DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS	6			SH 6, ETC.
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	WACO	McLENNAN, ETC.	1
CHECK	CONTROL	SECTION	JOB	
	6473	31	001	

INDEX OF SHEETS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	INDEX OF SHEETS

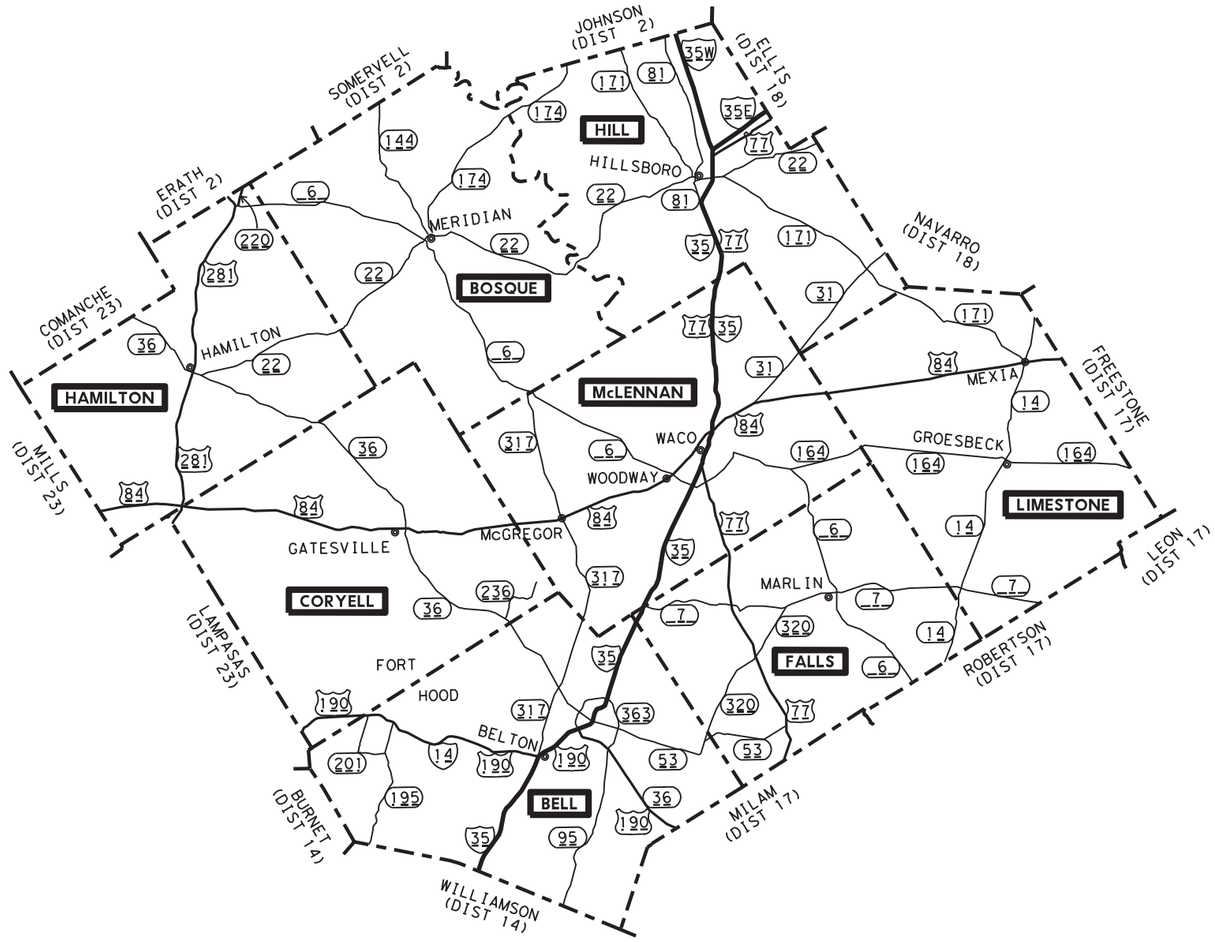
STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
HIGHWAY ROUTINE MAINTENANCE CONTRACT

TYPE OF WORK:

LARGE SIGN MAINTENANCE DISTRICT WIDE

PROJECT NO. : RMC 6473-31-001
HIGHWAY : SH 6, ETC.
LIMITS OF WORK: VARIOUS LOCATIONS ACROSS THE WACO DISTRICT



SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, SEPTEMBER 1, 2024 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, WILL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL - AID CONSTRUCTION CONTRACTS(FORM FHWA 1273, OCTOBER 2023).

EXCEPTIONS: NONE
EQUATIONS: NONE
RR CROSSINGS: NONE

Texas Department of Transportation

Recommended for Letting — 9/27/2024
DocuSigned by: Charles W Smith, PE
E7CF02001F6C45F... Engineer

Recommended for Letting — 9/27/2024
DocuSigned by: Stephen Michael Kasberg P.E.
6597DEC5B49C452...

Approved for Letting — 9/27/2024
Signed by:
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9/16/2024 11:39:19 AM
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NODE

SHEET NO.	DESCRIPTION
	GENERAL
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2	INDEX OF SHEETS
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4	ESTIMATE AND QUANTITIES
5	CONSOLIDATED SUMMARY
	TRAFFIC CONTROL STANDARDS
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20	WZ(RS)-22
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22 - 23	TCP(1-4)-18 THROUGH TCP(1-5)-18
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	TRAFFIC STANDARDS
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SHEET NO.	DESCRIPTION
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71	OSBS - SC
72	OSB - FD
73	OSB - FD - SC
74	COSS-SE
75	COSS-Z4 & Z4I-10
76 - 77	COSSD
78	COSSF-21
79	COSS-FD

* THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE HAVE BEEN SELECTED BY ME OR UNDER MY DIRECT SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

STATE OF TEXAS
CHARLES W. SMITH
110312
LICENSED
PROFESSIONAL ENGINEER

Charles W. Smith, PE 9/27/2024
SIGNATURE OF REGISTRANT & DATE

INDEX OF SHEETS

CHANGE ORDER	FED. RD. DIV. NO.	CONT	SECT	JOB	HIGHWAY
	6	6473	31	001	SH 6, ETC.
	STATE	DIST	COUNTY		SHEET NO.
	TEXAS	WACO	MCLENNAN, ETC.		2

GENERAL

This is a NON-SITE-SPECIFIC contract for repair and installation of road signs at various locations within the Waco District, as specified in the plans.

PRE-BID QUESTIONS

Contractor questions on this project are to be emailed to the Waco District at the following address:

Stephen Kasberg - Wacoprebid@txdot.gov, 254-867-2780, 100 S. Loop Dr., Waco, TX
Carmen Chau - Wacoprebid@txdot.gov, 254-867-2794, 100 S. Loop Dr., Waco, TX

Contractor questions will be accepted through email, phone, and in person by the above individuals. Questions may also be submitted via the Letting Pre-Bid Q&A web page. This webpage can be accessed from the Notice to Contractors dashboard located at the following Address:

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

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

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

The construction, operation and maintenance of the proposed project will be consistent with the state implementation plan as prepared by the Texas Commission on Environmental Quality.

The disturbed area for this project, as shown on the plans is 0.00 acres. However, the Total Disturbed Area (TDA) will establish the required authorization for storm water discharges. The TDA of this project will be determined by the sum of the disturbed area in all project locations in the contract, and all disturbed area on all Project-Specific Locations (PSL) located in the project limits and/or within 1 mile of the project limits. The department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction site as shown on the plans, according to the TDA of the project. The Contractor will obtain any required authorization from the TCEQ for the discharge of storm water from any PSL for construction support activities on or off of the project row according to the TDA of the project. When the TDA for the project exceeds 1 acre, provide a copy of the appropriate application of permit (NOI, or Construction Site Notice) to the Engineer, for any PSL located in the project limits or within 1 mile of the project limits. Follow the directives and adhere to all requirements set forth in the TCEQ, Texas Pollution Discharge Elimination System, Construction General Permit (TPDES, CGP).

There is a high probability that an environmentally sensitive area could be encountered on the Contractor designated Project-Specific Locations (PSL) for this project (haul roads, equipment staging areas, borrow pits, disposal sites, field offices, storage areas, parking areas, etc.). Item 7.6 “Project-Specific Locations”, provides a listing of regulatory agencies that may need to be contacted regarding this project.

GENERAL NOTES

ITEM 1 ABBREVIATIONS AND DEFINITIONS:

This is a Non-Site-Specific Contract as defined in Item 1.3.95.

ITEM 5: CONTROL OF THE WORK

Provide the Engineer Daily by 3PM the planned activities for the following day including location, quantities of materials to be placed, etc. in a format acceptable to the Engineer.

Submit all fabrication and shop drawings per TxDOT’s online shop drawing submittal system and copy the Area Engineer on the email submittal, unless otherwise directed.

Acceptance or denial of an alternate is at the sole discretion of the Department. Contractor is responsible for impacts to the project schedule and cost resulting from the use of alternates.

Underground utilities owned by the Texas Department of Transportation may be present within the Right-Of-Way on this project. For signal, illumination, surveillance, and communications & control maintained by TxDOT, call the TxDOT Traffic Signal Office (254)867-2808 for locates a minimum of 48 hours in advance of excavation. For irrigation systems, call TxDOT Landscape Office (254)867-2726 for locates a minimum of 48 hours in advance of excavation. If city or town owned irrigation facilities are present, call the appropriate department of the local city or town a minimum of 48 hours in advance of excavation. The Contractor is liable for all damages when utilities are damaged due to Contractor’s negligence including, but not limited to, repair or replacement at the Contractor’s expense.

ITEM 6: CONTROL OF MATERIALS

This proposed Contract will not include federal funds. Buy Texas stipulations apply in accordance with 6.1.2 “Buy Texas”.

References to manufacturer’s trade name or catalog numbers are for the purpose of identification only and the Contractor will be permitted to furnish like materials of other

manufacturers provided they are of equal quality and comply with specifications for this project.

ITEM 7: LEGAL RELATIONS AND RESPONSIBILITIES

No significant traffic generator events identified.

If utilizing private property for waste disposal sites, field office sites, equipment storage sites or for any other purpose involved with this project, provide to the Engineer written proof of the property owner's approval of the use of this property. This proof may be in the form of a letter or agreement signed by the property owner or other documents acceptable to the Engineer. Provide such proof prior to occupying the site.

Personal vehicles of the Contractor's employees will not be parked within the right of way at any time including any section closed to public traffic, unless the vehicle is being utilized for construction procedures. However, the Contractor's employees may park on the right of way at the sites where the Contractor has his office, equipment and materials storage yard.

Once this drawing and supporting information is reviewed and approved by TxDOT, all construction workers should be made aware of the limits designated on the drawings by the Contractor's supervision. Work in all waters of the US will be limited to the minimum necessary required to construct the bridge, culvert or roadway fills. Work will also include all activities needed for bridge and culvert demolitions. Working or disturbing soil in the stream channel outside the limits of the work plan will not be allowed. Orange fencing will be provided and maintained to establish the TxDOT approved boundaries in which work may be conducted between the Ordinary High-Water Marks. Orange fencing will not be paid for but will be considered subsidiary to Item 502, "Barricades, Signs and Traffic Handling".

Law Enforcement Personnel.
As approved by the Engineer, provide uniformed off duty police officers and squad cars during the following activities:

- Lane closures on controlled access facilities or 4 lane divided facilities with speed limits above 55mph,
- ramp closures,
- Roadway Closures,
- Support of phase construction traffic switches,
- nighttime work, or
- other situations that indicate a need for additional traffic control to protect the traveling public or the construction workforce.

Law Enforcement Personnel will be paid when use is approved by the Engineer. The Contractor retains the right to have law enforcement personnel on sight at their own cost and discretion when not approved by the Engineer.

Submit charge summary and invoices using the Department form 318. Provide documentation such as payroll, log sheets with signatures and badge number, or invoices from the government entity providing the officers for reimbursement.

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. Windows / Windshields may not be blocked.

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.

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.

ITEM 8: PROSECUTION AND PROGRESS

This Project will be Calendar Day in accordance with Article 8.3.1.5.

ITEM 416: DRILLED SHAFT FOUNDATIONS

Soil from foundation drilling will be removed immediately and no earth spoil material will be deposited into water of a stream.

ITEM 500: MOBILIZATION

Each work order will include multiple locations, but only one mobilization (callout) will be paid per work order. Specific project locations and plan details will be shown by work order at later dates. If the Contractor does not complete the work in the allotted work days, liquidated damages will be charged for each day that work remains incomplete.

ITEM 502: BARRICADES, SIGNS, AND TRAFFIC HANDLING

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.

Access will be provided to all business and residences at all times.

Place barricades and signs in locations that do not obstruct the sight distance of drivers entering the highway from driveways or side streets.

The Contractor Responsible Person(s) (CRP) for Work Zone Traffic Controls will inspect and ensure any deficiencies are corrected each and every day throughout the duration of this contract. Any misaligned or damaged traffic control devices will be repaired as soon as practical after deficiency is discovered.

In addition to providing a Contractor’s Responsible Person and a phone number for emergency contact, have an employee(s) available to respond on the project for emergencies and for taking corrective measures within One (1) Hour.

Short Term Lane Closure Allowances:
Provide written proposed lane closure information by 1:00 pm on the business day prior to the proposed closures. Do not close lanes when this requirement is not met.

Traffic Control Plans with Lane Closures causing backups of 20 minutes or greater in duration will be modified to reduce delays to less than 20 minutes.

Lane Closure and Pilot Car Operations will be implemented to prevent conflicts with activities including school drop-off / dismissal, large employer shift changes, etc.

Lane Closures and Pilot Car Operations will not be allowed in nighttime work hours without approval of the Engineer.

Lane Closure length will be limited to two (2) miles unless otherwise approved by the Engineer.

Lane Closures will be limited to one (1) lane per direction at any time.

ITEM 505: TRUCK MOUNTED ATTENUATORS

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 total number of truck mounted attenuators (TMA) required when utilizing the traffic control standards are shown in the tables below.

TCP 1 Series	Scenario	Required TMA
(1-1)-18		1
(1-4)-18 / (1-5)-18		1

TCP 2 Series	Scenario	Required TMA
(2-1)-18 / (2-4)-18 / (2-6)-18	All	1

TCP 6 Series	Scenario		Required TMA	
(6-1)-12	A	B	1	2
(6-2)-12 / (6-3)-12	All		1	
(6-4)-12	A	B	1	2
(6-5)-12	A	B	1	2
(6-8)-14 / (6-9)-14	All		1	

Shadow vehicles equipped for truck mounted attenuators (TMA) for stationary operations will be paid for by the day and must be available for use at any time as determined by the Engineer.

The Contractor will be responsible for determining if one or more of these operations will be ongoing at the same time to determine the total number of TMA needed for the project for those times per plan requirements. Additional TMAs used that are not specified in the plans in which the Contractor expects compensation will require prior approval from the Engineer.

ITEM 636: SIGNS

Verify all dimensions at the actual proposed sign location in order to maintain dimensions as shown on the Sign Mounting Details.

Stake the location of the new signs a minimum of 7 days in advance of anticipated installation. The Engineer will review and approve the final installation locations.

For freeway sections, keep the advance guide sign or the exit direction sign for an exit in place at all times, unless written approval is given. Replace any signs that have been removed before the end of the workday, unless written approval is given.

ITEM 644: SMALL ROADSIDE SIGN ASSEMBLIES

Bolt Clamp type will be used on Texas Triangular Slip Base System.

As practical with new construction, leave the existing sign assemblies in place until the proposed foundation, post and sign are in installed, and then remove the old sign assemblies.

Do not leave any sign foundation holes open overnight. Ensure all holes drilled are at least the minimum required depth with no loose material remaining in the hole.

Stake proposed sign locations and receive approval before installation of sign foundations.

Existing Mile Markers Signs are to be relocated to their original location(s) as they were prior to the beginning of the project.

Expanded foam foundations are not permitted.

Cut the bottom of all posts square.

For sign types which design details are not shown on these plans, fabricate according to the “STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS”.

Remove unsalvageable material.

The Contractor will relocate the existing double sided street name signs and furnish the post mounted brackets for the street name signs to be paid for as part of the proposed Stop Signs (R1-1). Existing street name signs will be mounted above Stop signs. If damaged while being relocated, the Contractor will furnish new double sided street name sign at their own expense.

ITEM 647: LARGE ROADSIDE SIGN SUPPORTS AND ASSEMBLIES

Stake proposed sign locations and receive approval before installation of sign foundations. Determine each post length after the stub has been placed.

COUNTY: MCLENNAN, ETC.

HIGHWAY: SH 6, ETC.

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Estimate & Quantity Sheet

CONTROLLING PROJECT ID 6473-31-001 **DISTRICT** Waco **COUNTY** McLennan
HIGHWAY SH0006

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**6473-31-001**			
		PROJECT ID		**A00212193**			
		COUNTY		**McLennan**			
		HIGHWAY		**SH0006**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	416-7024	DRILL SHAFT (NON - REINFORCED) (12 IN)	LF	20.000		20.000	
	416-7028	DRILL SHAFT (SIGN MTS) (24 IN)	LF	80.000		80.000	
	416-7030	DRILL SHAFT (SIGN MTS) (36 IN)	LF	40.000		40.000	
	432-7013	RIPRAP (MOW STRIP)(4 IN)	CY	6.000		6.000	
	500-7002	MOBILIZATION (CALLOUT)	EA	12.000		12.000	
	505-7001	TMA (STATIONARY)	DAY	40.000		40.000	
	636-7001	ALUMINUM SIGNS (TY A)	SF	250.000		250.000	
	636-7002	ALUMINUM SIGNS (TY G)	SF	1,000.000		1,000.000	
	636-7003	ALUMINUM SIGNS (TY O)	SF	500.000		500.000	
	636-7004	REPLACE EXISTING ALUMINUM SIGNS(TY A)	SF	250.000		250.000	
	636-7005	REPLACE EXISTING ALUMINUM SIGNS(TY G)	SF	250.000		250.000	
	636-7006	REPLACE EXISTING ALUMINUM SIGNS(TY O)	SF	500.000		500.000	
	644-7001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	5.000		5.000	
	644-7008	IN SM RD SN SUP&AM TY10BWG(1)SA(U-EXAL)	EA	5.000		5.000	
	644-7018	IN SM RD SN SUP&AM TY10BWG(2)SA(P-EXAL)	EA	5.000		5.000	
	644-7036	IN SM RD SN SUP&AM TYS80(1)SA(U-EXAL)	EA	5.000		5.000	
	644-7049	IN SM RD SN SUP&AM TYS80(2)SA(P-EXAL)	EA	5.000		5.000	
	644-7057	IN SM RD SN SUP&AM TYTWT(1)WS(P)	EA	5.000		5.000	
	644-7058	IN SM RD SN SUP&AM TYTWT(1)WS(T)	EA	5.000		5.000	
	644-7061	IN BRIDGE MNT CLEARANCE SGN ASSM(TY N)	EA	3.000		3.000	
	644-7062	IN BRIDGE MNT CLEARANCE SGN ASSM(TY S)	EA	3.000		3.000	
	644-7065	RELOCATE SM RD SN SUP&AM TY 10BWG	EA	3.000		3.000	
	644-7067	RELOCATE SM RD SN SUP&AM TY S80	EA	3.000		3.000	
	644-7068	RELOCATE SM RD SN SUP&AM TY TWT	EA	3.000		3.000	
	644-7073	REMOVE SM RD SN SUP&AM	EA	5.000		5.000	
	644-7075	REMOVE SM RD SN SUP&AM (SIGN ONLY)	EA	5.000		5.000	
	647-7001	INSTALL LRSS (STRUCT STEEL)	LB	3,000.000		3,000.000	
	647-7002	RELOCATE LRSA	EA	5.000		5.000	
	647-7003	REMOVE LRSA	EA	10.000		10.000	
	647-7004	RELOCATE LRSS (SIGN ONLY)	EA	10.000		10.000	
	647-7006	REMOVE LRSA (FOUNDATION ONLY)(24 IN)	EA	5.000		5.000	
	7010-7002	MAINTENANCE SPEED LIMIT SIGNING	DAY	20.000		20.000	

Sum of Quantity			PROJECT
PAY ITEM	PAY ITEM DESCRIPTION	UNIT	LARGE SIGN REPLACEMENT RMC (6473-31-001)
416 7024	DRILL SHAFT (NON - REINFORCED) (12 IN)	LF	20
416 7028	DRILL SHAFT (SIGN MTS) (24 IN)	LF	80
416 7030	DRILL SHAFT (SIGN MTS) (36 IN)	LF	40
432 7013	RIPRAP (MOW STRIP)(4 IN)	CY	6
500 7002	MOBILIZATION (CALLOUT)	EA	12
505 7001	TMA (STATIONARY)	DAY	40
636 7001	ALUMINUM SIGNS (TY A)	SF	250
636 7002	ALUMINUM SIGNS (TY G)	SF	1000
636 7003	ALUMINUM SIGNS (TY O)	SF	500
636 7004	REPLACE EXISTING ALUMINUM SIGNS(TY A)	SF	250
636 7005	REPLACE EXISTING ALUMINUM SIGNS(TY G)	SF	250
636 7006	REPLACE EXISTING ALUMINUM SIGNS(TY O)	SF	500
644 7001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	5
644 7008	IN SM RD SN SUP&AM TY10BWG(1)SA(U-EXAL)	EA	5
644 7018	IN SM RD SN SUP&AM TY10BWG(2)SA(P-EXAL)	EA	5
644 7036	IN SM RD SN SUP&AM TYS80(1)SA(U-EXAL)	EA	5
644 7049	IN SM RD SN SUP&AM TYS80(2)SA(P-EXAL)	EA	5
644 7057	IN SM RD SN SUP&AM TYTWT(1)WS(P)	EA	5
644 7058	IN SM RD SN SUP&AM TYTWT(1)WS(T)	EA	5
644 7061	IN BRIDGE MNT CLEARANCE SGN ASSM(TY N)	EA	3
644 7062	IN BRIDGE MNT CLEARANCE SGN ASSM(TY S)	EA	3
644 7065	RELOCATE SM RD SN SUP&AM TY 10BWG	EA	3
644 7067	RELOCATE SM RD SN SUP&AM TY S80	EA	3
644 7068	RELOCATE SM RD SN SUP&AM TY TWT	EA	3
644 7073	REMOVE SM RD SN SUP&AM	EA	5
644 7075	REMOVE SM RD SN SUP&AM (SIGN ONLY)	EA	5
647 7001	INSTALL LRSS (STRUCT STEEL)	LB	3000
647 7002	RELOCATE LRSA	EA	5
647 7003	REMOVE LRSA	EA	10
647 7004	RELOCATE LRSS (SIGN ONLY)	EA	10
647 7006	REMOVE LRSA (FOUNDATION ONLY)(24 IN)	EA	5
7010 7002	MAINTENANCE SPEED LIMIT SIGNING	DAY	20

CONSOLIDATED SUMMARIES

CHANGE ORDER	FED. RD. DIV. NO.	CONT	SECT	JOB	HIGHWAY
	6	6473	31	001	SH 6, ETC.
	STATE	DIST	COUNTY		SHEET NO.
	TEXAS	WACO	MCLENNAN, ETC.		5

BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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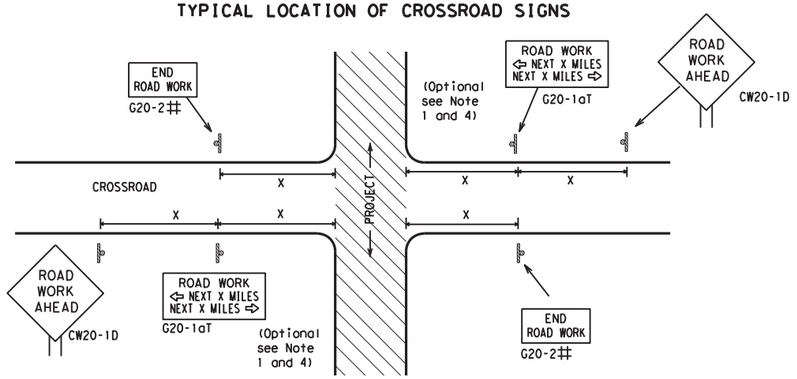
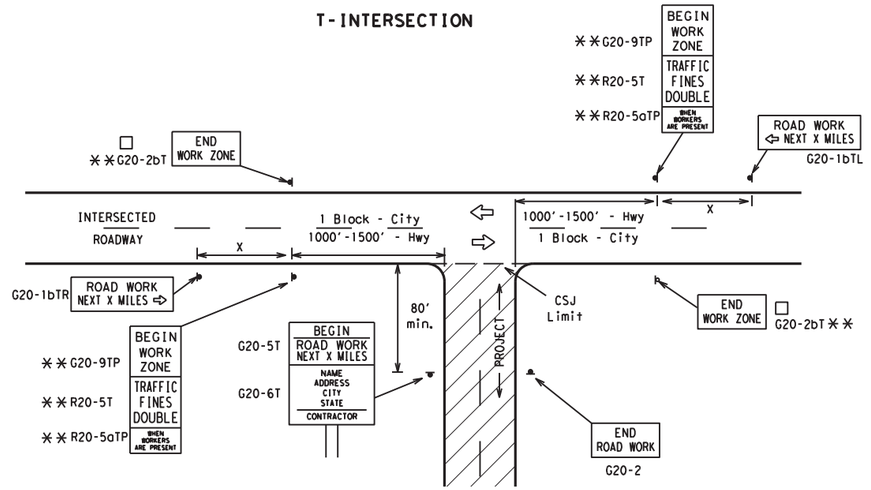
TYPICAL LOCATION OF CROSSROAD SIGNS



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.

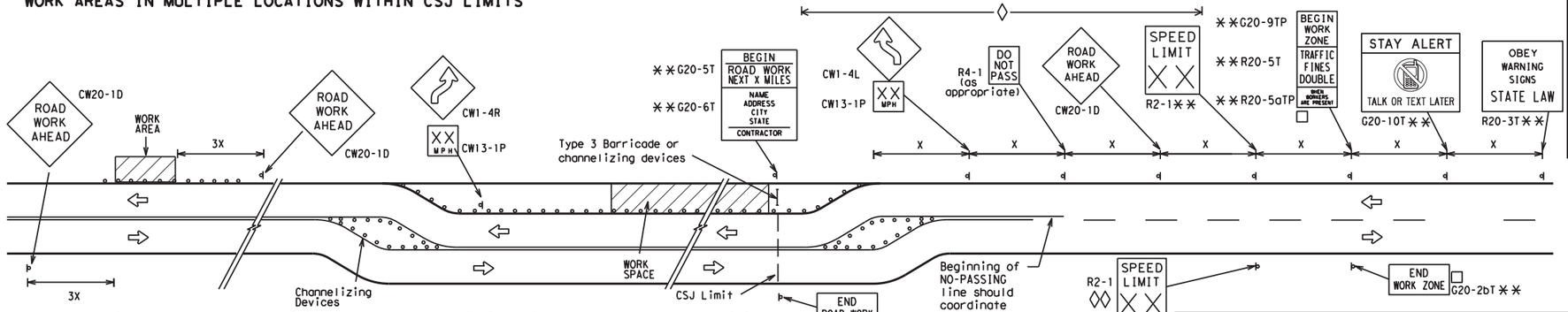
△ Minimum distance from work area to first Advance Warning sign nearest the work area and/or distance between each additional sign.

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.

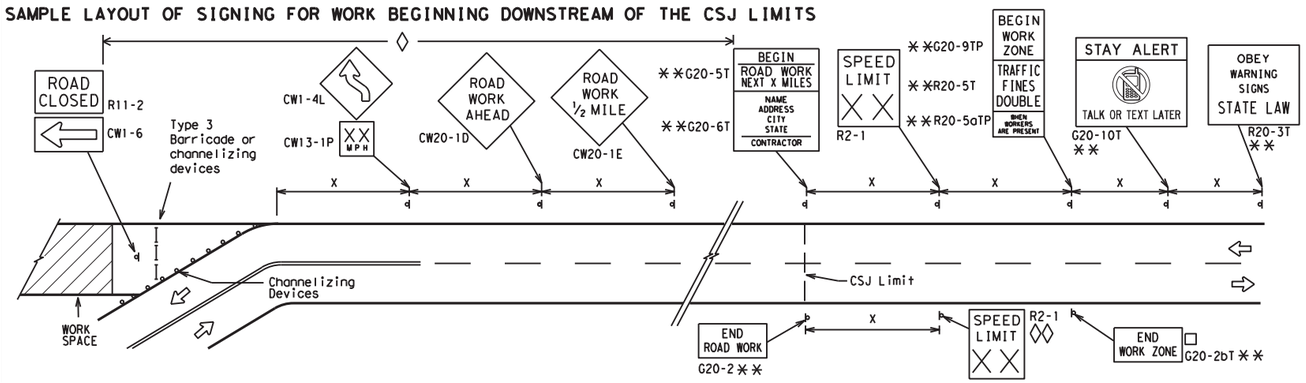
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS



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

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



NOTES

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

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

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

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

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

LEGEND

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

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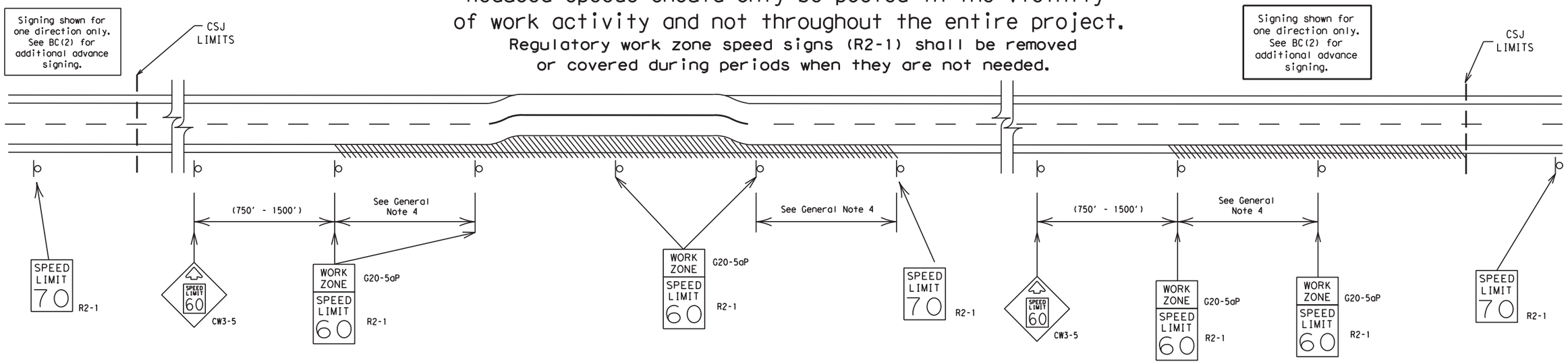
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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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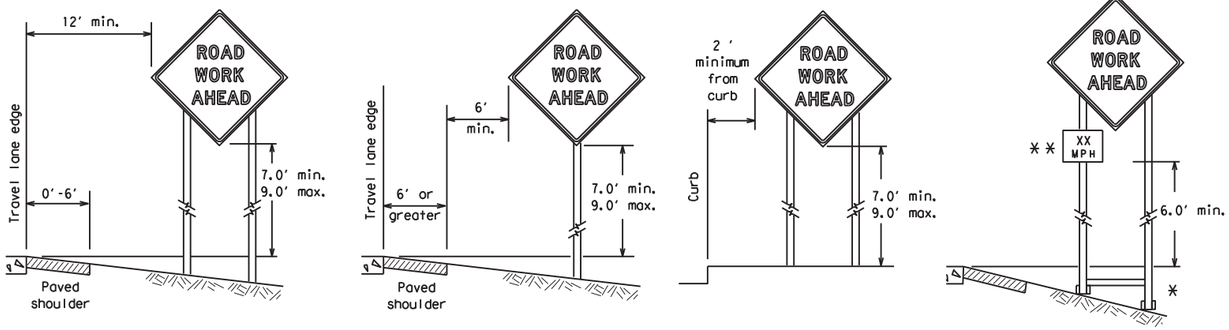
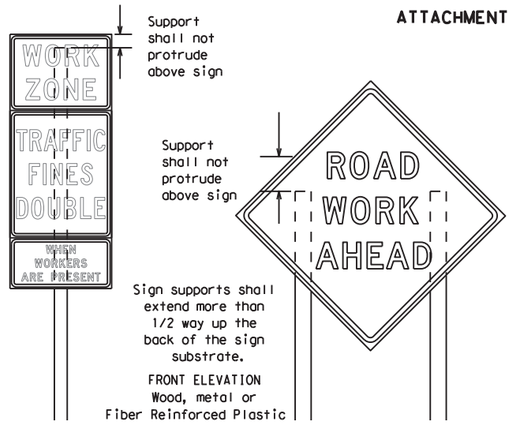
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

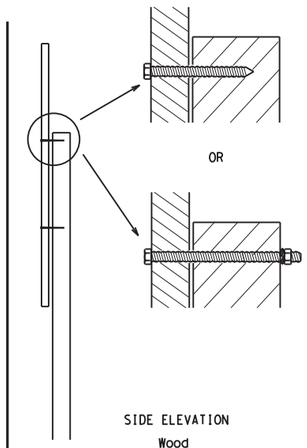


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

* * 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





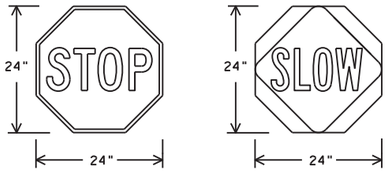
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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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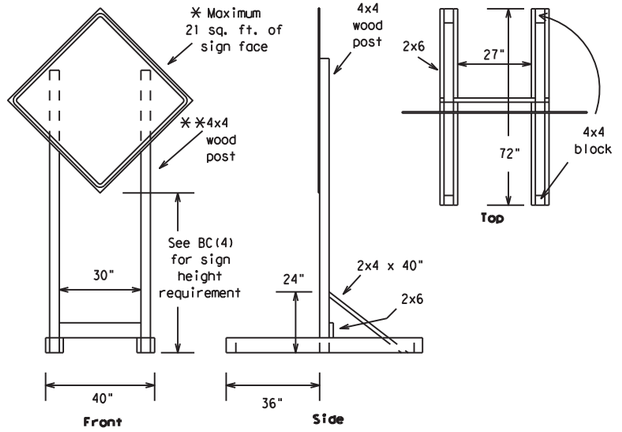
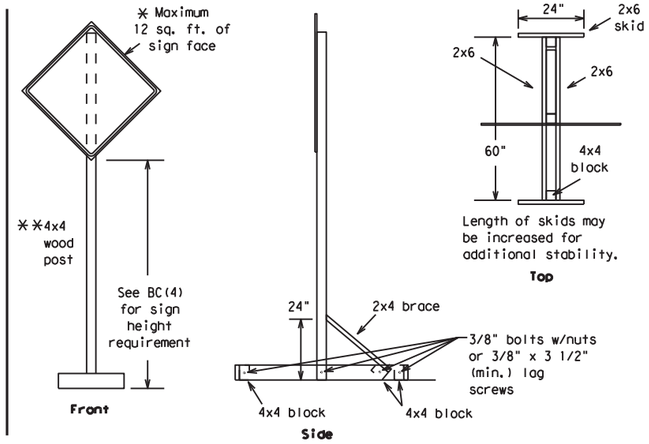
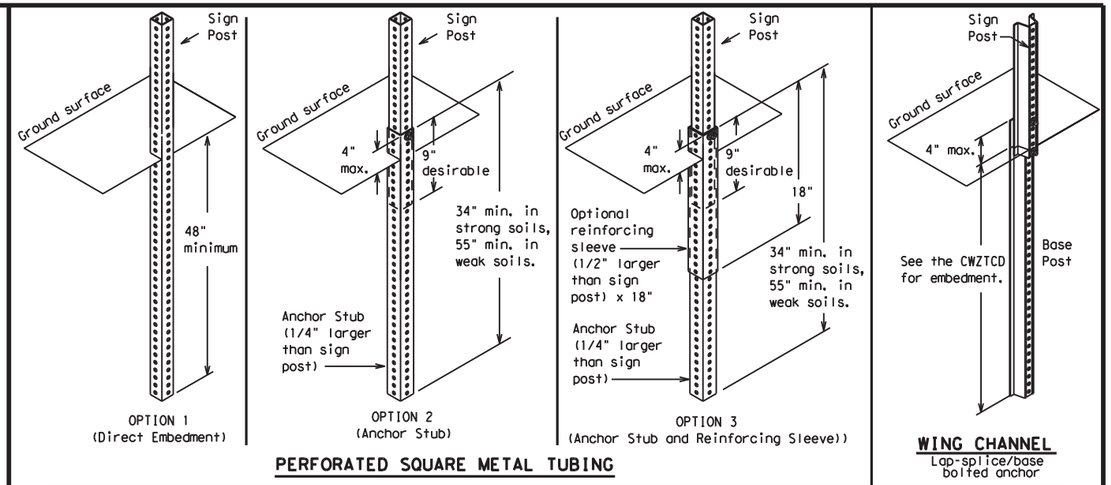




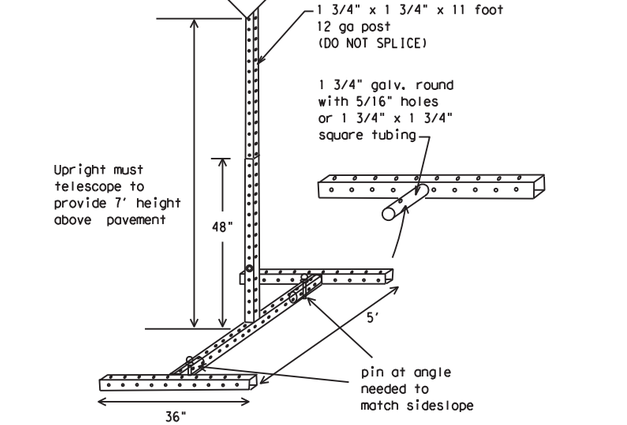
SKID MOUNTED WOOD SIGN SUPPORTS

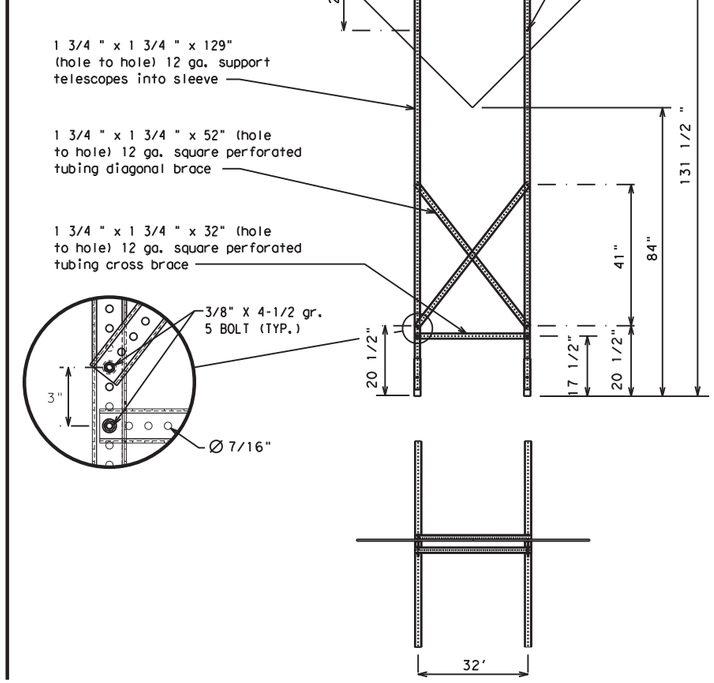
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

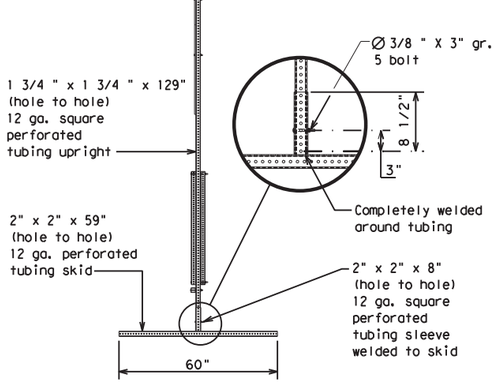


GROUND MOUNTED SIGN SUPPORTS

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.

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

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REVISIONS	6473	31	001	SH 6, ETC.
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	WACO	MCLENNAN, ETC.		10

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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
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

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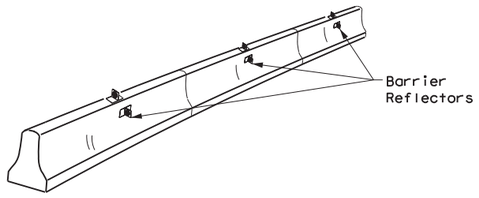
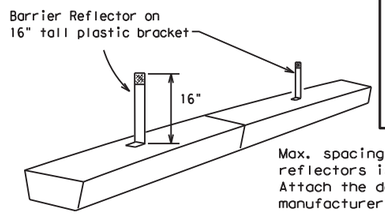
© TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS		6473	31	001	SH 6, ETC.
9-07 8-14		DIST	COUNTY		SHEET NO.
7-13 5-21		WACO	MCLENNAN, ETC.		11

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



CONCRETE TRAFFIC BARRIER (CTB)

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

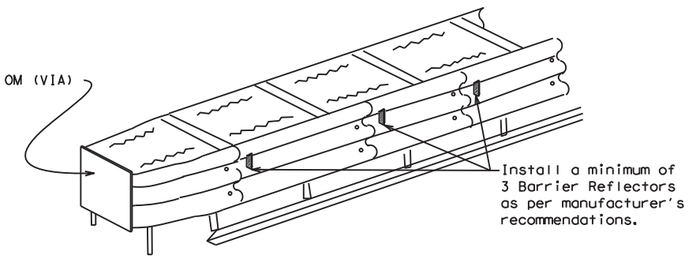


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

LOW PROFILE CONCRETE BARRIER (LPCB)

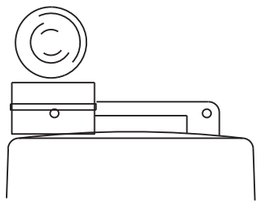


DELINEATION OF END TREATMENTS

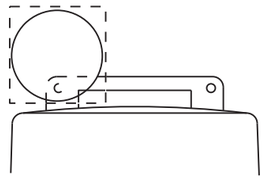
END TREATMENTS FOR CTB'S USED IN WORK ZONES

End treatments used on CTB's in work zones shall meet the 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

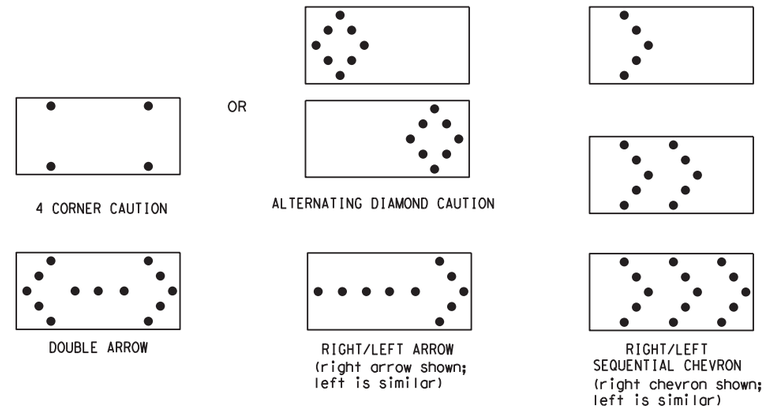
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

Texas Department of Transportation

Traffic Safety Division Standard

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

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	6473	31	001	SH 6, ETC.
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	WACO	MCLENNAN, ETC.		12

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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:

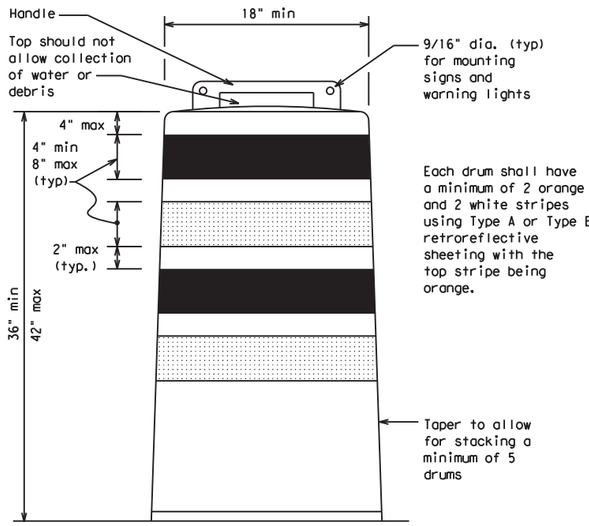
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

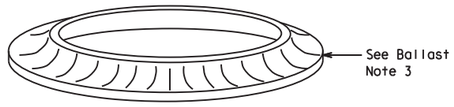
RETROREFLECTIVE SHEETING

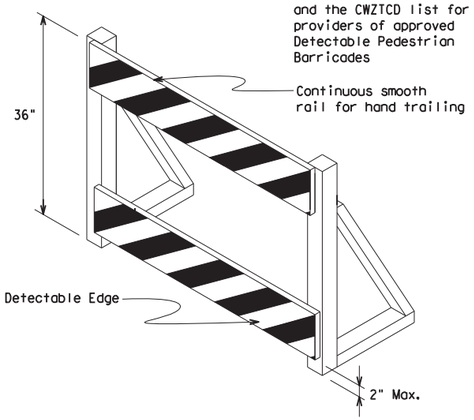
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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



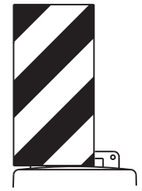




DETECTABLE PEDESTRIAN BARRICADES

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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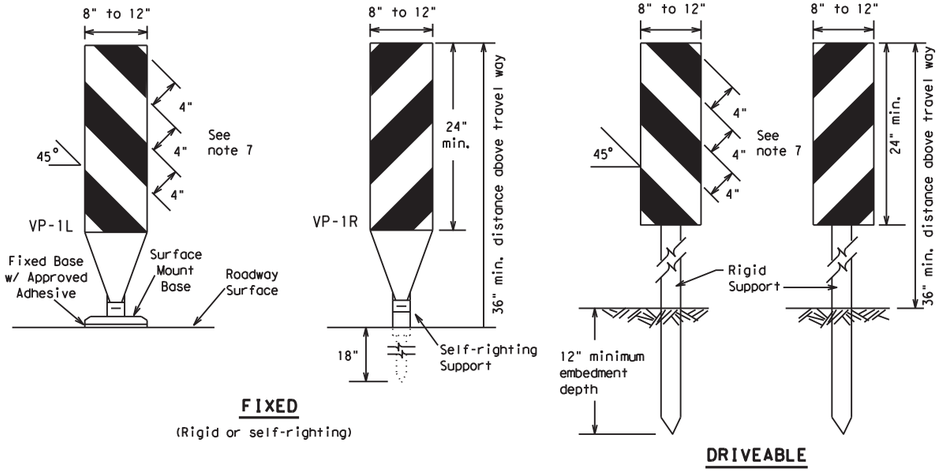
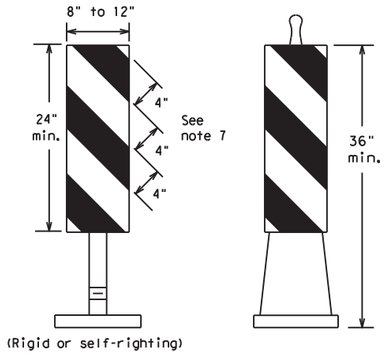


FIXED
(Rigid or self-righting)

DRIVEABLE

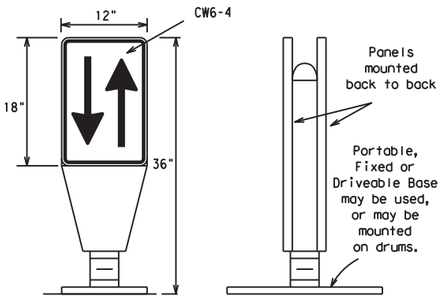


(Rigid or self-righting)

PORTABLE

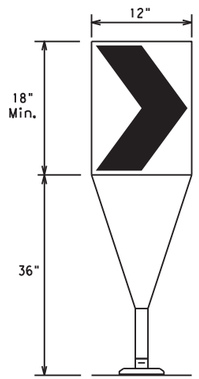
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



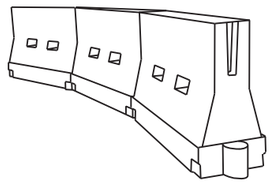
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

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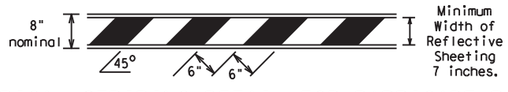
7-13 5-21	WACO	MCLENNAN, ETC.		14

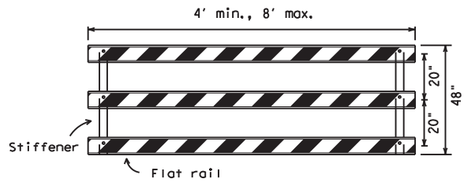
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



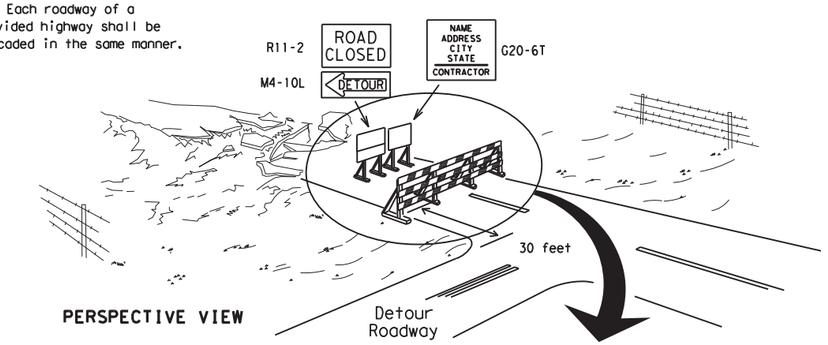
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

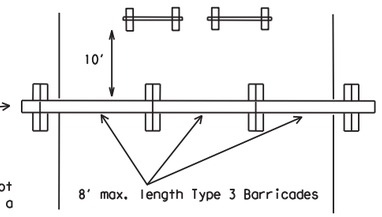
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

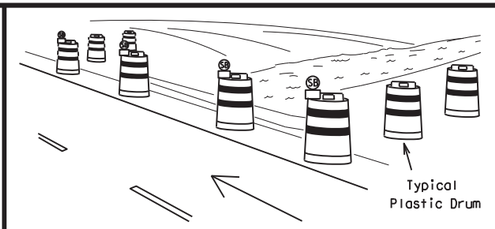
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

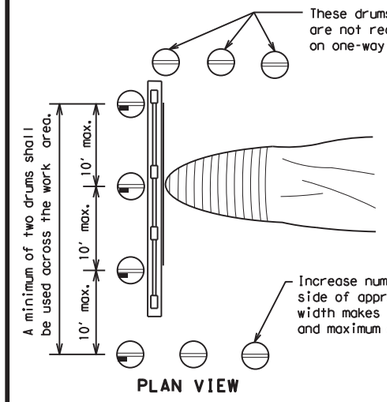
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

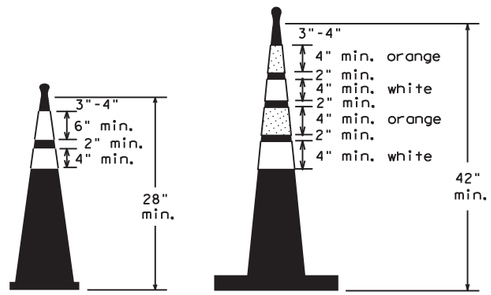
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



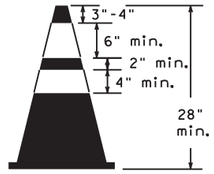
PLAN VIEW

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

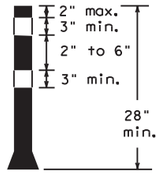
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones



One-Piece cones

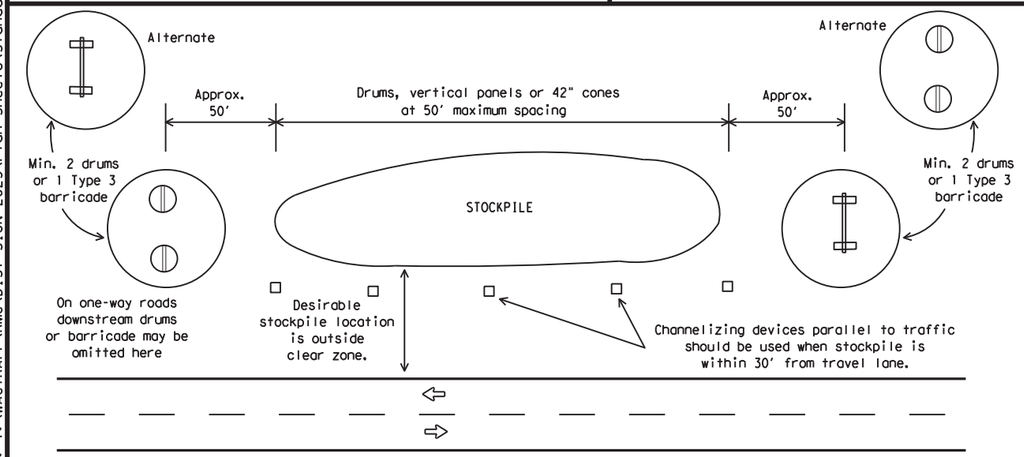


Tubular Marker

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

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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

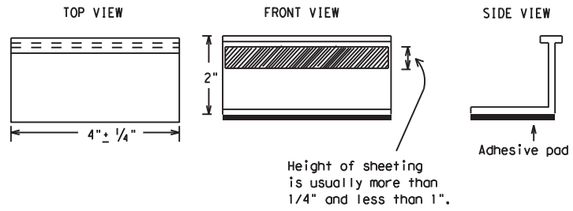
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

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	6473	31	001	SH 6, ETC.
	DIST	COUNTY		SHEET NO.
	WACO	MCLENNAN, ETC.		16

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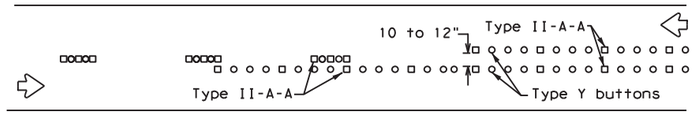
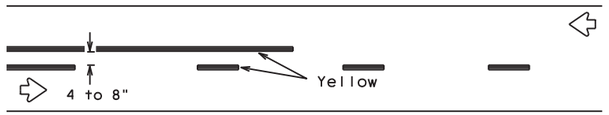
PAVEMENT MARKING PATTERNS

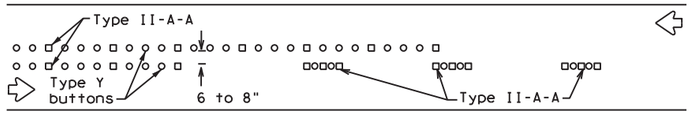
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



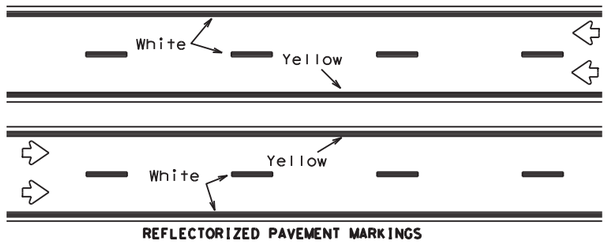
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



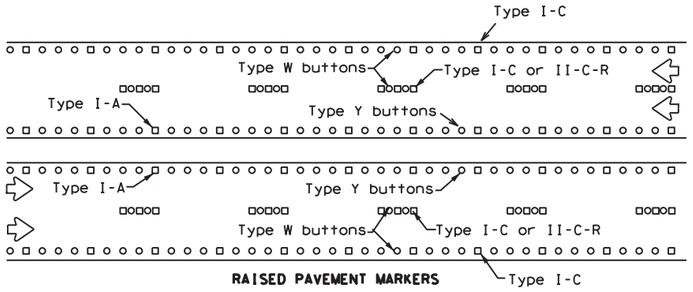
RAISED PAVEMENT MARKERS - PATTERN B

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



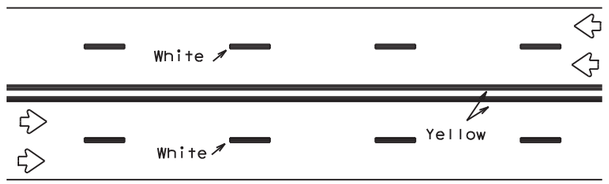
REFLECTORIZED PAVEMENT MARKINGS



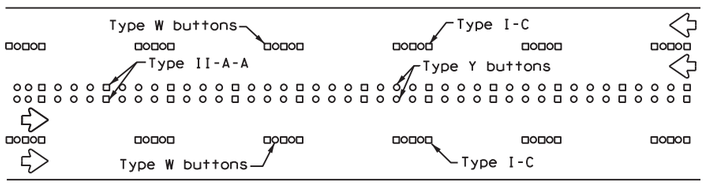
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



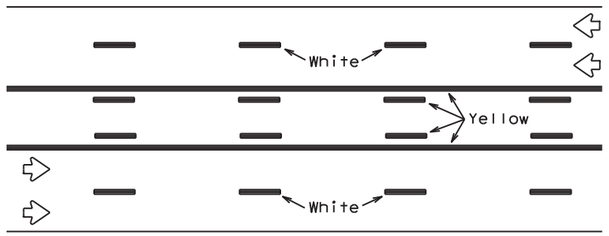
REFLECTORIZED PAVEMENT MARKINGS



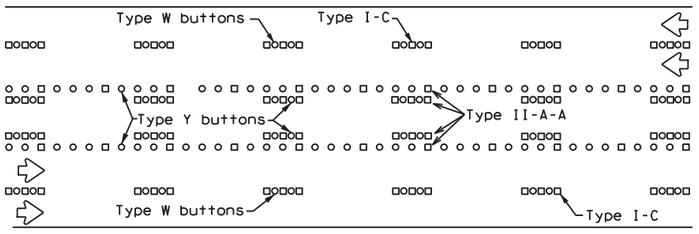
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

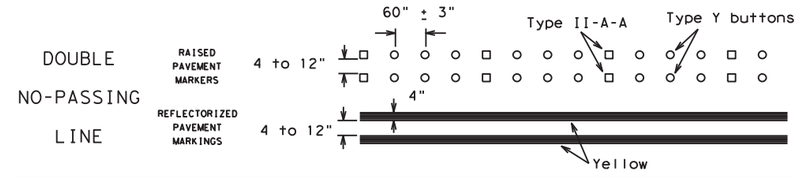
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

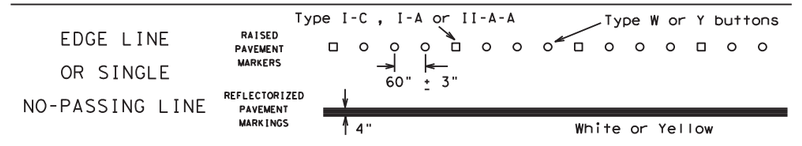
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

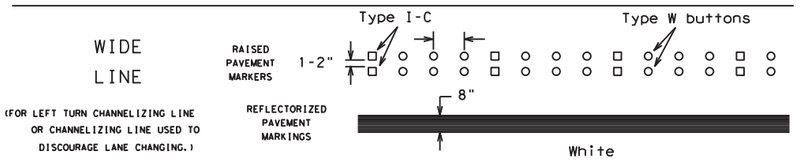


EDGE LINE OR SINGLE NO-PASSING LINE



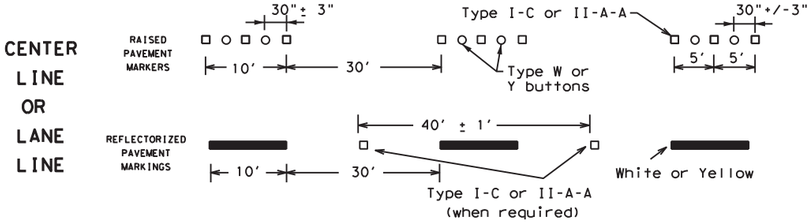
WIDE LINE

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

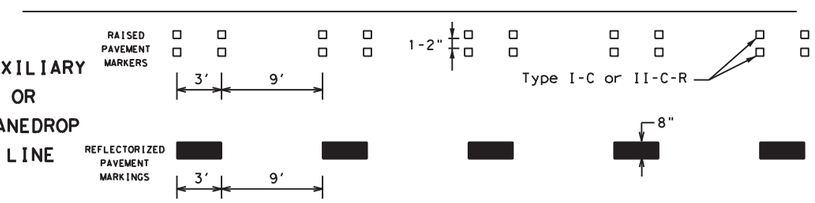


BROKEN LINES

CENTER LINE OR LANE LINE

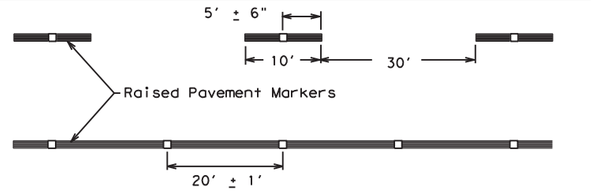


AUXILIARY OR LANEDROP LINE



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

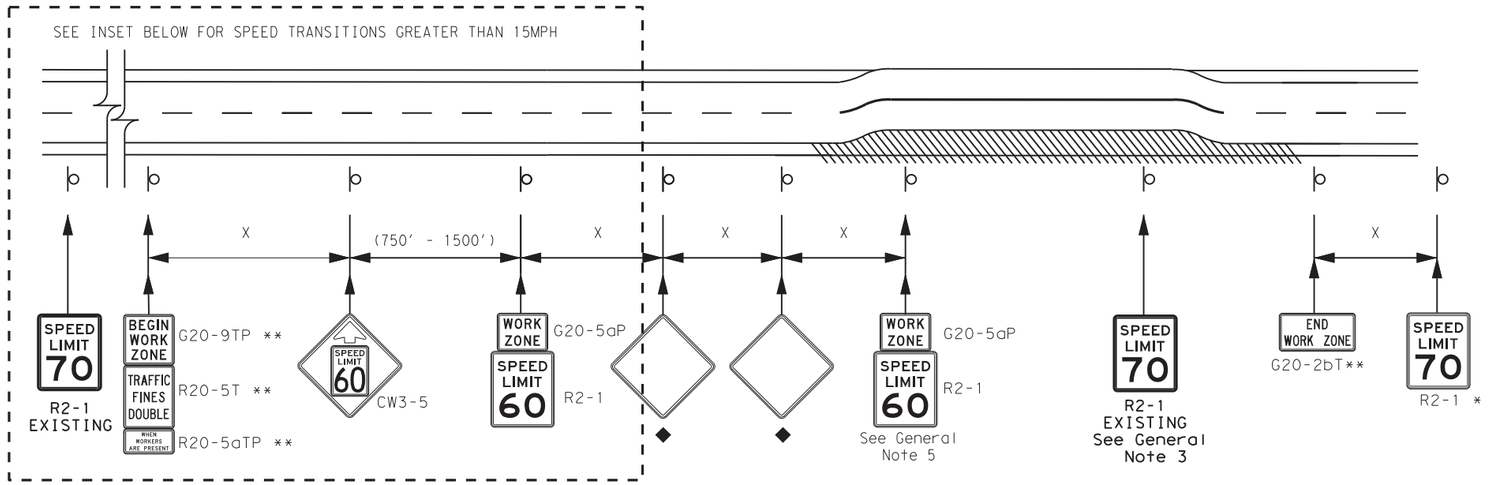
BC(12)-21

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	6473	31	001	SH 6, ETC.
	DIST	COUNTY		SHEET NO.
	WACO	MCLENNAN, ETC.		17

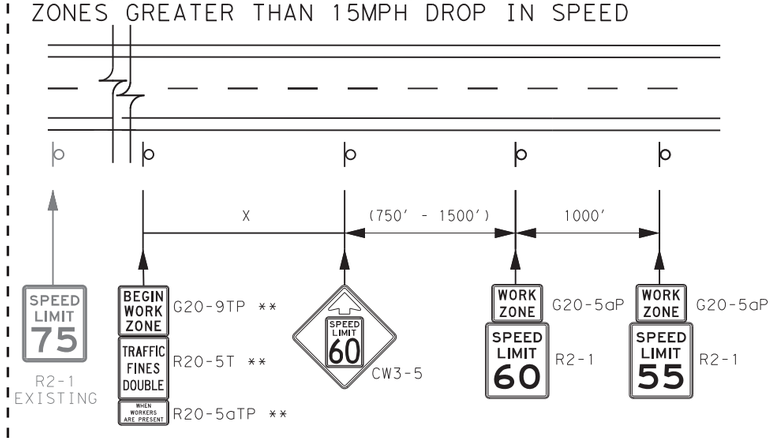
TYPICAL APPLICATION OF MAINTENANCE WORK ZONE SPEED LIMIT SIGNS

Signing shown for one direction only.

Remove all temporary speed limit signs and concealments of permanent speed limit signs when the maintenance activity has been completed and equipment has been removed from the activity site.



ALTERNATE SIGNING FOR TRANSITION OF SPEED ZONES GREATER THAN 15MPH DROP IN SPEED



* At the end of the maintenance work zone place a sign indicating the speed limit after the temporary zone ends.

** Signs should not be installed for mobile operations.

◆ Signs are for illustrative purposes only. Signs and sign spacing requirements may vary depending on the TCP, TMUTCD Typical Application, or project specific details for the project.

GENERAL NOTES

1. Signs may be skid mounted for long term or intermediate term work durations. Roll up signs may be used for short term, short duration or mobile operations.
2. Reduced speeds shall only be posted in the vicinity of work activity and not throughout the entire maintenance work area.
3. Cover all permanent speed limit signs within the work area that conflict with the temporary reduced speed limit. Advisory speed plaques on warning signs within the work area are not required by law to be covered.
4. Speed zone signs are illustrated for one direction of travel and are normally posted for each direction of travel.
5. Frequency of maintenance work zone speed limit signs should be:
   a. 40 mph and greater — 0.2 to 2 miles
   b. 35 mph and less — 0.2 to 1 mile
6. Regulatory speed limit signs shall have black legend and border on a white reflective background (See "Reflective Sheeting" on BC(4)).
7. Turning signs from view or laying signs over or down will not be allowed, unless as otherwise noted under "REMOVING OR COVERING" on BC(4).
8. Speeds shown on details above are for illustration only. Maintenance work zone speed limits shall only be posted as approved for each highway maintenance activity work zone.
9. For more specific guidance concerning the type of work, work zone conditions and factors impacting allowable regulatory maintenance speed zone reduction see TxDOT form #1204M available from TRF.

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)

DURATION OF WORK

1. As defined by the "Texas Manual on Uniform Traffic Control Devices" Part 6.
2. 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 lastingmore 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-term 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.

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 mtal tubing may be turned away from traffic 90 degrees when the sign message in 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 headlight 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.

SIGN DETAILS

Sign Number	Conventional Road	Expressway/ Freeway
G20-2bT	36"x18"	48"x24"
G20-5aP	24"x18"	36"x24"
G20-9TP	24"x24"	36"x30"
R20-5T	24"x30"	36"x36"
R20-5aTP	24"x12"	36"x18"
CW3-5	36"x36"	48"x48"
R2-1	24"x30"	36"x48"

Texas Department of Transportation

Traffic Safety Division Standard

MAINTENANCE WORK ZONE SPEED LIMIT SIGNS

FILE: mntwzsl.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	6473	31	001	SH 6, ETC.
	DIST	COUNTY		SHEET NO.
	WACO	MCLENNAN, ETC.		18

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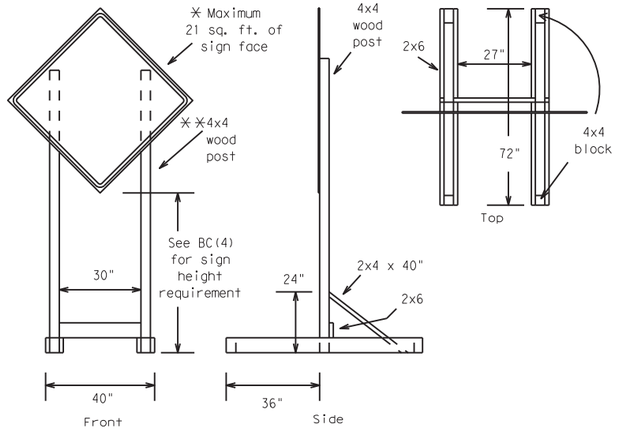
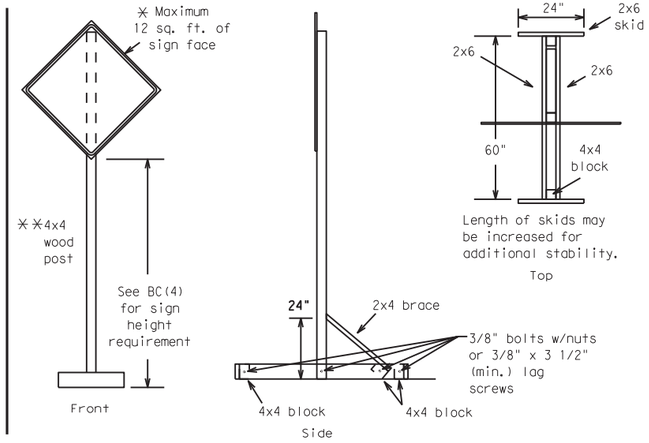
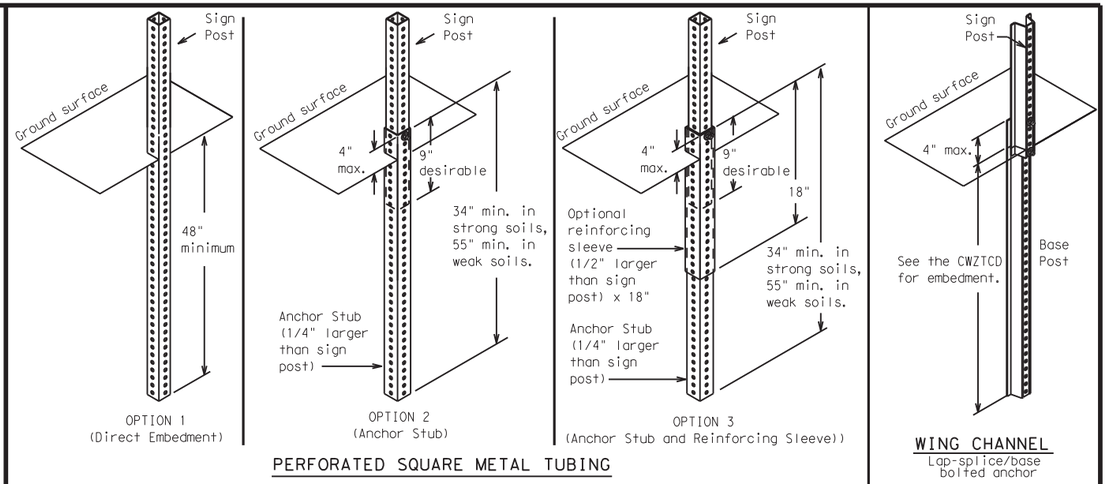




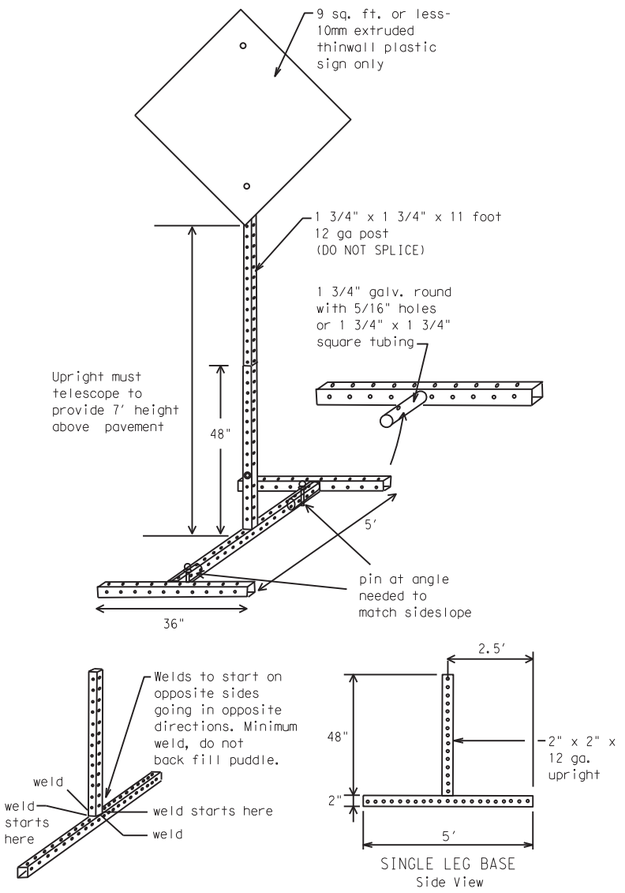
SKID MOUNTED WOOD SIGN SUPPORTS

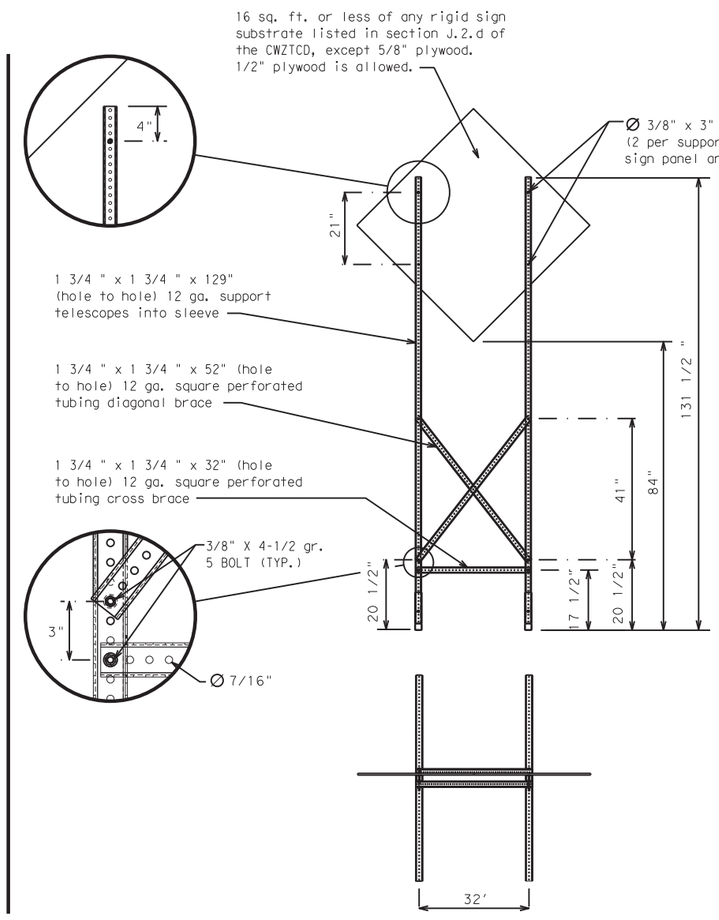
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

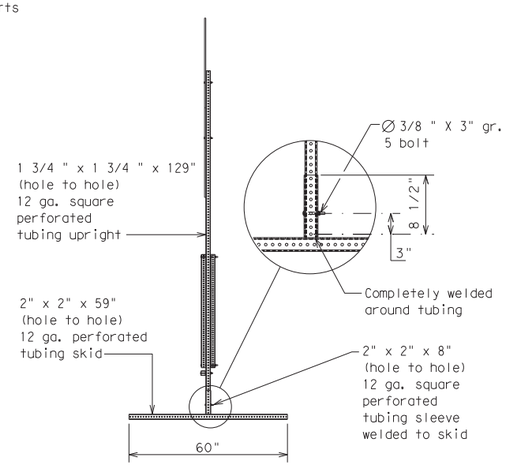


GROUND MOUNTED SIGN SUPPORTS

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 sheet 1 for definition of "Work Duration."

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

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

Texas Department of Transportation

Traffic Safety Division Standard

MAINTENANCE WORK ZONE SPEED LIMIT SIGNS

FILE: mntwzsl.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	6473	31	001	SH 6, ETC.
	DIST	COUNTY		SHEET NO.
	WACO	MCLENNAN, ETC.		19

DATE: 9/16/2024 11:39:28 AM
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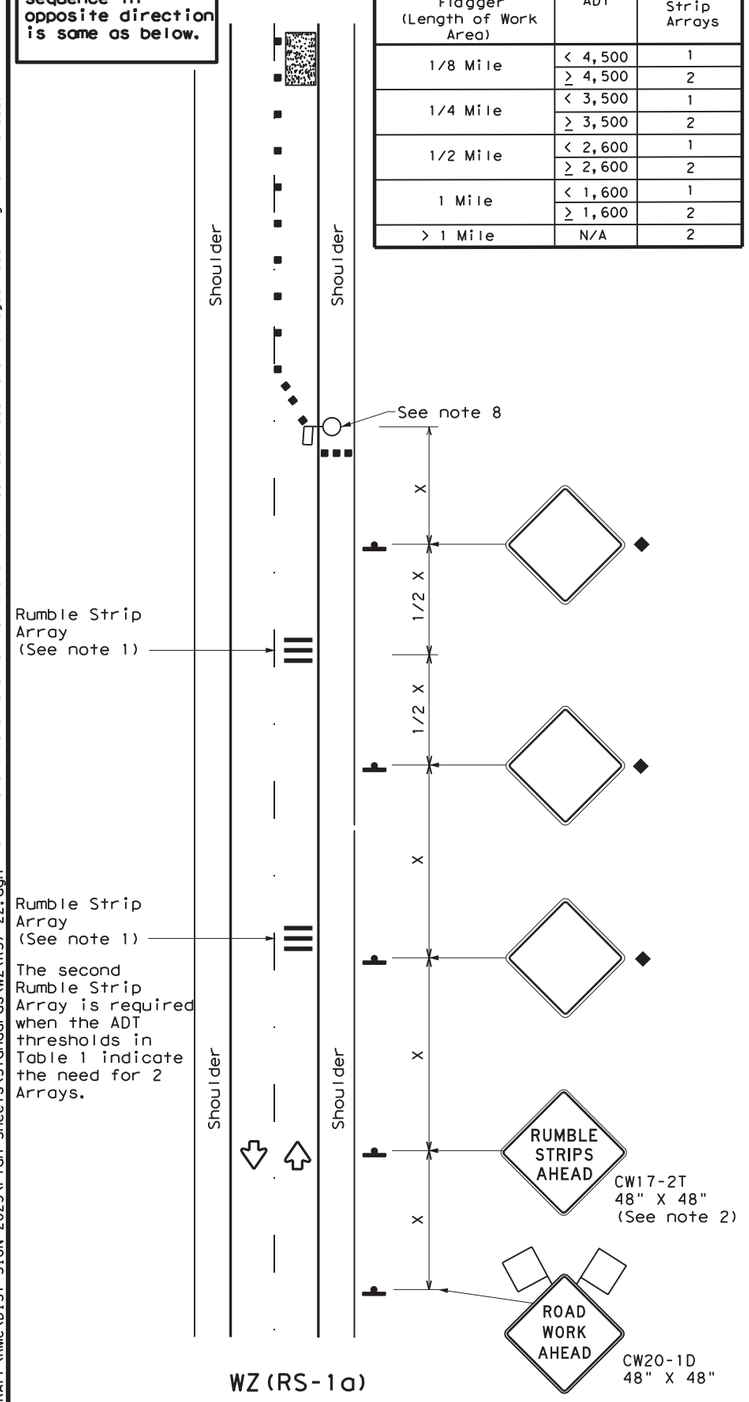
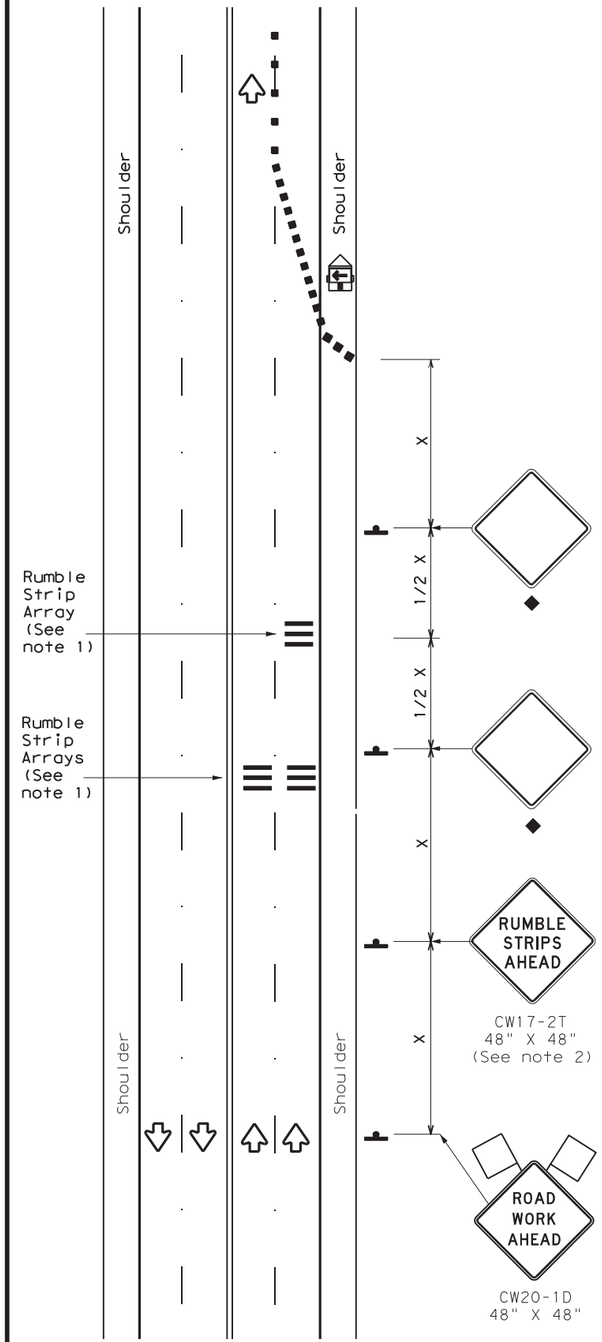
Warning sign and rumble strip sequence in opposite direction is same as below.

TABLE 1		
Flagger to Flagger (Length of Work Area)	ADT	# of Rumble Strip Arrays
1/8 Mile	< 4,500	1
	≥ 4,500	2
1/4 Mile	< 3,500	1
	≥ 3,500	2
1/2 Mile	< 2,600	1
	≥ 2,600	2
1 Mile	< 1,600	1
	≥ 1,600	2
> 1 Mile	N/A	2



WZ(RS-1a)

RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION



WZ(RS-1b)

RUMBLE STRIPS FOR LANE CLOSURE ON CONVENTIONAL ROADWAY

GENERAL NOTES

1. Each Rumble Strip Array should consist of three rumble strips spaced center to center at the spacing shown in Table 2, placed transverse across the lane at locations shown.
2. The CW17-2T "RUMBLE STRIPS AHEAD" sign should be located after the CW20-1D "ROAD WORK AHEAD sign and spaced as shown. If traffic is observed to be queuing, or is expected to queue beyond the Rumble Strips, the CW17-2T sign and the first Rumble Strip Array may be located upstream of the CW20-1D sign as necessary to provide needed warning.
3. Temporary Rumble Strips will be considered subsidiary to Item 502, and shall be a product listed on the Compliant Work Zone Traffic Control Devices.
4. Remove Temporary Rumble Strips before removing the advanced warning signs.
5. Temporary Rumble Strips should not be used on horizontal curves, loose gravel, soft or bleeding asphalt, heavily rutted pavements or unpaved surfaces.
6. Temporary Rumble Strips shall be installed and maintained as per manufacturer's recommendations.
7. This standard sheet shall be used in conjunction with other appropriate TCP standard, TMUTCD typical application or project specific detail for the project.
8. The one-lane two-way application may utilize a flagger, an Automated Flagger Assistance Device (AFAD) or a Portable Traffic Signal (PTS).
9. Replace defective Temporary Rumble Strips as directed by the Engineer.
10. Temporary Rumble Strips may be used on freeways or expressways based on engineering judgment and written direction from the Engineer.

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

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

* Conventional Roads Only

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

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

◆ Signs are for illustrative purposes only. Signs required may vary depending on the TCP, TMUTCD Typical Application, or project specific details for the project.

* For posted speeds in excess of 65 MPH, it is recommended that spacing is increased as speed limits increase. Increasing space between rumble strips will improve effectiveness.

TABLE 2	
Speed	Approximate distance between strips in an array
≤ 40 MPH	10'
> 40 MPH & ≤ 55 MPH	15'
= 60 MPH	20'
≥ 65 MPH	* 35' +

Texas Department of Transportation

Traffic Safety Division Standard

TEMPORARY RUMBLE STRIPS

WZ(RS)-22

FILE: wzrs22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-14 1-22 4-16	6473	31	001	SH 6, ETC.
	DIST	COUNTY		SHEET NO.
	WACO	MCLENNAN, ETC.		20

117

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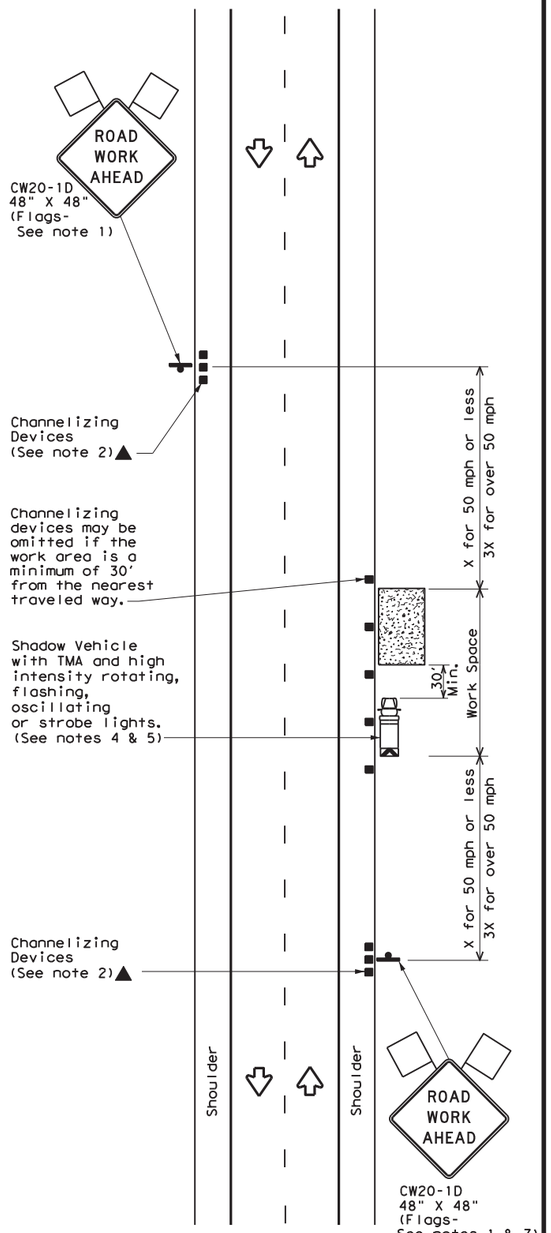
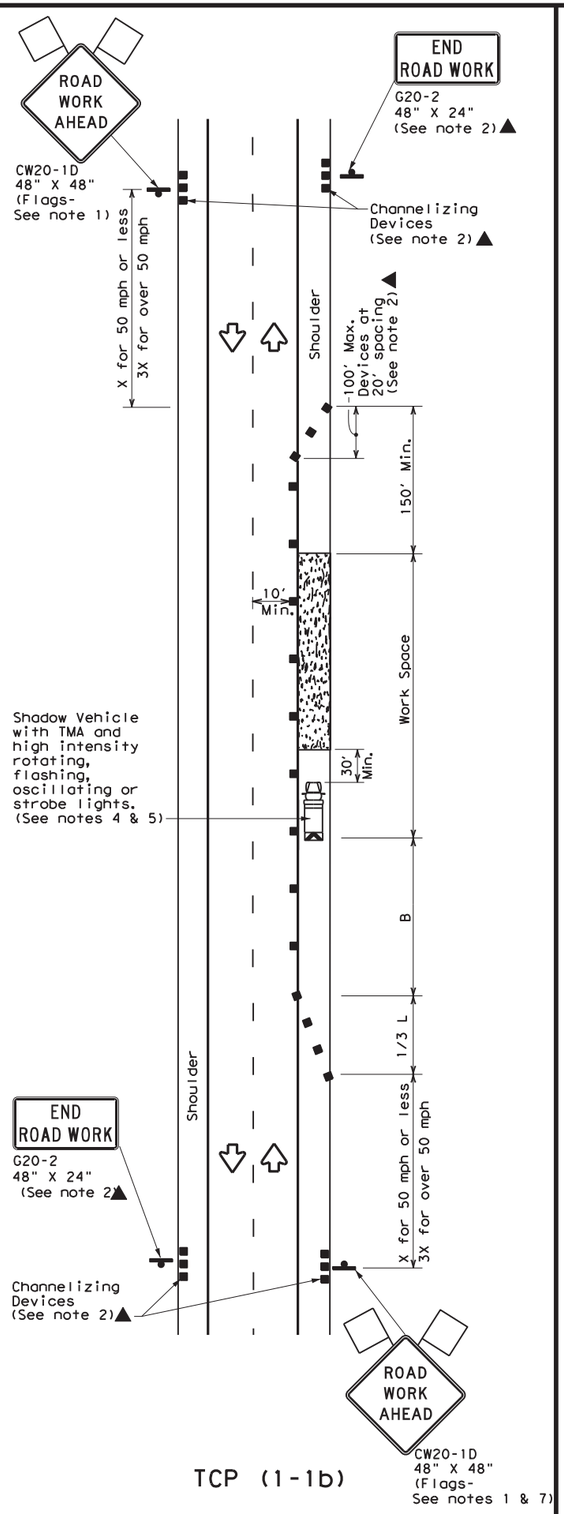


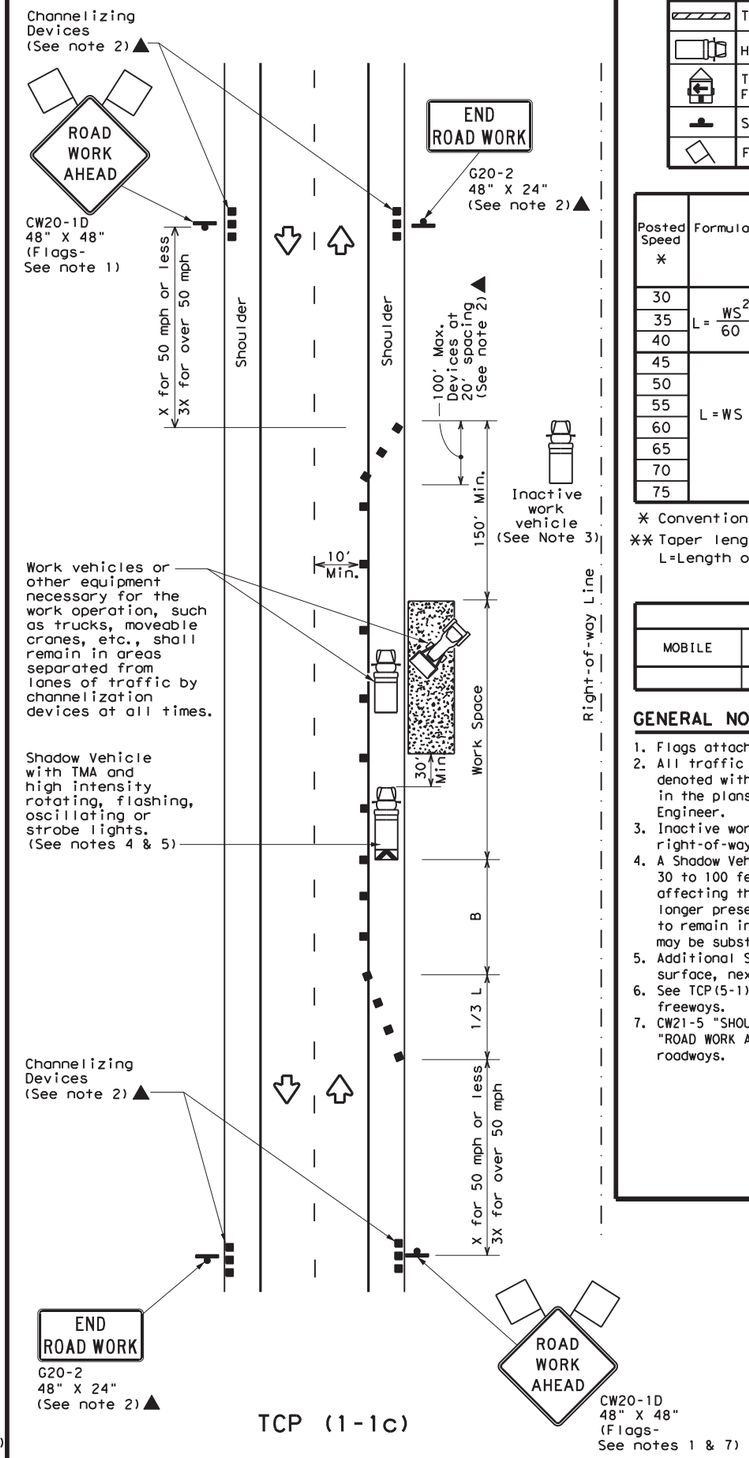
TCP (1-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (1-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (1-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(1-1)-18

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© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 2-12 1-97 2-18	6473	31	001	SH 6, ETC.
	DIST	COUNTY		SHEET NO.
	WACO	MCLENNAN, ETC.		21

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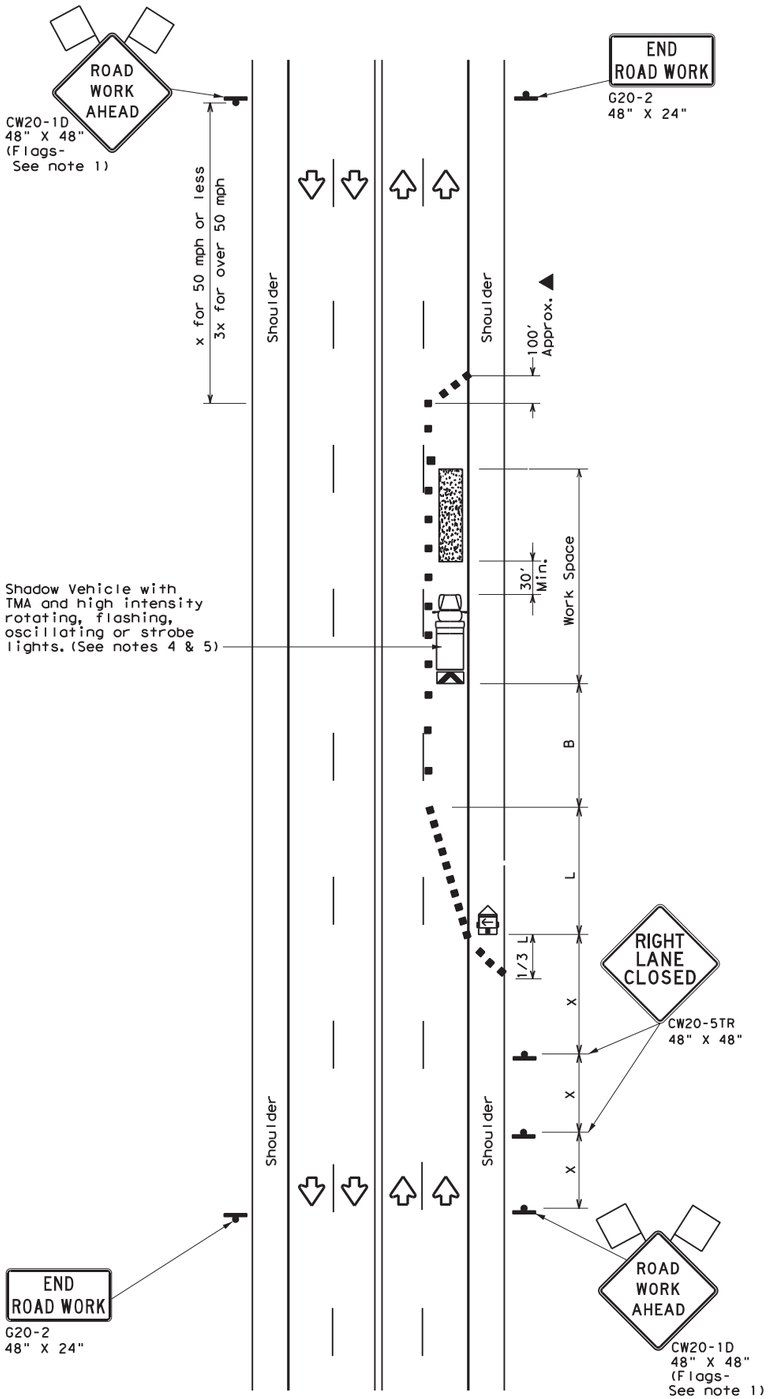
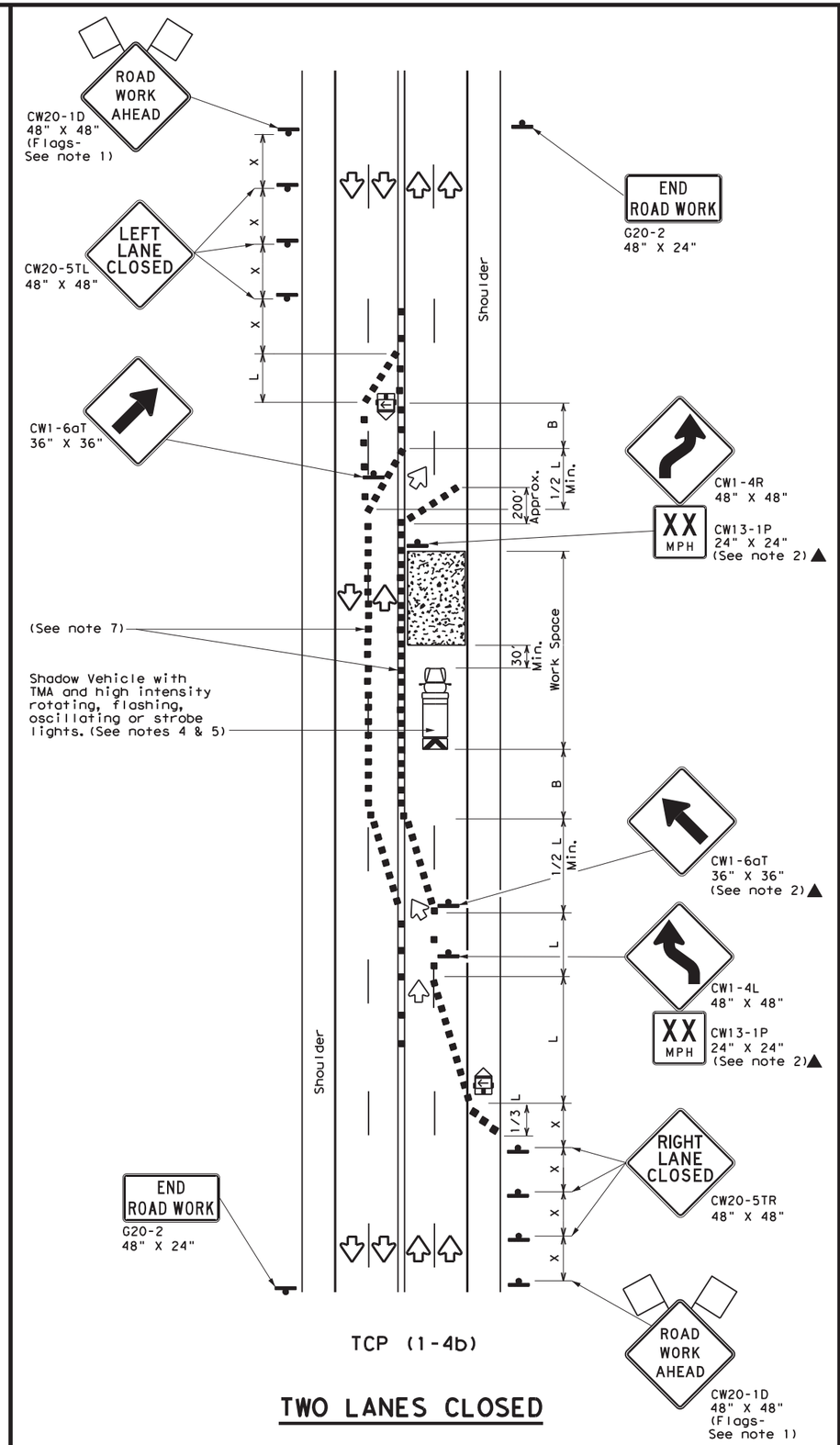


TCP (1-4a)

ONE LANE CLOSED



TCP (1-4b)

TWO LANES CLOSED

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

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

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

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

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The CW20-1D "ROAD WORK AHEAD" sign may be repeated if the visibility of the work zone is less than 1500 feet.
4. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
5. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.

TCP (1-4a)

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

TCP (1-4b)

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

Texas Department of Transportation — Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

TCP(1-4)-18

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© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	WACO	MCLENNAN, ETC.		22

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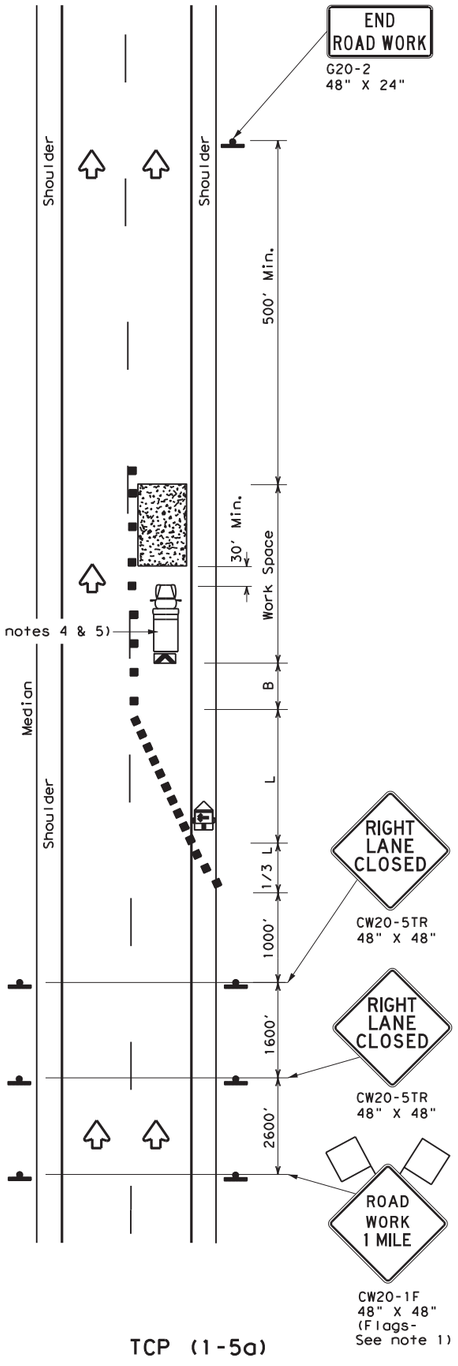
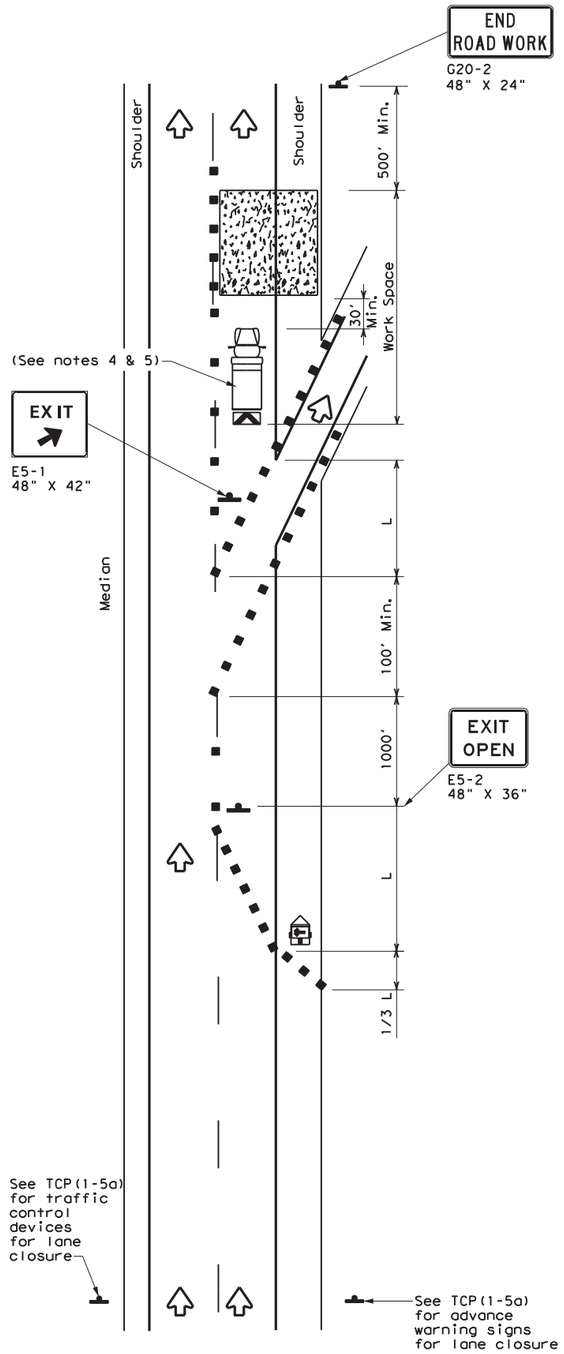


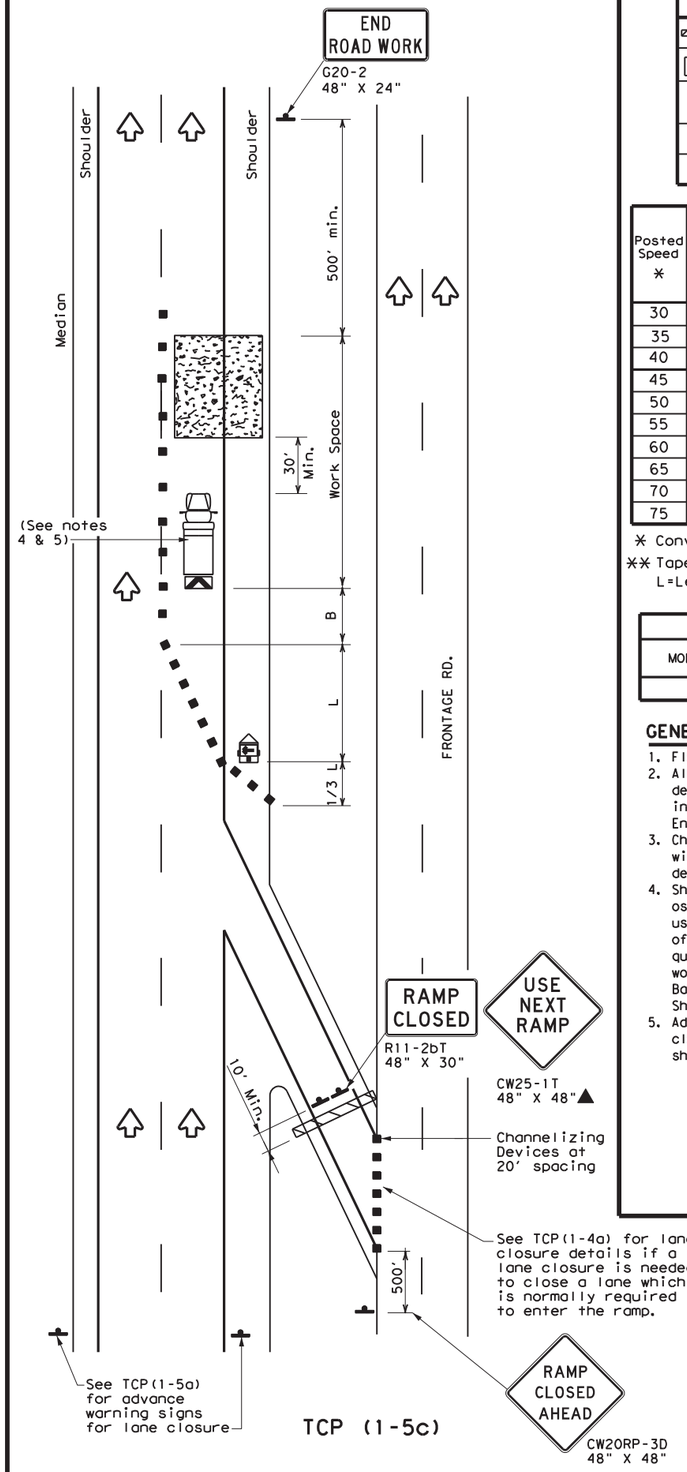
TCP (1-5a)

ONE LANE CLOSURE



TCP (1-5b)

LANE CLOSURE NEAR EXIT RAMPS



TCP (1-5c)

LANE CLOSURE NEAR ENTRANCE RAMPS

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES FOR DIVIDED HIGHWAYS

TCP(1-5)-18

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©TxDOT February 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-18	6473	31	001	SH 6, ETC.
	DIST	COUNTY		SHEET NO.
	WACO	MCLENNAN, ETC.		23

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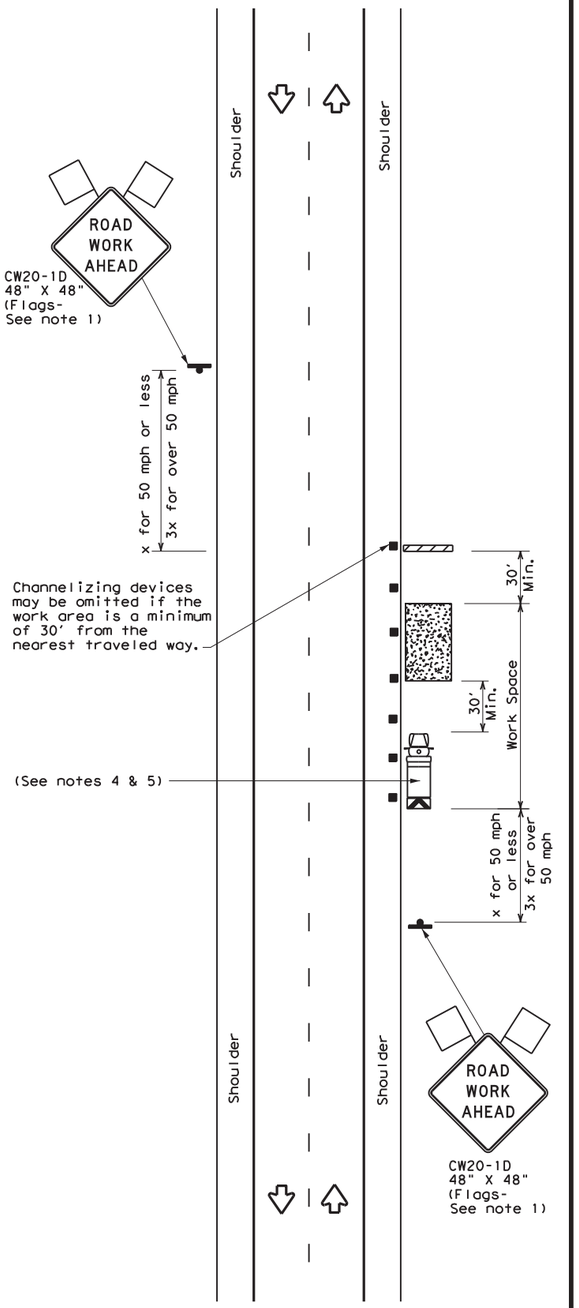
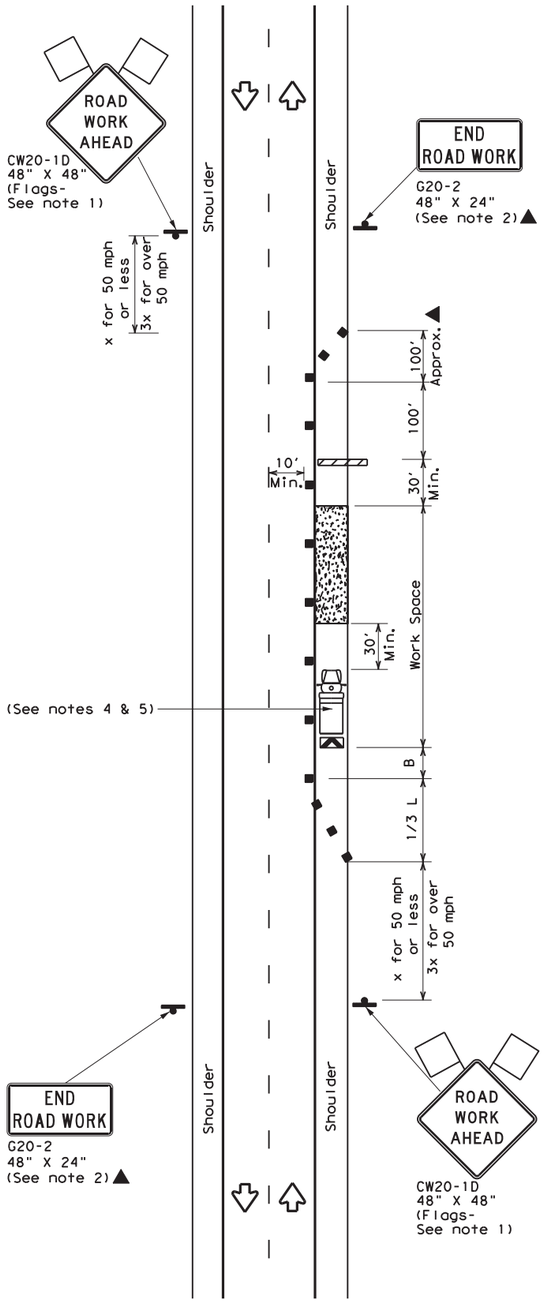


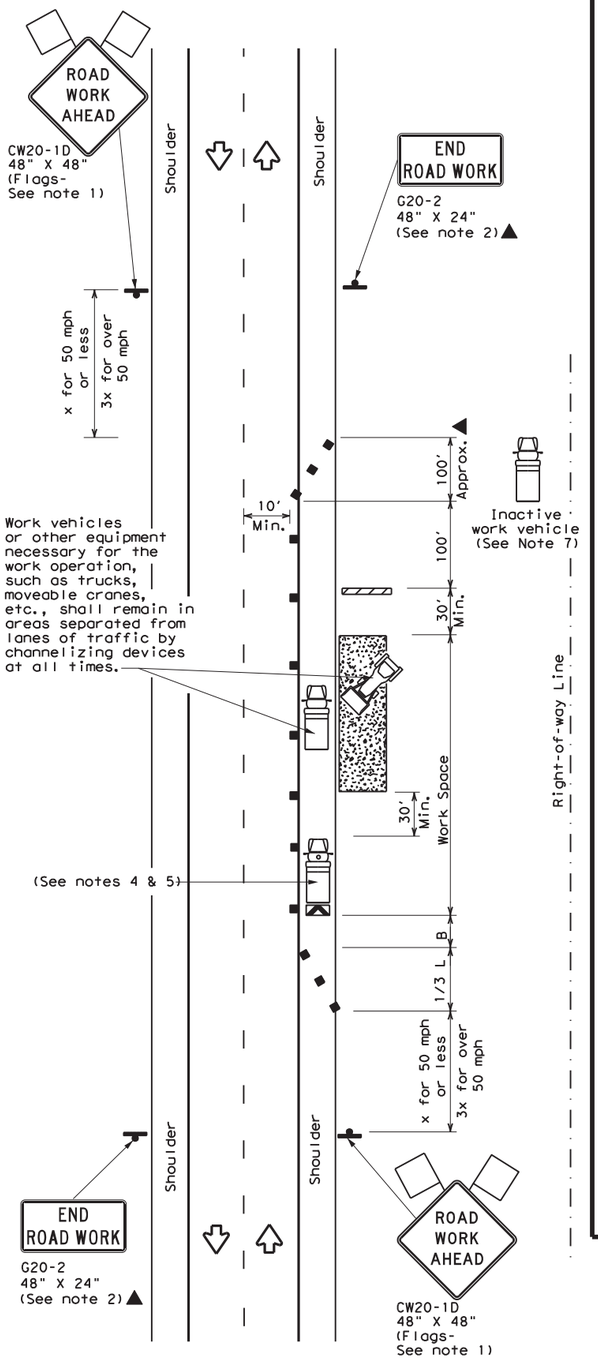
TCP (2-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(2-1)-18

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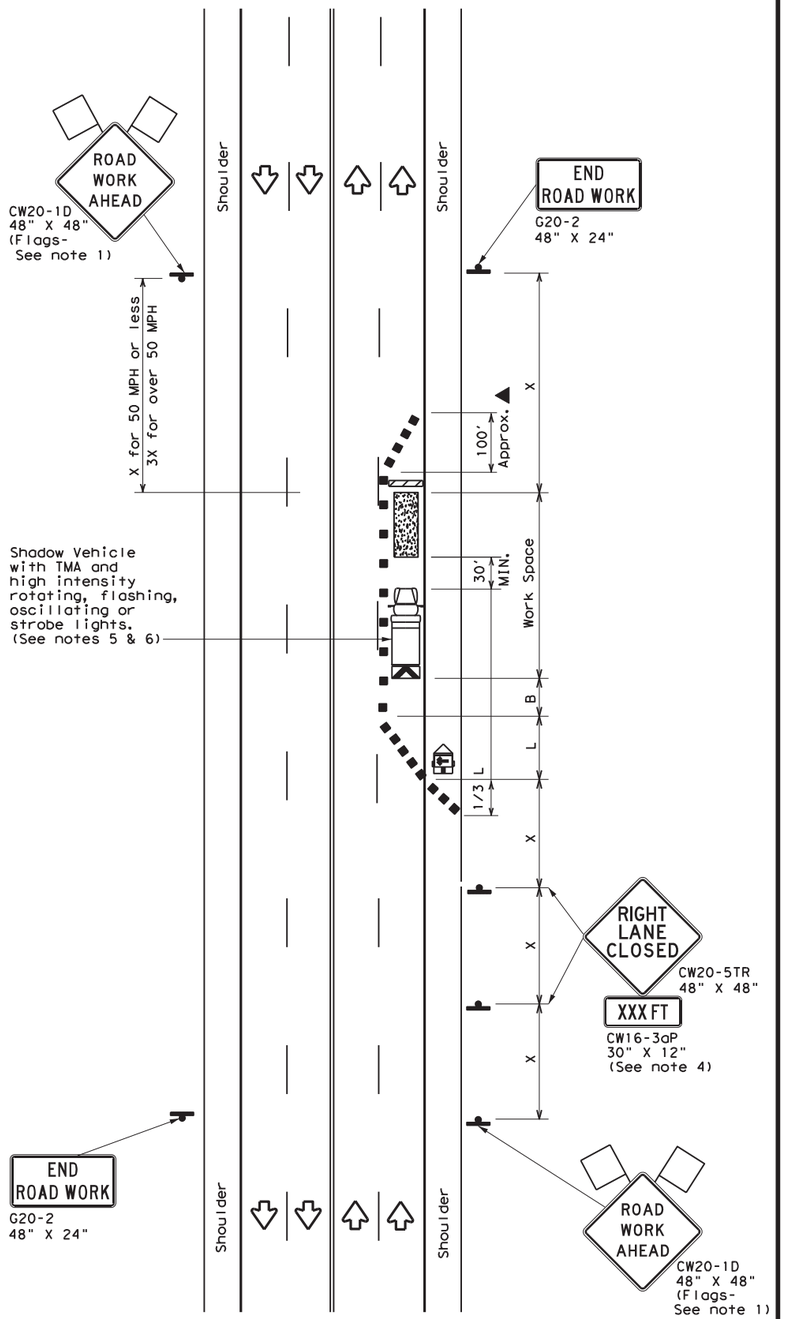
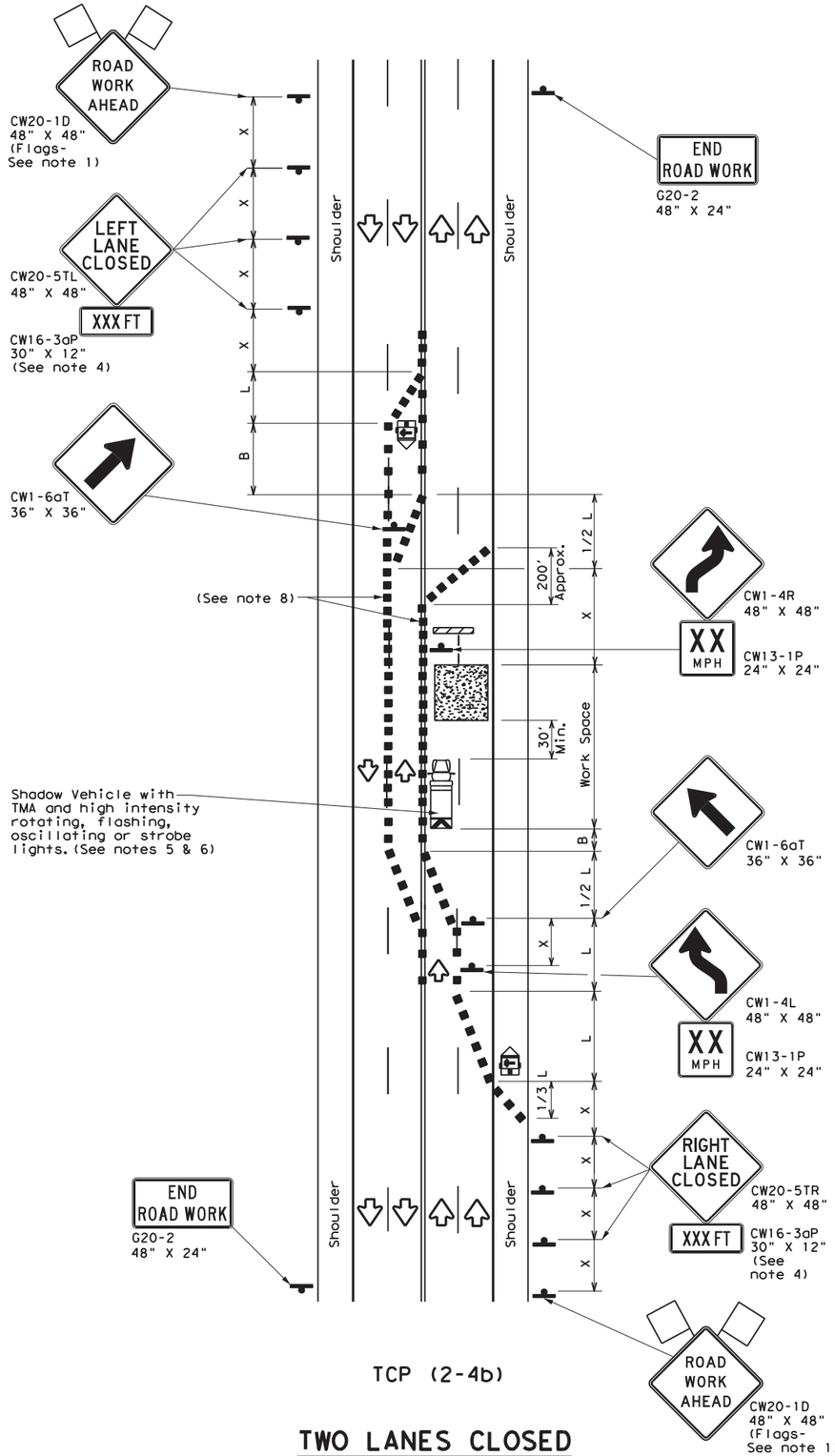
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	6473	31	001	SH 6, ETC.
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	WACO	MCLENNAN, ETC.		24
1-97 2-18				



TCP (2-4a)

ONE LANE CLOSED



TCP (2-4b)

TWO LANES CLOSED

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

TCP (2-4a)

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

TCP (2-4b)

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

Texas Department of Transportation — Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

TCP(2-4)-18

FILE: tcp2-4-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	6473	31	001	SH 6, ETC.
1-97 2-12	DIST	COUNTY		SHEET NO.
4-98 2-18	WACO	MCLENNAN, ETC.		25

DATE: 9/16/2024 11:39:31 AM
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DATE: 9/16/2024 11:39:32 AM
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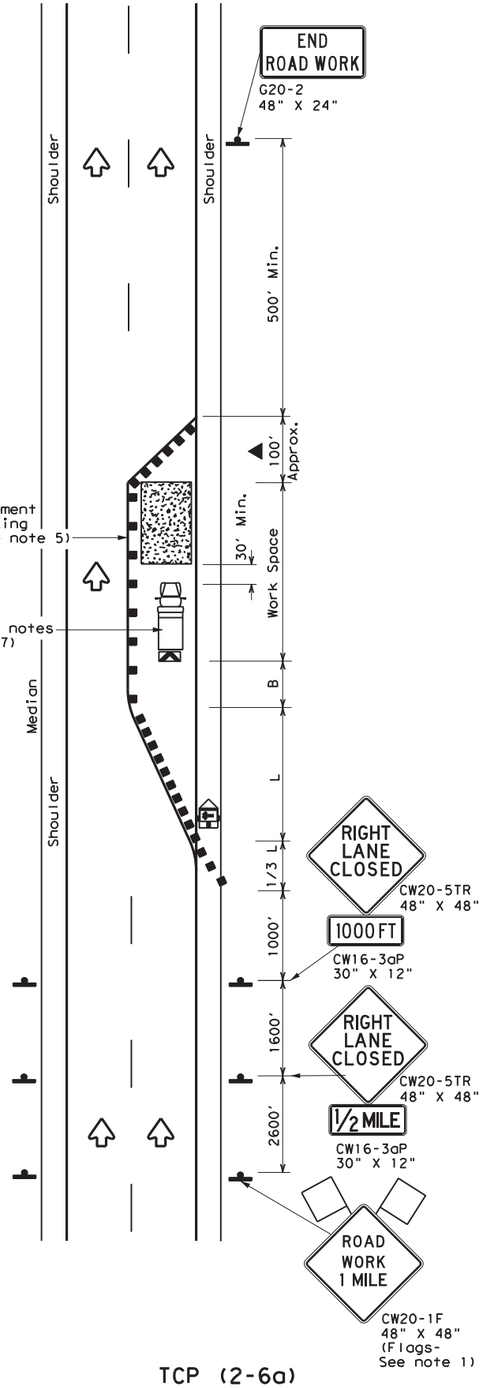
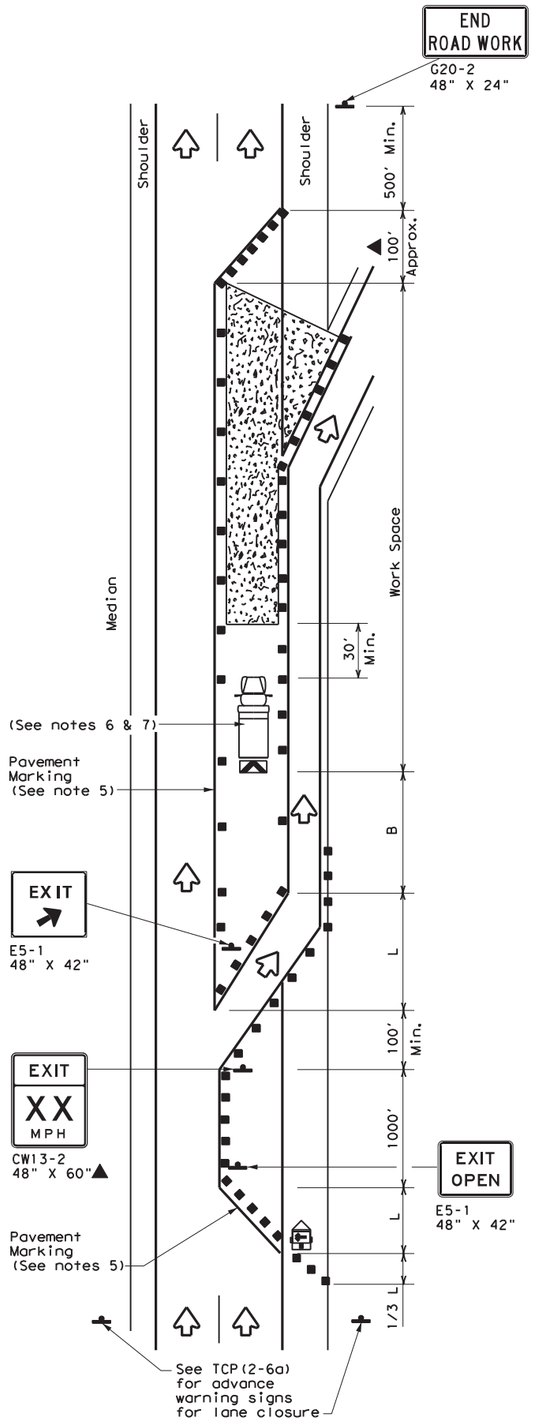


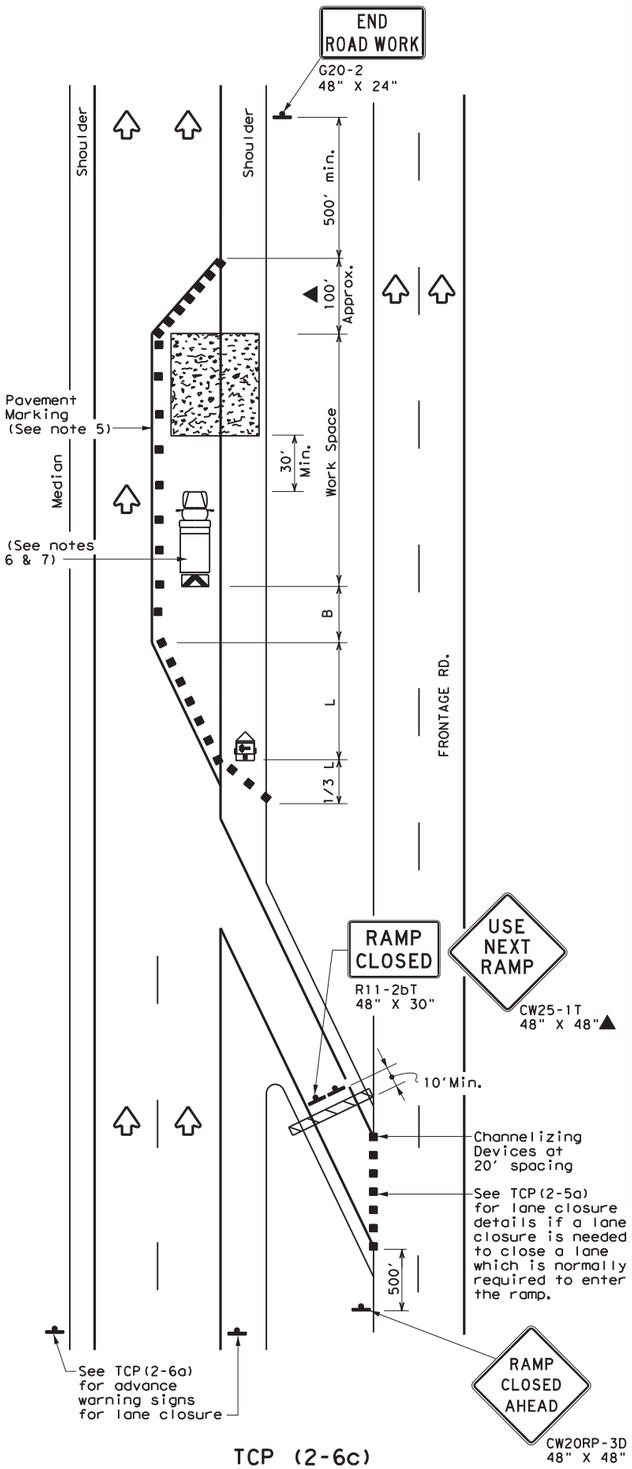
TCP (2-6a)

ONE LANE CLOSURE



TCP (2-6b)

LANE CLOSURE NEAR EXIT RAMPS



TCP (2-6c)

LANE CLOSURE NEAR ENTRANCE RAMPS

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

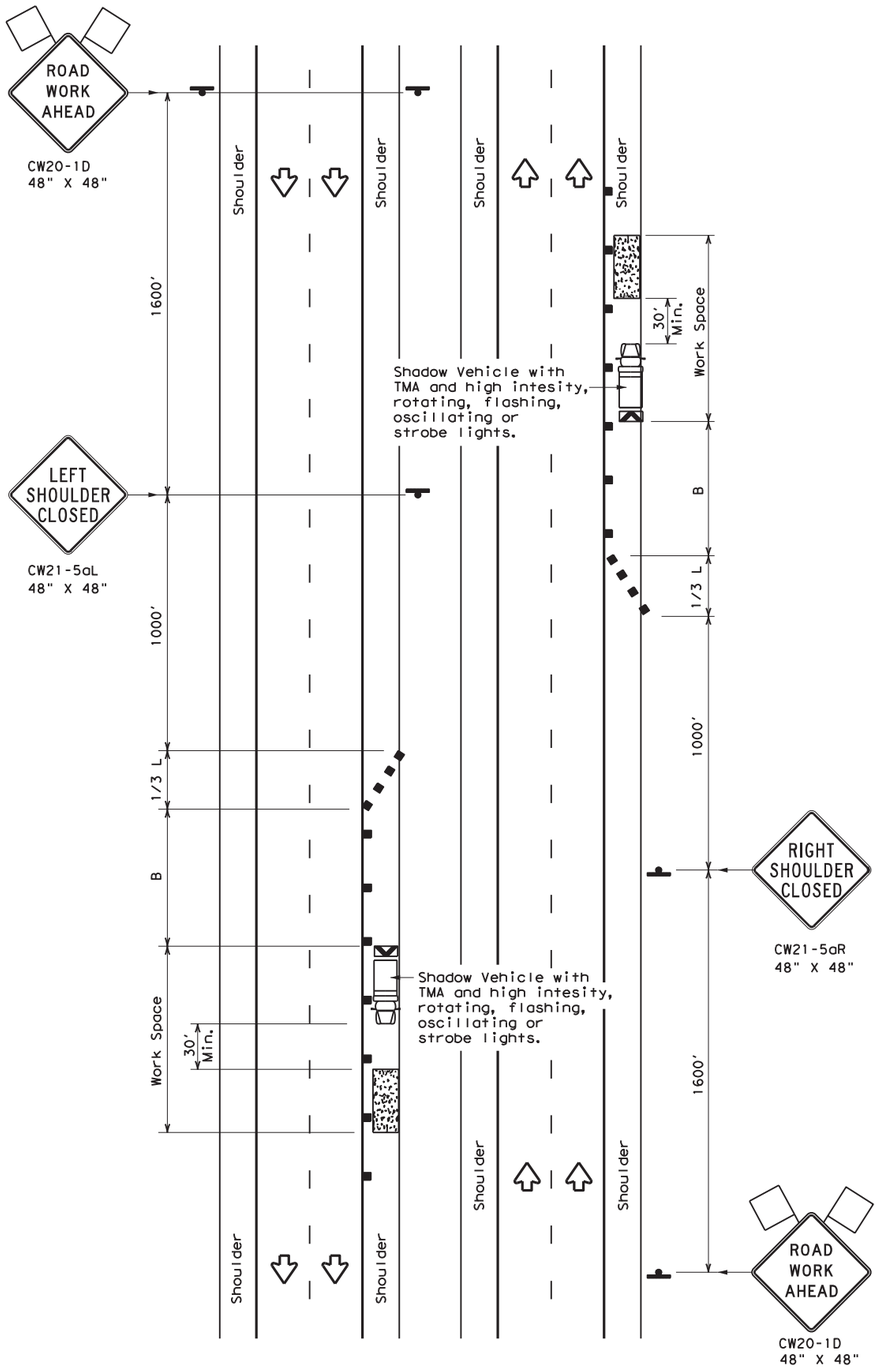
Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON DIVIDED HIGHWAYS

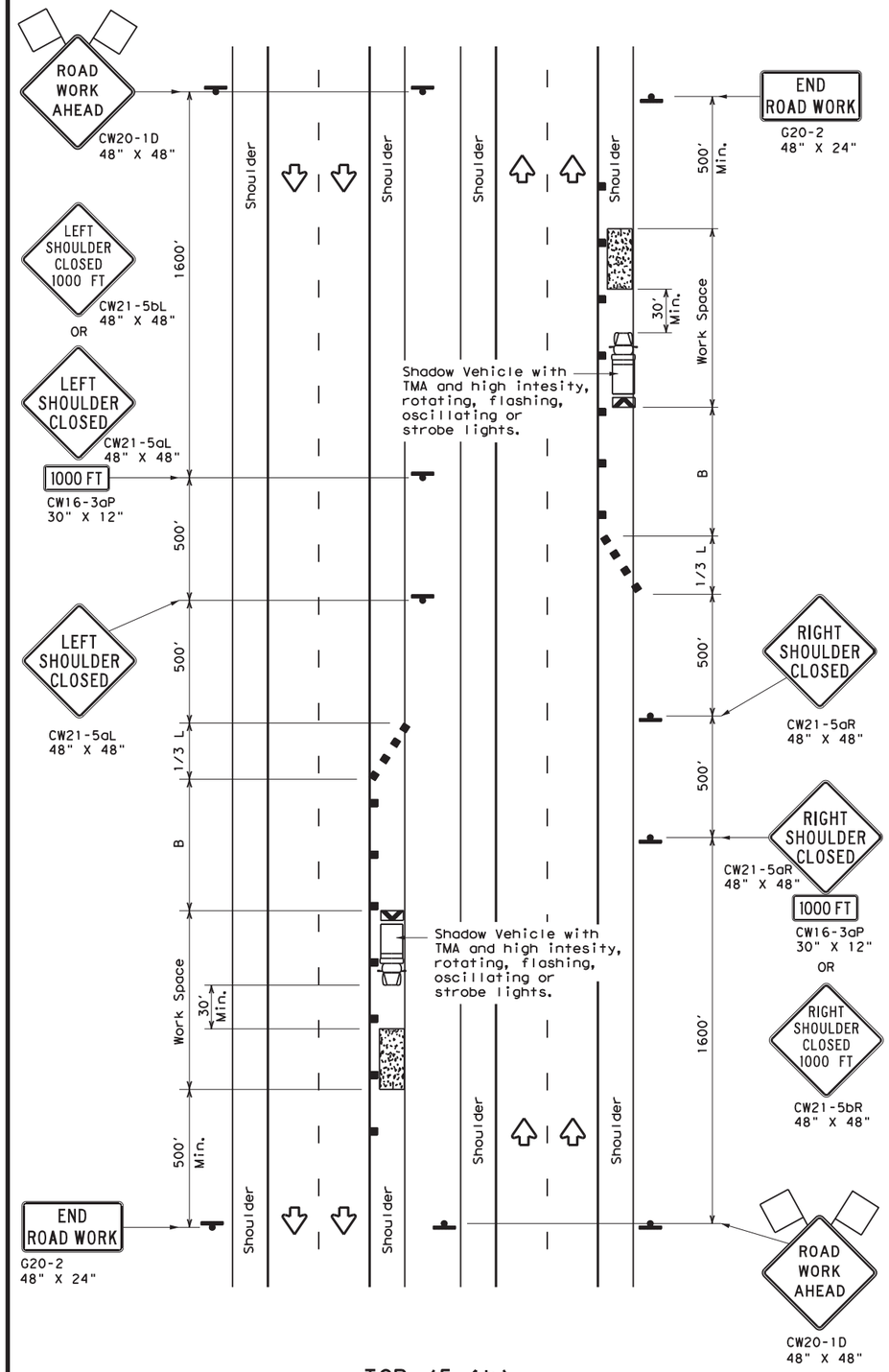
TCP(2-6)-18

FILE: tcp2-6-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 2-12 1-97 2-18	6473	31	001	SH 6, ETC.
	DIST	COUNTY		SHEET NO.
	WACO	MCLENNAN, ETC.		26



TCP (5-1a)

WORK AREA ON SHOULDER



TCP (5-1b)

WORK AREA ON SHOULDER

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

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

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN SHOULDER WORK FOR FREEWAYS / EXPRESSWAYS

TCP(5-1)-18

FILE: tcp5-1-18.dgn	DN:	CK:	DW:	CK:
©TxDOT February 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-18	6473	31	001	SH 6, ETC.
	DIST	COUNTY		SHEET NO.
	WACO	MCLENNAN, ETC.		27

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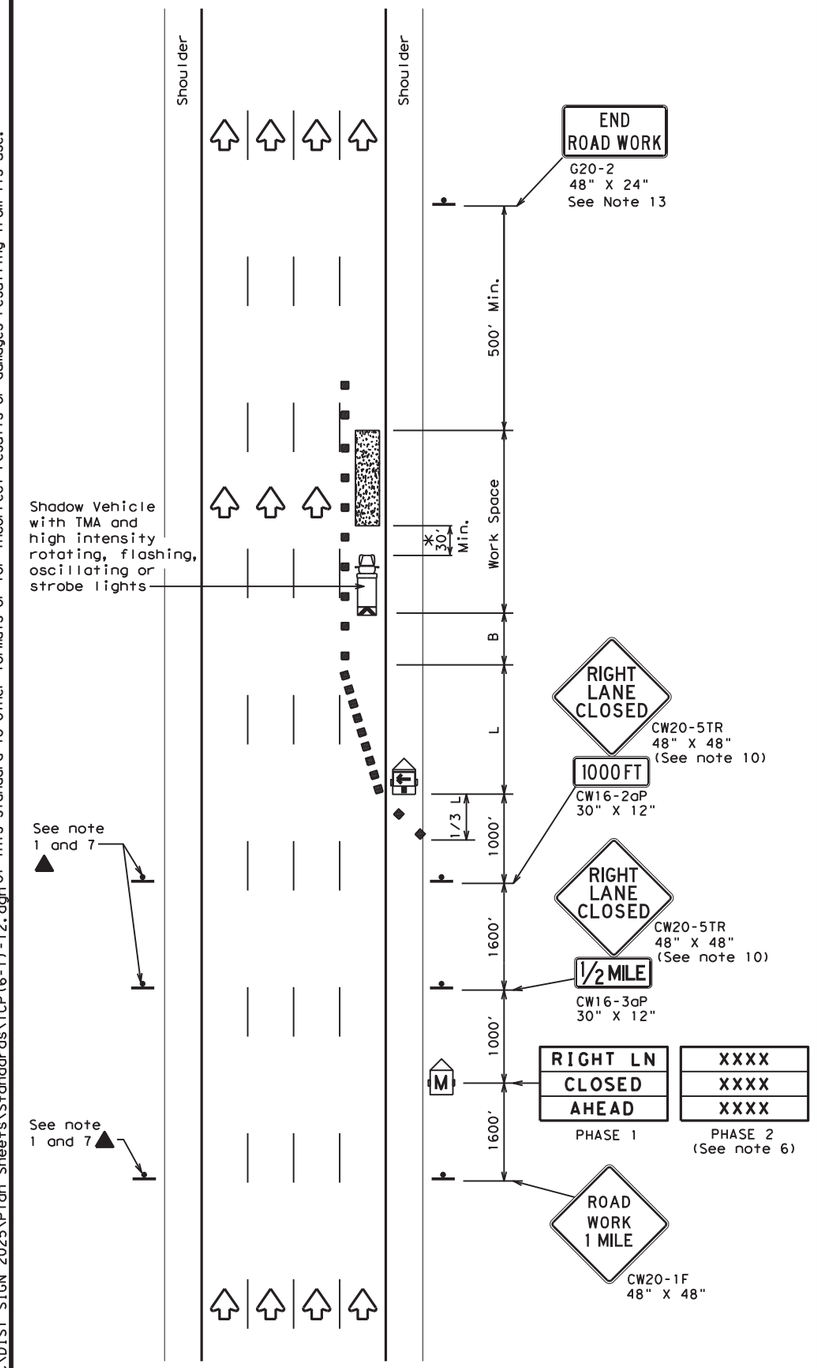
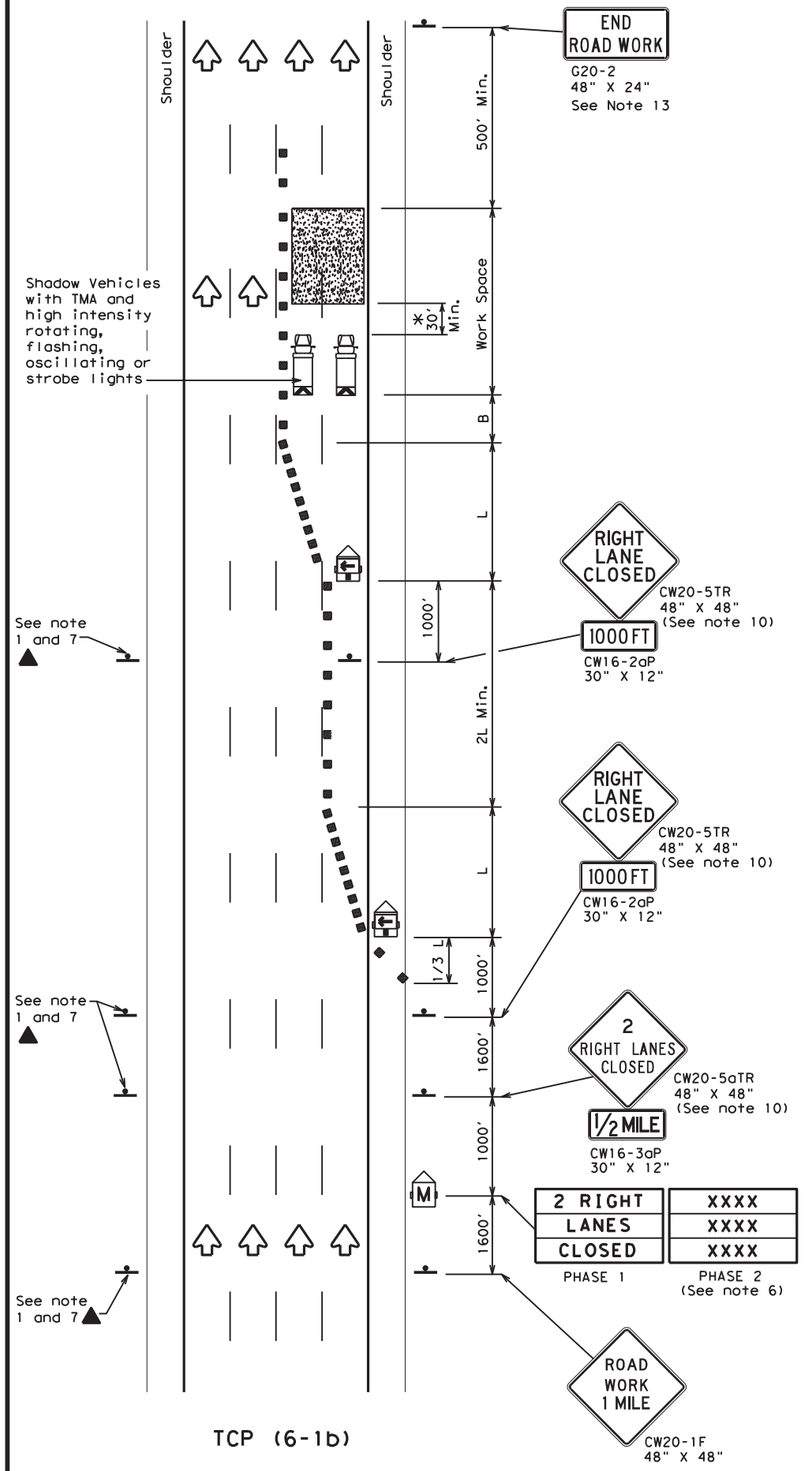


TCP (6-1a)

TYPICAL FREEWAY ONE LANE CLOSURE



TCP (6-1b)

TYPICAL FREEWAY TWO LANE CLOSURE

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

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

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

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

GENERAL NOTES

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

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

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN FREEWAY LANE CLOSURES

TCP(6-1)-12

FILE: tcp6-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	6473	31	001	SH 6, ETC.
8-12	DIST	COUNTY		SHEET NO.
	WACO	MCLENNAN, ETC.		28

201

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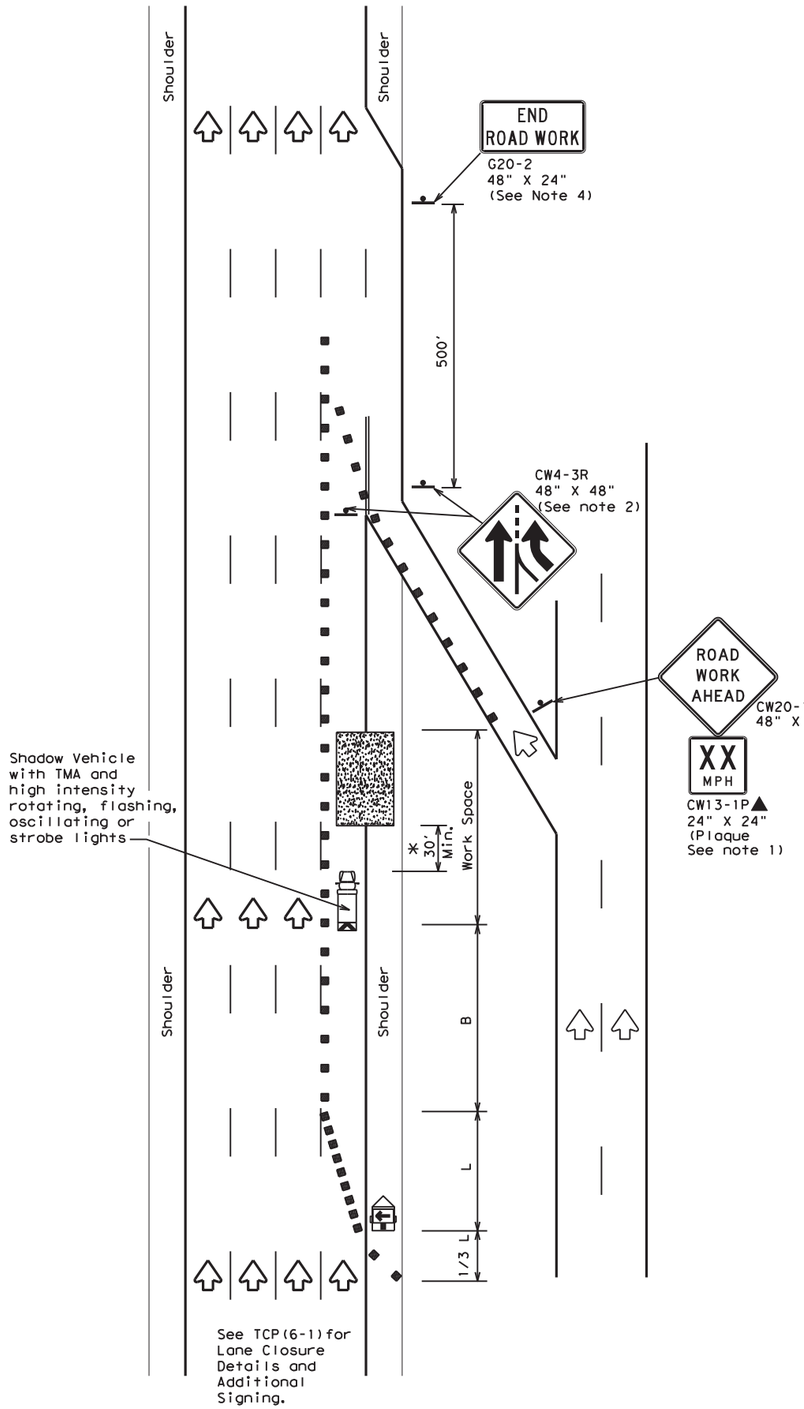
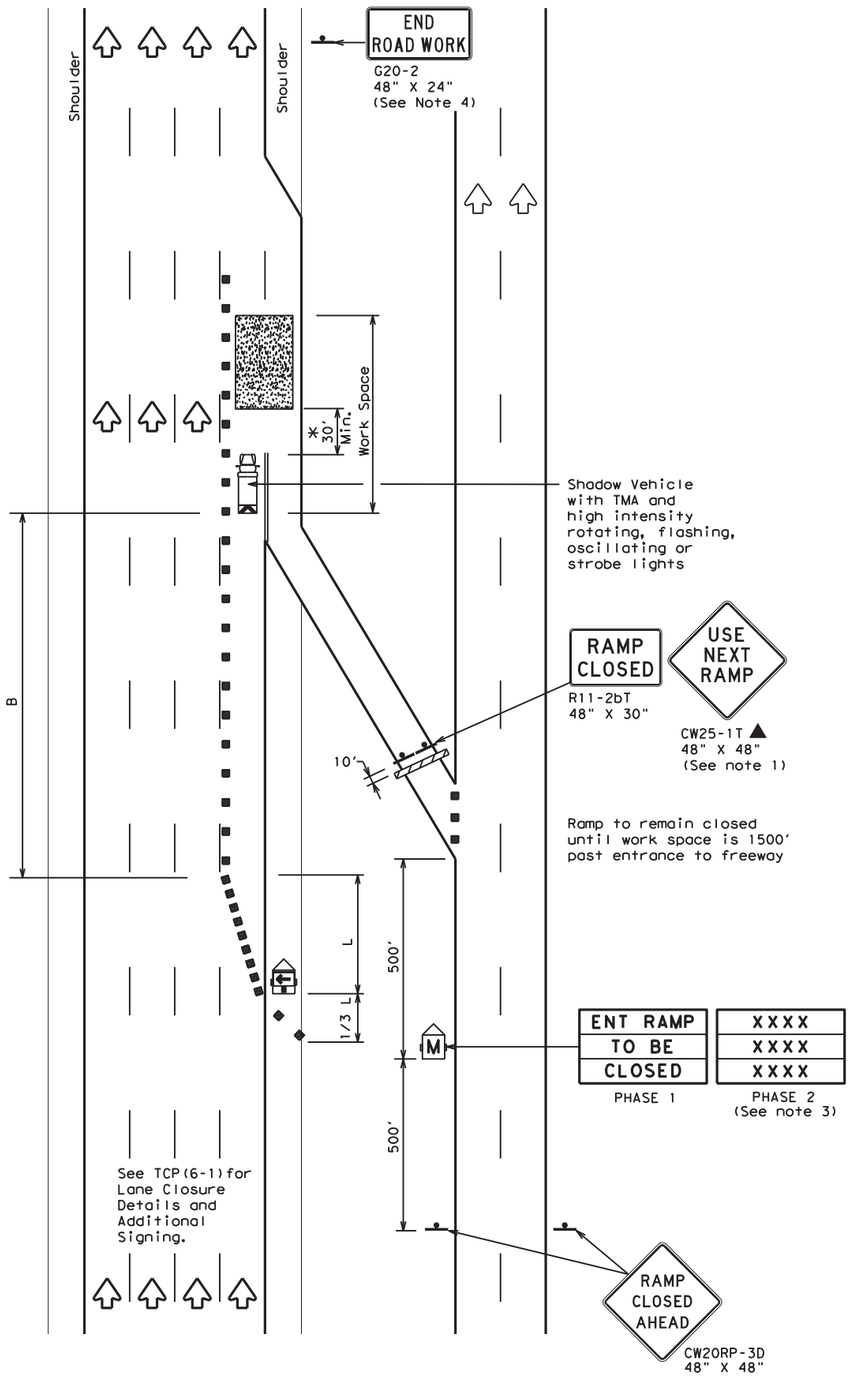


TCP (6-2a)

ENTRANCE RAMP OPEN
WORK WITHIN 500' OF RAMP



TCP (6-2b)

ENTRANCE RAMP CLOSED

LEGEND

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

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

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

TYPICAL USAGE

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

GENERAL NOTES

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

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

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

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
WORK AREA NEAR RAMP

TCP(6-2)-12

FILE: tcp6-2.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	6473	31	001	SH 6, ETC.
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	WACO	MCLENNAN, ETC.		29

202

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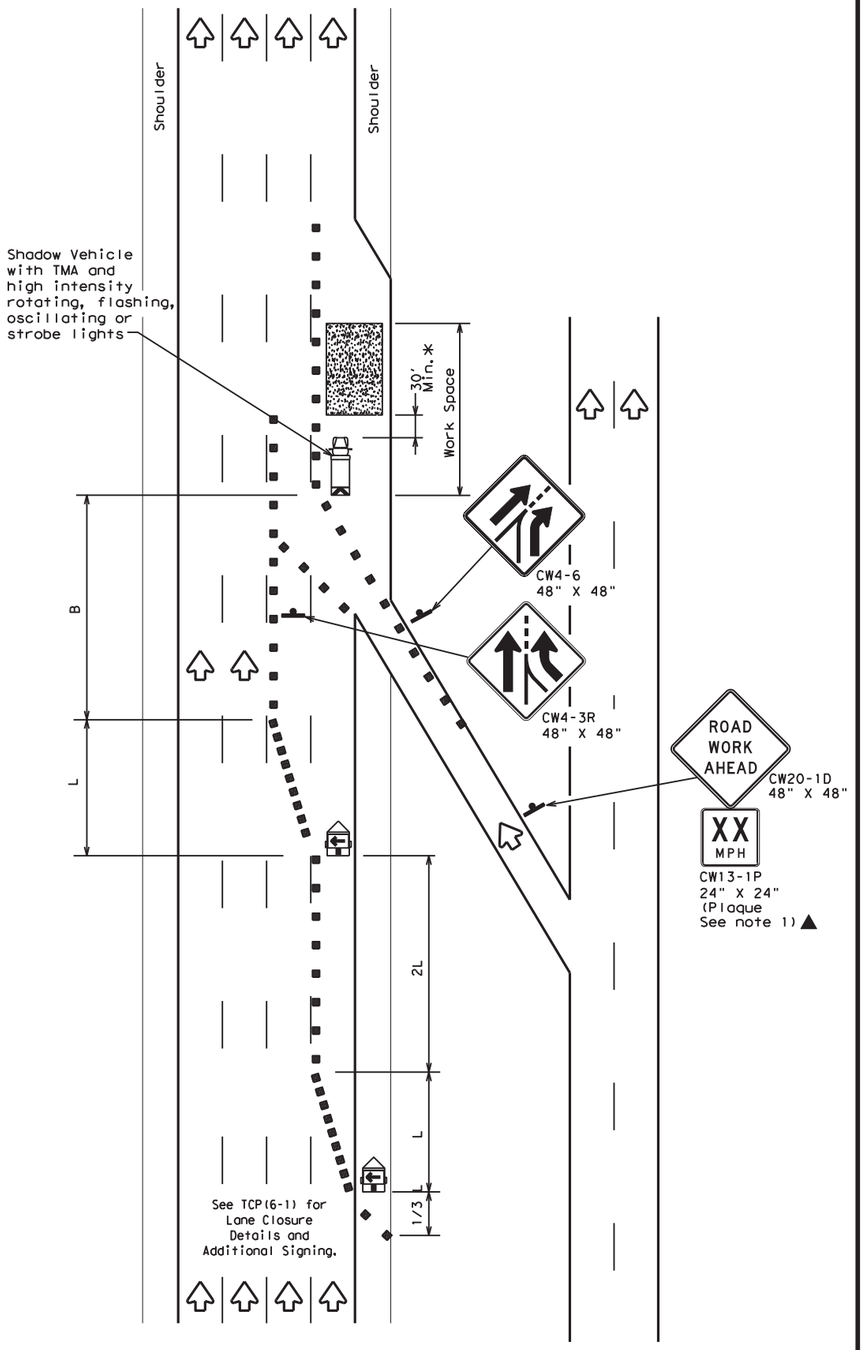
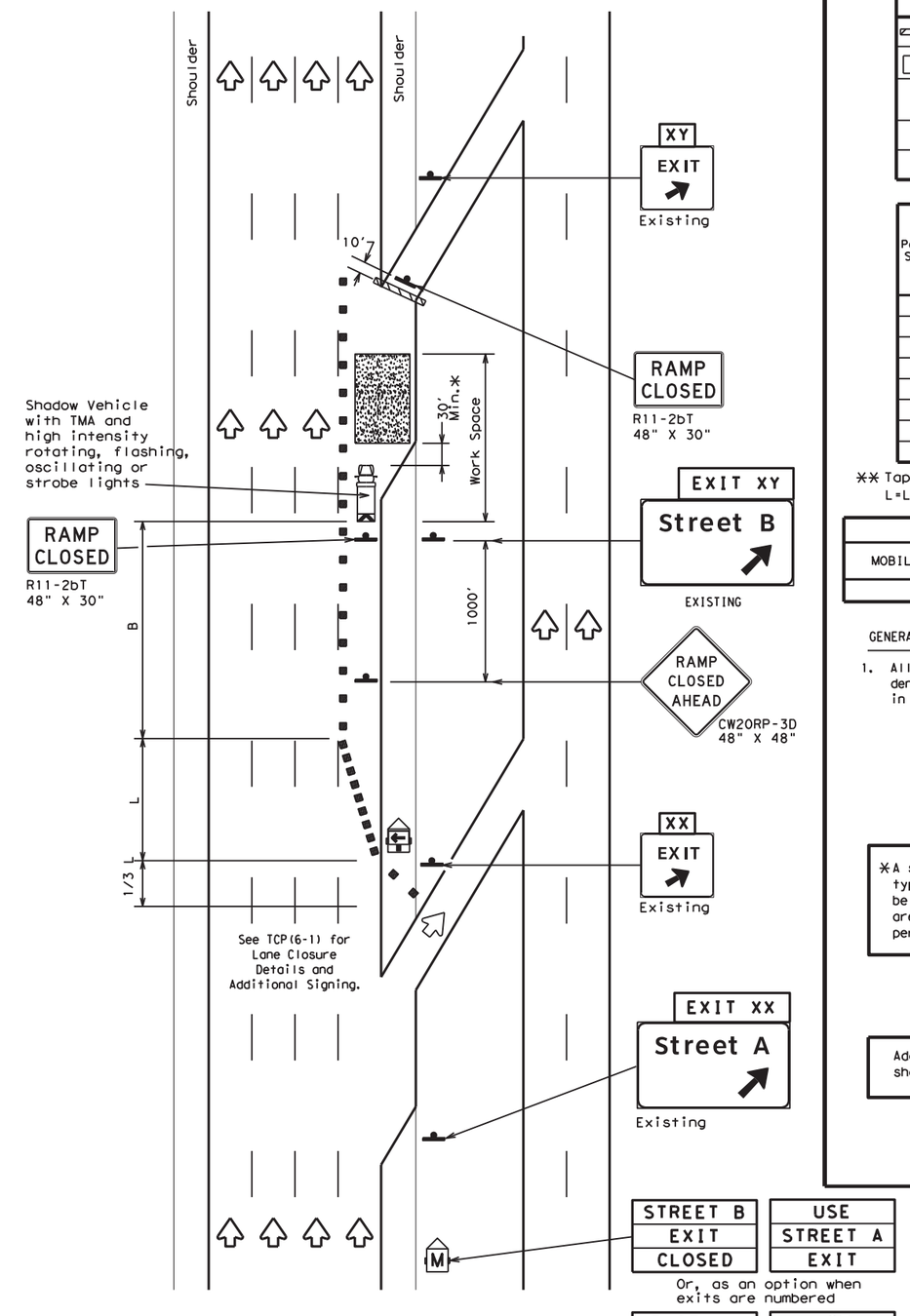


TCP (6-3a)

ENTRANCE RAMP OPEN



TCP (6-3b)

EXIT RAMP CLOSED

TRAFFIC EXITS PRIOR TO CLOSED RAMP

LEGEND

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

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

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

TYPICAL USAGE

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

GENERAL NOTES:

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

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

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

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
WORK AREA BEYOND RAMP

TCP(6-3)-12

FILE: tcp6-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	6473	31	001	SH 6, ETC.
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	WACO	MCLENNAN, ETC.		30

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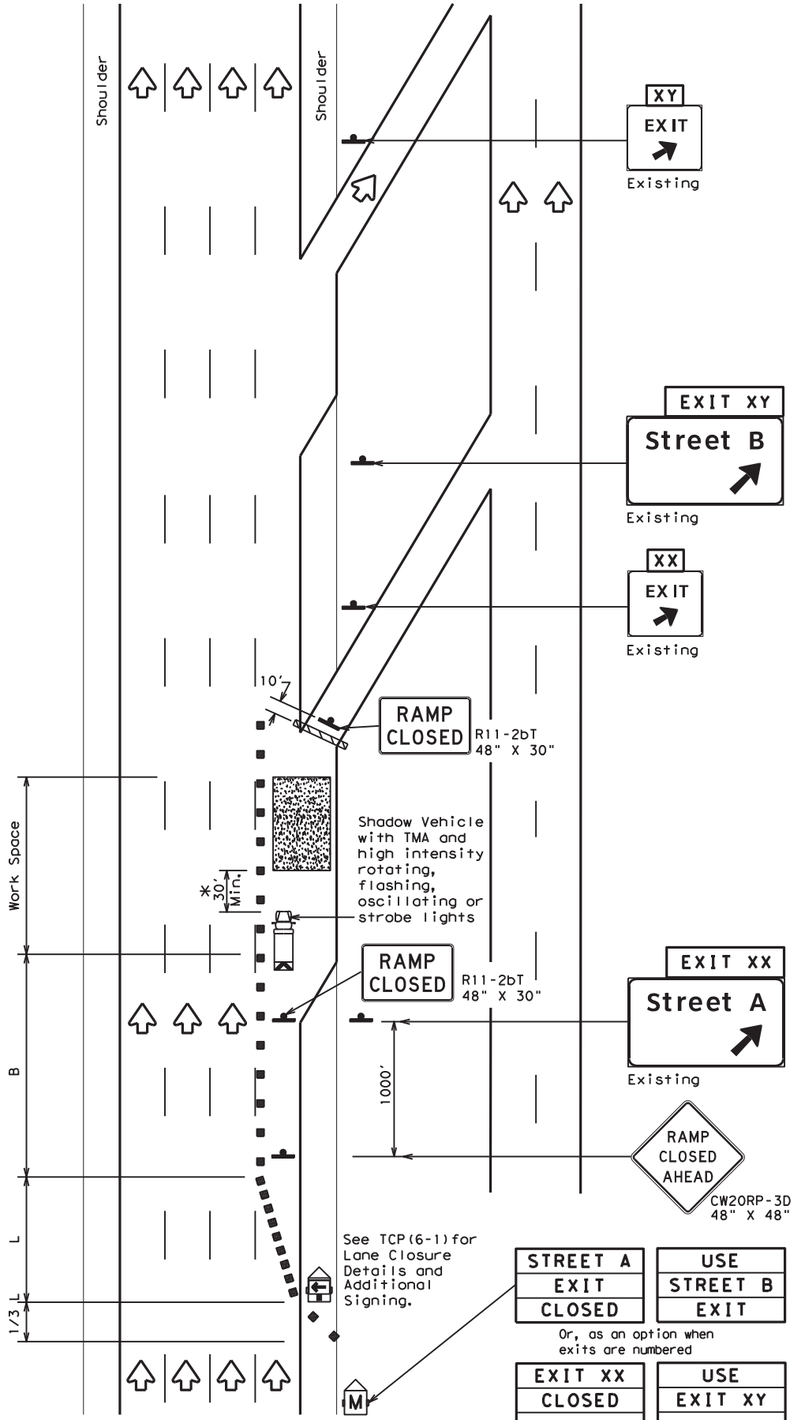
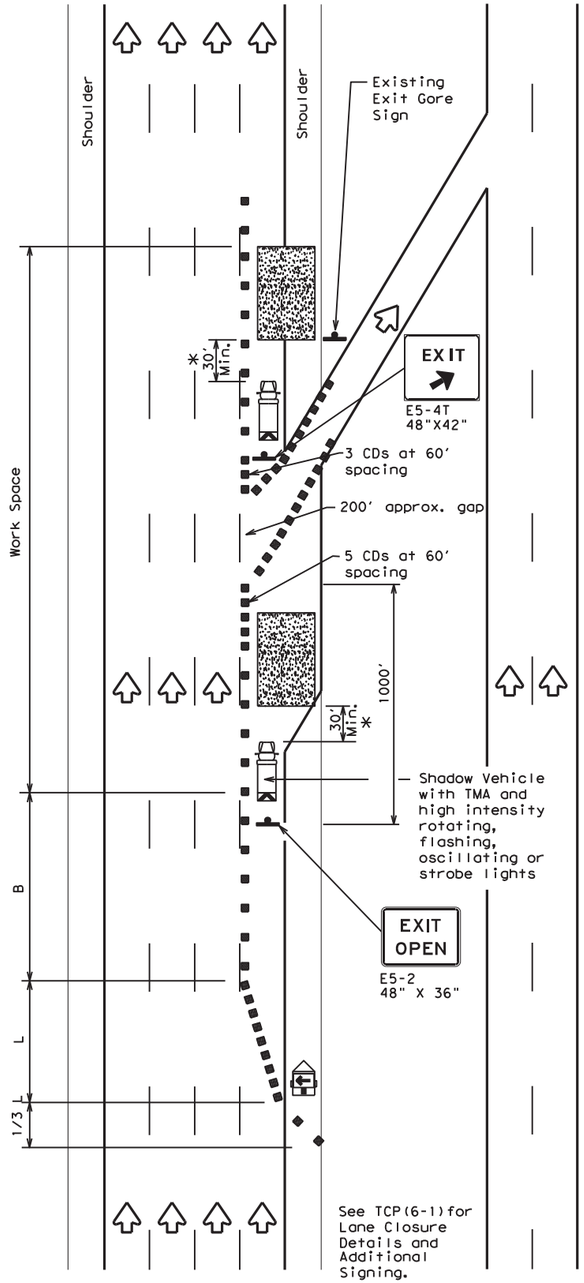


TCP (6-4a)

EXIT RAMP CLOSED
TRAFFIC EXITS PAST CLOSED RAMP



TCP (6-4b)

EXIT RAMP OPEN

LEGEND

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

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

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

TYPICAL USAGE

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

GENERAL NOTES

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

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

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

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
WORK AREA AT EXIT RAMP

TCP(6-4)-12

FILE: tcp6-4.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT Feburary 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	6473	31	001	SH 6, ETC.
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	WACO	MCLENNAN, ETC.		31

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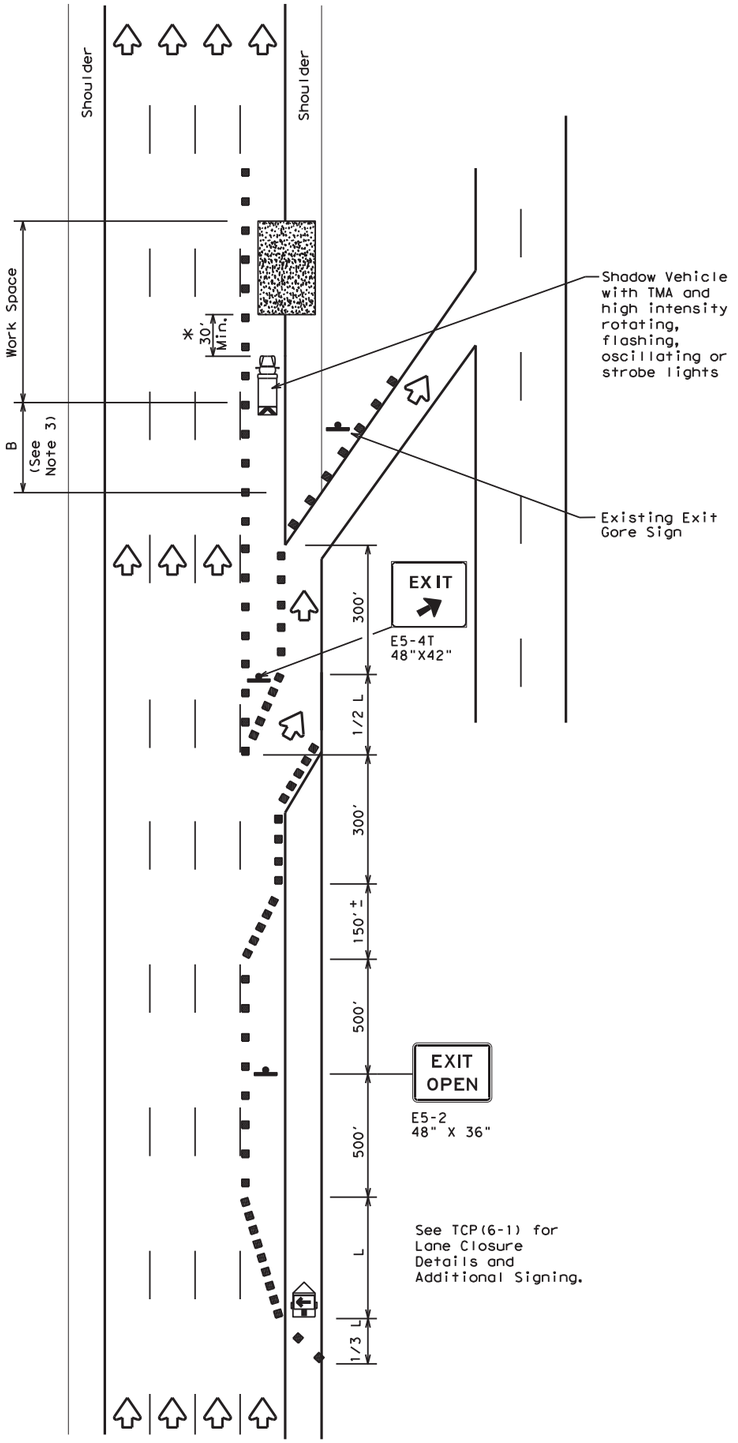
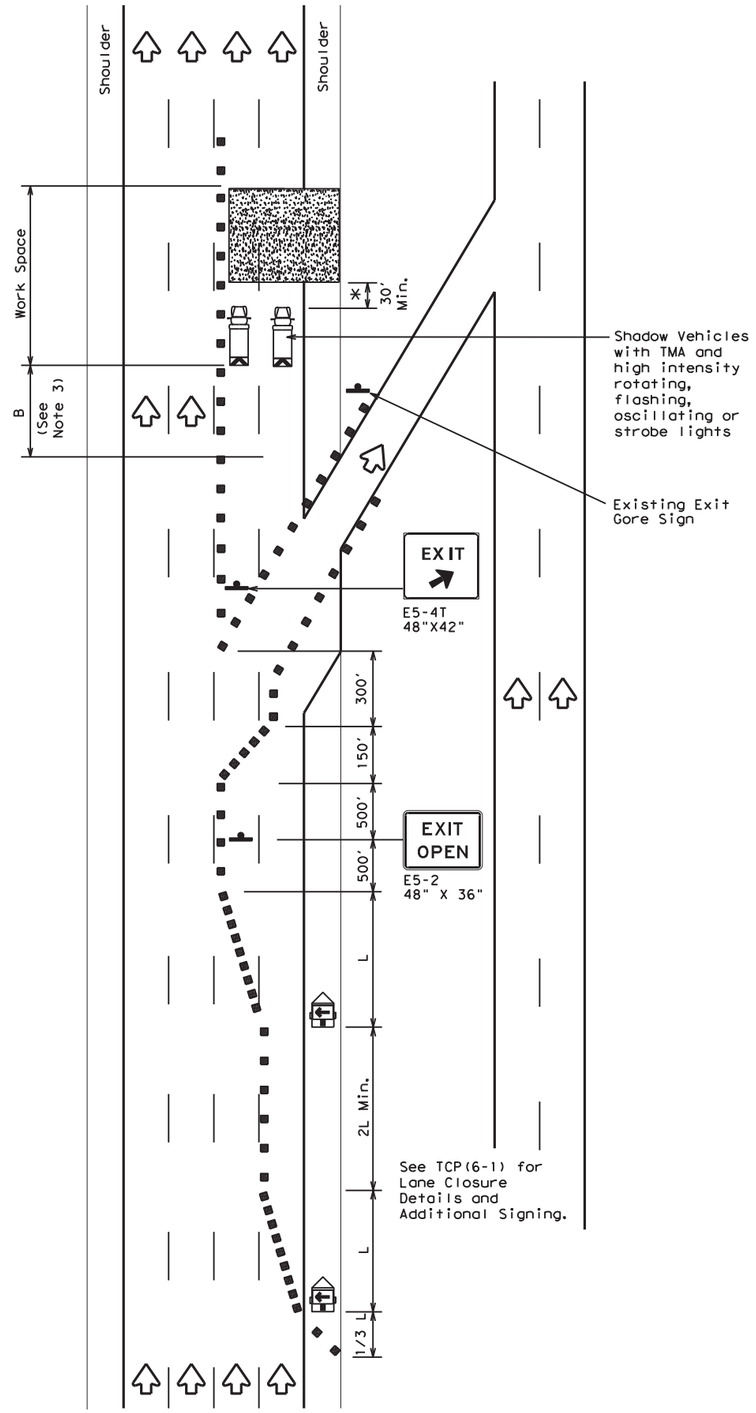


TCP (6-5a)

EXIT RAMP OPEN



TCP (6-5b)

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

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

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

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

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

GENERAL NOTES

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

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

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

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
WORK AREA BEYOND EXIT RAMP

TCP(6-5)-12

FILE: tcp6-5.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT Feburary 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	6473	31	001	SH 6, ETC.
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	WACO	MCLENNAN, ETC.		32

DATE: 9/16/2024 11:39:36 AM
FILE: I:\WACTRAFF\RMC\DIST SIGN 2025\Plan Sheets\Standards\TCP(6-8)-12.dgn

LEGEND

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

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

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

TYPICAL USAGE

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

GENERAL NOTES

1. Place channelizing devices in the gore at 20′ spacing.
2. See the Standard Highway Sign Design for Texas (SHSD) for sign details.
3. The PCMS may be omitted when a permanent DMS sign is available in an appropriate location to display a similar message as called for on the PCMS.
4. When it is determined that a through lane should be closed in addition to the exit ramp, refer to TCP(6-4) for traffic control details.
5. Truck mounted attenuator is required.
6. The PCMS may be omitted if replaced with a "RAMP CLOSED" AHEAD (CW20RP-3D) Sign.
7. Roadway ADT should be greater than 10,000.

Texas Department of Transportation

Traffic Operations Division Standard

WORK IN EXIT GORE FOR ADT GREATER THAN 10,000

TCP(6-8)-14

FILE: tcp6-8.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	6473	31	001	SH 6, ETC.
	DIST	COUNTY		SHEET NO.
	WACO	MCLENNAN, ETC.		33

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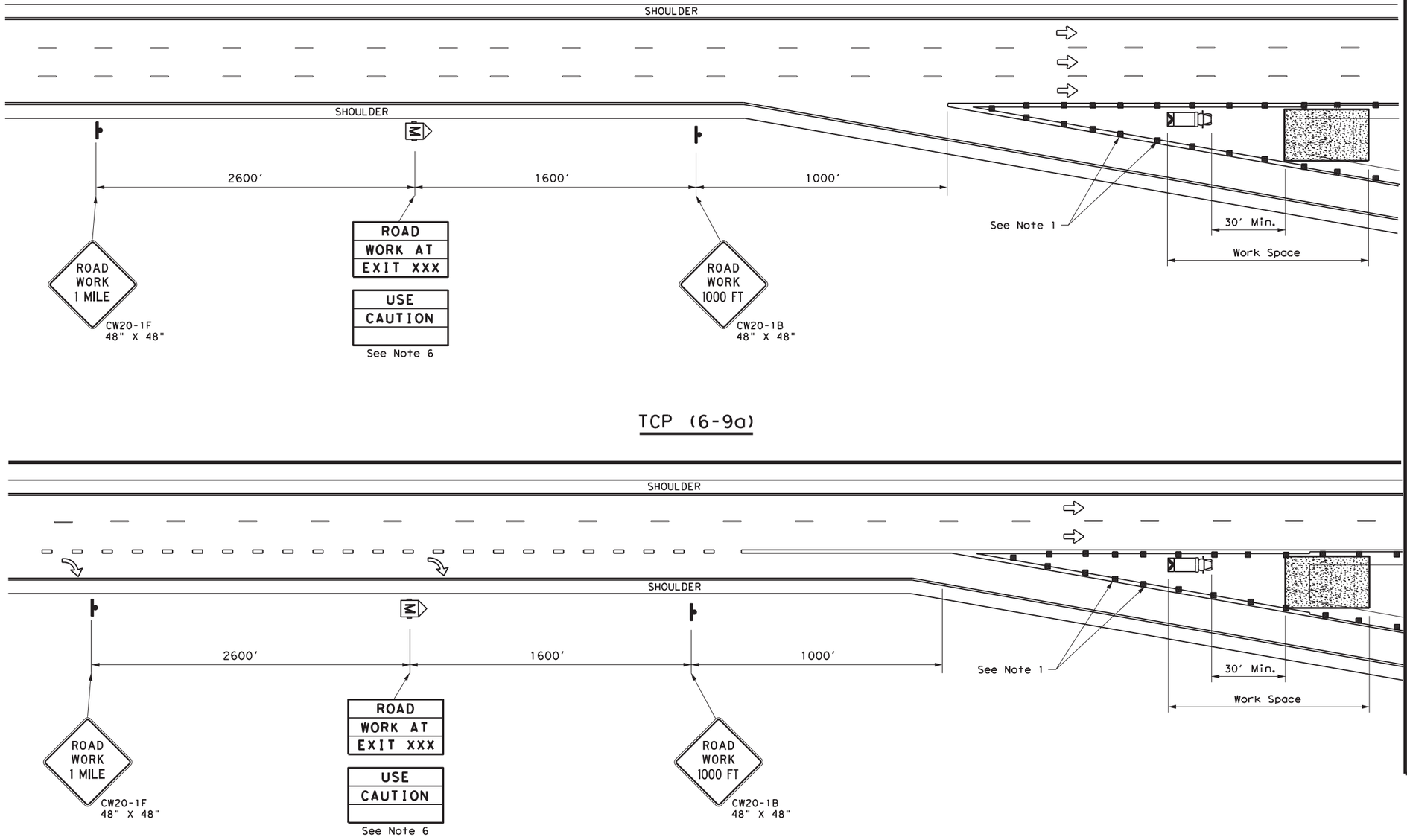


TCP (6-9a)

TCP (6-9b)

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

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

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

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

GENERAL NOTES

1. Place channelizing devices in the gore at 20' spacing.
2. See the Standard Highway Sign Design for Texas (SHSD) for sign details.
3. The PCMS may be omitted when a permanent DMS sign is available in an appropriate location to display a similar message as called for on the PCMS.
4. When it is determined that a through lane should be closed in addition to the exit ramp, refer to TCP(6-4) and TCP(6-8) for traffic control details.
5. Truck mounted attenuators are required.
6. The PCMS may be omitted if replaced with a "ROAD WORK ½ MILE" (CW20-1E).
7. Roadway ADT should be less than 10,000.

Texas Department of Transportation

Traffic Operations Division Standard

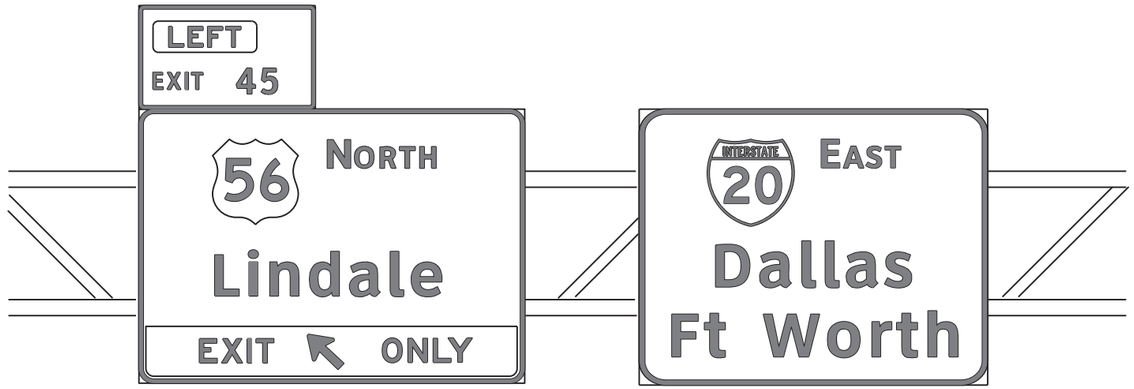
WORK IN EXIT GORE FOR ADT LESS THAN 10,000

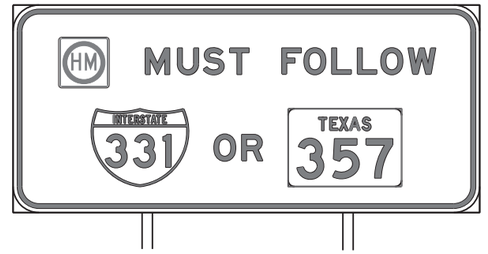
TCP(6-9)-14

FILE: tcp6-9.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	6473	31	001	SH 6, ETC.
	DIST	COUNTY		SHEET NO.
	WACO	MCLENNAN, ETC.		34

REQUIREMENTS FOR OVERHEAD AND LARGE GROUND-MOUNTED SIGNS

TYPICAL EXAMPLES





GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign summary sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Black legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod, or F).
   White legend shall use the Clearview Alphabet.
   The following Clearview fonts shall be used to replace the existing white FHWA lettering, when not specified in the SHSD or in the plans.

B	CV-1W
C	CV-2W
D	CV-3W
E	CV-4W
Emod	CV-5WR
F	CV-6W

3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shall be cut-out white sheeting applied to colored background sheeting.
6. Information regarding borders and radii for signs is found in the "Standard Highway Sign Designs for Texas". Dimensions shown and described for borders and corner radii on parent sign are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in width as much as 1 inch. Borders and corner radii within a parent sign must be of matching widths. The sign area outside the corner radius need not be trimmed or rounded if fabricated from an extruded material.
7. Sign substrate for ground-mounted signs shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative. Sign substrate for overhead signs shall be any material that meets DMS-7110. Exit Number Panels attached above the parent sign shall be made with the same substrate and sheeting as the parent sign.
8. Mounting details of attachments to parent sign face are shown on Standard Plan Sheet TSR(5). Mounting details of exit number panels above parent sign are shown in the "SMD series" Standard Plan Sheets.
9. Background sheeting shall be applied to the substrate per sheeting manufacturer's recommendations. Sheeting will not be allowed to bridge the horizontal gap between panels.
10. Cut all legend, symbols, borders, and direct applied sign attachments at panel joints.

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

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE B OR C SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE D SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(1)-13

FILE: tsr1-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	6473	31	001	SH 6, ETC.
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	WACO	MCLENNAN, ETC.		35

DATE: 9/16/2024 11:39:37 AM
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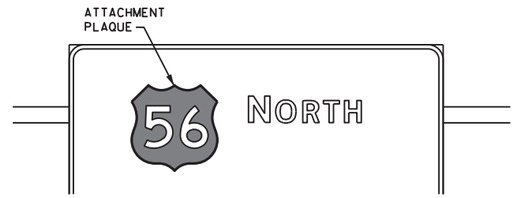
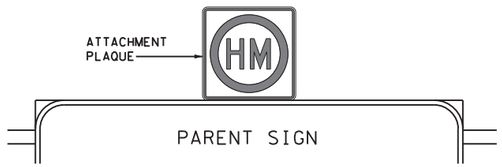
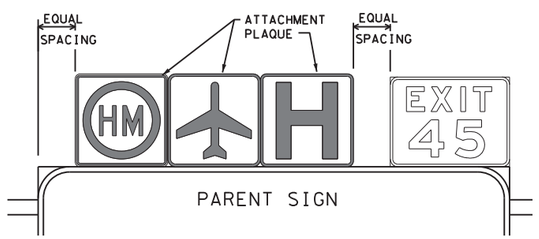
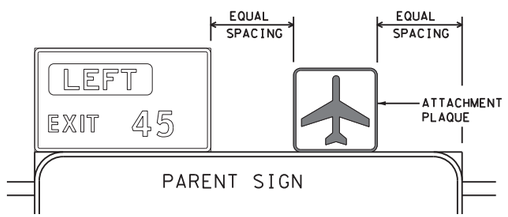
REQUIREMENTS FOR ATTACHMENTS TO OVERHEAD AND LARGE GROUND MOUNTED SIGNS









TYPICAL EXAMPLES

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

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	ALL	TYPE B OR C SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B OR C SHEETING

GENERAL NOTES

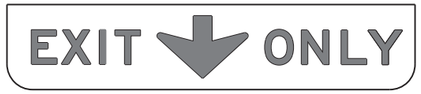
1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Route Marker legends (ie. IH, US, SH and FM shields) shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod, or F).
3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
6. Colored legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to white background sheeting, or combination thereof.
7. Route markers and other attachments within the parent sign face shall be direct applied unless otherwise specified in the plans. Attachments not direct applied shall use 0.063 inch thick one piece sheet aluminum signs (Type A).
8. General Service Plaques shall be 0.080 inch thick and Routing Plaques shall be 0.100 inch thick.
9. The priority for Routing Plaques shall be (left to right) Hazardous Material, Airport then Hospital. See examples for mounting location.
10. Mounting details of attachments to parent signs face are shown on Standard Plan Sheet TSR(5). Mounting details of sign plaque attachments above and below parent sign are shown in the "SMD series" Standard Plan Sheets.
11. Plaques shall be horizontally centered at the top of the parent sign. If an exit number panel exists, the plaque shall be centered between the edge of the parent sign and the edge of the exit number panel. The plaque may be placed above the exit number panel when there is insufficient space.

TYPICAL EXAMPLES

REQUIREMENTS FOR EXIT ONLY AND LEFT EXIT PANELS

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

SHEETING REQUIREMENTS FOR OVERHEAD EXIT PANELS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLUORESCENT YELLOW	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND	BLACK	ACRYLIC NON-REFLECTIVE FILM



TYPICAL EXAMPLES

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD). Individual panel sizes shown in the plans may be adjusted to fit actual parent sign sizes if necessary.
2. Exit Panel legend shall use the Federal Highway Administration (FHWA)Standard Highway Alphabets E Series.
3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend shall be applied by screening process or cut-out acrylic non-reflective black film to yellow background sheeting, or combination thereof.
5. Exit Only and Left Exit panels within the parent sign face shall be direct applied unless otherwise specified in the plans. Panels not direct applied shall use 0.063 inch thick one piece sheet aluminum signs (Type A).
6. Mounting details of Exit Only and Left Exit panel attachments to parent signs face are shown on Standard Plan Sheet TSR(5).

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

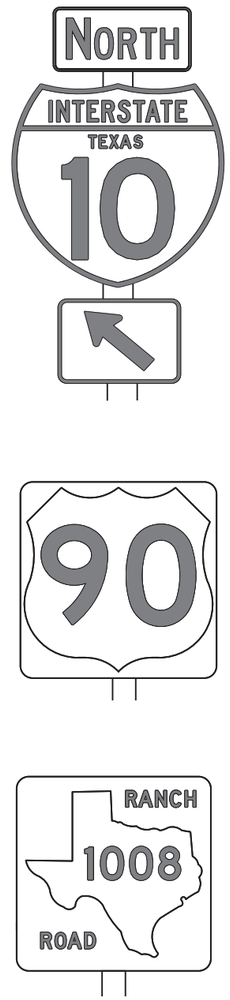
TSR(2)-13

FILE: tsr2-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	6473	31	001	SH 6, ETC.
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	WACO	MCLENNAN, ETC.		36
2				

DATE: 9/16/2024 11:39:38 AM
FILE: T:\WACTRAFF\RMC\DIST SIGN 2025\Plan Sheets\Standards\TSR(3)-13.dgn

REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

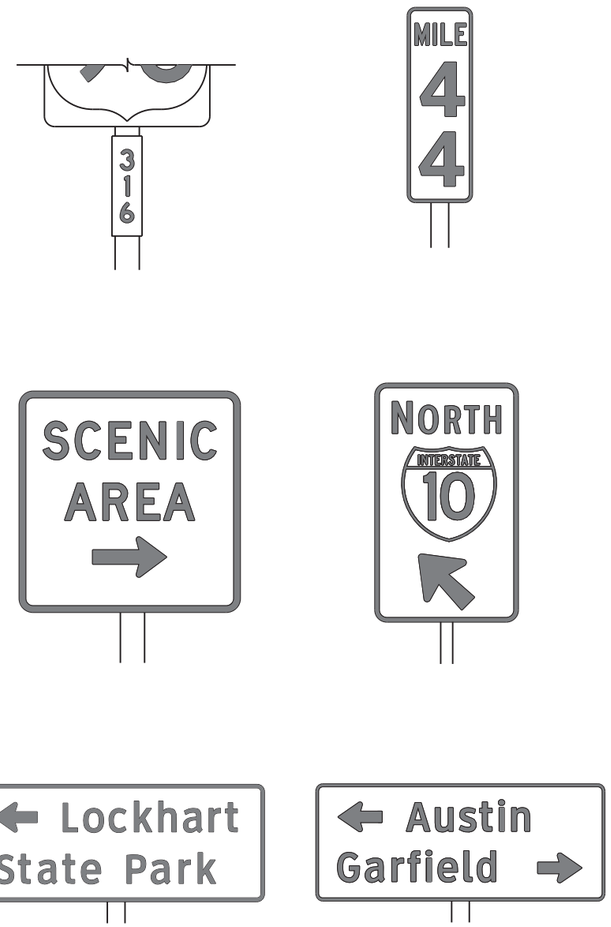
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



TYPICAL EXAMPLES

REQUIREMENTS FOR BLUE, BROWN & GREEN D AND I SERIES GUIDE SIGNS

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	ALL	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE D SHEETING
LEGEND, SYMBOLS & BORDERS	ALL OTHERS	TYPE B OR C SHEETING



TYPICAL EXAMPLES

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).

2. White legend shall use the Clearview Alphabet. The following Clearview fonts shall be used to replace the existing white Federal Highway Administration (FHWA) Standard Highway Alphabets, when not specified in the SHSD, or in the plans.

B	CV-1W
C	CV-2W
D	CV-3W
E	CV-4W
Emod	CV-5WR
F	CV-6W

3. Route sign legend (ie. IH, US, SH and FM shields) shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets B, C, D, E, Emod or F).

4. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.

5. Independent mounted route sign with white or colored legend and borders shall be applied by screening process with transparent color ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof. White legend, symbols and borders on all other signs shall be cut-out white sheeting applied to colored background sheeting.

6. Information regarding borders and radii for signs is found in the "Standard Highway Sign Designs for Texas". Dimensions shown and described for borders and corner radii on parent sign are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in width as much as 1 inch. Borders and corner radii within a parent sign must be of matching widths. The sign area outside the corner radius should be trimmed or rounded.

7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.

8. Mounting details of roadside signs are shown in the "SMD series" Standard Plan Sheets.

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

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080
7.5 to 15	0.100
Greater than 15	0.125

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

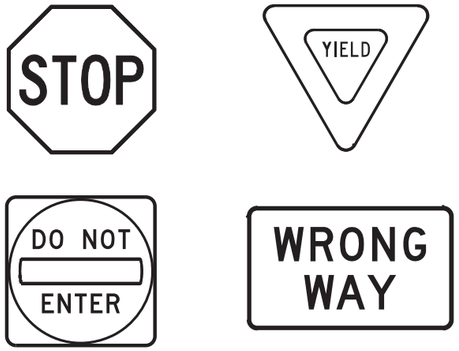
TSR(3)-13

FILE: tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	6473	31	001	SH 6, ETC.
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	WACO	MCLENNAN, ETC.		37

DATE: 9/16/2024 11:39:38 AM
FILE: T:\WACTRAFF\RMC\DIST SIGN 2025\Plan Sheets\Standards\TSR(4)-13.dgn

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS

(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND, BORDERS AND SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Sign legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
6. Colored legend shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to background sheeting, or combination thereof.
7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
8. Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

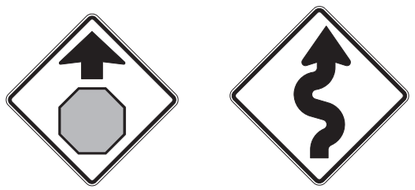
ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080
7.5 to 15	0.100
Greater than 15	0.125

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

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

REQUIREMENTS FOR WARNING SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLOURESCENT YELLOW	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR SCHOOL SIGNS

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	FLOURESCENT YELLOW GREEN	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

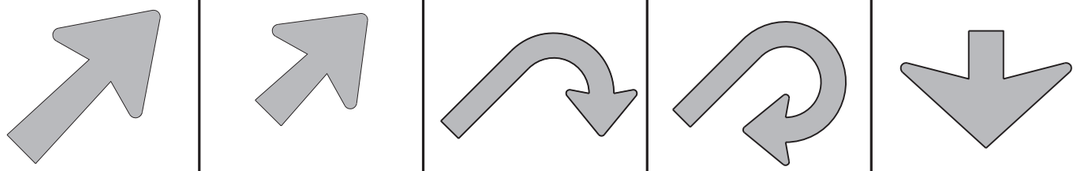
TSR(4)-13

FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	6473	31	001	SH 6, ETC.
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	WACO	MCLENNAN, ETC.		38

DATE: 9/16/2024 11:39:39 AM
FILE: T:\WACTRAFF\RMC\DIST SIGN 2025\Plan Sheets\Standards\TSR(5)-13.dgn

ARROW DETAILS

for Large Ground-Mounted and Overhead Guide Signs



TYPE	LETTER SIZE	USE
A-1	10.67" U/L and 10" Caps	Single Lane Exits
A-2	13.33" U/L and 12" Caps	
A-3	16" & 20" U/L	
B-1	10.67" U/L and 10" Caps	Multiple Lane Exits
B-2	13.33" U/L and 12" Caps	
B-3	16" & 20" U/L	

CODE	USED ON SIGN NO.
E-3	E5-1aT
E-4	E5-1bT

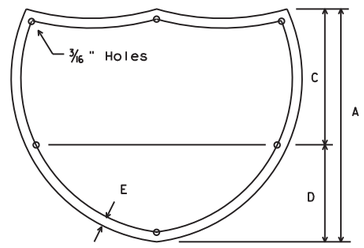
NOTE

Arrow dimensions are shown in the "Standard Highway Sign Designs for Texas" manual.

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

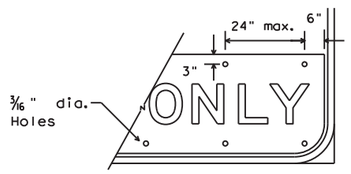
http://www.txdot.gov/

SIGN BLANK PUNCHING DETAILS FOR ATTACHMENTS WHEN SPECIFIED TO BE TYPE A ALUMINUM SIGNS (FOR MOUNTING TO GUIDE SIGN FACE)

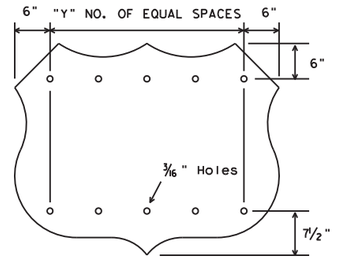


INTERSTATE ROUTE MARKERS

A	C	D	E
36	21	15	1 1/2
48	28	20	1 3/4

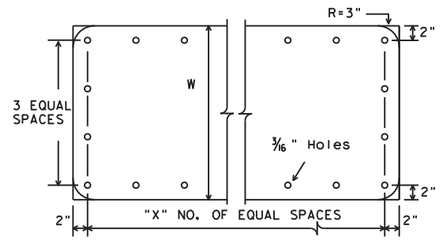


EXIT ONLY PANEL



U.S. ROUTE MARKERS

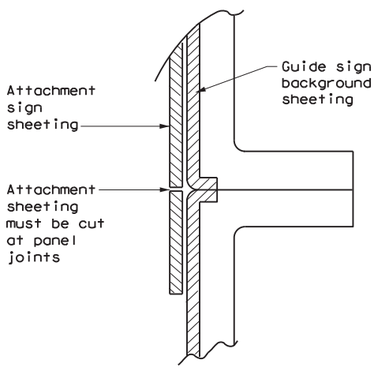
Sign Size	"Y"
24x24	2
30x24	3
36x36	3
45x36	4
48x48	4
60x48	5



STATE ROUTE MARKERS

No. of Digits	W	X
4	24	4
4	36	5
4	48	6
3	24	3
3	36	4
3	48	5

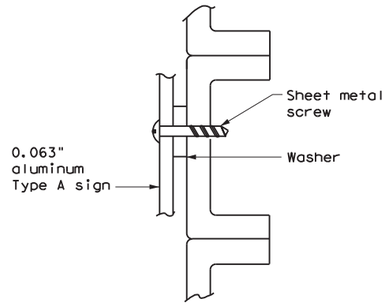
MOUNTING DETAILS OF ATTACHMENTS TO GUIDE SIGN FACE ("EXIT ONLY" AND "LEFT EXIT" PANELS, ROUTE MARKERS AND OTHER ATTACHMENTS)



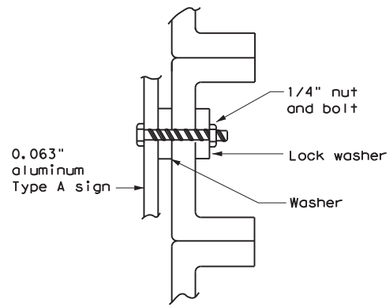
DIRECT APPLIED ATTACHMENT

NOTE:

1. Sheeting for legend, symbols, and borders must be cut at panel joints.
2. Direct applied attachment signs will be subsidiary to "Aluminum Signs" or "Fiberglass Signs".



SCREW ATTACHMENT



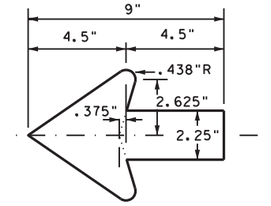
NUT/BOLT ATTACHMENT

NOTE:

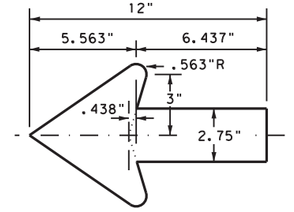
Furnish Type A aluminum sign attachments only when specified in the plans. These signs will be paid for under "Aluminum Signs".

ARROW DETAILS

for Destination Signs (Type D)



Standard arrow to be used with 6 inch letters.



Standard arrow to be used with 8 inch letters.

Texas Department of Transportation

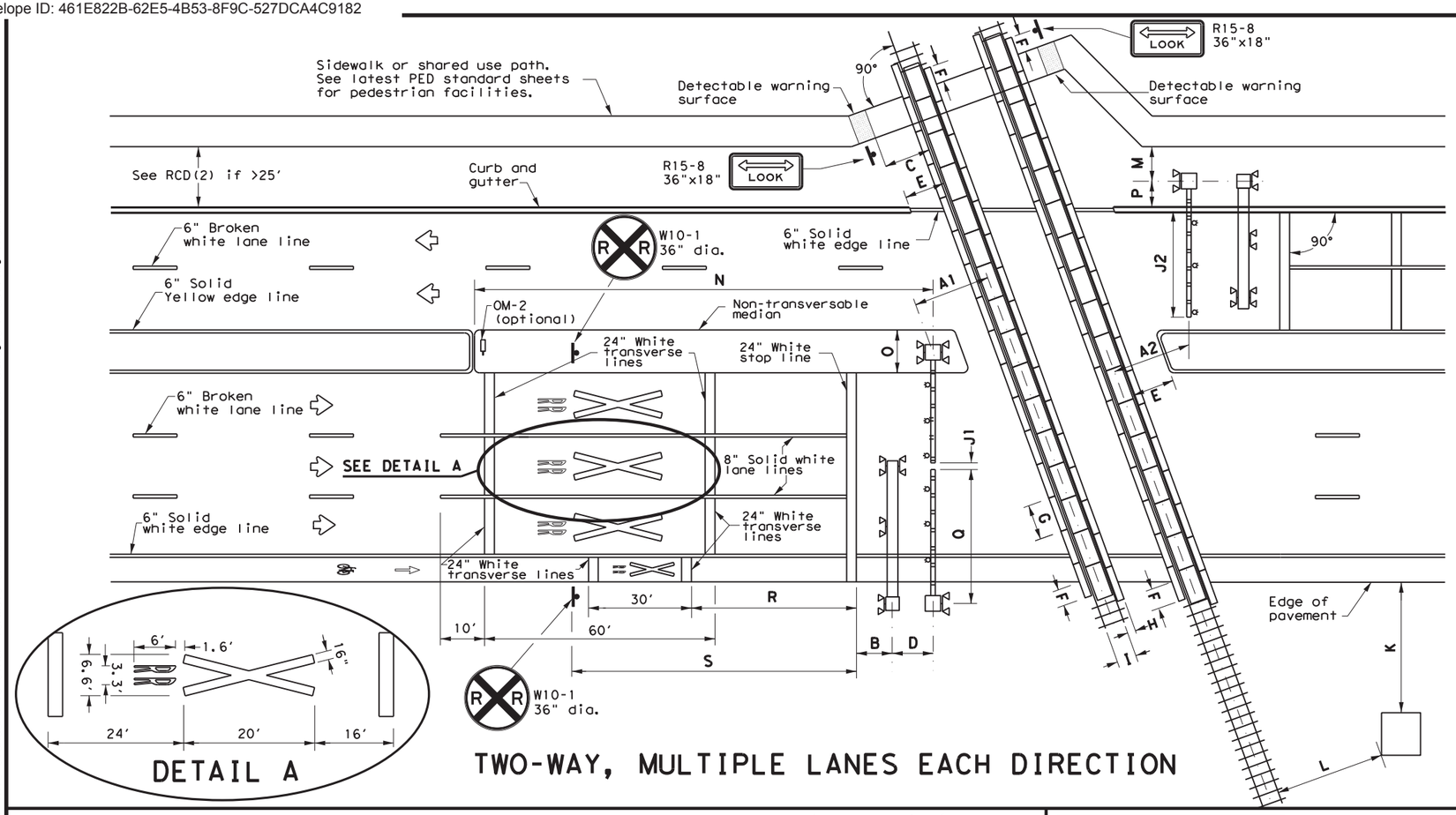
Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(5)-13

FILE: tsr5-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	6473	31	001	SH 6, ETC.
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	WACO	MCLENNAN, ETC.		39

5



NOTES

A1: Center of RR mast to center of rail: 12' minimum, 15' typical.

A2: Tip of gate to center of rail: 12' minimum, 15' typical.

B: Center of mast (cantilever, gate, or mast flasher) of nearest active traffic control device to stop line: 8' (NOTE: Stop line may be moved as needed, but should be at least 8' back from gates, if present).

C: Near edge of detectable warning surface to nearest rail: 12' minimum.

D: Center of gate mast to center of cantilever mast: 6' typical.
NOTE: Cantilever may be located in front or behind gates.

E: Edge of median or curb to nearest rail: 10' typical.
NOTE: Design median edge to be parallel with rail.

F: Edge of planking panel from edge of pavement or sidewalk: 3' minimum.
NOTE: Field panels need not be in line with gauge panels.

G: Length of panels along rail: 8' typical.

H: Width of field panel: 2' typical (check with railroad company).

I: Distance between rails: 4'- 8'1/2".

J1: Tip of gate to tip of gate: 2' maximum.

J2: 90% of traveled roadway to be covered by gate.

K: Nearest edge of RR cabinet from edge of pavement: 30' typical.
NOTE: Cabinet not required to be parallel to edge of pavement.

L: Nearest edge of RR cabinet from nearest rail: 25' typical.

M: Center of RR mast to edge of sidewalk: 6' minimum.

N: Center of gate mast to leading edge of non-traversable median: 100' minimum to qualify as a Quiet Zone SSM. NOTE: 60'will suffice if there is a street intersection within the 100' and all street intersections within 60' are closed.

O: Width of median for RR gate assembly: 8'-6" minimum, 10' typical when using median gates. NOTE: Center of gate mast minimum 4'-3" from face of curb.

P: Center of RR mast to face of curb: 5'-3" minimum.
Center of RR mast to edge of pavement (with shoulder): 7' minimum.
Center of RR mast to edge of pavement (no shoulder): 9'-3" minimum.
NOTE: Final location determined by the railroad company.

Q: Gate length: 28' or less typical, but railroad company may allow up to 32' under special circumstances.

R: Stop line to first RR Crossing transverse line (bike lane): 50' typical.

S: Stop line to GRADE CROSSING ADVANCE WARNING (W10-1) sign and adjacent RR Crossing pavement markings. See Table 1. See RCD(2) for other signs.

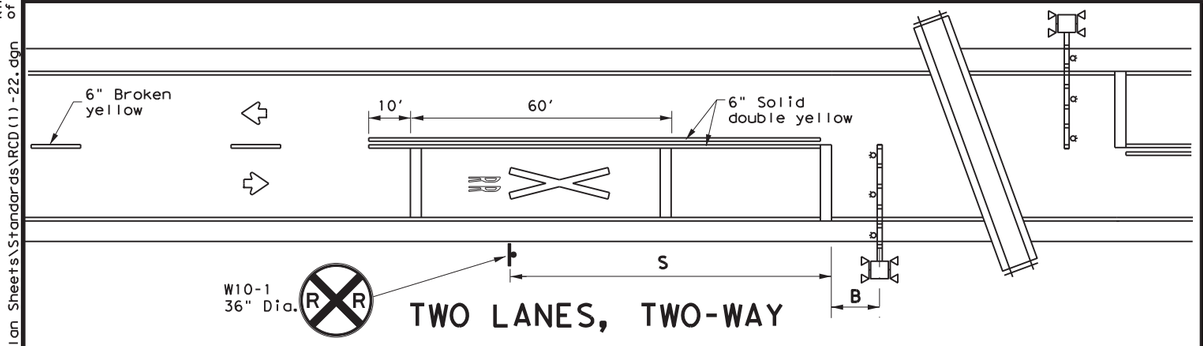
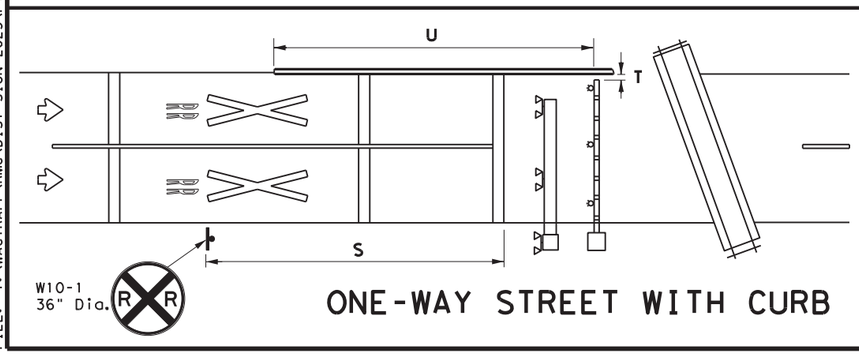


TABLE 1	
Approach Speed (mph)	Desirable Placement (feet)
20	100
25	100
30	100
35	100
40	125
45	175
50	250
55	325
60	400
65	475
70	550
75	650

LEGEND	
	Sign
	Object Marker
	Traffic Flow
	Cantilever
	Gate Assembly
	Mast Flasher Pair

GENERAL NOTES

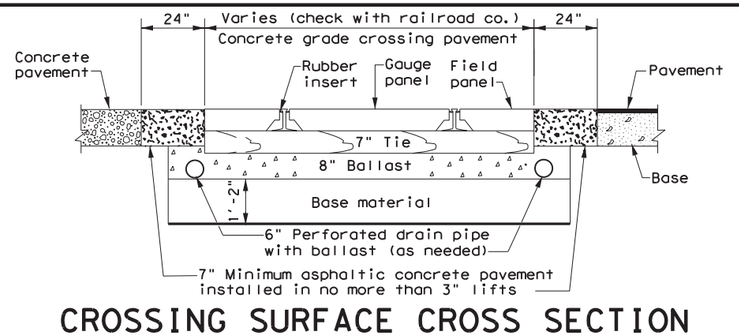
1. Medians and curbs must be non-traversable to qualify as a Quiet Zone Supplementary Safety Measure (SSM). Non-traversable curbs in Quiet Zones are 6" tall minimum and used on roadways where speed does not exceed 40 mph.
2. Raised pavement markers may be used to supplement striping. See PM(2) and PM(3) standard sheets.
3. Medians preferred whenever possible to prevent vehicles from driving around gates.
4. Longitudinal edge striping may be continued thru crossing as needed. Illumination may also be considered for nighttime visibility.
5. See SMD standard sheets for sign mounting details.
6. See the Standard Highway Sign Design for Texas (SHSD) manual for sign and pavement marking details.



NOTES

T: Tip of gate to edge of curb: 1' maximum for Quiet Zone SSM, 90% of traveled way covered by gates for all other locations.

U: Non-traversable curb length from gate: 100' minimum for a Quiet Zone SSM, 10' minimum for all other locations.



Texas Department of Transportation

Traffic Safety Division Standard

RAILROAD CROSSING DETAILS SIGNING, STRIPING, AND DEVICE PLACEMENT RCD(1)-22

FILE: rcd1-22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	6473	31	001	SH 6, ETC.
2-16 11-22	DIST	COUNTY		SHEET NO.
	WACO	MCLENNAN, ETC.		40

DATE: 9/16/2024 11:39:39 AM
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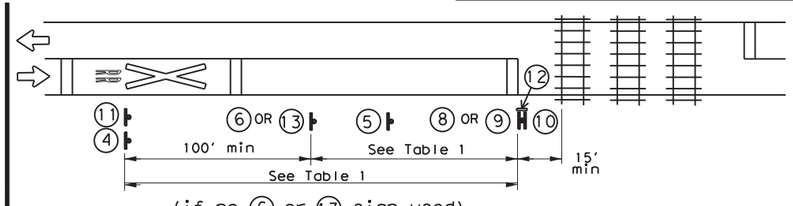
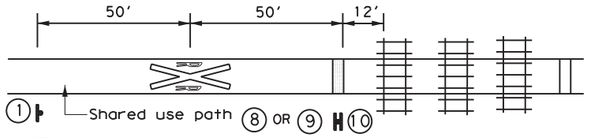


(if no (6) or (13) sign used)

PASSIVE CROSSING

NOTES

1. STOP or YIELD sign may also be installed to the left of the crossbuck sign, rather than below it.
2. A 2" white retroreflective strip shall be installed on front and back of crossbuck sign post.
3. See the Crossbuck Assemblies with YIELD or STOP Signs at Passive Grade Crossings section of the TMUTCD for further details about sign mounting arrangements.



NOTES

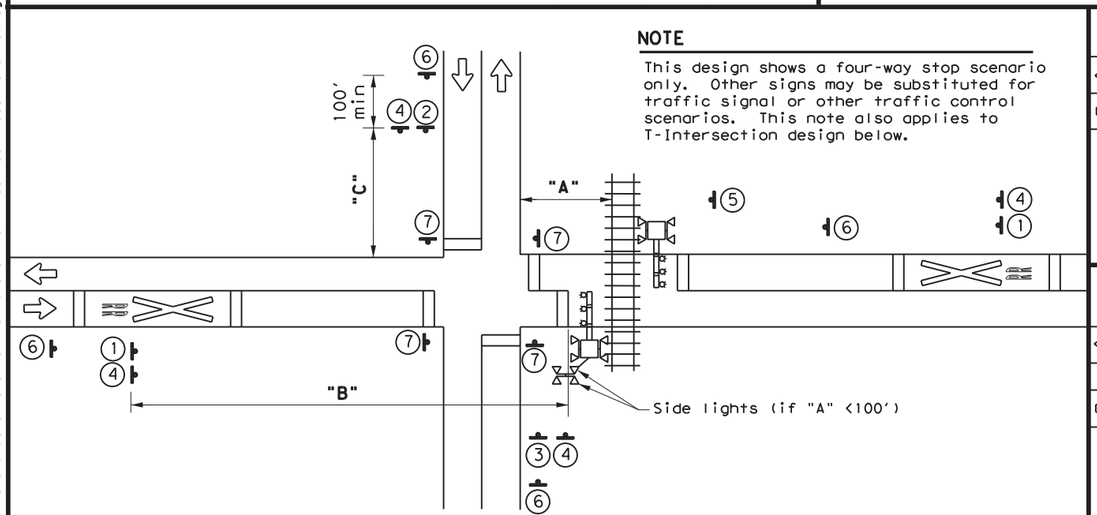
1. A shared use path is considered a separate pathway crossing when more than 25' from traveled way of adjacent roadway.
2. Detectable warning used at stop bar.
3. Smaller signs preferred. See the Design of Bicycle Signs section within the TMUTCD for sizing details.

PATHWAY CROSSING

TABLE 1	
Approach Speed (mph)	Desirable Placement (feet)
20	100
25	100
30	100
35	100
40	125
45	175
50	250
55	325
60	400
65	475
70	550
75	650

GENERAL NOTES

1. Railroad company to provide active traffic control devices, CROSSBUCK (R15-1), NUMBER OF TRACKS (R15-2P) plaque (if more than 1 track), and EMERGENCY NOTIFICATION (I-13) signs.
2. LOW GROUND CLEARANCE (W10-5) signs may be relocated further upstream of crossing to provide advance warning of alternate route.
3. GRADE CROSSING AND INTERSECTION ADVANCE WARNING (W10-2) signs may be modified as needed to fit roadway geometry.
4. Table 1 placement distances may vary per the Placement of Warning Signs section of the TMUTCD.
5. See Table 1 to determine placement of STOP AHEAD (W3-1) and YIELD AHEAD (W3-2) signs unless shown otherwise.
6. DO NOT STOP ON TRACKS (R8-8) signs installed when potential for vehicles stopping on tracks is significant as determined by sealing engineer. Install so sign does not block view of RR mast.
7. See the Standard Highway Sign Design for Texas (SHSD) manual for sign and pavement marking details.

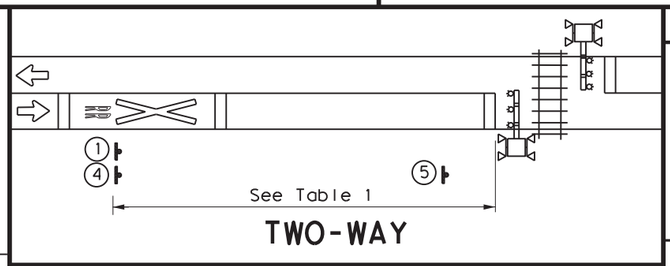


NOTE

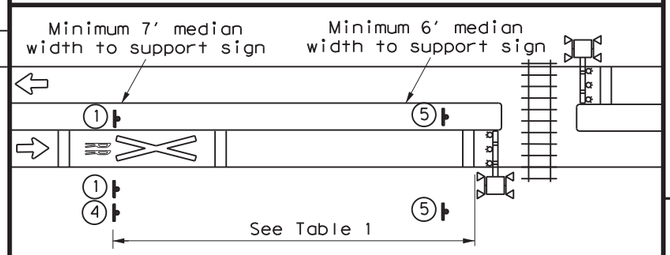
This design shows a four-way stop scenario only. Other signs may be substituted for traffic signal or other traffic control scenarios. This note also applies to T-Intersection design below.

	"A" <100'	"A" ≥100'
"B"	See Table 1. Place pavement markings and signs on opposite side of intersection from rail if spacing from Table 1 would put markings within intersection.	See Table 1. Place pavement markings and signs between rail and intersection if spacing from Table 1 would put markings within intersection.
"C"	See Table 1.	GRADE CROSSING AND INTERSECTION ADVANCE WARNING (W10-2, W10-3, W10-4) signs should only be installed if W10-1 sign is not between intersection and railroad crossing. If needed, see Table 1.

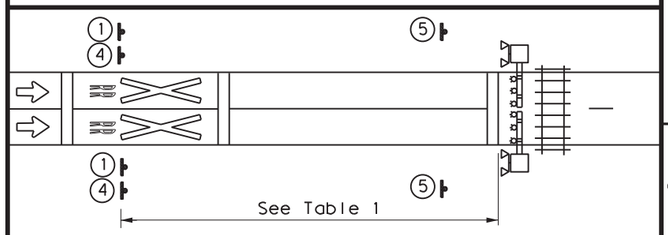
GRADE CROSSING NEAR A PARALLEL STREET



TWO-WAY

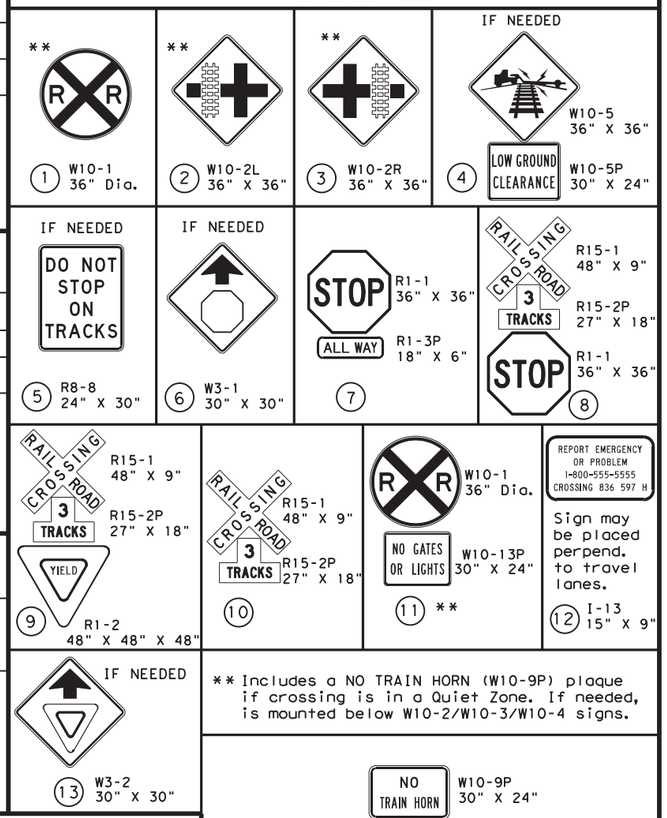


TWO-WAY WITH MEDIAN



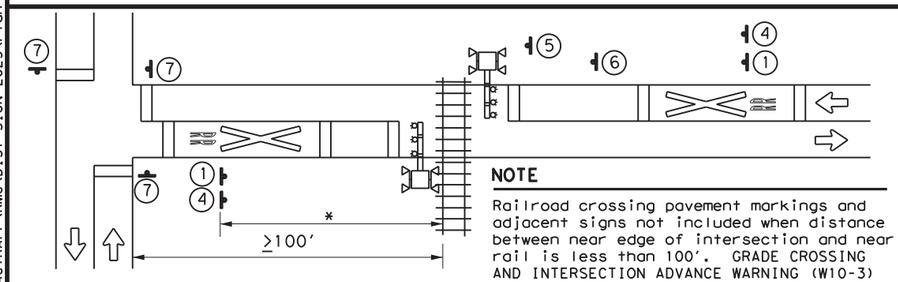
ONE-WAY

SIGNS



** Includes a NO TRAIN HORN (W10-9P) plaque if crossing is in a Quiet Zone. If needed, is mounted below W10-2/W10-3/W10-4 signs.

NO TRAIN HORN W10-9P 30" X 24"

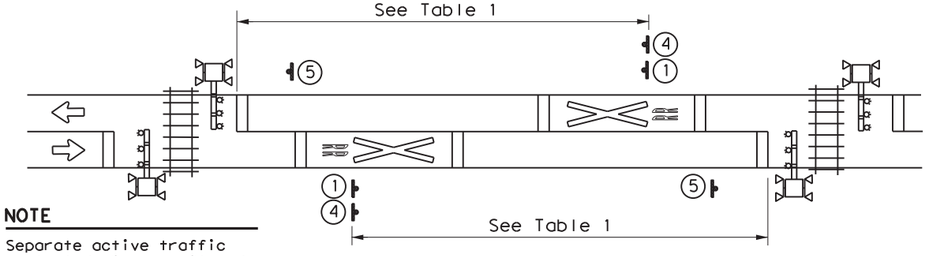


*Use Table 1 if sufficient space exists.

NOTE

Railroad crossing pavement markings and adjacent signs not included when distance between near edge of intersection and near rail is less than 100'. GRADE CROSSING AND INTERSECTION ADVANCE WARNING (W10-3) signs installed on roadway parallel with rail in this case.

T-INTERSECTION



NOTE

Separate active traffic control devices, railroad crossing pavement markings, and adjacent signs required when tracks are more than 100' apart.

TWO ADJACENT CROSSINGS

Texas Department of Transportation

Traffic Safety Division Standard

RAILROAD CROSSING DETAILS SIGNING & STRIPING

RCD(2)-22

FILE: rcd2-22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	6473	31	001	SH 6, ETC.
2-16 11-22	DIST	COUNTY		SHEET NO.
	WACO	MCLENNAN, ETC.		41

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

SM RD SGN ASSM TY XXXXX(X)XX(X-XXXX)

Post Type

FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
TWT = Thin-Walled Tubing (see SMD(TWT))
10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

Number of Posts (1 or 2)

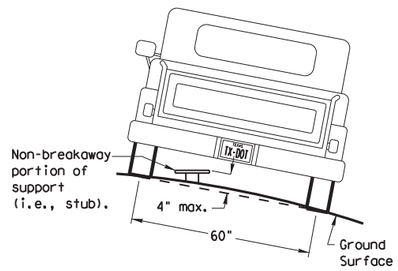
Anchor Type

UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
WS = Wedge Anchor Steel - (see SMD(TWT))
WP = Wedge Anchor Plastic (see SMD(TWT))
SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

Sign Mounting Designation

P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
IF REQUIRED
1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-1))

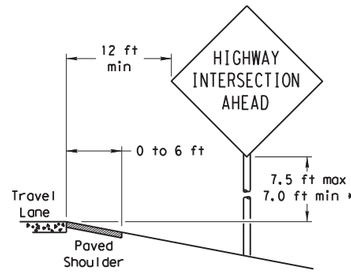
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

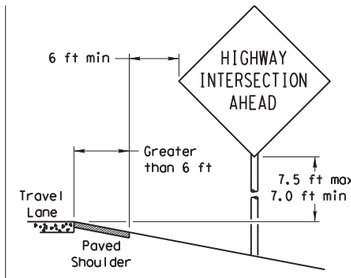
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

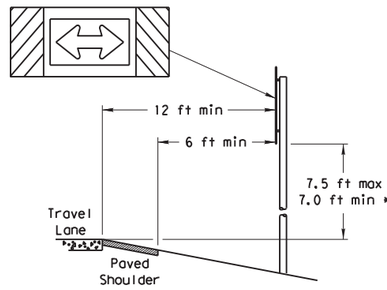
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



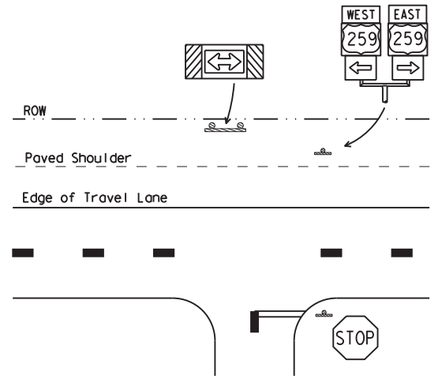
GREATER THAN 6 FT. WIDE

When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

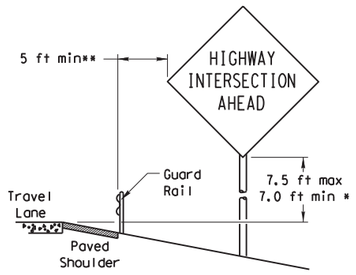
T-INTERSECTION



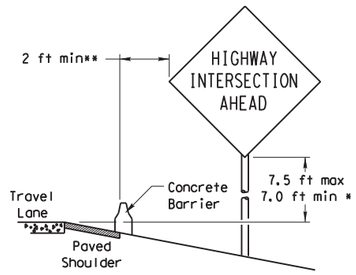
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER

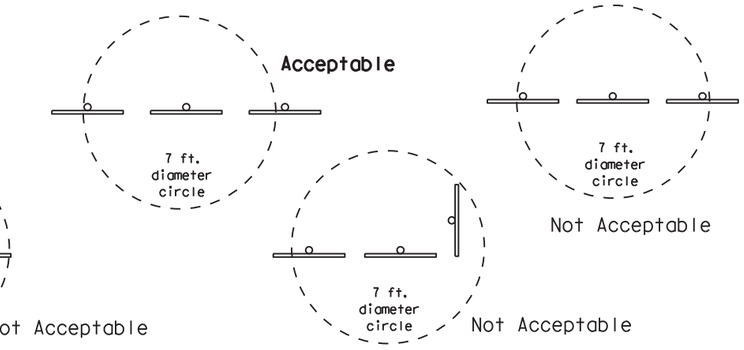


BEHIND GUARDRAIL



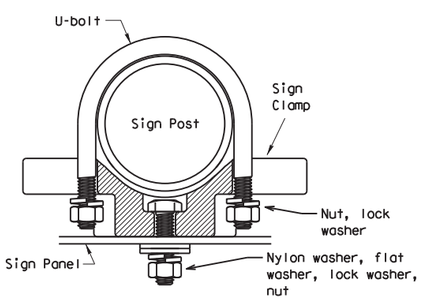
BEHIND CONCRETE BARRIER

**Sign clearance based on distance required for proper guard rail or concrete barrier performance.



TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

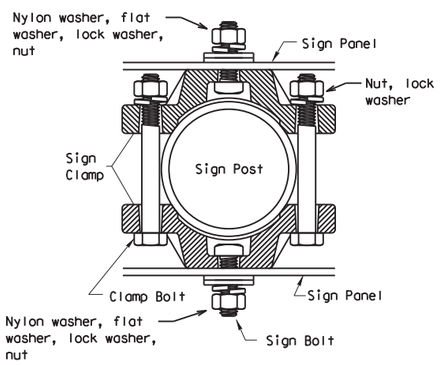


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

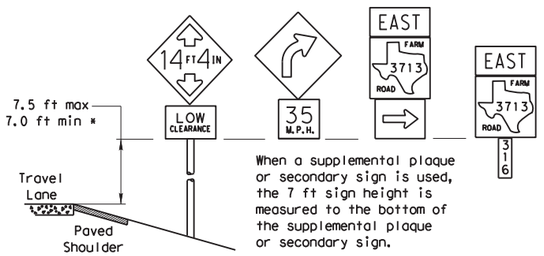
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



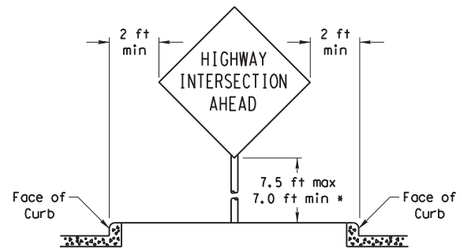
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



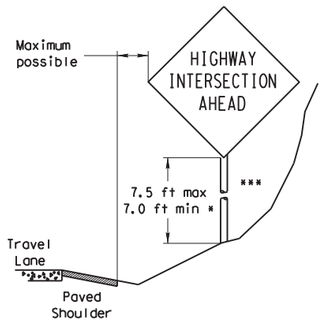
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

* Signs shall be mounted using the following condition that results in the greatest sign elevation:

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

The website address is:
http://www.txdot.gov/publications/traffic.htm

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

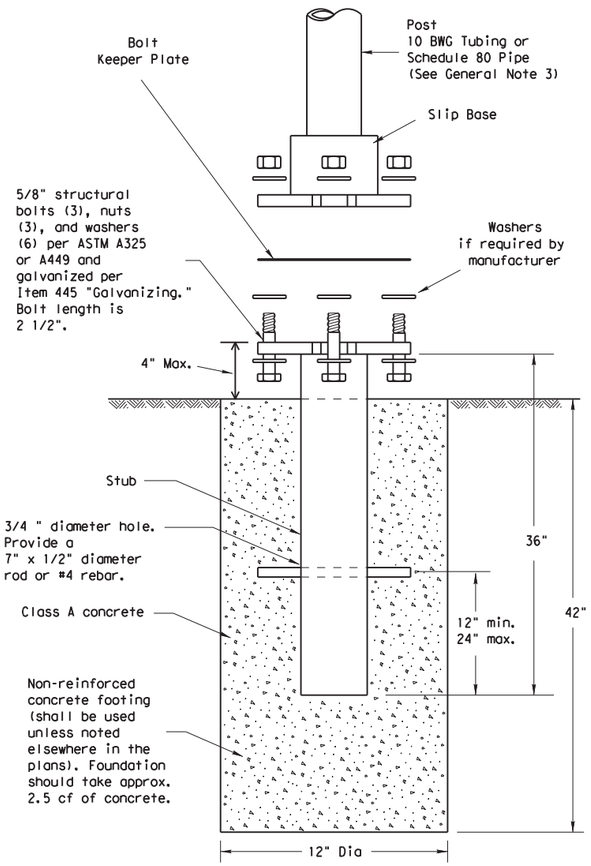
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS 9-08

CONT	SECT	JOB	HIGHWAY
6473	31	001	SH 6, ETC.
DIST	COUNTY		SHEET NO.
WACO	MCLENNAN, ETC.		42

DATE:
FILE:

TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



SM RD SGN ASSM TY XXXXX(X)SA(X-XXXX)

NOTE

There are various devices approved for the Triangular Slipbase System. Please reference the Material Producer List for approved slip base systems. http://www.txdot.gov/business/producer_list.htm The devices shall be installed per manufacturers' recommendations. Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   10 BWG Tubing (2.875" outside diameter)
   - 0.134" nominal wall thickness
   - Seamless or electric-resistance welded steel tubing or pipe
   - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   - Other steels may be used if they meet the following:
     - 55,000 PSI minimum yield strength
     - 70,000 PSI minimum tensile strength
     - 20% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
   - Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
   - Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.

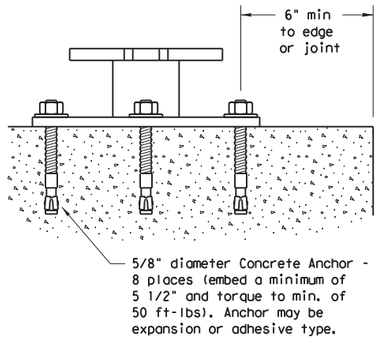
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum yield strength
     - 62,000 PSI minimum tensile strength
     - 21% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
   - Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
   - Galvanization per ASTM A123
3. See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is: http://www.txdot.gov/publications/traffic.htm
4. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

Foundation
1. Prepare 12-inch diameter by 42-inch deep hole. If solid rock is encountered, the depth of the foundation may be reduced such that it is embedded a minimum of 18 inches into the solid rock.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor-driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
3. Push the pipe end of the slip base stub into the center of the concrete. Rotate the stub back and forth while pushing it down into the concrete to assure good contact between the concrete and stub. Continue to work the stub into the concrete until it is between 2 to 4 inches above the ground.
4. Plumb the stub. Allow a minimum of 4 days to set, unless otherwise directed by the Engineer.
5. The triangular slipbase system is multidirectional and is designed to release when struck from any direction.

Support
1. Cut support so that the bottom of the sign will be 7 to 7.5 feet above the edge of the travelway (i.e., edge of the closest lane) when slip plate is below the edge of pavement or 7 to 7.5 feet above slip plate when the slip plate is above the edge of the travelway. The cut shall be plumb and straight.
2. Attach sign to support using connections shown. When multiple signs are installed on the same support, ensure the minimum clearance between each sign is maintained. See SMD(SLIP-2) for clearances based on sign types.

CONCRETE ANCHOR



SM RD SGN ASSM TY XXXXX(X)SB(X-XXXX)

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

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

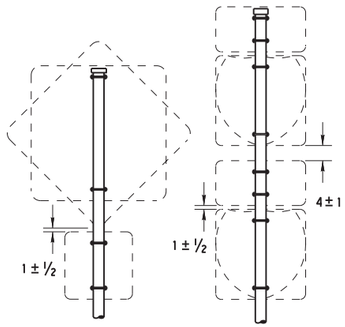
REVISIONS
9-08

CONT	SECT	JOB	HIGHWAY
6473	31	001	SH 6, ETC.

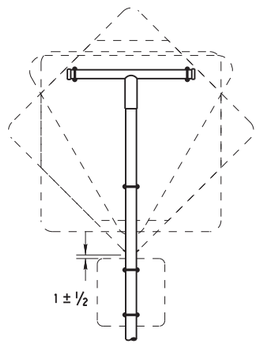
DIST	COUNTY	SHEET NO.
WACO	MCLENNAN, ETC.	43

DATE:
FILE:

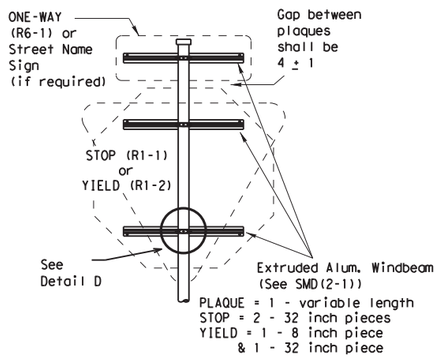
DATE:
FILE:



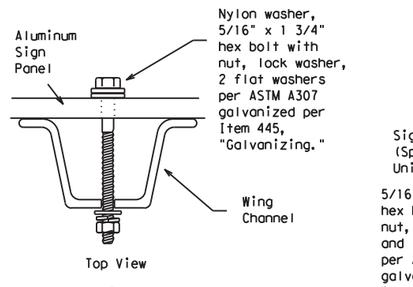
SM RD SGN ASSM TY XXXXX(1)XX(P)



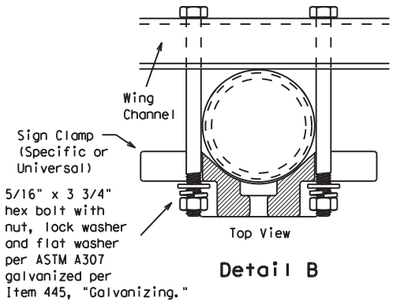
SM RD SGN ASSM TY XXXXX(1)XX(T)



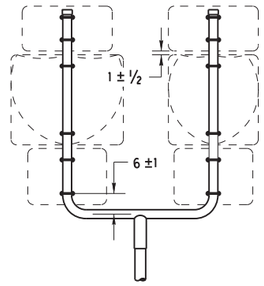
SM RD SGN ASSM TY XXXXX(1)XX(P-BM)



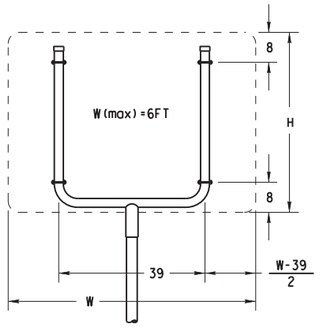
Detail A



Detail B



SM RD SGN ASSM TY XXXXX(1)XX(U)



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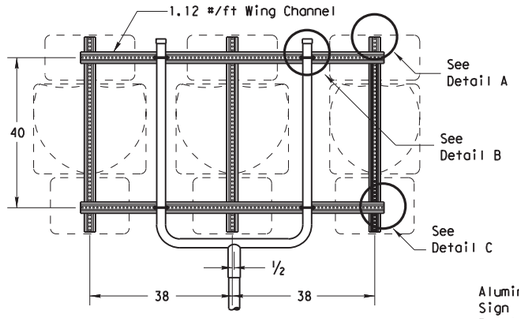
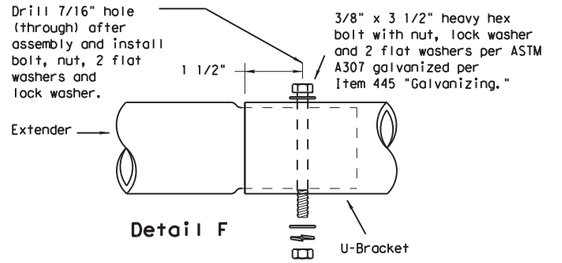
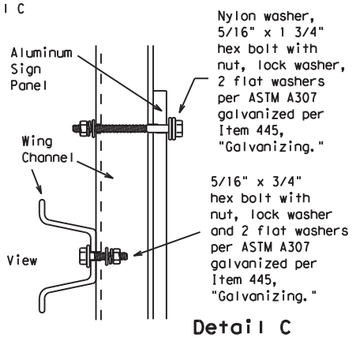


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

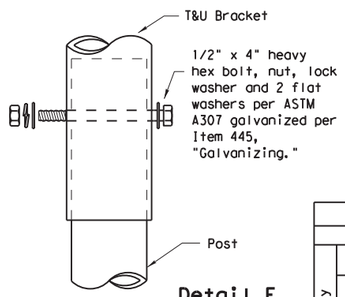


Detail F

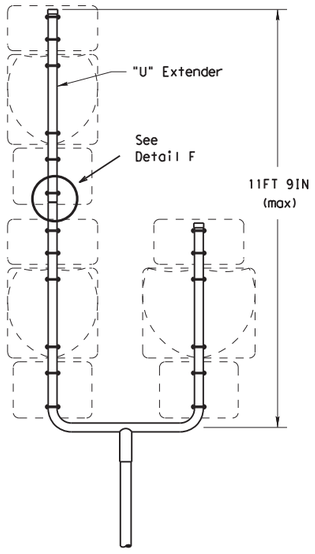
Splices shall only be allowed behind the sign substrate.



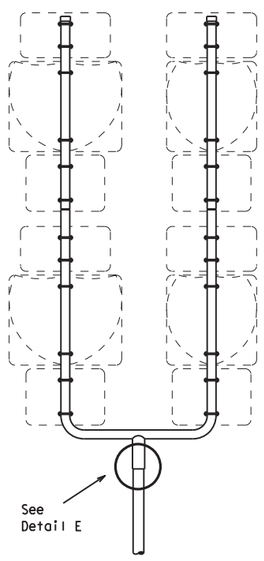
Detail C



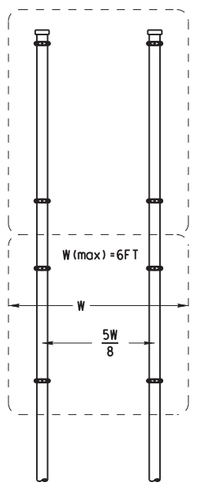
Detail E



SM RD SGN ASSM TY S80(1)XX(U-1EXT)

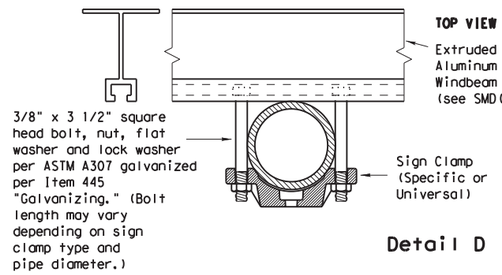


SM RD SGN ASSM TY S80(1)XX(U-2EXT)

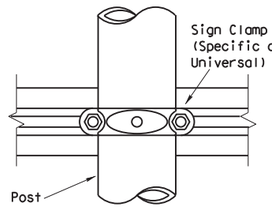


SM RD SGN ASSYM TY XXXXX(2)XX(P)

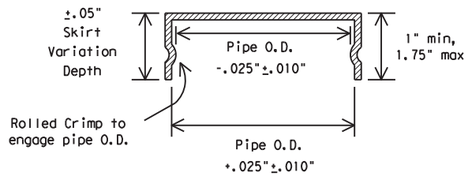
SIDE VIEW



Detail D



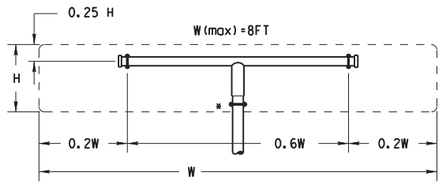
FRICTION CAP DETAIL



Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes.

The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.



All dimensions are in english unless detailed otherwise.

SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

GENERAL NOTES:

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

1.
2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
11. Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.
13. Sign blanks shall be the sizes and shapes shown on the plans.

REQUIRED SUPPORT

	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

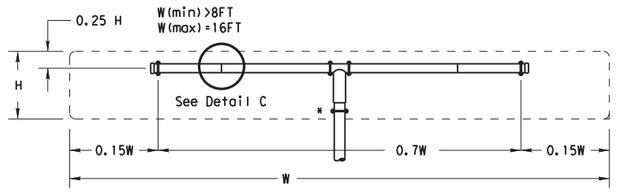
Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

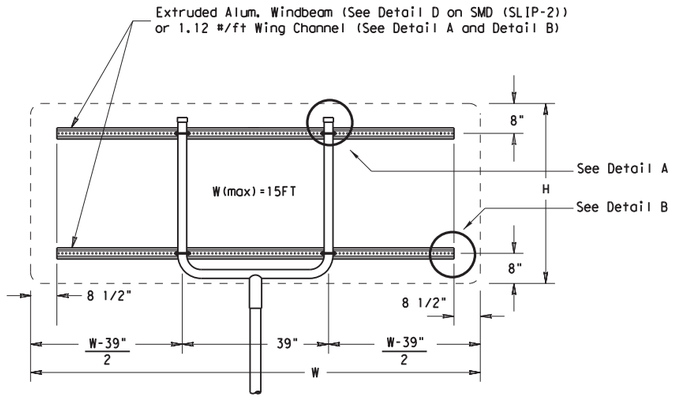
SMD(SLIP-2)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	6473	31	001	SH 6, ETC.
	DIST	COUNTY		SHEET NO.
	WACO	MCLENNAN, ETC.		44

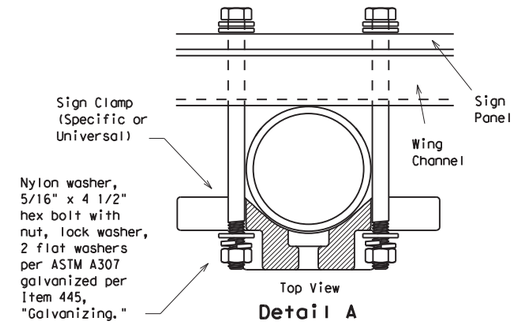
DATE:
FILE:



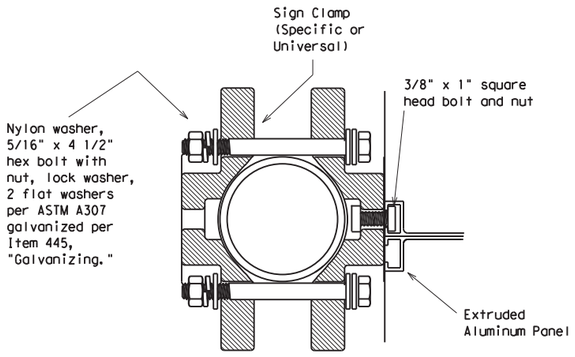
SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)



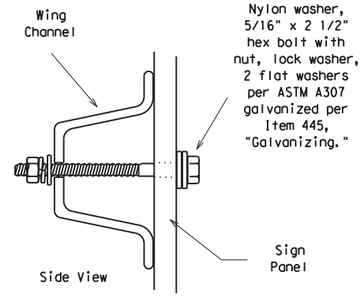
SM RD SGN ASSM TY XXXXX(1)XX(U-XX)



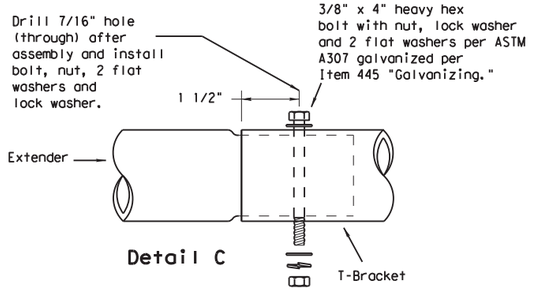
Detail A



Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET

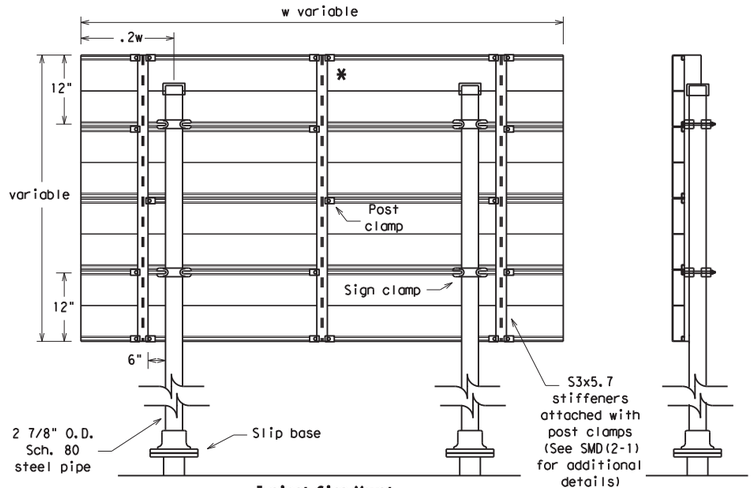


Detail B



Detail C

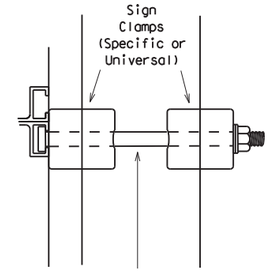
Splices shall only be allowed behind the sign substrate.



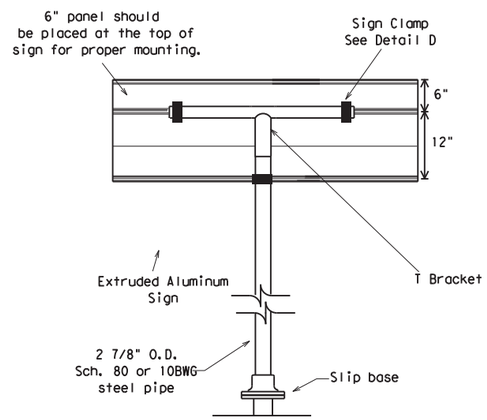
Typical Sign Mount

SM RD SGN ASSM TY S80(2)XX(P-EXAL)

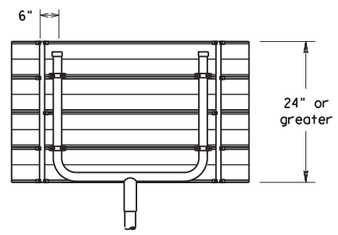
* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.



Detail E



Extruded Aluminum Sign
With T Bracket



Use Extruded Alum. Windbeam as stiffeners
See SMD (2-1) for additional details

See Detail E
for clamp installation

GENERAL NOTES:

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

1. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
2. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
3. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
4. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
5. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
6. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
7. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
8. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
9. Sign blanks shall be the sizes and shapes shown on the plans.
10. Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
11. Post open ends shall be fitted with Friction Caps.

REQUIRED SUPPORT

	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

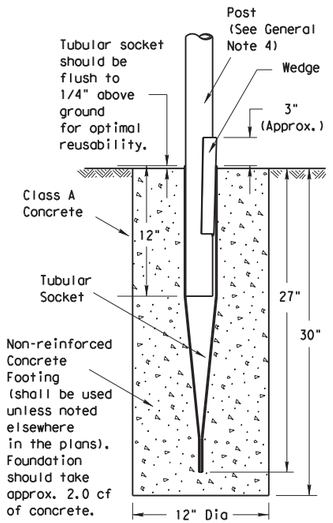
REVISIONS
9-08

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

CONT	SECT	JOB	HIGHWAY
6473	31	001	SH 6, ETC.

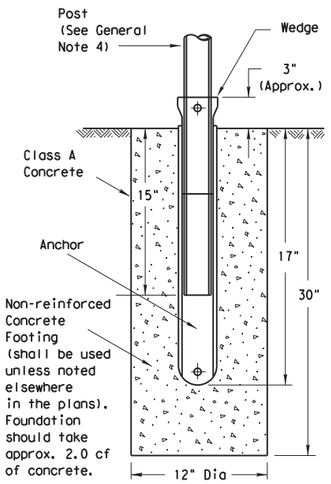
DIST	COUNTY	SHEET NO.
WACO	MCLENNAN, ETC.	45

Wedge Anchor Steel System



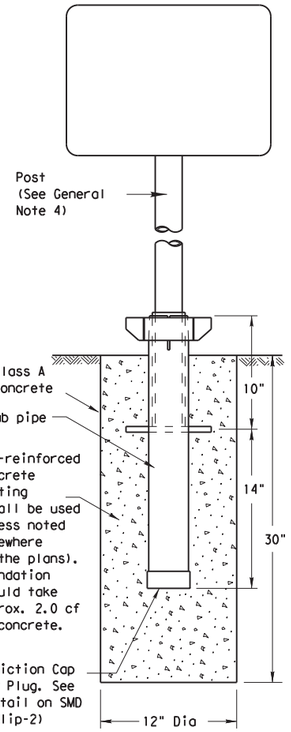
SM RD SGN ASSM TY TWT(X)WS(X)

Wedge Anchor High Density Polyethylene (HDPE) System

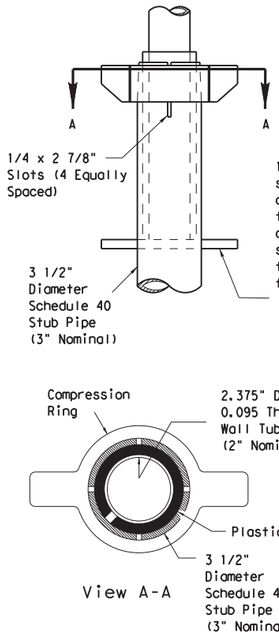


SMD RD SGN ASSM TY TWT(X)WP(X)

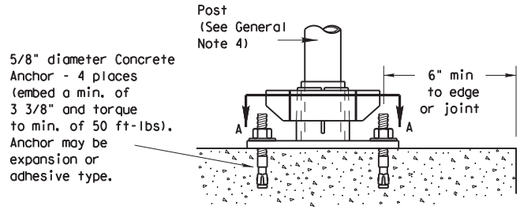
Universal Anchor System with Thin-Walled Tubing Post



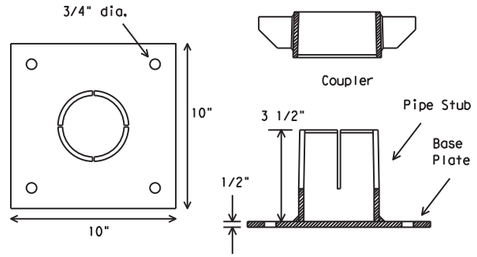
SM RD SGN ASSM TY TWT(X)UA(P)



Plastic insert must be used when using the TWT with either the Universal Anchor System or the Bolt Down Universal Anchor System. The insert should be approx. 10" long and cover the tubing from just above the top of the stub pipe to the bottom of the sign post when using the Universal Anchor System. The insert should be cut to approx. 4 1/2" when used with the Bolt Down Universal Anchor System.

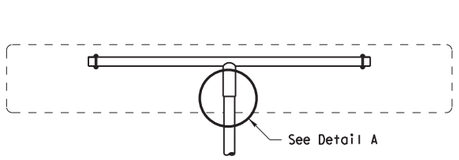


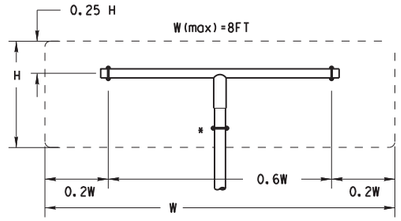
Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. A heavy hex nut per ASTM A563 and hardened washer per ASTM F436. The stud bolt shall have minimum yield and ultimate tensile strengths of 50 and 75 ksi, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Top of bolt shall extend at least flush with top of nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 3 3/8" minimum embedment, shall have a minimum allowable tension and shear of 2450 and 1525 psi, respectively. Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations.



SM RD SGN ASSM TY TWT(X)UB(P)

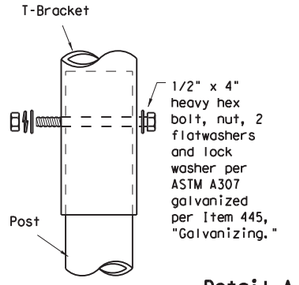
Sign Installation Using a Prefabricated T-Bracket for Thin-Wall Tubing Post





SM RD SGN ASSM TY TWT(X)XX(T)

(* - See General Note 6)



Detail A

9/16" hole may need to be drilled through post to accommodate bolt.

NOTE

The devices shall be installed per manufacturer's recommendations.
Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. The Wedge Anchor System and the Universal Anchor System with thin wall tubing post may be used to support up to 10 square feet of sign area.
2. The tubular socket, wedge and prefabricated T-bracket shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to the approval of the TxDOT Traffic Standards Engineer.
3. Except for posts (13 BWG Tubing), clamps, nuts and bolts, all components shall be prequalified. A list of prequalified vendors may be obtained from the Material Producer List web page. The website address is: http://www.txdot.gov/business/producer list.htm
4. Material used as post with this system shall conform to the following specifications:
   13 BWG Tubing (2.375" outside diameter) (TWT)
   0.095" nominal wall thickness
   Seamless or electric-resistance welded steel tubing
   Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   Other steels may be used if they meet the following:
   55,000 PSI minimum yield strength
   70,000 PSI minimum tensile strength
   18% minimum elongation in 2"
   Wall thickness (uncoated) shall be within the range of .083" to .099"
   Outside diameter (uncoated) shall be within the range of 2.369" to 2.381"
   Galvanization per ASTM 123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.
5. Sign blanks shall be the sizes and shapes shown on the plans.
6. Additional sign clamp required on the "T-bracket" post for 24" high signs. Place clamp at least 3" above bottom of sign when possible.
7. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
8. See the Traffic Operations Division website for detailed drawings of sign clamps and Wedge Anchor System components. The website address is: http://www.txdot.gov/publications/traffic.htm

WEDGE ANCHOR SYSTEM INSTALLATION PROCEDURE

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Place concrete into hole until it is approximately flush with the ground. Concrete shall be Class A.
3. Insert tubular socket into concrete until top of socket is approximaely 1/4 " above the concrete footing.
4. Plumb the socket. Allow a minimum 4 days for concrete to set, unless otherwise directed by Engineer..
5. Attach the sign to the sign post.
6. Insert the sign post into socket and align sign face with roadway.
7. Drive the wedge into the socket to secure post. This will leave approximately 3 inches of the wedge exposed.

UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURE

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
2. Insert base post in hole to depths shown and backfill hole with concrete.
3. Level and plumb the base post using a torpedo level and allow concrete adequate time to set. The bottom of the slots provided in the stub pipe shall remain above the top of the concrete foundation.
4. Attach the sign to the sign post.
5. Install plastic insert around bottom of post.
6. Insert sign post into base post. Lower until the post comes to rest on steel rod.
7. Seat compression ring using a hammer. Typically, the top of compression ring will be approximately level with top of stub post when optimally installed.
8. Check sign post by hand to ensure it is unable to turn. If loose, increase the tightening of the compression ring.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS WEDGE & UNIVERSAL ANCHOR WITH THIN WALL TUBING POST

SMD(TWT)-08

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

9-08 REVISIONS

CONT	SECT	JOB	HIGHWAY
6473	31	001	SH 6, ETC.
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WACO	MCLENNAN, ETC.		46

DATE:
FILE:

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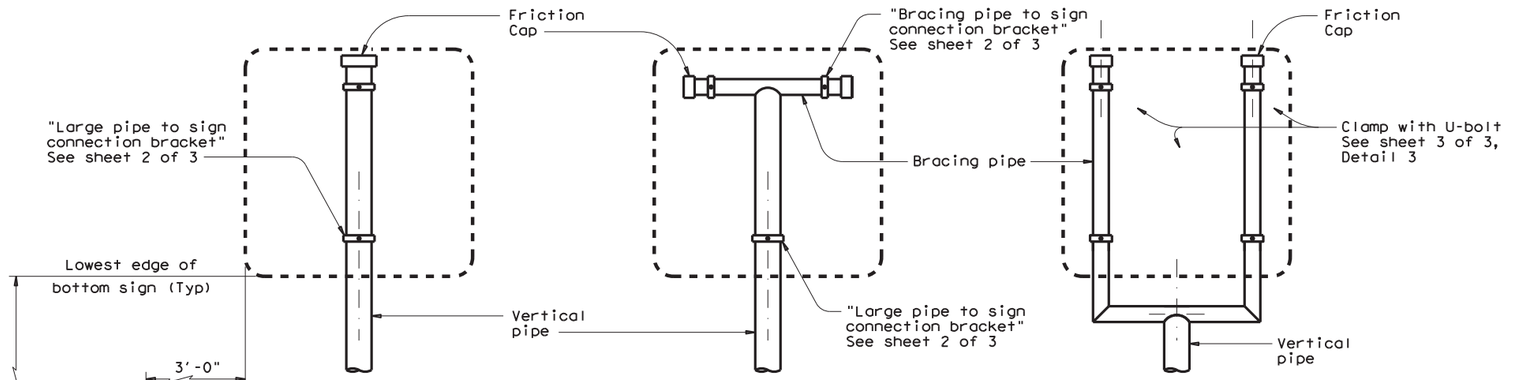
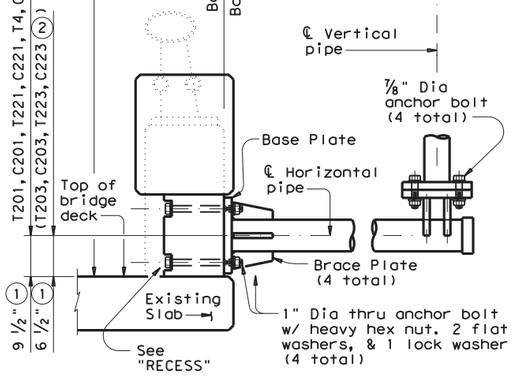
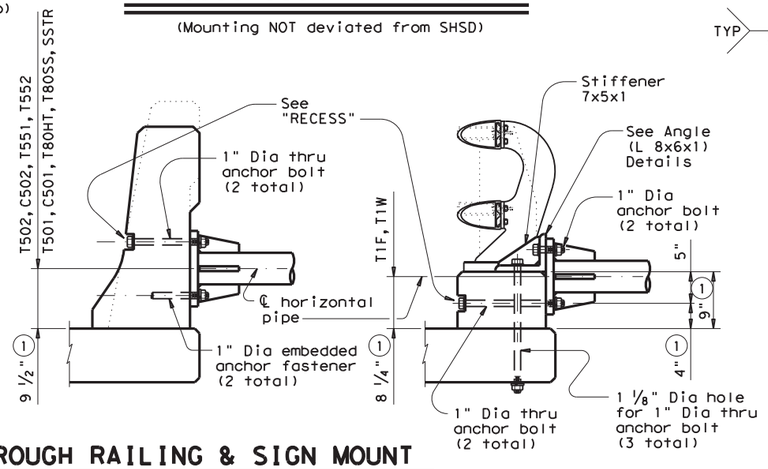


VARIOUS SIGN ATTACHMENTS

(Mounting NOT deviated from SHSD)

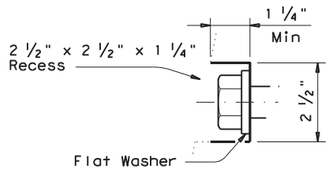




LONGITUDINAL SECTION THROUGH RAILING & SIGN MOUNT

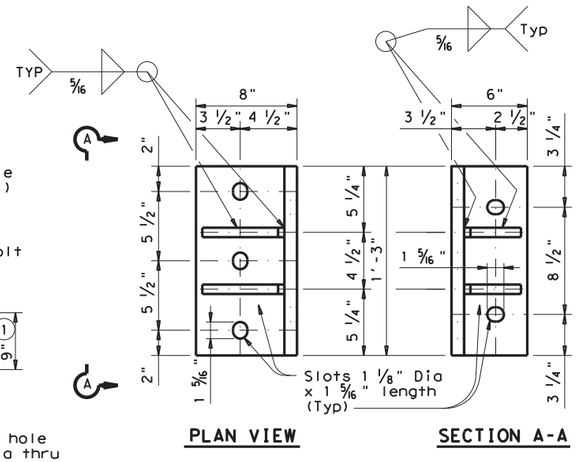
(1) Increase 2" for structure with overlay.

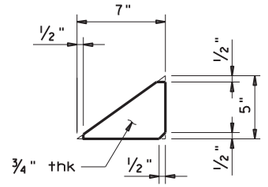
(2) Attached at ℄ post.



RECESS

PIPE SIZE AND THICKNESS			
Pipe Placement / Design Wind Speed	Horizontal	Vertical	Bracing
90 mph	5" X-Strong (.375")	4" X-Strong (.337")	2 1/2" Standard (.203")
130 mph	6" X-Strong (.432")	5" X-Strong (.375")	3" X-Strong (.300")





STIFFENER

ANGLE (L 8x6x1) DETAILS

GENERAL NOTES:

Design conforms to 2013 AASHTO Standard Specifications for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications thereto. Design 3-second gust wind speeds of 90 mph and 130 mph with a 1.14 gust factor, and a wind importance factor of 1.0 (50-year mean recurrence interval) for the supporting structures. For mounting connection between sign panel and pipe, wind importance factors of 0.71 and 0.54, for 90 mph and 130 mph winds, respectively, are applied to adjust the wind speeds to a 10-year mean recurrence interval.

See standard sheet WV & IZ(LTS2013) for the boundaries of each design wind zone. All mounting shall be based on 130 mph wind speed design except when located in 90 mph wind zone. Maximum panel area is 30 sq. ft. Maximum design height is 50 ft, with design height defined as the distance between natural ground (average elevation of surrounding terrain) and the center of sign(s) at the mounting location.

Material for pipe shall be ASTM A53 Grade B, or A501. Structural steel plates shall be ASTM A36, A572 Grade 50, or A588. Bolts used to connect pipe and mounting bracket, and wind beam to sign panel shall be ASTM A307. Anchor bolts shall be ASTM A325 or A193 B7. Each anchor bolt shall be provided with 2 flat washers, 1 lock washer, and 1 heavy hex nut. All parts shall be galvanized in accordance with Standard Specifications Item 445, "Galvanizing".

Attach horizontal pipe at least 2'-0" from the edge of any nearby drain slot.

Contractor shall verify applicable field dimensions before fabrication. Holes drilled through the railing parapet wall shall be drilled with rotary (coring or masonry drill) type equipment. Percussion (star) drilling shall not be allowed. Anchorage for pipe attached to rail shall be placed using an anchoring system approved by the engineer. Installation of anchor fasteners including hole depth, diameter and material shall be in accordance with the manufacturers' recommendation.

Each embedded anchor fastener shall resist an allowable design loading (after applying the reduction factors of bolt spacing and bolt edge distance) of:

	130 mph	90 mph
Tension	12.5 kips	7.5 kips
Shear	9.0 kips	5.0 kips

Each anchoring system shall provide a capacity to resist the required tension and shear acting simultaneously.

For sign connection to mounting, shop drill holes on sign blank in accordance with the current Standard Highway Sign Designs for Texas (SHSD). Additional hole(s) needed to meet a stipulated-type mounting may be field drilled. For multi-sign or back-to-back signs mounting, the engineer shall determine the proper type which ensures each individual mounting meets requirements.

Refer to Standard sheets SMD(GEN), SMD(SLIP-2 and SMD(2-1) for details not covered here.

Texas Department of Transportation

Traffic Operations Division Standard

BRIDGE RAILING SIGN MOUNT DETAILS

SMD(BR-1)-14

FILE: smdbr-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	6473	31	001	SH 6, ETC.
	DIST	COUNTY		SHEET NO.
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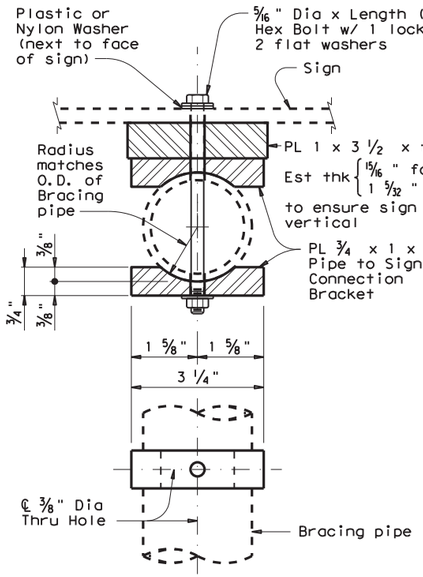
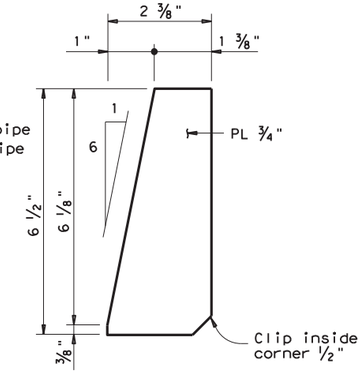
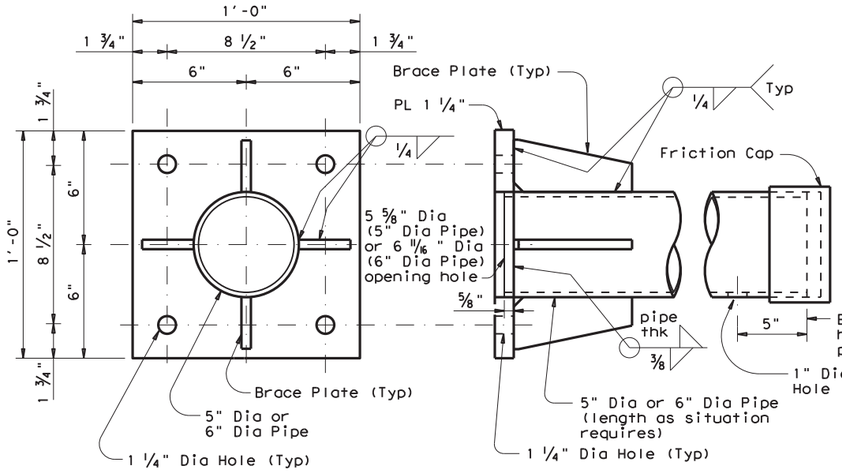


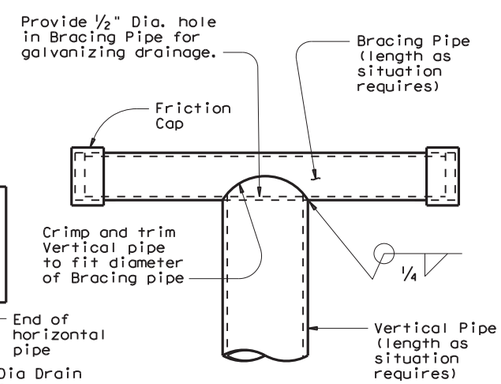
BRACING PIPE TO SIGN CONNECTION BRACKET DETAILS

(Showing T Mounting)

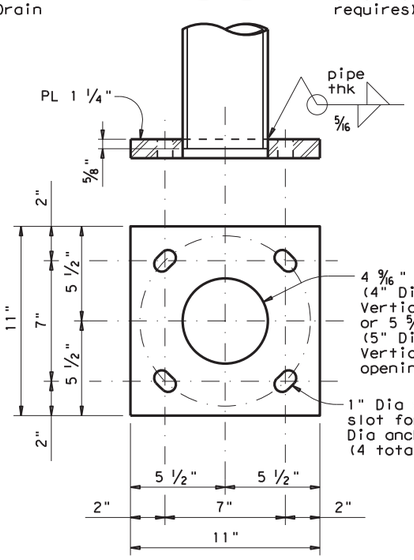


BRACE PLATE DETAILS



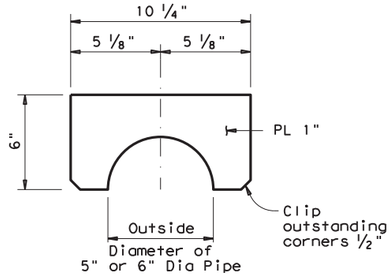


BASE PLATE DETAILS

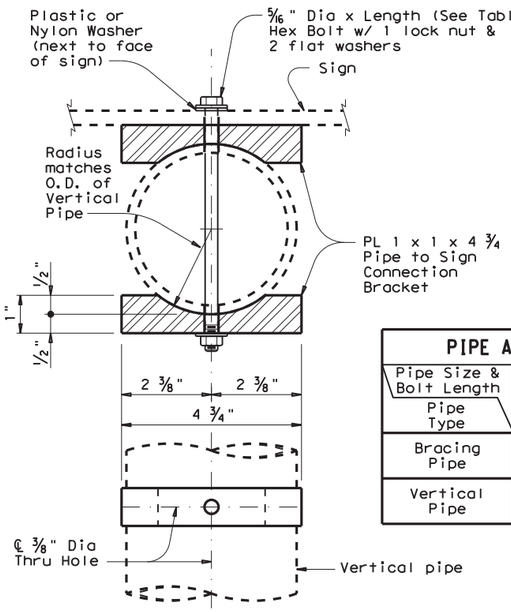


SIGN POLE & POLE BASE PLATE DETAILS

(Showing only T Mounting)



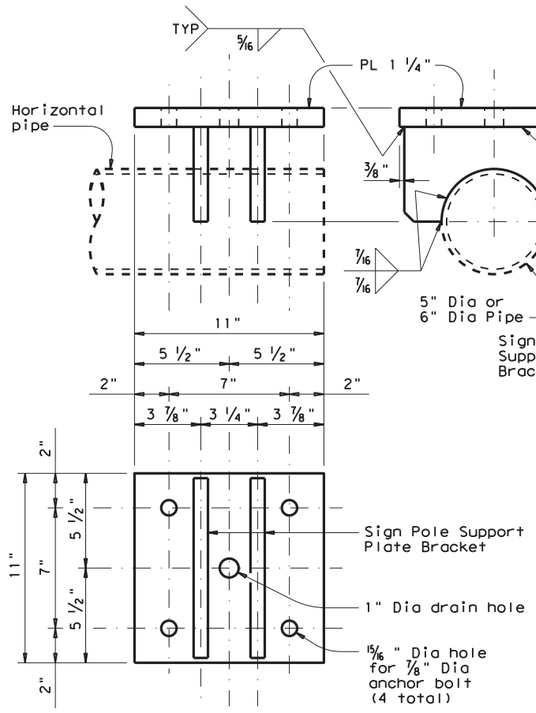
SIGN POLE SUPPORT PLATE BRACKET DETAILS



PIPE AND BOLT SPECIFICATIONS		
Pipe Size & Bolt Length / Pipe Type	Nominal Pipe Dia (in.)	Bolt Length (in.)
Bracing Pipe	2 1/2	6
	3	7
Vertical Pipe	4	7
	5	8

LARGE PIPE TO SIGN CONNECTION BRACKET DETAILS

(Showing P or T Mounting)



SIGN POLE SUPPORT PLATE DETAILS

SHEET 2 OF 3

Texas Department of Transportation

Traffic Operations Division Standard

BRIDGE RAILING SIGN MOUNT DETAILS

SMD(BR-2)-14

FILE: smdbr-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	6473	31	001	SH 6, ETC.
	DIST	COUNTY		SHEET NO.
	WACO	MCLENNAN, ETC.		48

26H

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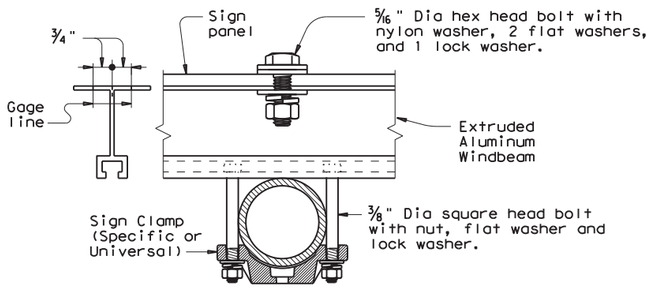
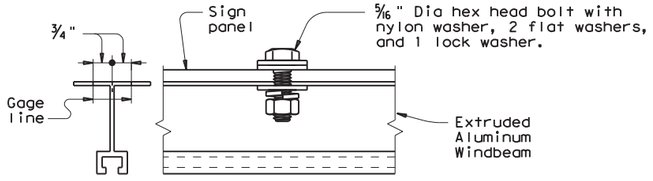


DETAIL 1



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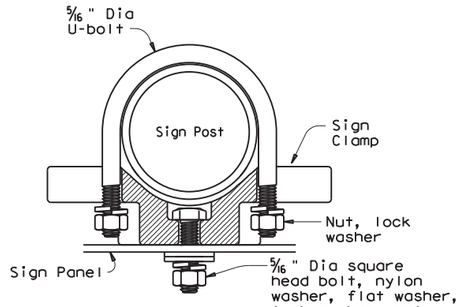
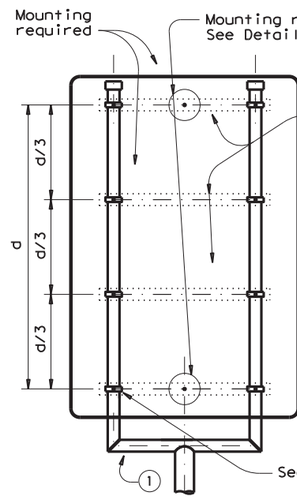


DETAIL 3

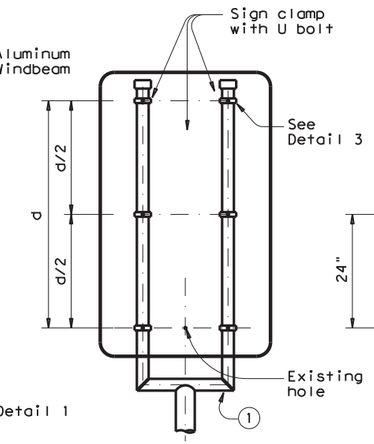
SIGN SHAPE	SQUARE			HORIZONTAL RECTANGLE			VERTICAL RECTANGLE			DIAMOND			OCTAGON			EQUILATERAL TRIANGLE			INTERSTATE SHIELD	PENTAGON (SCHOOL)	
Type of Sign Mounting on SHSD / Design Wind Speed	P	T	U	P	T	U	P	T	U	P	T	U	P	T	U	P	T	U	P	P	T
90 mph					(Type 23) 60"x48"	(Type 3) 72"x36" 78"x36" (Type 23) 72"x30" 84"x24"		(Type 2) 36"x48" (Type 32) 36"x60" 36"x72" 42"x60" 48"x54" 48"x60" 48"x72" (Type 3) 48"x84"			(Type 3) 60"x60"									(Type Special) 45"x36"		
130 mph	(Type 1) 30"x30" 36"x36"	(Type 3) 48"x48"		(Type 1) 36"x24" 36"x30"	(Type 23) 48"x42" 54"x42" 60"x30" 66"x36" 84"x24" (Type 3) 60"x48"	(Type 3) 72"x36" 78"x36" (Type 23) 72"x30" 84"x24"	(Type 1) 30"x36" 30"x42"	(Type 3) 36"x48" 36"x60" 36"x72" 42"x60" 48"x54" 48"x60" (Type 4) 48"x72" 48"x84"	(Type 3) 48"x60"	(Type 1) 36"x36"	(Type 3) 48"x48" 60"x60"					(Type 1) 48"x48"			(Type Special) 36"x36" 45"x36"		

Notes:
1. Drill holes in addition to the hole pattern of the Standard Highway Sign Designs for Texas (SHSD) at specified locations to meet a stipulated-type mounting indicated in the parenthesis ( ).
2. "Blank" in the above table indicates all other signs excluded from stipulated mounting shall be mounted in accordance with SHSD.

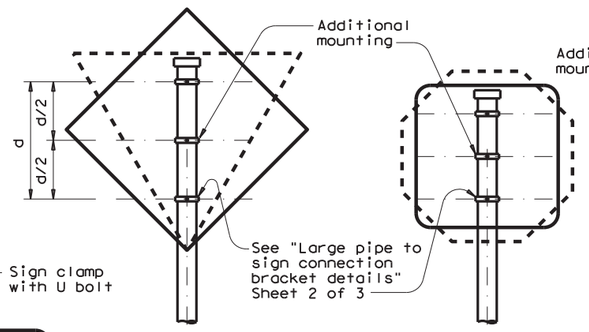
(1) In lieu of welding, the Fabricator may bend bracing pipe elbows if the following conditions are met:
a. Spacing between vertical bracing pipes is equal to or greater than 2'-6".
b. Bending radius is 12".
c. The distance between the lowest clamp and centerline of horizontal bent pipe is 13" max.



TYPE 4



TYPE 32



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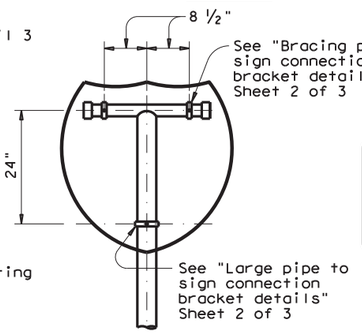

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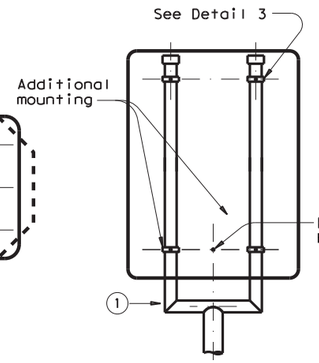

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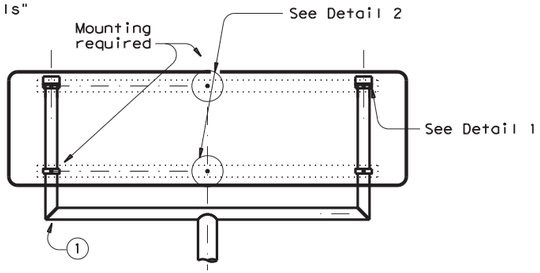

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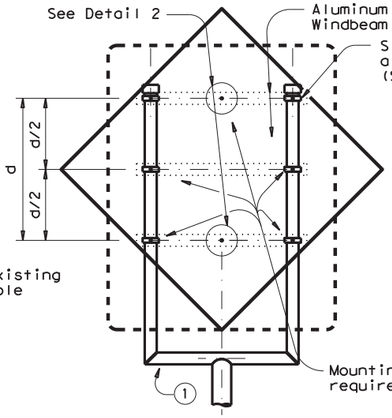

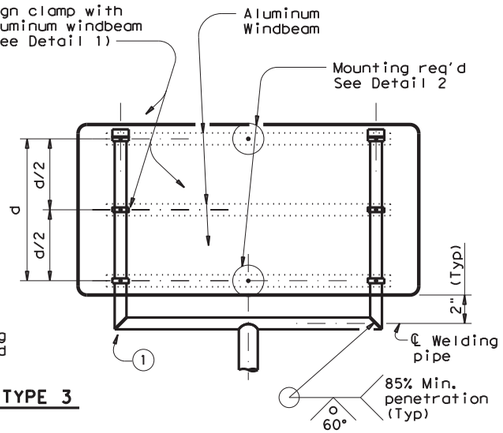

TYPE 3

SHEET 3 OF 3

Texas Department of Transportation

Traffic Operations Division Standard

BRIDGE RAILING SIGN MOUNT DETAILS

SMD(BR-3)-14

FILE: smdbr-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	6473	31	001	SH 6, ETC.
	DIST	COUNTY		SHEET NO.
	WACO	MCLENNAN, ETC.		49

DATE: 9/16/2024 11:39:45 AM
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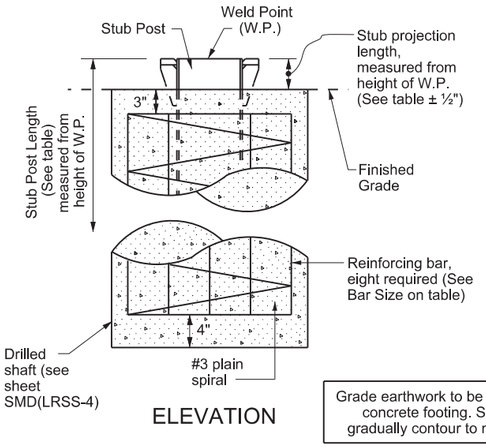
REINFORCED FOUNDATION DETAIL



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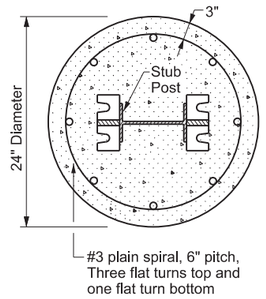
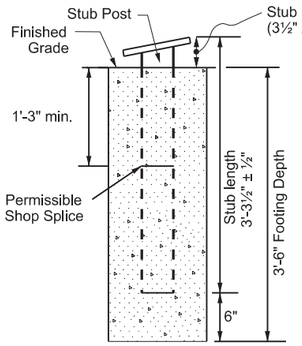


PLAN

Grade earthwork to be flush with the concrete footing. Slopes shall gradually contour to match plans.

☐ NON-REINFORCED FOUNDATION DETAIL



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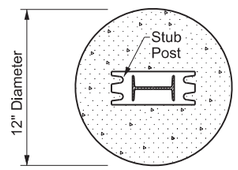


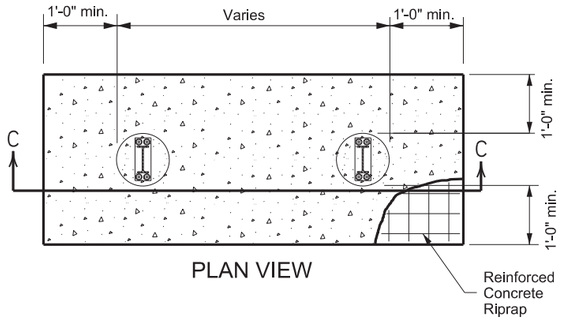
PLAN

Grade earthwork to be flush with the concrete footing. Slopes shall gradually contour to match plans.

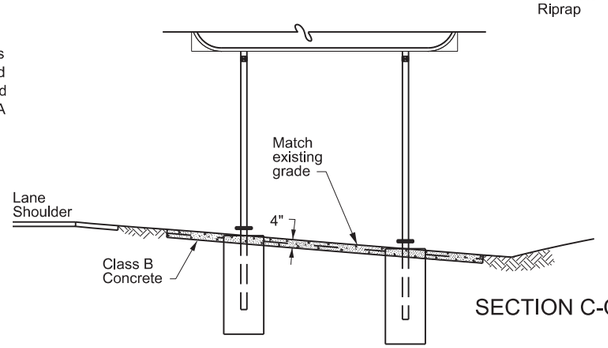
SIGN RIPRAP APRON DETAIL

NOTES:

1. Sign riprap aprons are optional.
2. If used, the depth of the apron shall be 4" or as indicated elsewhere on the plans.
3. Reinforced concrete shall be placed in accordance with Item 432, "Riprap."
4. Typical reinforcement is comprised of #3 or #4 bars @ 12" c.c. in both directions. However, the use of synthetic fiber, in lieu of steel reinforcing, is also acceptable; provided the fiber producer is listed on the "Fibers for Class A and Class B Concrete Applications" Material Producer List (MPL).



PLAN VIEW



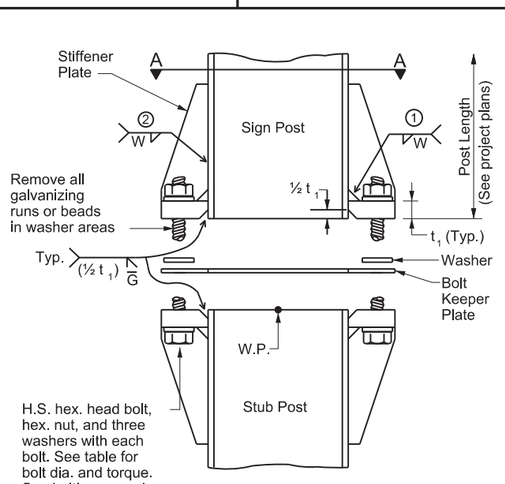
SECTION C-C

BOLTING PROCEDURE FOR ASSEMBLY OF BASE CONNECTION

1. Assemble sign post, BOLT KEEPER PLATE and stub post with bolts and three flat washers per bolt, as shown.
2. Shim as required, to plumb post.
3. Tighten all bolts to the maximum possible with a 12 to 15 inch wrench to clean bolt threads and to bed washers and shims.
4. Loosen each bolt in sequence and retighten bolts in a systematic order, to the prescribed torque. Do not overtighten.
5. To prevent nut loosening, burr threads of bolt at junction with nut using a center punch.

STRUCTURAL DATA TABLE

DIMENSIONS	BASE CONNECTION										BOLT KEEPER PLATE			FOUNDATION				
Post Size	Bolt Size & Torque	A	B	C	D	E	t_1	t_2	W	R	P	S	U	Stub length	Stub projection	Drill Shaft diameter	Bar Size	Concrete Type
W12x26	¾"Φ x 3½" 740-750 inch pounds 62-63 foot pounds	6"	2¼"	1⅜"	3½"	1¼"	1"	¾"	5⁄16"	13⁄32"	15"	1½"	16¾"	3'-0"	2½"	24"	#11	C
W10x22											12⅞"		14⅝"	3'-0"	2½"		#9	
W8x21											11"		12¾"	3'-0"	2½"		#8	
W8x18	⅝"Φ x 2¾" 440-450 inch pounds 36-38 foot pounds	5"	2"	1¼"	2¾"	1⅛"	¾"	½"	¼"	1⁄32"	10⅝"	1"	12⅛"	2'-6"	3"		#7	
W6x15											8½"		10"	2'-6"	3"		#6	
W6x9											8⅜"		9⅞"	2'-0"	3"		#5	
S4x7.7	½"Φ x 2½" 440-450 inch pounds 36-38 foot pounds	See Sign Post Stub (S4x7.7 and S3x5.7)									See Sign Post Stub (S4x7.7 and S3x5.7)			3'-3½"	3½"	12"	Non-reinforced ☐	A
S3x5.7																		



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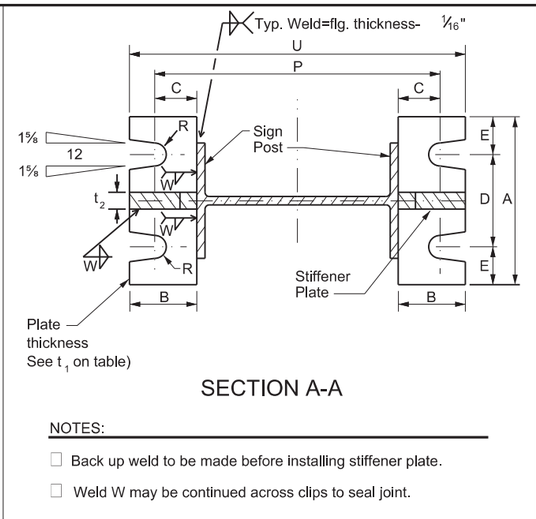
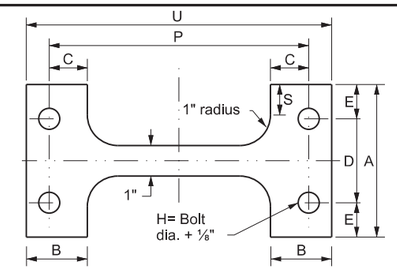


SECTION A-A

NOTES:

☐ Back up weld to be made before installing stiffener plate.

☐ Weld W may be continued across clips to seal joint.

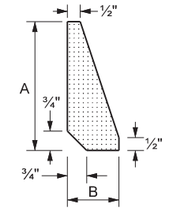


BOLT KEEPER PLATE
30 Ga galv. sheet steel

STIFFENER PLATE DETAIL

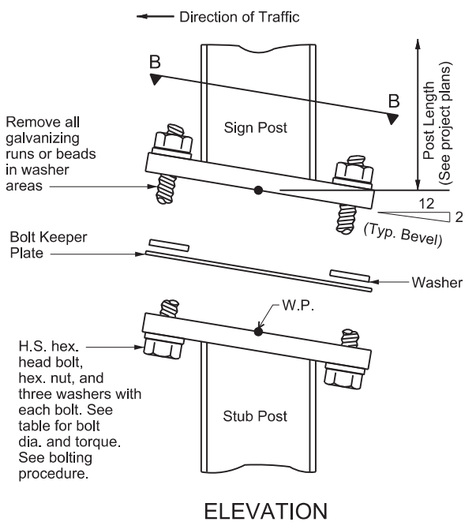
Steel Plate (thickness = t2)

(See Structural Data Table for dimensions)



SIGN POST AND STUB POST FOR WIDE FLANGE BEAMS (W)

SIGN POST AND STUB POST (FOR S4x7.7 AND S3x5.7)



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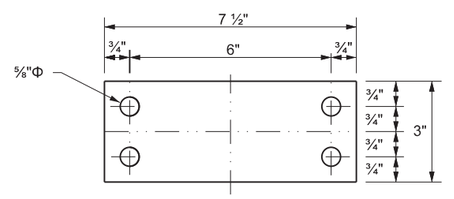
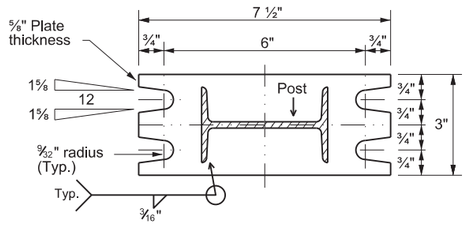
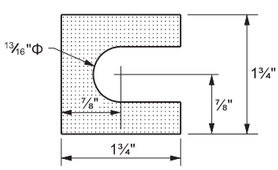


BOLT KEEPER PLATE
30 ga. galv. sheet steel



SECTION B-B



SHIM DETAIL

Furnish two .012"± thick and two .032"± thick shims per post. Shims shall be fabricated from brass shim stock or strip conforming to ASTM B36.

Texas Department of Transportation

Traffic Safety Division Standard

SIGN MOUNTING DETAILS LARGE ROADSIDE SIGNS FOUNDATION & STUB

SMD(2-1)-24

FILE: smd(2-1)-24.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	6473	31	001	SH 6, ETC.
8-95 5-24 4-98 9-08	DIST	COUNTY		SHEET NO.
	WACO	MCLENNAN, ETC.		50

27A

DATE: 9/16/2024 11:39:46 AM
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TYPICAL SIGN INSTALLATION AND LOCATION

LATERAL CLEARANCE NOTES:

1. Lateral clearances of signs mounted on the median side of the main lanes are the same as shown, where space will permit. Where a sign is to be located behind guardrail, an allowable minimum clearance of 5' may be used, measured from the face of the guardrail to the near edge of sign.
2. * 6' minimum and desirable may be used only in areas of limited lateral clearance and when approved by the Engineer.

POST SPACING NOTES:

1. Post spacing on a two post sign may be varied a maximum of ±10% of the total sign width to fit field conditions.
2. Post spacing on a three post sign may be varied a maximum of ±5% of the total sign width to fit field conditions.

SIGN HEIGHT NOTES:

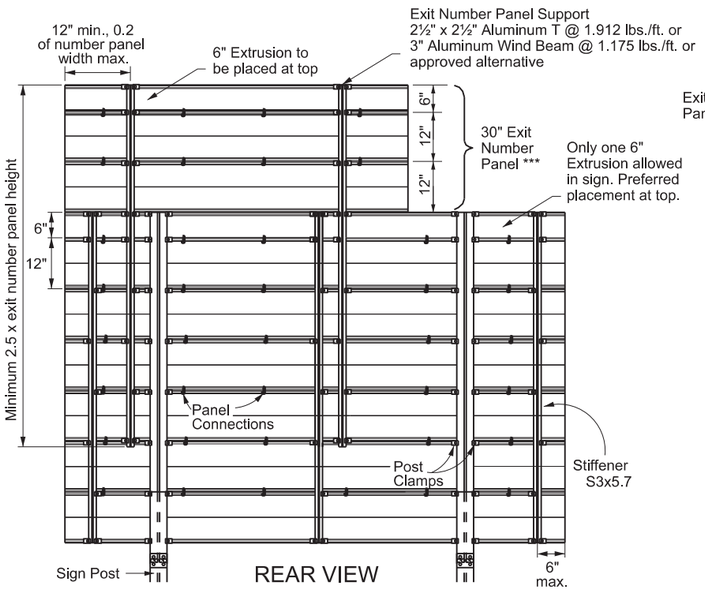
1. ** The 8'-6" maximum may be exceeded when placing signs on extreme slopes. In these conditions, a 7' minimum from natural ground to bottom of sign must be maintained.

GENERAL NOTES:

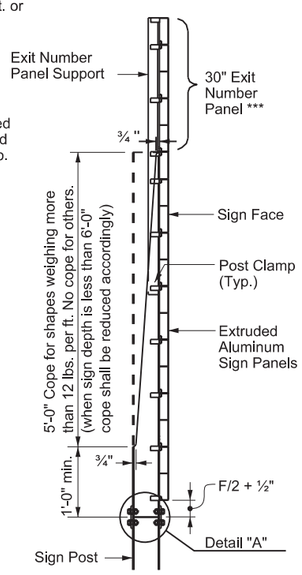
1. Exit number panel supports shall be ASTM A36 structural steel galvanized after fabrication, or ASTM B221 aluminum alloy 6061-T6 or approved alternative.
2. In accordance with DMS-7120, High-Strength (H.S.) Bolts, Nuts, and Washers shall be galvanized per ASTM Designation: B695 Class 50, or A153 Class C or D.
3. Posts, parent sign panels, and exit number panels shall comply with notes on sheets SMD(2-1) and SMD(2-3).
4. Signs (such as exit number panels) attached above a parent sign shall be made of the same type material as the parent sign. General Service and Routing sign plaques may be fabricated from flat sheet aluminum.
5. Exit number panel supports and other connection hardware required to fasten exit number panel to parent sign shall be subsidiary to "Aluminum Signs".
6. Signs to be furnished shall be detailed elsewhere in the plans. Refer to the "Typical Sign Requirements" standard for additional information.
7. *** Alternate exit number panel heights may be used, in accordance with the "Standard Highway Sign Designs for Texas (SHSD)."

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN HARDWARE	DMS-7120

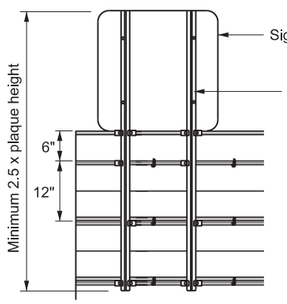
ALUMINUM PARENT SIGN & EXIT NUMBER PANEL MOUNTING DETAILS



REAR VIEW



SIDE VIEW

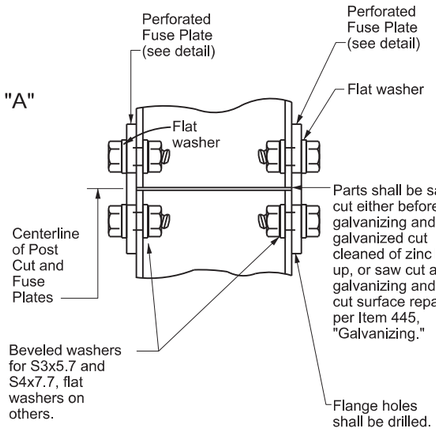


SIGN PLAQUE MOUNTING DETAIL

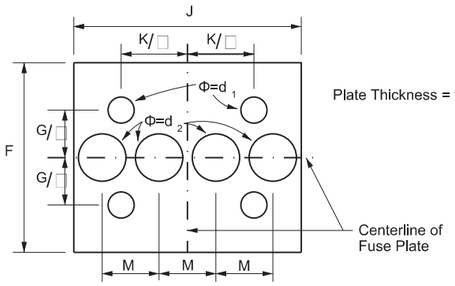
REAR VIEW

NOTE:
A sign plaque may be mounted to the parent sign or the exit number panel. See TSR(2) for typical plaque placement.

DETAIL "A"



PERFORATED FUSE PLATE DETAIL



NOTE:
Use H.S. hex head bolts, hex head nut, and bevel or flat washer (where req'd) under nut. All holes shall be drilled, sub-punched, and reamed. All plate cuts shall preferably be saw cuts. However, flame cutting will be permitted, provided all edges are ground. Metal projecting beyond the plane of the plate face will not be permitted. Steel fuse plates shall conform to the requirements of ASTM A36. ASTM A572 Grade 50 or ASTM A588 may be substituted for A36 at the option of the fabricator. Mill test reports shall be submitted for Fuse Plates. Steel used shall have an ultimate tensile strength not to exceed 80 KSI. For alternative Fuse Plates, contact the Traffic Safety Division.

STRUCTURAL DATA TABLE

DIMENSIONS	PERFORATED FUSE PLATE										
Post Size	F	G	J	K	M	d_1	d_2	t_3	Bolt Dia.	Wt. (ea.) (lbs.)	Bolt length
W12x26	6"	3"	6½"	3½"	1⅜"	13/16"	1 5/16"	½"	¾"	4.47	2¼"
W10x22	6"	3"	5¾"	2¾"	1⅜"	13/16"	1⅛"	½"	¾"	4.03	2¼"
W8x21	5½"	2½"	5¼"	2¾"	1¼"	13/16"	1"	½"	¾"	3.35	2¼"
W8x18	5"	2½"	5¼"	2¾"	1¼"	11/16"	1 1/16"	⅜"	⅝"	2.26	2¼"
W6x15	5"	2½"	6"	3½"	1½"	11/16"	1¼"	⅜"	⅝"	2.51	2¼"
W6x9	4¼"	2"	4"	2¼"	1"	9/16"	¾"	¼"	½"	1.01	1½"
S4x7.7	3¾"	1½"	2⅝"	1½"	⅝"	9/16"	⅜"	¼"	½"	0.60	1½"
S3x5.7											

Texas Department of Transportation

Traffic Safety Division Standard

SIGN MOUNTING DETAILS LARGE ROADSIDE SIGNS EXTRUDED ALUMINUM

SMD(2-2)-24

FILE: smd(2-2)-24.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	6473	31	001	SH 6, ETC.
8-95 9-08 5-24	DIST	COUNTY		SHEET NO.
	WACO	MCLENNAN, ETC.		51

27B

DATE: 9/16/2024 11:39:47 AM
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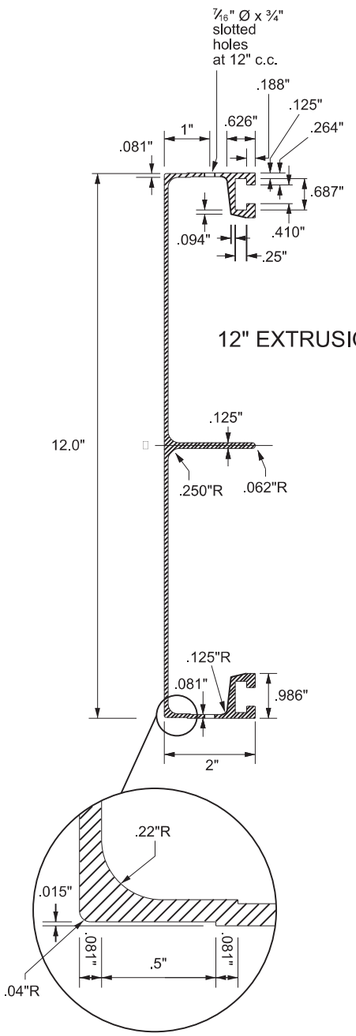
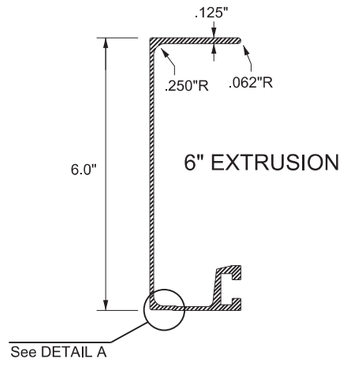
ALUMINUM SIGN PANEL EXTRUSION DETAILS

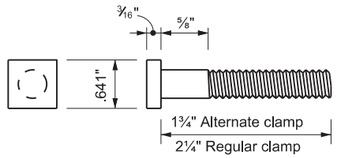


12" EXTRUSION

DETAIL A

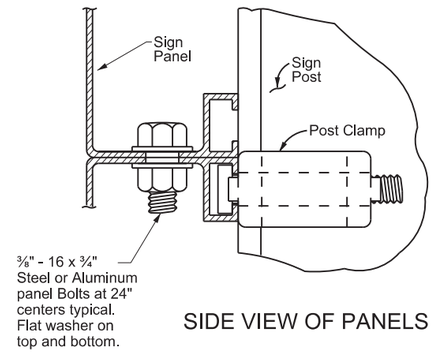


6" EXTRUSION



POST CLAMP BOLT DETAIL

PANEL CONNECTION DETAIL



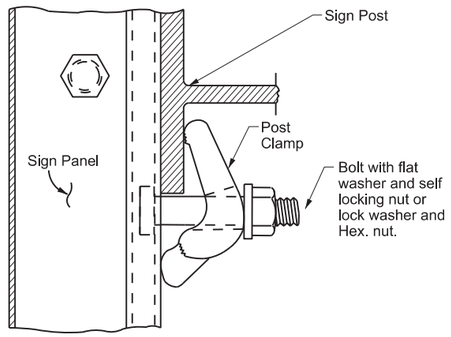
SIDE VIEW OF PANELS

GENERAL NOTES:

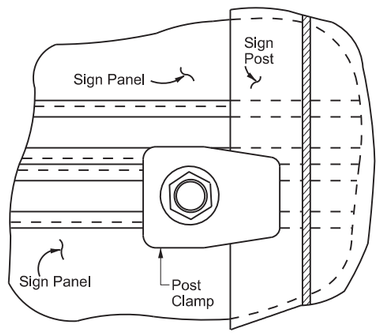
1. Design conforms with the 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals (Large Roadside Signs with a 25-year Mean Recurrence Interval, MRI, and Overhead Signs with a 50-year MRI).
2. Materials and fabrication shall conform to the requirements of the Department Material Specifications.
3. Structural steel shall be "low-alloy steel" for non-bridge structures per Item 442, "Metal For Structures."

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN HARDWARE	DMS-7120

POST CONNECTION DETAIL

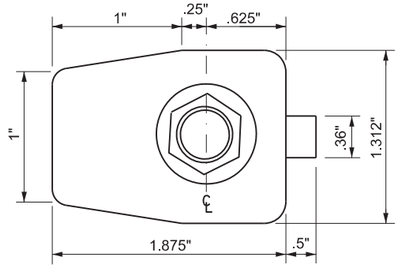


TOP VIEW OF POST

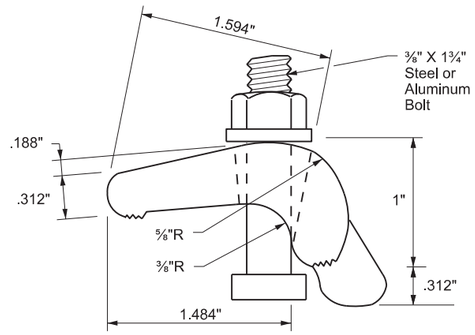


TOP VIEW OF CLAMP

REGULAR POST CLAMP DETAIL



PLAN

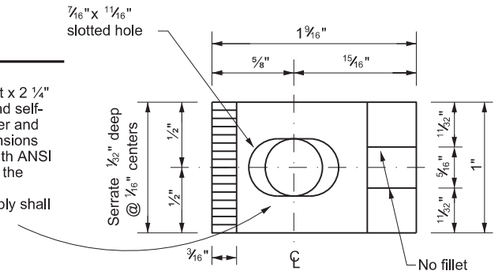


ELEVATION

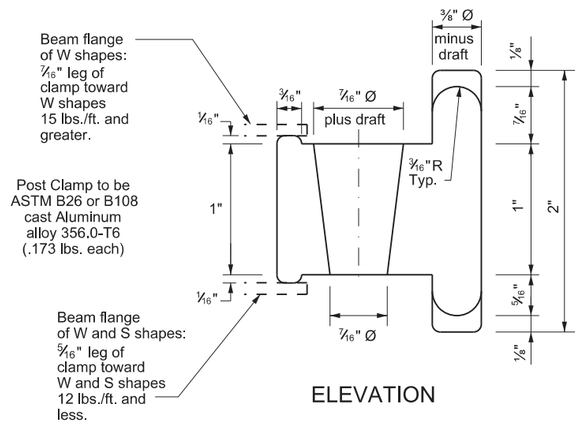
ALTERNATE POST CLAMP DETAIL

NOTE:

Centerline of hole for ⅜" diameter squarehead bolt x 2 ¼" long with a flat washer and self-locking nut, or lock washer and hex. nut. Bolt head dimensions shall be in accordance with ANSI B 18.2.1 as referred to in the AISC Manual of steel construction. Bolt assembly shall be galvanized.

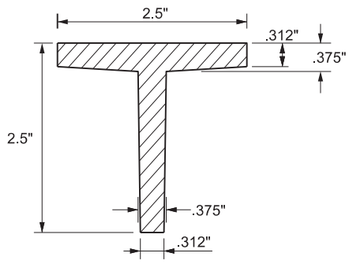


PLAN



ELEVATION

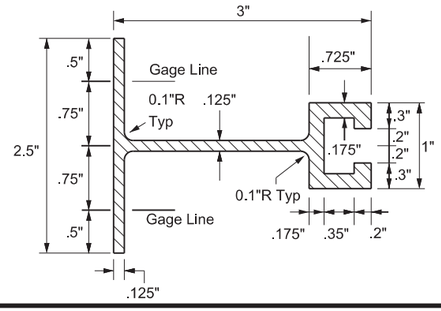
ALUMINUM T SECTION OR APPROVED ALTERNATIVE



1.912 lbs/ft

WINDBEAM CROSS SECTION

Windbeam to be extruded aluminum (1.175 lbs./ft.) or approved alternative



Texas Department of Transportation

Traffic Safety Division Standard

SIGN MOUNTING DETAILS SIGN PANELS & HARDWARE EXTRUDED ALUMINUM

SMD(2-3)-24

FILE: smd(2-3)-24.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	6473	31	001	SH 6, ETC.
2001 9-08 5-24	DIST	COUNTY		SHEET NO.
	WACO	MCLENNAN, ETC.		52

27C

DATE: 9/16/2024 11:39:48 AM
FILE: T:\WACTRAFF\RMC\DIST SIGN 2025\Plan Sheets\Standards\SMD(2-4)-24.dgn

TABLE 1

EXAMPLES (FOR DETERMINING Si and Sw)

NO.	SUPPORT	ZONE	"d"	EXIT PANEL	Si	Sw	COMMENT
1	S4x7.7 SPLIT 54%-46%	1	15.0	YES	5.0	10.0	Sw = 2x(Si)
2		2	14.0	YES	7.5	7.5	Sw = Si
3		1	15.0	NO	8.5	8.5	Sw = Si
4		3	14.0	NO	10.0	10.0	Sw = Si

Values shown for Si are maximum values. Si may be varied for different sign lengths and Truss mounting conditions. Sw should not exceed two times Si (Max.) or 10 feet.

TABLE 2

SPLIT 54%-46%

MAXIMUM SIGN SUPPORT SPACING 'Si" (FEET)

Bracket Type	"d" Deepest Sign in Group (feet)	EXTRUDED ALUMINUM SIGN PANELS							
		WITH EXIT NUMBER PANELS				WITHOUT EXIT NUMBER PANELS			
		WIND ZONE				WIND ZONE			
		1	2	3	4	1	2	3	4
S4x7.7	17	3.5	4.5	5.5	7	6	7.5	9	10
	16	4	5	6	8	7	9	10	10
	15	5	7	8	10	8.5	10	10	10
	14	6	7.5	9.5	10	10	10	10	10
	13	7.5	9	10	10	10	10	10	10
	12	8.5	10	10	10	10	10	10	10
	< 11	10	10	10	10	10	10	10	10
W6x12	20	6.5	8	9.5	10	10	10	10	10
	19	7.5	9	10	10	10	10	10	10
	18	8	10	10	10	10	10	10	10
	17	9	10	10	10	10	10	10	10
	16	10	10	10	10	10	10	10	10
	15	10	10	10	10	10	10	10	10
	14	10	10	10	10	10	10	10	10
	13	10	10	10	10	10	10	10	10
	12	10	10	10	10	10	10	10	10
	< 11	10	10	10	10	10	10	10	10

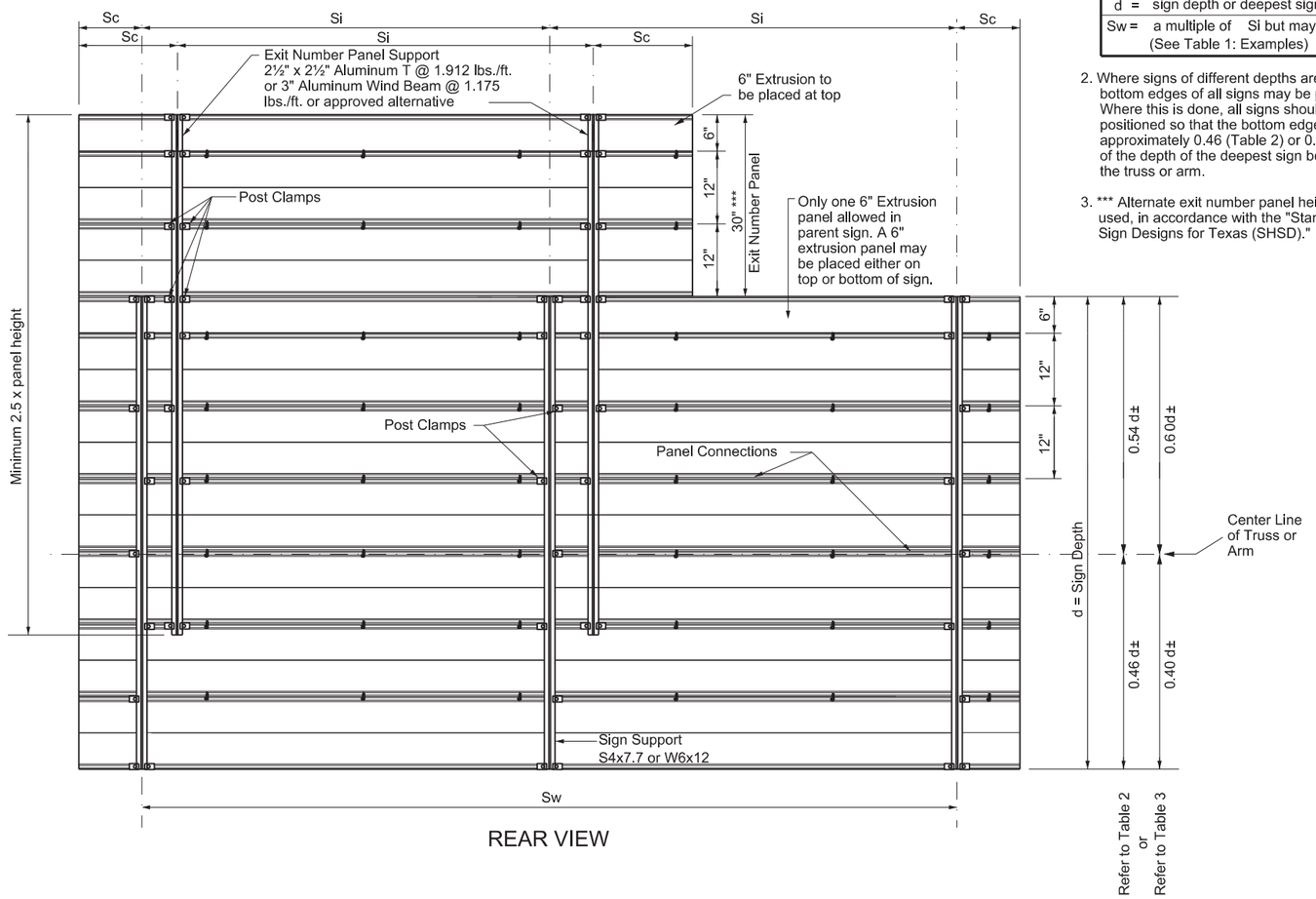
TABLE 3

SPLIT 60%-40%

MAXIMUM SIGN SUPPORT SPACING 'Si" (FEET)

Bracket Type	"d" Deepest Sign in Group (feet)	EXTRUDED ALUMINUM SIGN PANELS							
		WITH EXIT NUMBER PANELS				WITHOUT EXIT NUMBER PANELS			
		WIND ZONE				WIND ZONE			
		1	2	3	4	1	2	3	4
S4x7.7	15	3.5	4.5	5.5	7	6	7.5	9.5	10
	14	4	5	6.5	8	7.5	9.5	10	10
	13	5	6	7.5	9	9.5	10	10	10
	12	6	7	9	10	10	10	10	10
	< 11	7	8.5	10	10	10	10	10	10
W6x12	20	5	6	7	9.5	7	9	10	10
	19	5.5	6.5	8	10	8	10	10	10
	18	6	7.5	9	10	9.5	10	10	10
	17	7	8.5	10	10	10	10	10	10
	16	8	9.5	10	10	10	10	10	10
	15	9	10	10	10	10	10	10	10
	14	10	10	10	10	10	10	10	10
	13	10	10	10	10	10	10	10	10
	12	10	10	10	10	10	10	10	10
	< 11	10	10	10	10	10	10	10	10

ALUMINUM PARENT SIGN & EXIT NUMBER PANEL MOUNTING DETAILS



REAR VIEW

GENERAL NOTES:

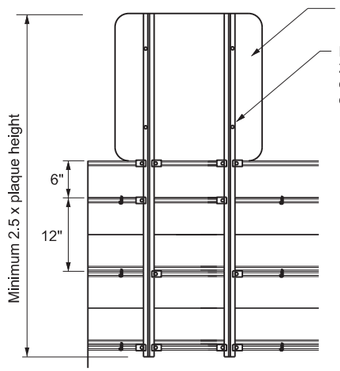
1.

Variables	
Sc =	6" Min., .25 Si Max.
Si =	Max. sign support spacing (feet)
d =	sign depth or deepest sign in group
Sw =	a multiple of Si but may not exceed 10' (See Table 1: Examples)

2. Where signs of different depths are used, the bottom edges of all signs may be placed in line. Where this is done, all signs should be positioned so that the bottom edges are approximately 0.46 (Table 2) or 0.40 (Table 3) of the depth of the deepest sign below the □ of the truss or arm.

3. *** Alternate exit number panel heights may be used, in accordance with the "Standard Highway Sign Designs for Texas (SHSD)."

SIGN PLAQUE MOUNTING DETAIL



REAR VIEW

NOTE:
A sign plaque may be mounted to the parent sign or the exit number panel. See TSR(2) for typical plaque placement.

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN HARDWARE	DMS-7120

Texas Department of Transportation

Traffic Safety Division Standard

SIGN MOUNTING DETAILS OVERHEAD SIGNS EXTRUDED ALUMINUM

SMD(2-4)-24

FILE: smd(2-4)-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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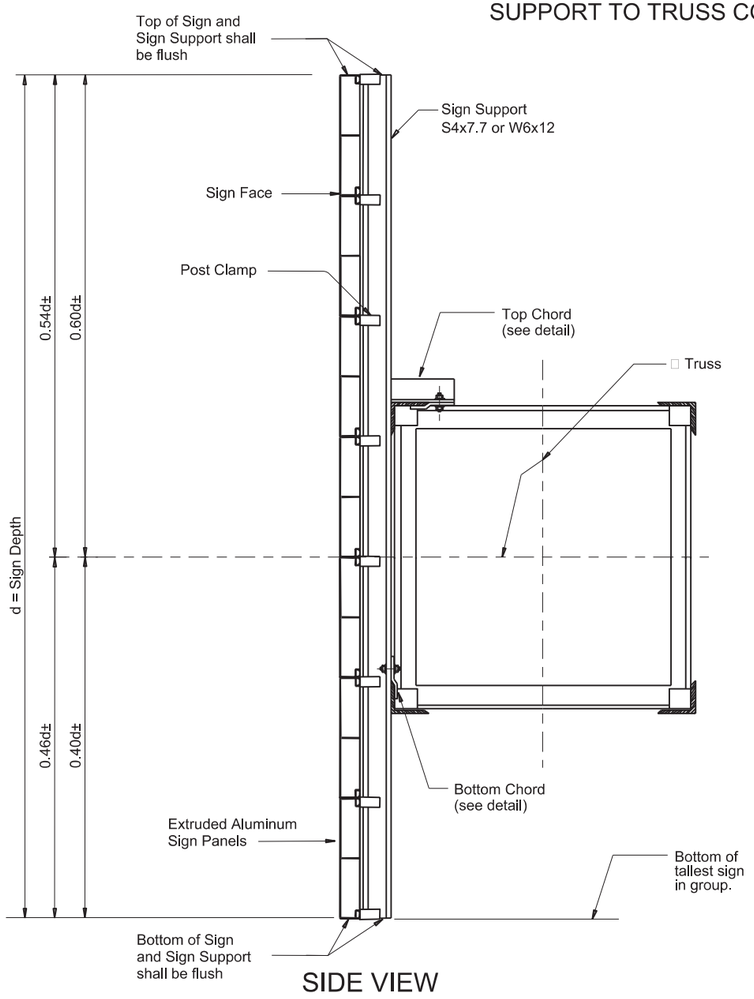
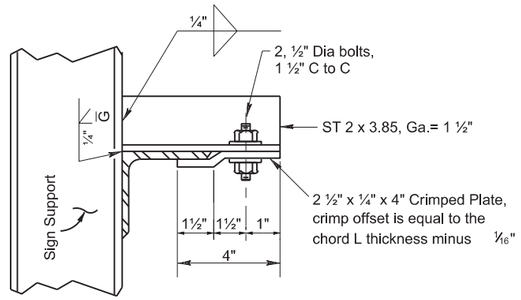
REVISIONS	6473	31	001	SH 6, ETC.
12-95 9-08 5-24	DIST	COUNTY		SHEET NO.
	WACO	MCLENNAN, ETC.		53

27D

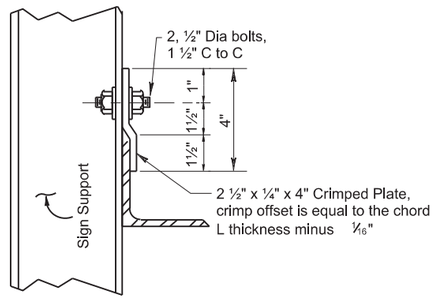
SUPPORT TO TRUSS CONNECTION - COSS AND OSB



SIDE VIEW



TOP CHORD

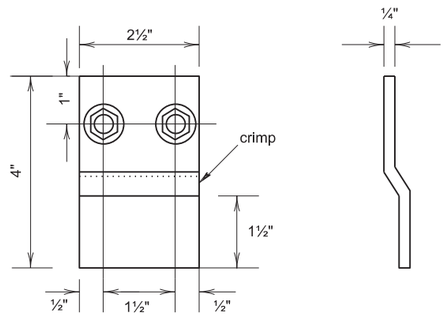


BOTTOM CHORD

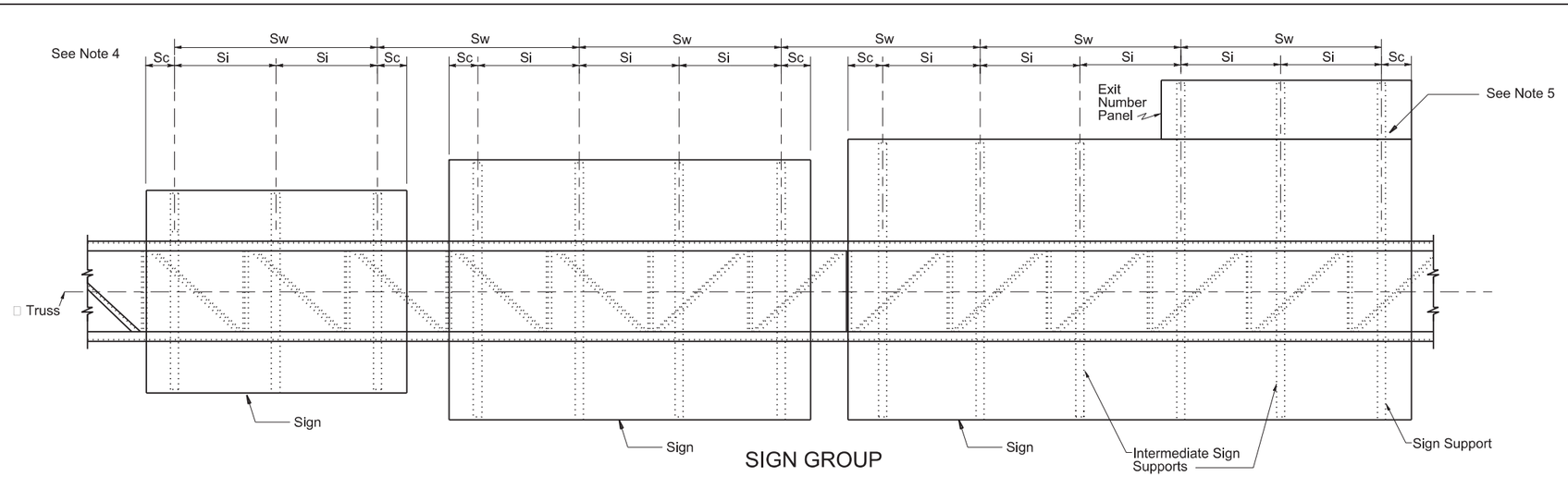
GENERAL NOTES:

1. Materials, fabrication, construction, and erection shall conform to the requirements of the Departmental Material Specifications and with details, dimensions, and weld procedures shown herein. Structural steel shall conform with ASTM A36 unless noted otherwise.
2. Bolts shall have hexagon heads and nuts and conform with ASTM A307.
3. All parts shall be galvanized after fabrication per Item 445, "Galvanizing".
4. See sheet SMD(2-4) for Extruded Aluminum Sign Details & max. support spacing.
5. An Exit Number Panel may be supported by sign support brackets as shown below, or may be supported as shown on sheet SMD(2-4). Regardless of method used spacing of supports shall not exceed Si.

CRIMPED PLATE DETAIL



PLAN ELEVATION



SIGN GROUP

Texas Department of Transportation

Traffic Safety Division Standard

SIGN MOUNTING DETAILS OVERHEAD SIGNS SUPPORT TO TRUSS CONNECTION SMD(2-5)-24

FILE: smd(2-5)-24.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	6473	31	001	SH 6, ETC.
12-95 9-08 5-24	DIST	COUNTY		SHEET NO.
	WACO	MCLENNAN, ETC.		54
27E				

DATE: 9/16/2024 11:39:48 AM
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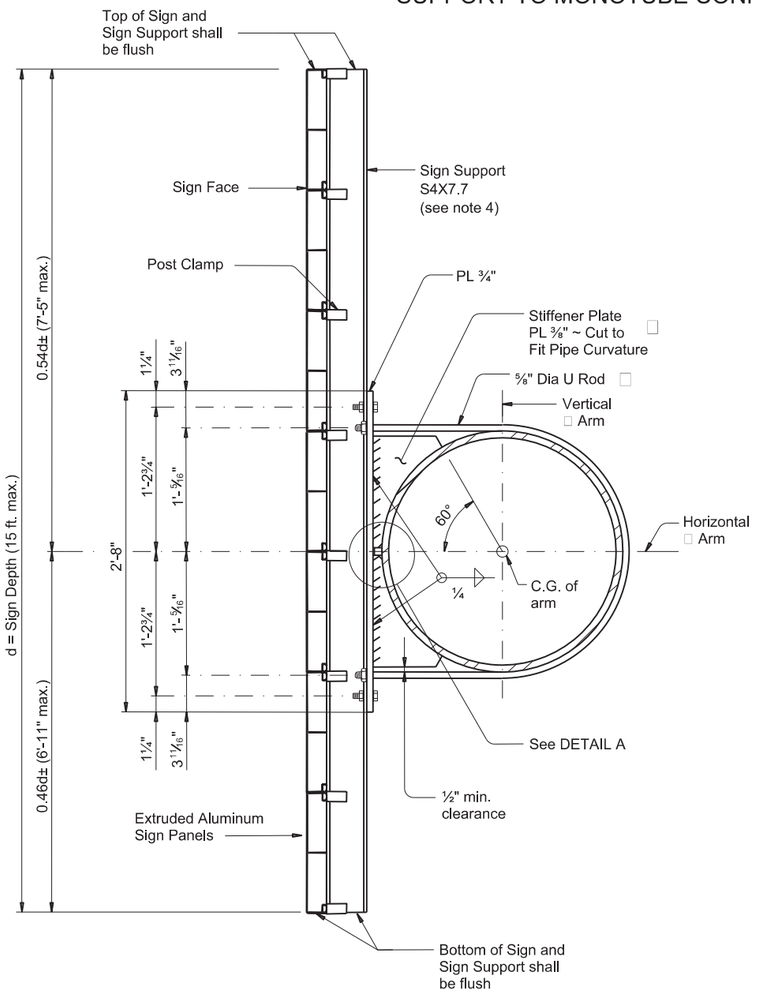
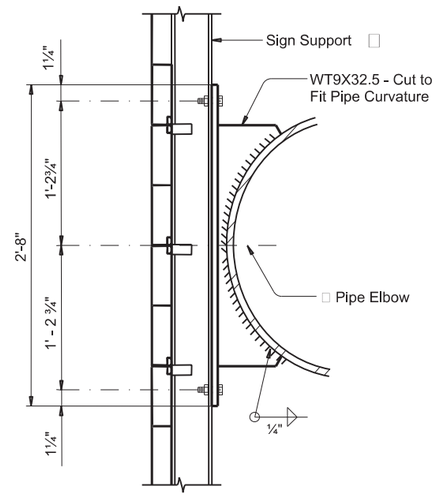
DATE: 9/16/2024 11:39:49 AM
FILE: T:\WACTRAFF\RMC\DIST SIGN 2025\Plan Sheets\Standards\SMD(2-6)-24.dgn

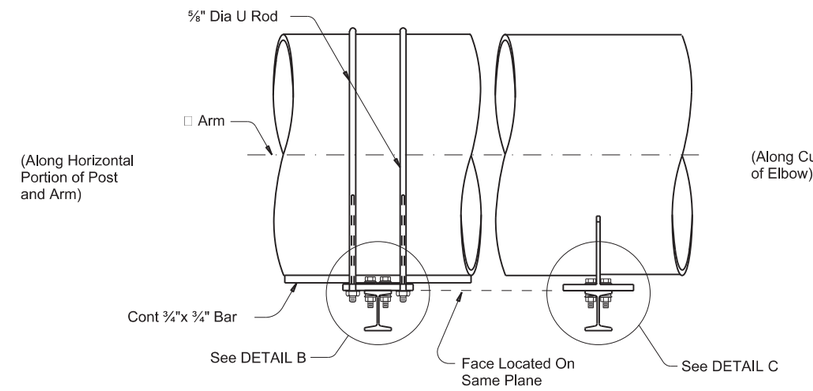
SUPPORT TO MONOTUBE CONNECTION - CANTILEVER AND SPAN



SIDE VIEW



SIDE VIEW
(At Curvature of Elbow)



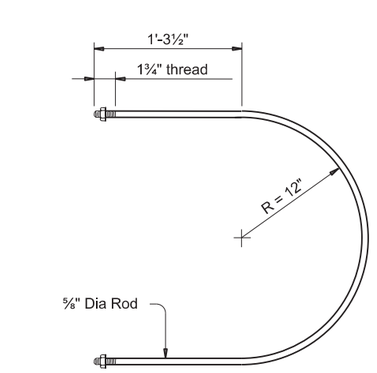
PLAN VIEW

GENERAL NOTES:

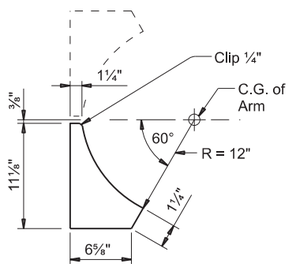
1. Materials, fabrication, construction, and erection shall conform to the requirements of the Departmental Material Specifications and with details, dimensions, and weld procedures shown herein. Structural steel shall conform with ASTM A36 unless noted otherwise.
2. Bolts shall have hexagon heads and nuts and conform with ASTM A307.
3. All parts shall be galvanized after fabrication per Item 445, "Galvanizing".
4. Monotube Sign Supports may only be S4X7.7 with a 54%-46% split. See Table 2 on SMD(2-4) for maximum support spacing.

NOTES:

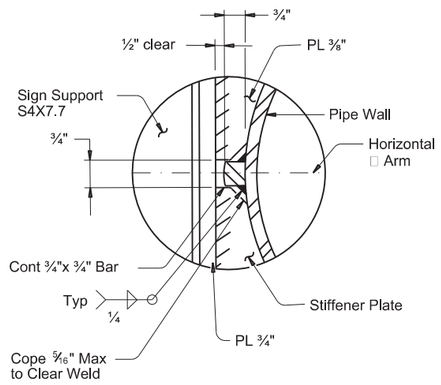
- Total of 4 ~ per assembly. See Stiffener Plate detail.
- ½" Dia bolt with one hardened washer, one beveled washer, and one lock washer.
- ⅝" Dia prevailing torque lock nut and washer ~ Typ.
- Raise sign bracket on sign support at elbow to match others located on arm.
- See U Rod detail.



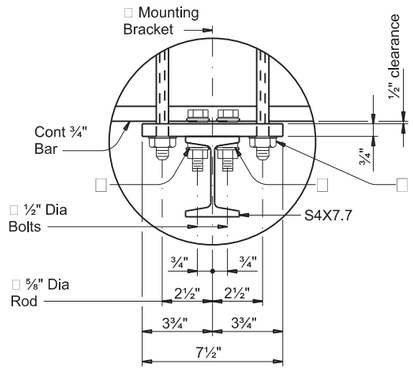
U ROD



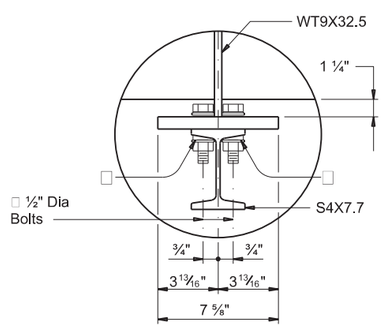
STIFFENER PLATE



DETAIL A



DETAIL B



DETAIL C

Texas Department of Transportation

Traffic Safety Division Standard

SIGN MOUNTING DETAILS OVERHEAD SIGNS SUPPORT TO MONOTUBE CONNECTION SMD(2-6)-24

FILE: smd(2-6)-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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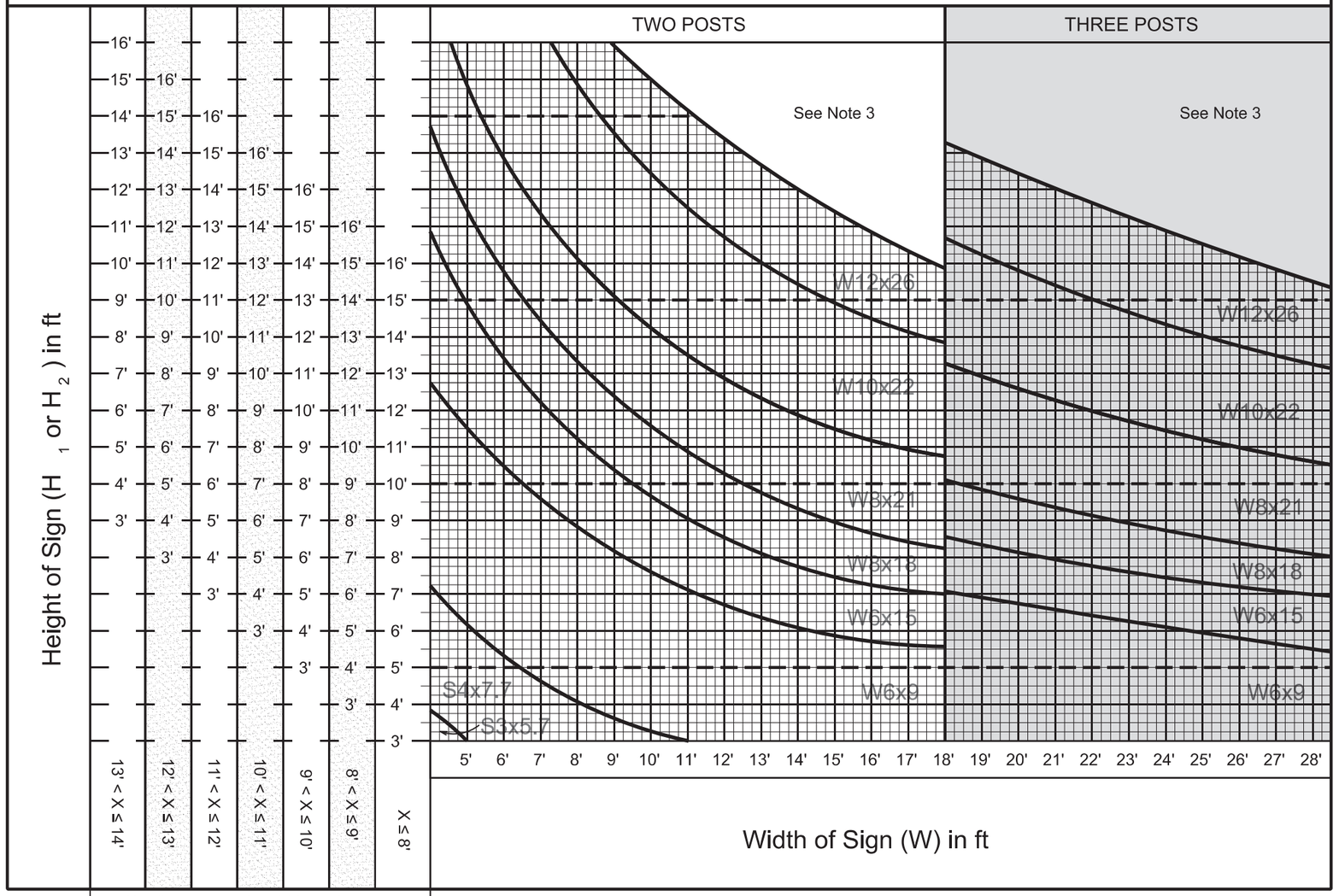
12-95 9-08 5-24	DIST	COUNTY		SHEET NO.
	WACO	MCLENNAN, ETC.		55

27F

Zone 1 - 90 MPH Wind Chart



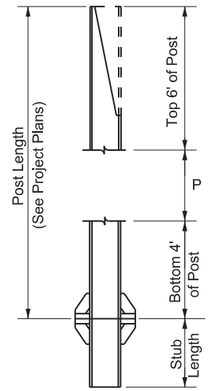
X = the average height from the ground line to the bottom edge of the sign.

NOTES:

1. The Post Weight Data Table shows the weight of a one, two, or three post(s) assembly - (this includes the top 6' and bottom 4' of the post, the foundation stub, related base connection plates and stiffeners, perforated fuse plates, and all high strength bolts, nuts, and washers).

2. See the Wind Velocity Worksheet to determine the wind zone for each large roadside sign.

3. Sign design falls outside of designed support tolerances - adjust sign height and/or width or sign location. In some cases, two post sign designs may be adjusted and increased to a three post sign design.



For total post weight add length (P) times post weight per ft. to weight shown in table below.

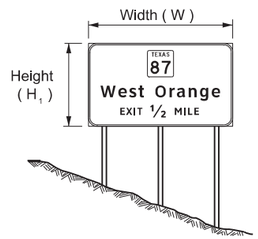
Weight Shown in Table + P x Post Weight per ft. = Total Post Weight

See SOLS (TYG) - Note 5, for example calculation.

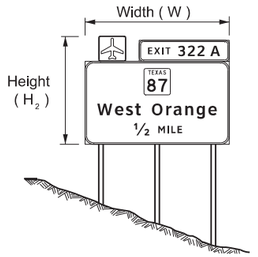
POST WEIGHT DATA

Post Size	Weight of One Post Assembly (lbs)	Weight of Two Post Assembly (lbs)	Weight of Three Post Assembly (lbs)
W12x26*	308.6	617.2	925.8
W10x22*	266.0	532.0	798.0
W8x21*	254.7	509.4	764.1
W8x18*	201.8	403.6	605.4
W6x15*	167.8	335.6	503.4
W6x9*	123.2	246.4	369.6
S4x7.7*	112.2	224.4	336.6
S3x5.7*	85.9	171.8	257.7

* Second number = POST WEIGHT PER FOOT
(Example: W12X26 weighs 26 pounds/foot of the post length)



OR



NOTE:
If an exit number panel or sign plaque is present, H_2 is to be used when determining post size. H_2 is measured from the bottom of the parent sign to the top of the highest attachment.

Texas Department of Transportation

Traffic Safety Division Standard

LARGE ROADSIDE SIGN SUPPORT POST SELECTION WORKSHEET
Zone 1 - 90 MPH
SMD(LRSS-1)-24

FILE: lrss-24.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	6473	31	001	SH 6, ETC.
7-78 9-08 1-82 5-24 5-01	DIST	COUNTY		SHEET NO.
	WACO	MCLENNAN, ETC.		56

29A

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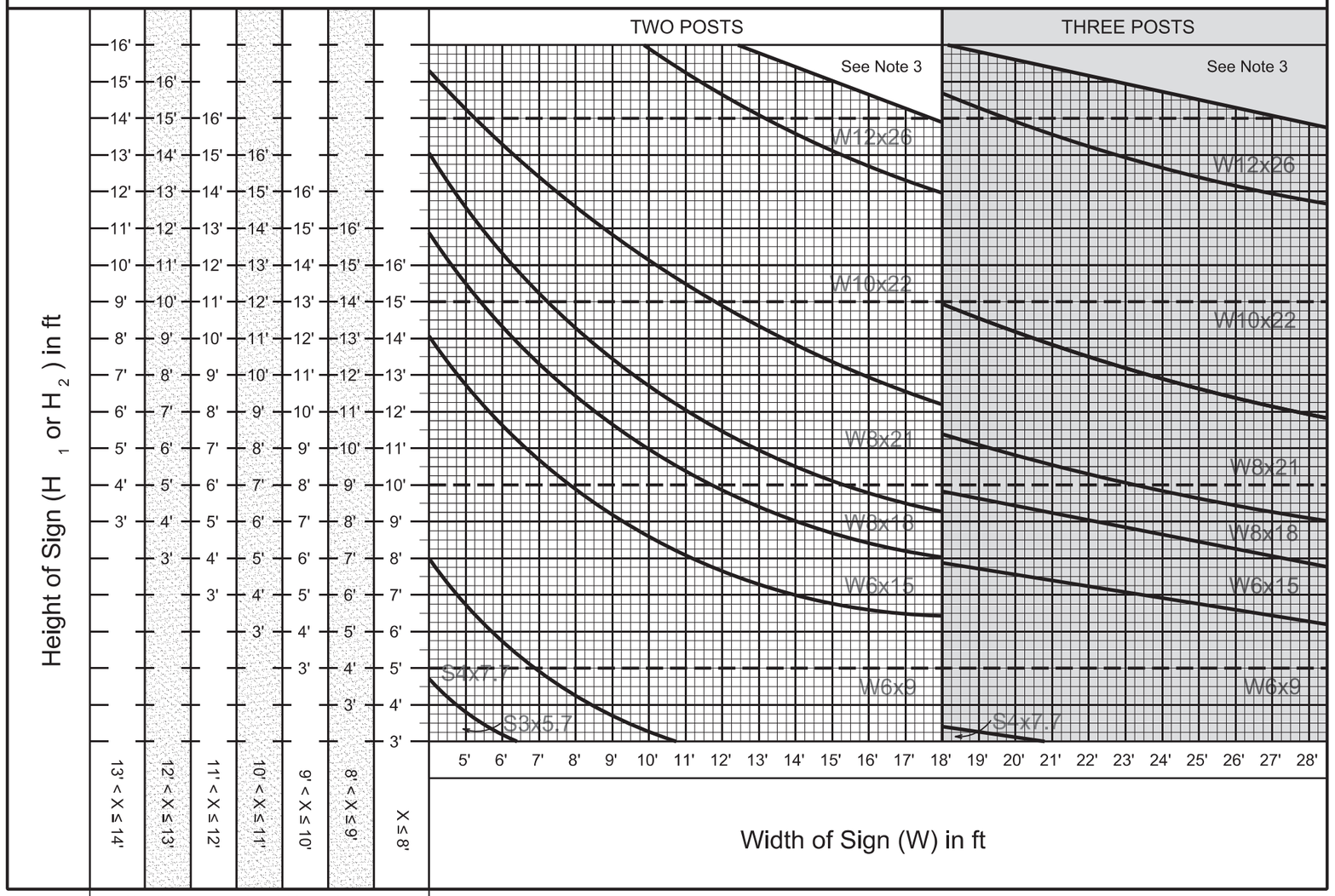
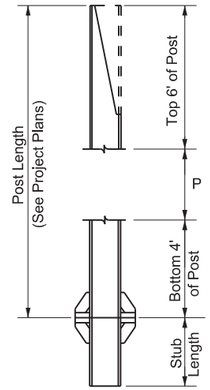
Zone 2 - 80 MPH Wind Chart



X = the average height from the ground line to the bottom edge of the sign.

NOTES:

1. The Post Weight Data Table shows the weight of a one, two, or three post(s) assembly - (this includes the top 6' and bottom 4' of the post, the foundation stub, related base connection plates and stiffeners, perforated fuse plates, and all high strength bolts, nuts, and washers).
2. See the Wind Velocity Worksheet to determine the wind zone for each large roadside sign.
3. Sign design falls outside of designed support tolerances - adjust sign height and/or width or sign location. In some cases, two post sign designs may be adjusted and increased to a three post sign design.



For total post weight add length (P) times post weight per ft. to weight shown in table below.

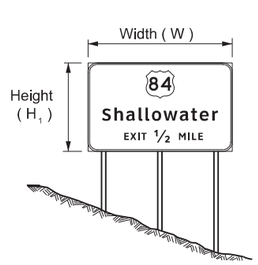
Weight Shown in Table + P x Post Weight per ft. = Total Post Weight

See SOLS (TYG) - Note 5, for example calculation.

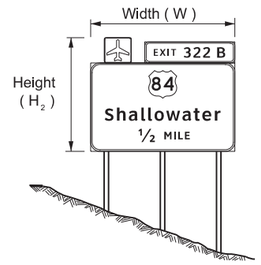
POST WEIGHT DATA

Post Size	Weight of One Post Assembly (lbs)	Weight of Two Post Assembly (lbs)	Weight of Three Post Assembly (lbs)
W12x26*	308.6	617.2	925.8
W10x22*	266.0	532.0	798.0
W8x21*	254.7	509.4	764.1
W8x18*	201.8	403.6	605.4
W6x15*	167.8	335.6	503.4
W6x9*	123.2	246.4	369.6
S4x7.7*	112.2	224.4	336.6
S3x5.7*	85.9	171.8	257.7

* Second number = POST WEIGHT PER FOOT
(Example: W12X26 weighs 26 pounds/foot of the post length)



OR



NOTE:
If an exit number panel or sign plaque is present, H_2 is to be used when determining post size. H_2 is measured from the bottom of the parent sign to the top of the highest attachment.

SHEET 2 OF 4

Texas Department of Transportation — Traffic Safety Division Standard

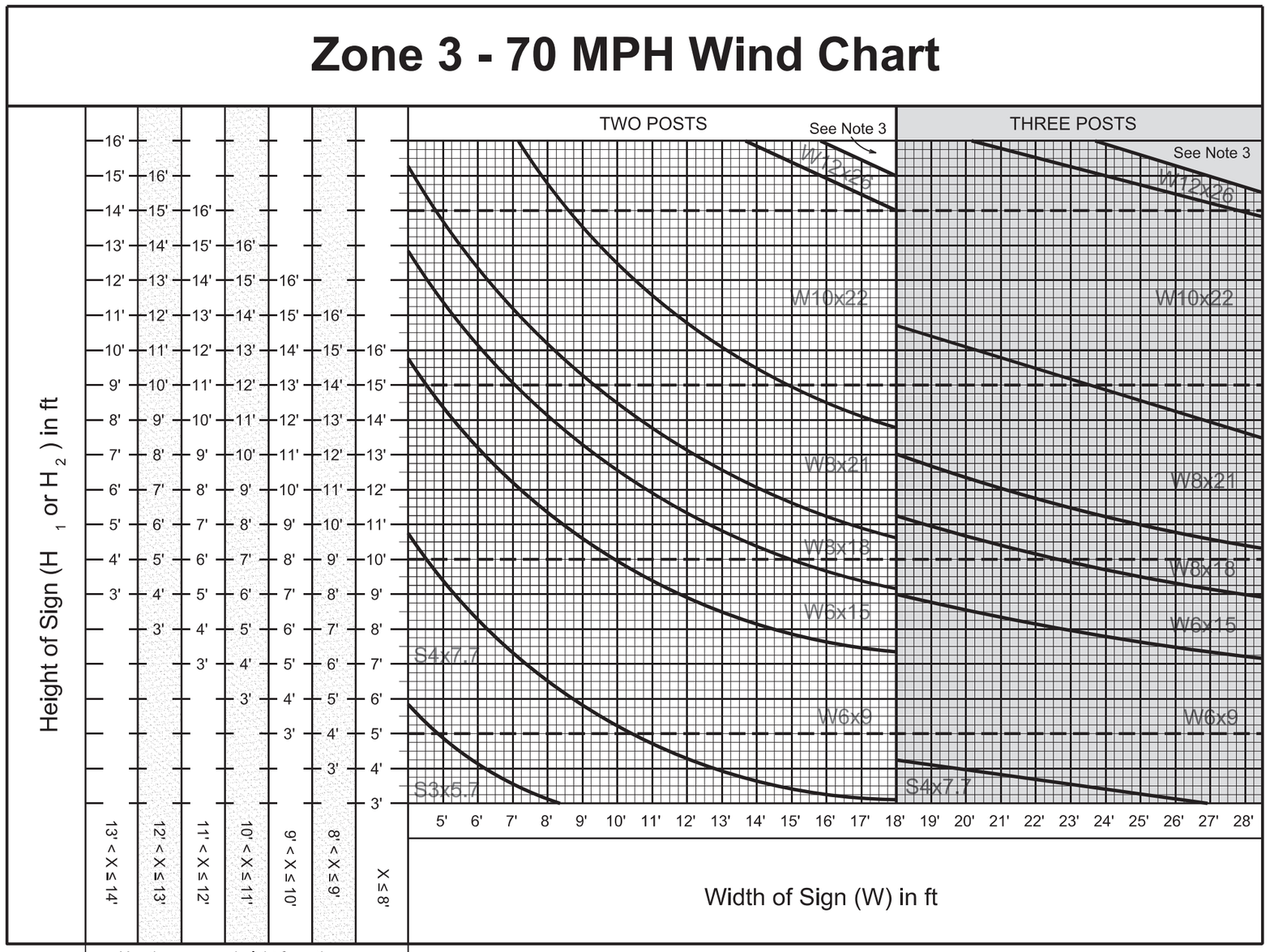
LARGE ROADSIDE SIGN SUPPORT POST SELECTION WORKSHEET
Zone 2 - 80 MPH
SMD(LRSS-2)-24

FILE: lrss-24.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS 7-78 9-08 1-82 5-24 5-01	6473	31	001	SH 6, ETC.
	DIST	COUNTY		SHEET NO.
	WACO	MCLENNAN, ETC.		57

29B

DATE: 9/16/2024 11:39:50 AM
FILE: T:\WACTRAFF\RMC\DIST SIGN 2025\Plan Sheets\Standards\SMD(LRSS)-24.dgn

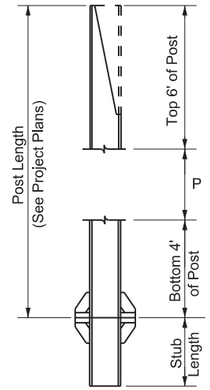
Zone 3 - 70 MPH Wind Chart



X = the average height from the ground line to the bottom edge of the sign.

NOTES:

1. The Post Weight Data Table shows the weight of a one, two, or three post(s) assembly - (this includes the top 6' and bottom 4' of the post, the foundation stub, related base connection plates and stiffeners, perforated fuse plates, and all high strength bolts, nuts, and washers).
2. See the Wind Velocity Worksheet to determine the wind zone for each large roadside sign.
3. Sign design falls outside of designed support tolerances - adjust sign height and/or width or sign location. In some cases, two post sign designs may be adjusted and increased to a three post sign design.



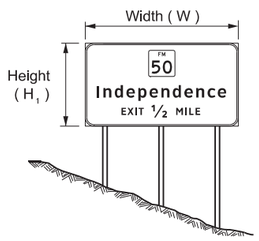
For total post weight add length (P) times post weight per ft. to weight shown in table below.

Weight Shown in Table + P x Post Weight per ft. = Total Post Weight

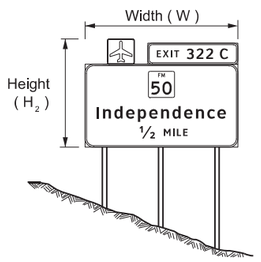
See SOLS (TYG) - Note 5, for example calculation.

POST WEIGHT DATA			
Post Size	Weight of One Post Assembly (lbs)	Weight of Two Post Assembly (lbs)	Weight of Three Post Assembly (lbs)
W12x26*	308.6	617.2	925.8
W10x22*	266.0	532.0	798.0
W8x21*	254.7	509.4	764.1
W8x18*	201.8	403.6	605.4
W6x15*	167.8	335.6	503.4
W6x9*	123.2	246.4	369.6
S4x7.7*	112.2	224.4	336.6
S3x5.7*	85.9	171.8	257.7

* Second number = POST WEIGHT PER FOOT
(Example: W12X26 weighs 26 pounds/foot of the post length)



OR



NOTE:
If an exit number panel or sign plaque is present, H_2 is to be used when determining post size. H_2 is measured from the bottom of the parent sign to the top of the highest attachment.

SHEET 3 OF 4

Texas Department of Transportation — Traffic Safety Division Standard

LARGE ROADSIDE SIGN SUPPORT POST SELECTION WORKSHEET
Zone 3 - 70 MPH
SMD(LRSS-3)-24

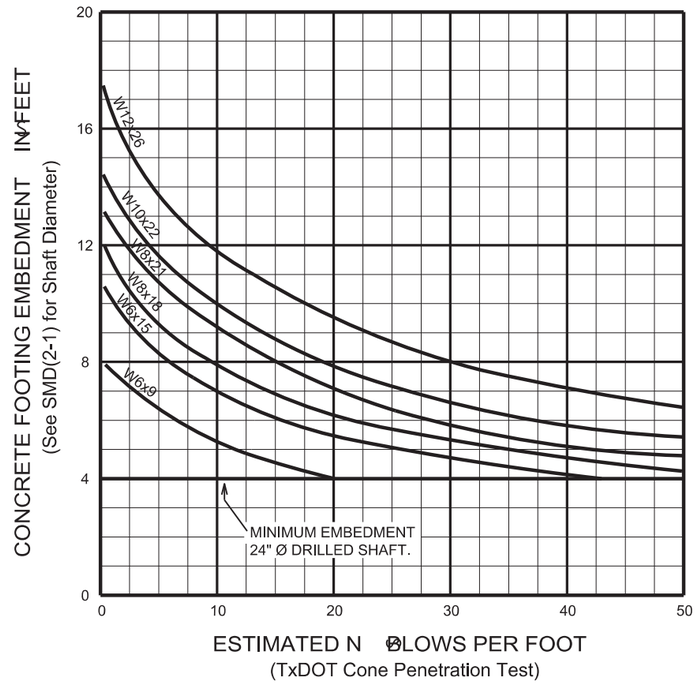
FILE: lrss-24.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	6473	31	001	SH 6, ETC.
7-78 9-08 1-82 5-24 5-01	DIST	COUNTY		SHEET NO.
	WACO	MCLENNAN, ETC.		58

29C

DATE: 9/16/2024 11:39:51 AM
FILE: T:\WACTRAFF\RMC\DIST SIGN 2025\Plan Sheets\Standards\SMD(LRSS)-24.dgn

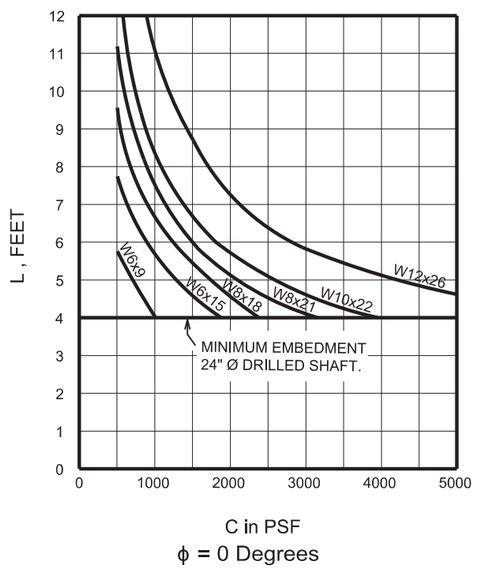
DRILLED CONCRETE FOOTING DEPTH CHART
(TxDOT PENETROMETER DESIGN)

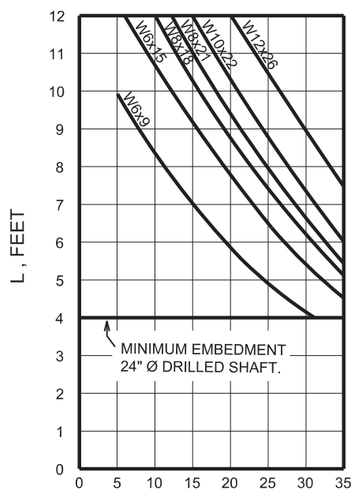
The estimated N value should be based at approximately the upper one-third point of the drilled concrete footing below the ground line.

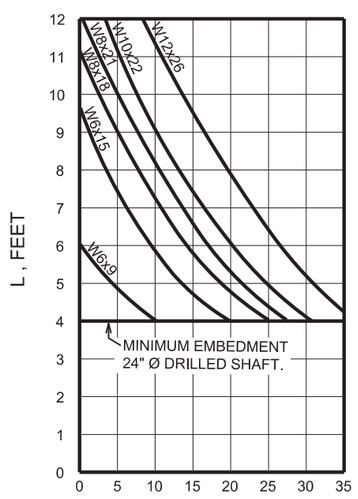


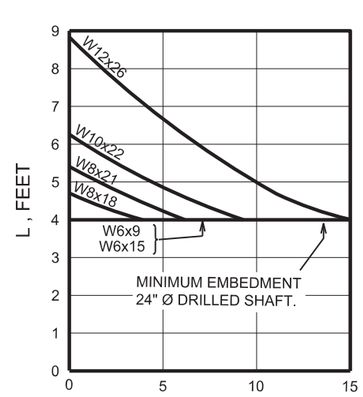
GENERAL NOTES:

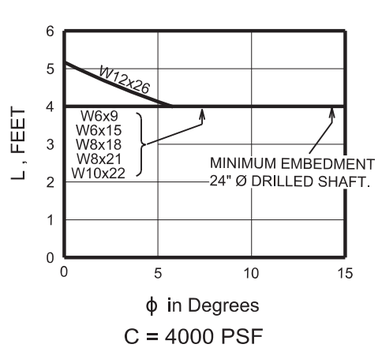
1. Curves shown on this sheet are applicable for reinforced concrete footings only.
2. Reinforced concrete footings shall use class C concrete.
3. Footings for S3x5.7 and S4x7.7 post sizes shall be non-reinforced and use class A concrete. For non-reinforced concrete footings see SMD (2-1).











DRILLED CONCRETE FOOTING DEPTH CHARTS
(COHFRIC DESIGN)

These charts may be used as an alternate to the chart above, provided that soil cohesion and internal friction (cohfric) data are available.

LEGEND

L = Required embedment of concrete drilled shaft, in feet
C = Cohesive shear strength of soil, in psf
ϕ = Angle of internal friction of soil, in degrees

For values of C and ϕ, which are intermediate to those on the charts, embedments may be determined by straight line interpolation.

Texas Department of Transportation

Traffic Safety Division Standard

LARGE ROADSIDE SIGN SUPPORT FOUNDATION WORKSHEET

SMD(LRSS-4)-24

FILE: lrss-24.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS 7-72 9-08 5-74 5-24 4-78	DIST	COUNTY		SHEET NO. 59

29D

DATE: 9/16/2024 11:39:52 AM
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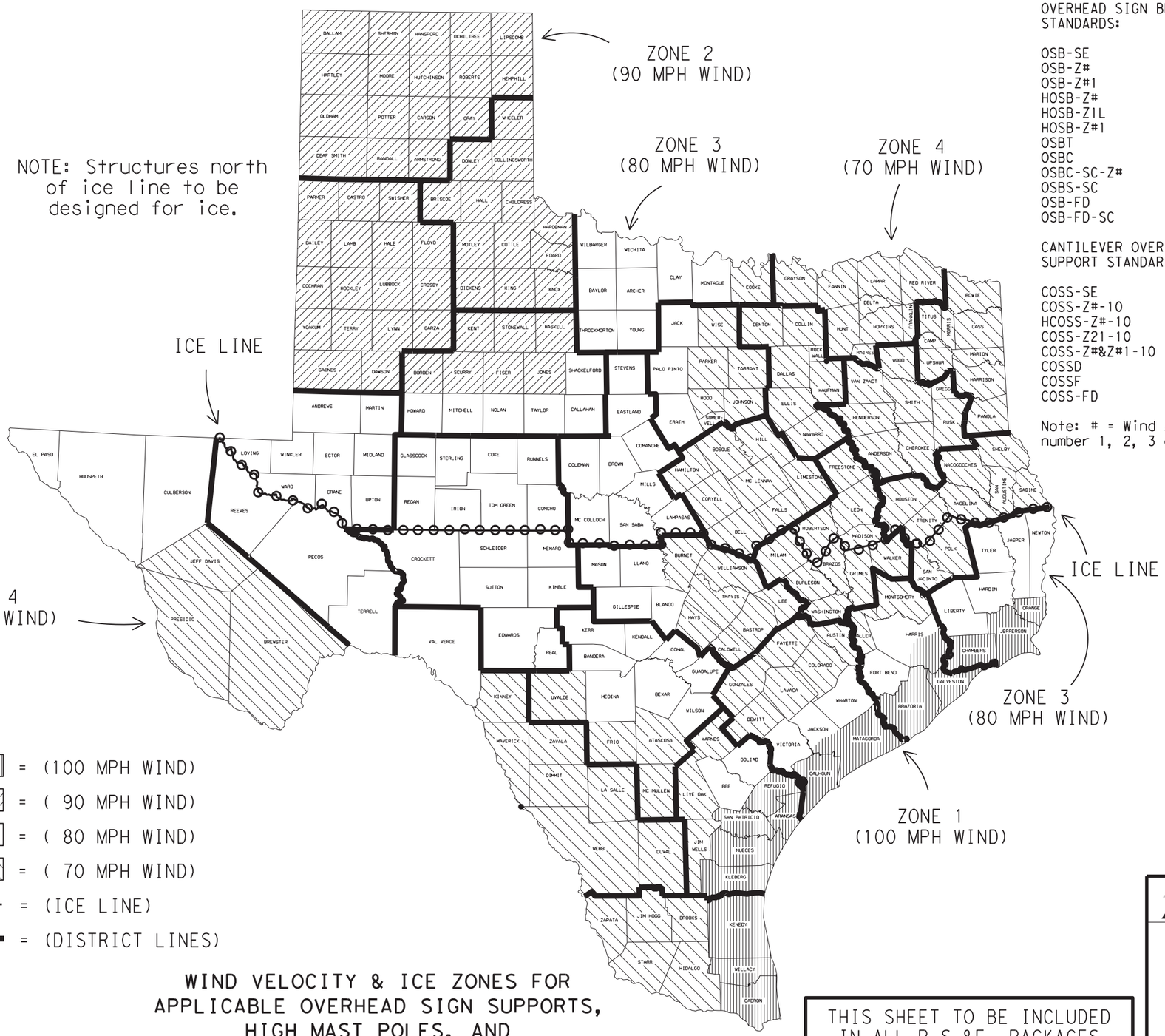
DATE: 9/16/2024 11:39:53 AM
FILE: I:\WAC\TRAFF\RMC\DIST SIGN 2025\Plan Sheets\Standards\WV&IZ-14.dgn



LEGEND

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

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

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

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.

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

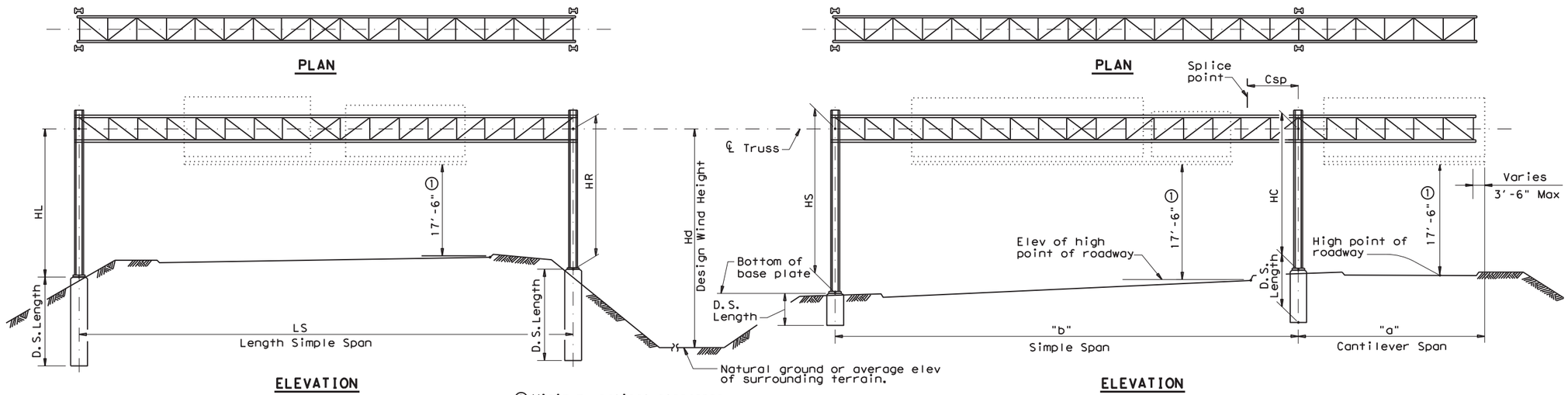
Texas Department of Transportation

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	6473	31	001	SH 6, ETC.
8-14-Added list of applicable standards, restricting use to structures designed for Fastest Mile wind speeds.	DIST	COUNTY		SHEET NO.
	WACO	MCLENNAN, ETC.		60



① Minimum vertical clearance

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

③ "Carbon Steel" for non-bridge structures per Item 442, "Metal For Structures".

SIMPLE SPAN

SIMPLE SPAN PROCEDURE:

Given: Span, Ls = 93.0′; Left Tower Height, H_L = 26.3′; Right Tower Height, H_R = 22.6′; Design Height, Hd = 27.0′; Avg. Penetrometer Value, N = 25; Dawson County.

Step 1: Select applicable OSB standard. From Wind Velocity and Ice Zone sheet (WV&IZ-96) determine that Dawson County is in Zone 2 (90 mph) and ice above the ice line. Since Design Height, Hd = 27.0′, use standard OSB-Z2I. If the Design Height were more than 30.0′, the applicable standard would be HOSB-Z2I.

Step 2: Determine truss details and tower size from OSB-Z2I. For our 93.0′ span go to the next larger span, i.e. 95.0′. Truss members are:
Chord ~ L 4"x 4"x ⅜"② w/ 10 bolt splice
D.L. Diag. ~ L 3"x 2 ½"x ⅜"③w/ 2 bolt connection
W.L. Diag. ~ L 3"x 3"x ¼" ③ w/ 3 bolt connection
D.L. Vert. ~ L 3"x 2"x ⅜" ③ w/ 2 bolt connection
W.L. Strut ~ 2 ½"x 2 ½"x ⅜"③w/ 1 bolt connection
Bolts are ¾" Dia high strength. Truss W x D = 4.5′x 4.5′. Required truss camber to compensate for dead load deflection is 1.46". Dead load of truss is 77 lb/ft. Avg. Tower Height = (26.3′+ 22.6′)÷2 = 24.45′. Use 25.0′ to determine column size and spacing for both towers, i.e. W14 x 34 spaced at 7.0′. Use actual tower heights for drilled shaft uplift as follows. For H_L = 26.3′ use 26.0′ to determine design uplift at the left tower = 79.8ᵏ. For H_R = 22.6′ use 23.0′ to determine design uplift at the right tower = 69.9ᵏ.

Step 3: Determine tower and anchor bolt details. Use OSBT standard.
From OSBT with W14 x 34 columns spaced at 7′-0":
Anchor Bolts = 1 ¾" Dia x 3′-10"
Base Plate = 11 ½"x 2 ¼"x 2′-1"
X, Y, and Z = 9 ½", 3", and 2 ¾" respectively
Tower Bracing = 2Ls ~ 3"x 2 ½"x ¼"
Foundation = 36" Dia shafts with 8 ~ #9 Bars.

Step 4: Determine drilled shaft length from OSB-FD. Enter chart for 36" Dia drilled shafts at N = 25.
Left Tower Uplift = 79.8ᵏ, therefore, L = 9′+ 3′= 12′
Right Tower Uplift = 69.9ᵏ, therefore, L = 8′+ 3′= 11′.

Step 5: Determine maximum spacing of tower bracing. The maximum spacing would normally be the same as the column spacing, i.e. 7.0′. However, the special note for tower bracing on Sheet 1 of the OSBT standard makes provision for an increase in spacing as follows:
On OSB-Z2I under 95.0′ span, the W14 x 34 column is shown for 25.0′ and 26.0′ column heights. Thus, the W14 x 34 is shown one time for heights greater than the design height of 25′-0". The special note for tower bracing allows a 1′-0" increase in the maximum spacing from 7.0′ to 8.0′.

CANTILEVER SPAN

CANTILEVER SPAN PROCEDURE:

Given: Simple Span, b = 80.0′; Cantilever Span, a = 30.0′; Left Tower Height, H_L = 20.0′; Right Tower Height, H_R = 28.0′; Design Wind Height, H = 30.0′; Avg. Penetrometer Value, N = 25.0′; Duval County.

Step 1: Calculate the following:
Equiv. Simple Span, $E_{SS} = b + 2a + (a^2 \div b)$
$= 151.30'$, Use 155.0′.
If E_{SS} exceeds 155.0′ a special tower design is required. Cantilever Equiv. Simple Span, Cess = 2a = 60.0′; Splice Point, Csp = $(a^2 \div b)$ = 11.30′; Equiv. Simple Span for Truss Web, Essw = $b + (a^2 \div b)$ = 91.0′, Use 95.0′.

Step 2: Select applicable OSB standard. From Wind Velocity and Ice Zone sheet determine that Duval County is in Zone 4 (70 mph) and is below the ice line. Since Design Wind Height, H = 30.0′, Use standard OSB-Z4. If the Design Height were more than 30.0′ the applicable standard would be HOSB-Z4.

Step 3: Determine truss details and tower size from OSB-Z4.
Cantilever Truss: For Ccss= 60.0′ truss members are:
Chord L 3"x 3"x ¼"② with 6 bolt splice
D.L. Diag. L 2"x 2"x ⅜" with 2 bolt connection
W.L. Diag. L 2 ½"x 2 ½"x ⅜" with 2 bolt connection
D.L. Vert. L 2"x 2"x ⅜" with 2 bolt connection
W.L. Strut L 2"x 2"x ⅜" with 1 bolt connection
Bolts are ⅝" Dia High Strength. Truss WxD = 4.0′x 4.0′. Required cantilever truss camber to compensate for dead load deflection is 0.49".

Simple Span Truss: For b = 80.0′ truss members are:
Chord L 3"x 3"x ⅜"② with 9 bolt splice
D.L. Diag. L 2"x 2"x ⅜" with 2 bolt connection
W.L. Diag. L 3"x 3"x ⅜" with 2 bolt connection
D.L. Vert. L 2"x 2"x ⅜" with 2 bolt connection
W.L. Strut L 2"x 2"x ⅜" with 1 bolt connection
Bolts are ⅝" Dia High Strength. Truss WxD = 4.0′x 4.0′. If W and D for the cantilever and simple spans are different, increase smaller W and D to match the larger truss. Required simple span camber to compensate for dead load deflection is 1.12".

Truss from cantilever tower to splice point: Extend cantilever chords past the tower a distance, Csp= 11.2′ which falls in the third panel. The splice is permissible at any point within the third panel. Web members from the tower out to and including the splice panel, i.e. the third panel, shall be modified as follows. For Essw= 95.0′ web members are:
D.L. Diag. L 2 ½"x 2 ½"x ⅜" with 2 bolt connection
W.L. Diag. L 3"x 2 ½"x ¼" with 2 bolt connection
D.L. Vert. L 2"x 2"x ⅜" with 2 bolt connection
W.L. Strut L 2"x 2"x ⅜" with 1 bolt connection
Ignore W and D dimensions. Instead, use W and D as required for cantilever and simple span trusses. Use ⅝" Dia high strength bolts as required for 95.0′ span.

Tower Size: Avg. Tower Height = (20.0′+ 28.0′)÷2 = 24.0′. Use 24.0′ height and 155.0′ equivalent simple span to determine column size and spacing for both towers, i.e. W14 x 34 spaced at 7.5′
Use spans and actual tower heights for uplift as follows:
For H_S = 20.0′, and b = 80.0′ determine uplift = 31.7ᵏ.
For H_C = 28.0′, and E_{SS} = 155.0′ determine uplift = 77.9ᵏ.

Step 4: Determine tower and anchor bolt details. Use standard OSBT.
From OSBT with W14 x 34 columns spaced at 7.5′:
Anchor Bolts = 1 ¾" Dia x 3′-10"
Base Plate = 11 ½"x 2 ¼"x 2′-1"
X, Y, and Z = 9 ½", 3", and 2 ¾" respectively
Tower Bracing = 2Ls ~ 3"x 2 ½"x ¼"
Foundation = 36" Dia shafts with 8~#9 bars.

Step 5: Determine drilled shaft length from OSB-FD.
Enter chart for 36" Dia drilled shaft at N = 25.0′
Left Tower Uplift = 31.7ᵏ, therefore L = 6′+ 3′= 9′
Right Tower Uplift = 77.9ᵏ, therefore L = 8′+ 3′= 11′.

Step 6: Determine maximum spacing of tower bracing. The maximum spacing would normally be the same as the column spacing, i.e. 7.5′. However, the special note for tower bracing on Sheet 1 of the OSBT standard makes provision for an increase in spacing as follows:
On OSB-Z4 under 155.0′ span, the W14 x 34 column is shown for 23.0′ through 26.0′ column heights. Thus, the W14 x 34 column is shown two times for heights greater than 24.0′. The special note allows a 2.0′ increase from 7.5′ to 9.5′.

Texas Department of Transportation
Traffic Operations Division

OVERHEAD SIGN BRIDGE SELECTION EXAMPLES

OSB-SE

REVISIONS

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

CONT	SECT	JOB	HIGHWAY
6473	31	001	SH 6, ETC.

DIST	COUNTY	SHEET NO.
WACO	MCLENNAN, ETC.	61

DATE: 9/16/2024 11:39:54 AM
FILE: T:\WACTRAFF\RMC\DIST SIGN 2025\Plan Sheets\Standards\OSB-SE.dgn

ZONE 4 WITH ICE 70 M.P.H. WIND

SPAN	40′	45′	50′	55′	60′	65′	70′	75′
W x D = WIDTH x DEPTH	4.0 x 4.0	4.0 x 4.0	4.0 x 4.0	4.0 x 4.0	4.0 x 4.0	4.0 x 4.0	4.0 x 4.0	4.0 x 4.0
CHORD -②, Unless Otherwise Shown	L 3 x 3 x 3/16 ③ [4]	L 3 x 3 x 3/16 ③ [4]	L 3 x 3 x 3/16 ③ [4]	L 3 x 3 x 1/4 ③ [4]	L 3 x 3 x 1/4 [6]	L 3 x 3 x 1/4 [6]	L 3 x 3 x 5/16 [6]	L 3 x 3 x 5/16 [8]
DEAD LOAD DIAGONAL -③	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [3]
WIND LOAD DIAGONAL -③	L 2 1/2 x 2 1/2 x 3/16 [2]	L 2 1/2 x 2 1/2 x 3/16 [2]	L 2 1/2 x 2 1/2 x 3/16 [2]	L 2 1/2 x 2 1/2 x 3/16 [2]	L 2 1/2 x 2 1/2 x 3/16 [2]	L 3 x 3 x 3/16 [2]	L 3 x 3 x 3/16 [2]	L 3 x 3 x 3/16 [2]
DEAD LOAD VERTICAL -③	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]
WIND LOAD STRUT - ③	L 2 x 2 x 3/16 [1]	L 2 x 2 x 3/16 [1]	L 2 x 2 x 3/16 [1]	L 2 x 2 x 3/16 [1]	L 2 x 2 x 3/16 [1]	L 2 x 2 x 3/16 [1]	L 2 x 2 x 3/16 [1]	L 2 x 2 x 3/16 [1]
TOTAL DEFL. & TRUSS D.L.	DEFL=0.14" L=37 lb/ft	DEFL=0.21" L=37 lb/ft	DEFL=0.31" L=38 lb/ft	DEFL=0.36" L=43 lb/ft	DEFL=0.49" L=43 lb/ft	DEFL=0.67" L=45 lb/ft	DEFL=0.76" L=50 lb/ft	DEFL=0.99" L=50 lb/ft

TRUSS DETAILS — 5/8" Dia. H.S. Bolts, Spans 40′ Thru 95′

TOWER DETAILS

S = COLUMN SPACING	6.0′	6.0′	6.0′	6.0′	6.0′	6.0′	6.5′	6.5′
TOWER HEIGHT								
15′	W 10 x 15 (13.8)	W 10 x 15 (15.4)	W 10 x 15 (17.0)	W 10 x 15 (18.5)	W 10 x 15 (20.0)	W 10 x 15 (21.6)	W 10 x 15 (21.1)	W 10 x 17 (22.6)
16′	W 10 x 15 (14.8)	W 10 x 15 (16.5)	W 10 x 15 (18.2)	W 10 x 15 (19.8)	W 10 x 15 (21.5)	W 10 x 15 (23.2)	W 10 x 15 (22.6)	W 10 x 17 (24.2)
17′	W 10 x 15 (15.8)	W 10 x 15 (17.6)	W 10 x 15 (19.4)	W 10 x 15 (21.1)	W 10 x 15 (23.0)	W 10 x 15 (24.8)	W 10 x 17 (24.1)	W 10 x 17 (25.8)
18′	W 10 x 15 (16.8)	W 10 x 15 (18.7)	W 10 x 15 (20.6)	W 10 x 15 (22.5)	W 10 x 15 (24.4)	W 10 x 17 (26.3)	W 10 x 17 (25.6)	W 10 x 17 (27.4)
19′	W 10 x 15 (17.8)	W 10 x 15 (19.8)	W 10 x 15 (21.8)	W 10 x 15 (23.8)	W 10 x 15 (25.8)	W 10 x 17 (27.8)	W 10 x 22 (27.1)	W 10 x 22 (29.0)
20′	W 10 x 15 (18.8)	W 10 x 15 (20.9)	W 10 x 15 (23.1)	W 10 x 17 (25.1)	W 10 x 17 (27.1)	W 10 x 17 (29.3)	W 10 x 22 (28.6)	W 10 x 22 (30.6)
21′	W 10 x 15 (19.8)	W 10 x 15 (22.1)	W 10 x 15 (24.3)	W 10 x 17 (26.5)	W 10 x 17 (28.6)	W 10 x 22 (30.8)	W 10 x 22 (30.2)	W 10 x 22 (32.3)
22′	W 10 x 15 (20.9)	W 10 x 15 (23.2)	W 10 x 17 (25.6)	W 10 x 17 (27.8)	W 10 x 17 (30.0)	W 10 x 22 (32.4)	W 10 x 22 (31.7)	W 10 x 22 (33.9)
23′	W 10 x 15 (21.9)	W 10 x 15 (24.4)	W 10 x 17 (26.8)	W 10 x 22 (29.2)	W 10 x 22 (31.5)	W 10 x 22 (33.9)	W 10 x 22 (33.3)	W 10 x 22 (35.5)
24′	W 10 x 17 (23.0)	W 10 x 17 (25.5)	W 10 x 22 (28.1)	W 10 x 22 (30.6)	W 10 x 22 (33.0)	W 10 x 22 (35.5)	W 10 x 22 (34.8)	W 10 x 22 (37.2)
25′	W 10 x 17 (24.0)	W 10 x 17 (26.7)	W 10 x 22 (29.4)	W 10 x 22 (32.0)	W 10 x 22 (34.5)	W 10 x 22 (37.1)	W 10 x 26 (36.4)	W 10 x 26 (38.9)
26′	W 10 x 17 (25.1)	W 10 x 22 (27.9)	W 10 x 22 (30.6)	W 10 x 22 (33.3)	W 10 x 22 (36.0)	W 10 x 22 (38.7)	W 10 x 26 (37.9)	W 10 x 26 (40.5)
27′	W 10 x 22 (26.2)	W 10 x 22 (29.1)	W 10 x 22 (31.9)	W 10 x 22 (34.7)	W 10 x 26 (37.5)	W 10 x 26 (40.3)	W 10 x 26 (39.5)	W 12 x 26 (42.6)
28′	W 10 x 22 (27.3)	W 10 x 22 (30.3)	W 10 x 22 (33.2)	W 10 x 22 (36.2)	W 10 x 26 (39.0)	W 10 x 26 (41.9)	W 10 x 26 (41.1)	W 12 x 26 (44.3)
29′	W 10 x 22 (28.4)	W 10 x 22 (31.5)	W 10 x 22 (34.5)	W 10 x 26 (37.6)	W 10 x 26 (40.5)	W 12 x 26 (43.1)	W 12 x 26 (43.1)	W 12 x 26 (46.0)
30′	W 10 x 22 (29.5)	W 10 x 22 (36.7)	W 10 x 26 (35.9)	W 10 x 26 (39.0)	W 10 x 26 (42.0)	W 12 x 26 (44.7)	W 12 x 26 (44.7)	W 12 x 26 (47.7)

Tower Height = (HL + HR)/2 — COLUMN SIZE & UPLIFT (kips)

ZONE 4 WITH ICE 70 M.P.H. WIND

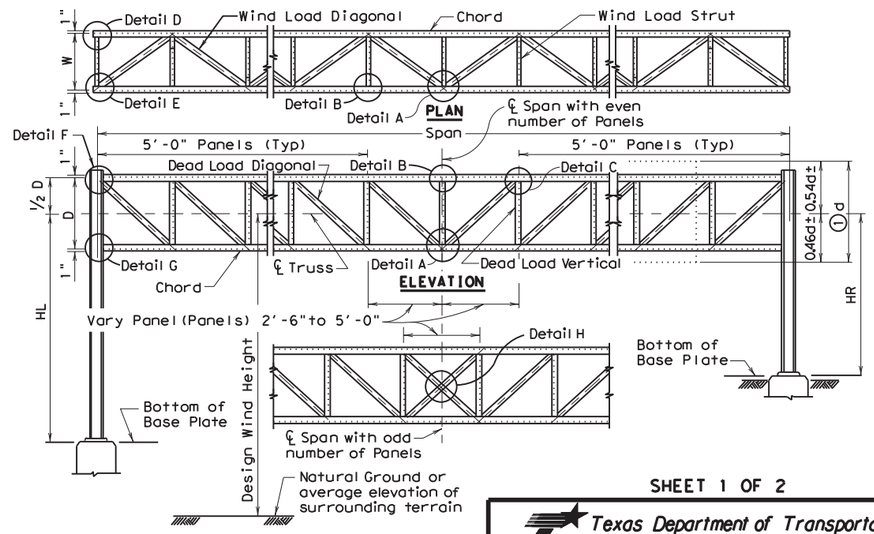
SPAN	80′	85′	90′	95′
W x D = WIDTH x DEPTH	4.0 x 4.0	4.0 x 4.0	4.0 x 4.0	4.0 x 4.0
CHORD -②, Unless Otherwise Shown	L 3 x 3 x 3/8 [9]	L 3 x 3 x 7/16 [10]	L 3 1/2 x 3 1/2 x 3/8 [11]	L 3 1/2 x 3 1/2 x 3/8 [11]
DEAD LOAD DIAGONAL -③	L 2 1/2 x 2 1/2 x 3/16 [3]	L 2 1/2 x 2 1/2 x 3/16 [3]	L 3 x 2 x 3/16 [3]	L 3 x 2 x 3/16 [3]
WIND LOAD DIAGONAL -③	L 3 x 3 x 3/16 [2]	L 3 x 3 x 3/16 [2]	L 3 x 3 x 1/4 [3]	L 3 x 2 1/2 x 1/4 [3]
DEAD LOAD VERTICAL -③	L 2 x 2 x 3/16 [2]	L 2 1/2 x 2 1/2 x 3/16 [2]	L 3 x 2 x 3/16 [2]	L 3 x 2 x 3/16 [2]
WIND LOAD STRUT - ③	L 2 x 2 x 3/16 [1]	L 2 x 2 x 3/16 [1]	L 2 x 2 x 3/16 [1]	L 2 x 2 x 3/16 [1]
TOTAL DEFL. & TRUSS D.L.	DEFL=1.12" L=56 lb/ft	DEFL=1.28" L=63 lb/ft	DEFL=1.58" L=63 lb/ft	DEFL=1.94" L=66 lb/ft

TRUSS DETAILS — 5/8" Dia. H.S. Bolts, Spans 40′ Thru 95′

TOWER DETAILS

S = COLUMN SPACING	6.5′	6.5′	6.5′	6.5′
TOWER HEIGHT				
15′	W 10 x 17 (23.4)	W 10 x 17 (24.7)	W 10 x 17 (26.2)	W 10 x 22 (27.6)
16′	W 10 x 17 (25.0)	W 10 x 17 (26.5)	W 10 x 22 (28.0)	W 10 x 22 (29.5)
17′	W 10 x 17 (26.7)	W 10 x 22 (28.2)	W 10 x 22 (29.9)	W 10 x 22 (31.4)
18′	W 10 x 17 (28.3)	W 10 x 22 (30.0)	W 10 x 22 (31.7)	W 10 x 22 (33.4)
19′	W 10 x 22 (30.0)	W 10 x 22 (31.8)	W 10 x 22 (33.6)	W 10 x 22 (35.4)
20′	W 10 x 22 (31.7)	W 10 x 22 (33.5)	W 10 x 22 (35.5)	W 10 x 22 (37.3)
21′	W 10 x 22 (33.4)	W 10 x 22 (35.3)	W 10 x 26 (37.3)	W 10 x 26 (39.3)
22′	W 10 x 22 (35.1)	W 10 x 22 (37.1)	W 10 x 26 (39.2)	W 10 x 26 (41.3)
23′	W 10 x 26 (36.8)	W 10 x 26 (38.9)	W 10 x 26 (41.1)	W 12 x 26 (43.6)
24′	W 10 x 26 (38.5)	W 10 x 26 (40.7)	W 10 x 26 (43.0)	W 12 x 26 (45.6)
25′	W 10 x 26 (40.2)	W 12 x 26 (42.9)	W 12 x 26 (45.3)	W 12 x 26 (47.6)
26′	W 10 x 26 (41.9)	W 12 x 26 (44.7)	W 12 x 26 (47.2)	W 12 x 26 (49.7)
27′	W 12 x 26 (44.0)	W 12 x 26 (46.5)	W 12 x 26 (49.2)	W 12 x 26 (51.7)
28′	W 12 x 26 (45.8)	W 12 x 26 (48.4)	W 12 x 26 (51.1)	W 12 x 26 (53.8)
29′	W 12 x 26 (47.6)	W 12 x 26 (50.3)	W 12 x 26 (53.1)	W 14 x 30 (55.9)
30′	W 12 x 26 (49.3)	W 12 x 26 (52.2)	W 14 x 30 (55.1)	W 14 x 30 (58.0)

Tower Height = (HL + HR)/2 — COLUMN SIZE & UPLIFT (kips)



① d = Sign Depth
Where signs of different depths are used, the bottom edges of all signs may be placed in line. Where this is done, all signs should be so positioned that the bottom edges are approximately 0.46 of the depth of the deepest sign below the ℄ of the truss.

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

③ "Carbon Steel" for non-bridge structures per Item 442, "Metal For Structures".

SHEET 1 OF 2

Texas Department of Transportation
Traffic Operations Division

OVERHEAD SIGN BRIDGE DETAILS

OSB-Z41

REVISIONS

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
CONT	SECT	JOB	HIGHWAY
6473	31	001	SH 6, ETC.
DIST	COUNTY		SHEET NO.
WACO	MCLENNAN, ETC.		62

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ZONE 4 WITH ICE 70 M.P.H. WIND

TRUSS DETAILS

¾" Dia. H.S. Bolts Spans 96' Thru 155'

SPAN	100'	105'	110'	115'	120'	125'	130'	135'
W x D = WIDTH x DEPTH	4.5 x 4.5	4.5 x 4.5	4.5 x 4.5	4.5 x 4.5	5.0 x 5.0	5.0 x 5.0	5.0 x 5.0	5.0 x 5.0
CHORD -②, Unless Otherwise Shown	L 3 ½x 3 ½x ⅜ [7]	L 3 ½x 3 ½x 7/16 [9]	L 4 x 4 x ⅜ [9]	L 4 x 4 x ⅜ [10]	L 4 x 4 x ⅜ [10]	L 4 x 4 x 7/16 [11]	L 4 x 4 x ½ [12]	L 4 x 4 x ½ [13]
DEAD LOAD DIAGONAL -③	L 3 x 2 x ⅜ [2]	L 3 x 2 ½x ⅜ [3]	L 3 x 3 x ⅜ [3]	L 3 x 3 x ⅜ [3]	L 3 x 3 x ⅜ [3]	L 3 x 2 x ¼ [3]	L 3 x 2 x ¼ [3]	L 3 x 2 ½x ¼ [3]
WIND LOAD DIAGONAL -③	L 3 x 2 ½x ¼ [2]	L 3 x 2 ½x ¼ [2]	L 3 x 2 ½x ¼ [2]	L 3 x 3 x ¼ [2]	L 3 x 3 x ¼ [2]	L 3 x 3 x ¼ [2]	L 3 x 3 x ¼ [2]	L 3 x 3 x ¼ [3]
DEAD LOAD VERTICAL -③	L 3 x 2 x ⅜ [2]	L 3 x 2 x ⅜ [2]	L 3 x 2 x ⅜ [2]	L 3 x 2 ½x ⅜ [2]	L 3 x 2 ½x ⅜ [2]	L 3 x 2 ½x ⅜ [2]	L 3 x 3 x ⅜ [2]	L 3 x 3 x ⅜ [2]
WIND LOAD STRUT - ③	L 2 ½x 2 ½x ⅜ [1]	L 2 ½x 2 ½x ⅜ [1]	L 2 ½x 2 ½x ⅜ [1]	L 2 ½x 2 ½x ⅜ [1]	L 2 ½x 2 ½x ⅜ [1]	L 2 ½x 2 ½x ⅜ [1]	L 2 ½x 2 ½x ⅜ [1]	L 2 ½x 2 ½x ⅜ [1]
TOTAL DEFL. & TRUSS D.L.	DEFL=1.94" L=69 lb/ft	DEFL=2.14" L=76 lb/ft	DEFL=2.60" L=78 lb/ft	DEFL=3.02" L=78 lb/ft	DEFL=2.97" L=81 lb/ft	DEFL=3.16" L=88 lb/ft	DEFL=3.46" L=93 lb/ft	DEFL=3.91" L=97 lb/ft

TOWER DETAILS

S = COLUMN SPACING	7.0'	7.0'	7.0'	7.0'	7.0'	7.0'	7.0'	7.0'
TOWER HEIGHT								
15'	W 10 x 22 (27.5)	W 10 x 22 (28.7)	W 10 x 22 (30.1)	W 10 x 22 (31.5)	W 10 x 22 (32.8)	W 10 x 26 (34.0)	W 10 x 26 (35.5)	W 10 x 26 (36.9)
16'	W 10 x 22 (29.5)	W 10 x 22 (30.8)	W 10 x 22 (32.3)	W 10 x 22 (33.7)	W 10 x 22 (35.1)	W 10 x 26 (36.4)	W 10 x 26 (38.1)	W 10 x 26 (39.5)
17'	W 10 x 22 (31.4)	W 10 x 22 (32.8)	W 10 x 22 (34.4)	W 10 x 22 (35.9)	W 10 x 26 (37.6)	W 10 x 26 (39.0)	W 10 x 26 (40.6)	W 10 x 26 (42.2)
18'	W 10 x 22 (33.4)	W 10 x 22 (34.9)	W 10 x 22 (36.6)	W 10 x 26 (38.2)	W 10 x 26 (40.0)	W 10 x 26 (41.5)	W 10 x 26 (43.2)	W 10 x 26 (44.8)
19'	W 10 x 22 (35.5)	W 10 x 26 (36.8)	W 10 x 26 (38.5)	W 10 x 26 (40.5)	W 10 x 26 (42.2)	W 12 x 26 (44.1)	W 12 x 26 (45.8)	W 12 x 26 (47.5)
20'	W 10 x 22 (37.3)	W 10 x 26 (38.8)	W 10 x 26 (40.7)	W 10 x 26 (42.7)	W 10 x 26 (44.5)	W 12 x 26 (46.6)	W 12 x 26 (48.3)	W 12 x 26 (50.2)
21'	W 10 x 26 (39.3)	W 10 x 26 (41.1)	W 12 x 26 (43.1)	W 12 x 26 (45.2)	W 12 x 26 (47.3)	W 12 x 26 (49.1)	W 12 x 26 (50.9)	W 12 x 26 (52.8)
22'	W 10 x 26 (41.3)	W 10 x 26 (43.2)	W 12 x 26 (45.3)	W 12 x 26 (47.5)	W 12 x 26 (49.7)	W 12 x 26 (51.6)	W 12 x 26 (53.5)	W 12 x 26 (55.5)
23'	W 12 x 26 (43.6)	W 12 x 26 (45.6)	W 12 x 26 (47.5)	W 12 x 26 (49.8)	W 12 x 26 (52.1)	W 12 x 26 (54.1)	W 14 x 30 (56.6)	W 14 x 30 (58.7)
24'	W 12 x 26 (45.6)	W 12 x 26 (47.7)	W 12 x 26 (49.7)	W 12 x 26 (52.1)	W 12 x 26 (54.5)	W 14 x 30 (56.6)	W 14 x 30 (59.2)	W 14 x 30 (61.5)
25'	W 12 x 26 (47.6)	W 12 x 26 (49.8)	W 12 x 26 (51.5)	W 14 x 30 (55.0)	W 14 x 30 (57.5)	W 14 x 30 (59.7)	W 14 x 30 (61.9)	W 14 x 30 (64.2)
26'	W 12 x 26 (49.7)	W 12 x 26 (52.0)	W 12 x 26 (53.7)	W 14 x 30 (57.4)	W 14 x 30 (59.7)	W 14 x 30 (62.2)	W 14 x 30 (64.6)	W 14 x 30 (67.0)
27'	W 12 x 26 (51.7)	W 14 x 30 (54.5)	W 14 x 30 (57.0)	W 14 x 30 (59.8)	W 14 x 30 (62.5)	W 14 x 34 (64.8)	W 14 x 34 (67.2)	W 14 x 34 (69.7)
28'	W 12 x 26 (53.8)	W 14 x 30 (56.7)	W 14 x 30 (59.3)	W 14 x 30 (62.2)	W 14 x 30 (64.9)	W 14 x 34 (67.4)	W 14 x 34 (69.9)	W 14 x 34 (72.5)
29'	W 14 x 30 (56.3)	W 14 x 30 (58.9)	W 14 x 30 (61.6)	W 14 x 34 (64.3)	W 14 x 34 (67.4)	W 14 x 34 (69.9)	W 14 x 34 (72.6)	W 16 x 36 (75.8)
30'	W 14 x 30 (58.4)	W 14 x 30 (61.1)	W 14 x 30 (63.9)	W 14 x 34 (66.7)	W 14 x 34 (69.9)	W 14 x 34 (72.5)	W 16 x 36 (75.3)	W 16 x 36 (78.6)

COLUMN SIZE & UPLIFT (kips)

Tower Height = (HL + HR)/2

ZONE 4 WITH ICE 70 M.P.H. WIND

TRUSS DETAILS

¾" Dia. H.S. Bolts Spans 96' Thru 155'

SPAN	140'	145'	150'	155'
W x D = WIDTH x DEPTH	5.0 x 5.0	5.0 x 5.0	5.0 x 5.0	5.0 x 5.0
CHORD -②, Unless Otherwise Shown	L 5 x 5 x 7/16 [14]	L 5 x 5 x 7/16 [15]	L 5 x 5 x ½ [16]	L 5 x 5 x ½ [18]
DEAD LOAD DIAGONAL -③	L 3 x 2 ½ x ¼ [3]	L 3 x 3 x ¼ [3]	L 3 ½x 3 x ¼ [4]	L 3 ½x 3 x ¼ [4]
WIND LOAD DIAGONAL -③	L 3 x 3 x ¼ [3]	L 3 x 3 x ¼ [3]	L 3 ½x 3 ½x ¼ [3]	L 3 ½x 3 ½x ¼ [3]
DEAD LOAD VERTICAL -③	L 3 x 3 x 3/16 [2]	L 3 x 2 x ¼ [3]	L 3 x 2 ½x ¼ [3]	L 3 x 2 ½x ¼ [3]
WIND LOAD STRUT - ③	L 2 ½x 2 ½x ⅜ [1]	L 2 ½x 2 ½x ⅜ [1]	L 2 ½x 2 ½x ⅜ [1]	L 2 ½x 2 ½x ⅜ [1]
TOTAL DEFL. & TRUSS D.L.	DEFL=4.49" L=103 lb/ft	DEFL=5.14" L=105 lb/ft	DEFL=5.23" L=118 lb/ft	DEFL=5.94" L=118 lb/ft

TOWER DETAILS

S = COLUMN SPACING	7.5'	7.5'	7.5'	7.5'
TOWER HEIGHT				
15'	W 12 x 26 (35.0)	W 12 x 26 (36.4)	W 12 x 26 (37.3)	W 12 x 26 (38.8)
16'	W 12 x 26 (37.6)	W 12 x 26 (39.1)	W 12 x 26 (40.1)	W 12 x 26 (41.7)
17'	W 12 x 26 (40.1)	W 12 x 26 (41.7)	W 12 x 26 (42.8)	W 12 x 26 (44.5)
18'	W 12 x 26 (42.7)	W 12 x 26 (44.4)	W 12 x 26 (45.6)	W 12 x 26 (47.4)
19'	W 12 x 26 (45.3)	W 12 x 26 (47.1)	W 12 x 26 (48.4)	W 12 x 26 (50.3)
20'	W 12 x 26 (47.9)	W 12 x 26 (49.7)	W 12 x 26 (51.1)	W 14 x 30 (53.2)
21'	W 12 x 26 (50.5)	W 14 x 30 (52.8)	W 14 x 30 (54.3)	W 14 x 30 (56.5)
22'	W 14 x 30 (53.1)	W 14 x 30 (55.6)	W 14 x 30 (57.2)	W 14 x 30 (59.4)
23'	W 14 x 30 (56.2)	W 14 x 30 (58.3)	W 14 x 30 (60.0)	W 14 x 34 (62.3)
24'	W 14 x 30 (58.8)	W 14 x 30 (61.1)	W 14 x 30 (62.8)	W 14 x 34 (65.2)
25'	W 14 x 30 (60.9)	W 14 x 34 (63.8)	W 14 x 34 (65.7)	W 14 x 34 (68.2)
26'	W 14 x 30 (63.6)	W 14 x 34 (66.6)	W 14 x 34 (68.5)	W 14 x 34 (71.2)
27'	W 14 x 34 (66.8)	W 14 x 34 (69.3)	W 16 x 36 (72.1)	W 16 x 36 (74.8)
28'	W 14 x 34 (69.5)	W 16 x 36 (72.1)	W 16 x 36 (75.0)	W 16 x 36 (77.9)
29'	W 16 x 36 (72.9)	W 16 x 36 (75.7)	W 16 x 36 (77.9)	W 16 x 40 (80.9)
30'	W 16 x 36 (75.7)	W 16 x 36 (78.5)	W 16 x 36 (80.9)	W 16 x 40 (84.0)

COLUMN SIZE & UPLIFT (kips)

Tower Height = (HL + HR)/2

KEY TO TRUSS AND TOWER DETAILS

Truss members are all angles.
Truss columns are all wide flange shapes.

W 10 x 26 (44.2) ← 44.2 kips Uplift at base plate
- 26 Pounds per foot.
- 10" Nominal size
- Wide Flange

DEFL = 0.12" = inches Deflection due to dead load of truss, walkway, signs and lights.
DL = 42 lb/ft = pounds per foot dead load of truss members only; does not include walkway, signs, and lights.

NOTE: Details on these sheets are for Design Wind Heights up to 30 feet.

GENERAL NOTES

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

For overhead sign bridges with different tower heights, average the height of the two towers and use the tabulated height nearest the calculated average. For average heights falling midway between the two tabulated heights use the larger height.

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

Overhead sign bridges are designed for the equivalent area of a 10 foot deep sign panel over 75 percent of the span length, located as necessary to produce maximum stress. Design includes 3 pounds per square foot for sign panel, 20 pounds per linear foot for lights, and 50 pounds per linear foot for walkway, all placed as specified for the design sign panel.

Refer to "Overhead Sign Bridge Truss Details" for details called out in plan and elevation views.

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

Texas Department of Transportation
Traffic Operations Division

OVERHEAD SIGN BRIDGE DETAILS

OSB-Z4I

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

REVISIONS
8/08 add missing HS bolt dia; applicability notes; noted design specifications

CONT	SECT	JOB	HIGHWAY
6473	31	001	SH 6, ETC.

DIST	COUNTY	SHEET NO.
WACO	MCLENNAN, ETC.	63

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ZONE 4 WITH ICE 70 M.P.H. WIND

SPAN	40′	45′	50′	55′	60′	65′	70′	75′
	TRUSS DETAILS — 5/8" Dia. H.S. Bolts, Spans 40′ Thru 95′							
W x D = WIDTH x DEPTH	4.0 x 4.0	4.0 x 4.0	4.0 x 4.0	4.0 x 4.0	4.0 x 4.0	4.0 x 4.0	4.0 x 4.0	4.0 x 4.0
CHORD -②, Unless Otherwise Shown	L 3 x 3 x 3/16 ③ [4]	L 3 x 3 x 3/16 ③ [4]	L 3 x 3 x 3/16 ③ [4]	L 3 x 3 x 1/4 ③ [4]	L 3 x 3 x 1/4 [6]	L 3 x 3 x 5/16 [6]	L 3 x 3 x 5/16 [6]	L 3 x 3 x 5/16 [8]
DEAD LOAD DIAGONAL -③	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [3]
WIND LOAD DIAGONAL -③	L 2 1/2 x 2 1/2 x 3/16 [2]	L 2 1/2 x 2 1/2 x 3/16 [2]	L 2 1/2 x 2 1/2 x 3/16 [2]	L 2 1/2 x 2 1/2 x 3/16 [2]	L 2 1/2 x 2 1/2 x 3/16 [2]	L 3 x 3 x 3/16 [2]	L 3 x 3 x 3/16 [2]	L 3 x 3 x 3/16 [2]
DEAD LOAD VERTICAL -③	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]
WIND LOAD STRUT - ③	L 2 x 2 x 3/16 [1]	L 2 x 2 x 3/16 [1]	L 2 x 2 x 3/16 [1]	L 2 x 2 x 3/16 [1]	L 2 x 2 x 3/16 [1]	L 2 x 2 x 3/16 [1]	L 2 x 2 x 3/16 [1]	L 2 x 2 x 3/16 [1]
TOTAL DEFL. & TRUSS D.L.	DEFL=0.17" L=37 lb/ft	DEFL=0.25" L=38 lb/ft	DEFL=0.38" L=38 lb/ft	DEFL=0.36" L=43 lb/ft	DEFL=0.55" L=43 lb/ft	DEFL=0.58" L=50 lb/ft	DEFL=0.77" L=50 lb/ft	DEFL=0.99" L=50 lb/ft
	TOWER DETAILS							
S = COLUMN SPACING	6.0′	6.0′	6.0′	6.0′	6.0′	6.0′	6.5′	6.5′
TOWER HEIGHT								
25′	W 10 x 22 (27.2)	W 10 x 22 (30.2)	W 10 x 22 (33.1)	W 10 x 22 (36.0)	W 10 x 22 (39.0)	W 10 x 26 (41.8)	W 10 x 26 (41.0)	W 10 x 26 (43.7)
26′	W 10 x 22 (32.6)	W 10 x 22 (35.6)	W 10 x 22 (38.7)	W 10 x 26 (41.6)	W 10 x 26 (44.7)	W 10 x 26 (47.7)	W 12 x 26 (46.5)	W 12 x 26 (49.4)
27′	W 10 x 22 (34.1)	W 10 x 22 (37.3)	W 10 x 26 (40.4)	W 10 x 26 (43.5)	W 10 x 26 (46.7)	W 12 x 26 (49.8)	W 12 x 26 (48.6)	W 12 x 26 (51.9)
28′	W 10 x 22 (35.7)	W 10 x 26 (38.9)	W 10 x 26 (42.2)	W 10 x 26 (45.4)	W 12 x 26 (48.7)	W 12 x 26 (52.0)	W 12 x 26 (50.7)	W 12 x 26 (53.8)
29′	W 10 x 26 (37.2)	W 10 x 26 (40.6)	W 10 x 26 (44.0)	W 12 x 26 (47.3)	W 12 x 26 (50.8)	W 12 x 26 (54.2)	W 12 x 26 (52.8)	W 12 x 26 (56.0)
30′	W 10 x 26 (33.8)	W 10 x 26 (42.3)	W 12 x 26 (45.8)	W 12 x 26 (49.3)	W 12 x 26 (52.8)	W 12 x 26 (56.3)	W 12 x 26 (54.9)	W 14 x 30 (58.1)
31′	W 10 x 26 (40.4)	W 12 x 26 (44.0)	W 12 x 26 (47.7)	W 12 x 26 (51.3)	W 12 x 26 (54.9)	W 14 x 30 (58.5)	W 14 x 30 (57.0)	W 14 x 30 (60.4)
32′	W 10 x 26 (42.0)	W 12 x 26 (45.8)	W 12 x 26 (49.5)	W 12 x 26 (53.2)	W 12 x 26 (57.0)	W 14 x 30 (60.7)	W 14 x 30 (59.1)	W 14 x 30 (62.6)
33′	W 12 x 26 (43.7)	W 12 x 26 (47.6)	W 12 x 26 (51.4)	W 12 x 26 (55.2)	W 14 x 30 (59.0)	W 14 x 30 (62.9)	W 14 x 30 (61.3)	W 14 x 34 (64.7)
34′	W 12 x 26 (45.4)	W 12 x 26 (49.3)	W 12 x 26 (53.3)	W 14 x 30 (57.2)	W 14 x 30 (61.2)	W 14 x 30 (65.2)	W 14 x 34 (63.3)	W 14 x 34 (67.0)
35′	W 12 x 26 (47.0)	W 12 x 26 (51.2)	W 14 x 30 (55.2)	W 14 x 30 (59.2)	W 14 x 30 (63.3)	W 14 x 34 (67.2)	W 14 x 34 (65.5)	W 14 x 34 (69.3)
36′	W 12 x 26 (48.8)	W 14 x 30 (52.9)	W 14 x 30 (57.1)	W 14 x 30 (61.3)	W 14 x 34 (65.3)	W 14 x 34 (69.5)	W 14 x 34 (67.7)	W 14 x 34 (71.7)
37′	W 12 x 26 (50.5)	W 14 x 30 (54.7)	W 14 x 30 (59.0)	W 14 x 34 (63.1)	W 14 x 34 (67.5)	W 14 x 34 (71.8)	W 14 x 34 (69.9)	W 16 x 36 (73.8)
38′	W 14 x 30 (52.1)	W 14 x 30 (56.6)	W 14 x 30 (61.0)	W 14 x 34 (65.2)	W 14 x 34 (69.7)	W 14 x 34 (74.1)	W 16 x 36 (72.0)	W 16 x 36 (76.2)
39′	W 14 x 30 (53.9)	W 14 x 30 (58.4)	W 14 x 34 (62.8)	W 14 x 34 (67.3)	W 14 x 34 (71.9)	W 16 x 36 (76.3)	W 16 x 36 (74.3)	W 16 x 36 (78.5)
40′	W 14 x 30 (55.6)	W 14 x 34 (60.1)	W 14 x 34 (64.8)	W 14 x 34 (69.4)	W 16 x 36 (73.9)	W 16 x 36 (78.6)	W 16 x 36 (76.5)	W 16 x 36 (80.9)
42′	W 14 x 34 (59.0)	W 14 x 34 (63.9)	W 14 x 34 (68.9)	W 16 x 36 (73.5)	W 16 x 36 (78.5)	W 16 x 36 (83.4)	W 16 x 40 (80.6)	W 16 x 40 (85.2)
45′	W 14 x 34 (64.5)	W 16 x 36 (69.6)	W 16 x 36 (74.8)	W 16 x 36 (80.1)	W 16 x 40 (84.9)	W 16 x 40 (90.1)	W 16 x 40 (87.6)	W 18 x 46 (92.4)

COLUMN SIZE & UPLIFT (kips)

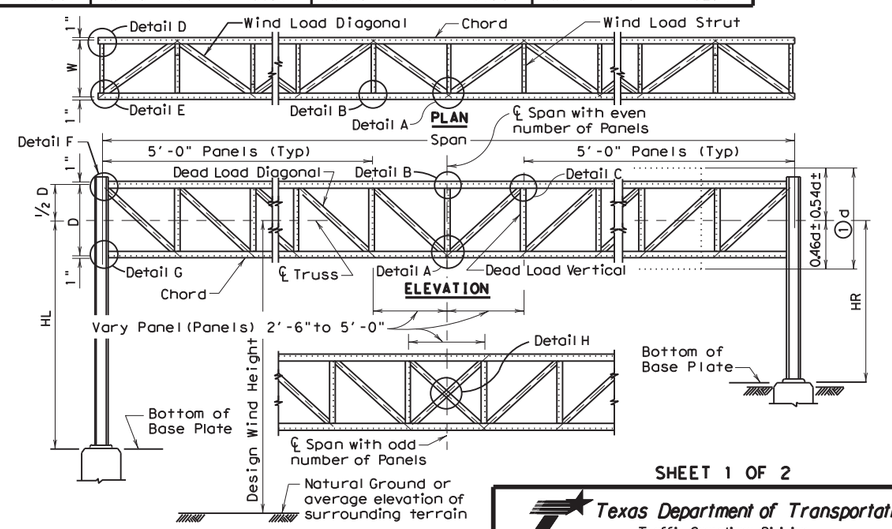
Tower Height = (HL + HR)/2

ZONE 4 WITH ICE 70 M.P.H. WIND

SPAN	80′	85′	90′	95′
	TRUSS DETAILS — 5/8" Dia. H.S. Bolts, Spans 40′ Thru 95′			
W x D = WIDTH x DEPTH	4.0 x 4.0	4.0 x 4.0	4.0 x 4.0	4.0 x 4.0
CHORD -②, Unless Otherwise Shown	L 3 x 3 x 3/8 [9]	L 3 x 3 x 7/16 [10]	L 3 1/2 x 3 1/2 x 3/8 [11]	L 3 1/2 x 3 1/2 x 3/8 [11]
DEAD LOAD DIAGONAL -③	L 2 1/2 x 2 1/2 x 3/16 [3]	L 3 x 2 x 3/16 [3]	L 3 x 2 x 3/16 [3]	L 3 x 2 x 3/16 [3]
WIND LOAD DIAGONAL -③	L 3 x 3 x 3/16 [2]	L 3 x 3 x 3/16 [2]	L 3 x 2 1/2 x 1/4 [3]	L 3 x 2 1/2 x 1/4 [3]
DEAD LOAD VERTICAL -③	L 2 x 2 x 3/16 [2]	L 3 x 2 x 3/16 [2]	L 3 x 2 x 3/16 [2]	L 3 x 2 x 3/16 [2]
WIND LOAD STRUT - ③	L 2 x 2 x 3/16 [1]	L 2 x 2 x 3/16 [1]	L 2 x 2 x 3/16 [1]	L 2 x 2 x 3/16 [1]
TOTAL DEFL. & TRUSS D.L.	DEFL=1.11" L=56 lb/ft	DEFL=1.29" L=62 lb/ft	DEFL=1.60" L=65 lb/ft	DEFL=1.95" L=65 lb/ft
	TOWER DETAILS			
S = COLUMN SPACING	6.5′	6.5′	6.5′	6.5′
TOWER HEIGHT				
25′	W 12 x 26 (46.4)	W 12 x 26 (49.0)	W 12 x 26 (51.7)	W 12 x 26 (54.5)
26′	W 12 x 26 (52.2)	W 12 x 26 (54.9)	W 12 x 26 (57.7)	W 14 x 30 (60.5)
27′	W 12 x 26 (54.4)	W 12 x 26 (57.3)	W 14 x 30 (60.2)	W 14 x 30 (63.2)
28′	W 12 x 26 (56.7)	W 14 x 30 (59.7)	W 14 x 30 (62.7)	W 14 x 30 (65.8)
29′	W 14 x 30 (59.0)	W 14 x 30 (62.1)	W 14 x 30 (65.2)	W 14 x 34 (68.3)
30′	W 14 x 30 (61.3)	W 14 x 30 (64.6)	W 14 x 34 (67.6)	W 14 x 34 (71.0)
31′	W 14 x 30 (63.7)	W 14 x 34 (66.9)	W 14 x 34 (70.2)	W 14 x 34 (73.6)
32′	W 14 x 34 (65.7)	W 14 x 34 (69.4)	W 14 x 34 (72.9)	W 14 x 34 (76.3)
33′	W 14 x 34 (68.1)	W 14 x 34 (71.8)	W 14 x 34 (75.4)	W 16 x 36 (78.9)
34′	W 14 x 34 (70.5)	W 14 x 34 (74.4)	W 16 x 36 (77.8)	W 16 x 36 (81.6)
35′	W 14 x 34 (72.9)	W 16 x 36 (76.7)	W 16 x 36 (80.5)	W 16 x 36 (84.4)
36′	W 16 x 36 (75.3)	W 16 x 36 (79.2)	W 16 x 36 (83.1)	W 16 x 36 (87.1)
37′	W 16 x 36 (77.8)	W 16 x 36 (81.8)	W 16 x 36 (85.8)	W 16 x 40 (89.5)
38′	W 16 x 36 (80.3)	W 16 x 36 (84.4)	W 16 x 40 (88.1)	W 16 x 40 (92.3)
39′	W 16 x 36 (82.7)	W 16 x 40 (86.8)	W 16 x 40 (90.8)	W 16 x 40 (95.1)
40′	W 16 x 40 (84.8)	W 16 x 40 (89.1)	W 16 x 40 (93.4)	W 16 x 40 (97.7)
42′	W 16 x 40 (89.7)	W 16 x 40 (93.9)	W 18 x 46 (98.7)	W 18 x 46 (103.4)
45′	W 18 x 46 (97.2)	W 18 x 46 (101.9)	W 18 x 46 (107.0)	W 18 x 50 (112.0)

COLUMN SIZE & UPLIFT (kips)

Tower Height = (HL + HR)/2



① d = Sign Depth
Where signs of different depths are used, the bottom edges of all signs may be placed in line. Where this is done, all signs should be so positioned that the bottom edges are approximately 0.46 of the depth of the deepest sign below the ℄ of the truss.

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

③ "Carbon Steel" for non-bridge structures per Item 442, "Metal For Structures".

SHEET 1 OF 2

Texas Department of Transportation
Traffic Operations Division

HIGH LEVEL OVERHEAD SIGN BRIDGE DETAILS

HOSB-Z41

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
REVISIONS			
8/08 ■ of HS bolts			

CONT	SECT	JOB	HIGHWAY
6473	31	001	SH 6, ETC.
DIST	COUNTY		SHEET NO.
WACO	MCLENNAN, ETC.		64

DATE: 9/16/2024 11:39:55 AM
FILE: T:\WACTRAFF\RMC\DIST SIGN 2025\Plan Sheets\Standards\HOSB-Z41.dgn

ZONE 4 WITH ICE 70 M.P.H. WIND

TRUSS DETAILS — ¾" Dia. H.S. Bolts, Spans 96' Thru 155'

SPAN	100'	105'	110'	115'	120'	125'	130'	135'
W x D = WIDTH x DEPTH	4.5 x 4.5	4.5 x 4.5	4.5 x 4.5	4.5 x 4.5	5.0 x 5.0	5.0 x 5.0	5.0 x 5.0	5.0 x 5.0
CHORD -②, Unless Otherwise Shown	L 3 ½x 3 ½x ⅜ [7]	L 3 ½x 3 ½x 7/16 [9]	L 4 x 4 x ⅜ [9]	L 4 x 4 x 7/16 [10]	L 4 x 4 x 7/16 [10]	L 4 x 4 x 7/16 [11]	L 4 x 4 x ½ [12]	L 5 x 5 x 7/16 [13]
DEAD LOAD DIAGONAL -③	L 3 x 2 x ⅜ [2]	L 3 x 2 ½x ⅜ [3]	L 3 x 3 x ⅜ [3]	L 3 x 3 x ⅜ [3]	L 3 x 3 x ⅜ [3]	L 3 x 2 x ¼ [3]	L 3 x 2 x ¼ [3]	L 3 x 2 ½x ¼ [3]
WIND LOAD DIAGONAL -③	L 3 x 2 ½x ¼ [2]	L 3 x 3 x ¼ [2]	L 3 x 3 x ¼ [2]	L 3 x 3 x ¼ [2]	L 3 x 3 x ¼ [2]	L 3 x 3 x ¼ [2]	L 3 x 3 x ¼ [2]	L 3 x 3 x ¼ [3]
DEAD LOAD VERTICAL -③	L 3 x 2 x ⅜ [2]	L 3 x 2 x ⅜ [2]	L 3 x 2 x ⅜ [2]	L 3 x 2 x ⅜ [2]	L 3 x 2 ½x ⅜ [2]	L 3 x 2 ½x 7/16 [2]	L 3 x 2 ½x 7/16 [2]	L 3 x 3 x ⅜ [2]
WIND LOAD STRUT - ③	L 2 ½x 2 ½x ⅜ [1]	L 2 ½x 2 ½x ⅜ [1]	L 2 ½x 2 ½x ⅜ [1]	L 2 ½x 2 ½x ⅜ [1]	L 2 ½x 2 ½x ⅜ [1]	L 2 ½x 2 ½x 7/16 [1]	L 2 ½x 2 ½x 7/16 [1]	L 2 ½x 2 ½x ⅜ [1]
TOTAL DEFL. & TRUSS D.L.	DEFL=1.96" L=69 lb/ft	DEFL=2.16" L=77 lb/ft	DEFL=2.59" L=78 lb/ft	DEFL=2.78" L=83 lb/ft	DEFL=2.73" L=86 lb/ft	DEFL=3.14" L=87 lb/ft	DEFL=3.35" L=92 lb/ft	DEFL=3.90" L=102 lb/ft

TOWER DETAILS

S = COLUMN SPACING	7.0'	7.0'	7.0'	7.0'	7.0'	7.0'	7.0'	7.0'
TOWER HEIGHT								
25'	W 14 x 30 (56.3)	W 14 x 30 (58.6)	W 14 x 30 (61.4)	W 14 x 30 (63.8)	W 14 x 34 (66.3)	W 14 x 34 (68.9)	W 14 x 34 (71.3)	W 14 x 34 (73.6)
26'	W 14 x 30 (58.8)	W 14 x 30 (61.2)	W 14 x 30 (64.1)	W 14 x 34 (66.5)	W 14 x 34 (69.3)	W 14 x 34 (71.9)	W 14 x 34 (74.5)	W 14 x 34 (76.9)
27'	W 14 x 30 (61.3)	W 14 x 30 (63.9)	W 14 x 30 (66.7)	W 14 x 34 (69.3)	W 14 x 34 (72.2)	W 14 x 34 (75.0)	W 14 x 34 (77.6)	W 16 x 36 (80.0)
28'	W 14 x 30 (63.9)	W 14 x 34 (66.4)	W 14 x 34 (69.4)	W 14 x 34 (72.2)	W 14 x 34 (75.2)	W 14 x 34 (78.1)	W 16 x 36 (80.7)	W 16 x 36 (83.3)
29'	W 14 x 34 (66.4)	W 14 x 34 (69.1)	W 14 x 34 (72.2)	W 14 x 34 (75.1)	W 16 x 36 (78.0)	W 16 x 36 (80.8)	W 16 x 36 (83.9)	W 16 x 36 (86.6)
30'	W 14 x 34 (69.0)	W 14 x 34 (71.7)	W 14 x 34 (75.0)	W 16 x 36 (77.8)	W 16 x 36 (81.0)	W 16 x 36 (83.9)	W 16 x 36 (87.1)	W 16 x 40 (89.5)
31'	W 14 x 34 (71.6)	W 14 x 34 (74.4)	W 16 x 36 (77.7)	W 16 x 36 (80.7)	W 16 x 36 (84.0)	W 16 x 36 (87.1)	W 16 x 40 (90.0)	W 16 x 40 (92.9)
32'	W 14 x 34 (74.3)	W 16 x 36 (77.0)	W 16 x 36 (80.5)	W 16 x 36 (83.7)	W 16 x 36 (87.1)	W 16 x 40 (90.0)	W 16 x 40 (93.2)	W 16 x 40 (96.2)
33'	W 16 x 36 (76.7)	W 16 x 36 (79.7)	W 16 x 36 (83.3)	W 16 x 36 (86.6)	W 16 x 40 (89.8)	W 16 x 40 (93.2)	W 16 x 40 (96.5)	W 18 x 46 (99.4)
34'	W 16 x 36 (79.4)	W 16 x 36 (82.5)	W 16 x 40 (85.8)	W 16 x 40 (89.2)	W 16 x 40 (92.8)	W 16 x 40 (96.3)	W 18 x 46 (99.5)	W 18 x 46 (102.8)
35'	W 16 x 36 (82.0)	W 16 x 40 (84.9)	W 16 x 40 (88.6)	W 16 x 40 (92.1)	W 16 x 40 (95.9)	W 18 x 46 (99.8)	W 18 x 46 (102.8)	W 18 x 46 (106.2)
36'	W 16 x 40 (84.3)	W 16 x 40 (87.6)	W 16 x 40 (91.5)	W 16 x 40 (95.1)	W 18 x 46 (98.8)	W 18 x 46 (103.0)	W 18 x 46 (106.1)	W 18 x 46 (109.5)
37'	W 16 x 40 (87.0)	W 16 x 40 (90.4)	W 16 x 40 (94.2)	W 18 x 46 (97.9)	W 18 x 46 (101.9)	W 18 x 46 (106.2)	W 18 x 46 (109.4)	W 18 x 46 (113.0)
38'	W 16 x 40 (89.7)	W 18 x 46 (93.0)	W 18 x 46 (97.1)	W 18 x 46 (100.9)	W 18 x 46 (105.0)	W 18 x 46 (109.4)	W 18 x 46 (112.7)	W 18 x 50 (116.2)
39'	W 18 x 46 (92.2)	W 18 x 46 (95.8)	W 18 x 46 (100.0)	W 18 x 46 (103.9)	W 18 x 46 (108.1)	W 18 x 50 (111.9)	W 18 x 50 (115.9)	W 18 x 50 (119.6)
40'	W 18 x 46 (94.9)	W 18 x 46 (98.6)	W 18 x 46 (102.9)	W 18 x 46 (106.9)	W 18 x 46 (111.2)	W 18 x 50 (115.2)	W 18 x 50 (119.2)	W 18 x 50 (123.1)
42'	W 18 x 46 (97.6)	W 18 x 46 (104.3)	W 18 x 46 (108.8)	W 18 x 50 (112.8)	W 18 x 50 (117.3)	W 18 x 50 (121.7)	W 18 x 55 (125.7)	W 18 x 55 (129.8)
45'	W 18 x 50 (108.5)	W 18 x 50 (112.7)	W 18 x 50 (117.5)	W 18 x 55 (121.8)	W 18 x 55 (126.7)	W 21 x 57 (130.9)	W 21 x 57 (135.5)	W 21 x 57 (139.8)

COLUMN SIZE & UPLIFT (kips)

Tower Height = (HL + HR)/2

ZONE 4 WITH ICE 70 M.P.H. WIND

TRUSS DETAILS — ¾" Dia. H.S. Bolts, Spans 96' Thru 155'

SPAN	140'	145'	150'	155'
W x D = WIDTH x DEPTH	5.0 x 5.0	5.0 x 5.0	5.0 x 5.0	5.0 x 5.0
CHORD -②, Unless Otherwise Shown	L 5 x 5 x 7/16 [14]	L 5 x 5 x ½ [15]	L 5 x 5 x ½ [16]	L 5 x 5 x ½ [18]
DEAD LOAD DIAGONAL -③	L 3 x 2 ½x ¼ [3]	L 3 ½x 3 x ¼ [3]	L 3 ½x 3 ½x ¼ [4]	L 3 ½x 3 ½x ¼ [4]
WIND LOAD DIAGONAL -③	L 3 ½x 3 x ¼ [3]	L 3 ½x 3 ½x ¼ [3]	L 3 ½x 3 ½x ¼ [3]	L 3 ½x 3 ½x ¼ [3]
DEAD LOAD VERTICAL -③	L 3 x 2 x ¼ [2]	L 3 x 2 ½x ¼ [3]	L 3 x 2 ½x ¼ [3]	L 3 x 2 ½x ¼ [3]
WIND LOAD STRUT - ③	L 2 ½x 2 ½x 3/16 [1]	L 2 ½x 2 ½x 3/16 [1]	L 2 ½x 2 ½x 3/16 [1]	L 2 ½x 2 ½x ⅜ [1]
TOTAL DEFL. & TRUSS D.L.	DEFL=4.51" L=105 lb/ft	DEFL=4.55" L=117 lb/ft	DEFL=5.23" L=118 lb/ft	DEFL=5.26" L=118 lb/ft

TOWER DETAILS

S = COLUMN SPACING	7.5'	7.5'	7.5'	7.5'
TOWER HEIGHT				
25'	**W 14 x 34 (70.5)**	W 14 x 34 (72.7)	W 16 x 36 (75.1)	W 16 x 36 (77.7)
26'	W 14 x 34 (73.7)	W 16 x 36 (75.9)	W 16 x 36 (78.4)	W 16 x 36 (81.2)
27'	W 16 x 36 (76.7)	W 16 x 36 (79.0)	W 16 x 36 (81.8)	W 16 x 36 (84.6)
28'	W 16 x 36 (79.8)	W 16 x 36 (82.3)	W 16 x 40 (84.9)	W 16 x 40 (87.8)
29'	W 16 x 36 (83.0)	W 16 x 40 (85.3)	W 16 x 40 (88.2)	W 16 x 40 (91.3)
30'	W 16 x 40 (85.9)	W 16 x 40 (88.6)	W 16 x 40 (91.6)	W 16 x 40 (94.8)
31'	W 16 x 40 (89.1)	W 16 x 40 (91.9)	W 18 x 46 (94.9)	W 18 x 46 (98.2)
32'	W 16 x 40 (92.3)	W 18 x 46 (94.8)	W 18 x 46 (98.3)	W 18 x 46 (101.7)
33'	W 18 x 46 (95.3)	W 18 x 46 (98.2)	W 18 x 46 (101.8)	W 18 x 46 (105.2)
34'	W 18 x 46 (98.6)	W 18 x 46 (101.5)	W 18 x 46 (105.2)	W 18 x 46 (108.8)
35'	W 18 x 46 (101.8)	W 18 x 46 (104.9)	W 18 x 46 (108.7)	W 18 x 50 (112.2)
36'	W 18 x 46 (105.1)	W 18 x 46 (108.2)	W 18 x 50 (112.0)	W 18 x 50 (115.7)
37'	W 18 x 46 (108.4)	W 18 x 50 (111.6)	W 18 x 50 (115.4)	W 18 x 50 (119.3)
38'	W 18 x 50 (111.5)	W 18 x 50 (115.0)	W 18 x 50 (118.9)	W 18 x 55 (122.7)
39'	W 18 x 50 (114.8)	W 18 x 50 (118.4)	W 18 x 55 (122.3)	W 18 x 55 (126.4)
40'	W 18 x 50 (118.1)	W 18 x 55 (121.6)	W 18 x 55 (125.8)	W 18 x 55 (130.0)
42'	W 18 x 55 (124.5)	W 18 x 55 (128.5)	W 21 x 57 (132.5)	W 21 x 57 (136.9)
45'	W 21 x 57 (134.2)	W 21 x 57 (138.5)	W 21 x 62 (143.0)	W 21 x 62 (147.7)

COLUMN SIZE & UPLIFT (kips)

Tower Height = (HL + HR)/2

KEY TO TRUSS AND TOWER DETAILS

Truss members are all angles.
Truss columns are all wide flange shapes.

W 10 x 26 (44.2) ← 44.2 kips Uplift at base plate
- 26 Pounds per foot.
- 10" Nominal size
- Wide Flange

DEFL = 0.12" = inches Deflection due to dead load of truss, walkway, signs and lights.
DL = 42 lb/ft = pounds per foot dead load of truss members only; does not include walkway, signs, and lights.

NOTE: Details on these sheets are for Design Wind Heights between 30 feet and 50 feet.

GENERAL NOTES

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

For overhead sign bridges with different tower heights, average the height of the two towers and use the tabulated height nearest the calculated average. For average heights falling midway between the two tabulated heights use the larger height.

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

Overhead sign bridges are designed for the equivalent area of a 10 foot deep sign panel over 75 percent of the span length, located as necessary to produce maximum stress. Design includes 3 pounds per square foot for sign panel, 20 pounds per linear foot for lights, and 50 pounds per linear foot for walkway, all placed as specified for the design sign panel.

Refer to "Overhead Sign Bridge Truss Details" for details called out in plan and elevation views.

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

SHEET 2 OF 2

Texas Department of Transportation
Traffic Operations Division

HIGH LEVEL OVERHEAD SIGN BRIDGE DETAILS

HOSB-Z41

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

REVISIONS
8/08 add missing HS bolt dia (select spans); applicability note; noted design specifications

CONT	SECT	JOB	HIGHWAY
6473	31	001	SH 6, ETC.

DIST	COUNTY	SHEET NO.
WACO	MCLENNAN, ETC.	65

DATE: 9/16/2024 11:39:56 AM
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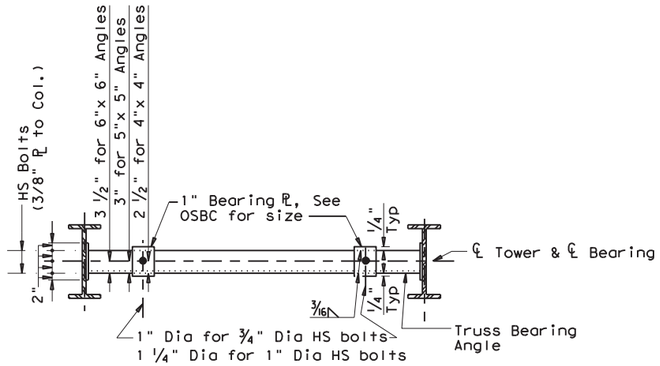


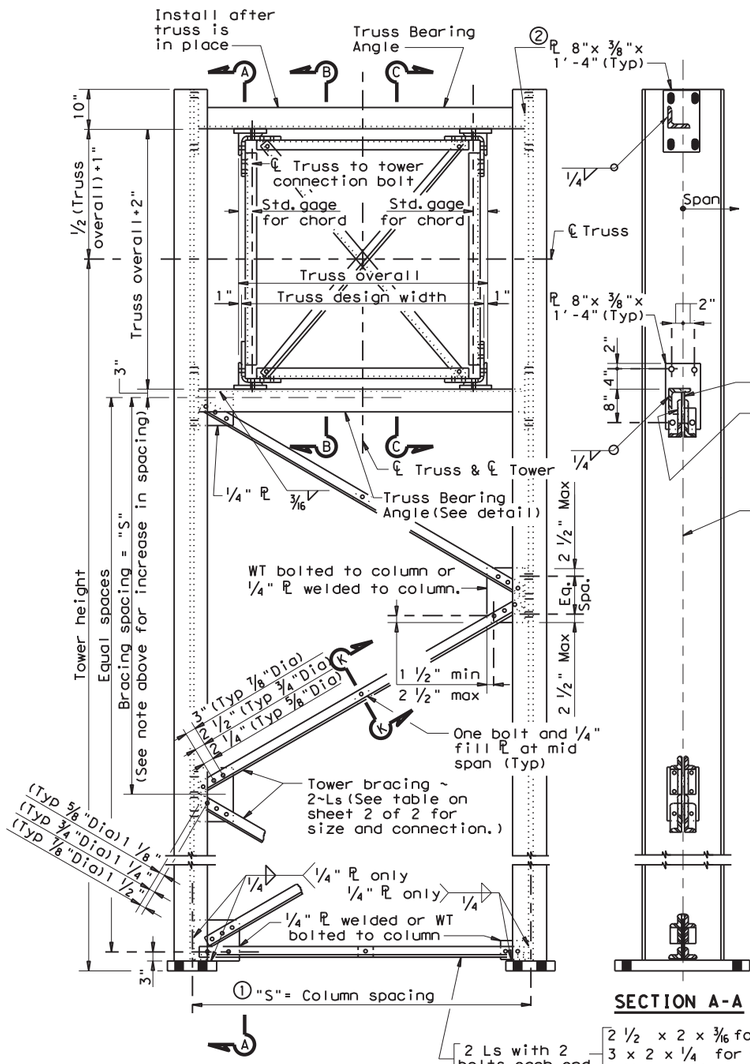
PLAN AT TRUSS BEARING ANGLE

COLUMN SPA. "S"	TRUSS BEARING ANGLE	HS BOLTS (DIA)
6'-0"	L 4 x 4 x 5/16	5/8"
6'-6"	L 5 x 5 x 3/8	5/8"
7'-0"	L 5 x 5 x 1/2	3/4"
7'-6" to 8'-6"	L 6 x 6 x 5/8	3/4"
9'-0"	L 6 x 6 x 3/4	3/4"
9'-6"	L 6 x 6 x 7/8	3/4"

② Nominal Dia. x 1 ½" slots in plate. (Top ℄ only) Use washer on plate side of HS bolt. (See table above for size of bolts.)

GENERAL NOTES

1. Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals and Interim revisions thereto for design heights up to 50 feet.
2. For size and spacing of columns see sheets, "Overhead Sign Bridge Details."
3. At contractor's option tower bracing connections may be high strength (HS) bolted or welded. If welded connections are used, length of connection shall be taken from the table shown on sheet, "Overhead Sign Bridge Truss Details-OSBC."
4. All connection bolts shall conform to ASTM A325 Type 1. Washers shall conform to ASTM F436. Bolts, nuts and washers shall be galvanized per Item 445, "Galvanizing".
5. All structural steel shall conform to ASTM A36 except where noted. Structural steel shall be galvanized after fabrication per Item 445, "Galvanizing".
6. Anchor bolts and nuts for anchor bolts shall be "Alloy steel" per Item 449, "Anchor Bolts".
7. Anchor bolts shall be rigidly held in position during concrete placement by using steel templates at the top and bottom. The bottom template and anchor plate assembly shall remain in place and shall not be damaged during concrete placement. The top template shall be removed after concrete has set.
8. Exposed nuts and washers shall be galvanized in accordance with Item 449, "Galvanizing". Embedded nuts and top and bottom templates need not be galvanized.
9. Lubricate and tighten the anchor bolts when erecting the structure per Item 449, "Anchor Bolts". After the structure has been aligned in its final position and the anchor bolts have been properly tightened, tack weld anchor bolt nuts to washers, and tack weld washers to base plates. Galvanizing in tack welded areas shall be repaired per Item 445, "Galvanizing".
10. Concrete shall be Class "C".

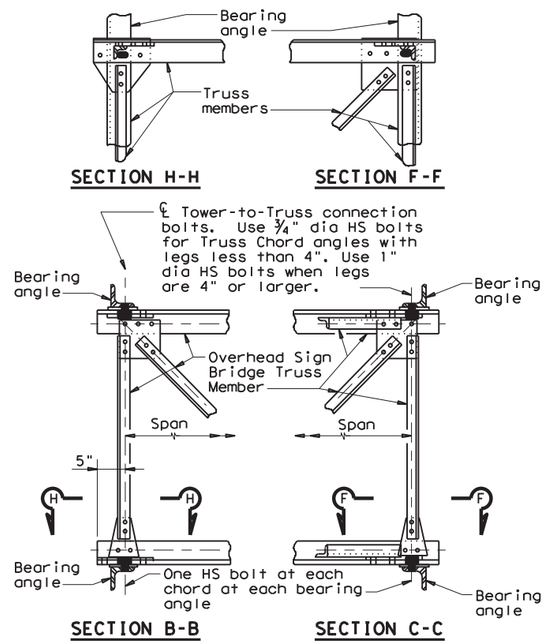


TRUSS DETAILS

① For column spacing see standard drawing, "Overhead Sign Bridge Details"

SPECIAL NOTE FOR TOWER BRACING

1. Normally, the maximum spacing for tower bracing is the same as column spacing; However, this spacing may be increased as follows:
2. Determine required column size and spacing to satisfy height for the wind zone and truss span being used. Height=$(H_L + H_R)/2$.
3. Note the number of times this column size is shown for larger heights for the same span and wind zone.
4. Spacing of bracing may be increased 1'-0" for each time height is shown, except the increase shall not exceed 5'-0".



TRUSS-TO-TOWER CONNECTION DETAILS

SHEET 1 OF 2

Texas Department of Transportation

Traffic Safety Division Standard

OVERHEAD SIGN BRIDGE TOWER DETAILS

OSBT(1)-21

FILE: osbt-21.dgn	DN:	CK:	DW:	CK:
©TxDOT November 2007	CONT	SECT	JOB	HIGHWAY
REVISIONS	6473	31	001	SH 6, ETC.
8-21	DIST	COUNTY		SHEET NO.
	WACO	MCLENNAN, ETC.		66

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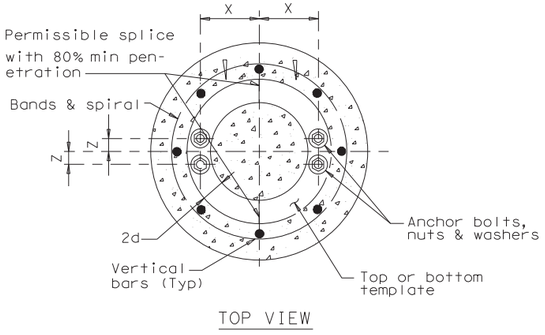
BRACING FOR 9′-0" TO 9′-6" COLUMN SPACING				
SIZE DOUBLE ANGLES	BOLTS REQUIRED			
	BRACING		WT to W	
	¾"	⅞"	¾"	⅞"
2 Ls 4 x 4 x 5/16	6	4	10	8
2 Ls 4 x 4 x 5/16	6	4	10	8
2 Ls 4 x 4 x 5/16	6	4	10	8
2 Ls 4 x 4 x 5/16	6	4	10	8
2 Ls 4 x 3 ½ x 5/16	5	4	10	8
2 Ls 4 x 3 ½ x 5/16	5	4	10	8
2 Ls 4 x 3 ½ x 5/16	5	4	10	8
2 Ls 4 x 3 x 5/16	5	4	10	8
2 Ls 4 x 3 x 5/16	5	4	10	8
2 Ls 4 x 3 x 5/16	5	4	10	8
2 Ls 4 x 3 x 5/16	5	4	10	8

BRACING FOR 8′-0" TO 8′-6" COLUMN SPACING.				
SIZE DOUBLE ANGLES	BOLTS REQUIRED			
	BRACING		WT to W	
	¾"	⅞"	¾"	⅞"
2 Ls 4 x 3 x 5/16	5	4	10	8
2 Ls 4 x 3 x 5/16	5	4	10	8
2 Ls 4 x 3 x 5/16	5	4	10	8
2 Ls 3 ½ x 3 x 5/16	5	4	8	6
2 Ls 3 ½ x 3 x 5/16	5	4	8	6
2 Ls 3 ½ x 3 x 5/16	5	4	8	6
2 Ls 4 x 3 x ¼	4	3	8	6
2 Ls 4 x 3 x ¼	4	3	8	6
2 Ls 4 x 3 x ¼	4	3	8	6
2 Ls 3 ½ x 3 x ¼	4	3	8	6
2 Ls 3 ½ x 3 x ¼	4	3	8	6

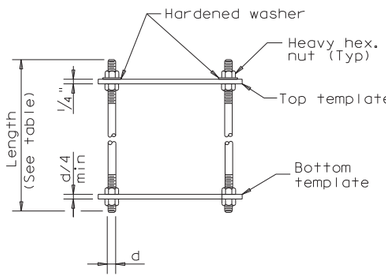
BRACING FOR 7′-0" TO 7′-6" COLUMN SPACING.						
SIZE DOUBLE ANGLES	BOLTS REQUIRED					
	BRACING			WT to W		
	5/8"	¾"	⅞"	5/8"	¾"	⅞"
2 Ls 4 x 3 x 5/16	7	5	4	12	10	8
2 Ls 4 x 3 x 5/16	7	5	4	12	10	8
2 Ls 4 x 3 x 5/16	7	5	4	12	10	8
2 Ls 3 ½ x 3 x 5/16	6	5	4	12	8	6
2 Ls 3 ½ x 3 x ¼	6	4	3	10	8	6
2 Ls 3 ½ x 3 x ¼	6	4	3	10	8	6
2 Ls 3 ½ x 3 x ¼	6	4	3	10	8	6
2 Ls 3 ½ x 3 x ¼	6	4	3	10	8	6
2 Ls 3 ½ x 3 x ¼	6	4	3	10	8	6
2 Ls 3 ½ x 3 x ¼	5	4	3	10	6	4
2 Ls 3 ½ x 2 ½ x ¼	5	4	3	8	6	4
2 Ls 3 ½ x 2 ½ x ¼	4	3	~	8	6	4
2 Ls 3 x 2 ½ x ¼	4	3	~	8	6	4
2 Ls 3 x 2 ½ x ¼	4	3	~	8	6	4
2 Ls 3 x 2 ½ x ¼	3	2	~	6	4	4
2 Ls 3 x 3 x 3/16	2	2	~	4	4	4
2 Ls 3 x 3 x 3/16	2	2	~	4	4	4
2 Ls 2 ½ x 2 ½ x 3/16	2	~	~	4	4	4
2 Ls 2 ½ x 2 x 3/16	2	~	~	4	4	4

BRACING FOR 6′-0" TO 6′-6" COLUMN SPACING.				
SIZE DOUBLE ANGLES	BOLTS REQUIRED			
	BRACING		WT to W	
	5/8"	¾"	5/8"	¾"
2 Ls 3 x 3 x ¼	4	3	8	6
2 Ls 3 x 3 x ¼	4	3	8	6
2 Ls 3 x 2 ½ x ¼	4	3	8	6
2 Ls 3 x 2 ½ x ¼	4	3	6	4
2 Ls 3 x 2 ½ x ¼	4	3	6	4
2 Ls 3 x 2 ½ x ¼	4	3	6	4
2 Ls 3 x 2 ½ x ¼	4	3	6	4
2 Ls 3 x 2 ½ x ¼	4	3	6	4
2 Ls 2 ½ x 2 ½ x 3/16	3	~	4	4
2 Ls 2 ½ x 2 x 3/16	2	~	4	4
2 Ls 2 ½ x 2 x 3/16	2	~	4	4
2 Ls 2 ½ x 2 x 3/16	2	~	4	4
2 Ls 2 ½ x 2 x 3/16	2	~	4	4
2 Ls 2 ½ x 2 x 3/16	2	~	4	4

"X"	"Y"	"Z"	BASE PLATE SIZE	ANCHOR BOLT SIZE	FOUNDATION DATA	COLUMN SIZE
			L x W x T	DIA. x LENGTH	DIA. DRILL SHAFT/W REINF.	
16 ¾"	5 ½"	4 ½"	20"x 3 ½"x 3′-8 ½"	2 ¾"x 5′-8"	54" Dr Shaft with 20~#11	W27 x 84
						W27 x 94
15 ¼"	5"	4"	18"x 3 ¼"x 3′-4 ½"	2 ¾"x 5′-8"	48" Dr Shaft with 18~#11	W24 x 117
15 ¼"	5"	4"	18"x 3 ⅛"x 3′-4 ½"	2 ¾"x 5′-8"	48" Dr Shaft with 18~#11	W24 x 104
15 ¼"	5"	4"	18"x 3"x 3′-4 ½"	2 ¾"x 5′-8"	48" Dr Shaft with 18~#11	W24 x 94
15"	4 ½"	3 ¾"	16 ½"x 3"x 3′-3"	2 ½"x 5′-2"	48" Dr Shaft with 14~#11	W24 x 84
14 ¾"	4 ½"	3 ¾"	16 ½"x 2 ¾"x 3′-2 ½"	2 ½"x 5′-2"	48" Dr Shaft with 14~#11	W24 x 76
14 ¾"	4 ½"	3 ¾"	16 ½"x 2 ¾"x 3′-2 ½"	2 ½"x 5′-2"	48" Dr Shaft with 14~#11	W24 x 68
13 ½"	4 ½"	3 ¾"	16 ½"x 2 ¾"x 3′-0"	2 ½"x 5′-2"	42" Dr Shaft with 12~#11	W21 x 68
13 ½"	4 ½"	3 ¾"	16 ½"x 2 ½"x 3′-0"	2 ½"x 5′-2"	42" Dr Shaft with 12~#11	W21 x 62
13"	4"	3 ½"	15"x 2 ½"x 2′-10"	2 ¼"x 4′-9"	42" Dr Shaft with 10~#11	W21 x 57
11 ¾"	4"	3 ½"	15"x 2 ½"x 2′-7 ½"	2 ¼"x 4′-9"	42" Dr Shaft with 10~#11	W18 x 55
11 ¾"	4"	3 ½"	15"x 2 ½"x 2′-7 ½"	2 ¼"x 4′-9"	42" Dr Shaft with 10~#11	W18 x 50
11 ½"	3 ½"	3"	13"x 2 ½"x 2′-6"	2"x 4′-3"	42" Dr Shaft with 8~#10	W18 x 46
10 ½"	3 ½"	3"	13"x 2 ¼"x 2′-4"	2"x 4′-3"	36" Dr Shaft with 8~#10	W16 x 40
10 ¼"	3"	2 ¾"	11 ½"x 2 ¼"x 2′-2 ½"	1 ¾"x 3′-10"	36" Dr Shaft with 8~#9	W16 x 36
9 ½"	3"	2 ¾"	11 ½"x 2 ¼"x 2′-1"	1 ¾"x 3′-10"	36" Dr Shaft with 8~#9	W14 x 34
9 ¼"	3"	2 ¾"	11 ½"x 2"x 2′-0 ½"	1 ¾"x 3′-10"	36" Dr Shaft with 8~#9	W14 x 30
8"	2 ¾"	2 ⅛"	9 ¾"x 1 ¾"x 1′-9 ½"	1 ½"x 3′-4"	30" Dr Shaft with 8~#8	W12 x 26
7"	2 ½"	2"	9"x 1 ¾"x 1′-7"	1 ⅜"x 3′-1"	30" Dr Shaft with 8~#8	W10 x 26
6 ¾"	2 ¼"	1 ⅞"	8 ¼"x 1 ½"x 1′-6"	1 ¼"x 2′-11"	30" Dr Shaft with 8~#8	W10 x 22
6 ¾"	2"	1 ⅝"	7 ¼"x 1 ⅜"x 1′-5 ½"	1 ⅛"x 2′-8"	24" Dr Shaft with 8~#7	W10 x 17
6 ½"	1 ¾"	1 ½"	6 ½"x 1 ¼"x 1′-4 ½"	1"x 2′-5"	24" Dr Shaft with 8~#7	W10 x 15

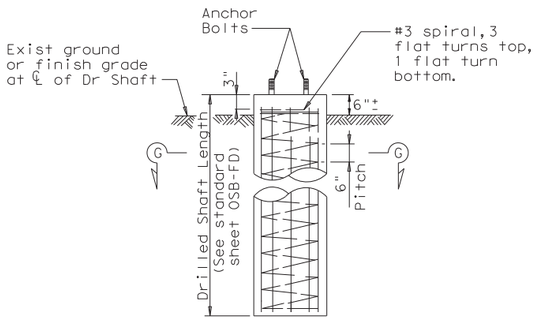


TOP VIEW

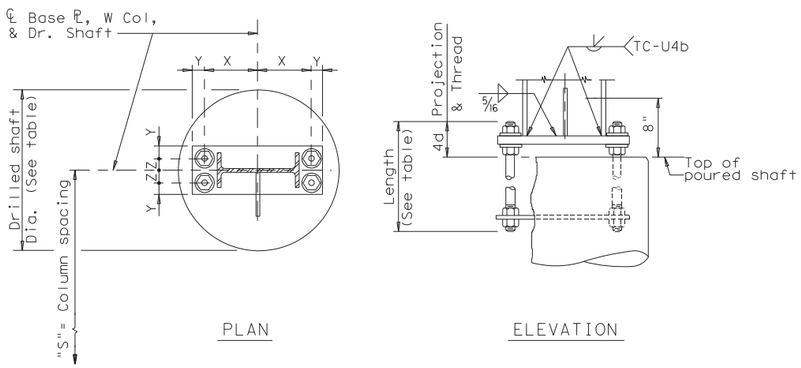


SIDE VIEW
(PRIOR TO INSTALLATION)

ANCHOR BOLT ASSEMBLY

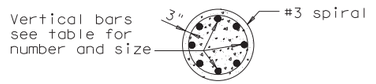


FOUNDATION DETAIL



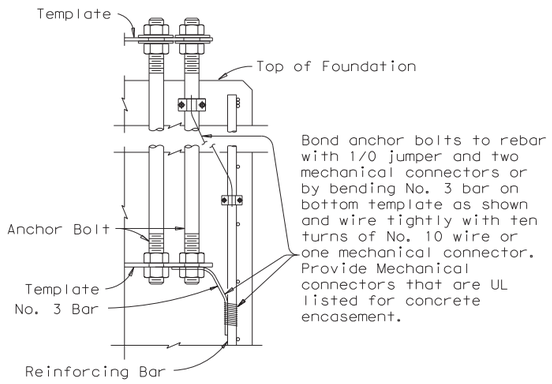
BEARING SEAT DETAILS

(See table for base plate size anchor bolt size, dimensions X, Y, Z and drilled shaft diameter.)



SECTION G-G

Anchor Bolt Dia. (d)	Washer Dimensions				Hole in Base Plate
	Outside Diameter	Hole Diameter	Thickness		
			Min	Max	
1½"orless	2d	d + ⅛"	0.136"	0.177"	d + ¼"
1 ¾"	2d - ⅛"	d + ⅛"	0.178"	0.280"	d + 5/16"
2"	2d - ¼"	d + ⅛"	0.178"	0.280"	d + 5/16"
over 2"	2d - ½"	d + ⅛"	0.240"	0.340"	d + 5/16"



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

LIGHTNING PROTECTION SYSTEM

ANCHOR BOLT SIZE				
DIA	BOLT ③ LENGTH	THREAD ③ LENGTH	PROJECTION LENGTH	GALVAN. ③ LENGTH
1"	2′-5"	4"	4 ½"	10"
1 ⅛"	2′-8"	4 ½"	5"	10 ½"
1 ¼"	2′-11"	5"	5 ½"	11"
1 ⅜"	3′-1"	5 ½"	6"	11 ½"
1 ½"	3′-4"	6"	6 ½"	1′-0"
1 ¾"	3′-10"	7"	7 ½"	1′-1"
2"	4′-3"	8"	8 ½"	1′-2"
2 ¼"	4′-9"	9"	9 ½"	1′-3"
2 ½"	5′-2"	10"	10 ½"	1′-4"
2 ¾"	5′-8"	11"	11 ½"	1′-5"

③ Anchor Bolt Fabrication Tolerances:
Bolt Length ~ ±½"
Thread Length ~ ±½"
Galvanized Length ~ -¼"

④ Thread lenght applies to upper and lower threads

SHEET 2 OF 2

Texas Department of Transportation

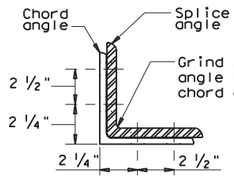
Traffic Safety Division Standard

OVERHEAD SIGN BRIDGE TOWER DETAILS

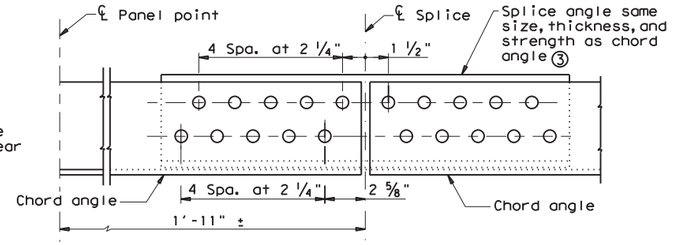
OSBT(2)-21

FILE: osbt-21.dgn	DN:	CK:	DW:	CK:
©TxDOT November 2007	CONT	SECT	JOB	HIGHWAY
REVISIONS	6473	31	001	SH 6, ETC.
8-21	DIST	COUNTY		SHEET NO.
	WACO	MCLENNAN, ETC.		67

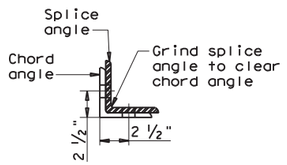
45B



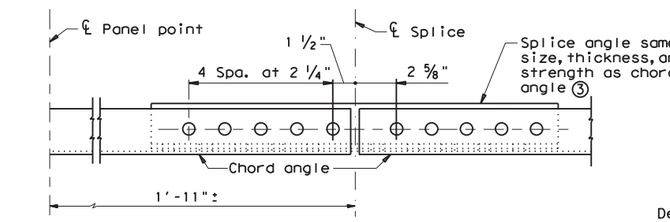
SECTION ON ℄ SPLICE
(6" L Shown)



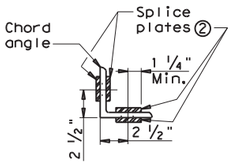
CHORD SPLICE USING ANGLES (SINGLE SHEAR)
(Place splice angle on inside of truss)
(6" L Shown)



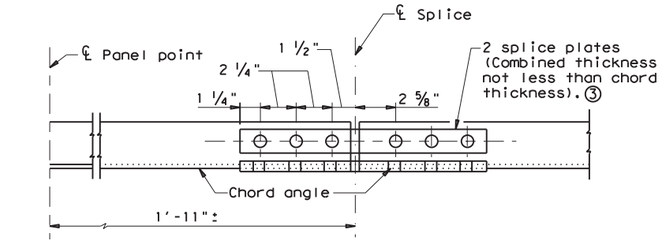
SECTION ON ℄ SPLICE
(4" L Shown)



CHORD SPLICE USING ANGLES (SINGLE SHEAR)
(Place splice angle on inside of truss)
(4" L Shown)

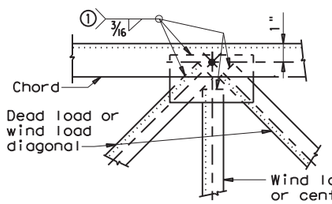


SECTION ON ℄ SPLICE
(4" L Shown)

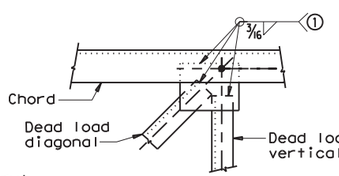


CHORD SPLICE USING PLATES (DOUBLE SHEAR) ④

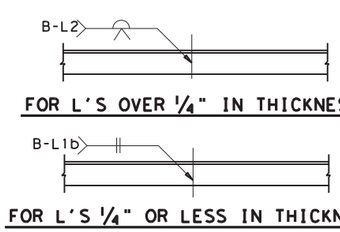
SPLICE DETAILS



DETAIL A



DETAIL C
Gussets plates in details "E" & "F" to be similar.

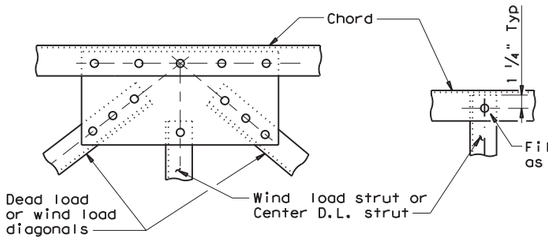


FOR L'S OVER ¼" IN THICKNESS

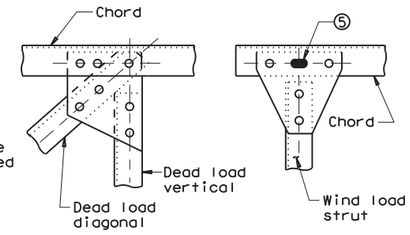
FOR L'S ¼" OR LESS IN THICKNESS

ALTERNATE WELDED SPLICE AND CONNECTION DETAILS

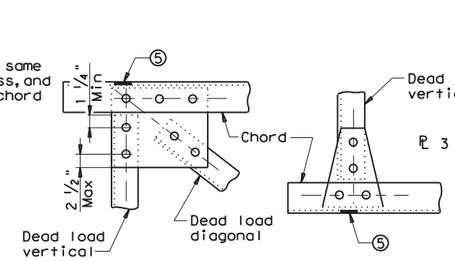
TABLE OF MINIMUM WELD LENGTHS		
Number of bolts	3/16" Fillet Weld Replaces:	
	5/8" Dia. Bolt	3/4" Dia. Bolt
1	2"	3"
2	4"	6"
3	6"	9"
4	8"	11 ½"
5	10"	14 ½"
6	12"	17 ½"
7	14"	20"



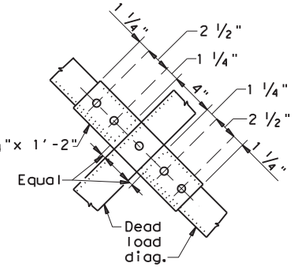
DETAIL A DETAIL B



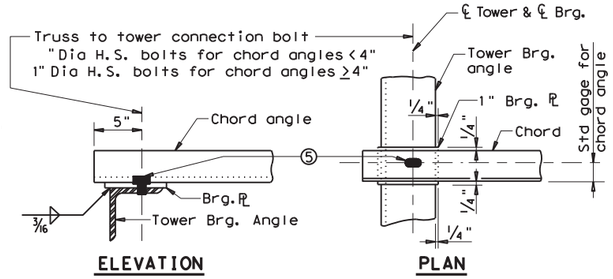
DETAIL C DETAIL D DETAIL E



DETAIL F DETAIL G

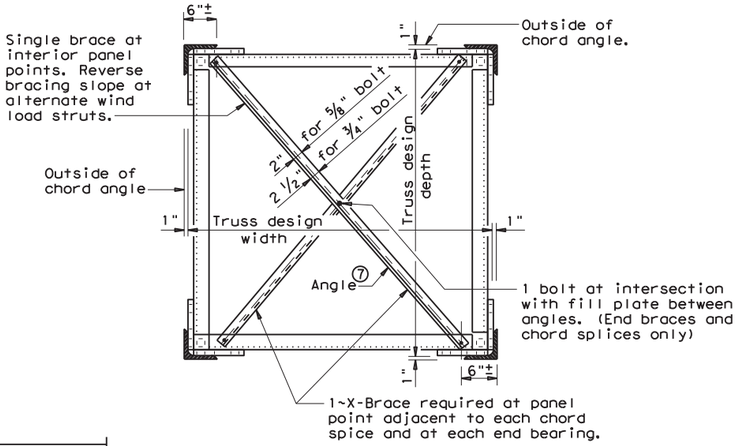


DETAIL H



ELEVATION PLAN

BEARING PLATE DETAILS ⑥



TRUSS SECTION

(Diagonals not shown)

Total No. of Bolts in Diagonals at Joints	No. of Bolts required in Gusset ℄ at Chord Connection
0	2
2	2
3	3
4	3
5	4
6	4
8	5
10	6
12	6

① See "TABLE OF MINIMUM WELD LENGTHS" for the length of welds.

② Area of splice plates shall be equal to or greater than area of chord angle.

③ When chord angles of different thickness are spliced, use shim plate and number of bolts required for thinner angle. For splice angle use thickness of the thinner angle.

④ When splice plates are used on both sides of chord angle (double shear) only half the number of bolts shown in the table on standard drawing "OVERHEAD SIGN BRIDGE DETAILS" are required.

⑤ Slotted hole in Gusset ℄ and chord angle 1"x 1 ½" slot for ¾" dia. bolts, 1 ¼"x 2" slot for 1" dia. bolts. Use ℄ washer on Gusset ℄ side.

⑥ Bearing plate may be omitted if welded connections are used on wind truss.

⑦ 2"x 1 ½"x 3/16" angle for 5/8" Dia bolts [1]
2 ½"x 2"x 3/16" angle for ¾" Dia bolts [1]

GENERAL NOTES:

All bolts shall be in accordance with Item 447, "Structural Bolting".

The truss shall have an upward camber not less than the dead load deflections shown in the table on standard drawings "Overhead Sign Bridge Details" when blocked at the ends under dead load of the truss only.

Chord angles may be spliced in convenient lengths for galvanizing. Connection and splice details are typical only. Actual size of member and number of bolts will vary. The details shown on this sheet are intended as a guide only. See standard drawings "Overhead Sign Bridge Details" for number of bolts and size of members. Number of bolts shown for chord splice is based on single shear.

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

Texas Department of Transportation
Traffic Operations Division

OVERHEAD SIGN BRIDGE TRUSS DETAILS

OSBC

REVISIONS

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

CONT	SECT	JOB	HIGHWAY
6473	31	001	SH 6, ETC.

DIST	COUNTY	SHEET NO.
WACO	MCLENNAN, ETC.	68

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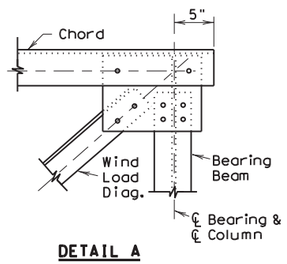
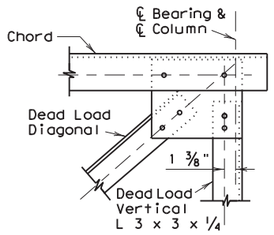
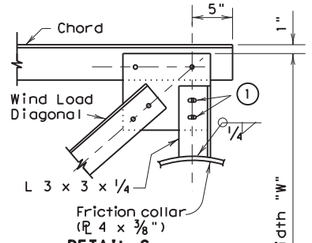


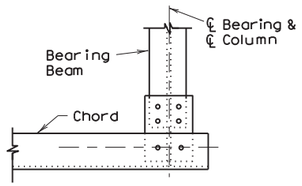
DETAIL A



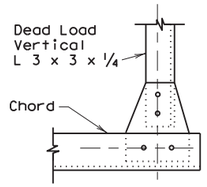
DETAIL F



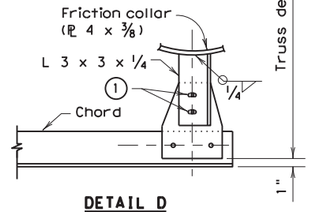
DETAIL C



DETAIL B



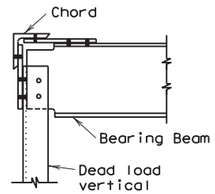
DETAIL G



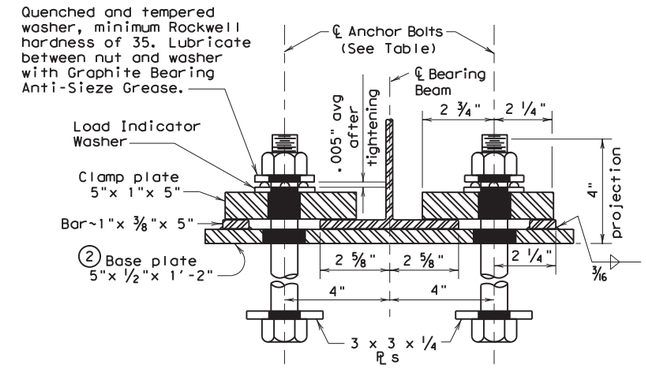
DETAIL D

① Slotted holes in gusset plates only.

② Oversized Hole diameter = Anchor Bolt diameter + ½"



DETAIL E



SECTION H-H

Note: When Bearing Beam is located off center, clamp plate may be turned as needed to give bearing area.

GENERAL NOTES:

Design conforms to the 1975 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals and Interim revisions thereto.

All structural steel shall conform to ASTM A36.

All parts, including anchor bolts, shall be galvanized after fabrication per Item 445, "Galvanizing".

Details on this sheet are applicable for design wind heights between 15 and 30 feet.

All connection bolts shall conform to ASTM A325 Type 1.

After truss is aligned in its final position, anchor bolt nuts shall be tack welded to washer and washer tack welded to clamp plate. Galvanizing in welded area shall be repaired in accordance with Item 445, "Galvanizing".

Anchor bolts and nuts for anchor bolts shall be "Alloy Steel" per Item 449 "Anchor Bolts".

Anchor bolts shall be tightened per Item 449.

Truss End Wind Struts are replaced by Bearing Beam on top and Friction Collar with L 3 x 3 x ¼. on bottom. End Dead Load Verticals are replaced by L 3 x 3 x ¼.

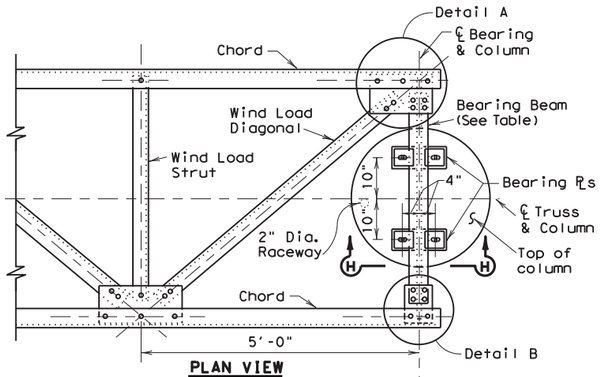
Details and towers shown on standard drawing OSBT are not used with single column towers.

For connection details not shown hereon see standard drawing OSBC.

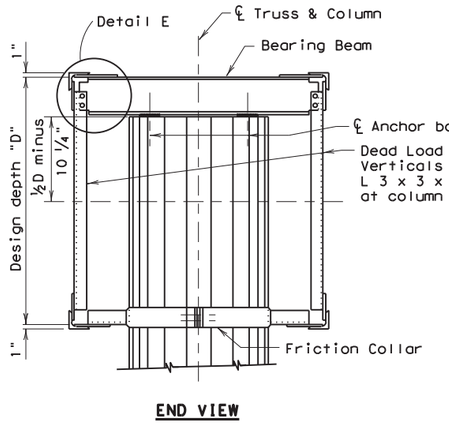
All concrete shall be Class C.

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

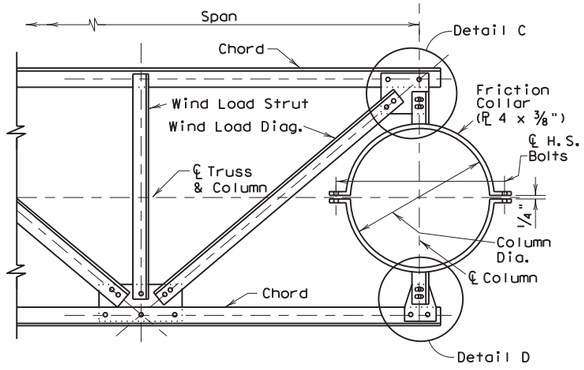
Details shown hereon are intended to be used with standard drawings "Overhead Sign Bridge Details" and OSBC. Details shown on standard drawing OSBC should be modified as shown on this drawing. When this drawing is used standard drawing OSBT is not required.



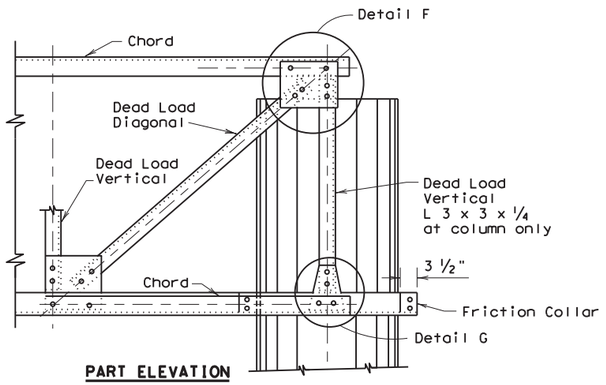
PLAN VIEW
(TOP CHORD)



END VIEW



PLAN VIEW
(BOTTOM CHORD)



PART ELEVATION

TRUSS END CONNECTION MODIFICATION DETAILS

SHEET 1 OF 2

Texas Department of Transportation
Traffic Operations Division

OVERHEAD SIGN BRIDGE TRUSS DETAILS SINGLE COLUMN

OSBC-SC-Z4

REVISIONS

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

CONT	SECT	JOB	HIGHWAY
6473	31	001	SH 6, ETC.

DIST	COUNTY	SHEET NO.
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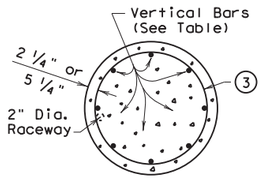
ZONE 4 70 M.P.H. WIND

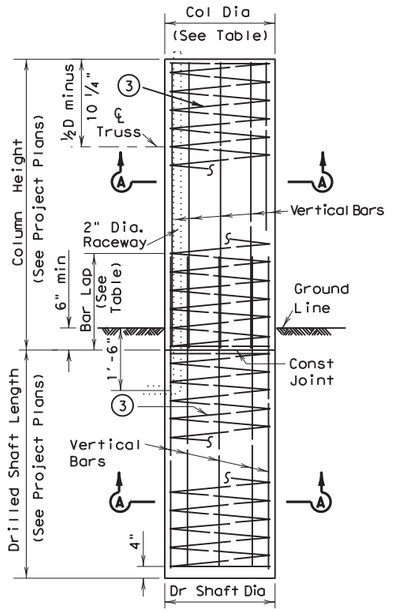
		SPAN	REACTIONS			COLUMN BENDING MOMENTS (Kip-Ft.)																		
		Ft.	D.L.	W.L.	Torque	14'	15'	16'	17'	18'	19'	20'	21'	22'	23'	24'	25'	26'	27'	28'	29'	30'	31'	32'	Height
¾" Dia x 1'-3" Anchor Bolts	W 8 x 15 BEARING BEAM	40	2.65	5.03	8.97	81	86	91	96	101	106	112	117	122	127	132	137	142	147	153	158	163	168	173	30" Diameter Column
		45	2.98	5.66	10.09	91	97	102	108	114	120	126	131	137	143	149	154	160	166	172	178	183	189	195	
		50	3.33	6.29	11.21	101	107	114	120	127	133	140	146	152	159	165	172	178	184	191	197	204	210	217	
		55	3.81	6.93	12.34	111	118	125	133	140	147	154	161	168	175	182	189	196	203	210	217	224	231	239	
		60	4.15	7.57	13.46	122	129	137	145	152	160	168	176	183	191	199	206	214	222	230	237	245	253	261	
		65	4.55	8.21	14.58	132	140	149	157	165	174	182	190	199	207	216	224	232	241	249	257	266	274	283	
		70	5.09	8.85	15.71	142	151	160	169	178	187	196	205	214	223	232	241	250	259	268	277	287	296	305	
		75	5.44	9.49	16.83	152	162	172	181	191	201	210	220	230	239	249	259	269	278	288	298	307	317	327	
		80	6.02	9.87	18.06	159	169	179	189	199	209	219	229	240	250	260	270	280	290	300	310	320	330	340	
		85	6.61	10.51	19.19	169	180	191	201	212	223	234	244	255	266	276	287	298	309	319	330	341	352	362	
		90	7.03	11.15	20.32	180	191	202	214	225	236	248	259	271	282	293	305	316	327	339	350	362	373	384	
		95	7.55	11.79	21.45	190	202	214	226	238	250	262	274	286	298	310	322	334	346	358	370	382	394	406	
		100	8.20	12.81	23.65	207	220	233	246	259	272	285	298	311	324	337	350	363	376	390	403	416	429	442	
		105	8.91	13.48	24.83	217	231	245	259	272	286	299	314	327	341	355	369	382	396	410	424	437	451	465	
		110	9.34	14.15	26.02	228	243	257	271	286	300	315	329	344	358	372	387	401	416	430	445	459	473	488	
		115	9.87	14.81	27.20	239	254	269	284	299	314	329	344	360	375	390	405	420	435	450	465	480	495	511	
		120	10.45	15.52	29.82	251	267	283	299	315	331	346	362	378	394	410	426	441	457	473	489	505	521	536	
1" Dia x 1'-6" Anchor Bolts		125	11.30	16.20	31.06	262	279	295	312	328	345	362	378	395	411	428	444	461	477	494	510	527	543	560	
		130	12.04	16.87	32.31	273	290	308	325	342	359	376	394	411	428	445	462	480	497	514	531	549	566	583	
		135	12.60	17.55	33.56	284	302	320	338	356	374	392	409	427	445	463	481	499	517	535	553	571	588	606	
		140	13.76	18.28	34.81	296	314	333	352	370	389	408	426	445	464	482	501	520	538	557	576	594	613	631	
		145	14.26	19.01	36.06	308	327	346	366	385	404	424	443	463	482	501	521	540	560	579	598	618	637	657	36" Diameter Column
		150	15.72	19.75	37.32	319	339	360	380	400	420	440	460	481	501	521	541	561	581	601	622	642	662	682	
		155	16.25	20.54	38.57	332	353	374	395	416	437	458	479	499	520	541	562	583	604	625	646	667	688	709	

For column and drilled shaft reinforcing steel see standard drawing OSBS-SC.
D.L. and W.L. reactions are in Kips.
Torque reactions are in Kip-Feet (Kip-Ft.).

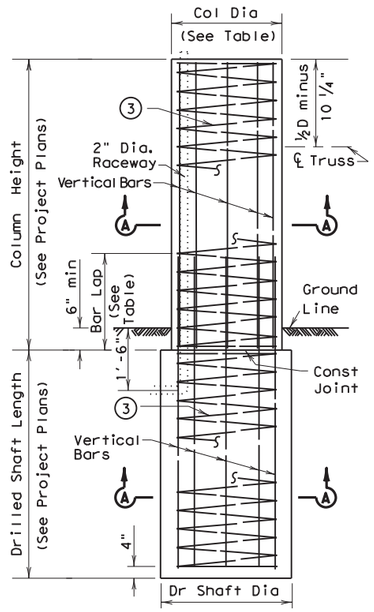
COLUMN BARS		
BAR SIZE	BAR LAP	
	Gr 40	Gr 60
# 9	3'-10"	5'-8"
#10	4'-10"	7'-3"
#11	5'-11"	8'-11"



COLUMN & SHAFT SECTION A-A



COLUMN & SHAFT EQUAL SIZE



COLUMN & SHAFT UNEQUAL SIZE

(3) #3 spiral at 6" pitch. Three flat turns top and one flat turn bottom. One flat turn top and bottom in Drilled shaft.

COLUMN AND DRILLED SHAFT DETAILS

NOTE: Use same diameter spiral for both column and drilled shaft.

SHEET 2 OF 2

Texas Department of Transportation
Traffic Operations Division

OVERHEAD SIGN BRIDGE TRUSS DETAILS SINGLE COLUMN

OSBC-SC-Z4

REVISIONS

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

CONT	SECT	JOB	HIGHWAY
6473	31	001	SH 6, ETC.

DIST	COUNTY	SHEET NO.
WACO	MCLENNAN, ETC.	70

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DRILLED SHAFT MOMENTS (Kip-ft)

CLAY SOIL

COLUMN MOMENT (Kip-ft) \ C / N	30" DIA DRILLED SHAFT				36" DIA DRILLED SHAFT				42" DIA DRILLED SHAFT			
	4	8	12	20	4	8	12	20	4	8	12	20
	10	20	30	50	10	20	30	50	10	20	30	50
75	77	76	75	75								
150	155	154	153	151								
225	234	231	230	228								
300	317	309	307	305								
375	399	388	385	382								
450	484	470	464	461								
525	571	550	544	538	564	548	543	537				
600	657	636	625	615	650	628	623	616				
675	742	717	705	682	739	712	703	694				
750	820	801	787	778	825	795	785	773				
825		888	871	857	921	882	865	853	909	875	863	851
900					1020	968	949	934	998	959	944	931
975					1108	1052	1032	1015	1091	1043	1027	1011
1050					1195	1138	1113	1095	1180	1128	1108	1092
1125					1293	1224	1198	1177	1273	1215	1193	1173
1200					1383	1317	1282	1258	1373	1301	1277	1264
1275						1404	1369	1339	1460	1393	1359	1336
1350						1490	1448	1420	1565	1478	1443	1416
1425						1577	1539	1504	1655	1568	1532	1498
1500						1664	1627	1584		1657	1614	1579
1575												
1650												
1725												
1800												
1875												
1950												
2025												

DRILLED SHAFT MOMENTS (Kip-ft)

SAND SOIL

COLUMN MOMENT (Kip-ft) \ Ø / N	30" DIA DRILLED SHAFT					36" DIA DRILLED SHAFT					42" DIA DRILLED SHAFT				
	28.5°	30°	32°	36°	40°	28.5°	30°	32°	36°	40°	28.5°	30°	32°	36°	40°
	12	21	35	65	100	12	21	35	65	100	12	21	35	65	100
75	82	80	79	78	75										
150	164	161	159	157	155										
225	255	242	238	236	234										
300	343	328	322	316	314										
375	432	416	403	396	394										
450	533	500	479	477	475										
525	617	587	576	561	555	610	583	567	556	553					
600	690	675	658	643	635	722	672	656	640	634					
675		763	743	725	717	805	760	727	723	714					
750		850	832	812	801	906	852	826	805	799					
825		935	917	892	883	1002	943	914	889	880	1015	937	908	889	877
900							1035	1002	973	965	1108	1028	996	971	958
975							1130	1088	1054	1045		1118	1083	1054	1041
1050							1218	1176	1141	1127		1223	1172	1137	1123
1125							1310	1267	1228	1208		1305	1257	1223	1209
1200								1357	1312	1294		1399	1346	1306	1291
1275								1450	1398	1376		1500	1438	1394	1377
1350								1536	1485	1460		1589	1524	1478	1458
1425								1623	1572	1543		1679	1615	1567	1542
1500									1658	1634			1709	1653	1627
1575															
1650															
1725															
1800															
1875															
1950															
2025															

EXAMPLE:

Given, 140' Span, Zone 4, Design Wind Height=30', Clay Soil with N=30.

1 From sheet OSBC-SC-Z4 determine column bending moment = 594 Kip-ft and column size is 30" Dia with 13~#11 Bars.

2 From sheet OSB-FD-SC with Clay Soil, N = 30 and column moment = 594 Kip-ft determine length of Drilled Shaft.
30" Dia = 14' + 3'; 36" Dia = 14' + 3'

3 From sheet OSBS-SC with column moment = 594 Kip-ft, Clay Soil N = 30 determine Drilled Shaft moments.
30" Dia Drilled Shaft M = 625 Kip-ft, 36" Dia Drilled Shaft M = 623 Kip-ft
With Drilled Shaft moment enter Drilled Shaft reinforcing steel table (using next larger moment shown).
Determine: 30" Dia shaft with 14~#11 Bars
36" Dia shaft with 16~#9 Bars

4 If 36" Dia Drilled Shaft is used the saving in length would be minimal, therefore use 30" Dia x 17' Drilled Shaft with 14~#11 Bars. If same reinforcing steel is desired in both shaft and column use 14~#11 Bars.

COLUMN OR DRILLED SHAFT REINFORCING STEEL (Gr 60)				
MOMENT	COLUMN OR SHAFT SIZE			
	30" DIA	36" DIA	42" DIA	48" DIA
100	8~#9			
150	8~#9			
200	8~#9			
250	8~#9			
300	9~#9			
350	11~#9			
400	13~#9	9~#9		
450	10~#10	11~#9		
500	13~#10	12~#9		
550	12~#11	13~#9		
600	13~#11	15~#9		
650	14~#11	16~#9	10~#10	
700		14~#10	11~#10	
750		15~#10	12~#10	
800		16~#10	13~#10	
850		18~#10	14~#10	
900		19~#10	15~#10	
950		16~#11	13~#11	
1000		17~#11	14~#11	
1050		18~#11	14~#11	
1100		19~#11	15~#11	12~#11
1150			16~#11	13~#11
1200			17~#11	14~#11
1250			17~#11	14~#11
1300			18~#11	15~#11
1350			19~#11	16~#11
1400			20~#11	16~#11
1450			21~#11	17~#11
1500			21~#11	17~#11
1550			22~#11	18~#11
1600			23~#11	19~#11
1650				19~#11
1700				20~#11
1750				21~#11
1800				21~#11
1850				22~#11
1900				23~#11
1950				23~#11
2000				24~#11
2050				
2100				
2150				
2200				

All Column and Shaft Reinforcing to be Grade 60.

Note: In cases where shaft and column are different size, and the same size bar cage is desired, use the reinforcing required for a shaft same size as column.

Texas Department of Transportation
Traffic Operations Division

OVERHEAD SIGN BRIDGE SINGLE COLUMN AND DRILLED SHAFT REINFORCING

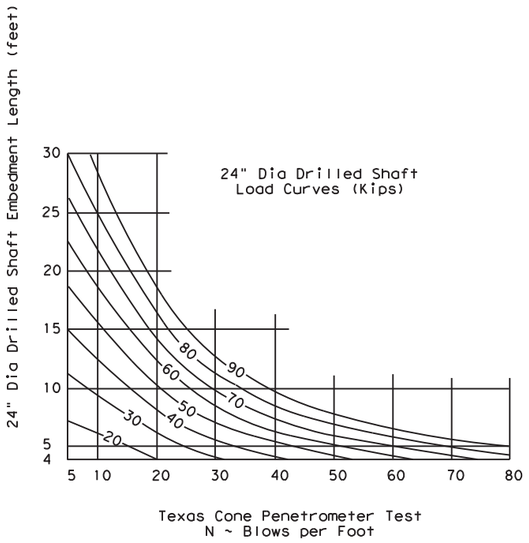
OSBS-SC

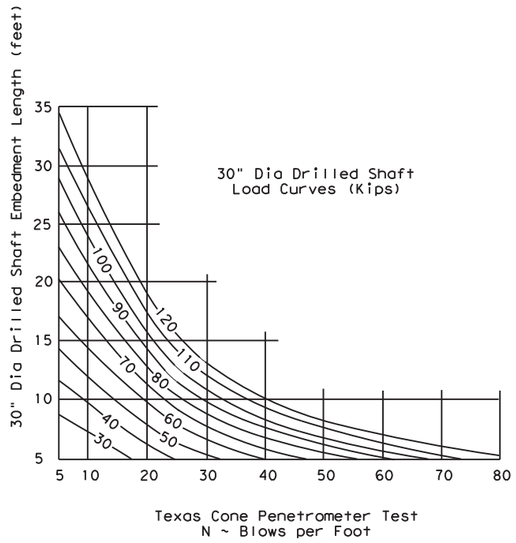
REVISIONS

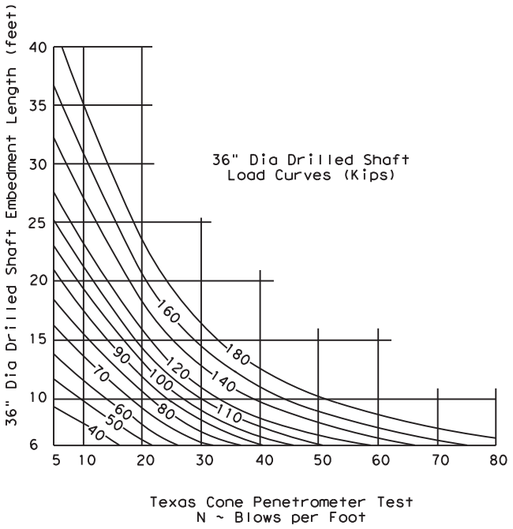
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

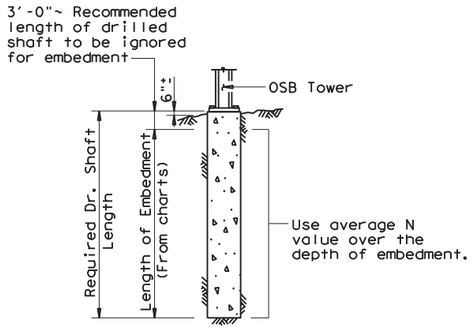
CONT	SECT	JOB	HIGHWAY
6473	31	001	SH 6, ETC.

DIST	COUNTY	SHEET NO.
WACO	MCLENNAN, ETC.	71



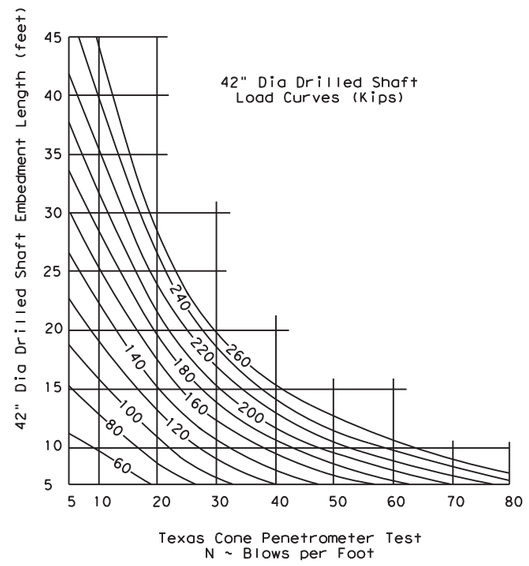


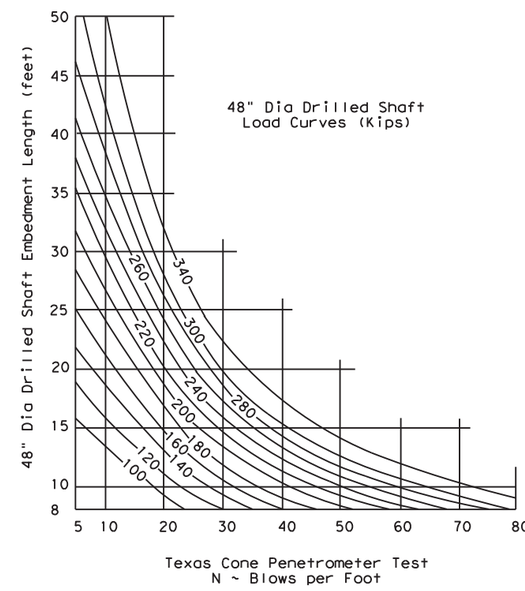


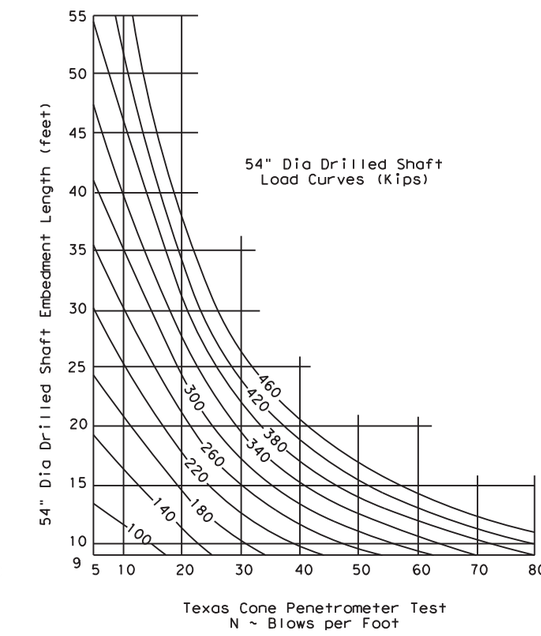


PROCEDURE:

1. Determine uplift from the applicable "Overhead Sign Bridge Details" standard drawing.
2. Determine required drilled shaft diameter from standard drawing OSBT.
3. Make an initial estimate of the required embedment length.
4. From Texas Cone Penetrometer Test data determine the average N value over the length of embedment.
5. Enter chart (for the correct shaft diameter) from the bottom at the average N value.
6. Proceed vertically into chart and locate intersection with column uplift. Interpolate between curves as needed.
7. From intersection point turn 90° to left and read embedment length along vertical scale.
8. If embedment length differs significantly from estimated value return to step 4 with embedment length determined in step 7.
9. Compute the required length of drilled shaft by adding 3'-0" to the required embedment length.







GENERAL NOTES:

These charts are to be used for Simple Span Overhead Sign Bridges with two shafts per tower.

Numbers shown on curved lines are uplift in kip.

Dead load of concrete in drilled shafts is included in curves.

Minimum embedment of drilled shafts is two diameters.

Load curves shall not be extrapolated below the N value of 5 blows per foot.

Texas Department of Transportation
Traffic Operations Division

FOUNDATION EMBEDMENT SELECTION CHARTS

OSB-FD

© TxDOT November 2007	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
REVISIONS	CONT	SECT	JOB	HIGHWAY
	6473	31	001	SH 6, ETC.
	DIST	COUNTY		SHEET NO.
	WACO	MCLENNAN, ETC.		72

DATE: 9/16/2024 11:39:59 AM
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DATE: 9/16/2024 11:40:00 AM
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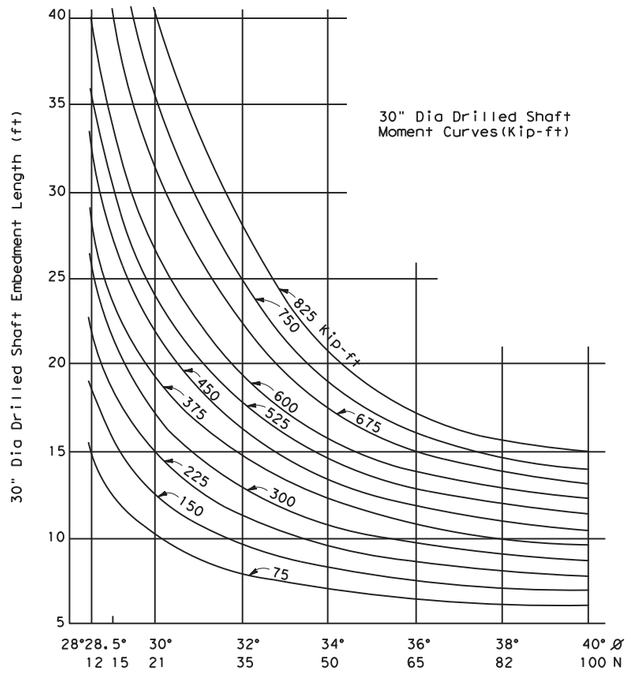
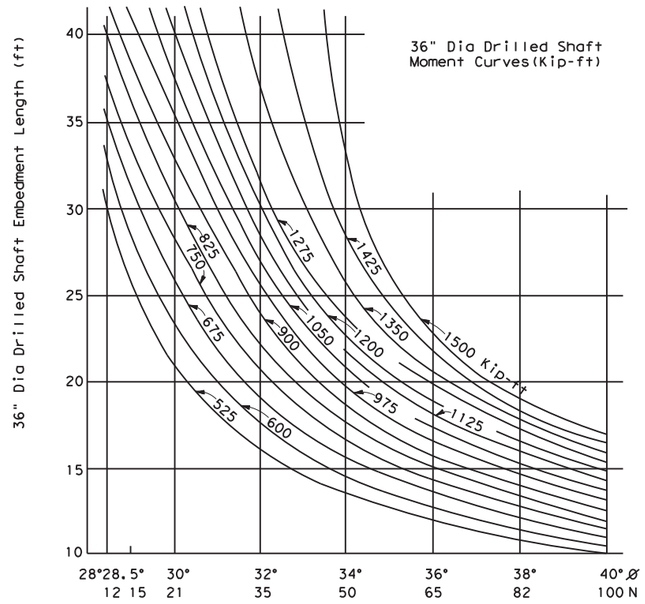
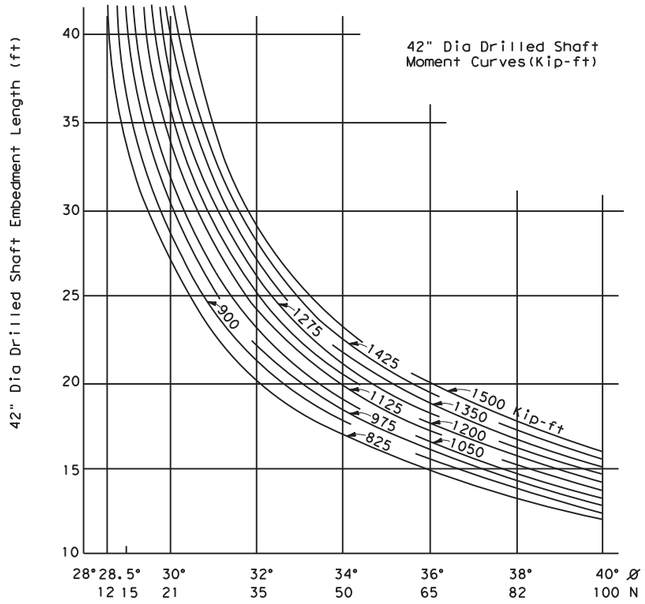






① SUBMERGED SAND SOIL (COHESIONLESS)

① NOTE:
For unsubmerged sands and clayey sands the charts for clay soil will give a conservative foundation design.

GENERAL NOTES:

Minimum embedment of drilled shafts is two diameters. Add 3'-0" to required embedment length to determine required length of drilled shaft.

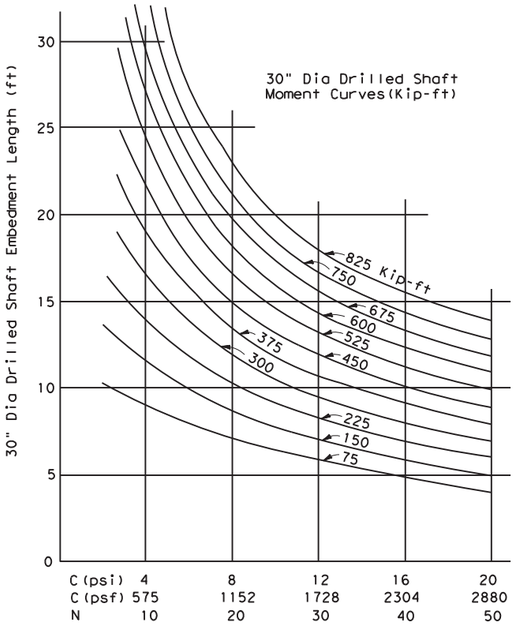
These graphs are intended for use with Overhead Sign Bridges, with one shaft footing. (Not suitable for cantilever structures).

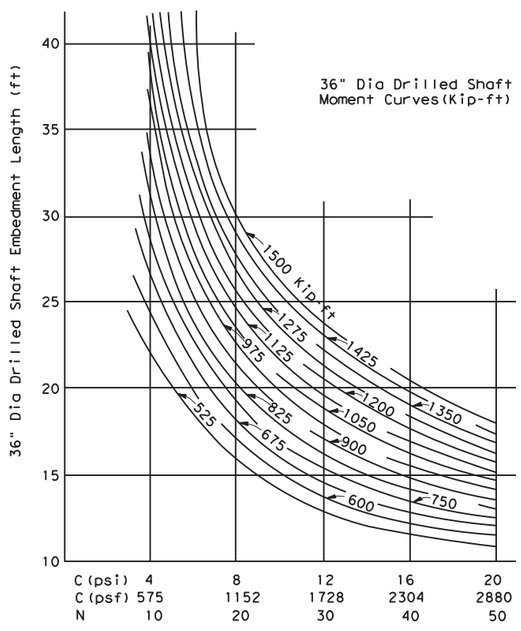
C = Cohesive shear strength of soil, in psf.

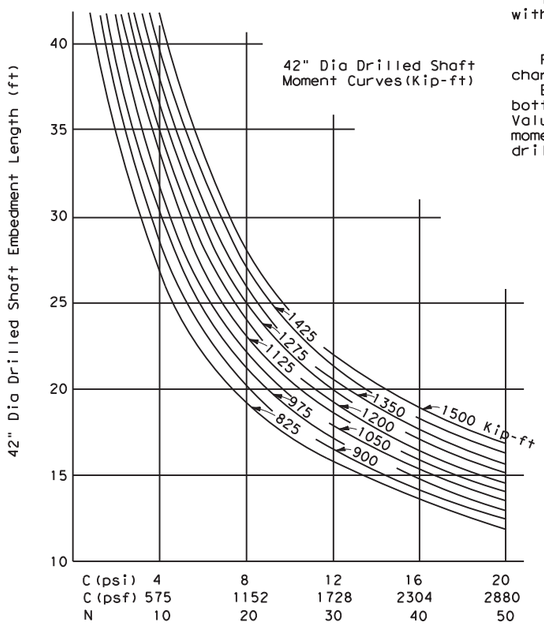
Ø = Angle of internal friction of soil, in degrees.

For values of C and Ø which are intermediate to those on the charts, embedments may be determined by straight line interpolation.

Enter graph (for the correct shaft size and soil type) from the bottom, either with soil properties, C or Ø or with Texas Penetrometer Value N. Proceed upward into graph and locate intersection with column moment, from intersection point turn 90° to left and read lengths of drilled shafts along left side of graph.







CLAY SOIL

Texas Department of Transportation
Traffic Operations Division

FOUNDATION EMBEDMENT SELECTION CHARTS

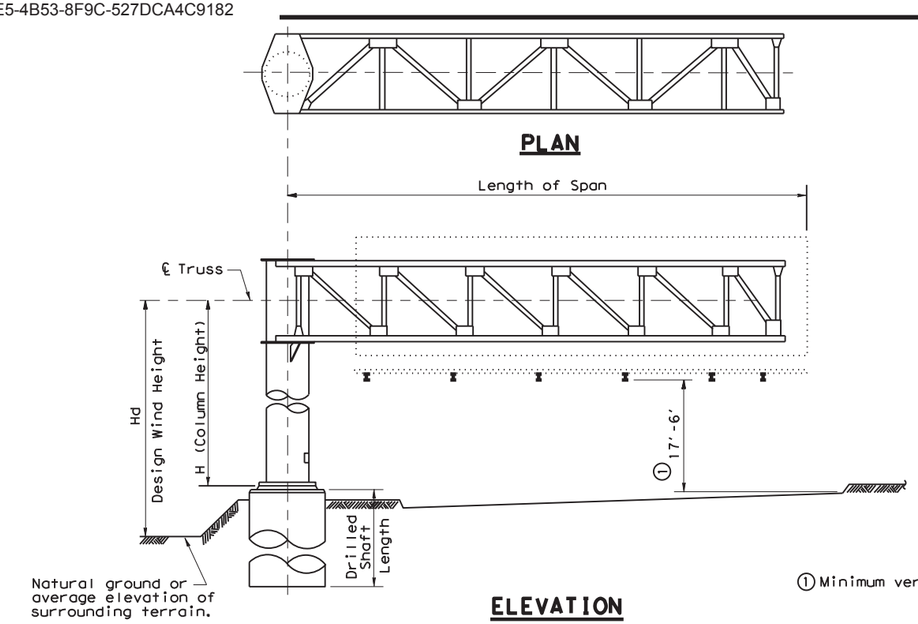
OSB-FD-SC

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

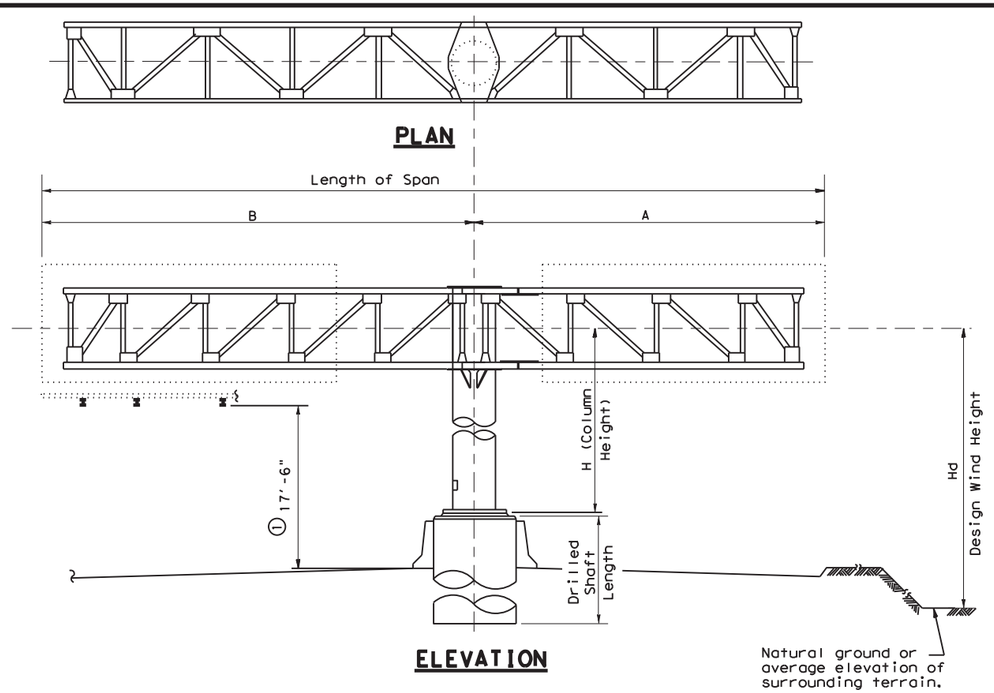
REVISIONS

CONT	SECT	JOB	HIGHWAY
6473	31	001	SH 6, ETC.

DIST	COUNTY	SHEET NO.
WACO	MCLENNAN, ETC.	73



① Minimum vertical clearance



SELECTION EXAMPLE CANTILEVER SPAN

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

Step 1: Select applicable COSS standard.
From Wind Velocity and Ice Zone sheet (WV & IZ-96) determine that Hill County is in Zone 4 (70 mph) and is above the ice line. Since Design Wind Height is less than 30′, use standard COSS-Z4 & Z4I. If Design Wind Height is more than 30′, use COSS-Z3 & Z3I. NOTE: In Zone 1 if Design Wind Height is greater than 30′ use HCOSS-Z1.

Step 2: Determine tower details from COSS-Z4 & Z4I. Use column height to nearest tabulated value′ i.e., 23′. Round span length up to the nearest tabulated value, i.e., 35′.
Tower details are:
Tower pipe 24" Dia with min. wall thickness = 0.312"
Base plate 33 ¾" Dia x 1 ¾"
Anchor bolts 8~1 ¾" Dia on 29 ⅜" bolt circle
Horizontal deflection of tower at ℄ truss = 0.889". During installation, double nuts at base plate may be used to plumb tower to compensate for horizontal deflection.
Design Moment = 244 Kip-ft
Design Torsion = 162 Kip-ft

Step 3: Determine truss details from COSS-Z4 & Z4I.
Read from small table at bottom of sheet for span = 35′.
Truss design width, W and depth, D = 4.0′x 4.0′.
Chord L 3 x 3 x 5/16 (HYC) with 6 bolt connection at tower
D.L. Diag. L 2 x 2 x 3/16 (HYC) with 2 bolt connection
W. L. Diag. L 3 x 3 x 3/16 (HYC) with 2 bolt connection
D. L. Vert. L 2 x 2 x 3/16 (HYC) with 2 bolt connection
W. L. Strut. L 2 x 2 x 3/16 (HYC) with 1 bolt connection
Bolts are ⅝" Dia high strength with 5~¾" Dia bolt alternate for chord connection at tower.
D.L. of truss = 50 lb/ft
Truss deflection at free end = 3.2". The fabricator shall compensate for this deflection by offsetting bolt holes between the upper and lower chords at the truss-to-tower connection.

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

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

SELECTION EXAMPLE DOUBLE CANTILEVER SPAN

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

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

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

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

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

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

Texas Department of Transportation
Traffic Operations Division

CANTILEVER OVERHEAD SIGN SUPPORTS SELECTION EXAMPLES

COSS-SE

REVISIONS

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

CONT	SECT	JOB	HIGHWAY
6473	31	001	SH 6, ETC.

DIST	COUNTY	SHEET NO.
WACO	MCLENNAN, ETC.	74

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ZONE 4 WITH AND WITHOUT ICE 70 MPH WIND

10' SPAN

TOWER HEIGHT (ft)	TOWER PIPE O.D. (in)	TOWER PIPE WALL THICK (in)	TOWER PIPE DEFL ΔH (in)	ANCHOR BOLTS SIZE DIA (in)	ANCHOR BOLTS NO.	ANCHOR BOLTS BOLT CIR DIA	BASE PLATE SIZE (in)	TRUSS DEFL ΔV (in)	DESIGN LOADS SHEAR V (Kips)	DESIGN LOADS TORSION T (K-ft)	DESIGN LOADS MOMENT M (K-ft)
14'	16	0.250	0.104	1 1/4	6	20 1/2"	24 × 1 1/4	0.2	2.75	12.39	38.53
15'			0.119						2.76		41.23
16'			0.136						2.77		43.94
17'			0.153						2.79		46.68
18'			0.172						2.80		49.43
19'			0.191						2.81		52.20
20'			0.212						2.83		54.99
21'			0.234						2.84		57.79
22'			0.257					0.2	2.85		60.61
23'			0.280					0.3	2.87		63.45
24'			0.305						2.88		66.30
25'			0.331	1 1/4		20 1/2"	24 × 1 1/4		2.89		69.16
26'			0.358	1 3/8		20 3/4"	24 1/2 × 1 3/8		2.90		72.04
27'			0.386						2.92		74.93
28'			0.416						2.93		77.84
29'			0.446						2.94		80.76
30'			0.477	1 3/8		20 3/4"	24 1/2 × 1 3/8		2.96		83.69
31'			0.509	1 1/2		21"	25 × 1 1/2		2.97		86.64
32'	16	0.250	0.543	1 1/2	6	21"	25 × 1 1/2	0.3	2.98	12.39	89.61

15' SPAN

TOWER HEIGHT (ft)	TOWER PIPE O.D. (in)	TOWER PIPE WALL THICK (in)	TOWER PIPE DEFL ΔH (in)	ANCHOR BOLTS SIZE DIA (in)	ANCHOR BOLTS NO.	ANCHOR BOLTS BOLT CIR DIA	BASE PLATE SIZE (in)	TRUSS DEFL ΔV (in)	DESIGN LOADS SHEAR V (Kips)	DESIGN LOADS TORSION T (K-ft)	DESIGN LOADS MOMENT M (K-ft)
14'	16	0.250	0.234	1 3/8	6	20 3/4"	24 1/2 × 1 1/4	0.5	4.13	28.76	59.63
15'			0.268				24 1/2 × 1 1/4	0.6	4.14		63.62
16'			0.305				24 1/2 × 1 3/8	0.6	4.16		67.63
17'			0.345	1 3/8		20 3/4"	24 1/2 × 1 3/8	0.6	4.17		71.67
18'			0.386	1 1/2		21"	25 × 1 3/8	0.7	4.18		75.74
19'			0.431				25 × 1 1/2	0.7	4.20		79.83
20'			0.477					0.7	4.21		83.94
21'			0.526					0.8	4.22		88.08
22'			0.577		6		25 × 1 1/2	0.8	4.23		92.23
23'			0.631		8		25 × 1 5/8	0.9	4.25		96.40
24'			0.687					0.9	4.26		100.60
25'			0.745					0.9	4.27		104.81
26'			0.806					1.0	4.29		109.03
27'			0.869						4.30		113.28
28'		0.250	0.935						4.31		117.54
29'		0.280	0.898						4.33		121.82
30'			0.961						4.34		126.11
31'			1.026					1.0	4.35		130.42
32'	16	0.280	1.094	1 1/2	8	21"	25 × 1 5/8	1.1	4.36	28.76	134.74

20' SPAN

TOWER HEIGHT (ft)	TOWER PIPE O.D. (in)	TOWER PIPE WALL THICK (in)	TOWER PIPE DEFL ΔH (in)	ANCHOR BOLTS SIZE DIA (in)	ANCHOR BOLTS NO.	ANCHOR BOLTS BOLT CIR DIA	BASE PLATE SIZE (in)	TRUSS DEFL ΔV (in)	DESIGN LOADS SHEAR V (Kips)	DESIGN LOADS TORSION T (K-ft)	DESIGN LOADS MOMENT M (K-ft)
14'	16	0.250	0.419	1 3/4	6	21 1/2"	26 × 1 3/4	1.3	5.59	52.67	83.06
15'		0.250	0.481					1.4	5.61		88.34
16'		0.250	0.547					1.5	5.62		93.66
17'		0.281	0.549					1.4	5.63		99.03
18'			0.615					1.5	5.64		104.44
19'			0.685					1.5	5.66		109.88
20'		0.281	0.759				26 × 1 3/4	1.6	5.67		115.36
21'		0.310	0.759				26 × 2	1.5	5.68		120.86
22'			0.834					1.6	5.70		126.40
23'			0.911		6			1.7	5.71		131.96
24'		0.310	0.992		8				5.77		138.12
25'		0.340	0.990						5.73		143.15
26'		0.340	1.071					1.7	5.75		148.78
27'		0.340	1.155					1.8	5.76		154.43
28'		0.375	1.139					1.7	5.77		160.10
29'		0.375	1.221					1.8	5.79		165.79
30'		0.375	1.307						5.80		171.49
31'		0.410	1.297						5.81		177.22
32'	16	0.410	1.382	1 3/4	8	21 1/2"	26 × 2	1.8	5.83	52.67	182.97

25' SPAN

TOWER HEIGHT (ft)	TOWER PIPE O.D. (in)	TOWER PIPE WALL THICK (in)	TOWER PIPE DEFL ΔH (in)	ANCHOR BOLTS SIZE DIA (in)	ANCHOR BOLTS NO.	ANCHOR BOLTS BOLT CIR DIA	BASE PLATE SIZE (in)	TRUSS DEFL ΔV (in)	DESIGN LOADS SHEAR V (Kips)	DESIGN LOADS TORSION T (K-ft)	DESIGN LOADS MOMENT M (K-ft)
14'	20	0.250	0.333	1 3/8	8	24 3/4"	28 1/2 × 1 3/8	1.4	7.00	82.44	107.23
15'			0.382					1.5	7.02		113.64
16'			0.435					1.6	7.03		120.14
17'			0.491					1.7	7.05		126.71
18'			0.550	1 3/8		24 3/4"	28 1/2 × 1 3/8	1.7	7.07		133.34
19'			0.613	1 1/2		25"	29 × 1 1/2	1.8	7.08		140.03
20'			0.679					1.9	7.10		146.77
21'		0.250	0.749					2.0	7.12		153.56
22'		0.281	0.735				29 × 1 1/2		7.13		160.39
23'			0.803				29 × 1 5/8		7.15		167.26
24'			0.874	1 1/2		25"			7.16		174.17
25'		0.281	0.949	1 3/4		25 3/8"		2.0	7.18		181.12
26'		0.312	0.920				29 × 1 5/8	2.1	7.20		188.02
27'			0.992				29 3/4 × 1 3/4		7.21		195.03
28'			1.067				29 3/4 × 1 3/4		7.23		202.07
29'		0.312	1.145				29 3/4 × 1 3/4	2.1	7.24		209.14
30'		0.344	1.119				29 3/4 × 2	2.2	7.26		216.23
31'		0.344	1.194				29 3/4 × 2	2.2	7.28		223.35
32'	20	0.344	1.273	1 3/4	8	25 3/8"	29 3/4 × 2	2.2	7.29	82.44	230.50

ZONE 4 WITH AND WITHOUT ICE 70 MPH WIND

30' SPAN

TOWER HEIGHT (ft)	TOWER PIPE O.D. (in)	TOWER PIPE WALL THICK (in)	TOWER PIPE DEFL ΔH (in)	ANCHOR BOLTS SIZE DIA (in)	ANCHOR BOLTS NO.	ANCHOR BOLTS BOLT CIR DIA	BASE PLATE SIZE (in)	TRUSS DEFL ΔV (in)	DESIGN LOADS SHEAR V (Kips)	DESIGN LOADS TORSION T (K-ft)	DESIGN LOADS MOMENT M (K-ft)
14'	24	0.250	0.285	1 1/2	8	29"	33 × 1 1/2	1.6	8.42	119.01	134.48
15'			0.327					1.6	8.44		141.90
16'			0.372					1.7	8.46		149.44
17'			0.420					1.8	8.48		157.10
18'			0.471					1.9	8.50		164.85
19'			0.524					2.0	8.52		172.68
20'			0.581					2.1	8.54		180.60
21'			0.641	1 1/2		29"	33 × 1 1/2	2.2	8.56		188.59
22'			0.703	1 3/4		29 3/8"	33 3/4 × 1 1/2	2.2	8.58		196.65
23'			0.768				33 3/4 × 1 1/2	2.3	8.60		204.76
24'			0.837				33 3/4 × 1 5/8	2.4	8.62		212.93
25'			0.908				33 3/4 × 1 5/8	2.5	8.64		221.15
26'		0.250	0.982				33 3/4 × 1 5/8	2.6	8.66		229.42
27'		0.281	0.949				33 3/4 × 1 3/4	2.4	8.67		237.74
28'			1.021				33 3/4 × 1 3/4	2.5	8.69		246.10
29'			1.095	1 3/4		29 3/8"	33 3/4 × 1 3/4	2.6	8.71		254.49
30'			1.172	2		29 3/4"	34 1/2 × 1 3/4	2.7	8.73		262.93
31'			1.251	2		29 3/4"	34 1/2 × 1 3/4	2.8	8.75		271.41
32'	24	0.281	1.333	2	8	29 3/4"	34 1/2 × 1 3/4	2.8	8.77	119.01	279.92

35' SPAN

TOWER HEIGHT (ft)	TOWER PIPE O.D. (in)	TOWER PIPE WALL THICK (in)	TOWER PIPE DEFL ΔH (in)	ANCHOR BOLTS SIZE DIA (in)	ANCHOR BOLTS NO.	ANCHOR BOLTS BOLT CIR DIA	BASE PLATE SIZE (in)	TRUSS DEFL ΔV (in)	DESIGN LOADS SHEAR V (Kips)	DESIGN LOADS TORSION T (K-ft)	DESIGN LOADS MOMENT M (K-ft)
14'	24	0.250	0.406	1 3/4	8	29 3/8"	33 3/4 × 1 1/2	2.6	9.77	161.98	165.20
15'			0.467					2.7	9.79		173.37
16'			0.531					2.8	9.81		181.71
17'		0.250	0.599				33 3/4 × 1 1/2	3.0	9.83		190.21
18'		0.281	0.602				33 3/4 × 1 5/8	2.9	9.85		198.85
19'			0.671					3.0	9.87		207.61
20'			0.743					3.1	9.89		216.48
21'			0.820				33 3/4 × 1 5/8	3.2	9.91		225.46
22'		0.281	0.900				33 3/4 × 1 3/4	3.4	9.93		234.52
23'		0.312	0.889				33 3/4 × 1 3/4	3.2	9.95		243.67
24'			0.968	1 3/4		29 3/8"	33 3/4 × 1 3/4	3.3	9.96		252.90
25'			1.050	2		29 3/4"	34 1/2 × 1 7/8	3.5	9.98		262.20
26'			1.136					3.6	10.00		271.57
27'		0.312	1.225					3.7	10.02		280.99
28'		0.340	1.200				34 1/2 × 1 7/8	3.5	10.04		290.48
29'			1.287				34 1/2 × 2	3.6	10.06		300.02
30'			1.377					3.7	10.08		309.61
31'			1.471					3.8	10.10		319.25
32'	24	0.340	1.567	2	8	29 3/4"	34 1/2 × 2	3.9	10.12	161.98	328.93

40' SPAN

TOWER HEIGHT (ft)	TOWER PIPE O.D. (in)	TOWER PIPE WALL THICK (in)	TOWER PIPE DEFL ΔH (in)	ANCHOR BOLTS SIZE DIA (in)	ANCHOR BOLTS NO.	ANCHOR BOLTS BOLT CIR DIA	BASE PLATE SIZE (in)	TRUSS DEFL ΔV (in)	DESIGN LOADS SHEAR V (Kips)	DESIGN LOADS TORSION T (K-ft)	DESIGN LOADS MOMENT M (K-ft)
14'	30	0.250	0.280	1 3/4	8	35 3/8"	39 3/4 × 1 1/2	2.4	11.22	211.94	200.44
15'			0.322					2.5	11.24		209.33
16'			0.366					2.6	11.27		218.45
17'			0.413					2.7	11.29		227.79
18'			0.463					2.8	11.32		237.32
19'		0.250	0.516					2.9	11.34		247.01
20'		0.281	0.510					2.8	11.37		256.86
21'			0.562					2.9	11.39		266.86
22'			0.617					3.0	11.41		276.98
23'			0.675				39 3/4 × 1 1/2	3.1	11.44		287.22
24'			0.735	1 3/4		35 3/8"	39 3/4 × 1 5/8	3.2	11.46		297.57
25'			0.797	2		35 3/4"	40 1/2 × 1 5/8	3.3	11.49		308.01
26'			0.862				40 1/2 × 1 5/8	3.4	11.51		318.55
27'			0.930				40 1/2 × 1 5/8	3.5	11.54		329.18
28'			1.000				40 1/2 × 1 3/4	3.6	11.56		339.89
29'			1.073					3.7	11.58		350.68
30'			1.148					3.8	11.61		361.53
31'			1.226					3.9	11.63		372.46
32'	30	0.281	1.306	2	8	35 3/4"	40 1/2 × 1 3/4	4.0	11.68	211.94	384.26

GENERAL NOTES :

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

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

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

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

For truss details see standard drawing COSSD.

For base and foundation details see standard drawing COSSF.

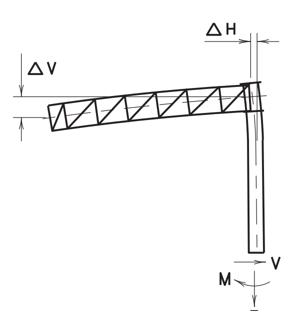
For cantilever truss lengths falling between those shown use sizes called for in the next longer span.

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

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

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

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



ELEVATION

(SHOWING DESIGN LOADS AND DEAD LOAD DEFLECTIONS)

TRUSS DETAILS

SPAN	10', 15', & 20'	25'	30'	35'	40'
W x D = WIDTH x DEPTH	4.0 x 4.0	4.0 x 4.0	4.0 x 4.0	4.0 x 4.0	4.0 x 4.0
CHORD-①, Unless Otherwise Shown	L 3 x 3 x 3/16 ② [4]	L 3 x 3 x 3/16 ② [4]	L 3 x 3 x 1/4 [6]	L 3 x 3 x 5/16 [6]	L 3 x 3 x 3/8 [9]
DEAD LOAD DIAGONAL-②	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 1/2 x 2 1/2 x 3/16 [3]
WIND LOAD DIAGONAL-②	L 2 1/2 x 2 1/2 x 3/16 [2]	L 2 1/2 x 2 1/2 x 3/16 [2]	L 2 1/2 x 2 1/2 x 3/16 [2]	L 3 x 3 x 3/16 [2]	L 3 x 3 x 3/16 [2]
DEAD LOAD VERTICAL-②	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]	L 2 x 2 x 3/16 [2]
WIND LOAD STRUT-②	L 2 x 2 x 3/16 [1]	L 2 x 2 x 3/16 [1]	L 2 x 2 x 3/16 [1]	L 2 x 2 x 3/16 [1]	L 2 x 2 x 3/16 [1]
TRUSS DEAD LOAD	37 lb/ft	38 lb/ft	43 lb/ft	50 lb/ft	56 lb/ft
SIZE H.S. BOLTS IN CONNECTION	5/8" DIA	5/8" DIA	5/8" DIA	5/8" DIA	5/8" DIA
NO. & SIZE OF H.S. BOLTS IN CHORD ANGLE TO TOWER CONNECTION PLATE	4 ~ 5/8" DIA ea	4 ~ 5/8" DIA or 3 ~ 3/4" DIA ea	6 ~ 5/8" DIA or 5 ~ 3/4" DIA ea	6 ~ 5/8" DIA or 5 ~ 3/4" DIA ea	9 ~ 5/8" DIA or 7 ~ 3/4" DIA ea

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

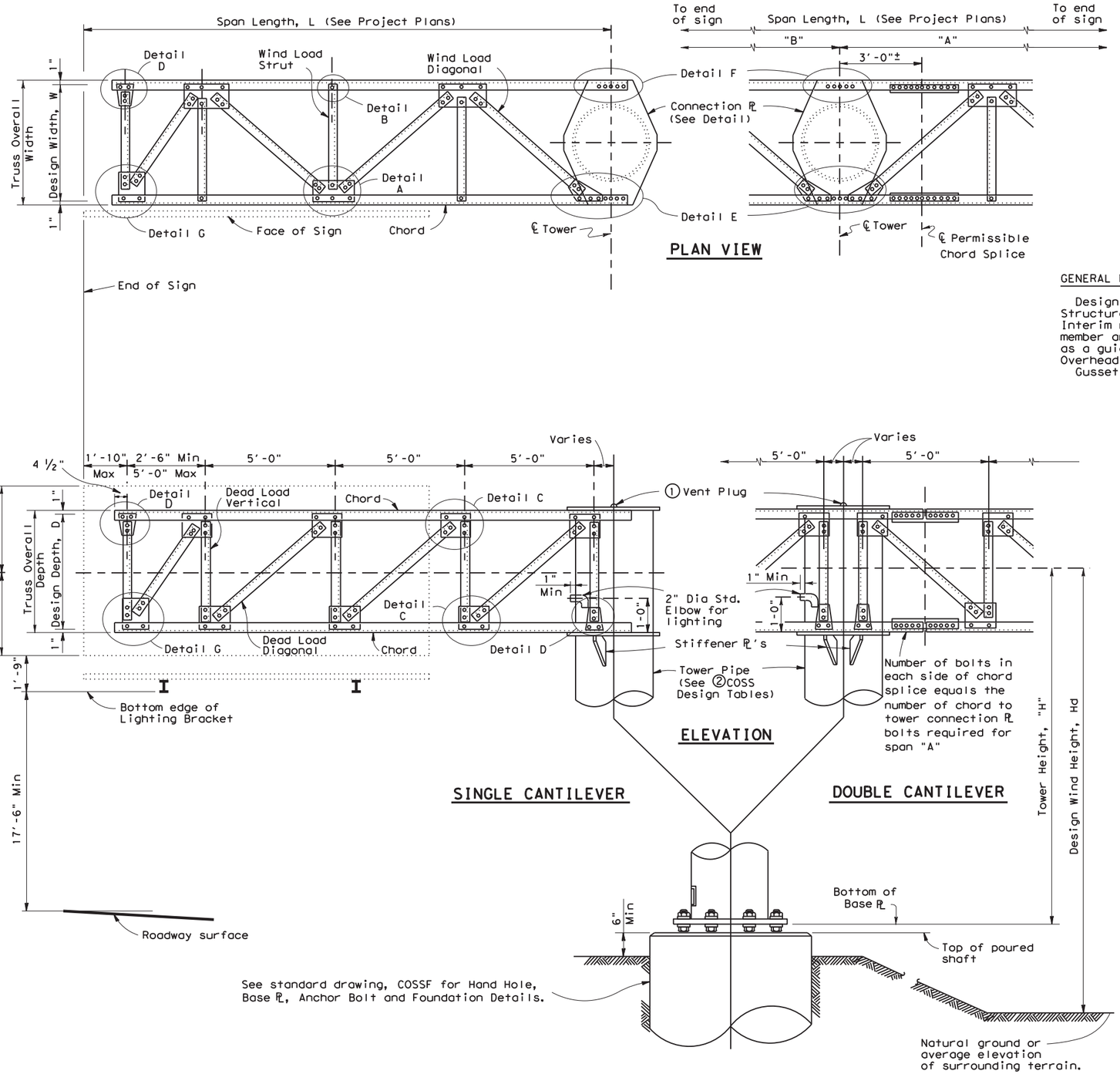
② "Carbon Steel" for non-bridge structures per Item 442, "Metal For Structures".

Texas Department of Transportation
Traffic Operations Division

CANTILEVER OVERHEAD SIGN SUPPORTS

COSS-Z4 & Z4I-10

©TxDOT November 2007	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
REVISIONS	CONT	SECT	JOB	HIGHWAY
4-10	6473	31	001	SH 6, ETC.
	DIST		COUNTY	SHEET NO.
	WACO		MCLENNAN, ETC.	75



GENERAL NOTES:

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

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

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

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

Texas Department of Transportation
Traffic Operations Division

CANTILEVER OVERHEAD SIGN SUPPORT DETAILS

COSSD

REVISIONS

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

CONT	SECT	JOB	HIGHWAY
6473	31	001	SH 6, ETC.

DIST	COUNTY	SHEET NO.
WACO	MCLENNAN, ETC.	76

66A

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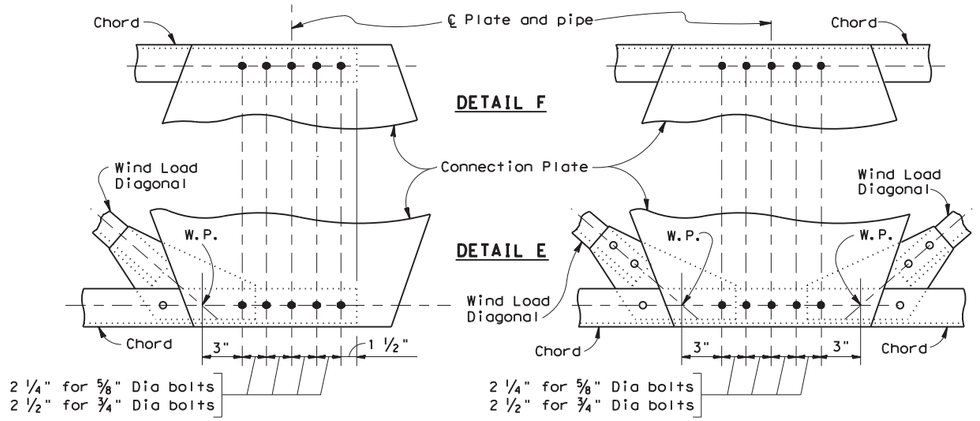
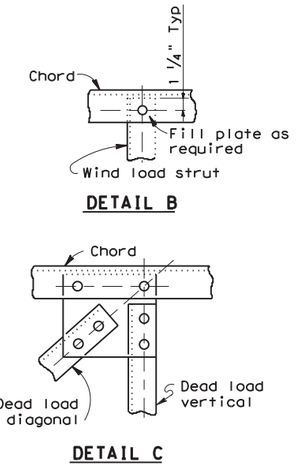
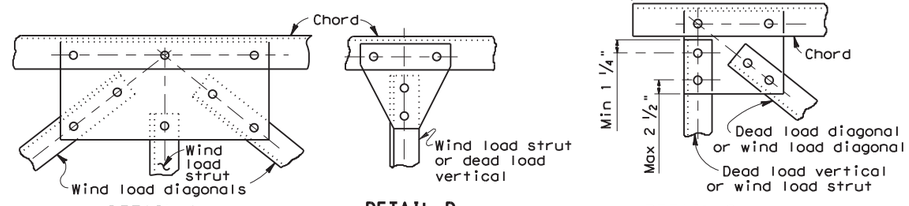


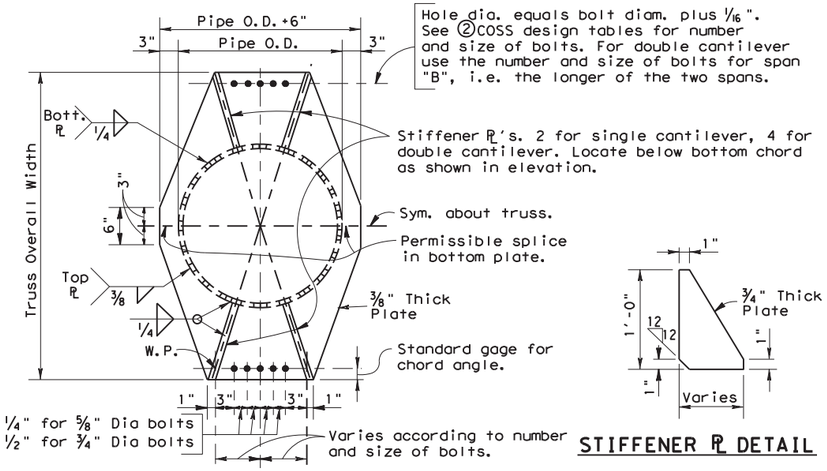
SINGLE CANTILEVER DOUBLE CANTILEVER



CONNECTION DETAILS

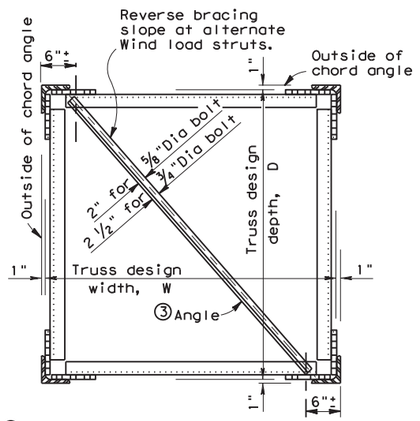


TOTAL NO. OF BOLTS IN DIAG'S. IN JOINT	NUMBER OF BOLTS REQD. IN GUSSET ℄ TO CHORD CONNECTION
0	2
2	2
3	3
4	3
5	4
6	4
8	5
10	6



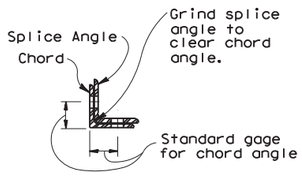
CONNECTION PLATE DETAIL

STIFFENER ℄ DETAIL

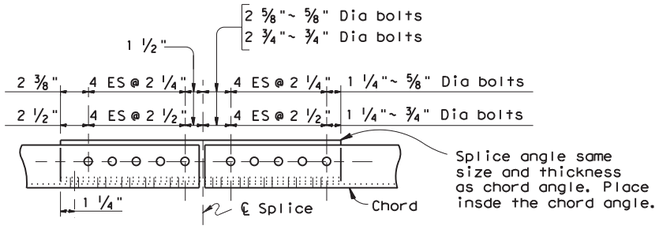


③2" x 2" x 3/16" angle for ⅝" Dia bolts [1]
2½" x 2" x 3/16" angle for ¾" Dia bolts [1]

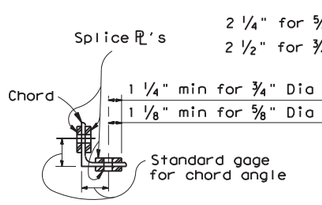
TRUSS SECTION
(DIAGONALS NOT SHOWN)



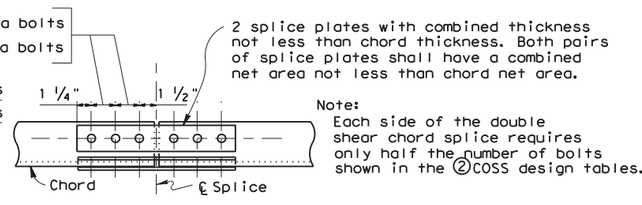
SECTION ON ℄ SPLICE



SINGLE SHEAR CHORD SPLICE

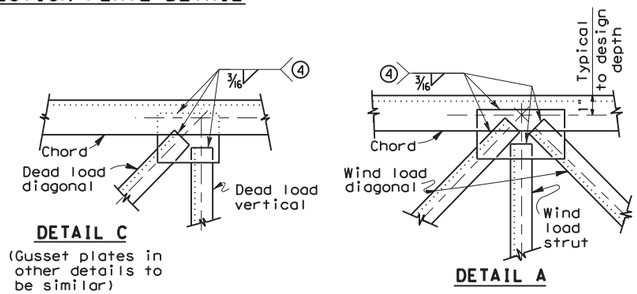


SECTION ON ℄ SPLICE



DOUBLE SHEAR CHORD SPLICE

SPLICE DETAILS



ALTERNATE WELDED CONNECTION DETAILS

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

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SHEET 2 OF 2

Texas Department of Transportation
Traffic Operations Division

CANTILEVER OVERHEAD SIGN SUPPORT DETAILS

COSSD

REVISIONS

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

CONT	SECT	JOB	HIGHWAY
6473	31	001	SH 6, ETC.

DIST	COUNTY	SHEET NO.
WACO	MCLENNAN, ETC.	77

Washers shall conform to ASTM F436.

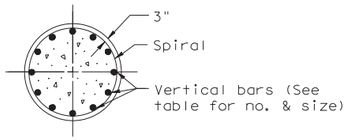
ANCHOR BOLT DIA.	WASHER DIMENSIONS				HOLE IN BASE PLATE
	OUTSIDE DIAMETER	HOLE DIAMETER	THICKNESS		
d			MIN.	MAX.	
1 ½" or less	2d	d + ⅛"	0.136"	0.177"	d + ¼"
1 ¾"	2d - ⅛"	d + ⅛"	0.178"	0.280"	d + 5/16"
2"	2d - ¼"	d + ⅛"	0.178"	0.280"	d + 5/16"
Over 2"	2d - ½"	d + ⅛"	0.240"	0.340"	d + 5/16"

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

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

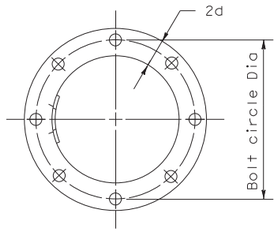
② Thread lenght applies to upper and lower threads

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

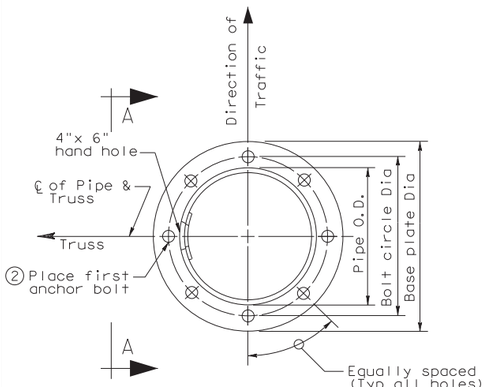


SECTION

A = #3 Plain spiral at 6" pitch (Grade 40)
B = #4 Plain spiral at 6" pitch (Grade 40)
C = #4 Plain spiral at 6" pitch (Grade 60)
D = #4 Plain spiral at 3 ½" pitch (Grade 60)

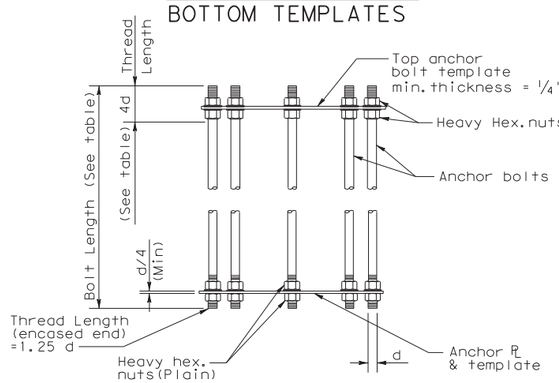


TOP VIEW OF TOP & BOTTOM TEMPLATES

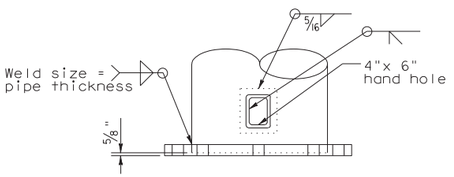


PLAN

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



ANCHOR BOLT ASSEMBLY
(PRIOR TO INSTALLATION)

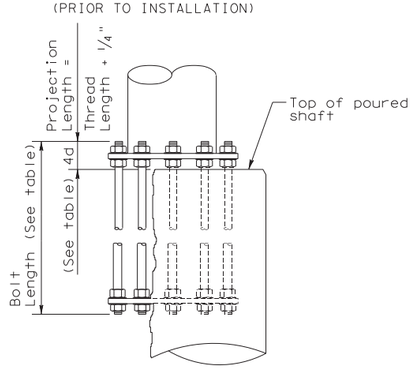


Cut 5" x 7" hole in pipe. Center 4" x 6" hand hole in ⅜" x 8" x 10" back up plate. Provide attachable cover made from section cut from pipe.

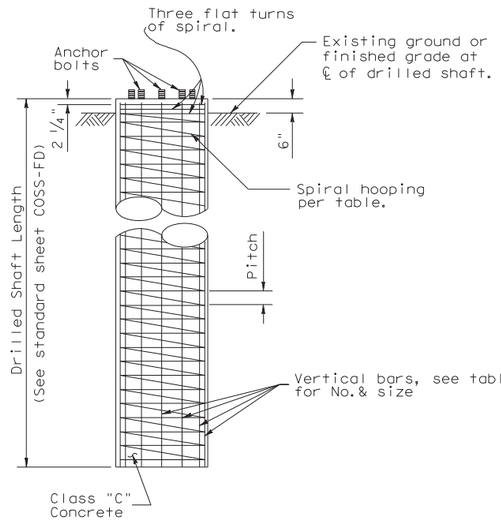
VIEW A-A

③ BASE PLATE & HANDHOLE DETAILS

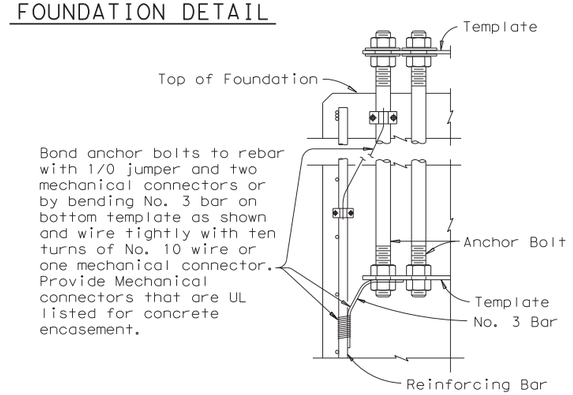
③ See "Cantilever Overhead Sign Support" or "High Level Cantilever Overhead Sign Support" sheets for Diameter and thickness of base plate.



BEARING SEAT ELEVATION



FOUNDATION DETAIL



LIGHTNING PROTECTION SYSTEM

GENERAL NOTES

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

Texas Department of Transportation

Traffic Safety Division Standard

CANTILEVER OVERHEAD SIGN SUPPORT FOUNDATION

COSSF-21

FILE: cossf-21.dgn	DN:	CK:	DW:	CK:
©TxDOT November 2007	CONT	SECT	JOB	HIGHWAY
REVISIONS	6473	31	001	SH 6, ETC.
8-21	DIST	COUNTY		SHEET NO.
	WACO	MCLENNAN, ETC.		78

DATE: 9/16/2024 11:40:03 AM
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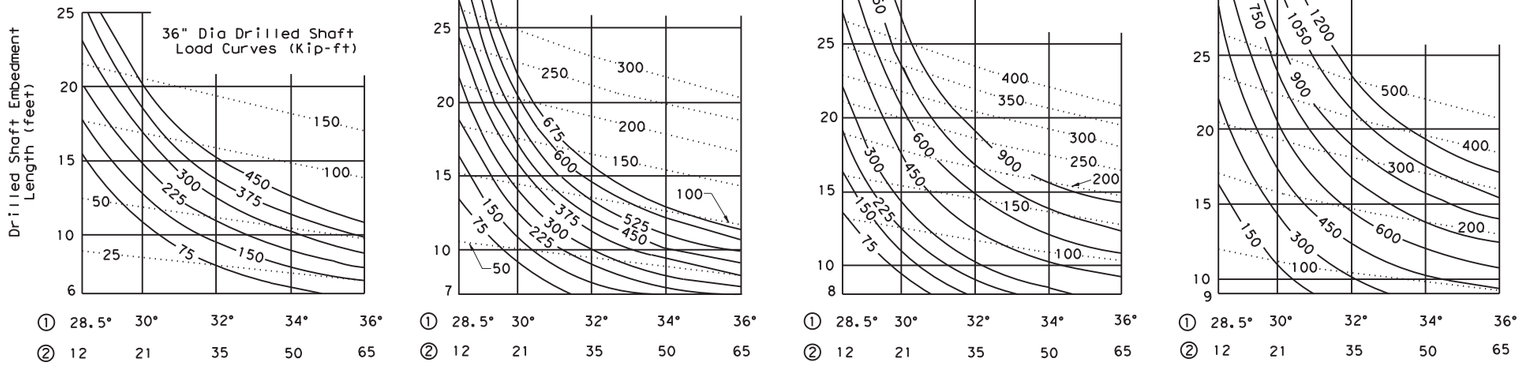


① Ø = Angle of internal friction of soil (degrees)

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

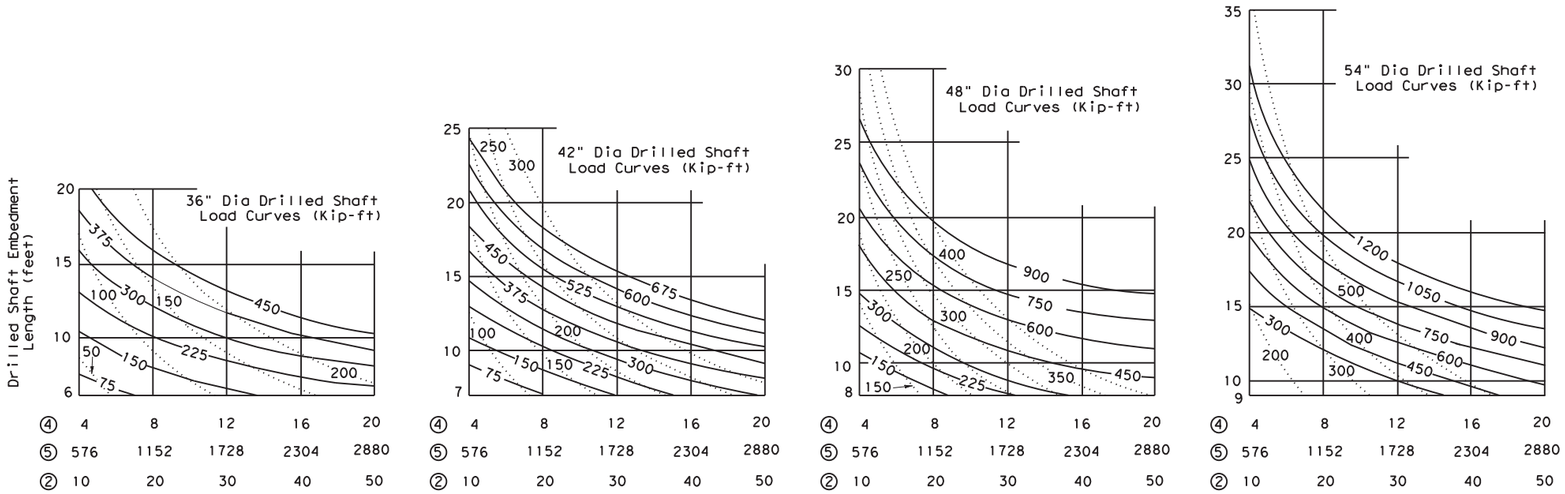
④ C(psi) = Cohesive shear strength of soil (psi)

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

③ **SUBMERGED SAND SOIL (COHESIONLESS)**

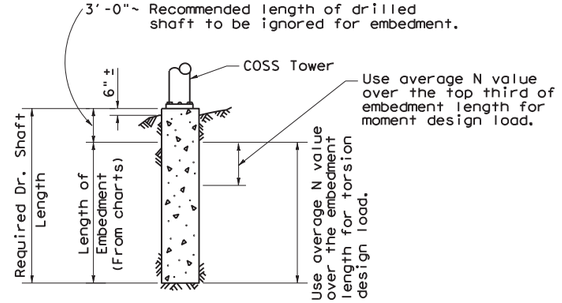
Moment ——————
Torsion ....

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



CLAY SOIL (COHESIVE)

Moment ——————
Torsion ....



PROCEDURE:

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

GENERAL NOTES:

These charts are for use with Cantilever Overhead Sign Supports with one shaft per tower.
Solid curves are base moment in Kip-ft.
Dash curves are base torsion in Kip-ft.
Minimum embedment of drilled shaft is two diameters.
Add 3'-0" to the required embedment length to determine the required length of drilled shaft.

Texas Department of Transportation
Traffic Operations Division

FOUNDATION EMBEDMENT SELECTION CHARTS

COSS-FD

REVISIONS

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

CONT	SECT	JOB	HIGHWAY
6473	31	001	SH 6, ETC.

DIST	COUNTY	SHEET NO.
WACO	MCLENNAN, ETC.	79

DATE: 9/16/2024 11:40:03 AM
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