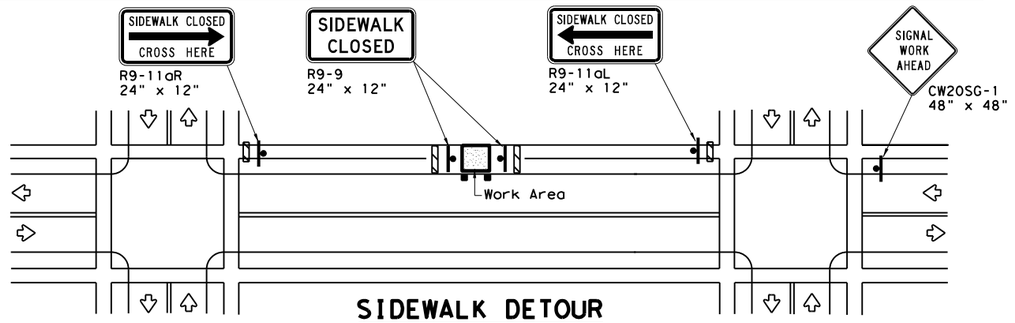
DEPARTMENTAL MATERIAL SPECIFICATIONS	
SIGN FACE MATERIALS	DMS-8300
FLEXIBLE ROLL-UP REFLECTIVE SIGNS	DMS-8310

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

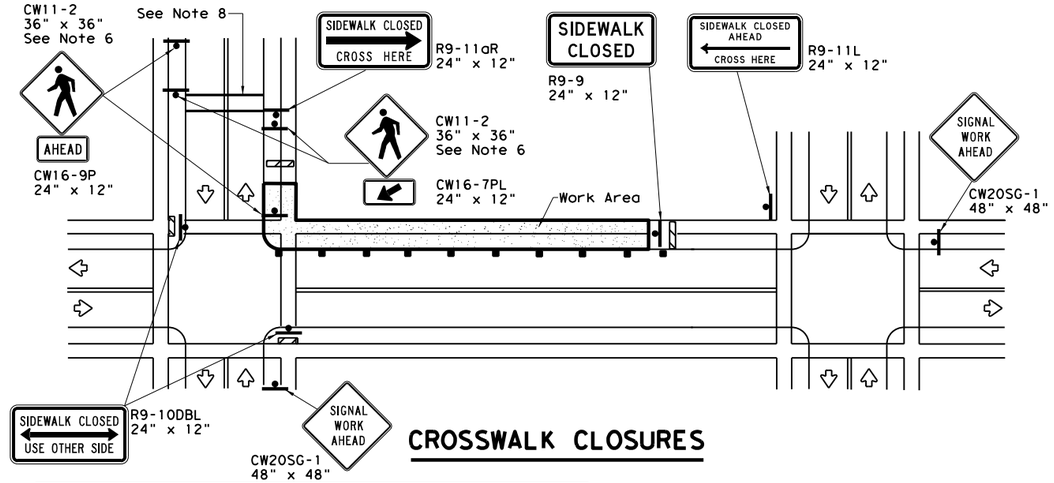
Only pre-qualified products shall be used. A copy of the "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found at the following web address:
http://www.txdot.gov/txdot_library/publications/construction.htm



SIDEWALK DIVERSION



SIDEWALK DETOUR



CROSSWALK CLOSURES

PEDESTRIAN CONTROL

1. Holes, trenches or other hazards shall be adequately protected by covering, delineating or surrounding the hazard with orange plastic pedestrian fencing or longitudinal channelizing devices, or as directed by the Engineer.
2. "CROSSWALK CLOSURES" as detailed above will require the Engineer's approval prior to installation.
3. R9 series signs shown may be placed on supports detailed on the BC standards or CWZTCD list, or when fabricated from approved lightweight plastic substrates, they may be mounted on top of a plastic drum at or near the location shown.
4. For speeds less than 45 mph longitudinal channelizing devices may be used instead of traffic barriers when approved by the Engineer. Attenuation of blunt ends and installation of water filled devices shall be as per BC(9) and manufacturer's recommendations.
5. Location of devices are for general guidance. Actual device spacing and location must be field adjusted to meet actual conditions.
6. Where pedestrians with visual disabilities normally use the closed sidewalk Detectable Pedestrian Barricades should be used instead of the Type 3 Barricades shown.
7. The width of existing sidewalk should be maintained if practical.
8. Pavement markings for mid-block crosswalks shall be paid for under the appropriate bid items.
9. When crosswalks or other pedestrian facilities are closed or relocated, temporary facilities shall be detectable and shall include accessibility features consistent with the features present in the existing pedestrian facility.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC SIGNAL WORK BARRICADES AND SIGNS

WZ(BTS-2)-13

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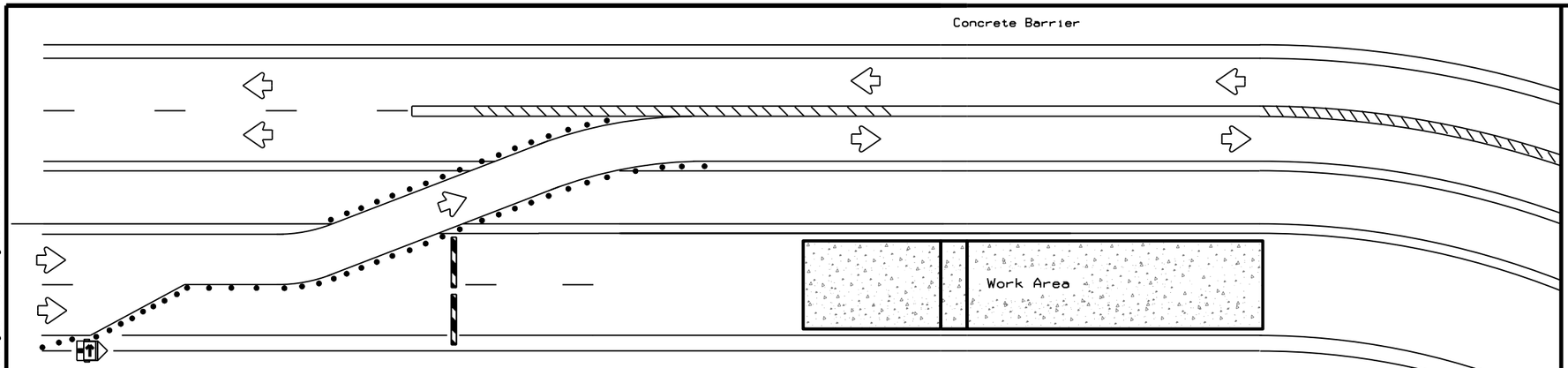
©TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	00	459	VA
2-98 10-99 7-13	DIST	COUNTY		SHEET NO.
4-98 3-03	AUS	TRAVIS, ETC.		40



NOTES:

1. Length of Safety Glare screen will be specified elsewhere in the plans.
2. The cumulative nominal length of the modular safety glare screen units shall equal the length of the individual sections of temporary concrete traffic barrier on which they are installed so the joint between barrier sections will not be spanned by any one safety glare screen unit.
3. Screen Panel/blades will be designed such that reflective sheeting conforming with Departmental Material Specification DMS-8300, Sign Face Materials, Type B or C Yellow, minimum size of 2 inches by 12 inches can be attached to the edge of the panel/blade. The sheeting shall be attached to one glare screen panel/blade per section of concrete barrier not to exceed a spacing of 30 feet. Barrier reflectors are not necessary when panel/blades are installed with reflective sheeting as described.
4. Payment for these devices will be under statewide Special Specification "Modular Glare Screens for Headlight Barrier."
5. This detail is only intended to show types of locations where Glare Screens would be appropriate. Required signing and other devices shall be as shown elsewhere in the plans.

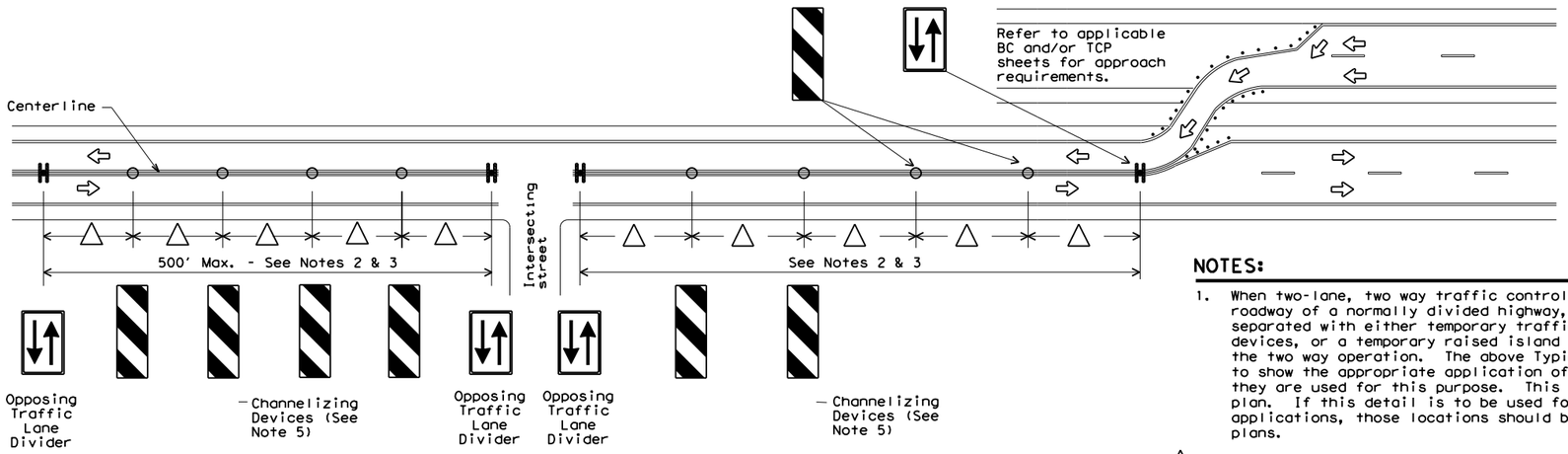
BARRIER DELINEATION WITH MODULAR GLARE SCREENS

LEGEND	
	Type 3 Barricade
• • •	Channelizing Devices
	Trailer Mounted Flashing Arrow Board
	Sign
\\\\	Safety glare screen

DEPARTMENTAL MATERIAL SPECIFICATIONS	
SIGN FACE MATERIALS	DMS-8300
DELINEATORS AND OBJECT MARKERS	DMS-8600
MODULAR GLARE SCREENS FOR HEADLIGHT BARRIER	DMS-8610

Only pre-qualified products shall be used. A copy of the Compliant Work Zone Traffic Control Devices List" CWZTCD)describes pre-qualified products and their sources and may be found at the following web address:

http://www.txdot.gov/business/resources/producer-list.html



VERTICAL PANELS & OPPOSING TRAFFIC LANE DIVIDERS (OTLD)
SEPARATING TWO-WAY TRAFFIC ON NORMALLY DIVIDED HIGHWAYS

NOTES:

1. When two-lane, two way traffic control must be maintained on one roadway of a normally divided highway, opposing traffic shall be separated with either temporary traffic barriers, channelizing devices, or a temporary raised island throughout the length of the two way operation. The above Typical Application is intended to show the appropriate application of channelizing devices when they are used for this purpose. This is not a traffic control plan. If this detail is to be used for other types of roads or applications, those locations should be stated elsewhere in the plans.

△2. Space devices according to the Tangent Spacing shown on the Device Spacing table on BC(9) but not exceeding 100'.

3. Every fifth device should be an OTLD except when spaced closer to accommodate an intersection. An OTLD should be the first device on each side of intersecting streets or roads.
4. Locations where surface mount bases with adhesives or self-righting devices will be required in order to maintain them in their proper position should be noted elsewhere in the plans.
5. Channelizing devices are to be vertical panels, 42" cones or tubular markers that are at least 36" tall. Tubular markers used to separate traffic should have a rubber base weighing at least 30 pounds. Tubular markers that are 42" tall or more shall have four bands of reflective material as detailed for 42" cones on BC(10). Tubular markers less than 42" but at least 36" tall shall have three bands of 3" wide white reflective material spaced 2" apart. Reflective material shall meet DMS-8300, Type A.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN TYPICAL DETAILS

WZ(TD)-17

FILE: wztd-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-17	0914	00	459	VA
4-98	DIST	COUNTY		SHEET NO.
3-03	AUS	TRAVIS, ETC.		41
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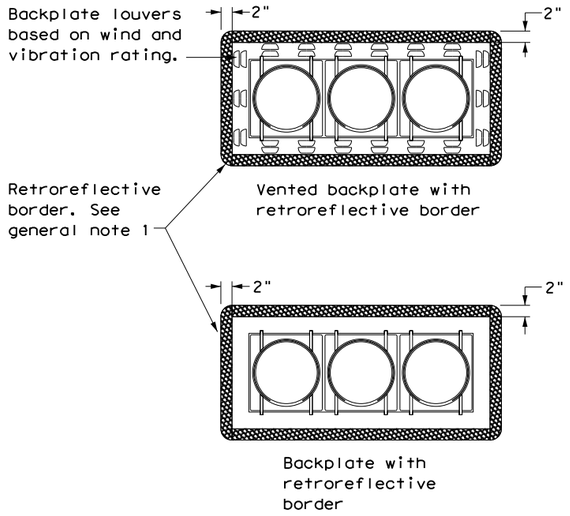
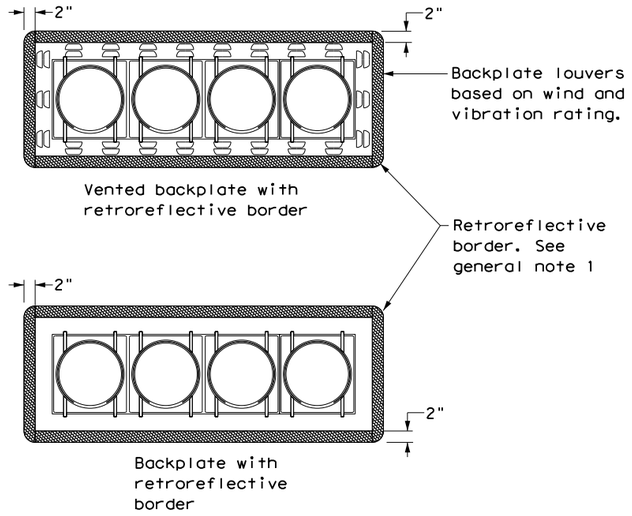
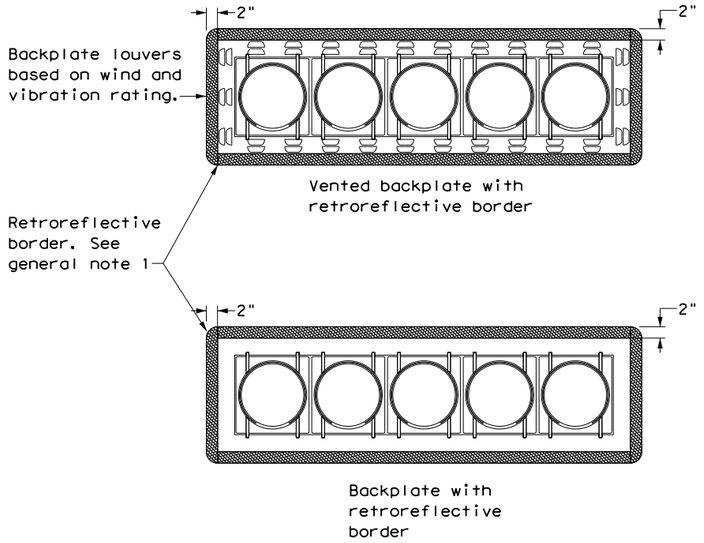


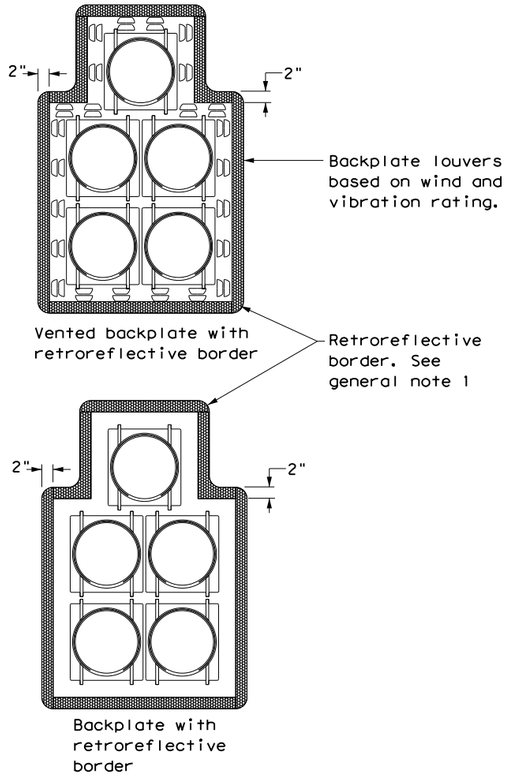
THREE-SECTION HEAD
HORIZONTAL OR VERTICAL



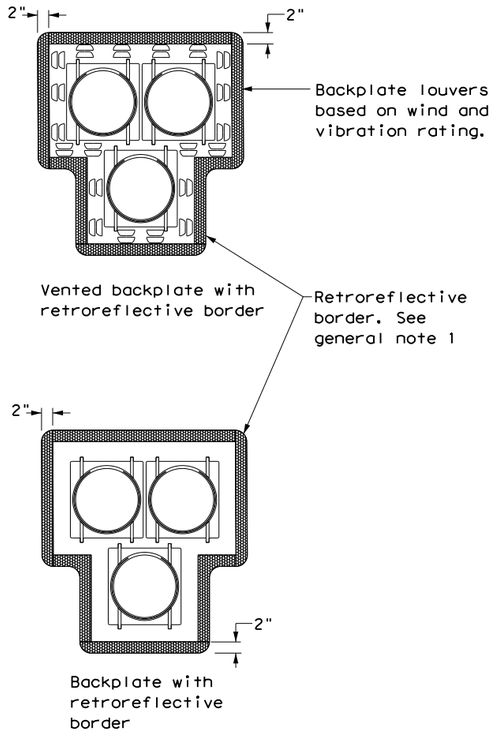
FOUR-SECTION HEAD
HORIZONTAL OR VERTICAL



FIVE-SECTION HEAD
HORIZONTAL OR VERTICAL



FIVE-SECTION HEAD
CLUSTER



PEDESTRIAN HYBRID
BEACON

GENERAL NOTES:

1. Backplates are optional for traffic signals and pedestrian hybrid beacons. When backplates are used, a 2-inch wide fluorescent yellow AASHTO Type B_{FL} or C_{FL} retroreflective border conforming to TxDOT DMS-8300 is required. Place on all approaches when used.
2. Signal head and backplate compatability must be verified by the contractor prior to installation.
3. When using backplates on signal heads, venting is preferred to reduce cyclic vibration stress.
4. When a vented backplate is used, the retroreflective border must not be placed over the louvers.
5. This standard sheet applies to all signal heads with backplates, including but not limited to:
   - Pole mounted
   - Overhead mounted
   - Span wire mounted
   - Mast arm mounted
   - Vertical signal heads
   - Horizontal signal heads
   - Clustered signal heads
   - Pedestrian hybrid beacons

Texas Department of Transportation

Traffic Safety Division Standard

TRAFFIC SIGNAL HEAD WITH BACKPLATE

TS-BP-20

FILE: ts-bp-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	00	459	VA
	DIST	COUNTY		SHEET NO.
	AUS	TRAVIS, ETC.		42

DATE:
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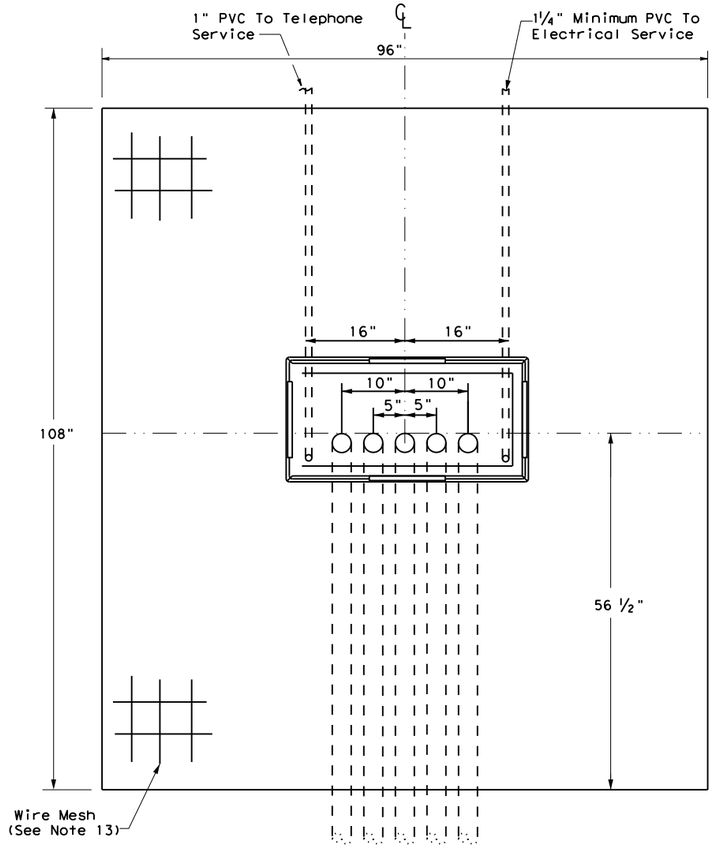
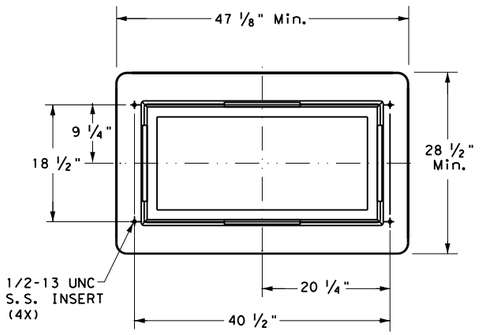
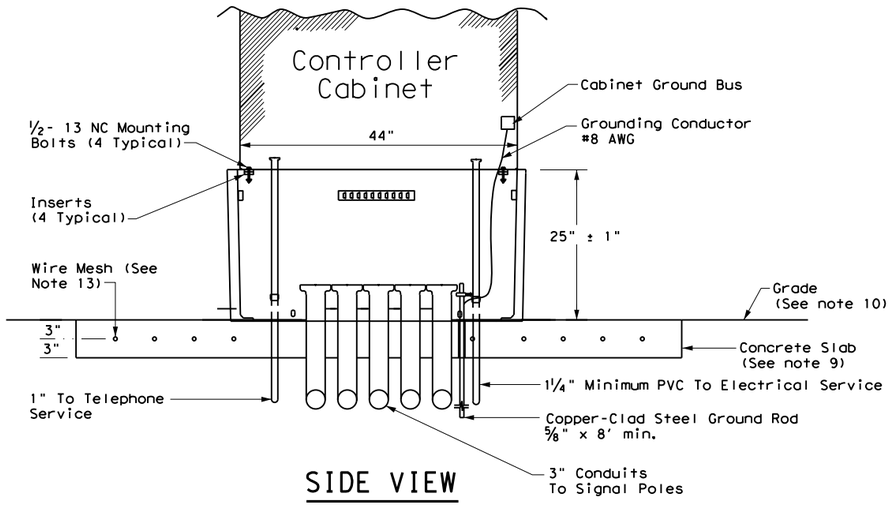


TOP VIEW



CABINET BASE



SIDE VIEW

TRAFFIC SIGNAL CONTROLLER BASE:

1. Provide a traffic signal controller base (cabinet base) manufactured of polymer concrete material consisting of calcareous and siliceous stone; glass fibers and thermoset polyester resin. The polymer concrete cabinet base must be reinforced on the inside of the cabinet base with fiberglass matting. Provide one of the following bases: Armorcast Part # A6001848X24, Quazite Model # PG3048Z709, or other as approved by TxDOT Traffic Safety Division.
2. The polymer concrete material must have a minimum compressive strength of 10,300 pounds per square inch (psi), minimum flexural strength of 3600 psi, and minimum shear strength of 3600 psi.
3. The polymer concrete cabinet base must conform to the dimensions shown and must accommodate a standard TxDOT basemount cabinet.
4. Supply the cabinet base with four 1#2"-13 UNC stainless steel inserts for attachment of the cabinet to the base. Inserts must withstand a minimum torque of 50 ft-lb and a minimum straight pull out strength of 750 lbs.
5. Provide the cabinet base with 4 cable racks mounted one on each side of the base 2" to 7 " from the top edge of the base. Unless approved otherwise, cable racks must be 1-1/2 x 9#16x 3#16inch steel channel with eight T-slots spaced at 1-1/2 inches. The cable racks must easily accommodate the insertion of tie wraps to attach field wiring to the racks to serve as strain relief. Secure cable racks to the base using 1#2"-13 UNC stainless steel screws and inserts.
6. The cabinet base, when secured to the concrete slab with controller cabinet attached, must withstand a minimum wind load of 125 mph or a 850 lb force applied at 49" above the bottom of the base without causing the base or cabinet to come out of their anchored position or cause any permanent deformation. The manufacturer must supply certification by an independent testing laboratory or sealed by a Texas Licensed Professional Engineer. Provide the cabinet base with hardware for attachment to a concrete slab.
7. The traffic signal base must be permanently marked either by impress or by permanent ink with the manufacturer's model number and name or logo.
8. Seal the base to the concrete with a silicone caulk bead and fastened to the slab per manufacturer's instructions.

CONCRETE SLAB:

9. Traffic signal controller pad must be a portland cement concrete slab poured in place, must conform to the dimensions shown, and must be level.
10. Grade earthwork such that it is flush with the concrete pad on all four sides, unless otherwise shown on the plans. Subsidiary to ITEM 680, four inch rip rap may be used in lieu of earthwork. Slopes shall gradually contour to match plans.
11. Bond a #8 AWG copper ground wire and an 8 ft ground rod bonded to the reinforcing mesh by a suitable UL Listed clamp and terminated to the cabinet grounding bus for the purpose of providing a local ground for the electrical grounding conductor. The electrical grounding conductor specified in Item 680-3.A.4 is required and must be terminated to the cabinet ground bus.
12. Install a PVC sleeve to prevent the ground rod from direct embedment in the slab.
13. Provide welded wire mesh 6X6-W2.9 X W2.9 for reinforcement. Provide joints and splices in the mesh with a minimum 6-inch overlap. Center the mesh between top and bottom and provide a minimum 3 inch cover on the edges.
14. Provide Class B concrete minimum for the slab in accordance with Item 421. Construct the slab in accordance with Item 531.

CONDUITS:

15. Stub up and run 3-inch conduits through the slab to the various traffic signal poles and ground boxes as shown on the layouts. Install the number of conduits as shown on layouts plus two additional 3 inch conduits for future use. Terminate the conduits with a bushing between 2 and 4-inches above the slab.
16. Extend conduits for future use at least 18-inches from the edge of the slab, terminate underground with a coupling, and cap and seal so that the seal can be removed without damaging the coupling. This must also apply to unused telephone conduit.
17. Stub up two separate conduits through the slab from the electrical and telephone services. Run the conduit for the electrical feed directly to the electrical service enclosure. Run the conduit for the telephone line directly to the telephone service, usually located on the same pole as the electrical service. Telephone must not under any circumstance share a conduit with any other function.
18. Terminate electric and telephone conduits above the slab with a coupling. After the base is installed, extend the conduits above the top of the base and secure to the base using a steel one-hole strap or similar suitable substitute.

CONTROLLER CABINET:

19. Anchor the controller cabinet to the base using four stainless steel 1/2-13 NC bolts.
20. The silicone caulk bead specified in Item 680.3.B must be RTV 133.

PAYMENT:

21. Bid TS-CF as subsidiary to Item 680.

Texas Department of Transportation

Traffic Safety Division Standard

TRAFFIC SIGNAL CONTROLLER CABINET BASE AND PAD

TS-CF-21

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© TxDOT October 2000	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	00	459	VA
12-04	DIST	COUNTY		SHEET NO.
2-21	AUS	TRAVIS, ETC.		43

FOUNDATION DESIGN TABLE

FDN TYPE	DRILLED SHAFT DIA	REINFORCING STEEL		EMBEDDED DRILLED SHAFT LENGTH-ft ④, ⑤, ⑥			ANCHOR BOLT DESIGN ①				FOUNDATION DESIGN LOAD ②		TYPICAL APPLICATION
		VERT BARS	SPIRAL & PITCH	TEXAS CONE PENETROMETER N blows/ft 10	15	40	ANCHOR BOLT DIA	Fy (ksi)	BOLT CIR DIA	ANCHOR TYPE	MOMENT K-ft	SHEAR Kips	
24-A	24"	4- #5	#2 at 12"	5.7	5.3	4.5	¾"	36	12 ¾"	1	10	1	Pedestal pole, pedestal mounted controller.
30-A	30"	8- #9	#3 at 6"	11.3	10.3	8.0	1 ½"	55	17"	2	87	3	Mast arm assembly. (see Selection Table)
36-A	36"	10- #9	#3 at 6"	13.2	12.0	9.4	1 ¾"	55	19"	2	131	5	Mast arm assembly. (see Selection Table) 30' strain pole with or without luminaire.
36-B	36"	12- #9	#3 at 6"	15.2	13.6	10.4	2"	55	21"	2	190	7	Mast arm assembly. (see Selection Table) Strain pole taller than 30' & strain pole with mast arm
42-A	42"	14- #9	#3 at 6"	17.4	15.6	11.9	2 ¼"	55	23"	2	271	9	Mast arm assembly. (see Selection Table)

NOTES:

① Anchor bolt design develops the foundation capacity given under Foundation Design Loads.

② Foundation Design Loads are the allowable moments and shears at the base of the structure.

③ Foundations may be listed separately or grouped according to similarity of location and type. Quantities are for the Contractor's information only.

④ Field Penetrometer readings at a depth of approximately 3 to 5 feet may be used to adjust shaft lengths.

⑤ If rock is encountered, the Drilled Shaft shall extend a minimum of two diameters into solid rock.

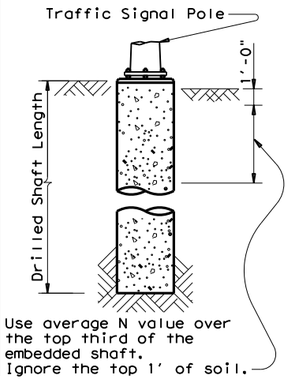
⑥ Decimal lengths in Design Table are to allow interpolation for other penetrometer values. Round to nearest foot for entry into Summary Table.

FOUNDATION SUMMARY TABLE ③

LOCATION IDENTIFICATION	AVG. N BLOW /ft.	FDN TYPE	NO. EA	DRILLED SHAFT LENGTH ⑥ (FEET) 24-A	30-A	36-A	36-B	42-A
TOTAL DRILLED SHAFT LENGTHS								

FOUNDATION SELECTION TABLE FOR STANDARD MAST ARM PLUS ILSN SUPPORT ASSEMBLIES (ft)

		FDN 30-A	FDN 36-A	FDN 36-B	FDN 42-A
80 MPH DESIGN WIND SPEED	MAX SINGLE ARM LENGTH	32'	48'		
	MAXIMUM DOUBLE ARM LENGTH COMBINATIONS	24' X 24'			
		28' X 28'			
		32' X 28'	32' X 32'		
			36' X 36'		
			40' X 36'		
			44' X 28'	44' X 36'	
100 MPH DESIGN WIND SPEED	MAX SINGLE ARM LENGTH		36'	44'	
	MAXIMUM DOUBLE ARM LENGTH COMBINATIONS		24' X 24'		
			28' X 28'		
			32' X 24'	32' X 32'	
				36' X 36'	
				40' x24'	40' X 36'
					44' x 36'



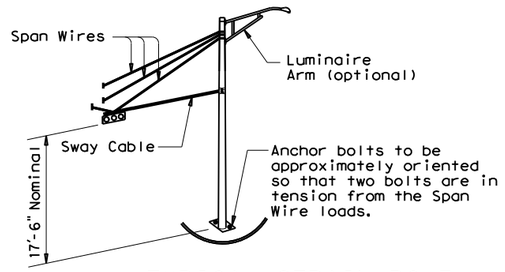
Use average N value over the top third of the embedded shaft. Ignore the top 1' of soil.

ANCHOR BOLT & TEMPLATE SIZES

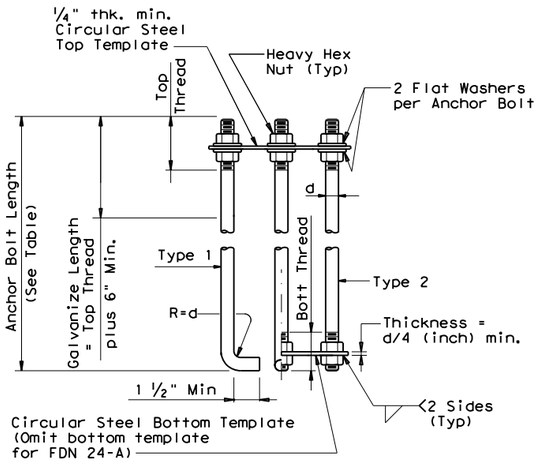
BOLT DIA IN.	⑦ BOLT LENGTH	TOP THREAD	BOTTOM THREAD	BOLT CIRCLE	R2	R1
¾"	1'-6"	3"	—	12 ¾"	7 ⅛"	5 ⅝"
1 ½"	3'-4"	6"	4"	17"	10"	7"
1 ¾"	3'-10"	7"	4 ½"	19"	11 ¼"	7 ¾"
2"	4'-3"	8"	5"	21"	12 ½"	8 ½"
2 ¼"	4'-9"	9"	5 ½"	23"	13 ¾"	9 ¼"

⑦ Min dimensions given, longer bolts are acceptable.

EXAMPLE:
1. For 80mph design wind speed, foundation 30-A can support up to a 32' arm with another arm up to 28'
2. For 100mph design wind speed, foundation 36-A can support a single 36' mast arm.



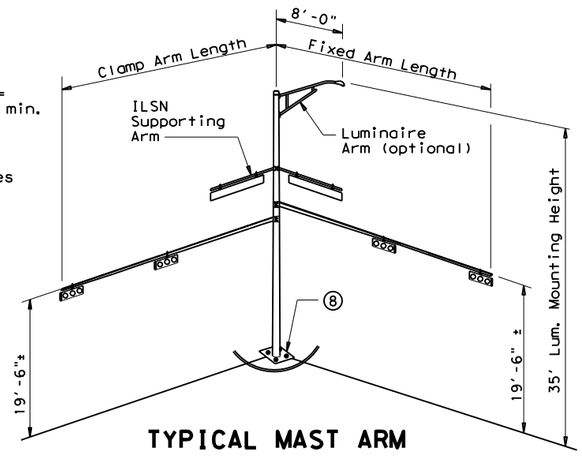
TYPICAL STRAIN POLE ASSEMBLY



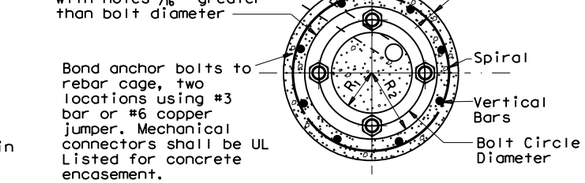
HOOKED ANCHOR (TYPE 1) NUT ANCHOR (TYPE 2)

ANCHOR BOLT ASSEMBLY

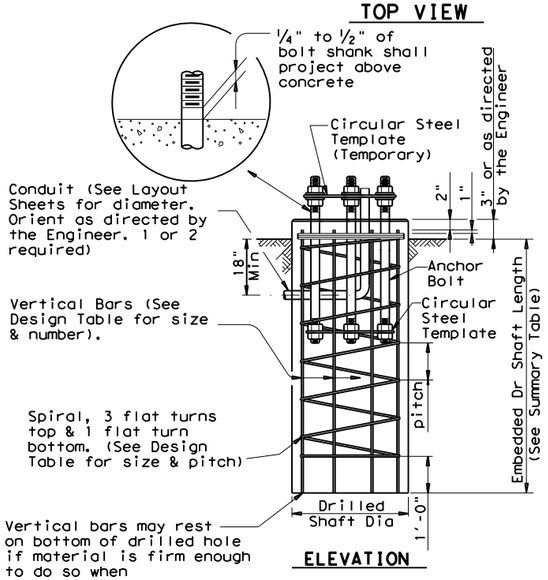
⑧ Orient anchor bolts orthogonal with the fixed arm direction to ensure that two bolts are in tension under dead load.



TYPICAL MAST ARM ASSEMBLY



TOP VIEW



ELEVATION

FOUNDATION DETAILS

GENERAL NOTES:

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

Reinforcing steel shall conform to Item 440, "Reinforcing Steel".

Concrete shall be Class "C".

Threads for anchor bolts and nuts shall be rolled or cut threads of 8UN series up to 2" in diameter or UNC series for all sizes. Bolts and nuts shall have Class 2A and 2B fit tolerances. Galvanized nuts shall be tapped after galvanizing.

Anchor bolts that are larger than 1" in diameter shall conform to "alloy steel" or "medium-strength mild steel" per Item 449, "Anchor Bolts". Anchor bolts that are 1" in diameter or less shall conform to ASTM A36. Galvanize a minimum of the top end thread length plus 6" 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".

Templates and embedded nuts need not be galvanized. Lubricate and tighten anchor bolts when erecting the structure in accordance with Item 449, "Anchor Bolts".

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL POLE FOUNDATION

TS-FD-12

REVISIONS	DN: MS	CK: JSY	DW: MAO/MMF	CK: JSY/TEB
5-96 11-99 1-12	CONT	SECT	JOB	HIGHWAY
	0914	00	459	VA
	DIST	COUNTY		SHEET NO.
	AUS	TRAVIS, ETC.		44

DATE: 9/15/2023 9:56:44 AM
FILE: 32*ts-fd.dgn

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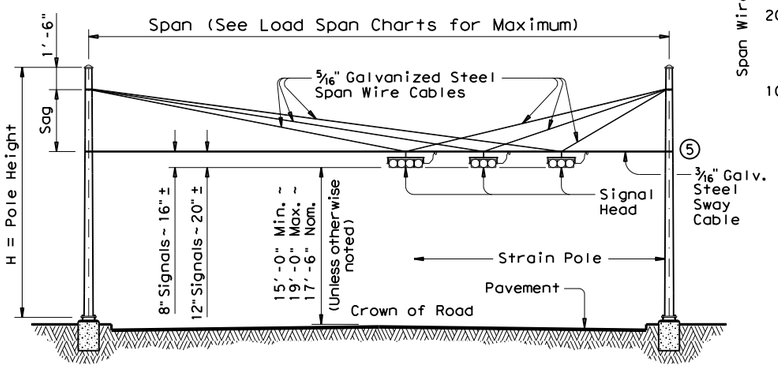
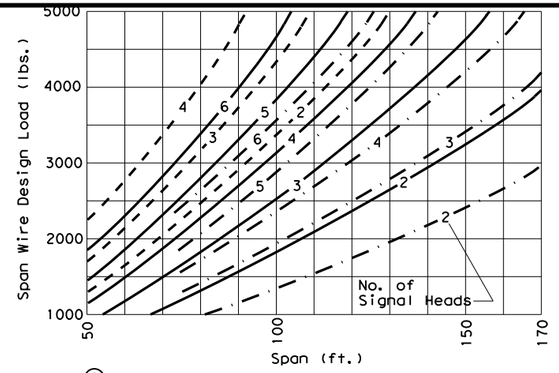
STRAIN POLE DESCRIPTION	Pole Type	Foundation Type	Maximum Permissible Span Wire Load (lbs.)
26′ Pole	A	36-A	5200
30′ Pole	B	36-A	4600
30′ Pole with Lum.	B	36-A	4400
30′ Pole with 20′ Mast Arm	C	36-B	5600
30′ Pole with 24′ Mast Arm	C	36-B	5500
30′ Pole with 28′ Mast Arm	C	36-B	5300
30′ Pole with 32′ Mast Arm	C	36-B	5100
30′ Pole with 36′ Mast Arm	C	36-B	4900
30′ Pole with 20′ Mast Arm & Lum.	C	36-B	5300
30′ Pole with 24′ Mast Arm & Lum.	C	36-B	5200
30′ Pole with 28′ Mast Arm & Lum.	C	36-B	5000
30′ Pole with 32′ Mast Arm & Lum.	C	36-B	4800
30′ Pole with 36′ Mast Arm & Lum.	C	36-B	4500
34′ Pole	D	36-B	5600
34′ Pole with Lum.	D	36-B	5400

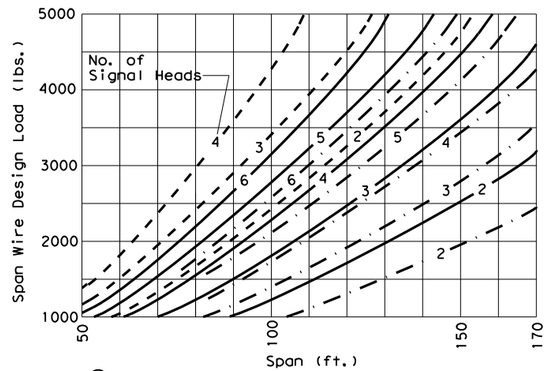
② Numbers on Load Span Charts indicate the number of signal heads on the span. The total span wire design load is based on one 5-section head and one or more additional 3-section head(s). Design wind pressures on cables are assumed as 1.0 lb/ft. Weight of span wire cables (one per signal head) is assumed as 0.65 lb/ft which includes an allowance for conductor cables and miscellaneous hardware. The effect of the sway cable on load distribution is ignored as it is assumed to break at design wind conditions. When a pole supports 2 spans, the span wire design loads for both spans should be added vectorially to determine the design load for that pole.



STRAIN POLE ELEVATIONS HORIZONTAL SIGNALS



② SIGNALS WITH 12-INCH LENS

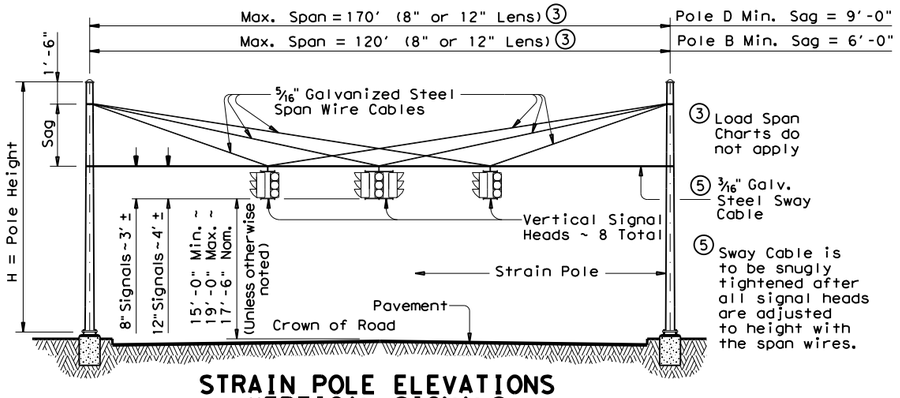


② SIGNALS WITH 8-INCH LENS

Signal Head Type	Wt. Per Head	Wind Area ◆
5-Section, 12" Lens	125 lbs	9.6 sq. ft.
5-Section, 8" Lens	70 lbs	4.8 sq. ft.
3-Section, 12" Lens	75 lbs	5.64 sq. ft.
3-Section, 8" Lens	45 lbs	3.0 sq. ft.

◆ Effective projected design wind area (actual area times drag coefficient)

– – – – – – Sag = 4′-6" (26′ or 30′ Pole)
——— Sag = 8′-0" (30′ or 34′ Pole)
— · — · — Sag = 11′-6" (34′ Pole)



STRAIN POLE ELEVATIONS VERTICAL SIGNALS

(Mast arms are not used with vertical signals)

Pole Type	ROUND POLES D_B in.	D_T in.	④thk in.	H ft.	POLYGONAL POLES D_B in.	D_T in.	④thk in.	H ft.
A	12.5	8.9	.239	26	13.0	9.0	.239	26
B	13.5	9.3	.239	30	14.0	9.0	.239	30
C	15.5	11.3	.239	30	16.0	11.0	.239	30
D	15.5	10.7	.239	34	16.0	11.0	.239	34

D_B = Pole Base O.D. D_T = Pole Top O.D. H = Pole Height

④ Thickness shown are minimum, thicker materials may be used.

SHIPPING PARTS LIST

Poles (Without Traffic Signal Arm)

Pole Type	Strain poles with Luminaire: Ship each pole with the following hardware attached: handhole at base, pole cap, 2 clamp-on simplex and 1 pipe plug.			Strain poles without Luminaire: Ship each pole with the following hardware attached: handhole at base, pole cap and 1 pipe plug.		
	Description	Designation	Quantity	Description	Designation	Quantity
A				26′ Strain Pole	SP 26 A-80	
B	30′ Strain Pole	SPL 30 B-80		30′ Strain Pole	SP 30 B-80	
D	34′ Strain Pole	SPL 34 D-80		34′ Strain Pole	SP 34 D-80	

Poles (With Traffic Signal Arm)

Pole Type	Strain poles with Luminaire: Ship each pole with the following hardware attached: handhole at base, pole cap, clamp-on simplex and 3 pipe plugs.			Strain poles without Luminaire: Ship each pole with the following hardware attached: handhole at base, pole cap and 3 pipe plugs.		
	Description	Designation	Quantity	Description	Designation	Quantity
C	30′ SPw/TS Arm	SPL 30 C-80		30′ SPw/TS Arm	SP 30 C-80	

Traffic Signal Arms (For Type C poles)

Nominal Arm Length	Type I Arm (1 Signal): Ship each Type I Arm with the following hardware attached: 2 CGB Connectors, 1 clamp with bolts and washers		Type II Arm (2 Signals): Ship each Type II Arm with the following hardware attached: ① 1 Bracket Assembly, 3 CGB Connectors and 1 clamp with bolts and washers		Type III Arm (3 Signals): Ship each Type III Arm with the following hardware attached: ① 2 Bracket Assemblies, 4 CGB Connectors and 1 clamp with bolts and washers	
ft.	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20I-80					
24	24I-80		24 II -80			
28	28I-80		28 II -80			
32			32 II -80		32 III -80	
36			36 II -80		36 III -80	

Anchor Bolt Assemblies (1 per pole)

Templates may be removed for shipment.

Anchor Bolt Diameter	Anchor Bolt Length	Quantity
1 ¾"	3′-10"	
2"	4′-3"	

Each Anchor Bolt Assembly consists of the following: Top and Bottom templates, 4 anchor bolts, 8 nuts, 8 flat washers, and 4 nut anchor devices (Type 2) per Standard Drawing "TS-FD".

Luminaire Arms

Nominal Arm Length	Quantity
8′ Arm	

① See Sheet "DMA-80"

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES STRAIN POLE ASSEMBLIES

(80 MPH WIND ZONE)

SP-80(1)-12

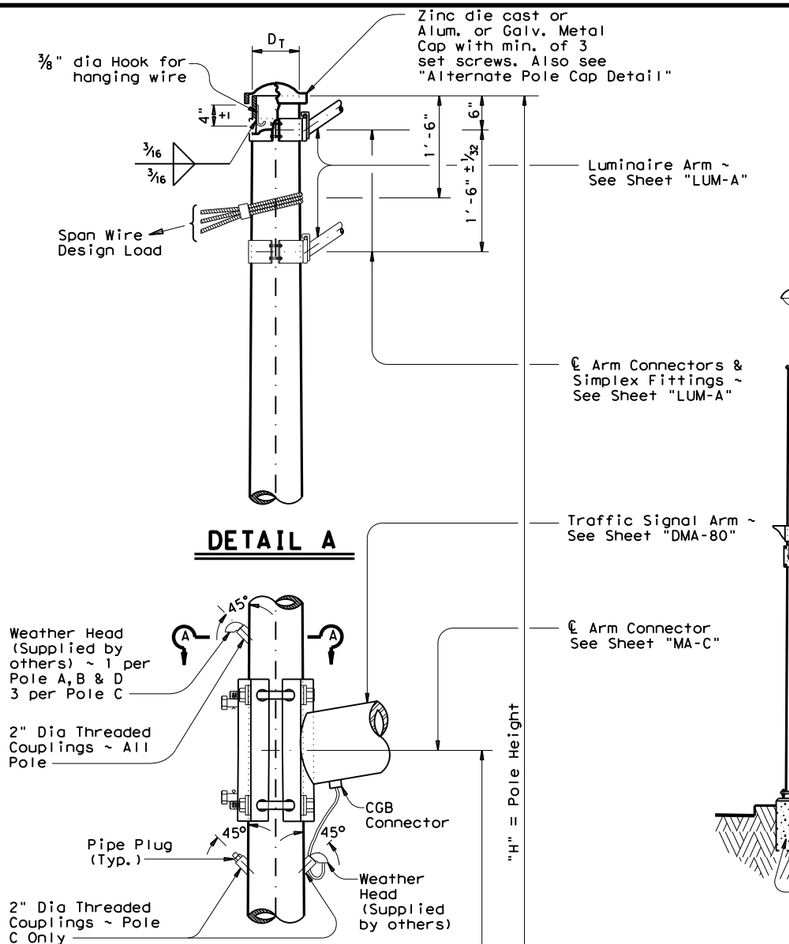
DN: MS	CK: JSY	DW: BR	CK: JSY

REVISIONS	CONT	SECT	JOB	HIGHWAY
6-96	0914	00	459	VA
1-12	DIST	COUNTY		SHEET NO.
	AUS	TRAVIS, ETC.		45

DATE:
FILE:

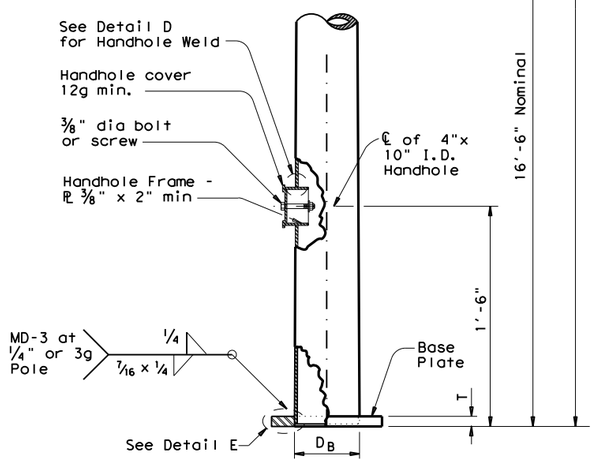
120A

DATE:
FILE:



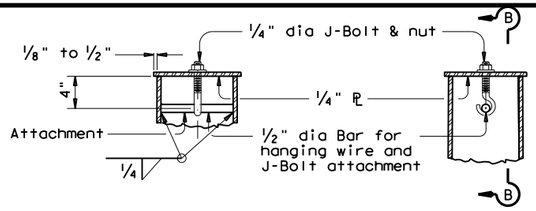
DETAIL A

DETAIL B



DETAIL C

POLE ELEVATION



SECTION B-B

ALTERNATE POLE CAP DETAIL

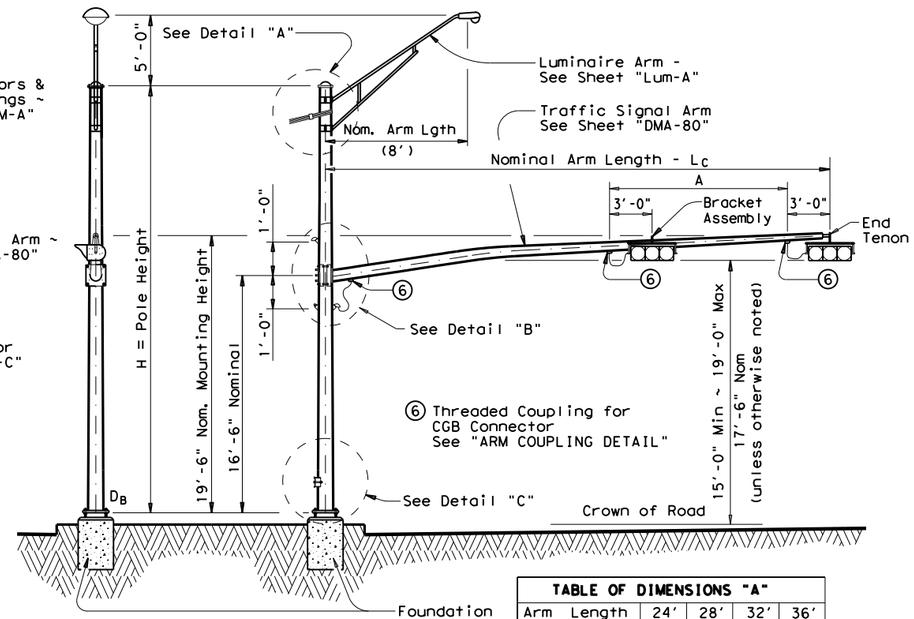
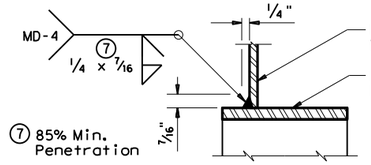
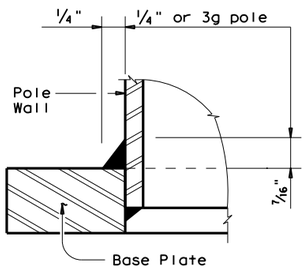


TABLE OF DIMENSIONS "A"				
Arm Length	24'	28'	32'	36'
Arm Type II	10'	11'	12'	13'
Arm Type III			10'	11'

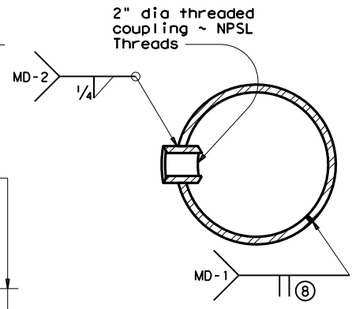
STRUCTURE ASSEMBLY



DETAIL D



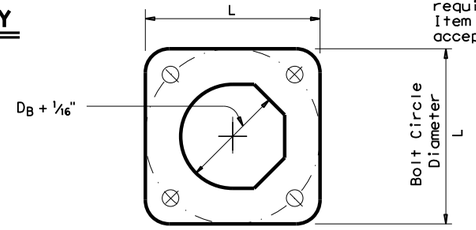
DETAIL E



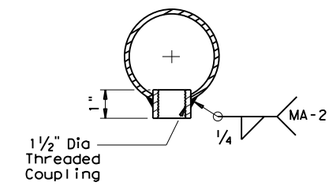
SECTION A-A

(Pole Coupling and Seam Weld Details)

⑧ 60% Min. penetration, except 100% penetration within 6" of circumferential base welds.



BASE PLATE PLAN



ARM COUPLING DETAIL

MATERIALS	
Round Shafts or Polygonal Shafts ⑨	ASTM A595 Gr.A, A588, A1008 HSLAS Gr.50 Class 2, A1011 HSLAS Gr.50 Class 2, A572 Gr.50 or A1011 SS Gr.50 ⑩
Plates ⑨	ASTM A36, A588, or A572 Gr.50
Connection Bolts	ASTM A325 except where noted
Pin Bolts	ASTM A325
Pipe ⑨	ASTM A53 Gr.B, A501, A1008 HSLAS-F Gr.50, A1011 HSLAS-F Gr.50
Steel Cable	ASTM A475, 7 Wire Utilities Grade
Misc. Hardware	Galvanized steel or stainless steel or as noted

⑨ ASTM A572, A1008 HSLAS, A1011 HSLAS, A1008 HSLAS-F, A1011 HSLAS-F, or A1011 SS may have higher yield strengths but shall not have less elongation than the grade indicated.

⑩ ASTM A1011 SS Gr.50 shall also have a minimum elongation of 18 percent in 8 inches or 23 percent in 2 inches. Material thickness in excess of those stipulated under A1011 SS will be acceptable providing the material meets all other A1011 SS requirements and the requirements of this item.

GENERAL NOTES

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications thereto. Design Wind Speed equals 80 mph plus a 1.3 gust factor. The maximum permissible span wire design loads tabulated are calculated at a stress load of 1.4 times the basic allowable stress. A simultaneous wind on the pole, mast arm, and luminaire is also included.

See standard sheet "DMA-80" for details of clamp-on traffic signal arms, sheet "MA-C" for traffic signal arm connection details, sheet "LUM-A" for luminaire arm and connection details, and sheet "TS-FD" for anchor bolt and foundation details.

Fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. Materials, fabrication tolerances, and shipping practices shall meet the requirements of this sheet and Item 686, "Traffic Signal Pole Assemblies (Steel)".

Unless otherwise noted, all parts shall be galvanized in accordance with Item 445, "Galvanizing", after fabrication.

Deviation from the details and dimensions shown herein require submission of shop drawings in accordance with Item 441, "Steel Structures". Alternate designs are not acceptable.

Foundation Type	Anchor Bolt Diameter	Bolt Hole Diameter	Bolt Circle Diameter	Base ℄ Dim. L x T
36-A	1 3/4"	2"	19"	19" x 1 3/4"
36-B	2"	2 1/4"	21"	21" x 2"

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES STRAIN POLE ASSEMBLIES

(80 MPH WIND ZONE)

SP-80(2)-12

REVISIONS	DN: MS	CK: JSY	DW: BR	CK: JSY
6-96 1-12	CONT	SECT	JOB	HIGHWAY
	0914	00	459	VA
	DIST	COUNTY		SHEET NO.
	AUS	TRAVIS, ETC.		46

120B

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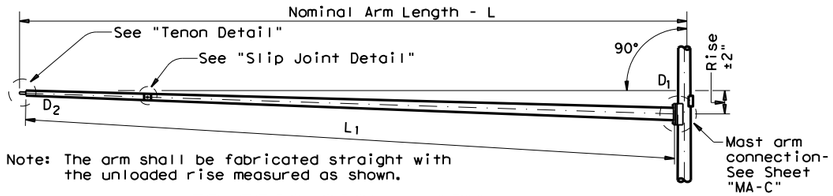
Arm Length	ROUND POLES					POLYGONAL POLES					Foundation Type
	D_B	D_{19}	D_{24}	D_{30}	① thk	D_B	D_{19}	D_{24}	D_{30}	① thk	
ft.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	
20	10.5	7.8	7.1	6.3	.179	11.5	8.5	7.7	6.8	.179	30-A
24	11.0	8.3	7.6	6.8	.179	12.0	9.0	8.2	7.3	.179	30-A
28	11.5	8.8	8.1	7.3	.179	12.5	9.5	8.7	7.8	.179	30-A
32	12.5	9.8	9.1	8.3	.179	12.0	9.0	8.2	7.3	.239	30-A
36	12.0	9.3	8.6	7.8	.239	12.5	9.5	8.7	7.8	.239	36-A
40	12.0	9.3	8.6	7.8	.239	13.5	10.5	9.7	8.8	.239	36-A
44	12.5	9.8	9.1	8.3	.239	14.0	11.0	10.2	9.3	.239	36-A
48	13.0	10.3	9.6	8.8	.239	15.0	12.0	11.2	10.3	.239	36-A

Arm Length	ROUND ARMS					POLYGONAL ARMS				
	L_1	D_1	D_2	① thk	Rise	L_1	D_1	② D_2	① thk	Rise
ft.	ft.	in.	in.	in.		ft.	in.	in.	in.	
20	19.1	6.5	3.8	.179	1'-9"	19.1	7.0	3.5	.179	1'-8"
24	23.1	7.5	4.3	.179	1'-10"	23.1	7.5	3.5	.179	1'-9"
28	27.1	8.0	4.2	.179	1'-11"	27.1	8.0	3.5	.179	1'-10"
32	31.0	9.0	4.7	.179	2'-1"	31.0	9.0	3.5	.179	2'-0"
36	35.0	9.5	4.6	.179	2'-4"	35.0	10.0	3.5	.179	2'-1"
40	39.0	9.5	4.1	.239	2'-8"	39.0	9.5	3.5	.239	2'-3"
44	43.0	10.0	4.1	.239	2'-11"	43.0	10.0	3.5	.239	2'-6"
48	47.0	10.5	4.1	.239	3'-4"	47.0	11.0	3.5	.239	2'-9"

D_B = Pole Base O.D.
D_{19} = Pole Top O.D. with no Luminaire and no ILSN
D_{24} = Pole Top O.D. with ILSN w/out Luminaire
D_{30} = Pole Top O.D. with Luminaire
D_1 = Arm Base O.D.
D_2 = Arm End O.D.
L_1 = Shaft Length
L = Nominal Arm Length

① Thickness shown are minimums, thicker materials may be used.

② D_2 may be increased by up to 1" for polygonal arms.



Note: The arm shall be fabricated straight with the unloaded rise measured as shown.

TRAFFIC SIGNAL ARM

(Fixed Mount)

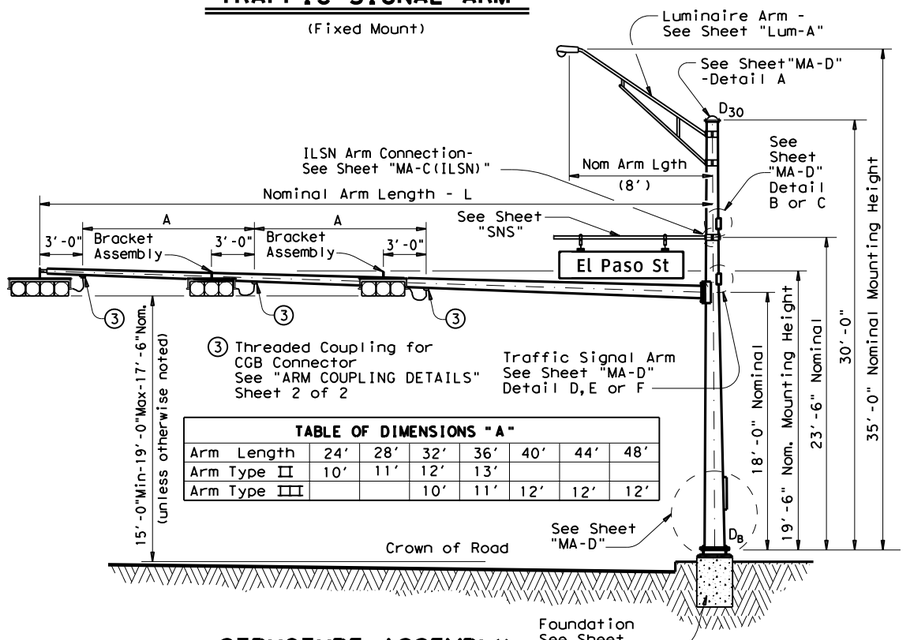


TABLE OF DIMENSIONS "A"							
Arm Length	24'	28'	32'	36'	40'	44'	48'
Arm Type II	10'	11'	12'	13'			
Arm Type III			10'	11'	12'	12'	12'

STRUCTURE ASSEMBLY

SHIPPING PARTS LIST

Ship each pole with the following attached: enlarged hand hole, pole cap, fixed-arm connection bolts and washers and any additional hardware listed in the table.

Nominal Arm Length	30' Poles With Luminaire		24' Poles With ILSN		19' Poles With No Luminaire and No ILSN	
	Above hardware plus: One (or two if ILSN attached) small hand hole, clamp-on simplex		Above hardware plus one small hand hole		See note above	
ft	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20L-80		20S-80		20-80	
24	24L-80		24S-80		24-80	
28	28L-80		28S-80		28-80	
32	32L-80		32S-80		32-80	
36	36L-80		36S-80		36-80	
40	40L-80		40S-80		40-80	
44	44L-80		44S-80		44-80	
48	48L-80		48S-80		48-80	

Traffic Signal Arms (1 per Pole) Ship each arm with the listed equipment attached

Nominal Arm Length	Type I Arm (1 Signal)		Type II Arm (2 Signals)		Type III Arm (3 Signals)	
	1 CGB connector		1 Bracket Assembly and 2 CGB Connectors		2 Bracket Assemblies and 3 CGB Connectors	
ft	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20I-80					
24	24I-80		24II-80			
28	28I-80		28II-80			
32			32II-80		32III-80	
36			36II-80		36III-80	
40					40III-80	
44					44III-80	
48					48III-80	

Luminaire Arms (1 per 30' pole)

Nominal Arm Length	Quantity
8' Arm	

ILSN Arm (Max. 2 per pole) Ship with clamps, bolts and washers

Nominal Arm Length	Quantity
7' Arm	
9' Arm	

Anchor Bolt Assemblies (1 per pole)

Anchor Bolt Diameter	Anchor Bolt Length	Quantity
1 ½"	3'-4"	
1 ¾"	3'-10"	

Each anchor bolt assembly consists of the following: Top and Bottom templates, 4 anchor bolts, 8 nuts, 8 flat washers, and 4 nut anchor devices (Type 2) per Standard Drawing "TS-FD".

Templates may be removed for shipment.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES

SINGLE MAST ARM ASSEMBLY

(80 MPH WIND ZONE)

SMA-80(1)-12

REVISIONS
5-96
11-99
1-12

DATE:
FILE:

DN: MS	CK: JSY	DW: MMF	CK: JSY
CONT	SECT	JOB	HIGHWAY
0914	00	459	VA
DIST	COUNTY		SHEET NO.
AUS	TRAVIS, ETC.		47

122A

DATE:
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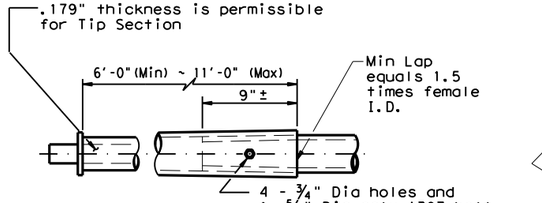
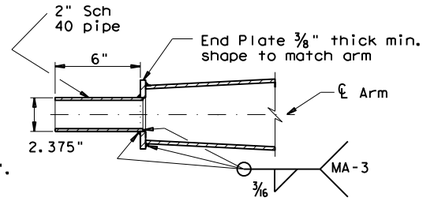


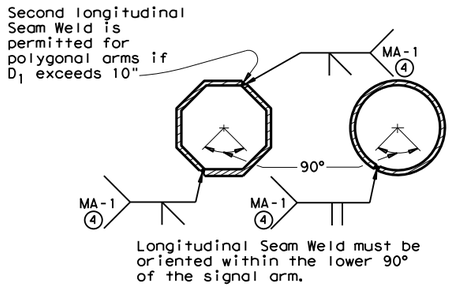
SLIP JOINT DETAIL



TENON DETAIL

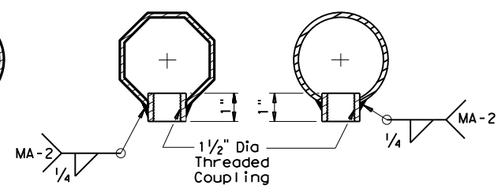
Stainless steel bands (or Cables) and cast bracket as in "Astro-Brac", "Sky Bracket" or "Easy Bracket" with 1 ½" Dia Threaded Coupling.

BRACKET ASSEMBLY



ARM WELD DETAIL

④ 60% Min. penetration 100% pemetration within 6" of circumferential base welds.



ARM COUPLING DETAILS

VIBRATION WARNING

Mast Arms of SMA and DMA structures and clamp-on Arms of LMA structures of approximately 40 ft or longer are subject to harmonic vertical vibrations in light wind conditions due to the aeroelastic characteristics of a few of the myriads of possible combinations of the following: signal numbers, weights and positions; existence/solidity of backplates; presence of additional attachments to the arm, such as signs and cameras; arm-wind orientation; and arm-pole stiffness.

Such vibrations may cause fatigue damage to the structure and may lead to galloping in moderate wind conditions which may further damage the structure and alarm the public. Tests have indicated that when wind is blowing toward the back side of signal heads having un-vented backplates attached the probability of unacceptable harmonic vibration and/or galloping is rather high.

If backplates are not required for improved visibility they should not be applied to the signal heads or, if they must be applied, they should be vented as a first and inexpensive measure to mitigate vibrations.

The traffic signal mast arms shall be visually inspected in 5 to 20 mph wind conditions after installation of signal heads and any attachments, including any required backpates. If vertical movements with a total excursion (maximum upward excursion to maximum downward excursion) of more than approximately 8" are observed at the arm tip, a damping plate shall be fitted to the arm. See "Damping Plate Mounting Details" on standard sheet, MA-DPD-10.

This visual inspection shall be repeated after each modification of the structure that could affect its aeroelastic response. Excessive vibrations shall not be allowed to continue for more than two days.

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications thereto. Design Wind Speed equals 80 mph plus a 1.3 gust factor.

Poles are designed to support one 8'-0" luminaire arm, one 9'-0" internally lighted street name sign and one traffic signal arm with a length as tabulated. The specified luminaire load applied at the end of the luminaire arm equals 60 lbs vertical dead load plus the horizontal wind load on an effective projected area of 1.6 sq ft. The specified internally lighted street name sign load applied 4.5 ft from the centerline of the pole equals 85 lbs vertical dead load plus horizontal wind load on an effective projected area of 11.5 sq ft. The specified signal load applied at the end of the traffic signal arm equals 180 lbs vertical dead load plus the horizontal wind load on an effective projected area of 32.4 sq ft (actual area times drag coefficient).

See Standard Sheet "MA-D" for pole details, "MA-C" for traffic signal arm connection details, "MA-C (ILSN)" for internally lighted street name sign arm connection details, "LUM-A" for luminaire arm and connection details, "SNS" for internally lighted street name sign details, and "TS-FD" for anchor bolt and foundation details. See "MA-C" for material specifications.

Fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. Materials, fabrication tolerances, and shipping practices shall meet the requirements of this sheet and Item 686, "Traffic Signal Pole Assemblies (Steel)".

Unless otherwise noted, all parts shall be galvanized in accordance with Item 445, "Galvanizing", after fabrication.

Deviation from the details and dimensions shown herein require submission of shop drawings in accordance with Item 441, "Steel Structures". Alternate designs are not acceptable.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES

SINGLE MAST ARM ASSEMBLY

(80 MPH WIND ZONE)

SMA-80(2)-12

DN: MS	CK: JSY	DW: MMF	CK: JSY

REVISIONS
5-96
1-12

CONT	SECT	JOB	HIGHWAY
0914	00	459	VA
DIST	COUNTY		SHEET NO.
AUS	TRAVIS, ETC.		48

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DATE:
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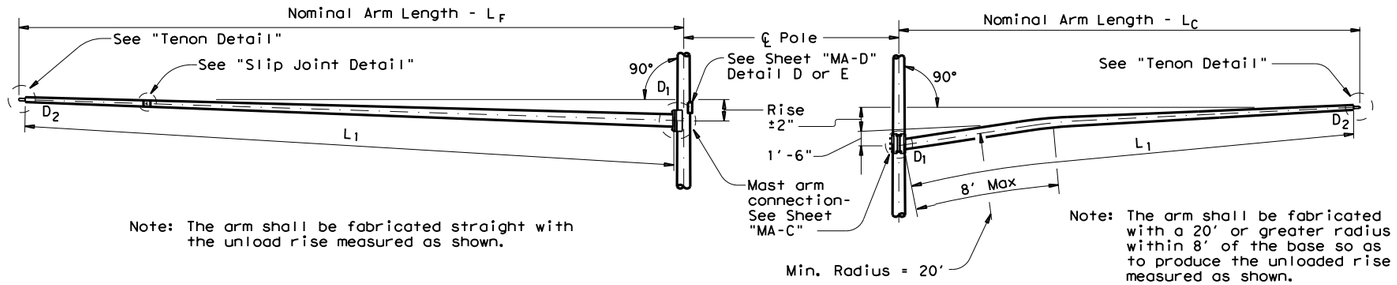
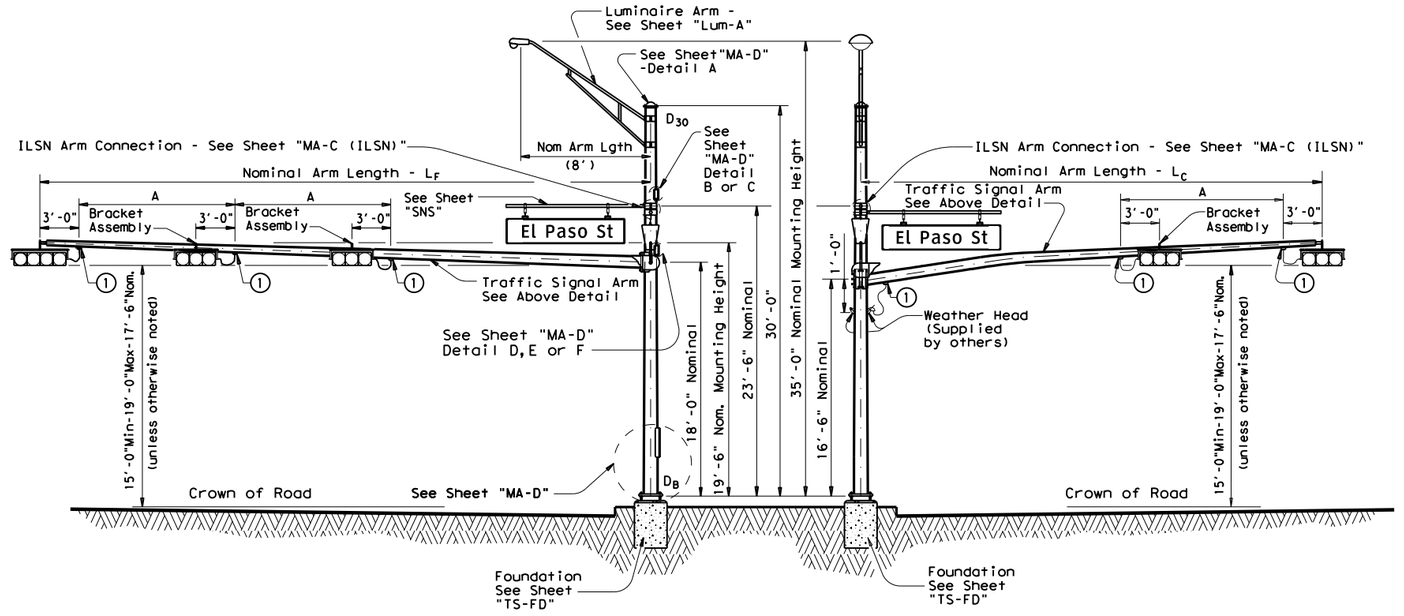


Note: The arm shall be fabricated straight with the unload rise measured as shown.

Note: The arm shall be fabricated with a 20' or greater radius within 8' of the base so as to produce the unloaded rise measured as shown.

FIXED MOUNT TRAFFIC SIGNAL ARM

CLAMP-ON TRAFFIC SIGNAL ARM



ELEVATION
(Showing fixed mount arm)

STRUCTURE ASSEMBLY
① Threaded Coupling for CGB Connector See "ARM COUPLING DETAILS" Sheet 2 of 3

ELEVATION
(Showing clamp mount arm)

TABLE OF DIMENSIONS "A"						
Arm Length	24'	28'	32'	36'	40'	44'
Arm Type II	10'	11'	12'	13'		
Arm Type III			10'	11'	12'	12'

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications thereto. Design Wind Speed equals 80 mph plus a 1.3 gust factor. Designs are based on an arm included angle of 90 degrees or more. Angles of less than approximately 75 degrees will require a special design.

Poles are designed to support one 8'-0" luminaire arm, two 9'-0" internally lighted street name signs and two traffic signal arms with length combinations as tabulated. The specified luminaire load applied at the end of luminaire arm equals 60 lbs vertical dead load plus the horizontal wind load on an effective projected area of 1.6 sq ft. The specified internally lighted street name sign applied 4'-6" from the centerline of the pole equals 85 lbs vertical dead load plus the horizontal wind load on an effective projected area of 11.5 sq ft. The specified signal load applied at the end of the traffic signal arm equals 180 lbs vertical dead load plus the horizontal wind load on an effective projected area of 32.4 sq ft (actual area times drag coefficient).

See Standard Sheet "MA-D" for pole details, "MA-C" for traffic signal arm connection details, "MA-C (ILSN)" for internally lighted street name sign arm connection details, "LUM-A" for luminaire arm and connection details, "SNS" for internally lighted street name sign details, and "TS-FD" for anchor bolt and foundation details. See "MA-C" for material specifications.

Fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. Materials, fabrication tolerances, and shipping practices shall meet the requirements of this sheet and Item 686, "Traffic Signal Pole Assemblies (Steel)".

Unless otherwise noted, all parts shall be galvanized in accordance with Item 445, "Galvanizing", after fabrication.

Deviation from the details and dimensions shown herein require submission of shop drawings in accordance with Item 441, "Steel Structures". Alternate designs are not acceptable.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES

DUAL MAST ARM ASSEMBLY

(80 MPH WIND ZONE)

DMA-80 (1)-12

DN: MS	CK: JSY	DW: MMF	CK: JSY

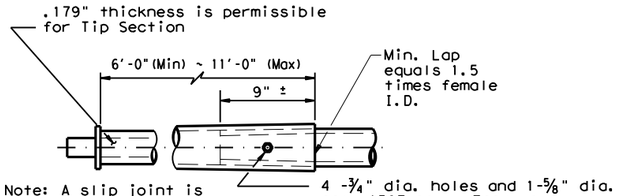
REVISIONS
5-96
1-12

CONT	SECT	JOB	HIGHWAY
0914	00	459	VA

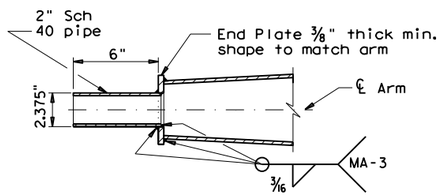
DIST	COUNTY	SHEET NO.
AUS	TRAVIS, ETC.	49

124A

DATE:
FILE:



SLIP JOINT DETAIL



TENON DETAIL

Stainless steel bands (or Cables) and cast bracket as in "Astro-Brac", "Sky Bracket" or "Easy Bracket" with 1 ½" Dia Threaded Coupling.

BRACKET ASSEMBLY

VIBRATION WARNING

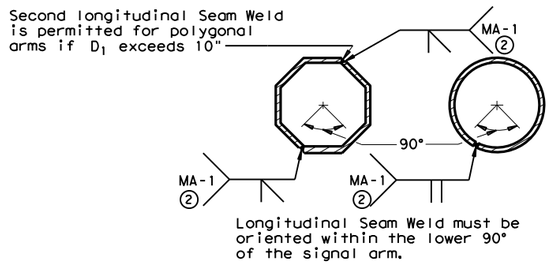
Mast Arms of SMA and DMA structures and clamp-on Arms of LMA structures of approximately 40 ft or longer are subject to harmonic vertical vibrations in light wind conditions due to the aeroelastic characteristics of a few of the myriads of possible combinations of the following: signal numbers, weights and positions; existence/solidity of backplates; presence of additional attachments to the arm, such as signs and cameras; arm-wind orientation; and arm-pole stiffness.

Such vibrations may cause fatigue damage to the structure and may lead to galloping in moderate wind conditions which may further damage the structure and alarm the public. Tests have indicated that when wind is blowing toward the back side of signal heads having un-vented backplates attached the probability of unacceptable harmonic vibration and/or galloping is rather high.

If backplates are not required for improved visibility they should not be applied to the signal heads or, if they must be applied, they should be vented as a first and inexpensive measure to mitigate vibrations.

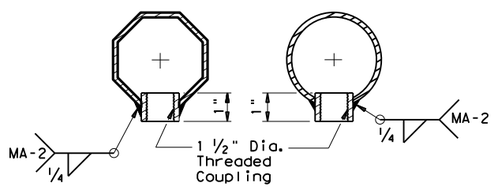
The traffic signal mast arms shall be visually inspected in 5 to 20 mph wind conditions after installation of signal heads and any attachments, including any required backpates. If vertical movements with a total excursion (maximum upward excursion to maximum downward excursion) of more than approximately 8" are observed at the arm tip, a damping plate shall be fitted to the arm. See "Damping Plate Mounting Details" on standard sheet, MA-DPD-10.

This visual inspection shall be repeated after each modification of the structure that could affect its aeroelastic response. Excessive vibrations shall not be allowed to continue for more than two days.



ARM WELD DETAIL

②60% Min. penetration
100% pemetration within 6" of circumferential base welds.



ARM COUPLING DETAILS

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES

DUAL MAST ARM ASSEMBLY

(80 MPH WIND ZONE)

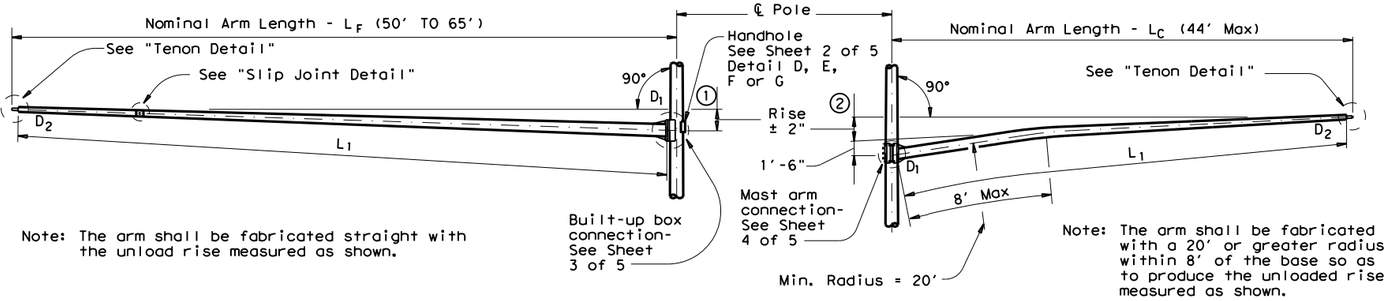
DMA-80 (2)-12

DN: MS	CK: JSY	DW: MMF	CK: JSY

REVISIONS
5-96
1-12

CONT	SECT	JOB	HIGHWAY
0914	00	459	VA
DIST	COUNTY		SHEET NO.
AUS	TRAVIS, ETC.		50

124B

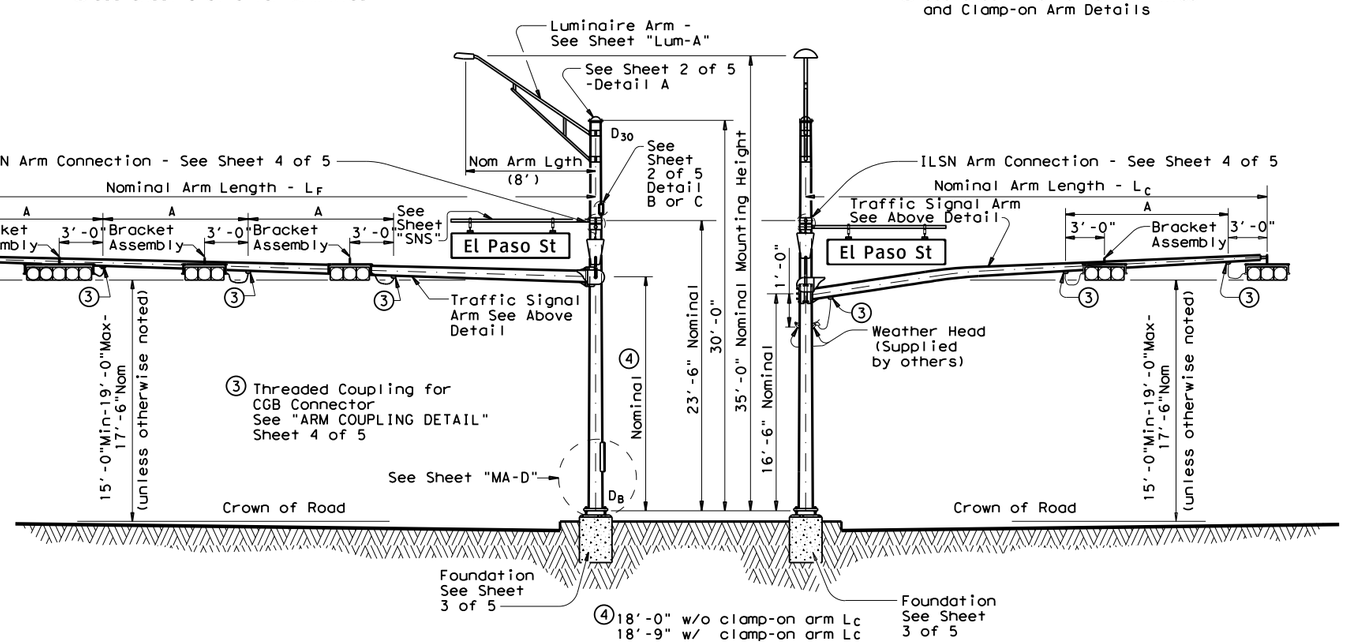


FIXED MOUNT TRAFFIC SIGNAL ARM

① See Sheet 3 of 5 for Arm Rise

CLAMP-ON TRAFFIC SIGNAL ARM (IF REQUIRED)

② See Sheet 4 of 5 for Arm Rise and Clamp-on Arm Details



ELEVATION

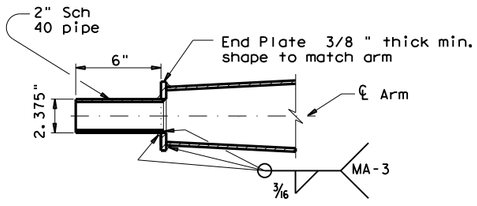
(Showing fixed mount arm)

STRUCTURE ASSEMBLY

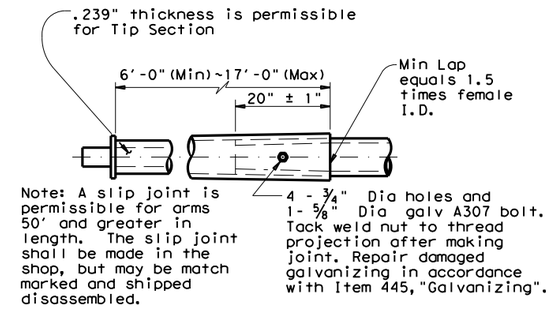
ELEVATION

(Showing clamp-on arm)

TABLE OF DIMENSIONS "A"										
Arm Length	24'	28'	32'	36'	40'	44'	50'	55'	60'	65'
Arm Type II	10'	11'	12'	13'						
Arm Type III			10'	11'	12'	12'				
Arm Type IV							12'	12'	12'	12'



TENON DETAIL



SLIP JOINT DETAIL (FIXED MOUNT ARM)

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications thereto. Design Wind Speed can be either 100 mph or 80 mph plus a 1.3 gust factor. If clamp-on traffic signal is required, designs are based on an arm included angle of 90 degrees or more. Angles of less than approximately 75 degrees will require a special design.

Poles are designed to support one 8'-0" luminaire arm, two 9'-0" internally lighted street name (ILSN) signs and two traffic signal arms with limited length combinations.

Each arm with its related attachment is shown below

Arm	Equivalent DL ⑤	WL EPA ⑤⑥
8' Luminaire Arm	Luminaire 60 lbs	1.6 sq ft
9' ILSN Arm	Sign 85 lbs	11.5 sq ft
50' to 65' Fixed Mount Arm	Signal Loads 310 lbs	52 sq ft
Up to 44' Clamp-on Arm	Signal Loads 180 lbs	32.4 sq ft

⑤ Equivalent dead load plus horizontal wind load applied at the end of arm except ILSN arm, which applied 4.5' from the centerline of the pole.

⑥ Effective projected area (actual area times drag coefficient) for the application of horizontal wind load.

Except as noted in Sheet 1 thru 5 of 5, other details not covered shall refer to Standard Sheet "MA-D" for pole details, "LUM-A" for luminaire arm and connection details, "SNS" for internally lighted street name sign details, and "TS-FD" for anchor bolt and foundation details.

Fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. Material, fabrication tolerances, and shipping practices shall also meet the requirements of this sheet and Item 686, "Traffic Signal Pole Assemblies (Steel)".

Unless otherwise noted, all parts shall be galvanized in accordance with Item 445, "Galvanizing" after fabrication.

Deviations from the details and dimensions shown herein require submission of shop drawings in accordance with the Item 441, "Steel Structures". Alternate designs are not acceptable.

Installation of damping plate for the long mast arm is not recommended.

Provision of the bracket assembly used to support the traffic signal heads shall be under the direction of the Engineer for approval.

Design also conforms to NCHRP Report 412 for fatigue resistance except that there are no stiffeners at the base plate. TxDOT is conducting tests to determine if stiffeners at the base plate will or will not result in optimal performance; depending upon the results of the tests, poles may need a retrofit to ensure optimal fatigue performance.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES
LONG MAST ARM ASSEMBLY (50 TO 65 FT) (80 AND 100 MPH WIND ZONE)
LMA(1)-12

Sheet 1 of 5

DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT

REVISIONS
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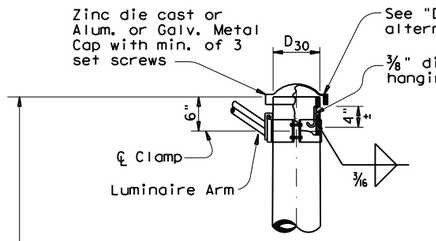
CONT	SECT	JOB	HIGHWAY
0914	00	459	VA
DIST	COUNTY		SHEET NO.
AUS	TRAVIS, ETC.		51

DATE:
FILE:

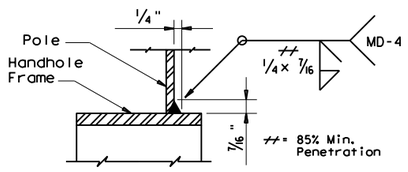
131A

DATE:
FILE:

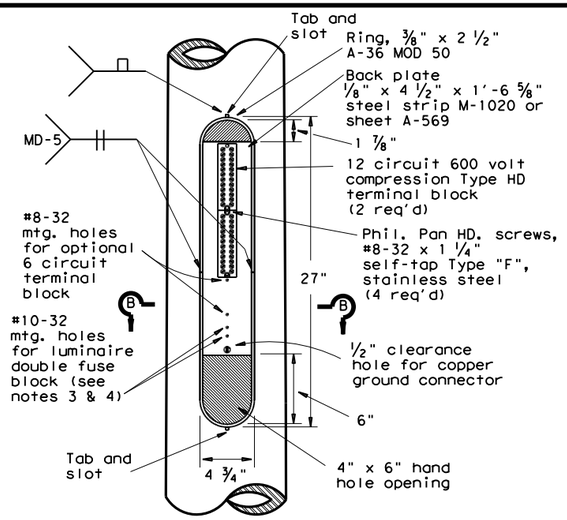


DETAIL A

(for pole with luminaire)



DETAIL H

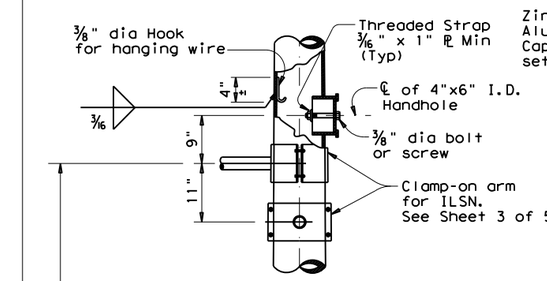


ACCESS COMPARTMENT

MATERIALS	
Round Shafts or Polygonal Shafts (7)	ASTM A595 Gr.A, A588, A1008 HSLAS Gr.50 Class 2, A1011 HSLAS Gr.50 Class 2, A572 Gr.50 or A1011 SS Gr.50 (8)
Plates (7)	ASTM A36, A588, or A572 Gr.50
Connection Bolts	ASTM A325, or A449 except where noted
Pin Bolts	ASTM A325
Pipe (7)	ASTM A53 Gr.B, A501, A1008 HSLAS-F Gr.50, A1011 HSLAS-F Gr.50
Misc. Hardware	Galvanized steel or stainless steel or as noted

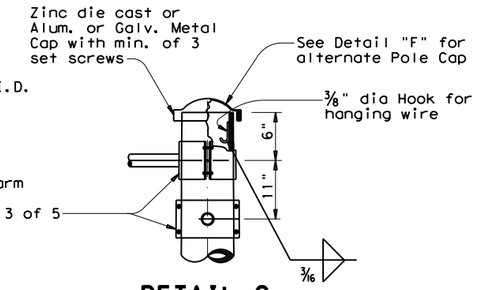
(7) ASTM A572, A1008 HSLAS, A1011 HSLAS, A1008 HSLAS-F, A1011 HSLAS-F, or A1011 SS may have higher yield strengths but shall not have less elongation than the grade indicated.

(8) ASTM A1011 SS Gr.50 shall also have a minimum elongation of 18 percent in 8 inches or 23 percent in 2 inches. Material thickness in excess of those stipulated under A1011 SS will be acceptable providing the material meets all other A1011 SS requirements and the requirements of this item.

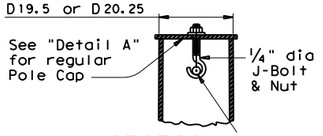


DETAIL B

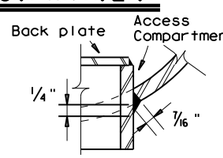
(If ILSN applied)



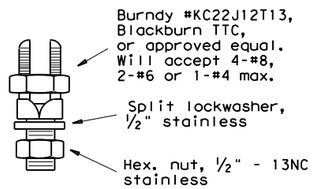
DETAIL C



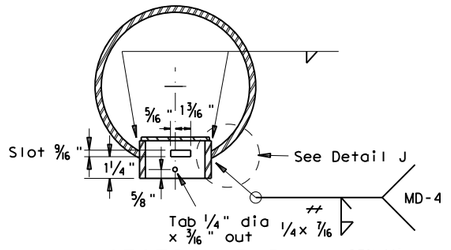
SECTION Y-Y



DETAIL J



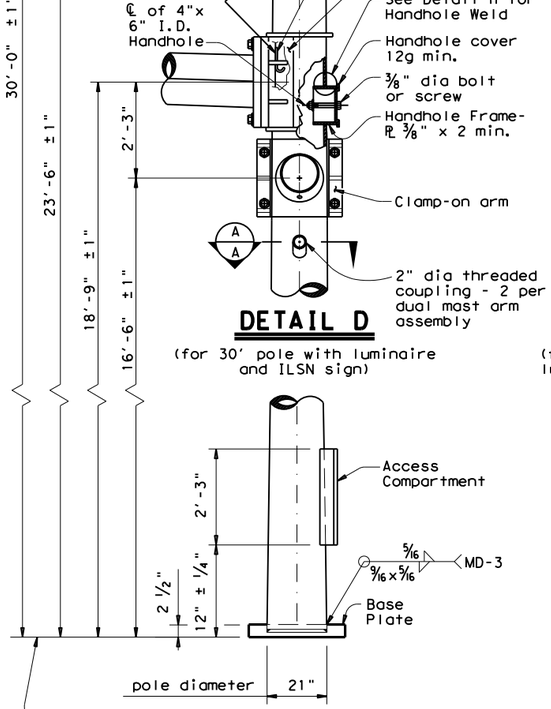
COPPER GROUND CONNECTOR



SECTION B-B

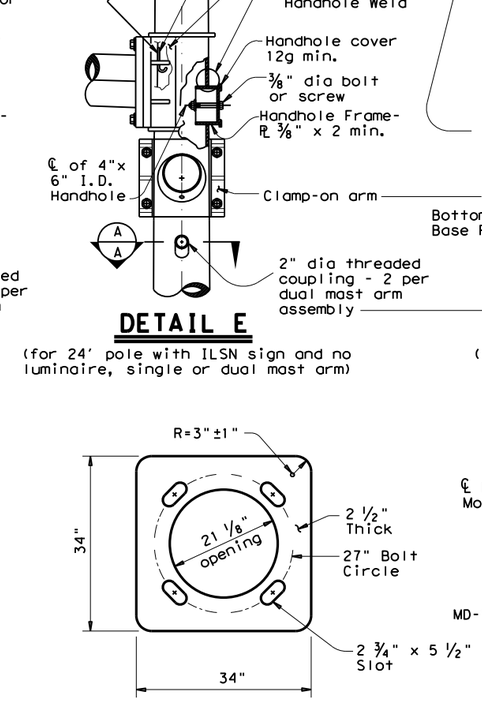
// = 85% Min. Penetration

Opening for access compartment shall be no more than 1/16 inch wider than the access compartment itself.



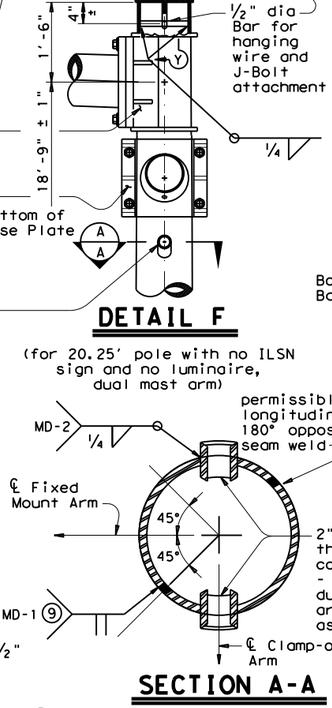
DETAIL D

(for 30' pole with luminaire and ILSN sign)



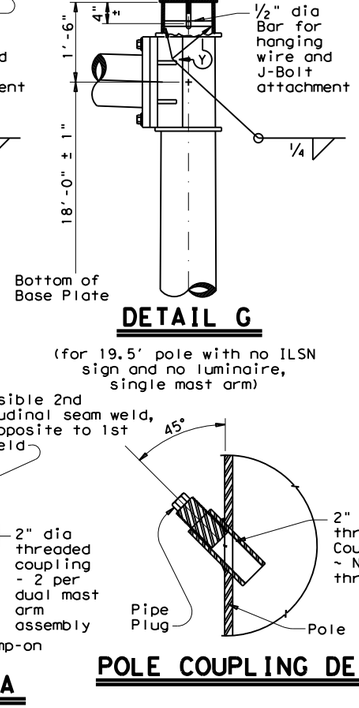
DETAIL E

(for 24' pole with ILSN sign and no luminaire, single or dual mast arm)



DETAIL F

(for 20.25' pole with no ILSN sign and no luminaire, dual mast arm)



DETAIL G

(for 19.5' pole with no ILSN sign and no luminaire, single mast arm)

POLE ELEVATION

BASE PLATE

SECTION A-A

POLE COUPLING DETAIL

(9) Longitudinal seam weld must be oriented within 90° (45° rotation each side) along the fixed mount arm. 60% min penetration required, 100% penetration within 6" of circumferential base weld.

ACCESS COMPARTMENT NOTES:

1. The cover shall be one piece formed from ABS plastic, shall be a pearl gray color, and shall be suitable for exposure to harsh sunlight and extreme weather. Cover shall latch with two screw latches and shall fit tightly to the enclosure ring to create a rainproof seal. Latch screws shall be 1/4-20 stainless flat socket head screws with tamper proof feature.
2. The pole manufacturer shall provide with each pole a separate kit consisting of: one cover with two latching assemblies, two terminal strips (Marathon #985GP12CU or approved equal), four #8-32 x 1 1/4" self tapping type "F" stainless steel pan head screws, and one ground connector (Blackburn TTC, Burndy KC22J12T13, or Ilsco SSS-5). The traffic signal contractor shall install the kit items in the field.
3. The screw hole spacing on the enclosure back plate shall be for two Marathon #985GP12 terminal strips, one Marathon #985GP06CU terminal strip, and one Bussmann #BM6032B fuse block.
4. Install one Bussmann #BM6032B, Littelfuse #L60030M-2C, or Ferraz-Shawmut #30352 fuse block for poles where luminaires are to be installed.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES
LONG MAST ARM ASSEMBLY (50 TO 65 FT) (80 AND 100 MPH WIND ZONE)

Sheet 2 of 5

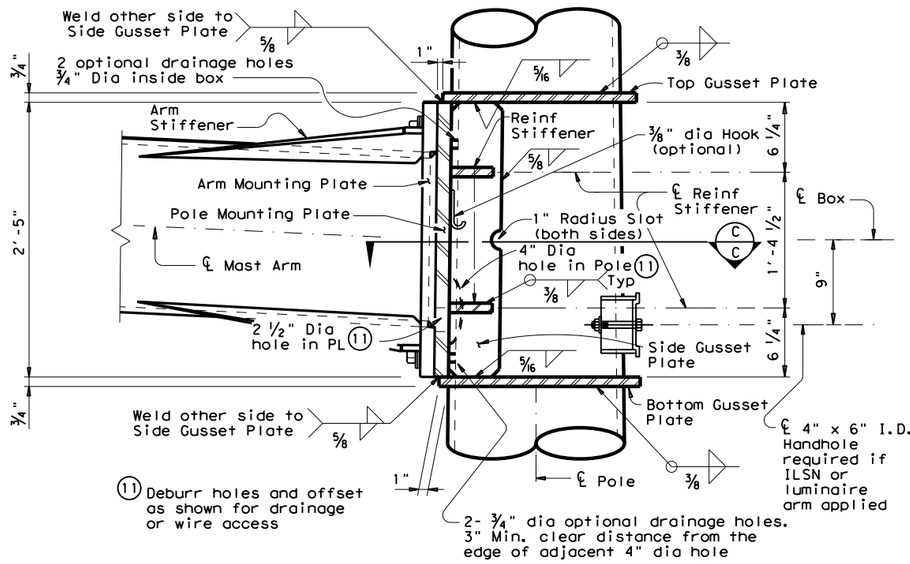
LMA(2)-12

DN: JSY	CK: ARC	DW: TGG	CK: JSY

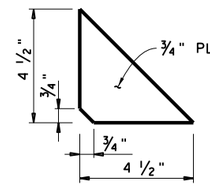
REVISIONS
4-20-01
1-12

CONT	SECT	JOB	HIGHWAY
0914	00	459	VA
DIST	COUNTY		SHEET NO.
AUS	TRAVIS, ETC.		52

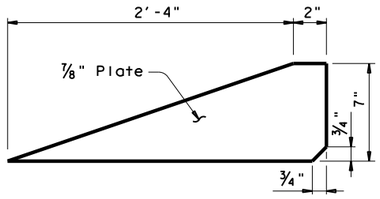
131B



BUILT-UP BOX CONNECTION

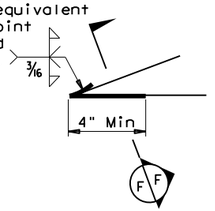


REINFORCING STIFFENER



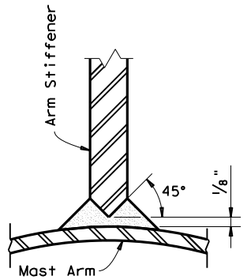
ARM STIFFENER
(Cut to match arm inclination and taper)

Provide Detail shown in SECTION F-F or equivalent 100% complete joint penetration weld from both sides.



Only 4" length at tip of Arm Stiffener requires a complete joint penetration weld. Smooth weld radius to connect Stiffener. Only a fillet weld is required for the remaining weld length.

DETAIL "K"



SECTION F-F

Fixed Mount Arm L_F	ROUND POLES (13)					Foundation Type
	D_B	$D_{19.5}$ or $D_{20.25}$	D_{24}	D_{30}	(12) thk	
ft.	in.	in.	in.	in.	in.	
50', 55' 60', 65'	21.0	18.2	17.6	16.8	.3125	48-A

Fixed Mount Arm L_F	ROUND ARMS (13)				
	L_1	D_1	D_2	(12) thk	Rise
ft.	ft.	in.	in.	in.	
50	49	18.5	11.7	.3125	3'- 3"
55	54	18.5	11.0	.3125	3'- 7"
60	59	18.5	10.3	.3125	3'-11"
65	64	18.5	9.6	.3125	4'- 4"

D_B = Pole Base O.D.
$D_{19.5}$ = Pole Top O.D. with no Luminaire and no ILSN (single mast arm)
$D_{20.25}$ = Pole Top O.D. with no Luminaire and no ILSN (dual mast arm)
D_{24} = Pole Top O.D. with ILSN w/out Luminaire
D_{30} = Pole Top O.D. with Luminaire
D_1 = Arm Base O.D.
D_2 = Arm End O.D.
L_1 = Shaft Length
L_F = Fixed Arm Length

(12) Thickness shown is minimum, thicker materials may be used.

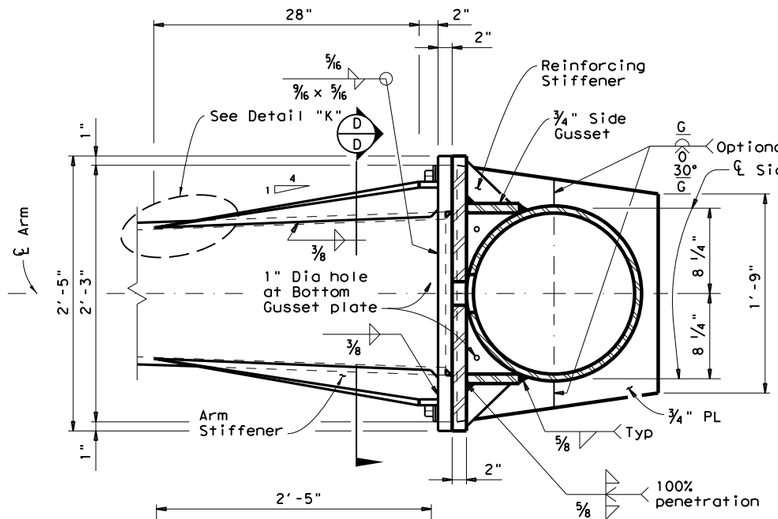
(13) Shaft profile 16-sided or 18-sided is considered to be equivalent to round section.

GENERAL NOTES:

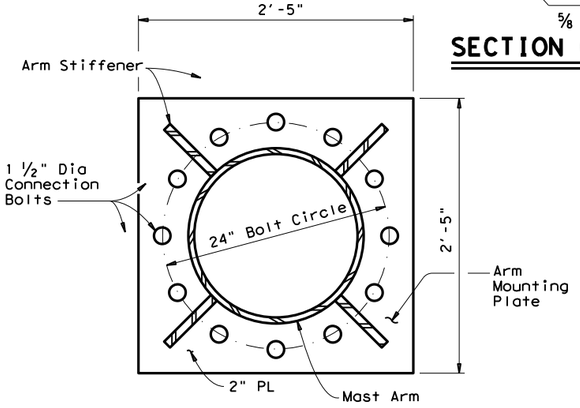
Built-up Box Connection: For the welded arm-to-pole connection as a build-up box configuration illustrated here is an example only, fabricators are required to submit a shop drawing of box connection for approval. The drawing shall specify the details of each box element, welds of arm-to-pole connection, arm-to-plate socket connection, and arm rise creation. Specify the proper location of drain holes along the pole. 2 1/2" dia hole in the pole mounting plate and 4" dia hole in the pole need to be aligned for wiring access or drainage. Arm stiffeners cut to match arm inclination and taper shall also be included.

The deviation from flat for either arm or pole mounting plate shall not exceed 1/32 in., which is measured along the center of mounting plate to a radial distance of 13.5 in. The deformed-from-flat connection between arm and pole mounting plates shall not be allowed if the center of both mounting plates cannot contact directly.

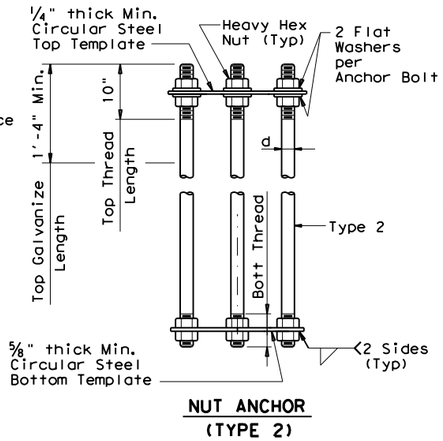
Fixed mount details are used for single mast arm assemblies and for the first arm on dual mast arm assemblies.



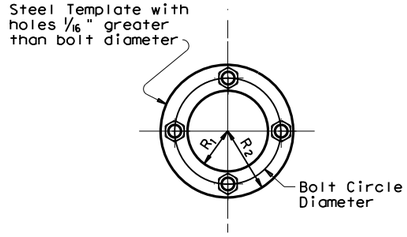
SECTION C-C



SECTION D-D



NUT ANCHOR
(TYPE 2)



TEMPLATE DETAIL

ANCHOR BOLT ASSEMBLY

ANCHOR BOLT & TEMPLATE SIZE						
Bolt Dia in.	Length ‡	Top Thread	Bottom Thread	Bolt Circle	R_2	R_1
2 1/2"	5'-2"	10"	6 1/2"	27"	16"	11"

‡ Min dimension given, longer bolts are acceptable.

FOUNDATION DESIGN TABLE													
FDN TYPE	DRILLED SHAFT DIA	REINFORCING STEEL		DRILLED SHAFT LENGTH-ft (16), (17), (18)			ANCHOR BOLT DESIGN (14)				FOUNDATION DESIGN LOAD (15)		TYPICAL APPLICATION
		VERT BARS	SPIRAL & PITCH	TEXAS CONE PENETROMETER N blows/ft			ANCHOR BOLT DIA	Fy (ksi)	BOLT CIR DIA	ANCHOR TYPE	MOMENT K-ft	SHEAR Kips	
				10	15	40							
48-A	48"	20 #9	#4 at 6"	21.9	19.5	14.7	2 1/2"	55	27"	2	490	10	50' to 65' Mast arm assembly.

SEE SHEET "TS-FD" FOR ADDITIONAL DETAILS.

(14) Anchor bolt design develops the foundation capacity given under Foundation Design Loads.

(15) Foundation Design Loads are the allowable moments and shears at the base of the structure.

(16) Field Penetrometer readings at a depth of approximately 3 to 5 feet may be used to adjust shaft lengths.

(17) If rock is encountered, the Drilled Shaft shall extend a minimum of two diameters into solid rock.

(18) Decimal lengths in Design Table are to allow interpolation for other penetrometer values. Round to nearest foot for entry into Summary Table.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES
LONG MAST ARM ASSEMBLY (50 TO 65 FT) (80 AND 100 MPH WIND ZONE)

Sheet 3 of 5 — LMA(3)-12

DN: JSY	CK: ARC	DW: TGG	CK: JSY

REVISIONS
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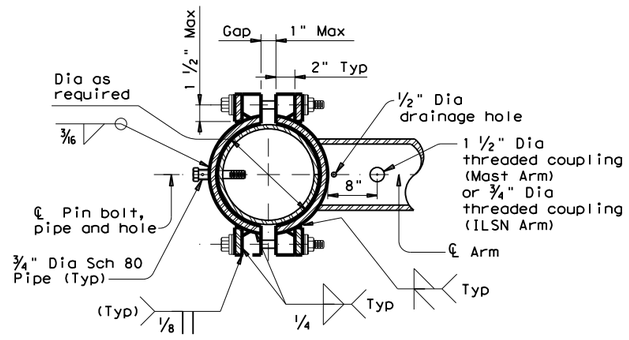
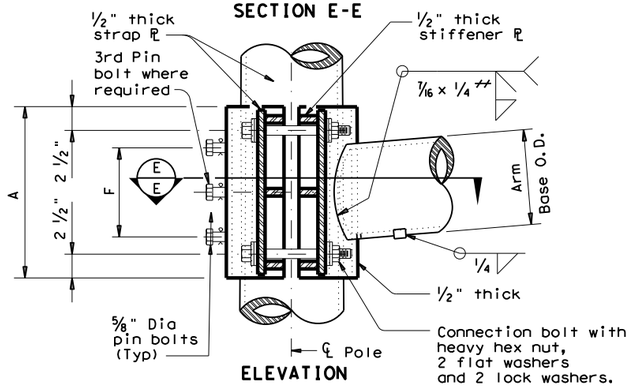
CONT	SECT	JOB	HIGHWAY
0914	00	459	VA
DIST	COUNTY		SHEET NO.
AUS	TRAVIS, ETC.		53

DATE:
FILE:

131C



SECTION E-E



ELEVATION
(Mast Arm or ILSN Arm to pole)

= 85% Min. Penetration

CLAMP-ON CONNECTION

80 MPH WIND

Clamp-on Arm Lc	ROUND ARMS					POLYGONAL ARMS				
	L_1	D_1	D_2	thk (12)	Rise	L_1	D_1	D_2	thk (12)	Rise
ft.	ft.	in.	in.	in.		ft.	in.	in.	in.	
20	19.1	6.5	3.8	.179	1'-9"	19.1	7.0	3.5	.179	1'-8"
24	23.1	7.5	4.3	.179	1'-10"	23.1	7.5	3.5	.179	1'-9"
28	27.1	8.0	4.2	.179	1'-11"	27.1	8.0	3.5	.179	1'-10"
32	31.0	9.0	4.7	.179	2'-1"	31.0	9.0	3.5	.179	2'-0"
36	35.0	9.5	4.6	.179	2'-4"	35.0	10.0	3.5	.179	2'-1"
40	39.0	9.5	4.1	.239	2'-8"	39.0	9.5	3.5	.239	2'-3"
44	43.0	10.0	4.1	.239	2'-11"	43.0	10.0	3.5	.239	2'-6"

100 MPH WIND

Clamp-on Arm Lc	ROUND ARMS					POLYGONAL ARMS				
	L_1	D_1	D_2	thk (12)	Rise	L_1	D_1	D_2	thk (12)	Rise
ft.	ft.	in.	in.	in.		ft.	in.	in.	in.	
20	19.1	8.0	5.3	.179	1'-8"	19.1	8.0	3.5	.179	1'-7"
24	23.1	9.0	5.8	.179	1'-9"	23.1	9.0	3.5	.179	1'-8"
28	27.1	9.5	5.7	.179	1'-10"	27.1	10.0	3.5	.179	1'-9"
32	31.0	9.5	5.2	.239	1'-11"	31.0	9.5	3.5	.239	1'-10"
36	35.0	10.0	5.1	.239	2'-0"	35.0	10.0	3.5	.239	1'-11"
40	39.0	10.5	5.1	.239	2'-3"	39.0	11.0	3.5	.239	2'-1"
44	43.0	11.0	5.1	.239	2'-8"	43.0	11.5	4.0	.239	2'-3"

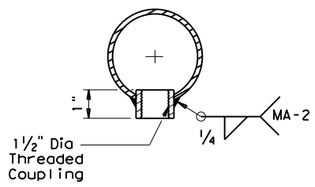
D1 = Arm Base O.D.
D2 = Arm End O.D.
L1 = Shaft Length
Lc = Clamp-on Arm Length

(12) Thickness shown is minimum, thicker materials may be used.

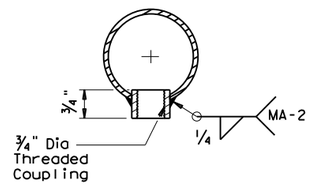
CLAMP-ON ARM CONNECTION

ILSN Arm Size		A	F	4 Conn. Bolts	5/8" Dia. Pin Bolts
Sch 40 pipe Dia	Thick			Dia	No.
in.	in.	in.	in.	in.	ea
3	.216	10	4	¾	2

Mast Arm Size		A	F	4 Conn. Bolts	5/8" Dia. Pin Bolts
Base Dia	Thick			Dia	No.
in.	in.	in.	in.	in.	ea
6.5	.179	12	6	1	2
7.5	.179	14	8	1	2
8.0	.179	14	8	1	2
9.0	.179	16	10	1	2
9.5	.179	18	12	1 ¼	3
9.5	.239	18	12	1 ¼	3
10.0	.239	18	12	1 ¼	3
10.5	.239	18	12	1 ¼	3
11.0	.239	18	12	1 ¼	3
11.5	.239	18	12	1 ¼	3



ARM COUPLING DETAIL



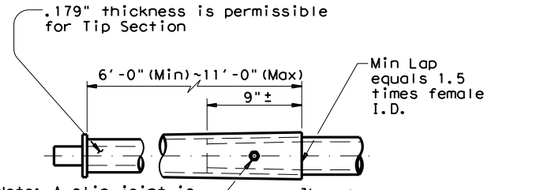
ILSN ARM COUPLING DETAIL

GENERAL NOTES:

Clamp-on details are used for the second arm on dual mast arm assemblies or ILSN arm support. For a clamp-on mast arm, a maximum 1 ½" wide vertical slotted hole may be cut in the front clamp plate to facilitate drainage during galvanizing. The slot shall be centered behind the arm and shall be no longer than the arm diameter minus 1". For an ILSN arm, a 1 ½" diameter hole shall be cut in the front clamp plate for wire access. A matched hole shall be field drilled through the pole to provide wire access after arm is oriented. Deburr both holes.

Where duplicate parts occur on a detail, welds shown for part shall apply to all similar parts on the detail.

Pin bolts are required to prevent rotation of clamp-on arms under design wind forces. Pin bolts shall be ASTM A325 with threads excluded from the shear plane. Pin bolt and ¾" diameter pipe shall have 3/16" diameter holes for a 1/8" diameter galvanized cotter pin. Back clamp plate shall be furnished with a ¾" diameter hole for each pin bolt. An 11/16" diameter hole for each pin bolt shall be field drilled through the pole after arm orientations have been approved by the Engineer.

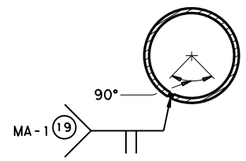


Note: A slip joint is permissible for arms 40' and greater in length. The slip joint shall be made in the shop, but may be match marked and shipped disassembled.

SLIP JOINT DETAIL (CLAMP-ON ARM)

Stainless steel bands (or Cables) and cast bracket as in "Astro-Brac", "Sky Bracket" or "Easy Bracket" with 1 ½" Dia Threaded Coupling.

BRACKET ASSEMBLY



ARM WELD DETAIL

(19) Longitudinal Seam Weld must be oriented within the lower 90° of the signal arm.
60% Min penetration
100% penetration within 6" of circumferential base welds.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES
LONG MAST ARM ASSEMBLY (50 TO 65 FT)
(80 AND 100 MPH WIND ZONE)

Sheet 4 of 5 — LMA(4)-12

DN: JK	CK: GRB	DW: FDN	CK: CAL

REVISIONS
4-20-01
1-12

CONT	SECT	JOB	HIGHWAY
0914	00	459	VA
DIST	COUNTY		SHEET NO.
AUS	TRAVIS, ETC.		54

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DATE:
FILE:

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DATE:
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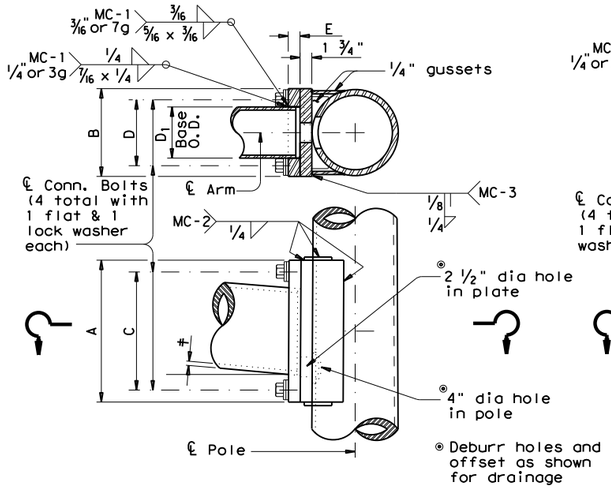
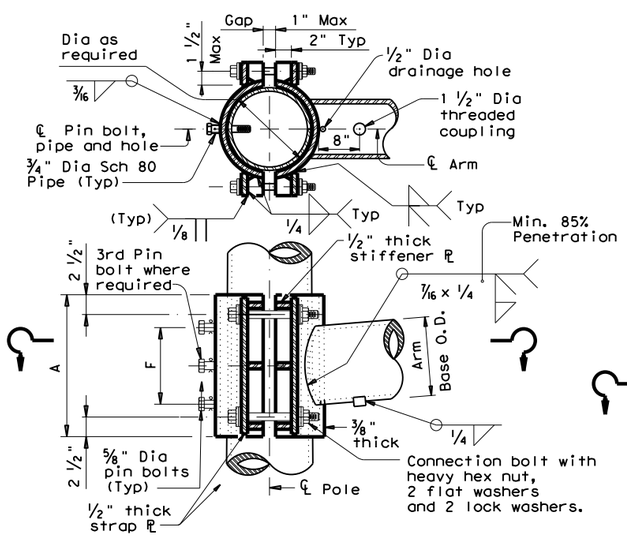
ARM SIZE D_1	ARM SIZE ǂ	A	B	C	D	E	CONN BOLT DIA
in.	in.	in.	in.	in.	in.	in.	in.
6.5	.179	12	9	9	6	1 3/4	1
7.5	.179	13	9	10	6	1 3/4	1
8.0	.179	14	10	11	7	2	1 1/4
9.0	.179	16	11	13	8	2	1 1/4
9.5	.179	17	12	14	9	2	1 1/4
9.5	.239	18	12	15	9	2	1 1/4
10.0	.239	18	12	15	9	2	1 1/4
10.5	.239	18	13	15	10	3	1 1/2
11.0	.239	18	13	15	10	3	1 1/2



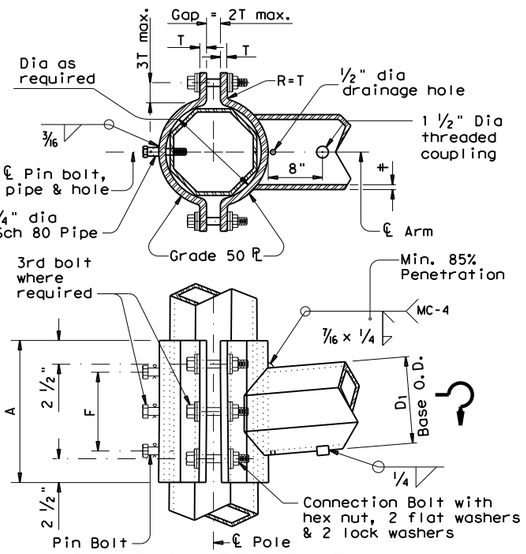
FIXED MOUNT DETAIL 1

ARM SIZE D_1	ARM SIZE ǂ	A	F	CONN. BOLTS No.	CONN. BOLTS Dia	PIN BOLTS No.	PIN BOLTS Dia
in.	in.	in.	in.	ea.	in.	ea.	in.
6.5	.179	12	6	4	1	2	5/8
7.5	.179	14	8	4	1	2	5/8
8.0	.179	14	8	4	1	2	5/8
9.0	.179	16	10	4	1	2	5/8
9.5	.179	18	12	4	1 1/4	3	5/8
9.5	.239	18	12	4	1 1/4	3	5/8
10.0	.239	18	12	4	1 1/4	3	5/8

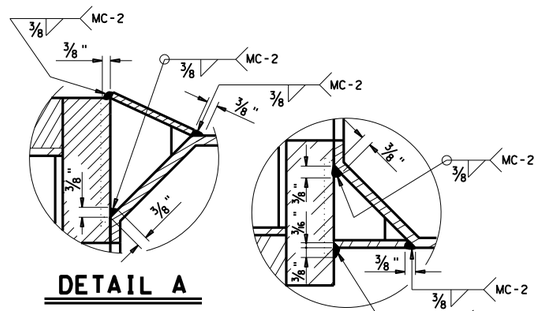


CLAMP-ON DETAIL 1

ARM SIZE D_1	ARM SIZE ǂ	A	F	T	CONN. BOLTS No.	CONN. BOLTS Dia	PIN BOLTS No.	PIN BOLTS Dia
in.	in.	in.	in.	in.	ea.	in.	ea.	in.
7.0	.179	12	6	3/4	4	3/4	2	5/8
7.5	.179	14	8	3/4	4	3/4	2	5/8
8.0	.179	14	8	3/4	4	3/4	2	5/8
9.0	.179	16	10	7/8	4	1	2	5/8
10.0	.179	18	10	7/8	4	1	2	5/8
9.5	.239	18	10	1	6	1	3	5/8
10.0	.239	18	10	1	6	1	3	5/8

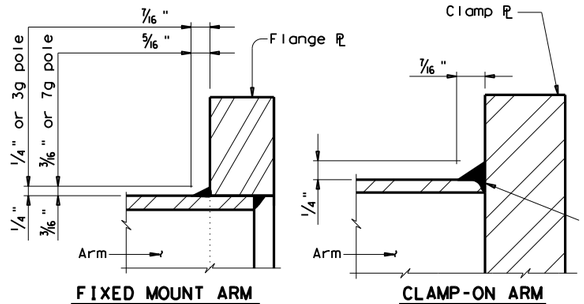


CLAMP-ON DETAIL 2



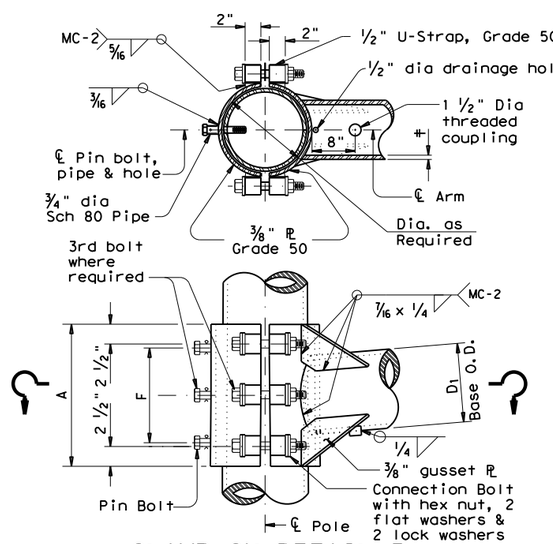
DETAIL A

DETAIL B



ARM BASE WELD DETAILS

ARM SIZE D_1	ARM SIZE ǂ	A	F	CONN. BOLTS No.	CONN. BOLTS Dia	PIN BOLTS No.	PIN BOLTS Dia
in.	in.	in.	in.	ea.	in.	ea.	in.
6.5	.179	12	6	4	1	2	5/8
7.5	.179	14	8	4	1	2	5/8
8.0	.179	14	8	4	1	2	5/8
9.0	.179	16	10	4	1	2	5/8
9.5	.179	18	12	6	1	3	5/8
9.5	.239	18	12	6	1	3	5/8
10.0	.239	18	12	6	1	3	5/8



CLAMP-ON DETAIL 3

MATERIALS

Round Shafts or Polygonal Shafts ①	ASTM A595 Gr.A, A588, A1008 HSLAS Gr.50 Class 2, A1011 HSLAS Gr.50 Class 2, A572 Gr.50 or A1011 SS Gr.50 ②
Plates ①	ASTM A36, A588, or A572 Gr.50
Connection Bolts	ASTM A325 or A449, except where noted
Pin Bolts	ASTM A325
Pipe ①	ASTM A53 Gr.B, A501, A1008 HSLAS-F Gr.50, A1011 HSLAS-F Gr.50
Misc. Hardware	Galvanized steel or stainless steel or as noted

① ASTM A572, A1008 HSLAS, A1011 HSLAS, A1008 HSLAS-F, A1011 HSLAS-F or A1011 SS may have higher yield strengths but shall not have less elongation than the grade indicated.

② ASTM A1011 SS Gr.50 material shall also have a minimum elongation of 18 percent in 8 inches or 23 percent in 2 inches. Material thickness in excess of those stipulated under A1011 SS will be acceptable providing the material meets all other A1011 SS requirements and the requirements of this item.

GENERAL NOTES:

Clamp-on details are used for the second arm on dual mast arm assemblies. A Maximum 1 1/2" wide vertical slotted hole shall be cut in the front clamp plate to facilitate drainage during galvanizing. The slot shall be centered behind the arm and shall be no longer than the arm diameter minus 1"

Fixed mount details are used for single mast arm assemblies and for the first arm on dual mast arm assemblies.

Where duplicate parts occur on a detail, welds shown for one part shall apply to all similar parts on the detail.

Pin bolts are required to prevent rotation of clamp-on arms under design wind forces.

NOTE:

Pin bolts shall be A325 with threads excluded from the shear plane. Pin bolt and 3/4" dia pipe shall have 9/16" dia holes for a 1/8" dia galvanized cotter pin. Back clamp plate shall be furnished with a 3/4" dia hole for each pin bolt. An 11/16" dia hole for each pin bolt shall be field drilled through the pole after arm orientations have been approved by the Engineer.

Texas Department of Transportation
Traffic Operations Division

STANDARD ASSEMBLY FOR TRAFFIC SIGNAL SUPPORT STRUCTURES

MAST ARM CONNECTIONS

MA-C-12

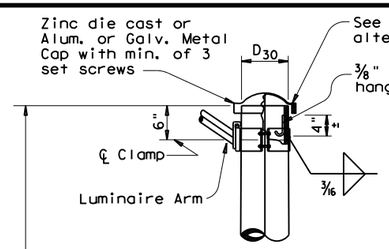
DN: MS	CK: JSY	DW: MMF	CK: JSY

REVISIONS
5-96
5-09
1-12

CONT	SECT	JOB	HIGHWAY
0914	00	459	VA
DIST	COUNTY		SHEET NO.
AUS	TRAVIS, ETC.		55

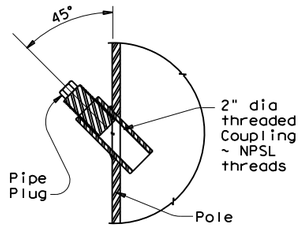
126A

DATE:
FILE:

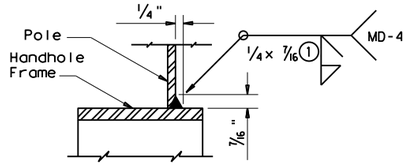


DETAIL A

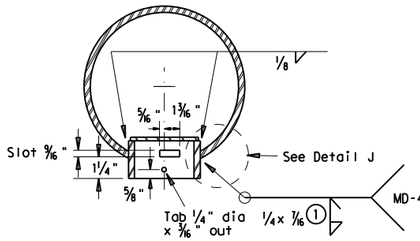
(for pole with luminaire)



POLE COUPLING DETAIL

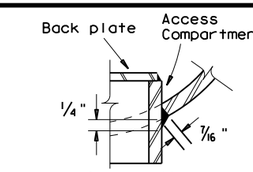


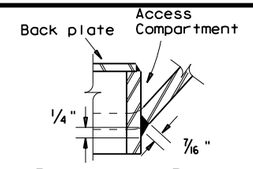
DETAIL G



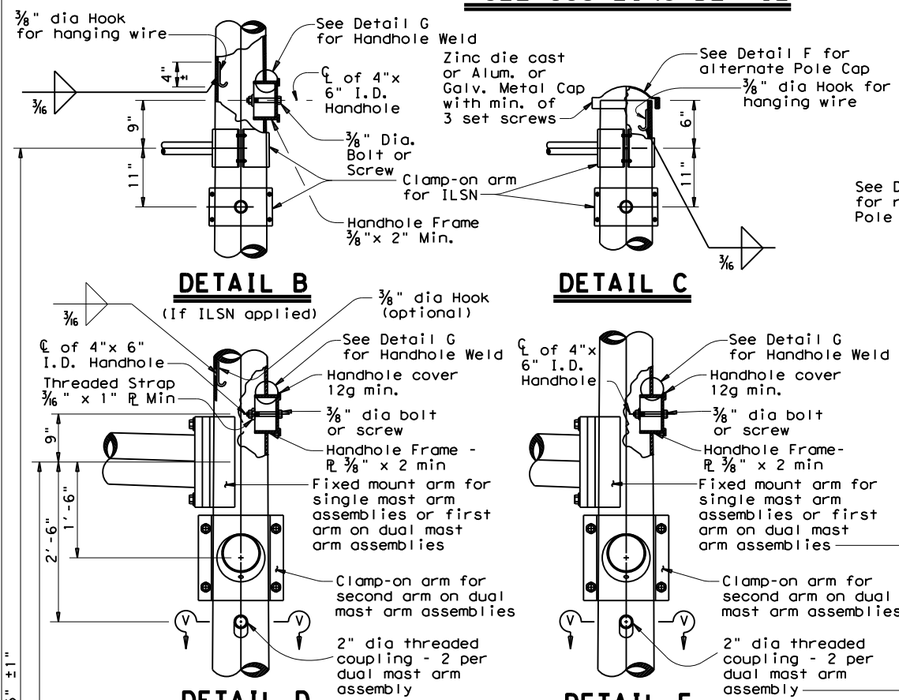
SECTION X-X

Opening for access compartment shall be no more than 1/16 inch wider than the access compartment itself.





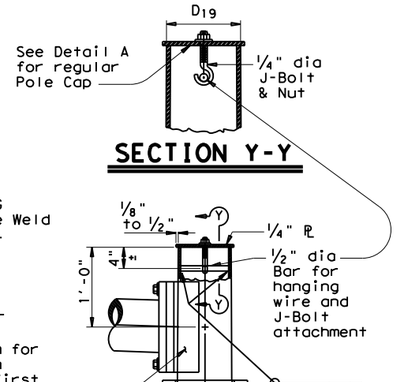
DETAIL J



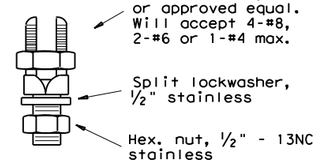
DETAIL B

(If ILSN applied)

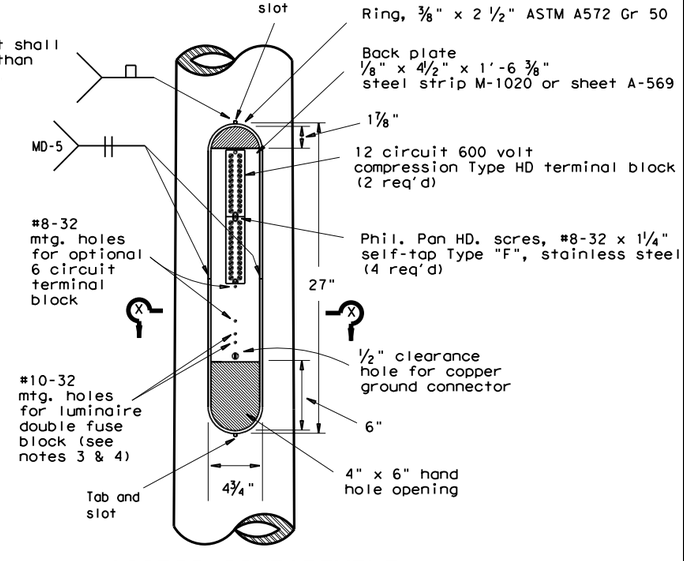
DETAIL C



SECTION Y-Y



COPPER GROUND CONNECTOR



ACCESS COMPARTMENT

DETAIL D

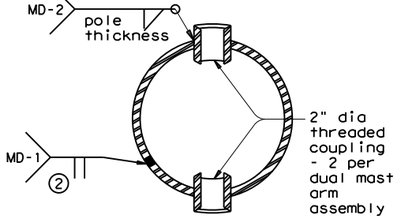
(for 30' pole with luminaire and ILSN sign)

DETAIL E

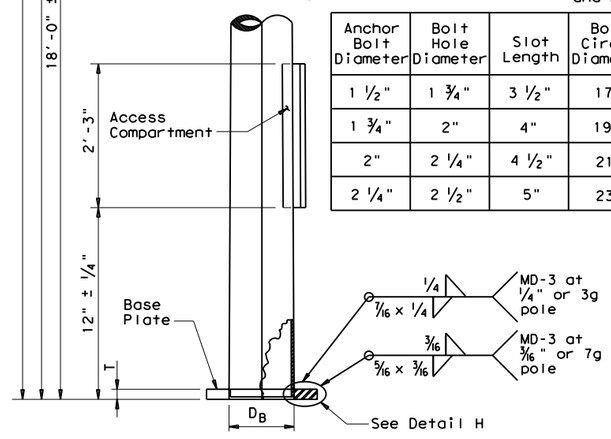
(for 24' pole with ILSN sign and no luminaire)

DETAIL F

(for 19' pole with no ILSN sign and no luminaire)

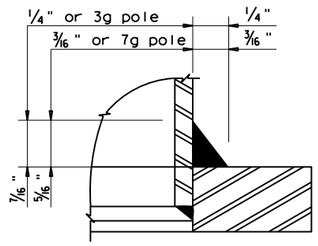


SECTION V-V

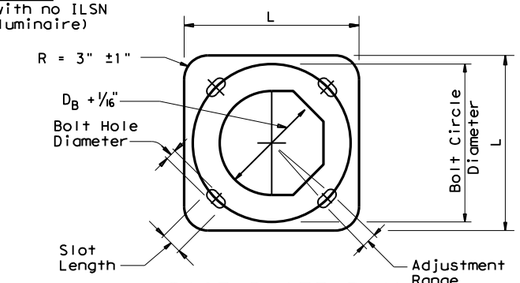


POLE ELEVATION

Anchor Bolt Diameter	Bolt Hole Diameter	Slot Length	Bolt Circle Diameter	Base ℞ Dim. L x T	Adjust. Range
1 1/2"	1 3/4"	3 1/2"	17"	18" x 1 1/2"	13.4°
1 3/4"	2"	4"	19"	20" x 1 3/4"	13.5°
2"	2 1/4"	4 1/2"	21"	22" x 2"	13.6°
2 1/4"	2 1/2"	5"	23"	24" x 2 1/4"	13.7°



DETAIL H



BASE PLATE PLAN

(1) 85% Min. penetration

(2) 60% Min. penetration 100% pemetration within 6" of circumferential base welds.

NOTES:

1. The cover shall be one piece formed from ABS plastic, shall be a pearl gray color, and shall be suitable for exposure to harsh sunlight and extreme weather. Cover shall latch with two screw latches and shall fit tightly to the enclosure ring to create a rainproof seal. Latch screws shall be 1/4-20 stainless flat socket head screws with tamper proof feature.
2. The pole manufacturer shall provide with each pole a separate kit consisting of: one cover with two latching assemblies, two terminal strips (Marathon #985GP12CU or approved equal), four #8-32 x 1 1/4" self tapping type "F" stainless steel pan head screws, and one ground connector (Blackburn TTC, Burndy KC22J12T13, or Ilsco SSS-5). The traffic signal contractor shall install the kit items in the field.
3. The screw hole spacing on the enclosure back plate shall be for two Marathon #985GP12 terminal strips, one Marathon #985GP06CU terminal strip, and one Bussmann #BM6032B fuse block.
4. Install one Bussmann #BM6032B, Littelfuse #L60030M-2C, or Ferraz-Shawmut #30352 fuse block for poles where luminaires are to be installed.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES MAST ARM POLE DETAILS

MA-D-12

DN: MS	CK: JSY	DW: FDN	CK: CAL

REVISIONS
8-99
1-12

CONT	SECT	JOB	HIGHWAY
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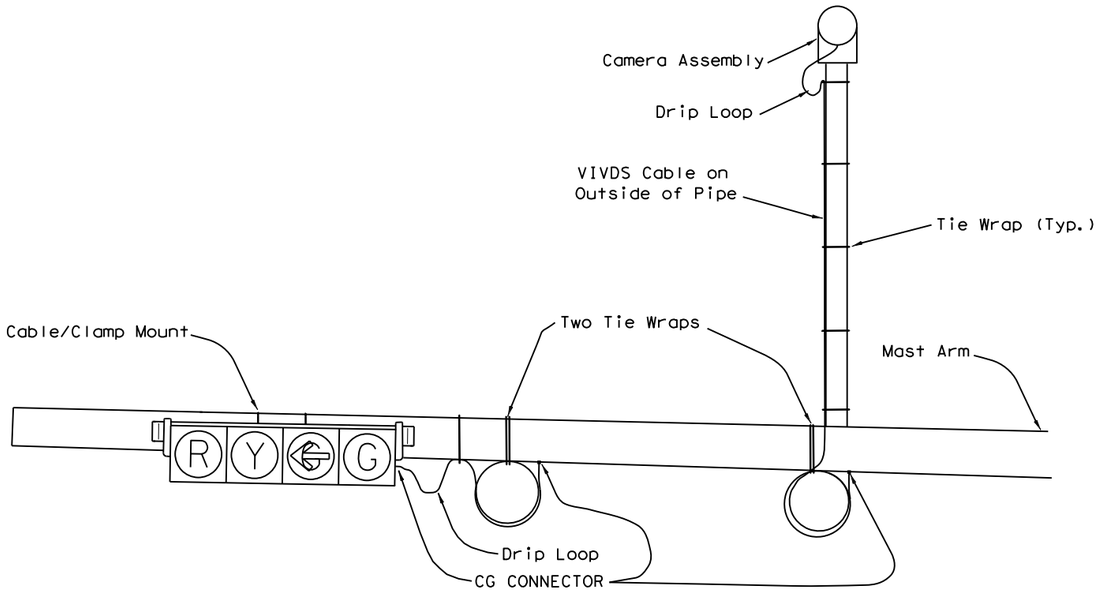
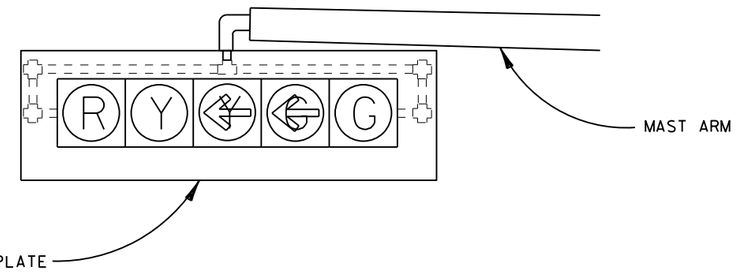
DIST	COUNTY		SHEET NO.
AUS	TRAVIS, ETC.		56

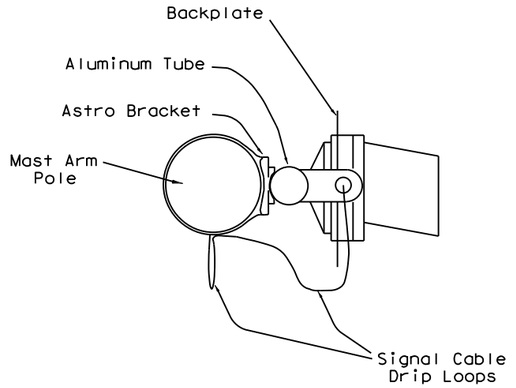


MAST ARM
ELEVATION VIEW

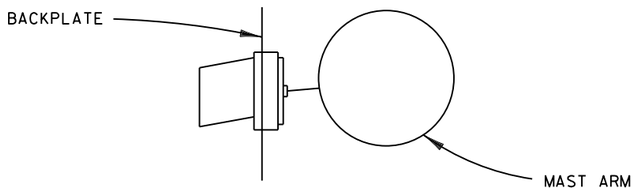
Backplate Not Shown



ELEVATION VIEW

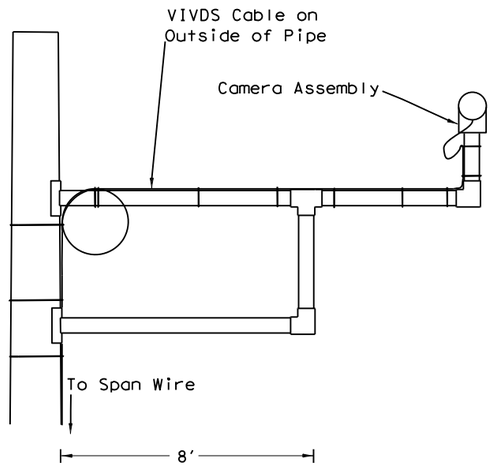


MAST ARM
SECTION VIEW(SIDE)

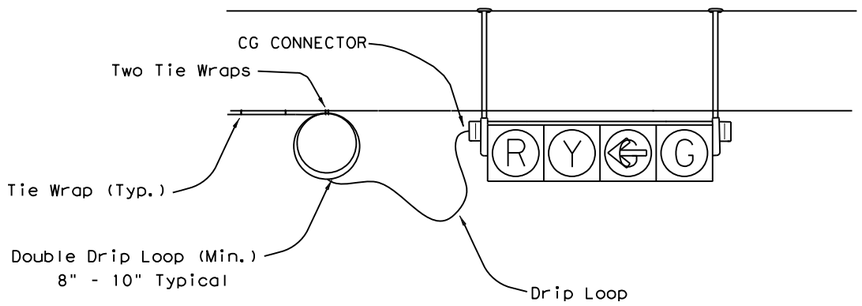


SECTION VIEW

SECTION VIEW



ELEVATION VIEW - CAMERA BRACKET



ELEVATION VIEW - SPAN WIRE

Backplate Not Shown

STATE OF TEXAS
MAHENDRAN THIVAKARAN
115129
LICENSED
PROFESSIONAL ENGINEER

M Thivakaran

10/24/2023

Texas Department of Transportation | Austin District Standard

Austin District Traffic

MISCELLANEOUS ATTACHMENT DETAILS

MAD-14

CONT	SECT	JOB	HIGHWAY
0914	00	459	VA
DIST	COUNTY		SHEET NO.
AUS	TRAVIS, ETC.		57

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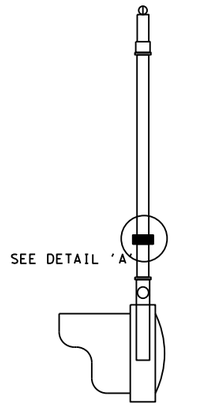
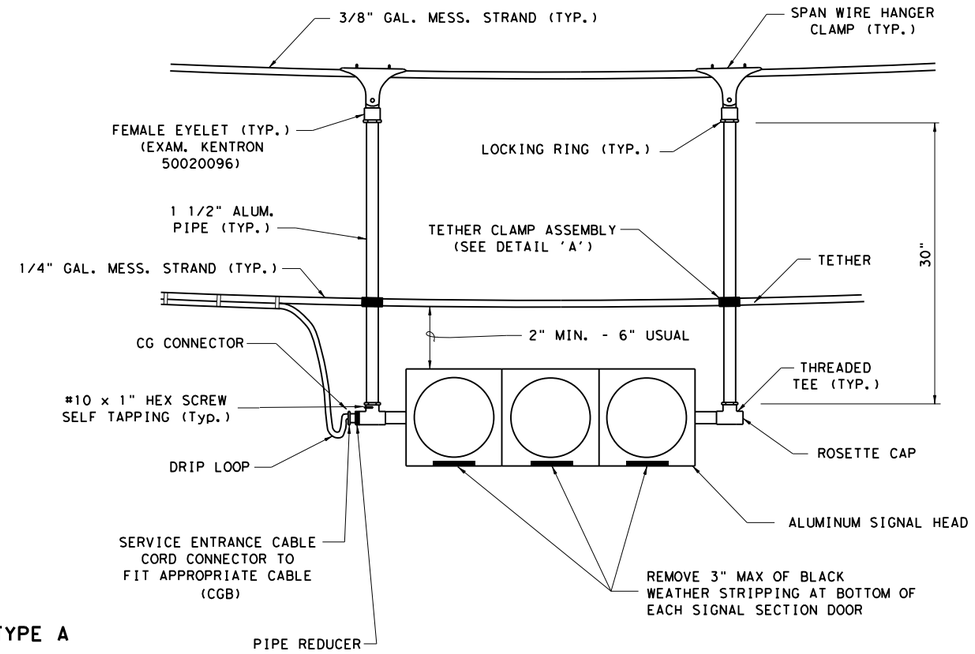
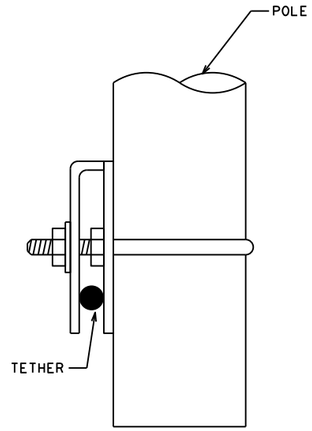


SIDE VIEW

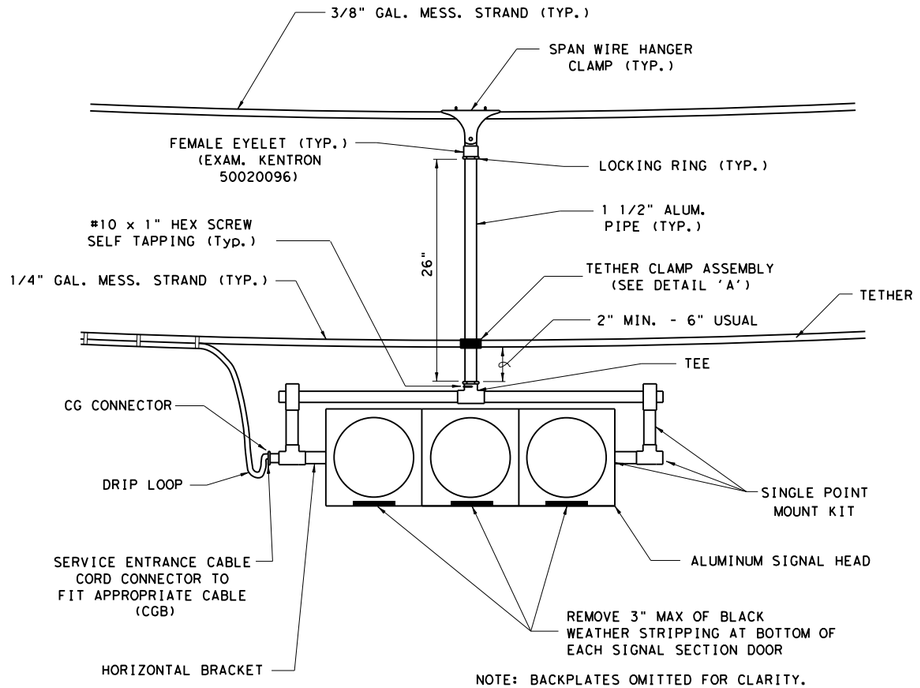


TYPE A

NOTE: BACKPLATES OMITTED FOR CLARITY.



DETAIL 'A'
TETHER CLAMP ASSEMBLY



TYPE B

NOTE: BACKPLATES OMITTED FOR CLARITY.

STATE OF TEXAS
MAHENDRAN THIVAKARAN
115129
LICENSED PROFESSIONAL ENGINEER

M Thivakaran

10/24/2023

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NO SCALE

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SIGNAL HEAD HORIZONTAL SPAN WIRE MOUNT

HSWM-14

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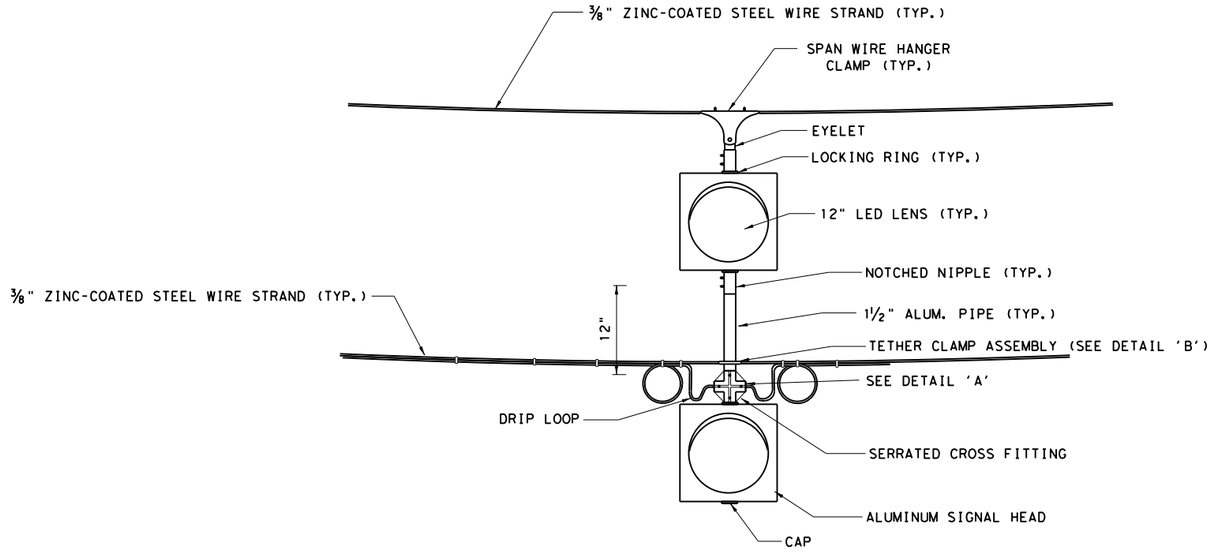
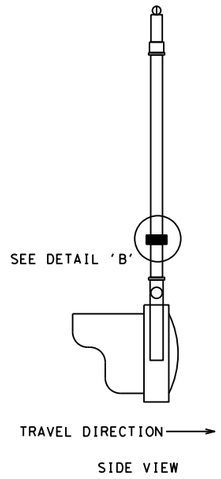
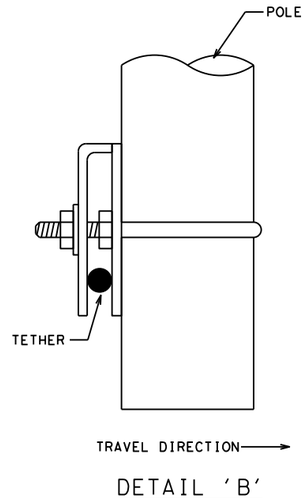
REVISIONS

CONT	SECT	JOB	HIGHWAY
0914	00	459	VA
DIST	COUNTY		SHEET NO.
AUS	TRAVIS, ETC.		58



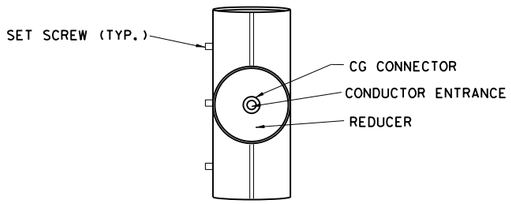


SIDE VIEW



DETAIL 'B'

TETHER CLAMP ASSEMBLY



DETAIL 'A'

SIDE VIEW
SERRATED CROSS FITTING

STATE OF TEXAS
MAHENDRAN THIVAKARAN
115129
LICENSED PROFESSIONAL ENGINEER

M Thivakaran

10/24/2023

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Austin District Traffic

FLASHING BEACON DETAIL SPAN WIRE MOUNT

FBDSWM-14

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	0914	00	459	VA
	DIST	COUNTY		SHEET NO.
	AUS	TRAVIS, ETC.		59

DATE: 9/20/2023 3:50:51 PM
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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
REVISIONS		0914	00	459	VA
		DIST	COUNTY		SHEET NO.
		AUS	TRAVIS, ETC.		60

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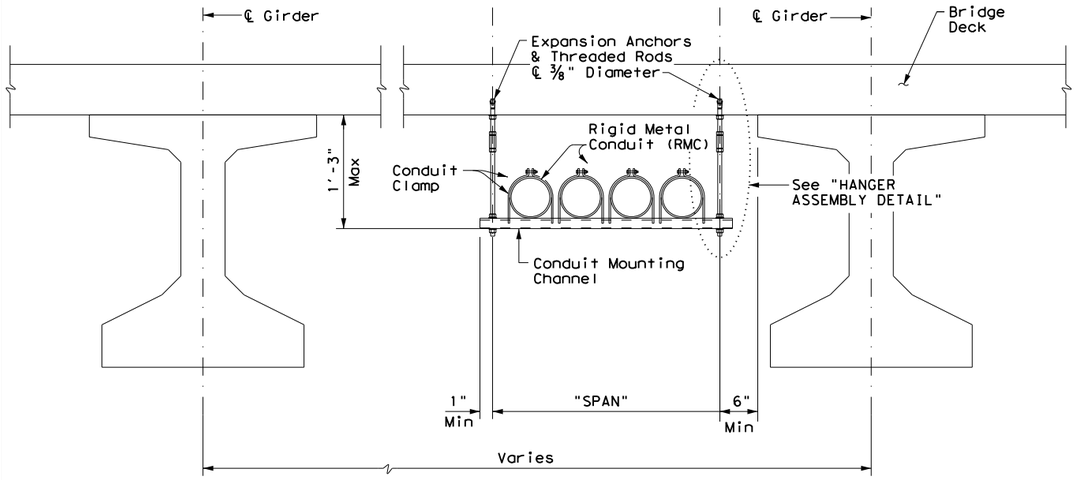
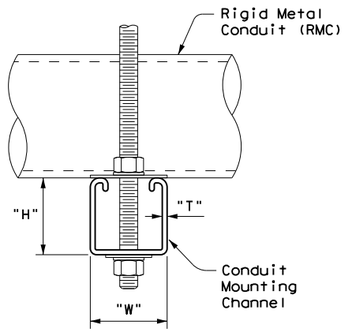
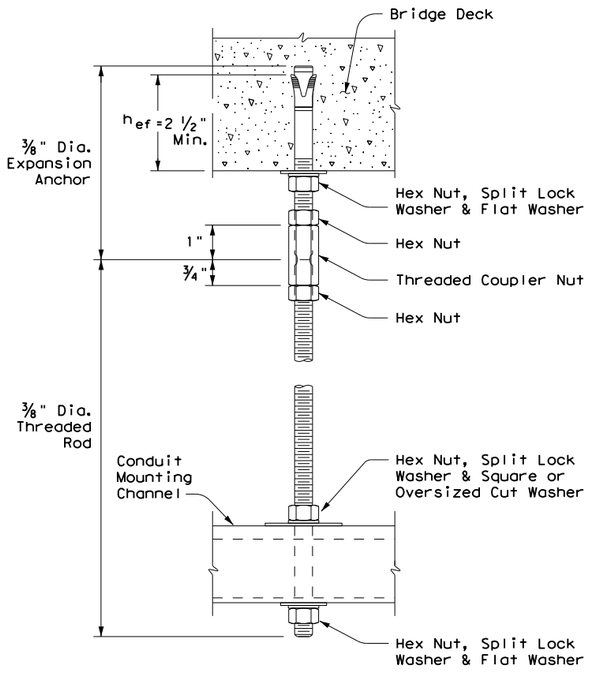


CONDUIT HANGING DETAIL

CONDUIT MOUNTING CHANNEL		
"SPAN"	"W" x "H"	"T"
less than 2'	1 5/8" x 1 3/8"	12 Ga.
2'-0" to 2'-6"	1 5/8" x 1 5/8"	12 Ga.
>2'-6" to 3'-0"	1 5/8" x 2 7/16"	12 Ga.

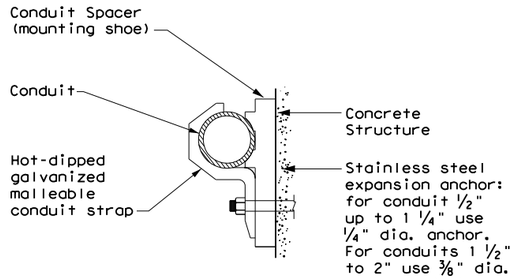
Channels with round or short slotted hole patterns are allowed, if the load carrying capacity is not reduced by more than 15%.

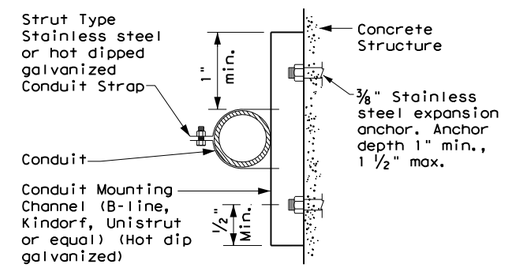




HANGER ASSEMBLY DETAIL

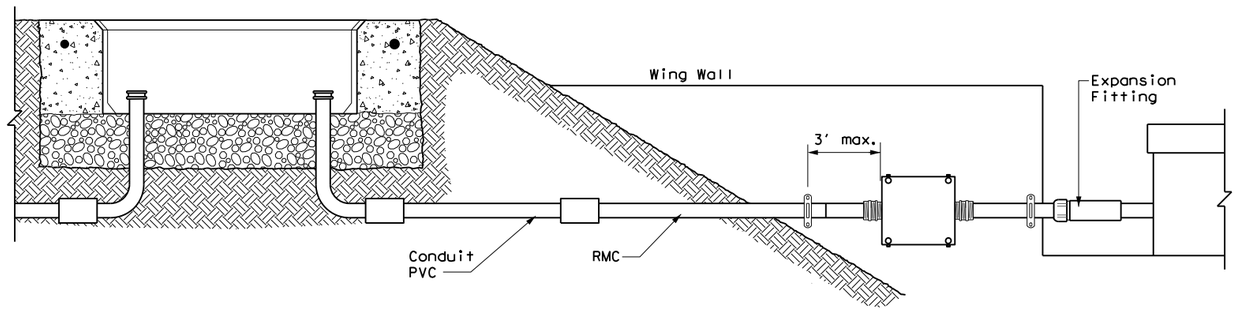
ELECTRIC CONDUIT TO BRIDGE DECK ATTACHMENT





CONDUIT MOUNTING OPTIONS

Attachment to concrete surfaces
See ED(1)B.2



TYPICAL CONDUIT ENTRY TO BRIDGE STRUCTURE DETAIL

EXPANSION ANCHOR NOTES FOR BRIDGE DECK ATTACHMENT

1. Use torque controlled mechanical expansion anchors that are approved for use in cracked concrete by the International Code Council, Evaluation Service (ICC-ES). The chosen anchor product shall have a designated ICC-ES Evaluation Report number, and its approval status shall be maintained on the ICC-ES website under Division 031600 for Concrete Anchors.
2. Unless otherwise approved by the Engineer: do not use adhesive anchors; do not use expansion anchors that are not included in the ICC-ES approval list; and do not use expansion anchors that are only approved for use in uncracked concrete.
3. Use anchors manufactured with stainless steel expansion wedges. Anchors manufactured with carbon steel expansion wedges are not allowed. Anchor bodies can be either zinc-plated carbon steel or stainless steel. For application in marine environment, both the anchor body and expansion wedge shall be stainless steel.
4. Install anchors as shown on the plans and in accordance with the anchor manufacturer's published installation instructions. Arrange a field demonstration test to evaluate the procedures and tools. The test shall be witnessed and approved by the Engineer prior to furnishing anchors on the structure.
5. Prior to hole drilling, use rebar locator to ensure clearing of existing deck strands or reinforcement. Install anchors to ensure a minimum effective embedment depth, (h_{ef}), as shown. Increase (h_{ef})as needed to ensure sufficient thread length for proper torqueing and tightening of anchors.
6. Use anchors of minimum 1600 Lbs tensile capacity (minimum of steel, concrete breakout, and concrete pullout strengths as determined by ACI 318 Appendix D) at the required minimum embedment depth (h_{ef}). No lateral loads shall be introduced after conduit installation.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUIT SUPPORTS

ED(2)-14

FILE: ed2-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	00	459	VA
	DIST	COUNTY		SHEET NO.
	AUS	TRAVIS, ETC.		61

ELECTRICAL CONDUCTORS

A. MATERIAL INFORMATION

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

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

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

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

B. CONSTRUCTION METHODS

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

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

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

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

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

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

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

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

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

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

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

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

C. TEMPORARY WIRING

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

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

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

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

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

GROUND RODS & GROUNDING ELECTRODES

A. MATERIAL INFORMATION

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

B. CONSTRUCTION METHODS

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

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

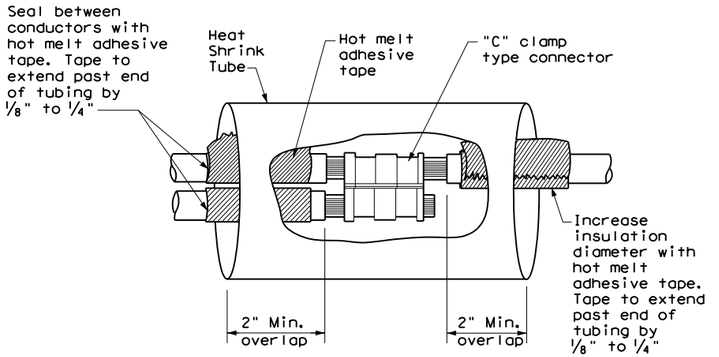
3. Install ground rods so the imprinted part number is at the upper end of the rod.

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

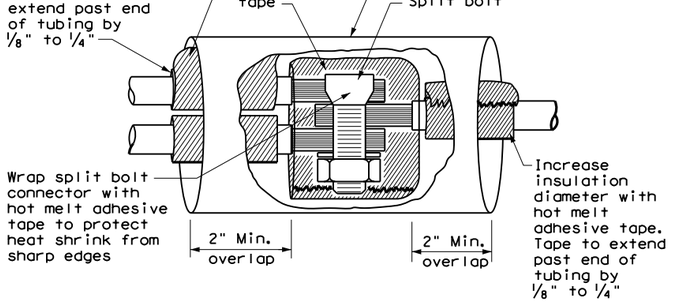
5. Route all conductors as short and straight as possible for connection to lightning protection ground rods. When a bend is required, ensure a minimum radius bend of four inches for these conductors.

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

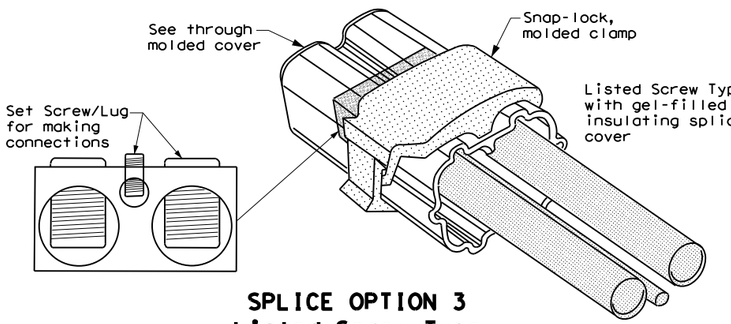
7. Written authorization is required before installing a ground rod in a horizontal trench for rocky soil or a solid rock bottom.



SPLICE OPTION 1
Compression Type



SPLICE OPTION 2
Split Bolt Type



SPLICE OPTION 3
Listed Screw Type

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Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUCTORS

ED(3)-14

FILE:	ed3-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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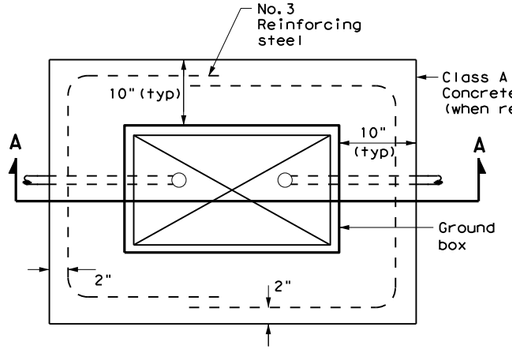
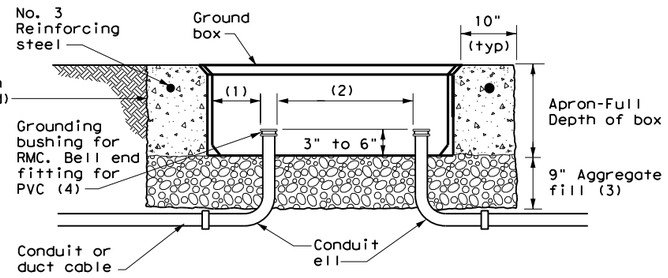


PLAN VIEW



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.

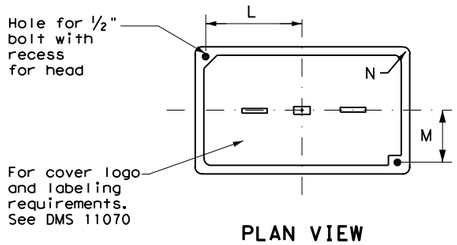
(2) Maintain sufficient space between conduits to allow for proper installation of bushing.

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

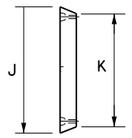
(4) Install a grounding bushing on the upper end of all RMC terminating in a ground box. Ground RMC elbows when any part of the elbow is less than 18 in. below the bottom of the ground box. Install a PVC bushing or bell end fitting on the upper end of all PVC conduits terminating in a ground box.

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

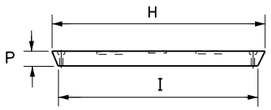
GROUND BOX COVER DIMENSIONS								
TYPE	DIMENSIONS (INCHES)							
	H	I	J	K	L	M	N	P
A, B & E	23 1/4	23	13 3/4	13 1/2	9 7/8	5 1/8	1 3/8	2
C & D	30 1/2	30 1/4	17 1/2	17 1/4	13 1/4	6 3/4	1 3/8	2



PLAN VIEW



END



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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	DIST	COUNTY		SHEET NO.
	AUS	TRAVIS, ETC.		63

71D

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

ZONE 2
(90 MPH WIND)

ZONE 3
(80 MPH WIND)

ZONE 4
(70 MPH WIND)

ICE LINE

ZONE 4
(70 MPH WIND)

ICE LINE

ZONE 3
(80 MPH WIND)

ZONE 1
(100 MPH WIND)

LEGEND

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

APPLICABLE STANDARDS SHEETS

OVERHEAD SIGN BRIDGE STANDARDS:

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

CANTILEVER OVERHEAD SIGN SUPPORT STANDARDS:

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

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

HIGH MAST ILLUMINATION POLE STANDARDS:

HMIP-98
HMIF-98

WALKWAYS AND BRACKETS STANDARDS:

SWW
SB(SWL-1)

TRAFFIC SIGNAL POLE STANDARDS:

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

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

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

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

WIND VELOCITY AND ICE ZONES

WV & IZ-14

FILE: windice.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 1996	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	00	459	VA
8-14-Added list of applicable standards, restricting use to structures designed for Fastest Mile wind speeds.	DIST	COUNTY		SHEET NO.
	AUS	TRAVIS, ETC.		64

DATE:
FILE:

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

TPDES TXR 150000: Stormwater Discharge Permit or Construction General Permit required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506.

List MS4 Operator(s) that may receive discharges from this project. They may need to be notified prior to construction activities.

1.

2.

☒ No Action Required ☐ Required Action

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
2. Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
3. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
4. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas.

The Contractor must adhere to all of the terms and conditions associated with the following permit(s):

☒ No Permit Required

☐ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)

☐ Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)

☐ Individual 404 Permit Required

☐ Other Nationwide Permit Required: NWP# _____

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices planned to control erosion, sedimentation and post-project TSS.

1.

2.

3.

4.

The elevation of the ordinary high water marks of any areas requiring work to be performed in the waters of the US requiring the use of a nationwide permit can be found on the Bridge Layouts.

Best Management Practices:

Erosion	Sedimentation	Post-Construction TSS
☐ Temporary Vegetation	☐ Silt Fence	☐ Vegetative Filter Strips
☐ Blankets/Matting	☐ Rock Berm	☐ Retention/Irrigation Systems
☐ Mulch	☐ Triangular Filter Dike	☐ Extended Detention Basin
☐ Sodding	☐ Sand Bag Berm	☐ Constructed Wetlands
☐ Interceptor Swale	☐ Straw Bale Dike	☐ Wet Basin
☐ Diversion Dike	☐ Brush Berms	☐ Erosion Control Compost
☐ Erosion Control Compost	☐ Erosion Control Compost	☐ Mulch Filter Berm and Socks
☐ Mulch Filter Berm and Socks	☐ Mulch Filter Berm and Socks	☐ Compost Filter Berm and Socks
☐ Compost Filter Berm and Socks	☐ Compost Filter Berm and Socks	☐ Vegetation Lined Ditches
	☐ Stone Outlet Sediment Traps	☐ Sand Filter Systems
	☐ Sediment Basins	☐ Grassy Swales

III. CULTURAL RESOURCES

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately.

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical.
Contractor must adhere to Construction Specification Requirements Specs 162, 164, 192, 193, 506, 730, 751, 752 in order to comply with requirements for invasive species, beneficial landscaping, and tree/brush removal commitments.

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS.

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

If any of the listed species are observed, cease work in the immediate area, do not disturb species or habitat and contact the Engineer immediately. The work may not remove active nests from bridges and other structures during nesting season of the birds associated with the nests. If caves or sinkholes are discovered, cease work in the immediate area, and contact the Engineer immediately.

LIST OF ABBREVIATIONS

BMP:	Best Management Practice	SPCC:	Spill Prevention Control and Countermeasure
CGP:	Construction General Permit	SW3P:	Storm Water Pollution Prevention Plan
DSHS:	Texas Department of State Health Services	PCN:	Pre-Construction Notification
FHWA:	Federal Highway Administration	PSL:	Project Specific Location
MOA:	Memorandum of Agreement	TCEQ:	Texas Commission on Environmental Quality
MOU:	Memorandum of Understanding	TPDES:	Texas Pollutant Discharge Elimination System
MS4:	Municipal Separate Stormwater Sewer System	TPWD:	Texas Parks and Wildlife Department
MBTA:	Migratory Bird Treaty Act	TxDOT:	Texas Department of Transportation
NOT:	Notice of Termination	T&E:	Threatened and Endangered Species
NWP:	Nationwide Permit	USACE:	U.S. Army Corps of Engineers
NOI:	Notice of Intent	USFWS:	U.S. Fish and Wildlife Service

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used.

Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: 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) 05-07-14 ADDED NOTE SECTION IV. 01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	0914	00	459	VA
	DIST	COUNTY		SHEET NO.
	AUS	TRAVIS, ETC.		65