

STATE OF TEXAS DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED HIGHWAY ROUTINE MAINTENANCE CONTRACT

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	ESTIMATE & QUANTITY SHEET
3A-3F	GENERAL NOTES
4	LOCATION MAP
5	SUMMARY SHEET
6	TREE AND BRUSH REMOVAL DETAILS
* 7-18	BC(1)-21 THRU BC(12)-21
* 19	TCP(1-1)-18
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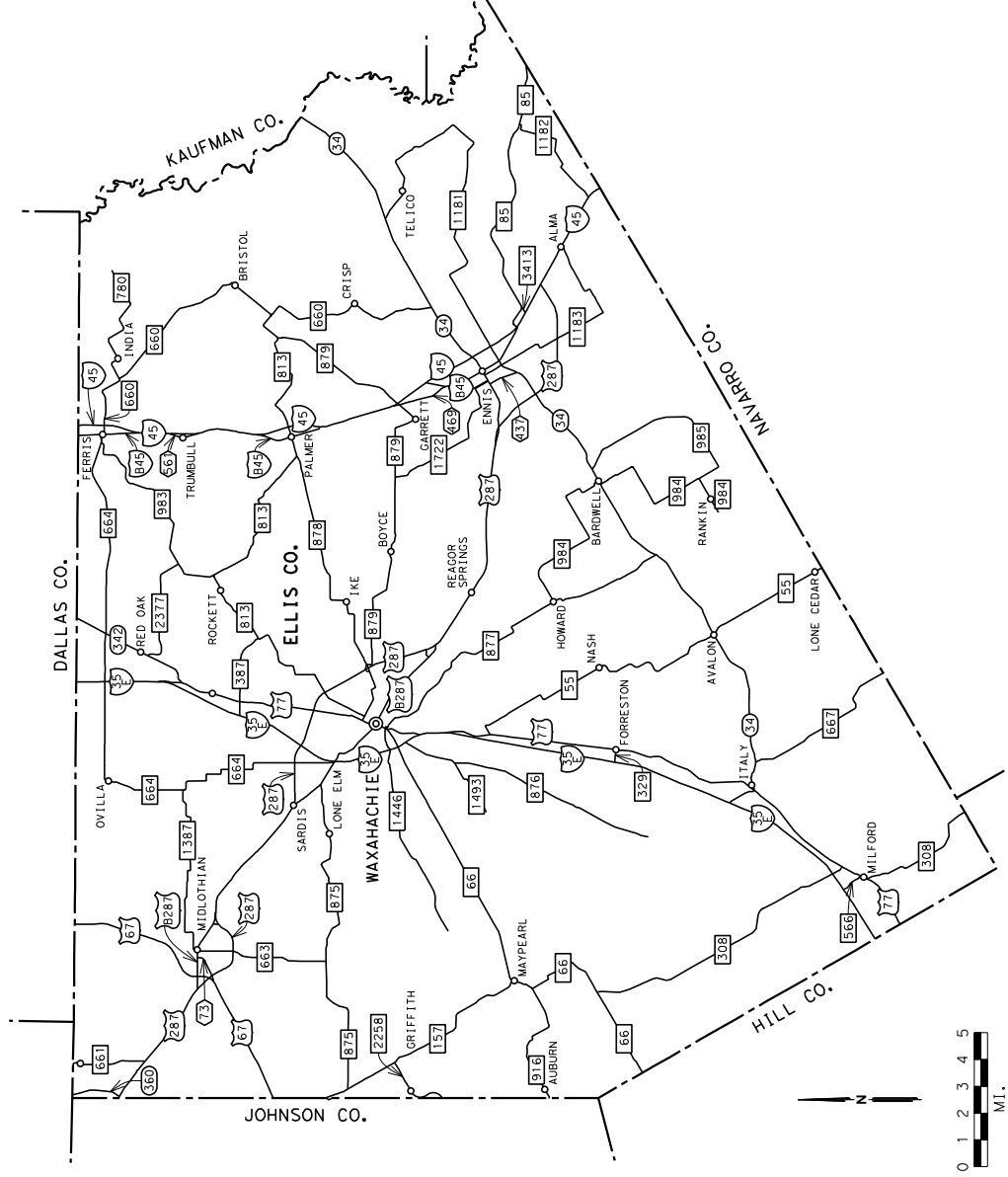
TYPE OF WORK:

TREE TRIMMING AND BRUSH REMOVAL

PROJECT NO. : RMC-647134001

HIGHWAY : BI0045G

LIMITS : VARIOUS ROADWAYS IN THE ELLIS COUNTY MAINTENANCE SECTION



Texas Department of Transportation

RECOMMENDED FOR LETTING



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

Mitchell L. Randall, PE, 2024-10-18 DATE

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION SEPTEMBER 1, 2024 AND SPECIAL SPECIFICATION ITEMS INCLUDED IN THE CONTRACT SHALL GOVERN ON THIS PROJECT.

GRAPHICS FILE	MAINTENANCE PROJECT NO.		SHEET NO.
	RMC-647134001		1
CHECKED	STATE	STATE DIST.	COUNTY
	TEXAS	DAL	ELLIS
CHECKED	CONT.	SECT.	JOB
	6471	34	001
			HIGHWAY NO.
			BI0045G

DocuSigned by:
Juan A. Paredes, P.E.
4A97FFA3D5654BC...
AREA ENGINEER

10/21/2024

DocuSigned by:
David Morru
72258DD350B94E4...
DISTRICT MAINTENANCE ENGINEER

10/21/2024

RECOMMENDED FOR LETTING

DocuSigned by:
JEFFREY BUSH
345B765EB03E406...
DIRECTOR OF OPERATIONS

10/21/2024



Estimate & Quantity Sheet

CONTROLLING PROJECT ID 6471-34-001 DISTRICT Dallas COUNTY Ellis
 HIGHWAY B10045G

CONTROL SECTION JOB		6471-34-001		TOTAL EST.	TOTAL FINAL
PROJECT ID		A00211541			
COUNTY		Ellis			
HIGHWAY		B10045G			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL
	500-7001	MOBILIZATION	LS	1.000	1.000
	502-7001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	5.000	5.000
	505-7001	TMA (STATIONARY)	DAY	81.000	81.000
	752-7001	TREE TRIMMING / BRUSH REMOVAL	MI	63.000	63.000
	752-7003	TREE TRIMMING / BRUSH REMOVAL(CHANNELS)	AC	19.000	19.000
	752-7005	TREE REMOVAL (4" - 12" DIA)	EA	103.000	103.000
	752-7006	TREE REMOVAL (12" - 18" DIA)	EA	34.000	34.000
	752-7007	TREE REMOVAL (18" - 24" DIA)	EA	4.000	4.000
	752-7008	TREE REMOVAL (24" - 30" DIA)	EA	3.000	3.000
	752-7009	TREE REMOVAL (30" - 36" DIA)	EA	2.000	2.000
	752-7010	TREE REMOVAL (36" - 42" DIA)	EA	1.000	1.000
	752-7011	TREE REMOVAL (42" - 48" DIA)	EA	1.000	1.000
	752-7012	TREE REMOVAL (48" - 60" DIA)	EA	3.000	3.000
	752-7013	TREE REMOVAL (60" - 72" DIA)	EA	2.000	2.000

DISTRICT	COUNTY	CCSJ	SHEET
Dallas	Ellis	6471-34-001	2

Project Number: RMC-647134001**Control:** 6471-34-001**County:** Ellis**Highway:** BI0045G**General:**

This project consists of performing “Tree Trimming & Brush Removal” on roadway(s) as detailed on the Summary Sheets in the Ellis County Maintenance Section.

Work to be performed under this contract is Site Specific.

Provide and maintain a dedicated email address for receipt of work orders and correspondence throughout the term of this contract. Acknowledgement of emailed work order/callouts is required no more than 12 hr. from notification.

Contractor’s attention is called to the fact that all adjoining pavement sections will be protected during all phases of construction and any damages incurred due to Contractor’s operation will be repaired and replaced at the Contractor’s expense.

Coordinate work through:

Michael Anthony
124 FM 876
Waxahachie, Texas 75167
972-923-2960

Bids will be received at 4777 E. Hwy 80, Mesquite, Texas 75150-6643.

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

Juan A. Paredes, P.E. Juan.Paredes@txdot.gov
Michael Anthony Michael.Anthony@txdot.gov

Questions may be submitted via the Letting Pre-Bid Q&A web page. This webpage can be accessed from the Notice to Contractors dashboard located at the following Address:

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

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

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

General Notes

Sheet 3A

Project Number: RMC-647134001**Control:** 6471-34-001**County:** Ellis**Highway:** BI0045G

Attention is directed to the possible presence of underground utilities owned by the Texas Department of Transportation (irrigation, signal, illumination and surveillance, communication, and control) on the right of way. Call the Department for locates at 214-320-6682 48 hr. in advance of excavation. Contact the appropriate department of the local city or town a minimum of 48 hr. in advance of excavation.

If overhead or underground power lines need to be de-energized, contact the electrical service provider to perform this work. Cost associated with de-energizing the power lines or other protective measures required are at no expense to the Department.

If working near power lines, comply with the appropriate sections of Texas State Law and Federal Regulations relating to the type of work involved.

Item 2 – Instructions to Bidders:

This project includes plan sheets that are not part of the bid proposal.

View or download plans at:

<http://www.dot.state.tx.us/business/plansonline/agreement.htm>

Item 7 – Legal Relations and Responsibilities:

Pre-construction safety meeting will be conducted with Contractor’s personnel prior to work beginning on a continuously prosecuted contract or before each callout work request.

Attendance of this meeting will not be paid directly but considered subsidiary to the various bid items.

Holiday restrictions – the Engineer may decide that no lane closures or construction operations will be allowed during the restricted periods listed in the following holiday schedule. TxDOT has the right to lengthen, shorten, or otherwise modify these restricted periods as actual, or expected, traffic conditions may warrant. Working days will not be charged for these restricted periods. No additional compensation will be allowed for these restricted closures (i.e., overhead, delays, stands-by, barricades or any other associated cost impacts).

- New Year’s Eve and Day (noon on December 31 thru 10 P.M. January 1)
- Easter Holiday weekend (noon on Friday thru 10 P.M. Sunday)
- Memorial Day weekend (noon on Friday thru 10 P.M. Monday)
- Independence Day (noon on July 3 thru 10 P.M. on July 5)
- Labor Day weekend (noon on Friday thru 10 P.M. Monday)
- Thanksgiving Holiday (noon on Wednesday thru 10 P.M. Sunday)

General Notes

Sheet 3B

Project Number: RMC-647134001

Control: 6471-34-001

County: Ellis

Highway: BI0045G

- Christmas Holiday (noon on December 23 thru 10 P.M. December 26)

Holiday restrictions for Independence Day, Thanksgiving Holiday, and the Christmas Holiday may be extended for the “week of” due to the nature of work being performed and the work location at the discretion of the Engineer for safety of the traveling public.

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

Event Restrictions – No Lane Closures that restricts or interferes with traffic will be allowed for the regional events set forth below. TxDOT has the right to lengthen, shorten, or otherwise modify these restrictions as actual traffic conditions may warrant. TxDOT also has the right to modify the list of major events as they are added, renamed, rescheduled, or as warranted.

- National Polka Festival – The event is the last weekend of every May. No lane closures will be allowed without Engineer approval for roadways in or around Ennis, Texas. Please see the event website for specific dates. www.nationalpolkafestival.com/
- Ennis Bluebonnet Trails Festival – The event is the month of April. No lanes closures on the various Farm-to-Market roadways will be allowed without Engineer approval. The roadways vary each year. Please see the event website for a current map and list of roadways. <https://www.visitennis.org/bluebonnet.html>
- Texas Motorplex - The are several major events held including the Spring, Summer, and Fall NHRA Nationals. These events affect US-287 (between Ennis and Waxahachie). No lane closures will be allowed without Engineer approval. Please visit the Texas Motorplex website for current schedule for specific dates and times. www.texasmotorplex.com
- Scarborough Renaissance Festival – Waxahachie, Texas – The event is every weekend (Saturday and Sunday) during the months of April and May. The event affects IH-35E northbound and southbound between mile markers 397 – 402 and FM-66. No lane closures will be allowed without Engineer approval. Additional information may be found on the events website. www.srfestival.com
- The University of Texas vs. University of Oklahoma football game (no lane closures beginning 4 hr. prior to the event and ending 3 hr. following event completion).

Item 8 – Prosecution and Progress:

Working days will be charged in accordance with Section 8.3.1.4, “Standard Workweek”.

Contractor will submit a bar chart or CPM chart for progress of schedule. Present work to begin no later than 7 calendar days from the work order letter unless otherwise approved.

General Notes

Sheet 3C

Project Number: RMC-647134001

Control: 6471-34-001

County: Ellis

Highway: BI0045G

Perform work during the shaded months presented in the “Schedule of Work” Table.

**TABLE 1
SCHEDULE OF WORK**

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Site-Specific Work												
Non-Site Specific Work												

For Non-Site-Specific items, perform work on site-specific locations before identified non-site-specific locations. Otherwise, work for Non-Site-Specific locations is expected to take place within the identified timeline shown on this “Schedule of Work” Table and the call-out work request.

Notification to perform “Non-Site Specific” work at locations not presented on the Summary Sheet will be in writing.

Item 502 – Barricades, Signs, and Traffic Handling:

Perform work Monday through Friday during daylight hours. Do not begin work until 30 minutes after sunrise and cease operations 30 minutes before sunset.

Weekend work may be allowed when approved by the Engineer.

Maximum length of lane closure will be 2 miles.

Traffic Control Plans with a lane closure causing backups of 10 minutes or greater in duration will be modified by the Engineer.

Trailer all slow-moving vehicles (designed to operate 25 mph or less) crossing freeway main lanes.

When moving unlicensed equipment on or across any pavement or public highways, protect the pavement from all damages using an acceptable method.

Equipment and materials will not be left within 30 ft. of the travel lane during non-working hours.

General Notes

Sheet 3D

Project Number: RMC-647134001 **Control:** 6471-34-001

County: Ellis **Highway:** BI0045G

Item 505 – Truck Mounted Attenuator (TMA):

The total number of truck mounted attenuators (TMAs) or trailer attenuators (TAs) required when utilizing the traffic control standards are shown in the tables below.

TCP 1 Series (1-1)-18	Scenario	Required TMA/TA
	All	1

TCP 5 Series (5-1)-18	Scenario	Required TMA/TA
	A	1
	B	1

Shadow vehicles equipped for truck mounted attenuators (TMA) for mobile and stationary operations 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 TMAs/TAs needed for the project for those times per plan requirements. Additional TMAs/TAs used that are not specified in the plans in which the Contractor expects compensation will require prior approval from the Engineer.

When TMAs are paid by the hour or day, “ready for operation” is defined as all equipment, material, personnel, etc. are present on the project ready to begin work.

Item 752 – Tree and Brush Removal:

Trim trees in accordance with 752.4.2. Tree Trimming.

Trees located in front of a residence, or a business will be pruned or trimmed as directed.

Do not use a telescopic side boom rotary mower.

Trim all trees at the right of way line to a minimum 18 ft. vertical face measured from the adjacent natural ground. If limbs encroach pavement after pruning, prune as directed.

Trees blocking signs will be trimmed as directed.

Tree Removal – Cut all trees as close to the ground as possible but no higher than 3 in. above the ground level until the stump can be removed according to the plans. Department will mark the trees to be removed with fluorescent orange paint.

All stumps will be removed before proceeding to a new location.

General Notes Sheet 3E

Project Number: RMC-647134001 **Control:** 6471-34-001

County: Ellis **Highway:** BI0045G

Do not use any chemical agents to aid in the deterioration or removal of the stump.

Brush Removal – Remove all brush at culverts, headwalls, wingwalls, guardrail, cable barrier, riprap and as directed. Trees less than 4 in. diameter are considered brush and are to be removed.

Burning of brush will not be permitted. Cleanup will be continuously and concurrently with pruning, trimming, and removal operations.

Remove and dispose of or mulch all dead fall (trees and/or limbs already fallen to the ground) from within the limits of the right of way. This will not be paid for directly but will be considered subsidiary to this item.

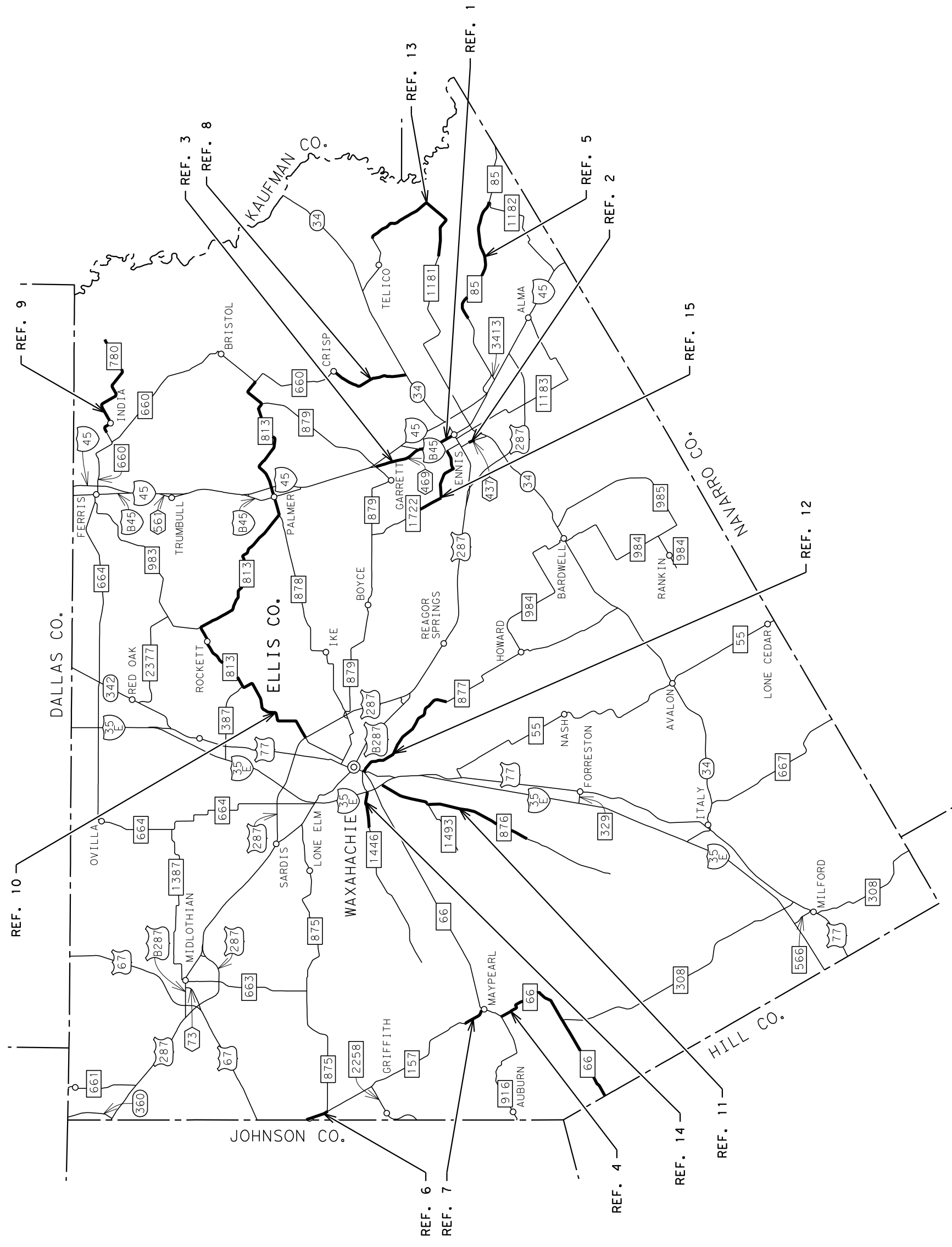
Operate equipment (chipper and/or screen) to ensure at least 90% of wood chips left on the right of way are smaller than 2 in. in size (length and width). Keep cutter bar and blades sharp to ensure limbs are not shredded.

Unless otherwise approved, all trees, limbs, and brush that are cut in 1 day will be picked up and moved off the right of way the same day.

All driveways, walkways, paths, right of way, and roadways will be left clean at the end of each workday.

General Notes Sheet 3F

LOCATION MAP



REF NO.	HWY	LIMITS
1	BI 45G	FROM SS 469 TO BU 287S
2	SS 437	FROM LAMPASAS ST TO MADISON ST
3	SS 469	FROM FM 879 TO BI 45G
4	FM 66	FROM HILL COUNTY LINE TO FM 916
5	FM 85	FROM JC SPENCE RD TO FM 1182
6	FM 157	FROM JOHNSON COUNTY LINE TO FM 875
7	FM 157	FROM BARTON RD TO FM 66
8	FM 660	FROM UNION HILL RD TO SH 34
9	FM 780	FROM ASKEW RD TO END OF MAINTENANCE
10	FM 813	FROM US 287 TO FM 660
11	FM 876	FROM IH 35E TO EDMONDSON RD
12	FM 877	FROM FM 66 TO HUNTER PASS
13	FM 1181	FROM WALKER CREEK RD TO CUTOFF RD
14	FM 1446	FROM LONE ELM RD TO IH 35E
15	FM 1722	FROM TURNER RD TO PRESTON ST



LOCATION MAP

DESIGN	FED. RD. DIV. NO.	MAINTENANCE PROJECT NO.	HIGHWAY NO.
MLR	6	RMC-647134001	B10045G
MLR	STATE	DISTRICT	SHEET NO.
CHECK	TEXAS	DAL	ELLIS
CHECK	CONTROL	SECTION	JOB
	6471	34	001
			4

SUMMARY SHEET

REF. NO.	HIGHWAY	ADT	REFERENCE MARKERS	LIMITS	0752-7001		0752-7003	0752-7005	0752-7006	0752-7007	0752-7008
					TREE TRIMMING / BRUSH REMOVAL	TREE TRIMMING / BRUSH REMOVAL (CHANNELS)	TREE REMOVAL (4" - 12" DIA)	TREE REMOVAL (12" - 18" DIA)	TREE REMOVAL (18" - 24" DIA)	TREE REMOVAL (24" - 30" DIA)	
1	BI 45G	11,840	294/296	SS 469 TO BU 287S	MI	AC	EA	EA	EA	EA	EA
2	SS 437	1,095	296/297	LAMPASAS ST TO MADISON ST	2.0						
3	SS 469	2,449	294/296	FM 879 TO BI 45G	1.0	2	3	2	2	1	1
4	FM 66	1,326	580/587	HILL COUNTY LINE TO FM 916	7.0	2	4	2			
5	FM 85	2,884	601/607	JC SPENCE RD TO FM 1182	2.5		4	2			
6	FM 157	4,892	302/303	JOHNSON COUNTY LINE TO FM 875	3.0		11				
7	FM 157	3,764	309/311	BARTON RD TO FM 66	1.5						
8	FM 660	985	296/299	UNION HILL RD TO SH 34	3.5	2	3	2	1	1	
9	FM 780	824	596/601	ASKEW RD TO END OF MAINTENANCE	2.5						
10	FM 813	17,817	587/607	US 287 TO FM 660	14.0		40	12	1		
11	FM 876	1,111	294/301	IH 35E TO EDMONDSON RD	4.0	1	8	2			
12	FM 877	3,195	294/299	FM 66 TO HUNTER PASS	5.0		10	5			
13	FM 1181	346	605/611	WALKER CREEK RD TO CUTOFF RD	2.5						
14	FM 1446	4,240	576/579	LONE ELM RD TO IH 35E	5.5	10	10	4			
15	FM 1722	3,848	596/599	TURNER RD TO PRESTON ST	3.0						
NON-SITE SPECIFIC					63.0	2	103	34	1	4	3
TOTAL						19	103	34			

REF. NO.	HIGHWAY	ADT	REFERENCE MARKERS	LIMITS	0752-7009		0752-7010	0752-7011	0752-7012	0752-7013	DAYS ALLOWED
					TREE REMOVAL (30" - 36" DIA)	TREE REMOVAL (36" - 42" DIA)	TREE REMOVAL (42" - 48" DIA)	TREE REMOVAL (48" - 60" DIA)	TREE REMOVAL (60" - 72" DIA)		
1	BI 45G	11,840	294/296	SS 469 TO BU 287S	EA	EA	EA	EA	EA	EA	
2	SS 437	1,095	296/297	LAMPASAS ST TO MADISON							
3	SS 469	2,449	294/296	FM 879 TO BI 45G							
4	FM 66	1,326	580/587	HILL COUNTY LINE TO FM							
5	FM 85	2,884	601/607	JC SPENCE RD TO FM 1182							
6	FM 157	4,892	302/303	JOHNSON COUNTY LINE TO							
7	FM 157	3,764	309/311	BARTON RD TO FM 66							
8	FM 660	985	296/299	UNION HILL RD TO SH 34							
9	FM 780	824	596/601	ASKEW RD TO END OF MAINTENANCE							
10	FM 813	17,817	587/607	US 287 TO FM 660	1			2	1		
11	FM 876	1,111	294/301	IH 35E TO EDMONDSON RD							
12	FM 877	3,195	294/299	FM 66 TO HUNTER PASS							
13	FM 1181	346	605/611	WALKER CREEK RD TO CUTOFF							
14	FM 1446	4,240	576/579	LONE ELM RD TO IH 35E							
15	FM 1722	3,848	596/599	TURNER RD TO PRESTON ST	1	1	1	1	1	1	
NON-SITE SPECIFIC					2	1	1	3	1	2	
TOTAL											86

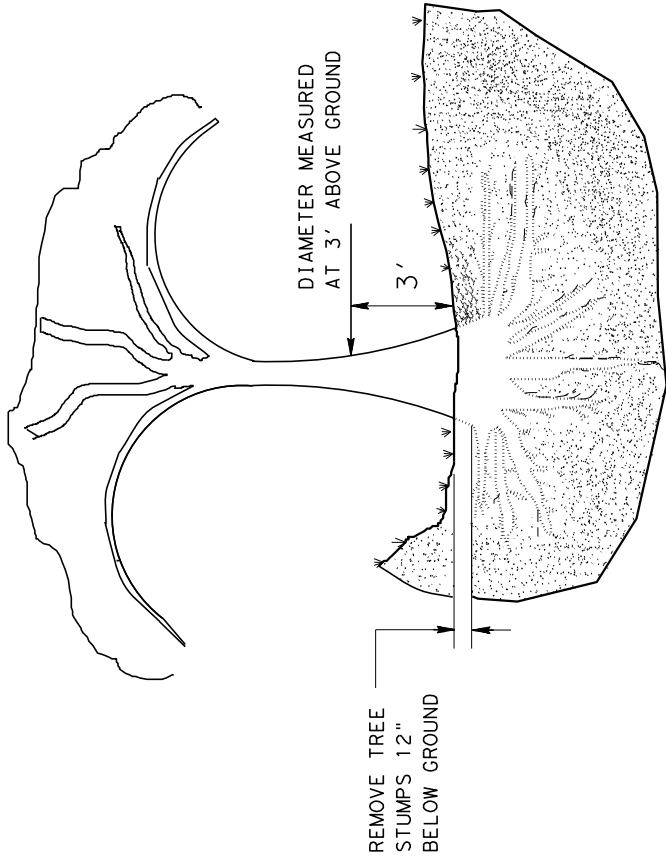
NOTES:

TREE REMOVAL MAY BE PERFORMED AT ANY TIME DURING THE TERM OF THE CONTRACT.
 TREE TRIMMING MAY NOT BE PERFORMED BETWEEN FEBRUARY 15TH AND JUNE 15TH.

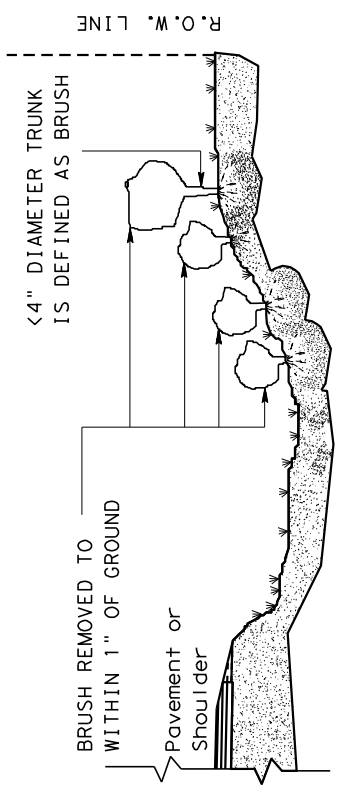


SUMMARY SHEET

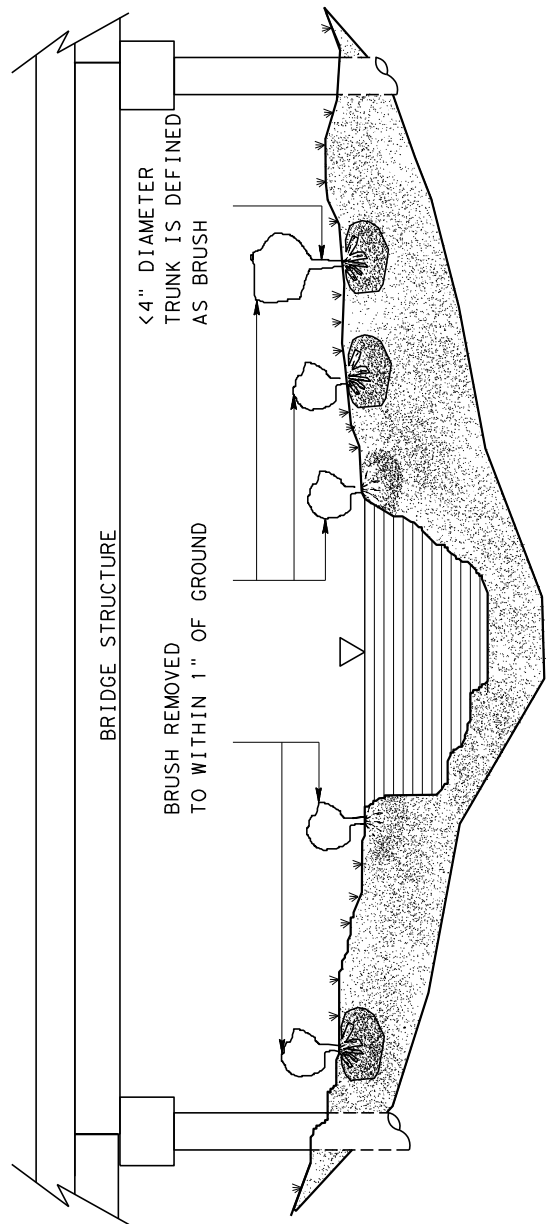
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MLR	6	RMC-647134001	BI0045G
GRAPHICS	STATE	DISTRICT	SHEET NO.
MLR	TEXAS	DAL	5
CHECK	CONTROL	SECTION	JOB
CHECK	6471	34	001



TREE REMOVAL

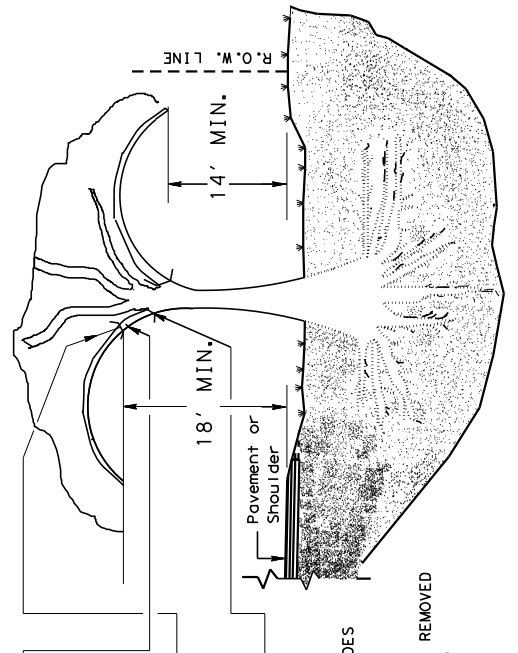


BRUSH REMOVAL



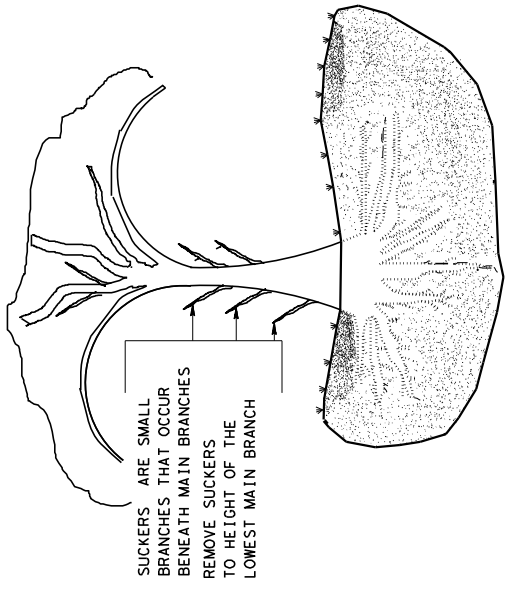
BRUSH REMOVAL UNDER BRIDGE AND IN CHANNEL

- STEP 1: CUT 1/3 WAY THROUGH BOTTOM OF LIMB 8" TO 12" ABOVE MAIN STEM (OR TRUNK).
- STEP 2: REMOVE LIMB 4" TO 6" BEYOND THE FIRST CUT
- STEP 3: REMOVE STUB WITH A SMOOTH CUT SO THAT TRACE COLLAR OF THE REMOVED LIMB PROTRUDES APPROXIMATELY 1/2" FROM THE MAIN STEM

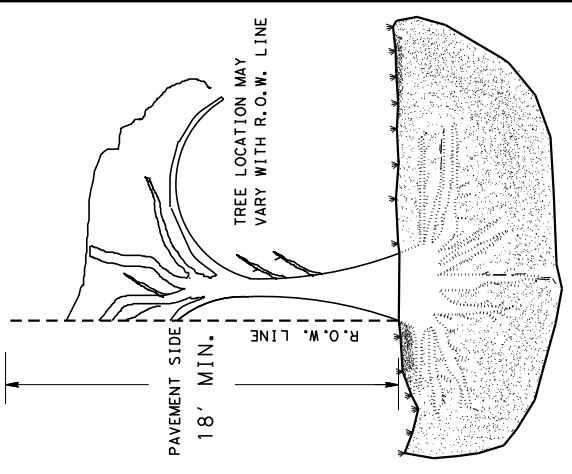


REMOVE ALL LIMBS ON PAVEMENT SIDE TO 18' AS MEASURED FROM THE EDGE OF PAVEMENT. TREES MAY OR MAY NOT OVERHANG PVMT.

TREE TRIMMING



STEPS 1,2 AND 3 APPLY WHEN REMOVING LIMBS 2" IN DIAMETER OR LARGER.



REMOVE ALL LIMBS ON PAVEMENT SIDE TO 18' ABOVE SURROUNDING NATURAL GROUND WHEN TREE IS AT R.O.W.

GENERAL NOTES:

TREE TRIMMING

1. TRIM AND REMOVE ALL TREE LIMBS ON THE PAVEMENT SIDE OF THE TRUNK 18' ABOVE THE PAVEMENT OR BRIDGE DECK ELEVATION, OVER HANGING THE ROADWAY OR NOT, UNLESS OTHERWISE SHOWN ON THE PLANS.
2. TRIM AND REMOVE ALL TREE LIMBS BETWEEN THE TRUNK AND R.O.W. LINE 14' ABOVE NATURAL GROUND, TERRAIN OR OTHER STRUCTURE ELEVATION, UNLESS OTHERWISE SHOWN ON THE PLANS.

TREE REMOVAL

3. FOR TREES MARKED FOR REMOVAL, THE DIAMETER OF TREES ARE DETERMINED BY MEASUREMENT OF THE TRUNK CIRCUMFERENCE 3' ABOVE THE GROUND. TREES WITH TRUNKS OF LESS THAN 4" DIAMETER ARE CONSIDERED TO BE BRUSH. TREES WITH MULTIPLE TRUNKS AT THE POINT OF MEASUREMENT ARE MEASURED AND PAID FOR SEPARATELY.
4. MEASUREMENTS FOR PAYMENT ARE PRESENTED IN TABLE 1: RANGE FOR PAY ITEMS.

TABLE 1
TREE TRUNK SIZE FOR TREE REMOVAL PAYMENT

PAY ITEM	TRUNK DIAMETER *		TRUNK CIRCUMFERENCE	
	LOWER LIMIT IS GREATER THAN	UPPER LIMIT IS LESS THAN OR EQUAL TO	LOWER LIMIT IS GREATER THAN OR EQUAL TO	UPPER LIMIT IS LESS THAN OR EQUAL TO
752 7005	4	12	12 1/2	37 1/2
752 7006	12	18	37 1/2	56 1/2
752 7007	18	24	56 1/2	75 1/2
752 7008	24	30	75 1/2	94
752 7009	30	36	94	113
752 7010	36	42	113	132
752 7011	42	48	132	151
752 7012	48	60	151	188 1/2
752 7013	60	72	188 1/2	226
	GREATER THAN 72	72	264	NOT APPLICABLE

*SEE GENERAL NOTE #3.



Mitchell L. Randall, P.E. 2024-10-18



TREE AND BRUSH REMOVAL DETAILS

DESIGN	FED. RD. DIV. NO.	MAINTENANCE PROJECT NO.	HIGHWAY NO.
MLR	6	RMC-647134001	BI0045G
GRAPHICS	STATE	DISTRICT	COUNTY
MLR	TEXAS	DAL	ELLIS
CHECK	CONTROL	SECTION	JOB
CHECK	6471	34	001
			6

BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

- 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).
- The development and design of the Traffic Control Plan (TCP) is the responsibility of the Engineer.
- 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.
- 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.
- 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.
- When projects about, 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.
- 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.
- 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.
- 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.
- 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.
- Traffic control devices should be in place only while work is actually in progress or a definite need exists.
- The Engineer has the final decision on the location of all traffic control devices.
- 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:

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

SHEET 1 OF 12



Traffic Safety Division Standard

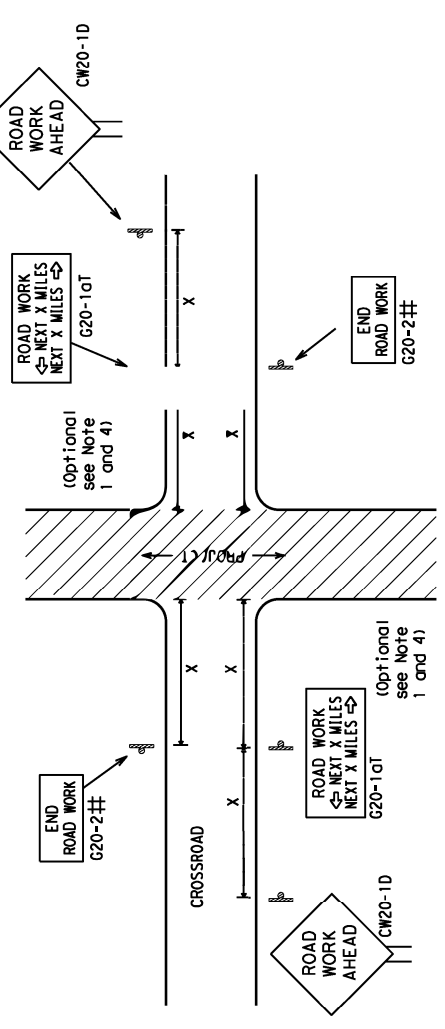
**BARRICADE AND CONSTRUCTION
GENERAL NOTES
AND REQUIREMENTS**

BC (1) - 21

FILE:	BC-21.dgn	DWG: TxDOT	CHK: TxDOT	DWG: TxDOT	CHK: TxDOT	HIGHWAY
① TxDOT	November 2002	CONT	SECT	JOB		
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4-03	7-13	REVISIONS				
9-07	8-14	DIST		COUNTY		SHEET NO.
5-10	5-21	DAL		ELLIS		7

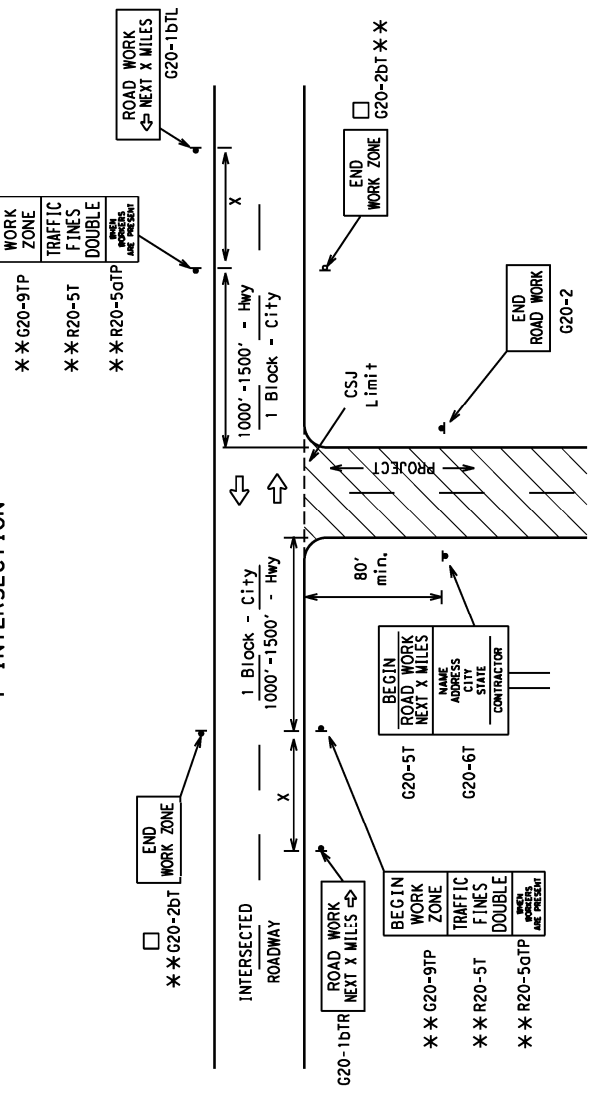
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

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)
- 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.
 - The Engineer may use the reduced size 36" x 36" "ROAD WORK AHEAD" (CW20-1D) sign on low volume crossroads 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.
 - 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.
 - 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.
 - Additional traffic control devices may be shown elsewhere in the plans for higher volume crossroads.
 - 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

- 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.
- 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" (G20-1bTL) and "ROAD WORK NEXT X MILES" (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}

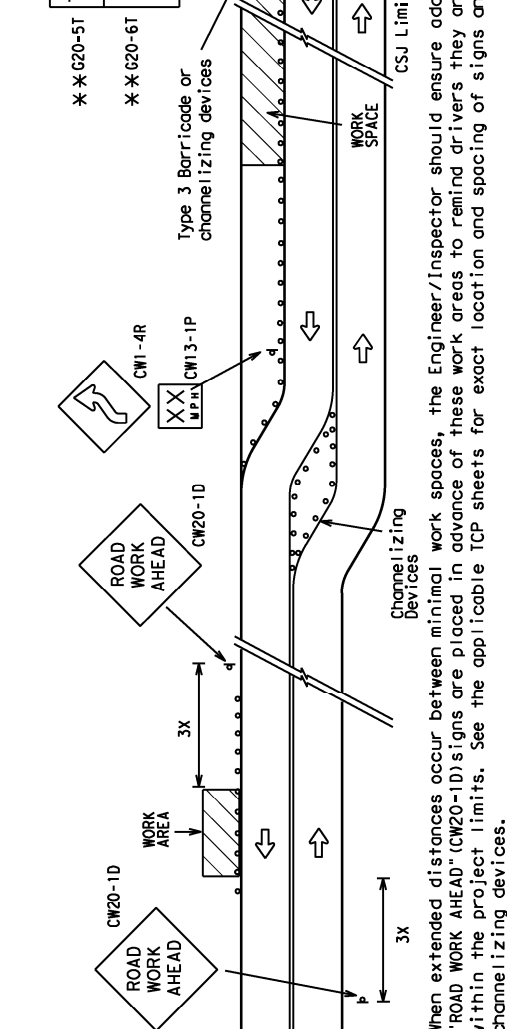
Sign Number or Series	SIZE		Sign Δ Spacing "X"
	Conventional Road	Expressway/Freeway	
CW20 ⁴			Posted Speed
CW21			MPH
CW22	48" x 48"	48" x 48"	30
CW23			35
CW25			40
			45
CW1, CW2, CW7, CW8, CW9, CW11, CW14	36" x 36"	48" x 48"	50
			55
			60
			65
CW3, CW4, CW5, CW6, CW8-3, CW10, CW12	48" x 48"	48" x 48"	70
			75
			80
			Feet (Apprx.)
			120
			160
			240
			320
			400
			500.2
			600.2
			700.2
			800.2
			900.2
			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.
 Δ Minimum distance from work area to first Advance Warning sign nearest the work area and/or distance between each additional sign.

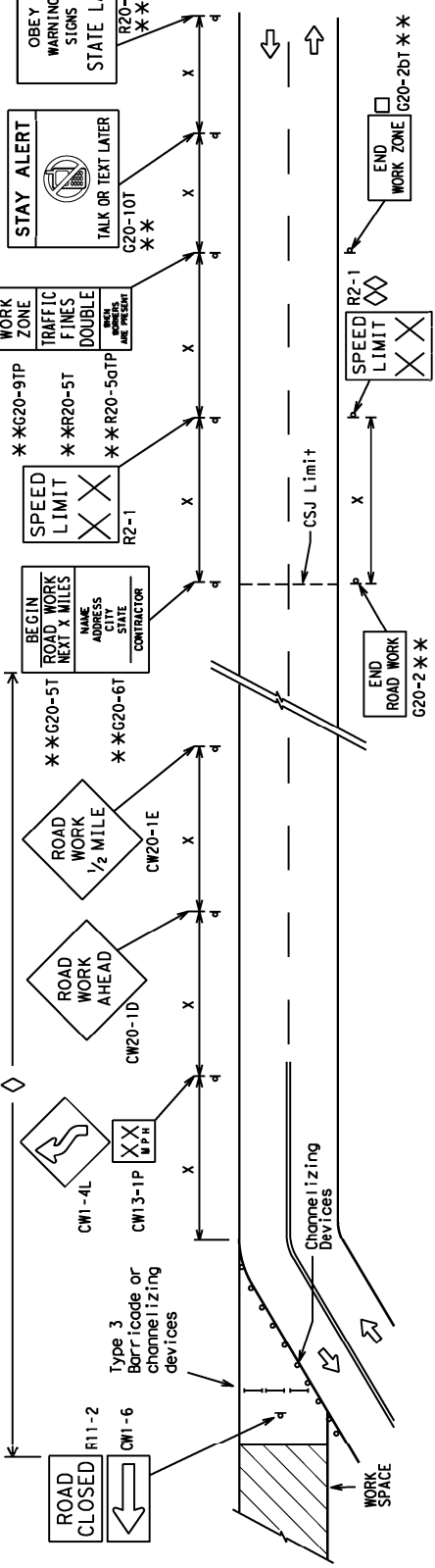
GENERAL NOTES

- Special or larger size signs may be used as necessary.
- Distance between signs should be increased as required to have 1500 feet advance warning.
- Distance between signs should be increased as required to have 1/2 mile or more advance warning.
- 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".
- Only diamond shaped warning sign sizes are indicated.
- 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.

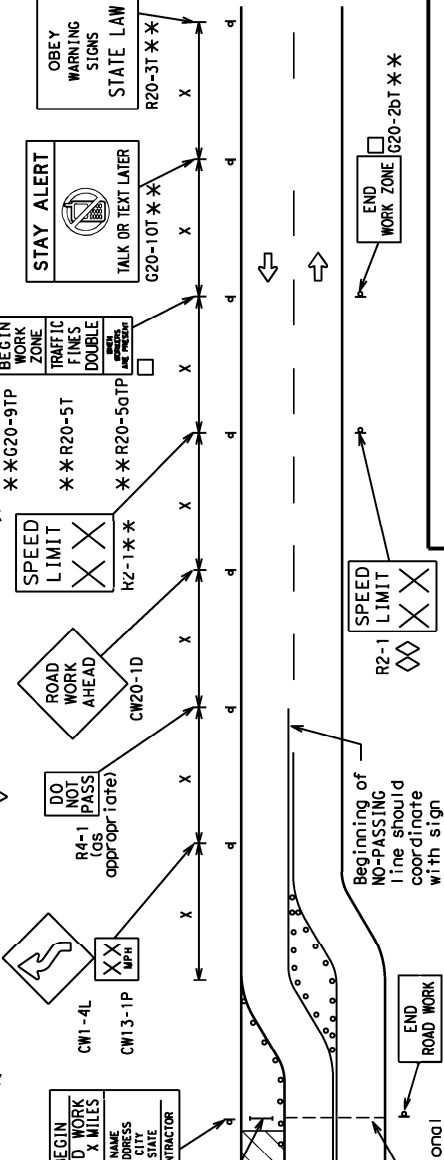
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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



SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS



NOTES

- The Contractor shall determine the appropriate distance to be placed on the G20-1 series signs and "BEGIN ROAD WORK NEXT X MILES" (G20-5T) sign for each specific project. This distance shall replace the "X" and shall be rounded to the nearest whole mile with the approval of the Engineer. No decimals shall be used.
- The "BEGIN WORK ZONE" (G20-9TP) and "END WORK ZONE" (G20-2bT) shall be used as shown on the sample layout when advance signs are required outside the CSJ Limits. They inform the motorist of entering or leaving a part of the work zone lying outside the CSJ Limits where traffic fines may double if workers are present.
 - CSJ limit signing is required for highway construction and maintenance work, with the exception of mobile operations.
 - Area for placement of "ROAD WORK AHEAD" (CW20-1D) sign and other signs or devices as called for on the Traffic Control Plan.
 - Contractor will install a regulatory speed limit sign at the end of the work zone.

LEGEND

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

SHEET 2 OF 12



BARRICADE AND CONSTRUCTION PROJECT LIMIT

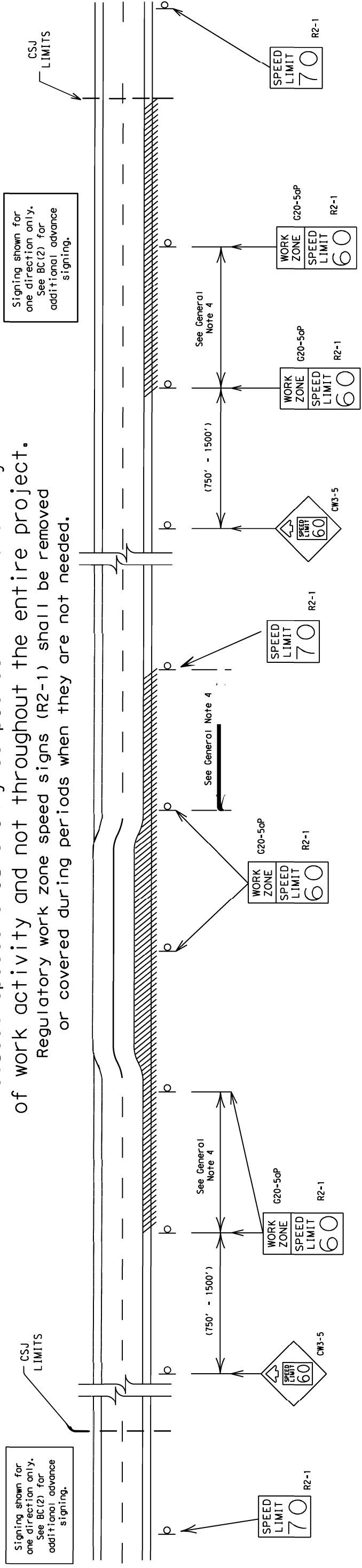
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TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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.

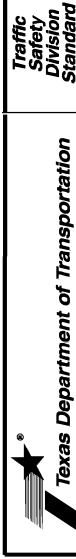
SHORT TERM WORK ZONE SPEED LIMITS

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" (G20-50P) 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.

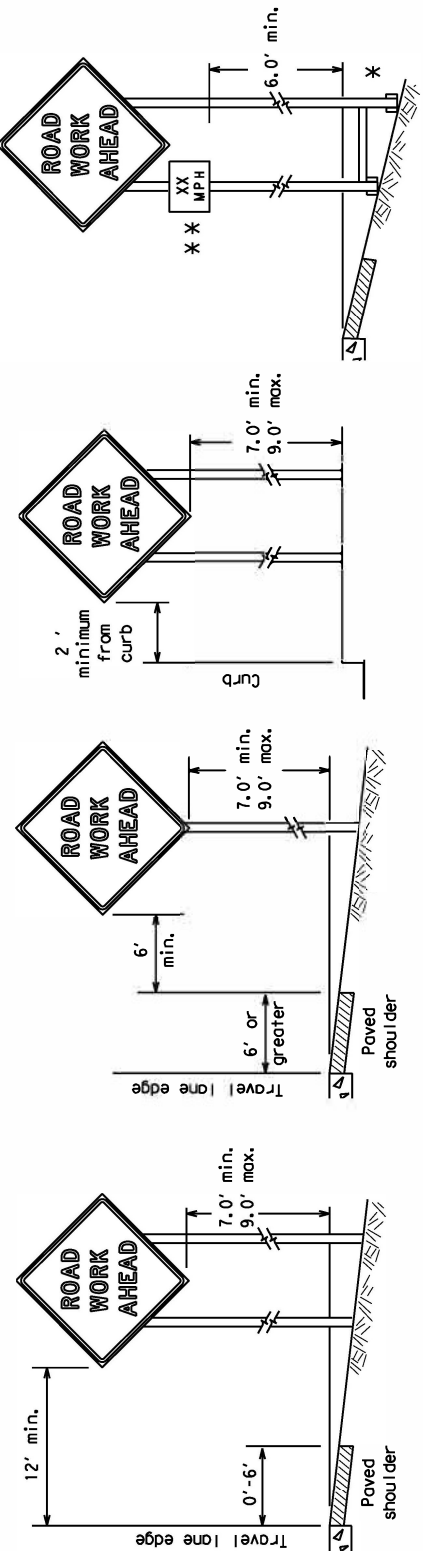


BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC (3) - 21

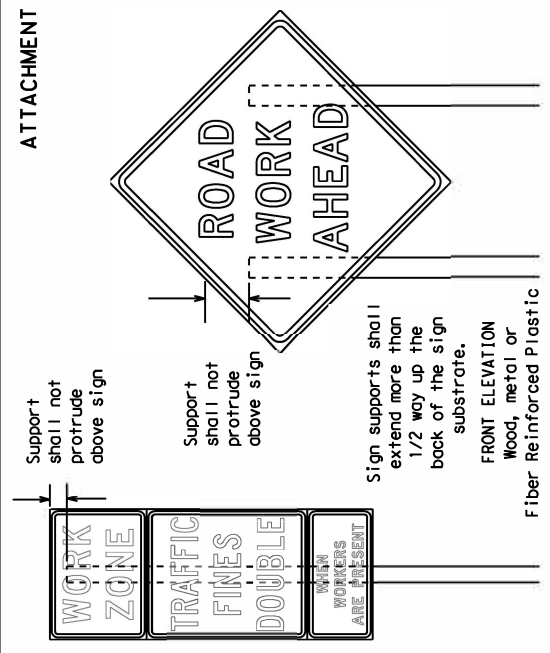
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DIST:	7-13	COUNTY:	DAL	ELLIS			
SHEET NO.:	9						

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.

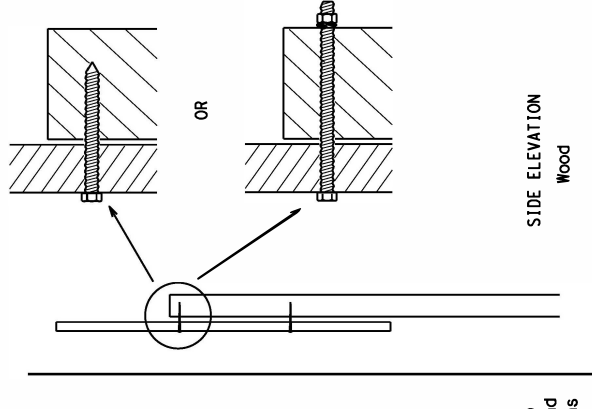
** When plaques are placed on dual-leg supports, they should be attached to the upright nearest the travel lane. Supplemental plaques (advisory or distance) should not cover the surface of the parent sign.



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

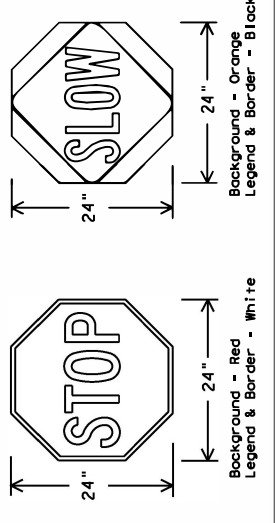
Nails shall NOT be allowed. Each sign shall be attached directly to the sign support. Multiple signs shall not be joined or spliced by any means. Wood supports shall not be extended or repaired by splicing or other means.



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 splice 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

- STOP/SLOW paddles are the primary method to control traffic by flaggers. The STOP/SLOW paddle size should be 24" x 24".
- STOP/SLOW paddles shall be retroreflective when used at night.
- STOP/SLOW paddles may be attached to a staff with a minimum length of 6' to the bottom of the sign.
- 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	SIGN FACE MATERIAL
BACKGROUND	TYPE B OR C SHEETING
BACKGROUND & BORDER	TYPE B _{FL} OR C _{FL} SHEETING
LEGEND & BORDER	TYPE B OR C SHEETING
LEGEND & BORDER	ACRYLIC NON-REFLECTIVE FILM

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

- 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 (LOCO), 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.
- 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 1S-CD standard.
- When existing permanent signs are moved and relocated due to construction purposes, they shall be visible to motorists at all times.
- 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.
- 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.
- 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

- Contractor shall install and maintain signs in a straight and plumb condition and/or as directed by the Engineer.
- Wooden sign posts shall be painted white.
- Barricades shall NOT be used as sign supports.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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)

- 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.
- Long-term stationary - work that occupies a location more than 3 days.
- 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.
- Short-term stationary - daytime work that occupies a location for more than 1 hour in a single daylight period.
- Short, duration - work that occupies a location up to 1 hour.
- Mobile - work that moves continuously or intermittently (stopping for up to approximately 15 minutes.)

SIGN MOUNTING HEIGHT

- 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.
- 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.
- Long-Term/Intermediate-term Signs may be used in lieu of Short-term/Short Duration signing.
- 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.
- 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

- 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

- 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.
- "Mesh" type materials are NOT an approved sign substrate, regardless of the tightness of the weave.
- 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

- 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).
- White sheeting, meeting the requirements of DMS-8300 Type A, shall be used for signs with a white background.
- 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

- 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


- When sign messages may be confusing or do not apply, the signs shall be removed or completely covered.
- 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.
- 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.
- When signs are covered, the material used shall be opaque, such as heavy mil black plastic, or other materials which will cover the entire sign face and maintain their opaque properties under automobile headlights at night, without damaging the sign sheeting.
- Burlap shall NOT be used to cover signs.
- Duct tape or other adhesive material shall NOT be affixed to a sign face.
- Signs and anchor studs shall be removed and holes backfilled upon completion of work.

SIGN SUPPORT WEIGHTS

- Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand should be used.
- The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
- Rock, concrete, iron, steel or other solid objects shall not be permitted for use as sign support weights.
- Sandbags shall 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 fire inner tubes) shall NOT be used.
- 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.
- 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.
- Sandbags shall NOT be placed under the skid and shall not be used to level sign supports placed on slopes.

FLAGS ON SIGNS

- 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.

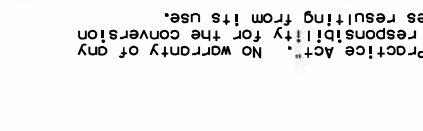


Texas Department of Transportation

**BARRICADE AND CONSTRUCTION
TEMPORARY SIGN NOTES**

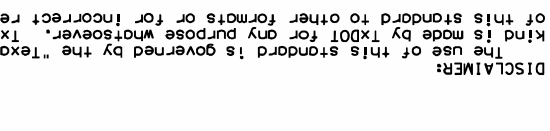
BC (4) - 21

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	REV: 9-07	DIST: 8-14	COUNTY: DAL	ELLIS
	REV: 7-13	DIST: 5-21		



* 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.

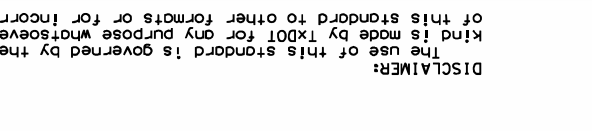
** When plaques are placed on dual-leg supports, they should be attached to the upright nearest the travel lane. Supplemental plaques (advisory or distance) should not cover the surface of the parent sign.



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 splice 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.

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

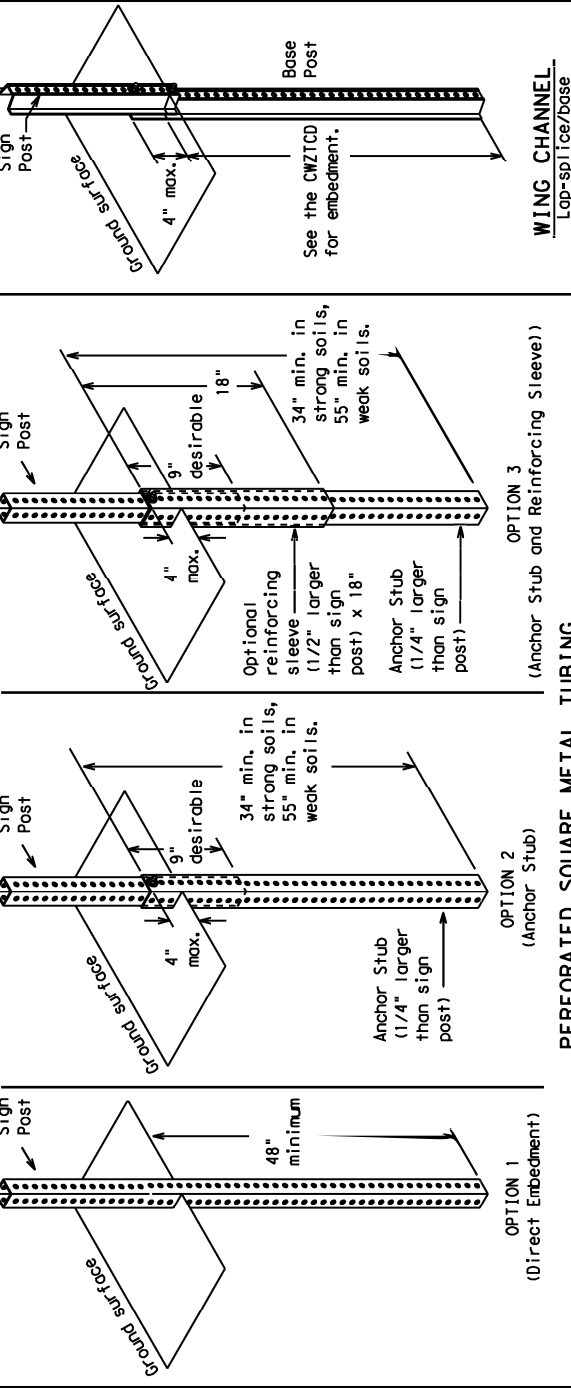
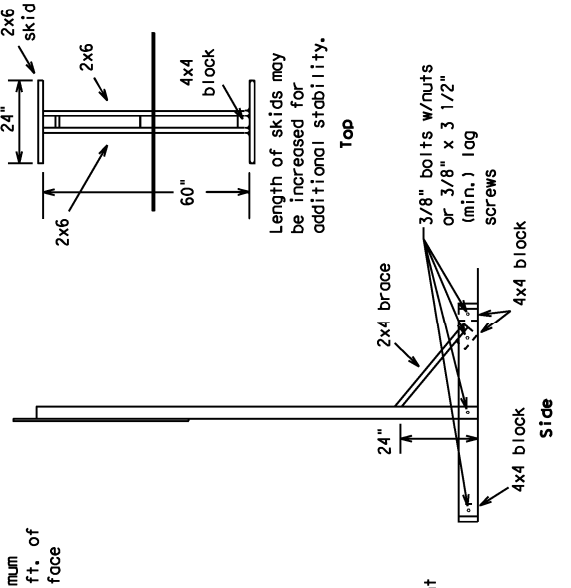
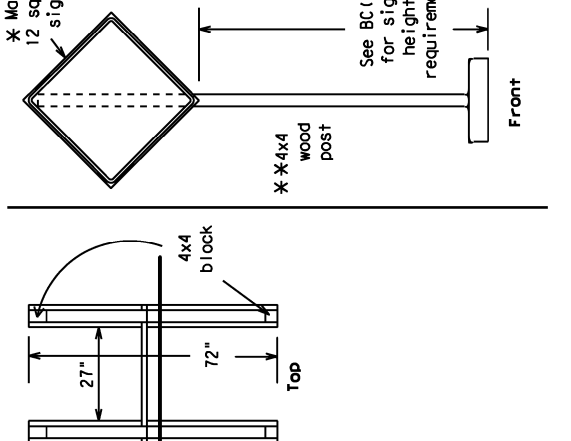
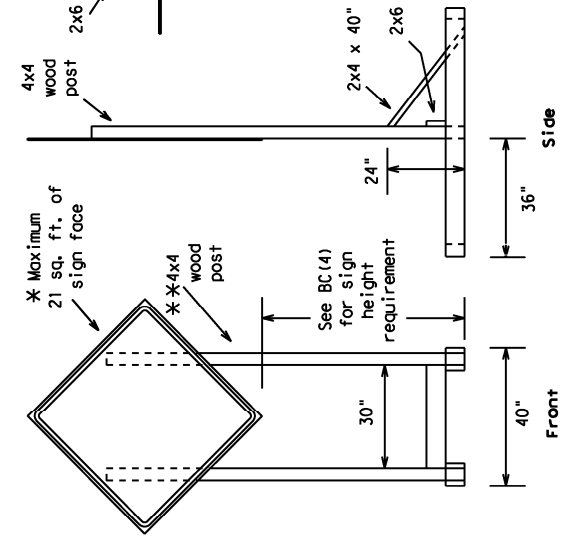
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- Any sign or traffic control device that is struck or damaged by the Contractor or his/her construction equipment shall be replaced as soon as possible by the Contractor to ensure proper guidance for the motorists. This will be subsidiary to Item 502.

STOP/SLOW PADDLES

- STOP/SLOW paddles are the primary method to control traffic by flaggers. The STOP/SLOW paddle size should be 24" x 24".
- STOP/SLOW paddles shall be retroreflective when used at night.
- STOP/SLOW paddles may be attached to a staff with a minimum length of 6' to the bottom of the sign.
- 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	SIGN FACE MATERIAL
BACKGROUND	TYPE B OR C SHEETING
BACKGROUND & BORDER	TYPE B _{FL} OR C _{FL} SHEETING
LEGEND & BORDER	TYPE B OR C SHEETING
LEGEND & BORDER	ACRYLIC NON-REFLECTIVE FILM



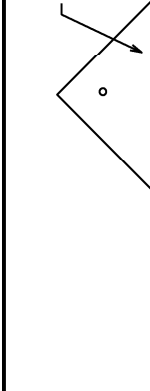
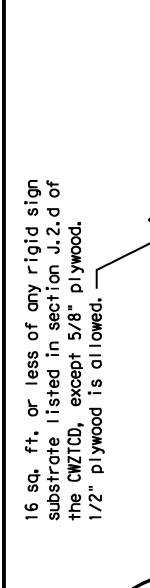
SKID MOUNTED WOOD SIGN SUPPORTS

* 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.

PERFORMED SQUARE METAL TUBING



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

- 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.
- No more than 2 sign posts shall be placed within a 7 ft. circle, except for specific materials noted on the CWZTCD List.
- When project is completed, all sign supports and foundations shall be removed from the project site. This will be considered subsidiary to Item 502.

WING CHANNEL

Top-splice/base bolted anchor

See the CWZTCD for embedment.

Optional reinforcing sleeve (1/2" larger than sign post) x 18"

Anchor Stub (1/4" larger than sign post) x 18"

OPTION 3 (Anchor Stub and Reinforcing Sleeve)

OPTION 2 (Anchor Stub)

OPTION 1 (Direct Embedment)

48" minimum

4" max.

9" desirable

34" min. in strong soils, 55" min. in weak soils.

34" min. in strong soils, 55" min. in weak soils.

18"

4" max.

9" desirable

34" min. in strong soils, 55" min. in weak soils.

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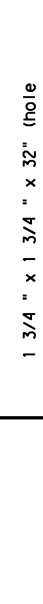
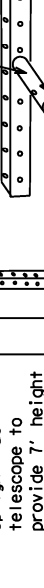
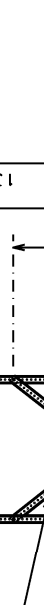
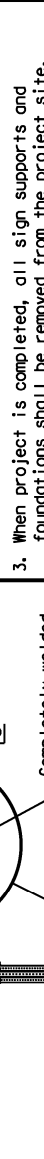
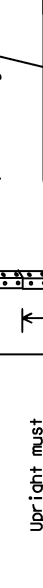
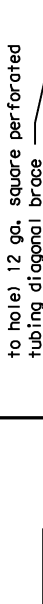
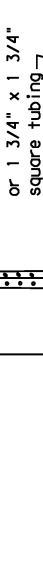
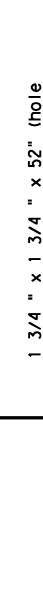
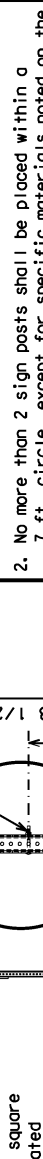
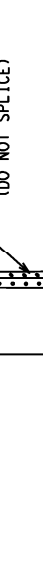
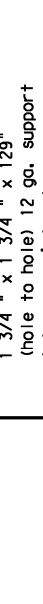
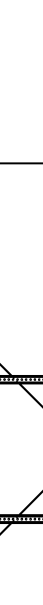
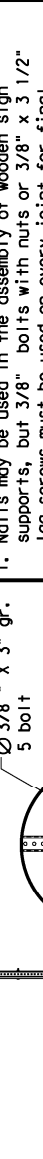
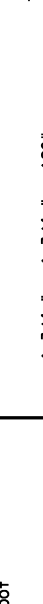
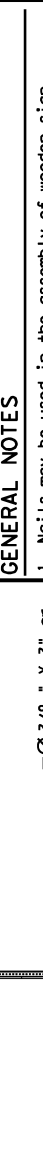
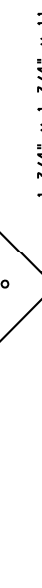
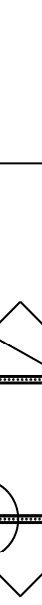
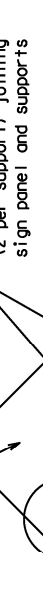
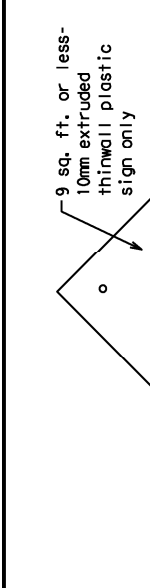
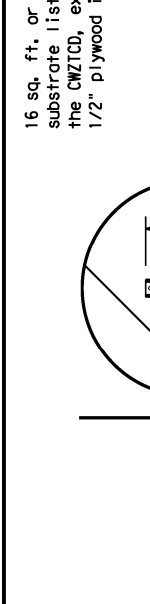
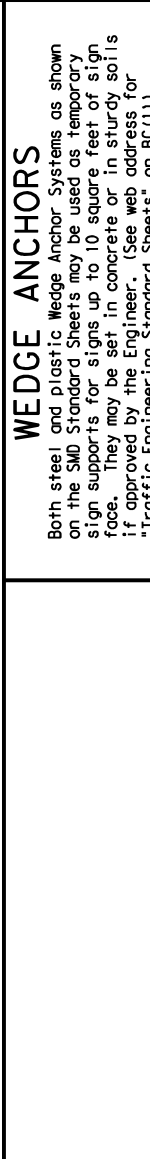
34" min. in strong soils, 55" min. in weak soils.

34" min. in strong soils, 55" min. in weak soils.

18"

SKID MOUNTED PERFORMED SQUARE STEEL TUBING SIGN SUPPORTS

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



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	Other Condition List
FREEWAY CLOSED X MILE	ROADWORK XXX FT
ROAD CLOSED AT SH XXX	FLAGGER XXXX FT
ROAD CLSD AT FM XXXX	RIGHT LN NARROWS XXXX FT
RIGHT X LANES CLOSED	MERGING TRAFFIC XXXX FT
CENTER LANE CLOSED	LOOSE GRAVEL XXXX FT
NIGHT LANE CLOSURES	DETOUR X MILE
VARIOUS LANES CLOSED	ROADWORK PAST SH XXXX
EXIT CLOSED	BUMP XXXX FT
MALL DRIVEWAY CLOSED	TRAFFIC SIGNAL XXXX FT
XXXXXXXX BLVD CLOSED	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	Location List	Warning List	** Advance Notice List
MERGE RIGHT	AT FM XXXX	SPEED LIMIT XX MPH	TUE-FRI XX AM-XX PM
DETOUR NEXT X EXITS	BEFORE RAILROAD CROSSING	MAXIMUM SPEED XX MPH	APR XX-XX PM-X AM
USE EXIT I-XX NORTH	NEXT X MILES	MINIMUM SPEED XX MPH	BEGINS MONDAY
STAY ON US XXX SOUTH	PAST US XXX EXIT	ADVISORY SPEED XX MPH	BEGINS MAY XX
TRUCKS USE US XXX N	XXXXXXX TO XXXXXX	RIGHT LANE EXIT	MAY X-X XX PM - XX AM
WATCH FOR TRUCKS	US XXX TO FM XXXX	USE CAUTION	NEXT FRI-SUN
EXPECT DELAYS	PREPARE TO STOP	DRIVE SAFELY	XX AM TO XX PM
REDUCE SPEED XXX FT	END SHOULDER USE	DRIVE WITH CARE	NEXT TUE AUG XX
USE OTHER ROUTES	WATCH FOR WORKERS		TONIGHT XX PM-XX AM
STAY IN LANE			

** See Application Guidelines Note 6.

Phase 1: Condition Lists

Road/Lane/Ramp Closure List	Other Condition List
FRONTAGE ROAD CLOSED	ROADWORK XXX FT
SHOULDER CLOSED XXX FT	FLAGGER XXXX FT
RIGHT LN CLOSED XXX FT	RIGHT LN NARROWS XXXX FT
RIGHT X LANES OPEN	MERGING TRAFFIC XXXX FT
DAYTIME LANE CLOSURES	LOOSE GRAVEL XXXX FT
I-XX SOUTH EXIT CLOSED	DETOUR X MILE
EXIT XXX CLOSED X MILE	ROADWORK PAST SH XXXX
RIGHT LN TO BE CLOSED	BUMP XXXX FT
X LANES CLOSED TUE - FRI	TRAFFIC SIGNAL XXXX FT
XXXXXXXX BLVD CLOSED	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	Location List	Warning List	** Advance Notice List
MERGE RIGHT	AT FM XXXX	SPEED LIMIT XX MPH	TUE-FRI XX AM-XX PM
DETOUR NEXT X EXITS	BEFORE RAILROAD CROSSING	MAXIMUM SPEED XX MPH	APR XX-XX PM-X AM
USE EXIT I-XX NORTH	NEXT X MILES	MINIMUM SPEED XX MPH	BEGINS MONDAY
STAY ON US XXX SOUTH	PAST US XXX EXIT	ADVISORY SPEED XX MPH	BEGINS MAY XX
TRUCKS USE US XXX N	XXXXXXX TO XXXXXX	RIGHT LANE EXIT	MAY X-X XX PM - XX AM
WATCH FOR TRUCKS	US XXX TO FM XXXX	USE CAUTION	NEXT FRI-SUN
EXPECT DELAYS	PREPARE TO STOP	DRIVE SAFELY	XX AM TO XX PM
REDUCE SPEED XXX FT	END SHOULDER USE	DRIVE WITH CARE	NEXT TUE AUG XX
USE OTHER ROUTES	WATCH FOR WORKERS		TONIGHT XX PM-XX AM
STAY IN LANE			

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

- Only 1 or 2 phases are to be used on a PCMS.
- The 1st phase (or both) should be selected from the "Road/Lane/Ramp Closure List" and the "Other Condition List".
- A 2nd phase can be selected from the "Action to Take/Effect on Travel, Location, General Warning, or Advance Notice Phase Lists".
- A Location Phase is necessary only if a distance or location is not included in the first phase selected.
- 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.
- For advance notice, when the current date is within seven days of the actual work date, calendar days should be replaced with no more than one week prior to the work.


WORDING ALTERNATIVES

- The words RIGHT, LEFT and ALL can be interchanged as appropriate.
- Roadway designations IH, US, SH, FM and LP can be interchanged as appropriate.
- EAST, WEST, NORTH and SOUTH (or abbreviations E, W, N and S) can be interchanged as appropriate.
- Highway names and numbers replaced as appropriate.
- ROAD, HIGHWAY and FREEWAY can be interchanged as needed.
- AHEAD may be used instead of distances if necessary.
- FT and MI, MILE and MILES interchanged as appropriate.
- AT, BEFORE and PAST interchanged as needed.
- 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

- 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.
- When symbol signs, such as the "Flagger Symbol" (DW20-7) 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.
- 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.
- 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

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC (6) - 21

FILE: BC-21.dgn DWE: TXDOT CJK: TXDOT DWE: TXDOT CJK: TXDOT

REVISED: 9-07 8-14 DIST: 647134 JOB: 001 HIGHWAY: B10045G

DATE: 7-13 5-21 COUNTY: SHEET NO.: 12

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	Other Condition List
FREEWAY CLOSED X MILE	ROADWORK XXX FT
ROAD CLOSED AT SH XXX	FLAGGER XXXX FT
ROAD CLSD AT FM XXXX	RIGHT LN NARROWS XXXX FT
RIGHT X LANES CLOSED	MERGING TRAFFIC XXXX FT
CENTER LANE CLOSED	LOOSE GRAVEL XXXX FT
NIGHT LANE CLOSURES	DETOUR X MILE
VARIOUS LANES CLOSED	ROADWORK PAST SH XXXX
EXIT CLOSED	BUMP XXXX FT
MALL DRIVEWAY CLOSED	TRAFFIC SIGNAL XXXX FT
XXXXXXXX BLVD CLOSED	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	Location List	Warning List	** Advance Notice List
MERGE RIGHT	AT FM XXXX	SPEED LIMIT XX MPH	TUE-FRI XX AM-XX PM
DETOUR NEXT X EXITS	BEFORE RAILROAD CROSSING	MAXIMUM SPEED XX MPH	APR XX-XX PM-X AM
USE EXIT I-XX NORTH	NEXT X MILES	MINIMUM SPEED XX MPH	BEGINS MONDAY
STAY ON US XXX SOUTH	PAST US XXX EXIT	ADVISORY SPEED XX MPH	BEGINS MAY XX
TRUCKS USE US XXX N	XXXXXXX TO XXXXXX	RIGHT LANE EXIT	MAY X-X XX PM - XX AM
WATCH FOR TRUCKS	US XXX TO FM XXXX	USE CAUTION	NEXT FRI-SUN
EXPECT DELAYS	PREPARE TO STOP	DRIVE SAFELY	XX AM TO XX PM
REDUCE SPEED XXX FT	END SHOULDER USE	DRIVE WITH CARE	NEXT TUE AUG XX
USE OTHER ROUTES	WATCH FOR WORKERS		TONIGHT XX PM-XX AM
STAY IN LANE			

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

- Only 1 or 2 phases are to be used on a PCMS.
- The 1st phase (or both) should be selected from the "Road/Lane/Ramp Closure List" and the "Other Condition List".
- A 2nd phase can be selected from the "Action to Take/Effect on Travel, Location, General Warning, or Advance Notice Phase Lists".
- A Location Phase is necessary only if a distance or location is not included in the first phase selected.
- 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.
- For advance notice, when the current date is within seven days of the actual work date, calendar days should be replaced with no more than one week prior to the work.

WORDING ALTERNATIVES

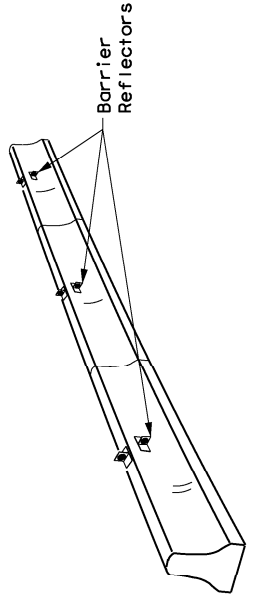
- The words RIGHT, LEFT and ALL can be interchanged as appropriate.
- Roadway designations IH, US, SH, FM and LP can be interchanged as appropriate.
- EAST, WEST, NORTH and SOUTH (or abbreviations E, W, N and S) can be interchanged as appropriate.
- Highway names and numbers replaced as appropriate.
- ROAD, HIGHWAY and FREEWAY can be interchanged as needed.
- AHEAD may be used instead of distances if necessary.
- FT and MI, MILE and MILES interchanged as appropriate.
- AT, BEFORE and PAST interchanged as needed.
- 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

- 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.
- When symbol signs, such as the "Flagger Symbol" (DW20-7) 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.
- 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.
- 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.

- 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).
- Color of Barrier Reflectors shall be as specified in the T MUTCD. The color of the reflectors shall be considered subsidiary to Item 512.

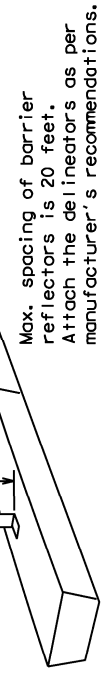


CONCRETE TRAFFIC BARRIER (CTB)

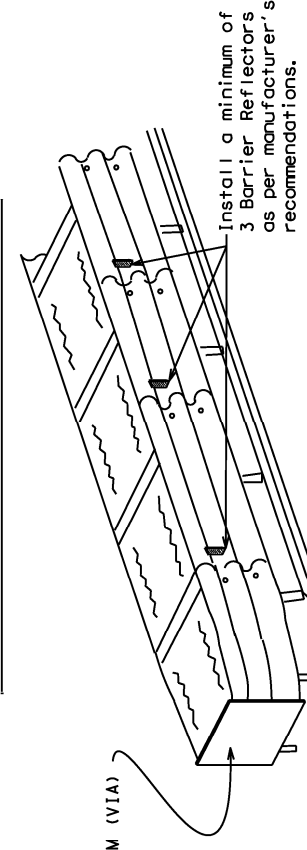
- Where traffic is on one side of the CTB, two (2) Barrier Reflectors shall be mounted in approximately the midsection of each section of CTB. An alternate mounting location is uniformly spaced at one end of each CTB. This will allow for attachment of a barrier grapple without damaging the reflector.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

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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



LOW PROFILE CONCRETE BARRIER (LPCB)

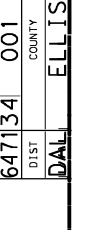
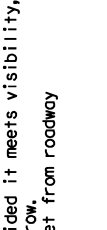
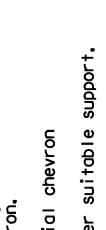
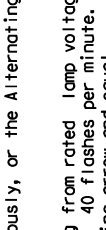
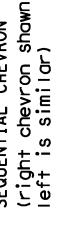
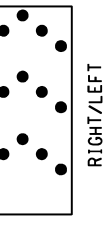
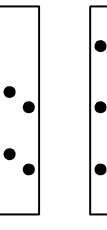
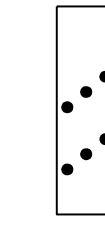
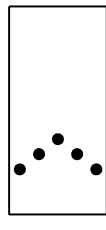


DELINEATION OF END TREATMENTS

END TREATMENTS FOR CTB'S USED IN WORK ZONES
End treatments used on CTB's in work zones shall meet the appropriate crashworthy standards as defined in the Manual for Assessing Safety Hardware (MASH). Refer to the CWZTCO List for approved end treatments and manufacturers.

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.

- 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.
- 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.
- 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.
- The Flashing Arrow Board should be able to display the following symbols:



4 CORNER CAUTION

DOUBLE ARROW

ALTERNATING DIAMOND CAUTION

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

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

4 CORNER CAUTION

DOUBLE ARROW

ALTERNATING DIAMOND CAUTION

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

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

4 CORNER CAUTION

DOUBLE ARROW

ALTERNATING DIAMOND CAUTION

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

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

4 CORNER CAUTION

DOUBLE ARROW

ALTERNATING DIAMOND CAUTION

WARNING LIGHTS

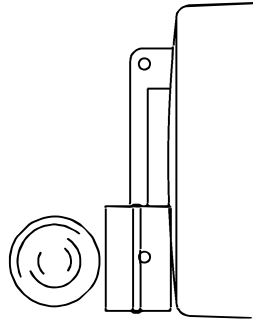
- Warning lights shall meet the requirements of the T MUTCD.
- Warning lights shall NOT be installed on barricades.
- Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet 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 B₁ or C₁ Sheeting meeting the requirements of Departmental Material Specification DMS-8300.
- 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".
- The Engineer/Inspector or the plans shall specify the location and type of warning lights to be installed on the traffic control devices. 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.
- 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.
- The location of warning lights and warning reflectors on drums shall be as shown elsewhere in the plans.

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

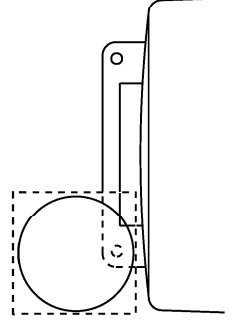
- Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
- Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
- A series of sequential flashing warning lights placed on channelizing 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.
- 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.
- Type A, Type C and Type D warning lights shall be installed at locations as detailed on other sheets in the plans.
- Warning lights shall not be installed on a drum that has a sign, chevron or vertical panel.
- 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

- 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.
- 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 CWZTCO.
- The warning reflector shall have a minimum retroreflective surface area (one-side) of 30 square inches.
- Round reflectors shall be fully reflectorized, including the area where attached to the drum.
- 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.
- 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.
- When used near two-way traffic, both sides of the warning reflector shall be reflectorized.
- The warning reflector should be mounted on the side of the handle nearest approaching traffic.
- The maximum spacing for warning reflectors should be identical to the channelizing device spacing requirements.



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

DISCLAIMER:

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

FLASHING ARROW BOARDS

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

ATTENTION
Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

- The "CAUTION" display consists of four corner lamps flashing simultaneously, or the Alternating Diamond Caution mode as shown.
- The straight line caution display is NOT ALLOWED.
- 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.
- 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.
- The sequential arrow display is NOT ALLOWED.
- The flashing arrow display is the TxDOT standard; however, the sequential chevron display may be used during daylight operations.
- The Flashing Arrow Board shall be mounted on a vehicle, trailer or other suitable support.
- A Flashing Arrow Board SHALL NOT BE USED to laterally shift traffic.
- A full matrix POMS 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.
- Minimum mounting height of trailer mounted Arrow Boards should be 7 feet from roadway to bottom of panel.

REVISIONS
9-07 8-14 DIST COUNTY
7-13 5-21 DAL ELLIS

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

BC (7) - 21

GENERAL NOTES

- For long term stationary work zones on freeways, drums shall be used as the primary channelizing device.
- 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.
- 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.
- 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).
- 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.
- 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:

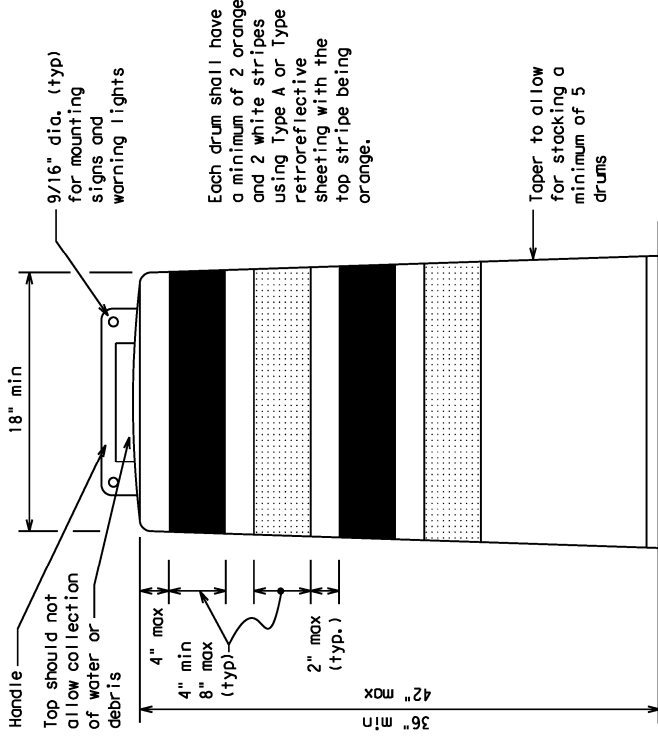
- Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
- The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents accidental separation due to normal handling and/or air turbulence created by passing vehicles.
- 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.
- 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.
- 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.
- 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.
- 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.
- Plastic drums shall be constructed of ultra-violet stabilized, orange, high-density polyethylene (HDPE) or other approved material.
- Drum body shall have a maximum unballasted weight of 11 lbs.
- Drum and base shall be marked with manufacturer's name and model number.

RETROREFLECTIVE SHEETING

- 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.
- 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

- 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.
- 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.
- Recycled truck tire sidewalls may be used for ballast on drums approved for this type of ballast on the CWZTCD list.
- 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.
- 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.
- Ballast shall not be placed on top of drums.
- Adhesives may be used to secure base of drums to pavement.



Each drum shall have a minimum of 2 orange and 2 white stripes using Type A or Type B retroreflective sheeting with the top stripe being orange.

9/16" dia. (typ) for mounting signs and warning lights

4" min

8" max (typ)

2" max (typ.)

42" max

36" min

Handle

Top should not allow collection of water or debris

Taper to allow for stacking a minimum of 5 drums

See Ballast Note 3

This detail is not intended for fabrication. See note 3 and the CWZTCD list for providers of approved Detectable Pedestrian Barricades

Continuous smooth rail for hand trailing

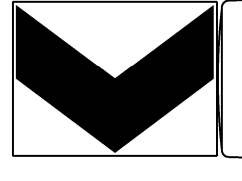
36"

Detectable Edge

2" Max.

DETECTABLE PEDESTRIAN BARRICADES

- 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 WZBIS-2) for Pedestrian Control requirements for Sidewalk Diversions, Sidewalk Detours and Crosswalk Closures.
- 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.
- Detectable pedestrian barricades similar to the one pictured above, longitudinal channelizing devices, same concrete barriers, and wood or chain link fencing with a continuous detectable edging can satisfactorily delineate a pedestrian path.
- 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.
- Warning lights shall not be attached to detectable pedestrian barricades.
- Detectable pedestrian barricades should use 8" nominal barricade rolls as shown on BC(10) provided that the top roll provides a smooth continuous rail suitable for hand trailing with no splinters, burrs, or sharp edges.



18" x 24" Sign
(Maximum Sign Dimension)
Chevron CWI-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**

- Signs used on plastic drums shall be manufactured using substrates listed on the CWZTCD.
- Chevrons and other work zone signs with an orange background shall be manufactured with Type B_{PL} or Type C_{PL} Orange sheeting meeting the color and retroreflectivity requirements of DMS-8300, "Sign Face Material," unless otherwise specified in the plans.
- 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.
- 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.
- Signs shall be installed using a 1/2 inch bolt (nominal) and nut, two washers, and one locking washer for each connection.
- Mounting bolts and nuts shall be fully engaged and adequately torqued. Bolts should not extend more than 1/2 inch beyond nuts.
- 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.
- 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.



SHEET 8 OF 12

Texas Department of Transportation

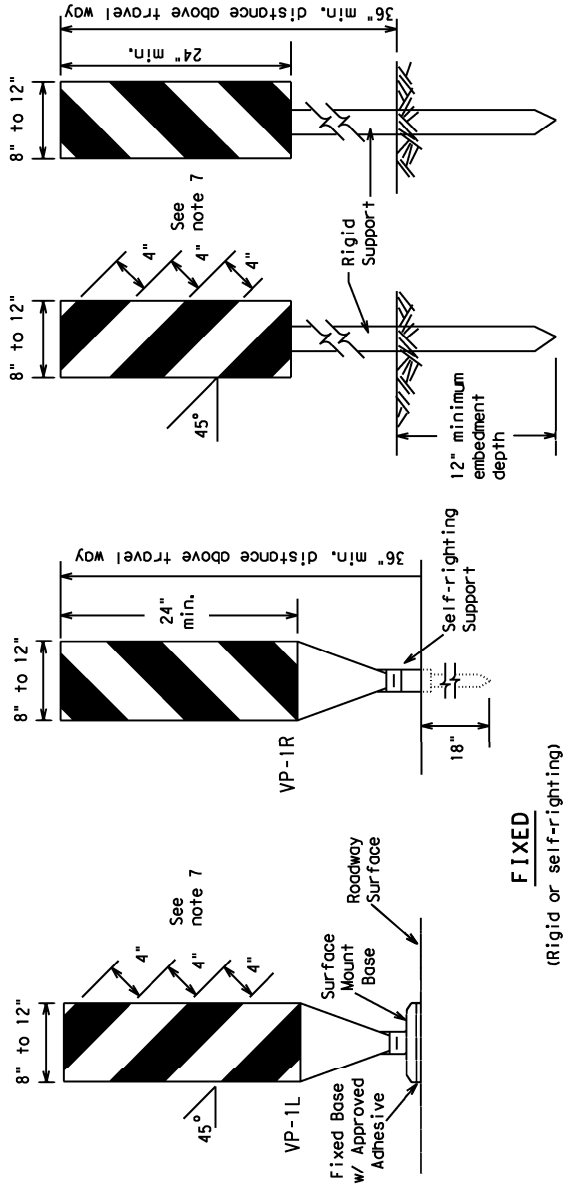
Traffic Safety Division Standard

**BARRICADE AND CONSTRUCTION
CHANNELIZING DEVICES**

BC (8) - 21

FILE:	bc-21.dgn	DATE:	TXDOT	DATE:	TXDOT	DATE:	TXDOT	DATE:	TXDOT
CONT:	November 2002	SECT:		JOB:	HIGHWAY				
REV:	647134	NO:	001	PROJECT:	B10045G				
DATE:	4-03 8-14	DIST:	9-07 5-21	COUNTY:					
DATE:	7-13	DIST:	DAL	COUNTY:	ELLIS				
SHEET NO.:	14								

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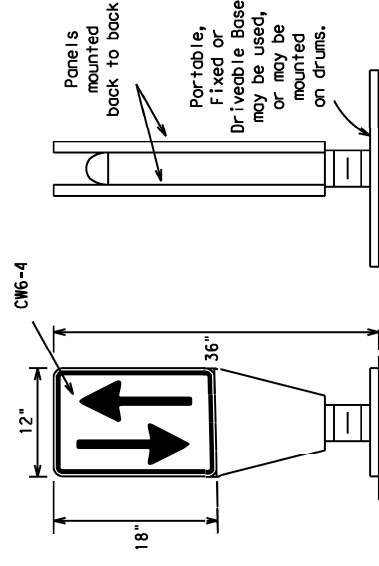


DRIVEABLE

- Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
- 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.
- 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.
- VP's used on expressways and freeways or other high speed roadways, may have more than 270 square inches of retroreflective area facing traffic.
- Self-righting supports are available with portable base. See "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
- Sheeting for the VP's shall be retroreflective Type A or Type B conforming to Departmental Material Specification DMS-8300, unless noted otherwise.
- Where the height of reflective material on the vertical panel is 36 inches or greater, a panel stripe of 6 inches shall be used.

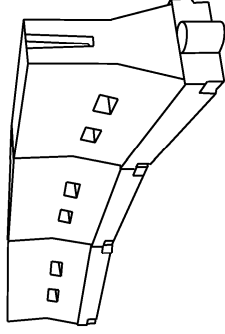
VERTICAL PANELS (VPS)

- 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.
- The OTLD may be used in combination with 42" cones or VPS.
- Spacing between the OTLD shall not exceed 500 feet. 42" cones or VPS placed between the OTLD's should not exceed 100 foot spacing.
- The OTLD shall be orange with a black non-reflective legend. Sheeting for the OTLD shall be retroreflective Type B₁ or Type C₁ conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.



- The chevron shall be a vertical rectangle with a minimum size of 12 by 18 inches.
- Chevrans 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.
- Chevrans, 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.
- To be effective, the chevron should be visible for at least 500 feet.
- Chevrans shall be orange with a black nonreflective legend. Sheeting for the chevron shall be retroreflective Type B₁ or Type C₁ conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.
- 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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

- 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.
- LCDs may be used instead of a line of cones or drums.
- LCDs shall be placed in accordance with the CWZTCD list.
- LCDs should not be used to provide positive protection for obstacles, pedestrians or workers.
- LCDs shall be supplemented with retroreflective delineation as required for temporary barriers on BC(7) when placed roughly parallel to the travel lanes.
- 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

- 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.
- 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.
- 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.
- Water ballasted systems used as barriers should not be used for a merging taper area, the taper shall be delineated and the taper length should be designed to optimize road user operations considering the available geometric conditions.
- 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 cones 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

GENERAL NOTES

- 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).
- 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.
- 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).
- 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.
- Portable bases shall be fabricated from virgin and/or recycled rubber. The portable bases shall weigh a minimum of 30 lbs.
- 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.
- 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.

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS



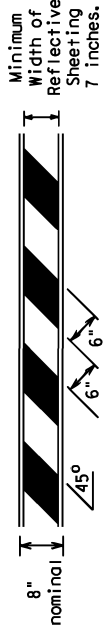
BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

FILE#	BC-21.dgn	DWG	TXDOT	DATE	TXDOT	CHK	TXDOT
REV#	01	DATE	01/01/01	BY	001	PROJECT	B10045G
REV#	02	DATE	08/14	BY	001	COUNTY	ELLIS
REV#	03	DATE	07-13	BY	001	SHEET NO.	15

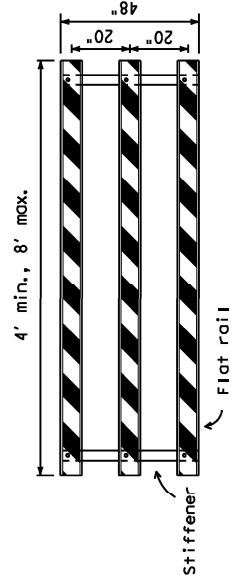
TYPE 3 BARRICADES

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.

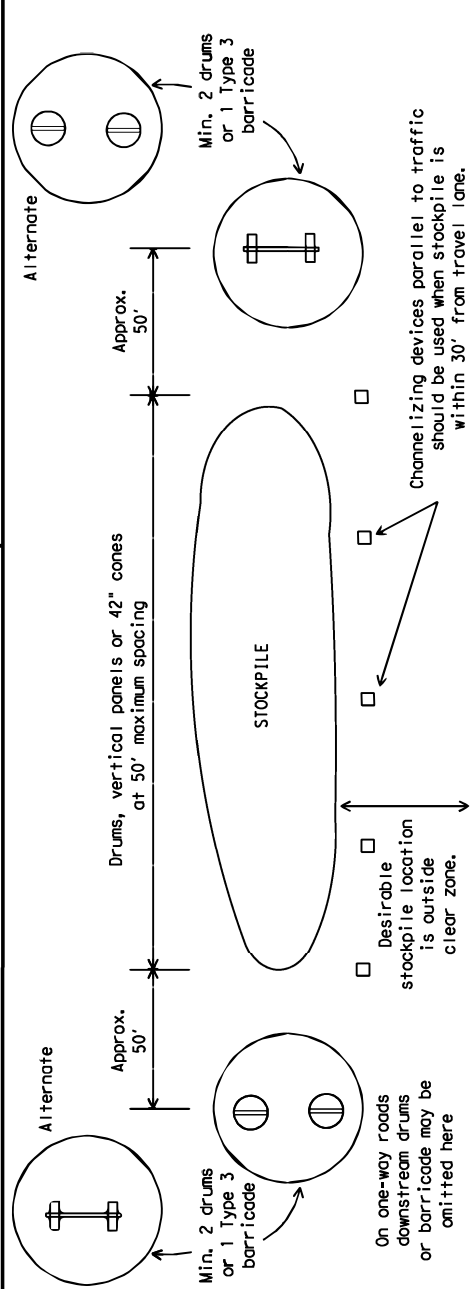


TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



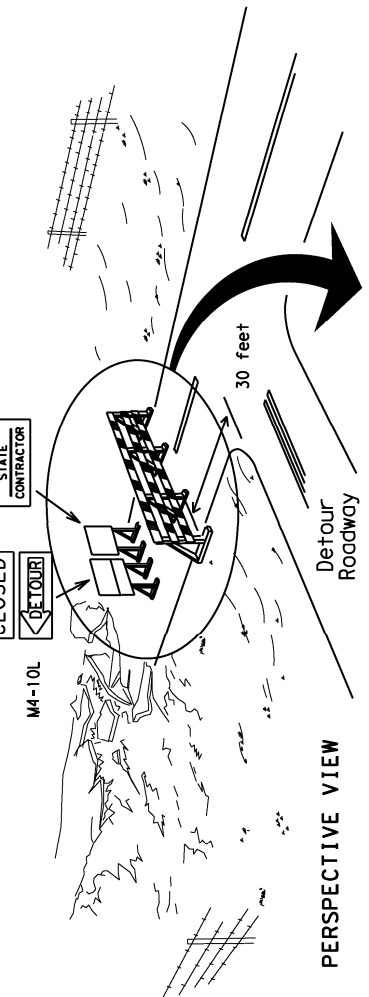
Stiffener may be inside or outside of support, but no more than 2 stiffeners shall be allowed on one barricade.

TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

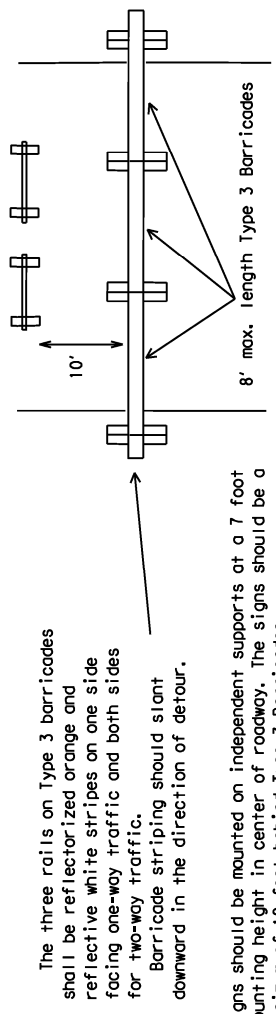


TRAFFIC CONTROL FOR MATERIAL STOCKPILES

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

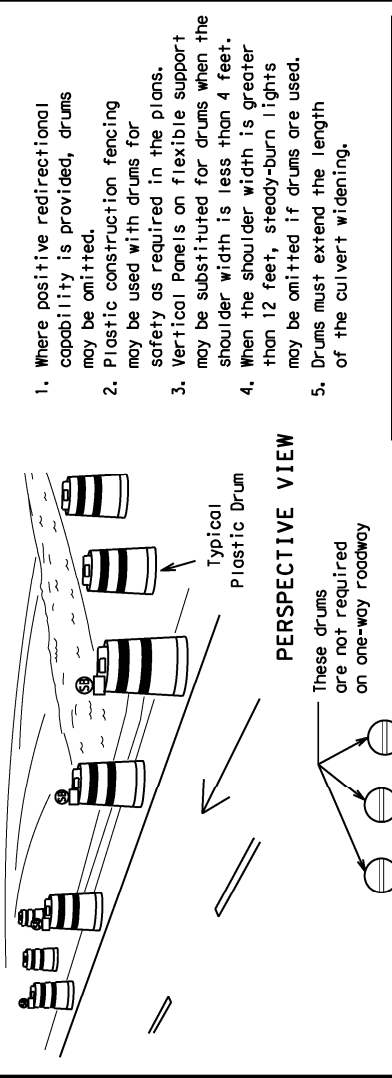


PERSPECTIVE VIEW



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.

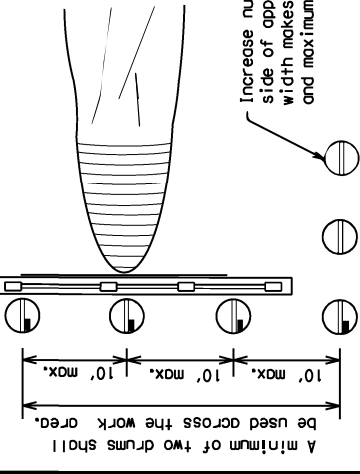
TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



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

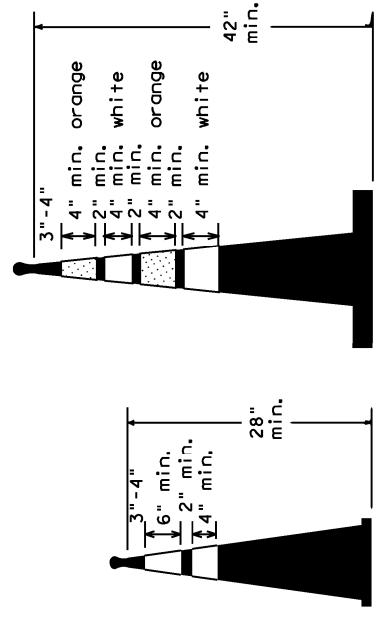
Increase number of plastic drums on the side of approaching traffic if the crown width makes it necessary. (Minimum of 2 and maximum of 4 drums)

PLAN VIEW



CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS

CONES



One-Piece cones

Two-Piece cones

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.

Texas Department of Transportation
Traffic Safety Division Standard

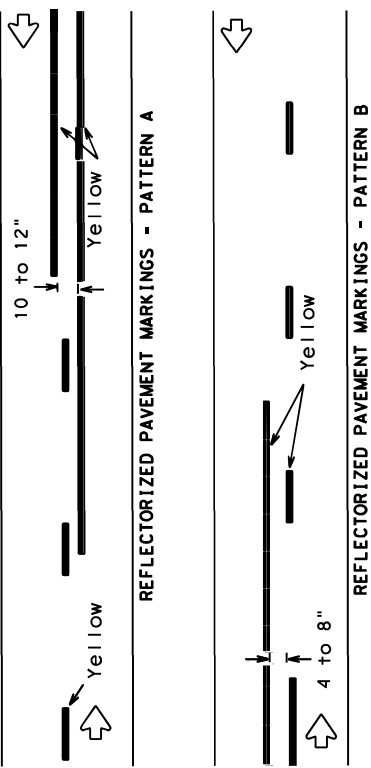
BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC (10) -21

FILE: BC-21.dgn	DWG: TXDOT	CHK: TXDOT	DATE: TXDOT	CHK: TXDOT
REVISED: November 2002	CONT: 647134	SECT: 001	JOB: B10045G	HIGHWAY
DATE: 9-07	DIST: 8-14	COUNTY: DAL	DESIGNER: ELLIS	SHEET NO.: 16

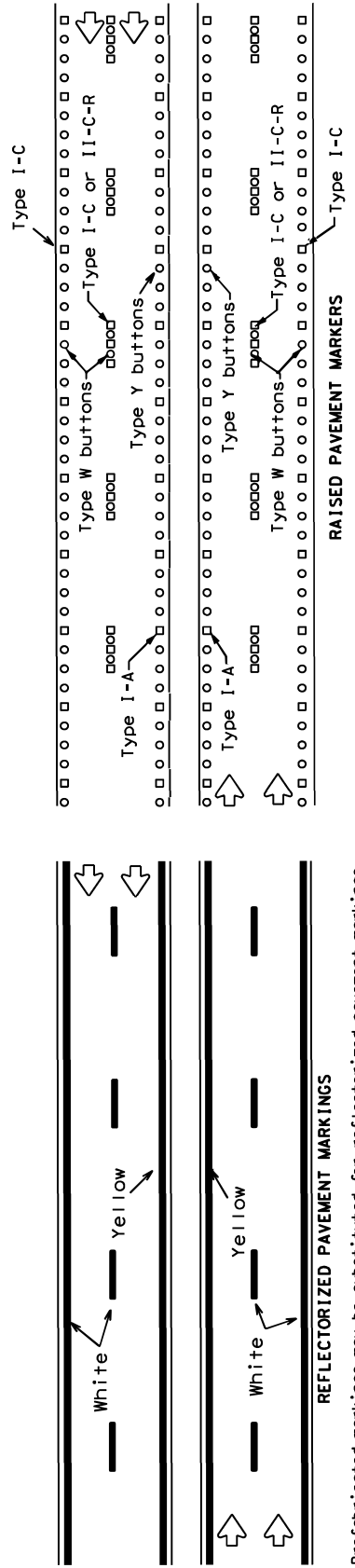
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PAVEMENT MARKING PATTERNS



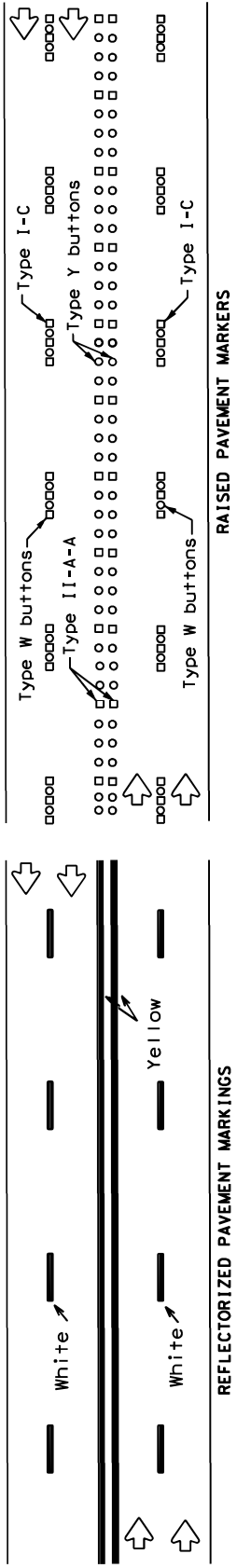
Pattern A is the TxDOT Standard, however Pattern B may be used if approved by the Engineer. Prefabricated markings may be substituted for reflectorized pavement markings.

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



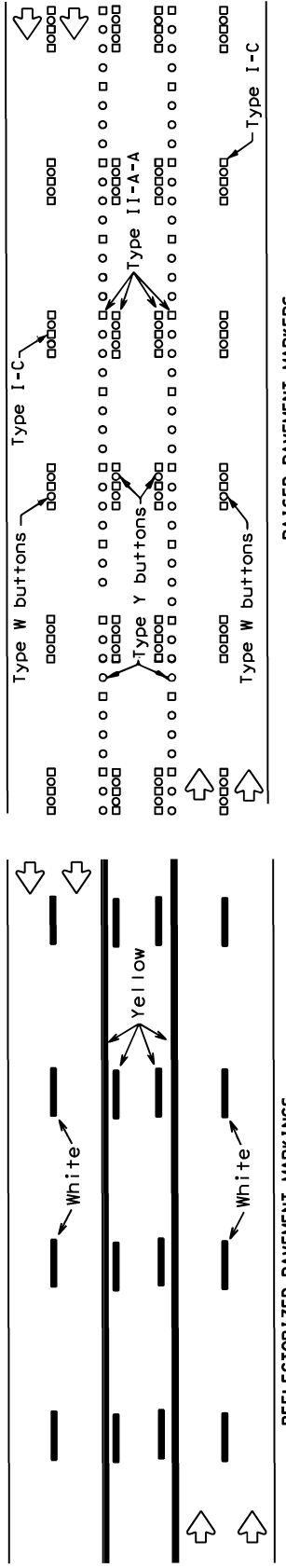
Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



Prefabricated markings may be substituted for reflectorized pavement markings.

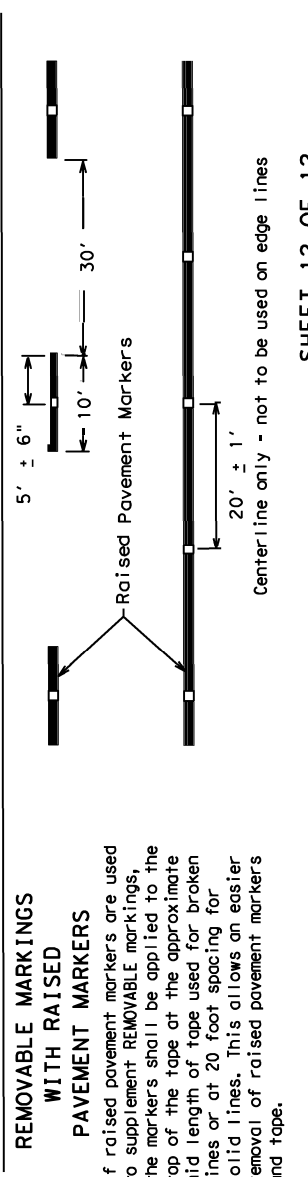
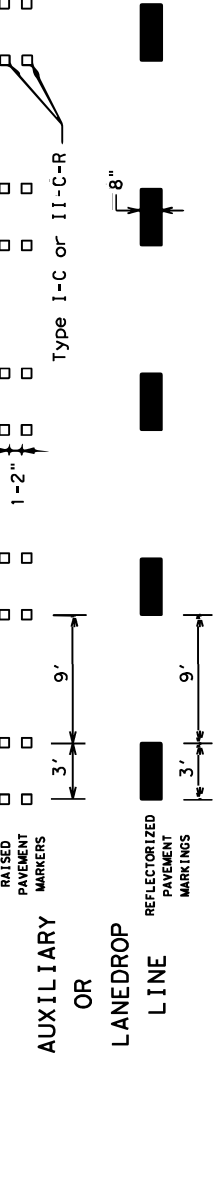
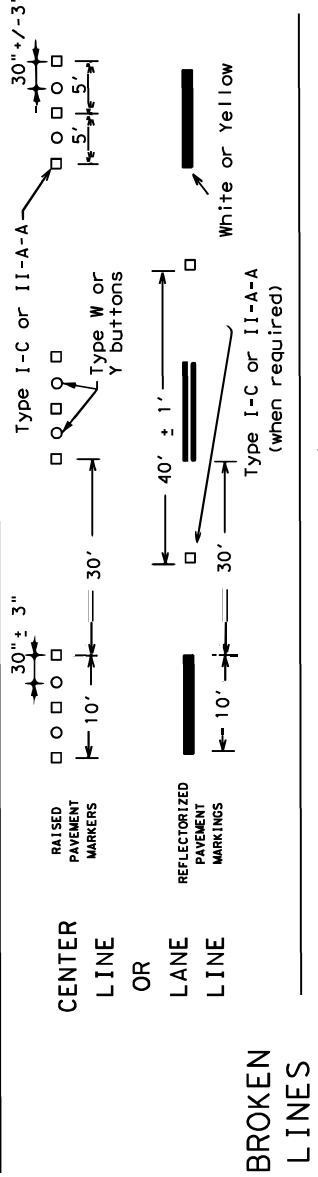
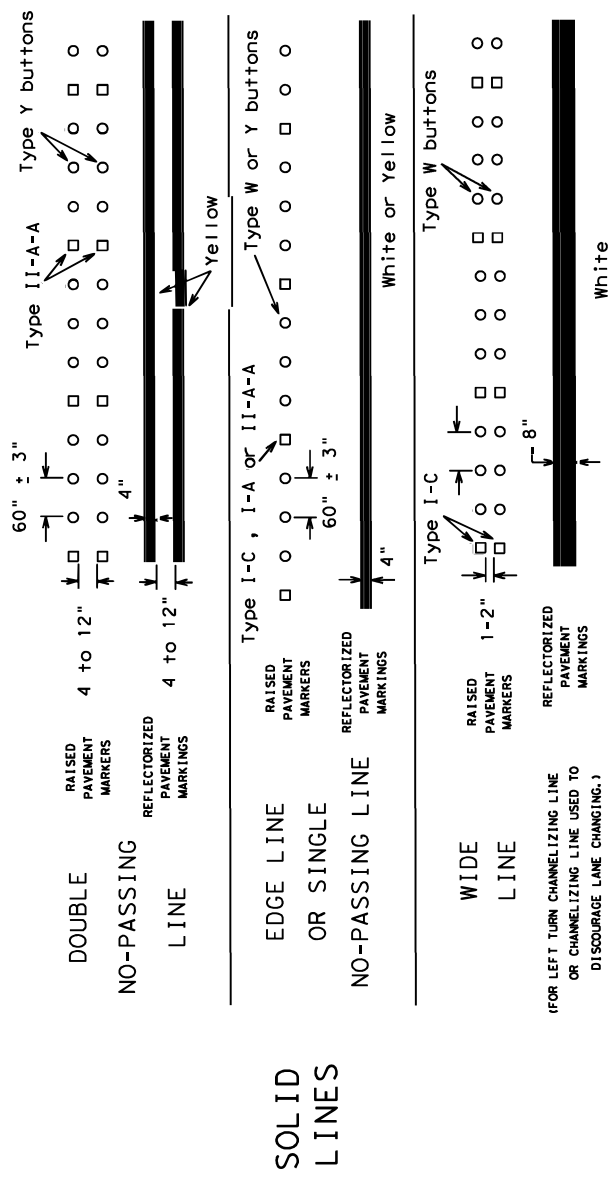
LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS



SHEET 12 OF 12



BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

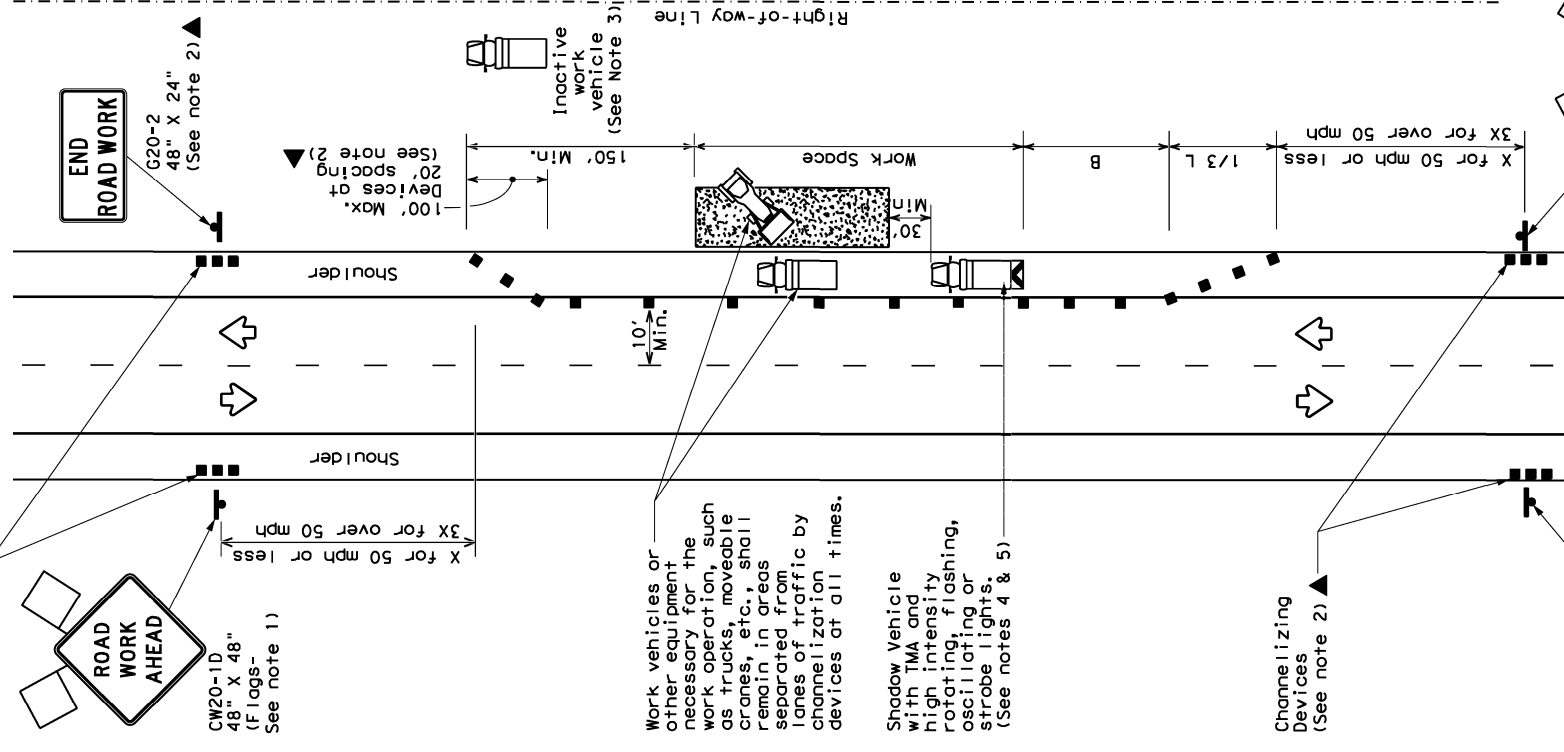
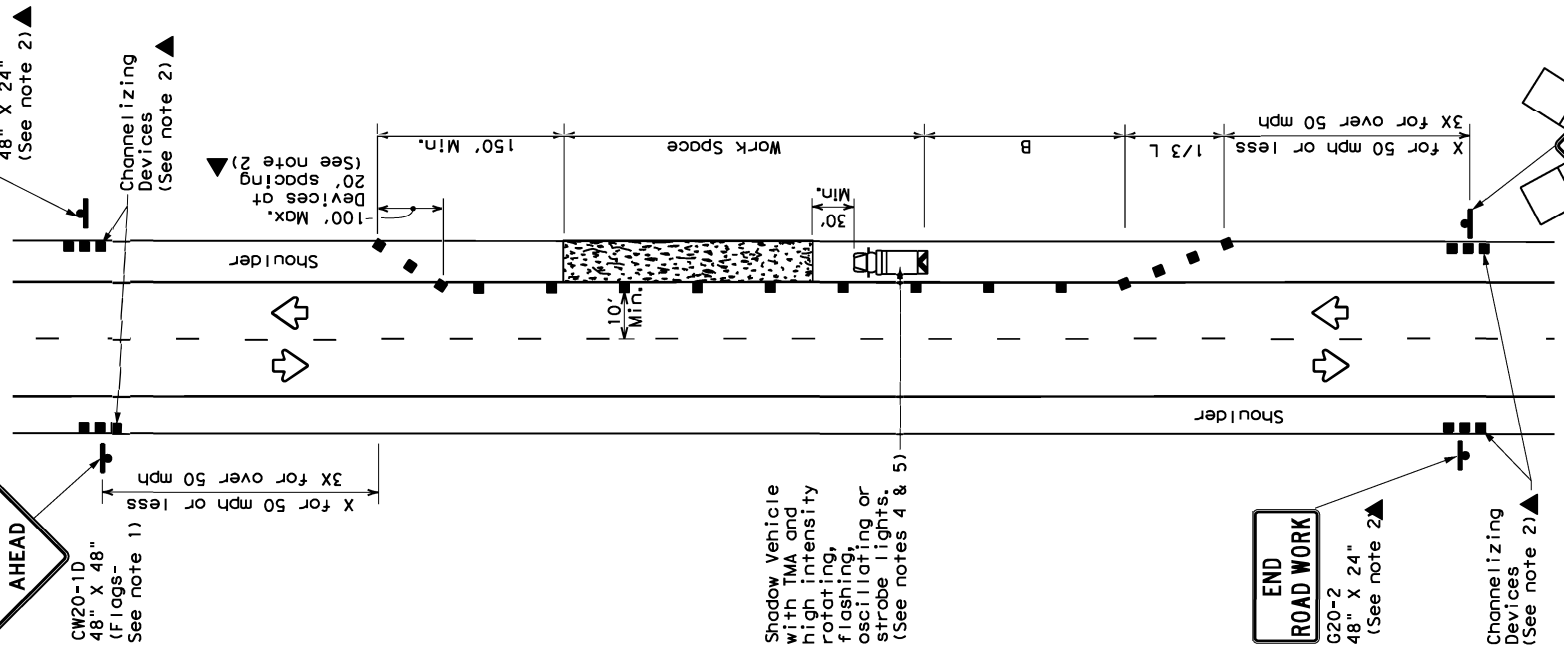
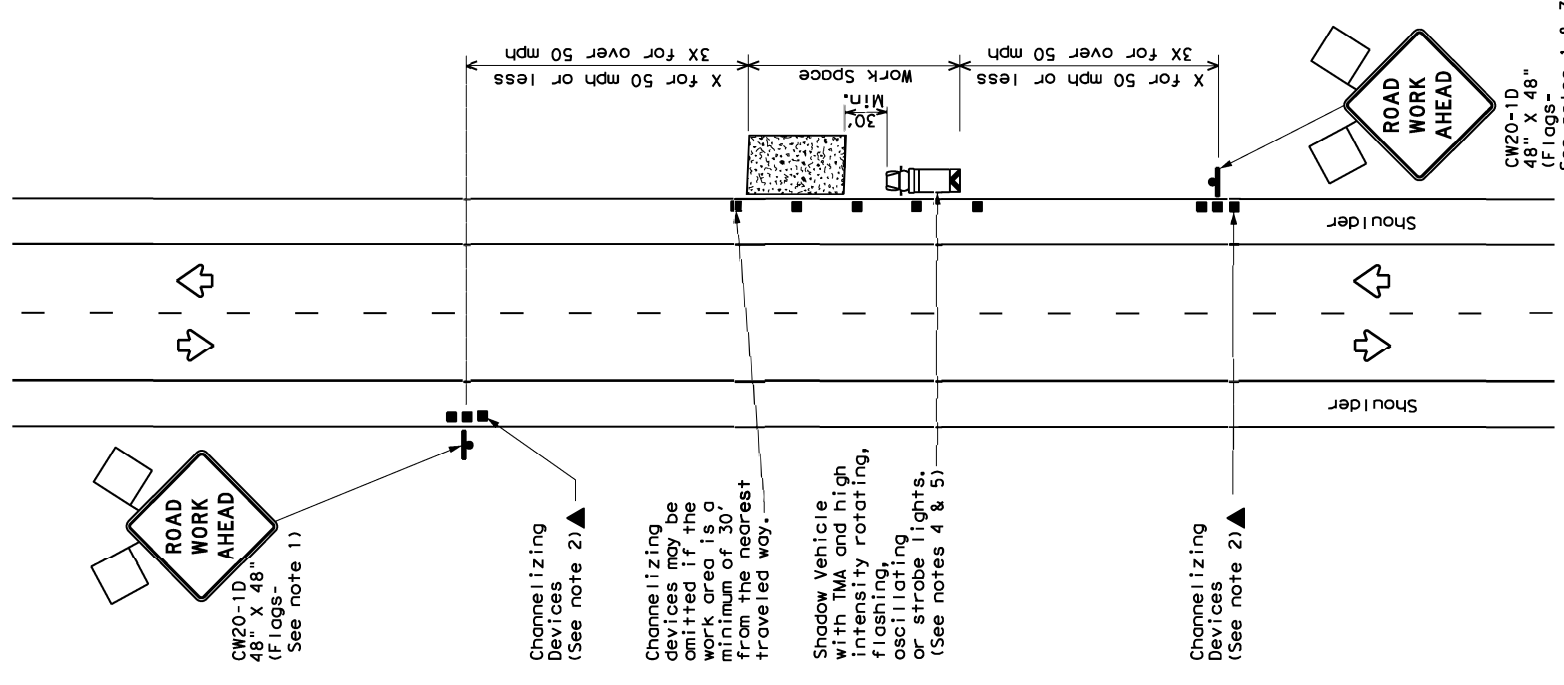
Raised pavement markers used as standard pavement markings shall be from the approved products list and meet the requirements of Item 672 "RAISED PAVEMENT MARKERS."

BC (12) - 21

FILE: BC-21.dgn	DATE: 11-02-8-14	DIST: 001	COUNTY: DALLAS	SHEET NO.: 18
REVISED: 1-97 9-07 5-21	REVISED: 2-98 7-13	JOB: B10045G	CONTRACT: 647134	SECTION: 001
DATE: 11-02-8-14	DATE: 11-02-8-14	DATE: 11-02-8-14	DATE: 11-02-8-14	DATE: 11-02-8-14

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LEGEND

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

Posted Speed * *	Formula	Minimum Desirable Taper Lengths *X*	Suggested Maximum Spacing of Channelizing Devices	Minimum Sign Spacing "X"	Suggested Longitudinal Buffer Space "B"
30	$L = \frac{WS^2}{60}$	10', 11', 12', 150', 165', 180'	On a Taper: 30'	On a Tangent: 60'	90'
35		205', 225', 245'	35'	70'	120'
40		265', 295', 320'	40'	80'	155'
45		450', 495', 540'	45'	90'	195'
50		500', 550', 600'	50'	100'	240'
55	$L = WS$	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'

* 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 STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
✓	✓		

- GENERAL NOTES**
- Flags attached to signs where shown are REQUIRED.
 - 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.
 - Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
 - A Shadow Vehicle with a TMA should be used anytime it can be positioned 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.
 - Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.
 - See TCP(5-1) for shoulder work on divided highways, expressways and freeways.
 - CW21-5 "SHOULDER WORK" signs may be used in place of CW20-1D "ROAD WORK AHEAD" signs for shoulder work on conventional roadways.

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
CONVENTIONAL ROAD SHOULDER WORK

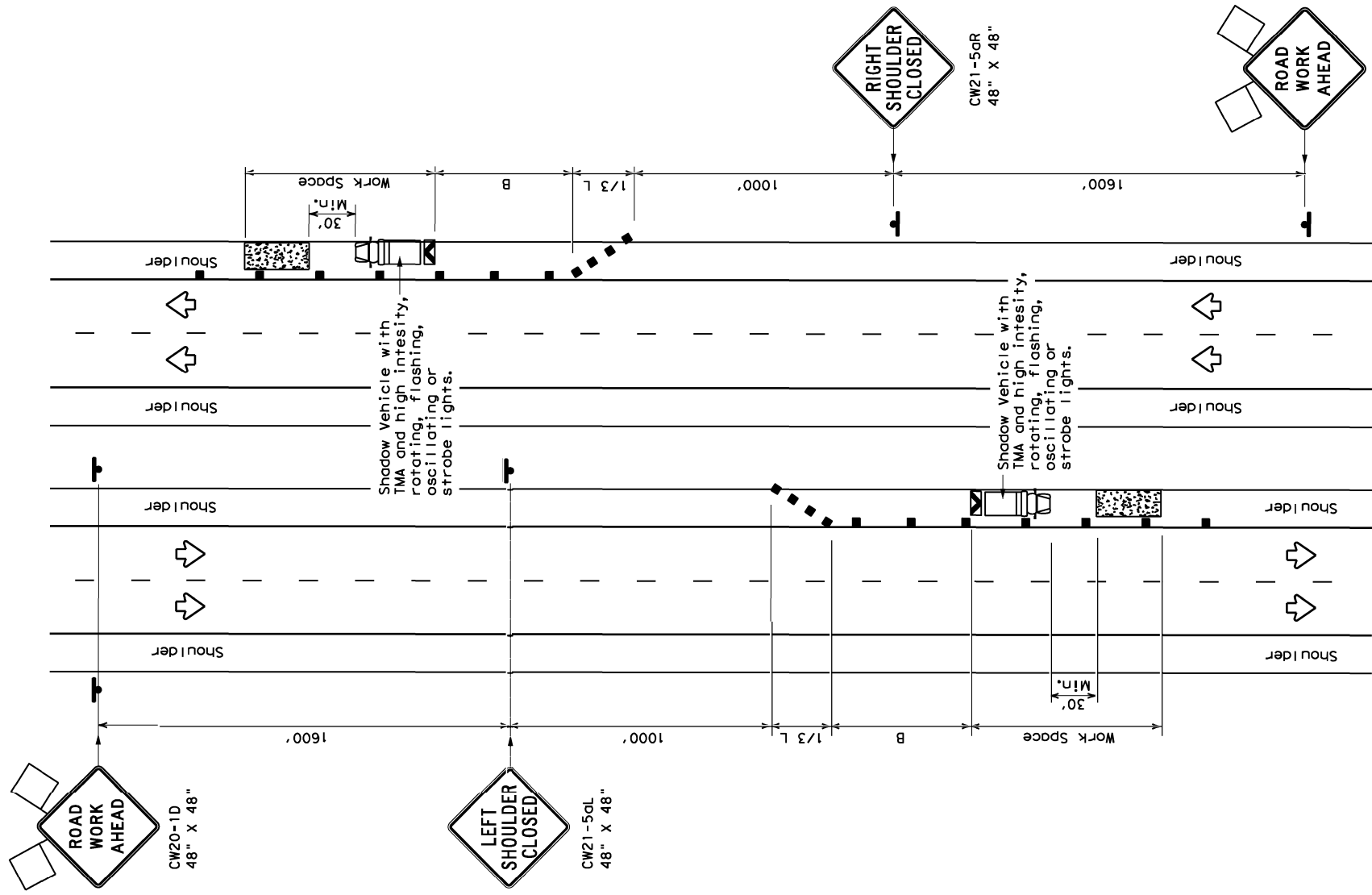
TCP (1-1) - 18

FILE: TCP1-18.dgn	DWG: CKE	DWG: CKE
TXDOT: December 1985	CONT: 647134	JOB: B10045G
REV: 2-94	REV: 4-98	DIST: COUNTY
REV: 8-95	REV: 2-12	DIST: COUNTY
REV: 1-97	REV: 2-18	DIST: COUNTY
	DAL	ELLIS
		SHEET NO. 19

WORK VEHICLES ON SHOULDER
Conventional Roads
TCP (1-1c)

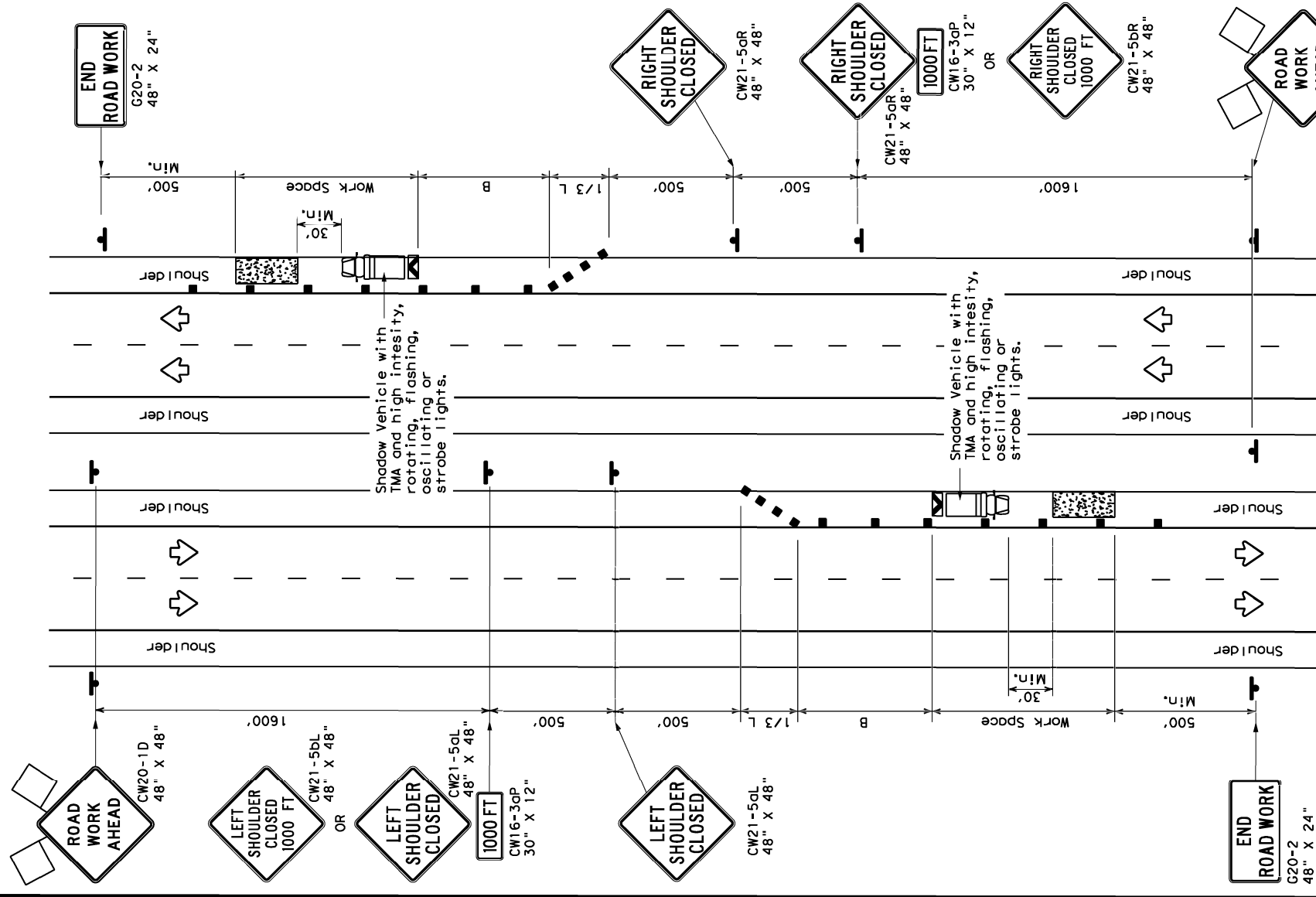
WORK SPACE ON SHOULDER
Conventional Roads
TCP (1-1b)

WORK SPACE NEAR SHOULDER
Conventional Roads
TCP (1-1a)



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	Portable Changeable Message Sign (PCMS)
Sign	Traffic Flow
Flag	Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths **		Suggested Maximum Spacing of Channelizing Devices		Suggested Maximum Longitudinal Buffer Space "B"
		Offset	Offset/Offset	On a Taper	On a Tangent	
30	$L = \frac{WS^2}{60}$	10'	11'	12'	30'	90'
35		150'	165'	180'	30'	120'
40		205'	225'	245'	35'	155'
45		265'	295'	320'	40'	195'
50		450'	495'	540'	45'	240'
55		500'	550'	600'	50'	295'
60		550'	605'	660'	55'	350'
65		600'	660'	720'	60'	410'
70		650'	715'	780'	65'	475'
75		700'	770'	840'	70'	540'
80		750'	825'	900'	75'	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)	TCP (5-1b)

- GENERAL NOTES**
- 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 affecting 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.
 - 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	DWG: _____	CHK: _____
TXDOT FEBRUARY 2012	CONT: _____	SECT: _____
2-18	REV: 647134	JOB: 001
	DIST: _____	COUNTY: _____
	DAL: _____	ELLIS: _____
		SHEET NO: 20

