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STATE OF TEXAS DEPARTMENT OF TRANSPORTATION

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STATE	DIST.	COUNTY	
TEXAS	WFS	WICHITA, ETC.	
CONT.	SECT.	JOB	HIGHWAY NO.
6380	47	001	IH 44, ETC.

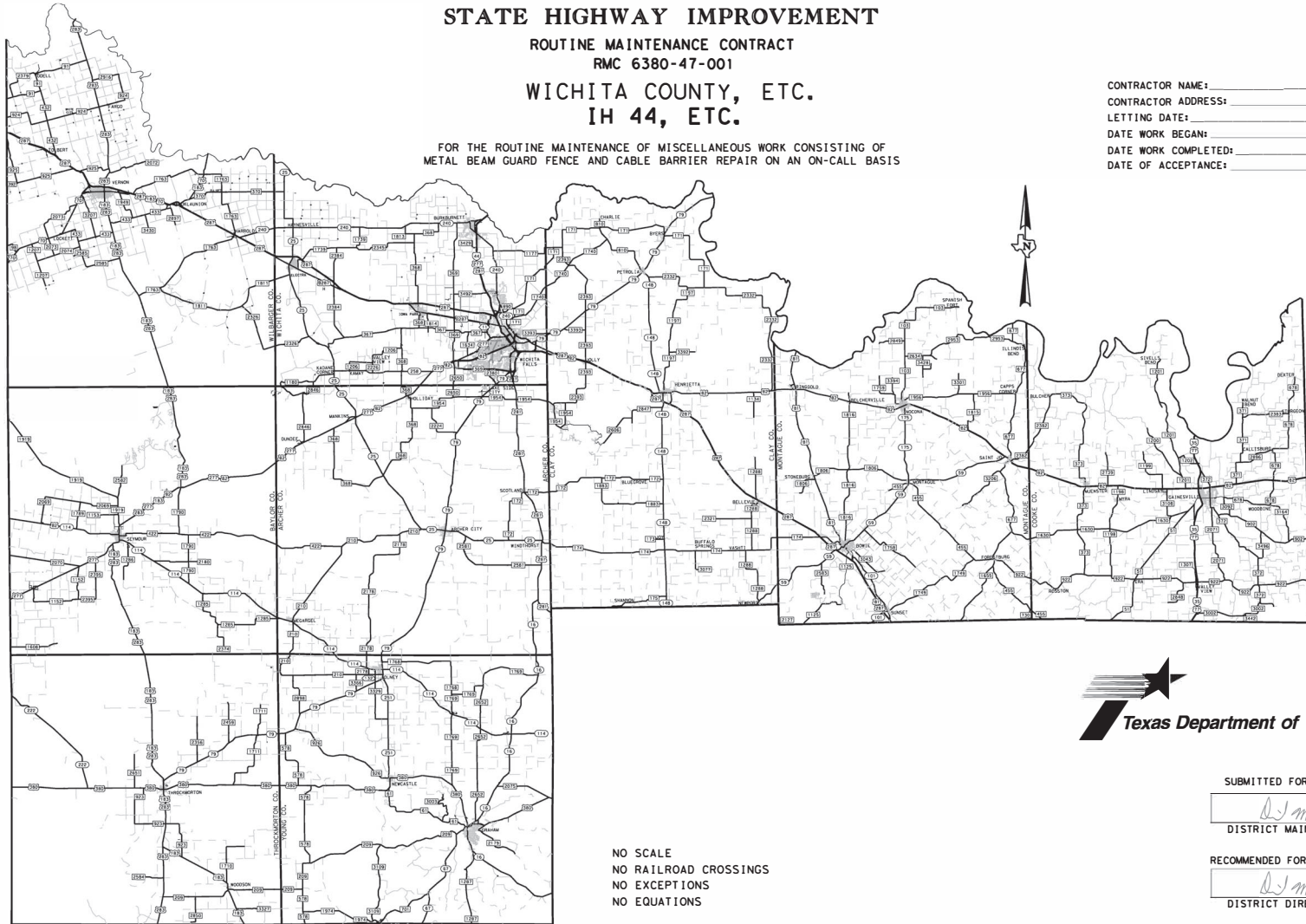
PLANS OF PROPOSED STATE HIGHWAY IMPROVEMENT

ROUTINE MAINTENANCE CONTRACT
RMC 6380-47-001

WICHITA COUNTY, ETC.
IH 44, ETC.

FOR THE ROUTINE MAINTENANCE OF MISCELLANEOUS WORK CONSISTING OF
METAL BEAM GUARD FENCE AND CABLE BARRIER REPAIR ON AN ON-CALL BASIS

CONTRACTOR NAME: _____
 CONTRACTOR ADDRESS: _____
 LETTING DATE: _____
 DATE WORK BEGAN: _____
 DATE WORK COMPLETED: _____
 DATE OF ACCEPTANCE: _____



NO SCALE
 NO RAILROAD CROSSINGS
 NO EXCEPTIONS
 NO EQUATIONS

SUBMITTED FOR LETTING: 05/21/2021

D. J. MRL P.E.
 DISTRICT MAINTENANCE ENGINEER

RECOMMENDED FOR LETTING: 05/21/2021

D. J. MRL P.E.
 DISTRICT DIRECTOR OF OPERATIONS

RECOMMENDED FOR LETTING: 05/21/2021

Nicholas P. Brown, P.E.
 DISTRICT ENGINEER

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION,
 NOVEMBER 1, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS,
 SHALL GOVERN ON THIS PROJECT.

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FILE: T:\WFSMAINT\Maintenance Projects\6380-47-001 On Call Guardrail FY 22 V - Desig\gn\gn Ser Dgn\sn1 - General\TITLE SHEET.dgn
 DATE: 5/21/2021

COUNTY: _____ PROJ. NO.: _____
 CITY: _____ LETTING DATE: _____
 DATE ACCEPTED: _____

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STATE OF TEXAS
DAVID M. ROHMER
92705
LICENSED PROFESSIONAL ENGINEER

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED WITH A ★ HAVE BEEN ISSUED BY ME AND ARE APPLICABLE TO THIS PROJECT.

D. M. Rohmer, P.E.

NAME _____

DATE 5/21/21

IH 44, ETC.
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Texas Department of Transportation
SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
6380	47	001	IH 44, ETC.
DIST	COUNTY	SHEET NO.	
WFS	WICHITA, ETC.	7	

Project Number: RMC 6380-47-001

County: WICHITA, ETC.

Control: 6380-47-001

Highway: IH 44, ETC.

GENERAL NOTES:

General:

This is a District wide contract consisting of "On Demand" metal beam guard fence and cable barrier repairs, replacement, and upgrades. Contact people are as follows:

Archer County	Cody Coltharp	(940) 574-2507
Montague County (Bowie)	Lee Adams	(940) 872-2209
Wichita County (Electra)	Chris Alaniz	(940) 495-4231
Cooke County (Gainesville)	Roger Krahl	(940) 641-1848
Young County (Graham)	Rudy Leal	(940) 549-0676
Clay County (Henrietta)	Darin Reed	(940) 867-1883
Montague County (Nocona)	Jimmy Sanderson	(940) 825-3158
Young County (Olney)	Rudy Leal	(940) 549-0676
Baylor County (Seymour)	Craig Hostas	(940) 256-1330
Throckmorton County	Rudy Leal	(940) 549-0676
Wilbarger County (Vernon)	Mitchell Nava	(940) 552-9393
Wichita County (Wichita Falls)	Brian Moore	(940) 249-7970

Contract Prosecution: Each contract awarded by the Department stands on its own and as such, is separate from other contracts. A Contractor awarded multiple contracts must be capable and sufficiently staffed to concurrently process and/or execute all contracts at the same time.

Contractor questions will be accepted through email by the individua listed below:

David Rohmer, P.E. David.Rohmer@txdot.gov

All contractor questions will be reviewed by the Engineer. Once a response is developed, it will be posted to TxDOT's Public FTP at the following Address:

<https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting%20Responses/>

All questions submitted that generate a response will be posted through this site. The site is organized by District, Project Type (Construction or Maintenance), Letting Date, and CCSJ/Project Name.

Personnel will be experienced in items of work in the contract, which they will be performing.

Furnish crew(s) and equipment capable of maintaining work in a continuous manner for the completion of the work listed on the work order.

Project Number: RMC 6380-47-001

County: WICHITA, ETC.

Control: 6380-47-001

Highway: IH 44, ETC.

Work will be accomplished in accordance with the metal beam guard fence and cable barrier standards on various highways District wide.

The contractor will provide all materials for this project in accordance with applicable specifications. Materials shall be new, unless otherwise directed by the Engineer.

ITEM 3 – Award and Execution of Contract

This contract includes non-site specific work. A work order letter will be issued and time charges will begin seven calendar days after such notice. Thereafter email and/or fax notification will be given to the contractor stating location and estimated materials needed to make the repair on an as need basis.

ITEM 4 – Scope of Work

If agreed upon in writing by both parties to the contract, the contract may be extended for an additional period of time not to exceed the original contract time period. The extended contract will be for the original bid quantities, terms and conditions plus any applicable change orders.

ITEM 8 – Prosecution and Progress

The contractor will be available to make repairs Monday through Friday and may be required to work on weekends if directed by the Engineer. For regular call outs, work will begin within (5) five calendar days after email/fax notification by the Engineer or his representative. If the contractor fails to respond within the mandated five calendar days, liquidated damages will be assessed according to special provision, "Schedule of Liquidated Damages."

For emergency call out work, work will begin within (2) two calendar days after email/fax notification by the Engineer or his representative. If the contractor fails to respond within the mandated two calendar days, liquidated damages will be assessed according to special provision, "Schedule of Liquidated Damages."

ITEM 9 – Measurement and Payment

Material-on-hand will not be paid on this contract.

ITEM 500 – Mobilization

Mobilization will be paid for each call out, either regular or emergency call-out.

Contractor should anticipate two call outs per month. Each callout shall be completed in 15 days

Project Number: RMC 6380-47-001

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ITEM 502 – Barricades, Signs, and Traffic Handling

Provide signing and traffic control in compliance with the Texas Manual on Uniform Traffic Control Devices (TMUTCD), latest edition, Traffic Control Plan Standards (TCP), and Barricades & Construction Standards (BC) listed on the title sheet. The appropriate traffic control method as outlined in the TMUTCD, latest edition, and elsewhere in the plans will be utilized for the various bid items.

All barricades, signs, barriers, cones, lights, signals and other such devices used by the contractor will be considered subsidiary to the bid items.

Additional signs, barricades and traffic handling may be necessary to complete the work and will be provided by the contractor as required and will be considered subsidiary to the various bid items.

7 day advance notice, applicable to TCP 6 series, is not required due to the nature of repair work being performed.

Equipment such as trucks, trailers, autos, etc., will be equipped with omni-directional flashing warning lights and these lights will be used within the work zone.

Remove from the roadway all temporary traffic control devices, such as cones, barrels, portable signs, vertical panels and etc., which will not be used within 24 hours and store at a central location approved by the Engineer. This includes removal of temporary traffic control devices from the roadway over the weekend.

Immediately replace all damaged traffic control devices, whether discovered by contractor personnel or department personnel. Remove the damaged traffic control devices from the project limits within 24 hours.

All flaggers used on this project must be certified to perform flagging duties. Provide a list of certified flaggers prior to beginning any roadwork which requires flagging. The Engineer must be provided with any modifications.

Do not commence work before sunrise and conduct work so that all machines, personnel and equipment are off the road by sunset.

ITEM 540- Metal Beam Guard Fence

Item 540-6035 "MTL BM GD FEN TRANS (31-"28")" will mainly be used when installing a new MASH SGT to an existing 28" guardrail system and will consist of all new material. Contractor will install a 31" MASH SGT and then will transition back to the 28" existing guardrail over a 25' stick of guardrail.

General Notes

C

Project Number: RMC 6380-47-001

County: WICHITA, ETC.

Control: 6380-47-001

Highway: IH 44, ETC.

Items 540, 542, and 544 will be used to pay for all new work from the beginning of the guardrail section to where it ties into the existing guardrail. Item 770 will be used to repair damage within a section of guardrail (not beginning at the start of the rail).

Example 1: A 28" SGT is hit and destroyed. Will pay the following:

- 542-6001 (Remove MBGF) = 25 LF
- 544-6003 (Remove End Treatment) = 1 EA
- 540-6035 (31" – 28" Transition) = 1 EA
- 544-6001 (Install End Treatment) = 1 EA

Example 2: A middle section of MBGF is hit between the SGT and bridge. This repair work will be paid under the appropriate items under item 770.

Example 3: An Existing turnout needs to be replaced. Will pay the following:

- 542-6002 (Remove Terminal Anchor Section) = 1 EA
- 544-6001 (Install End Treatment) = 1 EA

Concrete curbs will not be measured or paid for directly, but will be considered subsidiary to item 540.

ITEM 545- Crash Cushion Attenuators

If an existing crash cushion is hit and can be repaired, perform that work under item 774. However, if the crash cushion has to be replaced, replace it with an approved MASH device paid under Item 545. For example, for an existing crash cushion that has to be completely replaced will be paid as:

- 545-6001 (Crash Cush Atten – Install) = 1 EA
- 545-6003 (Crash Cush Atten – Remove) = 1 EA

ITEM 658- Delineator and Object Marker Assemblies

When a section of MBGF is repaired ensure that all delineators on entire section of MBGF, not just damaged area, is up to standards.

All delineators shall have a flat bottom and a flat top.

ITEM 770 – Guard Fence Repair

Furnish a mechanical posthole digger capable of digging holes in soil and rock the diameter and depth set forth in the latest standards. The digger may be mounted on a truck or self-propelled as long as the machine functions to the satisfaction of the Engineer.

General Notes

D

Project Number: RMC 6380-47-001

County: WICHITA, ETC.

Control: 6380-47-001

Highway: IH 44, ETC.

Remove and/or replace timber/steel post without concrete foundation will not be paid for without replacing the post with a new post.

When blockouts are damaged, they will be replaced with composite blockouts. Contractor will not begin repair on any location that cannot be completed before leaving the location.

Contractor will be required to adjust the depth of each guardrail post as necessary in order to maintain the uniform top alignment of all posts in each line of guardrail. Contractor will also drill holes in the guardrail posts necessary to maintain proper vertical alignment of the metal beam rail element. This will be considered subsidiary to the bid items.

Post to be paid with or without concrete foundation will be determined as follows:

If concrete must be removed to make the repair or to replace the post, Bid Item 770-6011 "Rem/Repl Tim/Stl Post w/Conc Fnd" will be paid.

All other applicable repairs or replacements will be paid under Bid Item 770-6010, "Rem/Repl Tim/Stl Post w/o Conc Fnd".

Work will not be permitted on both sides of the roadway simultaneously at any job site.

Existing locations may consist of either 28" high or 31" high MBGF. Use appropriate standards for each location. However, all new end treatment will be a MASH compliant device.

Item 770-6028 "REPL SINGLE GDRAIL TERM IMPACT HEAD" will be used to replace only the appropriate impact head on a SGT system. However, if the head on an existing 31" SKT system needs to be replaced, replace that impact head according to retrofit standard "SGT (14W)31-18". The extra posts and hardware needed to perform this retrofit will be considered subsidiary to this bid item.

For guardrails with a mow strip, all re-grouting of post repair is considered subsidiary to item 770.

ITEM 771 – Repair Cable Barrier System

Repair cable barrier system, as directed by Engineer, in accordance with manufacturer's recommendations as shown on the detail sheet included in the plans. Remove and replace concrete foundations in accordance with the details on the plans under the Repair Concrete Foundation pay item as directed by the Engineer.

Re-tensioning of cable barrier systems will be performed as directed by the Engineer.

General Notes

E

Project Number: RMC 6380-47-001

County: WICHITA, ETC.

Control: 6380-47-001

Highway: IH 44, ETC.

Do not work on multiple locations, unless approved by the Engineer prior to beginning work.

Do not work from the narrow side of the median, unless approved by the Engineer. Obtain approval from the Engineer prior to placement of lane closures. Provide a tension meter and use it to verify that repaired or replaced cables are properly tensioned.

All hardware for the TL-3 and TL-4 cable barrier systems will not be paid for directly but will be considered subsidiary to this item.

Delineator installation related to the cable barrier repair will not be measured or paid for directly but will be considered subsidiary to this Item.

Straightening of the post, including spacers and re-threading the cable, will be considered subsidiary to the various bid items.

Any temporary post placed by the maintenance section prior to contractor doing repairs will remain the property of the department and should be returned to the maintenance section.

UTILITIES:

Contractor is responsible for contacting a "one call" center when necessary and also City for any utility and line locations. Contact TXDOT representative, Jack Kelsey, Wichita Falls District Signal Shop, at (940) 720-7813, when drilling foundations within ¼ mile of any illumination or traffic signals.

General Notes

F

SHEET 5

ESTIMATE SUMMARY

								RMC 6380-47-001 GDRAIL/CBL BARRIER REPAIR IH 44, ETC. WICHITA COUNTY, ETC.		A L T	ITEM- CODE	DESCRIPTION	UNIT	TOTAL	
EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL					EST.	FINAL
								24.00		500 6033	MOBILIZATION (CALLOUT)	EA	24.00		
								12.00		500 6034	MOBILIZATION (EMERGENCY)	EA	12.00		
								2000.00		540 6001	MTL W-BEAM GD FEN (TIM POST)	LF	2000.00		
								15.00		540 6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	15.00		
								10.00		540 6008	MTL BEAM GD FEN TRANS (T101)	EA	10.00		
								10.00		540 6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	10.00		
								200.00		540 6017	MTL BM GD FEN (LONG SPAN SYSTEM)	LF	200.00		
								100.00		540 6035	MTL BM GD FEN TRANS (31"-28")	EA	100.00		
								2000.00		542 6001	REMOVE METAL BEAM GUARD FENCE	LF	2000.00		
								50.00		542 6002	REMOVE TERMINAL ANCHOR SECTION	EA	50.00		
								100.00		544 6001	GUARDRAIL END TREATMENT (INSTALL)	EA	100.00		
								50.00		544 6003	GUARDRAIL END TREATMENT (REMOVE)	EA	50.00		
								1.00		545 6006	CRASH CUSH ATTEN (INSTL) (L) (N) (TL2)	EA	1.00		
								200.00		658 6062	INSTL DEL ASSM (D-SW)SZ 1 (BRF)GF2 (BI)	EA	200.00		
								100.00		658 6064	INSTL DEL ASSM (D-SY)SZ 1 (BRF)GF2	EA	100.00		
								7000.00		770 6001	REPAIR RAIL ELEMENT (W - BEAM)	LF	7000.00		
								100.00		770 6002	REPAIR RAIL ELEMENT (THRIE - BEAM)	LF	100.00		
								100.00		770 6004	REPAIR RAIL ELEMENT (CURVED RAIL)	LF	100.00		
								1000.00		770 6010	REM / REPL TIMBER/STL POST W/O CONC FND	EA	1000.00		
								20.00		770 6011	REM / REPL TIMBER / STL POST W/CONC FND	EA	20.00		
								400.00		770 6017	REALIGN POSTS	EA	400.00		
								600.00		770 6018	INSTALL BLOCKOUT (TYPE SPECIFIED)	EA	600.00		
								200.00		770 6021	REPLACE SINGLE GDRAIL TERMINAL RAIL	LF	200.00		
								25.00		770 6022	REPLACE SINGLE GDRAIL TERMINAL POST	EA	25.00		
								15.00		770 6028	REPL SINGLE GDRAIL TERM IMPACT HEAD	EA	15.00		
								15.00		770 6029	REM & RESET SGT IMPACT HEAD	EA	15.00		
								50.00		770 6033	REPLACE SGT OBJECT MARKER	EA	50.00		
								1500.00		771 6001	REPLACE POSTS (TL-3)	EA	1500.00		
								150.00		771 6002	REPLACE POSTS (TL-4)	EA	150.00		
								24.00		771 6003	CABLE SPLICE / TURNBUCKLE (TL-3)	EA	24.00		
								10.00		771 6004	CABLE SPLICE / TURNBUCKLE (TL-4)	EA	10.00		
								24.00		771 6005	REPAIR CONCRETE FOUNDATION (TL-3)	EA	24.00		
								10.00		771 6006	REPAIR CONCRETE FOUNDATION (TL-4)	EA	10.00		
								20.00		771 6007	REPR OR REPLC CABLE BARR TERM SEC (TL-3)	EA	20.00		
								20.00		771 6008	REPR OR REPLC CABLE BARR TERM SEC (TL-4)	EA	20.00		
								1000.00		771 6009	REPLACE CABLE (TL-3)	LF	1000.00		
								1000.00		771 6010	REPLACE CABLE (TL-4)	LF	1000.00		
								24.00		771 6011	CHECK / RE-TENSION CABLE	EA	24.00		
								2.00		774 6002	REMOVE AND REPLACE (WIDE TRACC)	EA	2.00		
								2.00		774 6003	REMOVE AND REPLACE (NARROW REACT 350)	EA	2.00		
								2.00		774 6004	REMOVE AND REPLACE (WIDE REACT 350)	EA	2.00		
								2.00		774 6006	REPAIR (TRACC)	EA	2.00		
								5.00		774 6010	REPAIR (REACT)	EA	5.00		
								2.00		774 6044	REMOVE AND REPLACE (SMTC) (N)	EA	2.00		
								2.00		774 6046	REMOVE AND REPLACE (SMTC) (W)	EA	2.00		
								15.00		774 6052	REPAIR (FASTRACC)	LF	15.00		
								20.00		774 6068	REPAIR (SMTC) (N)	LF	20.00		
								2.00		774 6117	REMOVE AND REPLACE (QUADGUARD) (MASH) (N)	EA	2.00		
								2.00		774 6121	REMOVE AND REPLACE (TAU) (MASH) (N)	EA	2.00		
								12.00		6001 6001	PORTABLE CHANGEABLE MESSAGE SIGN	DAY	12.00		

ESTIMATE & QUANTITY SHEET

STATE DIST. NO.	COUNTY	PROJECT NO.	SHEET NO.
03	WICHITA, ETC.	RMC 6380-47-001	6

ESTIMATE SUMMARY

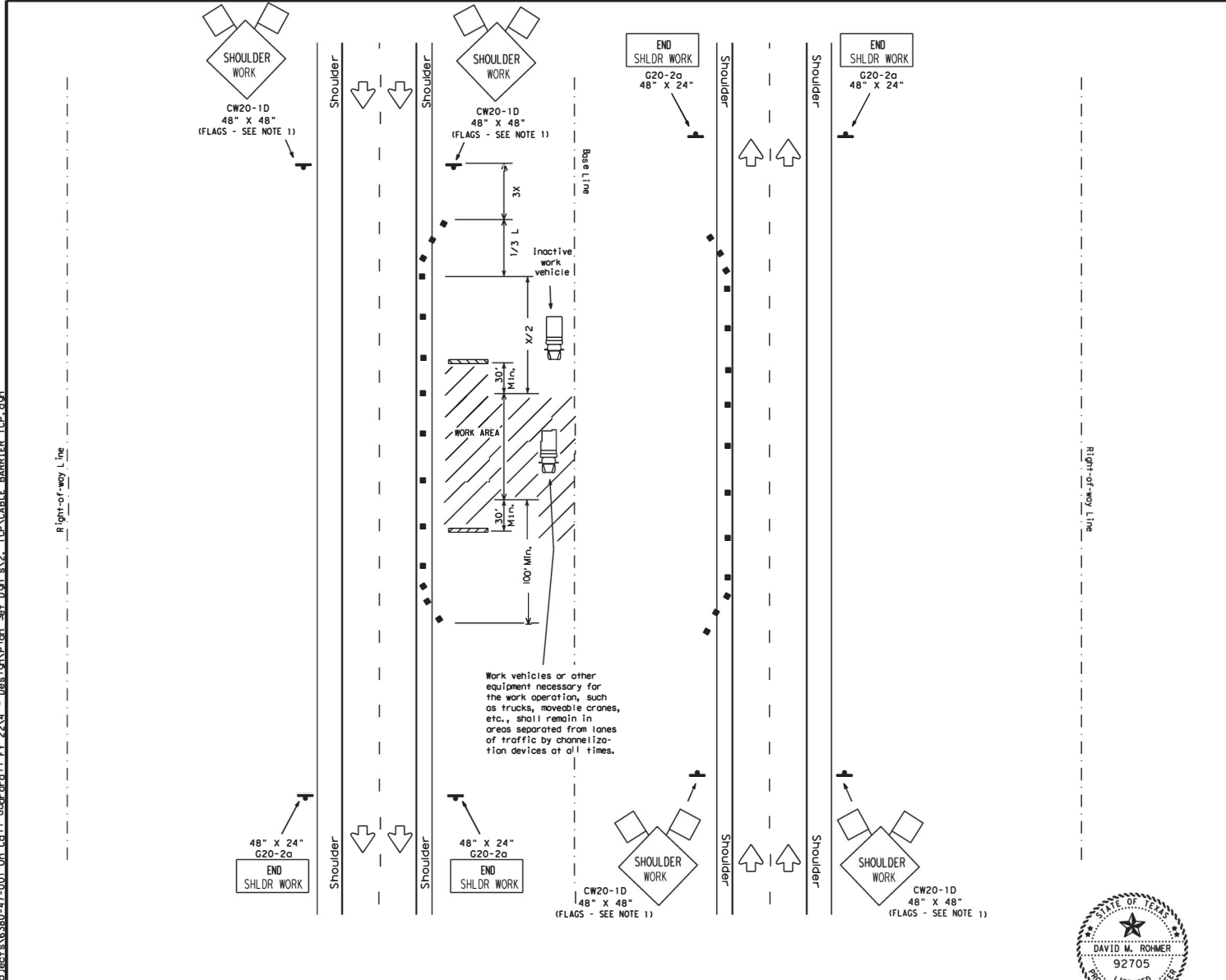
								RMC 6380-47-001 GRDRAIL/CBL BARRIER REPAIR IH 44, ETC. WICHITA COUNTY, ETC.			ALTA	ITEM-CODE			DESCRIPTION	UNIT	TOTAL				
EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL	ITEM NO.		DESC CODE	SP NO.							EST.	FINAL
										150.00				6185	6002		TMA (STATIONARY)	DAY	150.00		

ESTIMATE & QUANTITY SHEET

STATE DIST. NO.	COUNTY	PROJECT NO.	SHEET NO.
03	WICHITA, ETC.	RMC 6380-47-001	7

DATE: 5/21/2021
 PROJECT: 6380-47-001 On Co. II Expansion - Design Plan Set - Design - CABLE BARRIER REPAIR - TCP.dgn
 DRAWING: 6380-47-001 On Co. II Expansion - Design Plan Set - Design - CABLE BARRIER REPAIR - TCP.dgn

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CABLE BARRIER REPAIR IN MEDIAN AREA

LEGEND

- Type III Barricade
- Channelizing Devices
- Flag
- Heavy Work Vehicle
- Truck Mounted Attenuator
- Trailer Mounted Flashing Arrow Panel
- Portable Changeable Message Sign
- Flagger
- Sign Post

Posted Speed \times	Formula	Minimum Desirable Taper Lengths $\times \times$			Suggested Maximum Spacing of Device		Minimum Sign Spacing \times Distance
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60' - 75'	120'
35		205'	225'	245'	35'	70' - 90'	160'
40	$L = WS$	265'	295'	320'	40'	80' - 100'	240'
45		450'	495'	540'	45'	90' - 110'	320'
50	$L = WS$	500'	550'	600'	50'	100' - 125'	400'
55		550'	605'	660'	55'	110' - 140'	500'
60	$L = WS$	600'	660'	720'	60'	120' - 150'	\times 600'
65		650'	715'	780'	65'	130' - 165'	\times 700'
70	$L = WS$	700'	770'	840'	70'	140' - 175'	\times 800'

* 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	TYPICAL USAGE			
	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

- GENERAL NOTES:
- Unless otherwise stated in the plans, flags attached to signs are **REQUIRED**.
 - All traffic control devices illustrated are **REQUIRED**.
 - Type III barricades are required on both sides of work area at all times. (See BC Standards for barricade details.)
 - On high speed facilities advance warning signs should be installed approximately 3X from the work area or from the beginning of a lane or shoulder taper. On low speed facilities the advance warning sign should be placed on the "1" minimum distance.
 - This TCP is only to be used if operations can be performed without a lane closure. Use TCP-FREEMAN LANE CLOSURE for operations requiring a lane closure.
 - Devices shown are required on both sides of median regardless of side cable fence is installed on.
 - TCP devices shall be left in place until cable barrier installation is complete.
 - For short-duration work, (one hour or less), all signs and channelizing devices may be eliminated if a vehicle with high-intensity rotating, flashing, oscillating, or strobe lights is used in accordance with TA-1 of the TMUTCD.

Only pre-qualified products shall be used. A list of compliant products and their sources may be obtained by writing or faxing:

Standards Engineer
 Traffic Operations Division - TE
 Texas Department of Transportation
 125 East 11th Street
 Austin, Texas 78701-2483
 Phone (512) 416-3335
 Fax (512) 416-3161
 E-mail TRF-STANDARD@twd.te.dot.state.tx.us



D. M. Rohmer, P.E.
 5/21/21

TRAFFIC CONTROL PLAN

CABLE BARRIER REPAIR (ONE TIME USE)

REVISIONS		DATE	BY	CHKD	DATE	BY	CHKD
6345	52	001					

CONT SECT JOB HIGHWAY
 6345 52 001 IH 44, ETC.
 DIST COUNTY SHEET NO.
 WFS WICHITA, ETC. 7

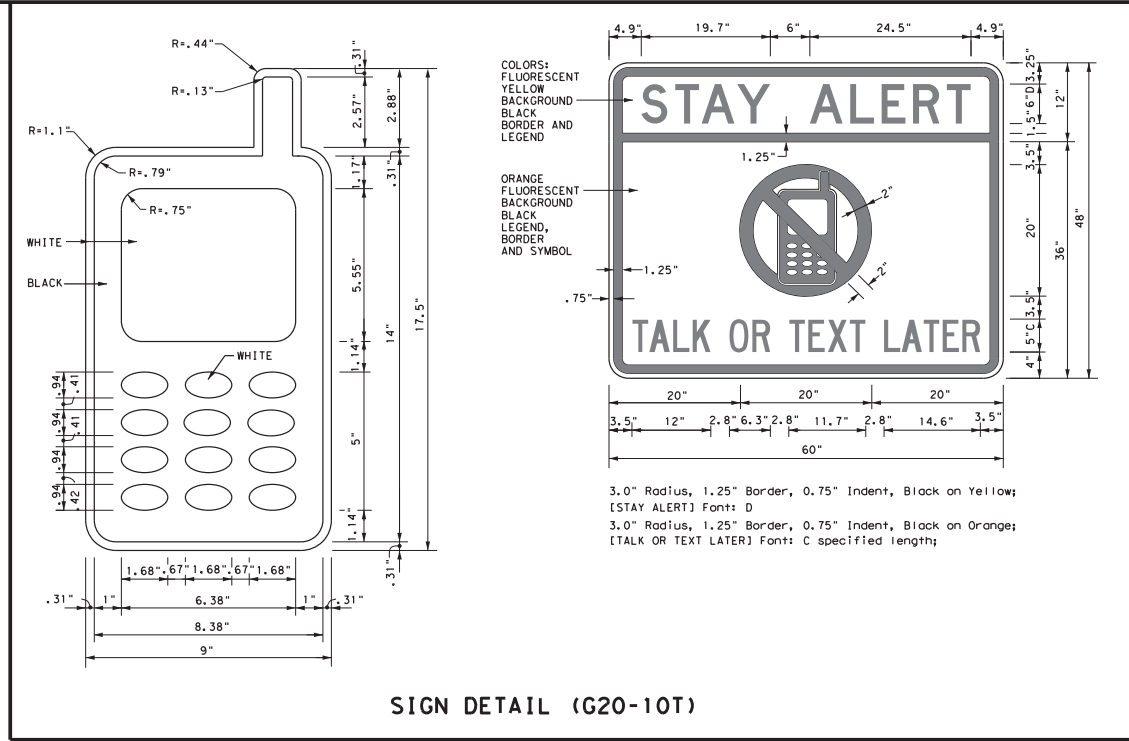
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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

- 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 abut, the Engineer(s) may omit the END ROAD WORK, TRAFFIC FINES DOUBLE, and other advance warning signs if the signing would be redundant and the work areas appear continuous to the motorists. If the adjacent project is completed first, the Contractor shall erect the necessary warning signs as shown on these sheets, the TCP sheets or as directed by the Engineer. The BEGIN ROAD WORK NEXT X MILES sign shall be revised to show appropriate work zone distance.
- 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.
- As shown on BC(2), the OBEY WARNING SIGNS STATE LAW sign, STAY ALERT TALK OR TEXT LATER (see Sign Detail G20-10T) and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. However, the TRAFFIC FINES DOUBLE sign will not be required on projects consisting solely of mobile operation work, such as striping or milling edgeline rumble strips. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits.
- Except for devices required by Note 10, 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 APPAREL 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.



Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found on-line at the web address given below or by contacting:

Texas Department of Transportation
 Traffic Operations Division - TE
 Phone (512) 416-3118

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 Operations Division Standard

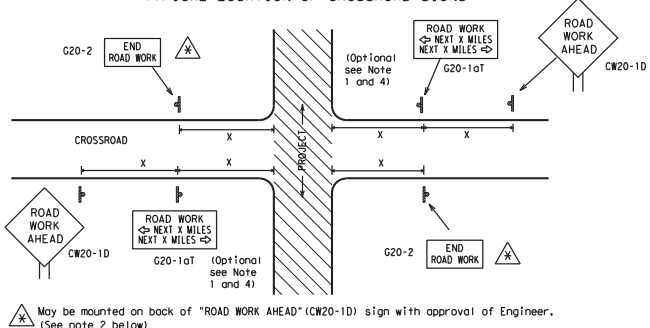
**BARRICADE AND CONSTRUCTION
 GENERAL NOTES
 AND REQUIREMENTS**
BC(1) - 14

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© TxDOT November 2002	CONT: 6380	SECT: 47	JOB: 001	HWY: IH 44, ETC.
4-03 REVISIONS	5-10	8-14	DIST: COUNTY	SHEET NO.
9-07	7-13		WFS WICHITA, ETC.	9

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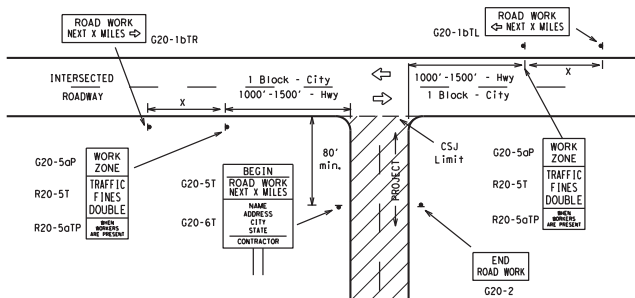
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TYPICAL LOCATION OF CROSSROAD SIGNS



- May be mounted on back of "ROAD WORK AHEAD" (CW20-1D) sign with approval of Engineer. (See note 2 below)
- 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 mounted back to back with the reduced size 36" x 18" "END ROAD WORK" (G20-2) sign on low volume crossroads (see Note 4 under "Typical Construction Warning Sign Size and Spacing"). See the "Standard Highway Sign Designs for Texas" manual for sign details. The Engineer may omit the advance warning signs on low volume crossroads. The Engineer will determine whether a road is low volume. 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" left arrow (G20-1bTL) and "ROAD WORK NEXT X MILES" right arrow (G20-1bTR) signs shall be replaced by the detour signing called for in the plans.

TYPICAL CONSTRUCTION WARNING SIGN SIZE AND SPACING¹⁵⁻⁶

Sign Number or Series	SIZE		SPACING	
	Conventional Road	Expressway/Freeway	Posted Speed MPH	Sign Spacing ^Δ Feet (Approx.) "X"
CW20 ⁴	48" x 48"	48" x 48"	30	120
CW21			35	160
CW22			40	240
CW23			45	320
CW25			50	400
CW1, CW2, CW7, CW8, CW9, CW11, CW14	36" x 36"	48" x 48"	55	500 ²
CW3, CW4, CW5, CW6, CW8-3, CW10, CW12			60	600 ²
			65	700 ²
			70	800 ²
	75	900 ²		
	80	1000 ²		
	*	*	*	*

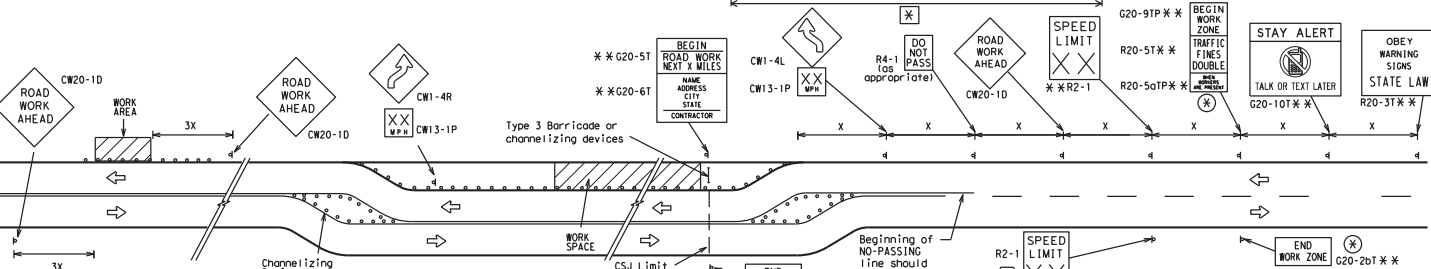
⁴ For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

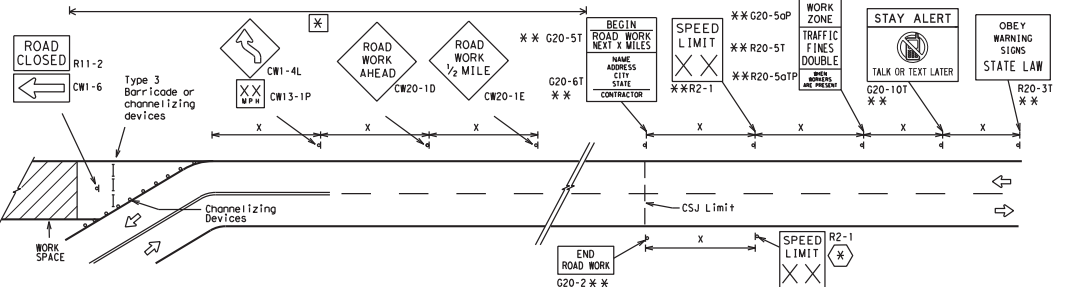
- Special or larger size signs may be used as necessary.
- Distance between signs should be increased as required to have 1500 feet advance warning.
- Distance between signs should be increased as required to have 1/2 mile or more advance warning.
- 36" x 36" "ROAD WORK AHEAD" (CW20-1D) signs may be used on low volume crossroads at the discretion of the Engineer. 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



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

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



NOTES

- The Contractor shall determine the appropriate distance to be placed on the G20-1 series signs and "BEGIN ROAD WORK NEXT X MILES" (G20-5T) sign for each specific project. This distance shall replace the "X" and shall be rounded to the nearest whole mile with the approval of the Engineer. No decimals shall be used.
- (*) The "BEGIN WORK ZONE" (G20-9TP) and "END WORK ZONE" (G20-2bT) shall be used as shown on the sample layout when advance signs are required outside the CSJ Limits. They inform the motorist of entering or leaving a part of the work zone lying outside the CSJ Limits where traffic fines may double if workers are present.
- ** Required CSJ Limit signing. See Note 10 on BC(1). TRAFFIC FINES DOUBLE signs will not be required on projects consisting solely of mobile operations work.
- (X) 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

Texas Department of Transportation
Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

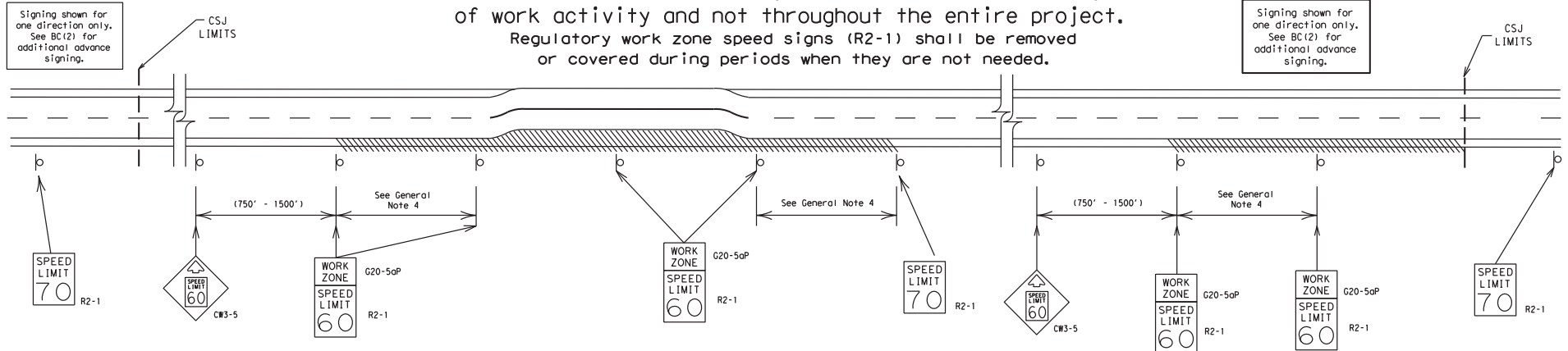
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REVISIONS	DIST: 9-07	COUNTY: 8-14	SHEET NO.:	
7-13	WFS	WICHITA, ETC.	10	

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:

- rough road or damaged pavement surface
- substantial alteration of roadway geometrics (diversions)
- construction detours
- grade
- width
- 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 travelled 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

- Regulatory work zone speed limits should be used only for sections of construction projects where speed control is of major importance.
- Regulatory work zone speed limit signs shall be placed on supports at a 7 foot minimum mounting height.
- Speed zone signs are illustrated for one direction of travel and are normally posted for each direction of travel.
- 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
- Regulatory speed limit signs shall have black legend and border on a white reflective background (See "Reflective Sheeting" on BC(4)).
- Fabrication, erection and maintenance of the "ADVANCE SPEED LIMIT" (CW3-5) sign, "WORK ZONE" (G20-5aP) plaque and the "SPEED LIMIT" (R2-1) signs shall not be paid for directly, but shall be considered subsidiary to Item 502.
- Turning signs from view, laying signs over or down will not be allowed, unless as otherwise noted under "REMOVING OR COVERING" on BC(4).
- Techniques that may help reduce traffic speeds include but are not limited to:
 - Law enforcement.
 - Flagger stationed next to sign.
 - Portable changeable message sign (PCMS).
 - Low-power (drone) radar transmitter.
 - Speed monitor trailers or signs.
- Speeds shown on details above are for illustration only. Work Zone Speed Limits should only be posted as approved for each project.
- 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.

SHEET 3 OF 12

Texas Department of Transportation		Traffic Operations Division Standard	
BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT			
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WFS:	WICHITA, ETC.	SHEET NO.:	11

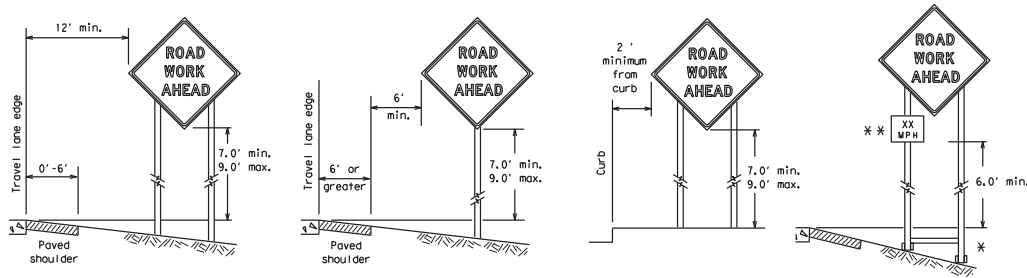
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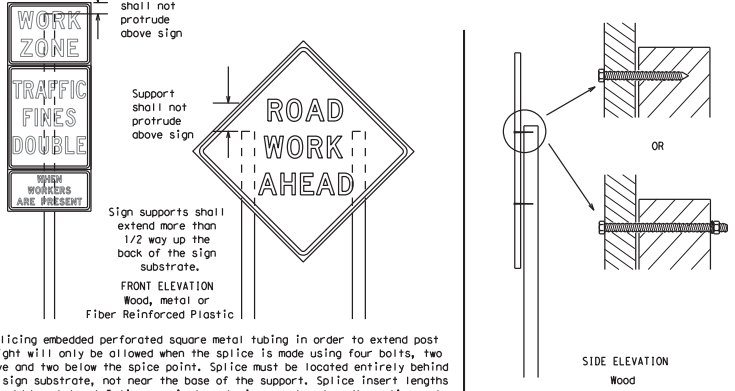
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



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

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

ATTACHMENT FOR SIGN SUPPORTS



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.

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). 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_L or Type C_L, 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

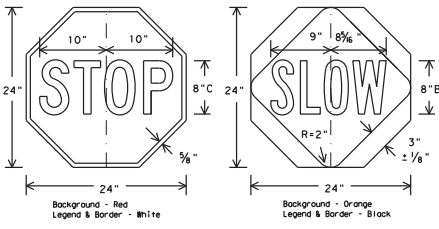
- Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand should be used.
- The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
- Rock, concrete, iron, steel or other solid objects shall not be permitted for use as sign support weights.
- Sandbags 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.
- Rubber bollards designed for channelizing devices should not be used for ballast on 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.

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" as detailed below.
- When used at night, the STOP/SLOW paddle shall be retroreflectORIZED.
- 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.



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, 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.
- When existing permanent signs are moved and relocated due to construction purposes, they shall be visible to motorists of all files.
- 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 sheets or the CWZTCD. The signs shall meet the required mounting heights shown on the BC Sheets or the SMD Standards 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.

Texas Department of Transportation
 Traffic Operations Division Standard

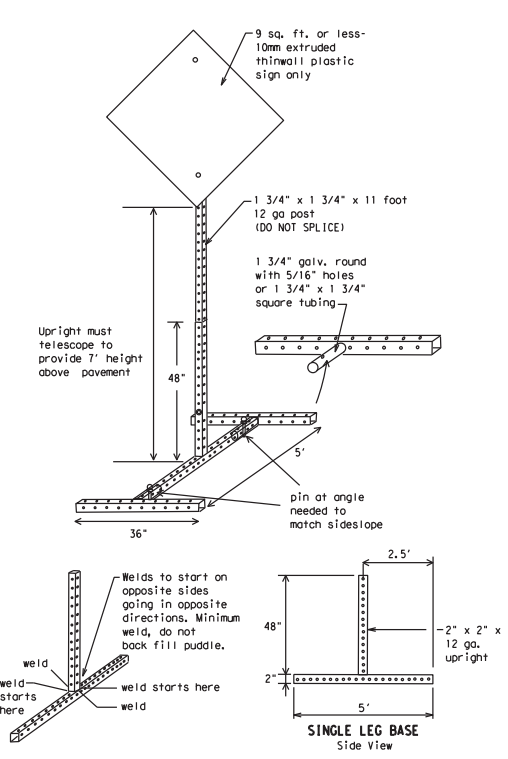
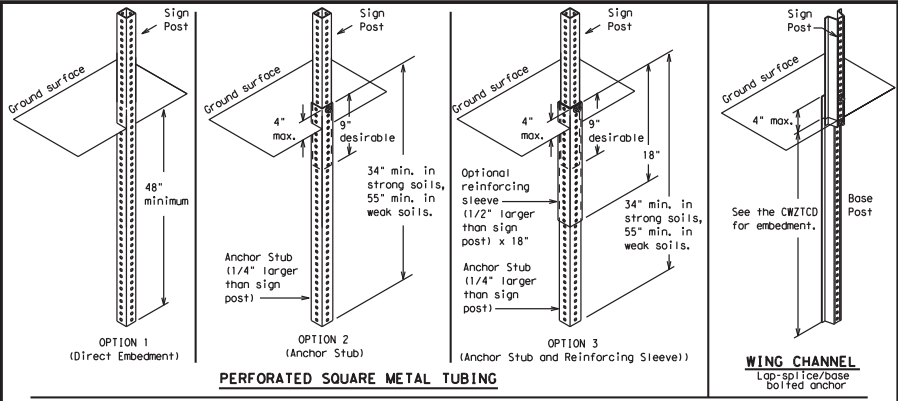
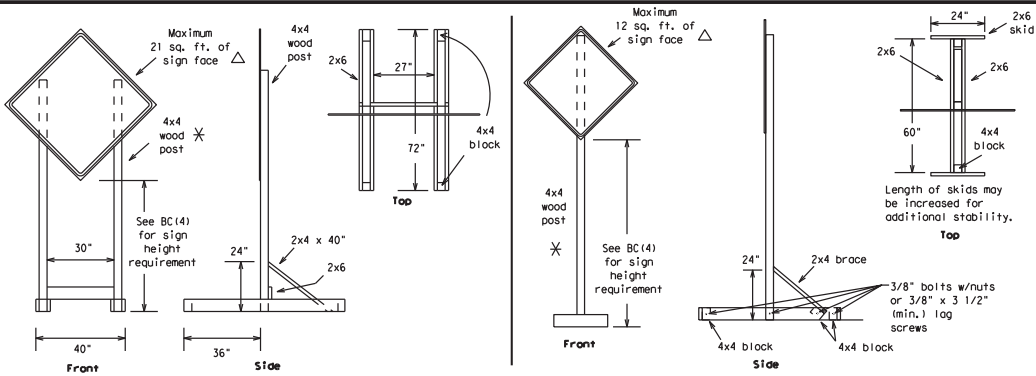
BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC (4) - 14

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REVISED:	NOVEMBER 2002	CONF:	6380	SECT:	47	JOB:	001	IH:	44, ETC.
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TIME:	7-13						WFS	WICHITA, ETC.	12

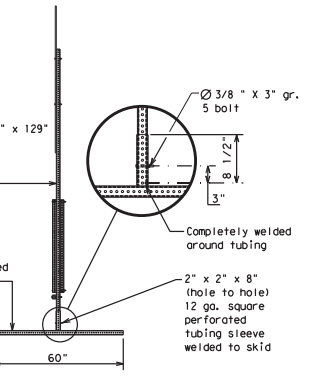
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WOOD POST SYSTEM FOR GROUND MOUNTED SIGN SUPPORTS

Nominal Post Size	Number of Posts	Maximum Sq. feet of Sign Face	Minimum Soil Embedment	Drilled Holes(s) Required
4 x 4	1	12	36"	NO
4 x 4	2	21	36"	NO
4 x 6	1	21	36"	YES
4 x 6	2	36	36"	YES



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.

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

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

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

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BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5) - 14

FILE:	DC-14.dgn	DWG:	TxDOT	CHK:	TxDOT	APP:	TxDOT	CHK:	TxDOT
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WHEN NOT IN USE, REMOVE THE PCMS FROM THE RIGHT-OF-WAY OR PLACE THE PCMS BEHIND BARRIER OR GUARDRAIL WITH SIGN PANEL TURNED PARALLEL TO TRAFFIC

PORTABLE CHANGEABLE MESSAGE SIGNS

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

WORD OR PHRASE	ABBREVIATION	WORD OR PHRASE	ABBREVIATION
Access Road	ACCS RD	Major	MAJ
Alternate	ALT	Miles	MI
Avenue	AVE	Miles Per Hour	MPH
Best Route	BEST RTE	Minor	MNR
Boulevard	BLVD	Monday	MON
Bridge	BRDG	Normal	NORM
Canot	CANT	North	N
Center	CTR	Northbound	(route) N
Construction Ahead	CONST AHD	Parking	PKING
CROSSING	XING	Road	RD
Detour Route	DETOUR RTE	Right Lane	RT LN
Do Not	DONT	Saturday	SAT
East	E	Service Road	SERV RD
Eastbound	(route) E	Shoulder	SHLDR
Emergency	EMER	Slippery	SLIP
Emergency Vehicle	EMER VEH	South	S
Entrance, Enter	ENT	Southbound	(route) S
Express Lane	EXP LN	Speed	SPD
Expressway	EXPWY	Street	ST
XXXX Feet	XXXX FT	Sunday	SUN
Fog Ahead	FOG AHD	Telephone	PHONE
Freeway	FRWY, FWY	Temporary	TEMP
Freeway Blocked	FWY BLKD	Thursday	THURS
Friday	FRI	To Downtown	TO DOWNTN
Hazardous Driving	HAZ DRIVING	Traffic	TRAF
Hazardous Material	HAZMAT	Travelers	TRVLRS
High Occupancy	HOV	Tuesday	TUES
Vehicle	HWY	Time Minutes	TIME MIN
Hour(s)	HR, HRS	Upper Level	UPR LEVEL
Information	INFO	Vehicles (s)	VEH, VEHs
ITS	ITS	Warning	WARN
Junction	JCT	Wednesday	WED
Left	LFT	Weight Limit	WT LIMIT
Left Lane	LFT LN	West	W
Lane Closed	LN CLOSED	Westbound	(route) W
Lower Level	LR LEVEL	Wet Pavement	WET PVMT
Maintenance	MAINT	Will Not	WONT

Roadway designation = IH-number, US-number, SH-number, FM-number
 * LANES SHIFT in Phase 1 must be used with STAY IN LANE in Phase 2.

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	FRONTAGE ROAD CLOSED	ROADWORK XXX FT	ROAD REPAIRS XXXX FT
ROAD CLOSED AT SH XXX	SHOULDER CLOSED XXX FT	FLAGGER XXXX FT	LANE NARROWS XXXX FT
ROAD CLSD AT FM XXXX	RIGHT LN CLOSED XXX FT	RIGHT LN XXXX FT	TWO-WAY TRAFFIC XX MILE
RIGHT X LANES CLOSED	RIGHT X LANES OPEN	MERGING TRAFFIC XXXX FT	CONST TRAFFIC XXX FT
CENTER LANE CLOSED	DAYTIME LANE CLOSURES	LOOSE GRAVEL XXXX FT	UNEVEN LANES XXXX FT
NIGHT LANE CLOSURES	I-XX SOUTH EXIT CLOSED	DETOUR X MILE	ROUGH ROAD XXXX FT
VARIOUS LANES CLOSED	EXIT XXX CLOSED X MILE	ROADWORK PAST SH XXXX	ROADWORK NEXT FRI-SUN
EXIT CLOSED	RIGHT LN TO BE CLOSED	BUMP XXXX FT	US XXX EXIT X MILES
MALL DRIVEWAY CLOSED	X LANES CLOSED TUE - FRI	TRAFFIC SIGNAL XXXX FT	LANES SHIFT *
XXXXXXXX BLVD CLOSED			

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List	Location List	Warning List	** Advance Notice List
MERGE RIGHT	AT FM XXXX	SPEED LIMIT XX MPH	TUE-FRI XX AM - X PM
DETOUR NEXT X EXITS	BEFORE RAILROAD CROSSING	MAXIMUM SPEED XX MPH	APR XX - X PM-X AM
USE EXIT XXX	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	WATCH FOR TRUCKS	RIGHT LANE EXIT	MAY X-X XX PM - XX AM
WATCH FOR TRUCKS	EXPECT DELAYS	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 days of the week. Advance notification should typically be for 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" (CW20-7) are represented graphically on the Full Matrix PCMS sign and, with the approval of the Engineer, it shall maintain the legibility/visibility requirement listed above.
- 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.



BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

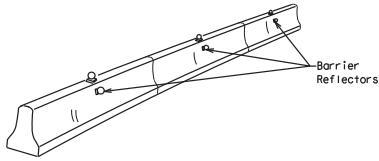
BC (6) - 14

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REV#	8-14	DATE	7-13	DATE	WFS	DATE	WICHITA, ETC.	DATE	14

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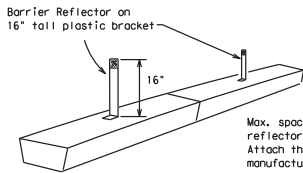
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- Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
- Color of Barrier Reflectors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



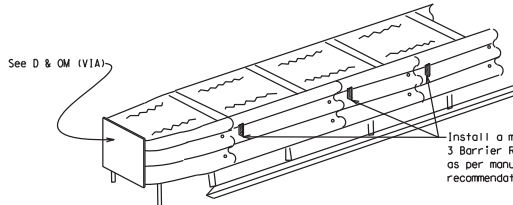
CONCRETE TRAFFIC BARRIER (CTB)

- 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)

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



DELINEATION OF END TREATMENTS

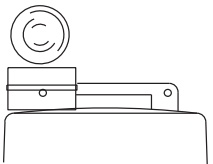
END TREATMENTS FOR CTB'S USED IN WORK ZONES

End treatments used on CTB's in work zones shall meet crashworthy standards as defined in the National Cooperative Highway Research Report 350. Refer to the CWZTCD List for approved end treatments and manufacturers.

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS

WARNING LIGHTS

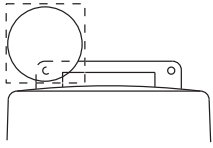
- Warning lights shall meet the requirements of the TMUTCD.
- Warning lights shall NOT be installed on barricades.
- Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn or mark a potentially hazardous area. Their use shall be as indicated on this sheet 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 B₁₀ or C₁₀ 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.



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

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.



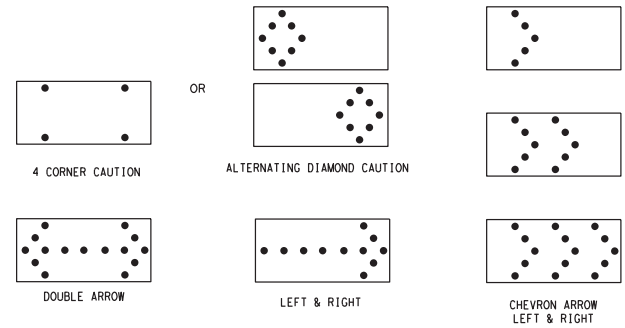
Warning reflector may be round or square. Must have a yellow reflective surface area of at least 30 square inches

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 CWZTCD.
- 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.

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:



- 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 PMS 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.

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

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

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

FLASHING ARROW BOARDS

SHEET 7 OF 12

TRUCK-MOUNTED ATTENUATORS

- Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the National Cooperative Highway Research Report No. 350 (NCHRP 350) or the Manual for Assessing Safety Hardware (MASH).
- Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
- Refer to the CWZTCD for a list of approved TMAs.
- TMAs are required on freeways unless otherwise noted in the plans.
- A TMA should be used anytime that it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the work performance.
- The only reason a TMA should not be required is when a work area is spread down the roadway and the work crew is an extended distance from the TMA.

Texas Department of Transportation
 Traffic Operations Division Standard

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

BC(7) - 14

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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:

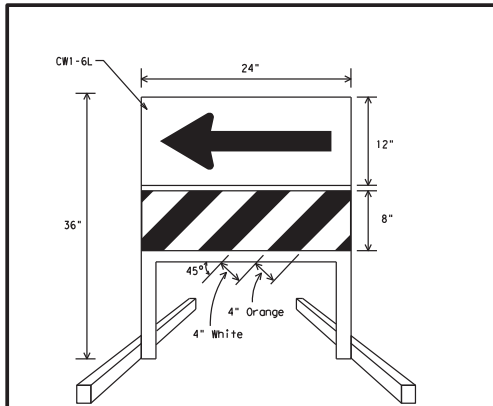
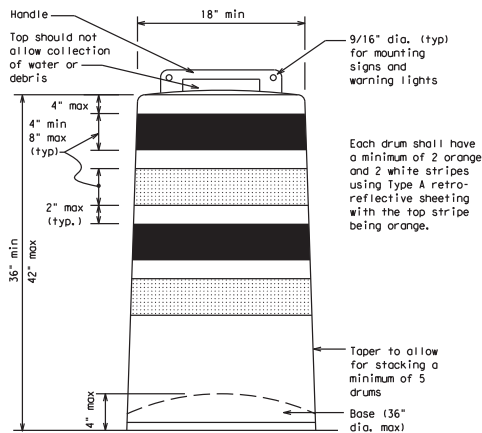
- Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
- The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

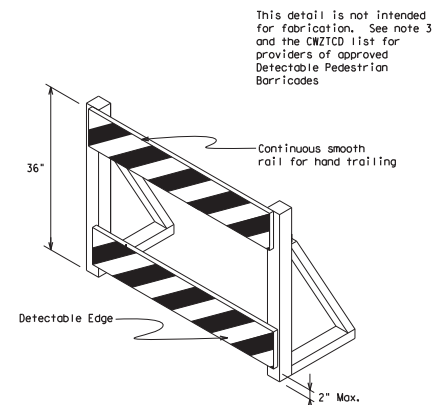
BALLAST

- Unbolstered 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.




DIRECTION INDICATOR BARRICADE

- The Direction Indicator Barricade may be used in tapers, transitions, and other areas where specific directional guidance to drivers is necessary.
- If used, the Direction Indicator Barricade should be used in series to direct the driver through the transition and into the intended travel lane.
- The Direction Indicator Barricade shall consist of One-Direction Large Arrow (CW1-6L) sign in the size shown with a black arrow on a background of Type B_{FL} or Type C_{FL} Orange retroreflective sheeting above a rail with Type A retroreflective sheeting in alternating 4" white and orange stripes sloping downward at an angle of 45 degrees in the direction road users are to pass. Sheeting types shall be as per DMS 8300.
- Double arrows on the Direction Indicator Barricade will not be allowed.
- Approved manufacturers are shown on the CWZTCD List. Ballast shall be as approved by the manufacturers instructions.




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.
- Where pedestrians with visual disabilities normally use the closed sidewalk, a device that is detectable by a person with a visual disability traveling with the aid of a long cane shall be placed across the full width of the closed sidewalk.
- Detectable pedestrian barricades similar to the one pictured above, longitudinal channelizing devices, some concrete barriers, and wood or chain link fencing with a continuous detectable edging can satisfactorily delineate a pedestrian path.
- 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 for Buildings and Facilities (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 may use 8" nominal barricade rails as shown on BC(10) provided that the top rail provides a smooth continuous rail suitable for hand trailing with no splinters, burrs, or sharp edges.



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

- Signs used on plastic drums shall be manufactured using substrates listed on the CWZTCD.
- Chevrans and other work zone signs with an orange background shall be manufactured with Type B_{FL} or Type C_{FL} Orange sheeting meeting the color and retroreflectivity requirements of DMS-8300, "Sign Face Material," unless otherwise specified in the plans.
- Vertical Panels shall be manufactured with orange and white sheeting meeting the requirements of DMS-8300 Type A 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.
- Chevrans 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 of 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 Operations Division Standard

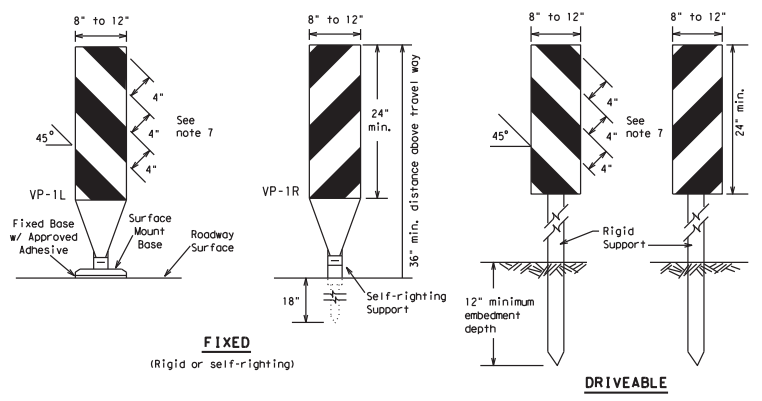
BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC (8) - 14

FILE: bc-14.dgn	DNV: TxDOT	CRK: TxDOT	DNV: TxDOT	CRK: TxDOT
© TxDOT November 2002	CONF: 6380	SECT: 47	JOB: 001	HIGHWAY: IH 44, ETC.
REVISIONS: 4-03 7-13	DIST: 9-07	COUNTY: 8-14	SHEET NO.:	16
			WFS	WICHITA, ETC.

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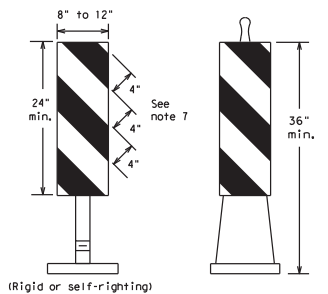
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FIXED
(Rigid or self-righting)

DRIVEABLE

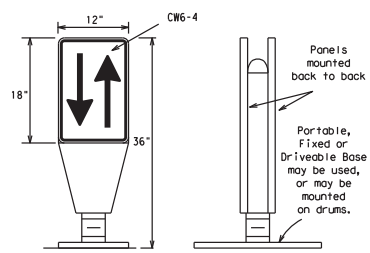
- Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
- VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is required. The Engineer/Inspector shall refer to the Roadway Design Manual Appendix B "Treatment of Pavement Drop-offs in Work Zones" for additional guidelines on the use of 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 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.



(Rigid or self-righting)

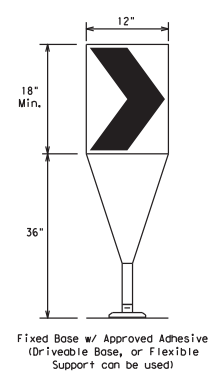
PORTABLE

VERTICAL PANELS (VPs)



OPPOSING TRAFFIC LANE DIVIDERS (OTLD)

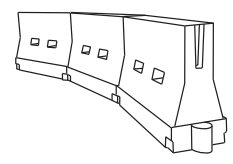
- Opposing Traffic Lane Dividers (OTLD) are delineation devices designed to convert a normal one-way roadway section to two-way operation. OTLD's are used on temporary centerlines. The upward and downward arrows on the sign's face indicate the direction of traffic on either side of the divider. The base 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.



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

- The chevron shall be a vertical rectangle with a minimum size of 12 by 18 inches.
- Chevrons are intended to give notice of a sharp change of alignment with the direction of travel and provide additional emphasis and guidance for vehicle operators with regard to changes in horizontal alignment of the roadway.
- Chevrons, when used, shall be erected on the outside of a sharp curve or turn, or on the far side of an intersection. They shall be in line with and at right angles to approaching traffic. Spacing should be such that the motorist always has three in view, until the change in alignment eliminates its need.
- To be effective, the chevron should be visible for at least 500 feet.
- Chevrons 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 to application and installation requirements specific to the device, and used only when shown on 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 perpendicular to traffic should have at least one row of reflective sheeting meeting the requirements for barricade rails as shown on BC(10) placed 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 NCHRP 350 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 except in low speed (less than 45 MPH) urban areas. When used on a taper in a low speed urban area, the taper shall be delineated and the taper length should be designed to optimize road user operations considering the available geometric conditions.
- 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

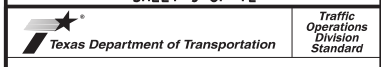
- Work Zone channelizing devices illustrated on this sheet may be installed in close proximity to traffic and are suitable for use on high or low speed roadways. The Engineer/Inspector shall ensure that spacing and placement is uniform and in accordance with the "Texas Manual on Uniform Traffic Control 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	
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent
30	L = WS / 60	150'	165'	180'	30'	60'
35		205'	225'	245'	35'	70'
40		265'	295'	320'	40'	80'
45	L = WS	450'	495'	540'	45'	90'
50		500'	550'	600'	50'	100'
55		550'	605'	660'	55'	110'
60		600'	660'	720'	60'	120'
65		650'	715'	780'	65'	130'
70		700'	770'	840'	70'	140'
75		750'	825'	900'	75'	150'
80		800'	880'	960'	80'	160'

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12



BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC (9) - 14

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9-07	8-14	6380	47	001	IH 44, ETC.				
7-13		DIST:	COUNTY		SHEET NO.				
		WFS:	WICHITA, ETC.		17				

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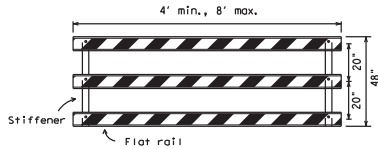
TYPE 3 BARRICADES

1. Refer to the Compliant Work Zone Traffic Control Devices List (CWZTD) 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 conforming to Departmental Material Specification DMS-8300 unless otherwise noted.

Barricades shall NOT be used as a sign support.

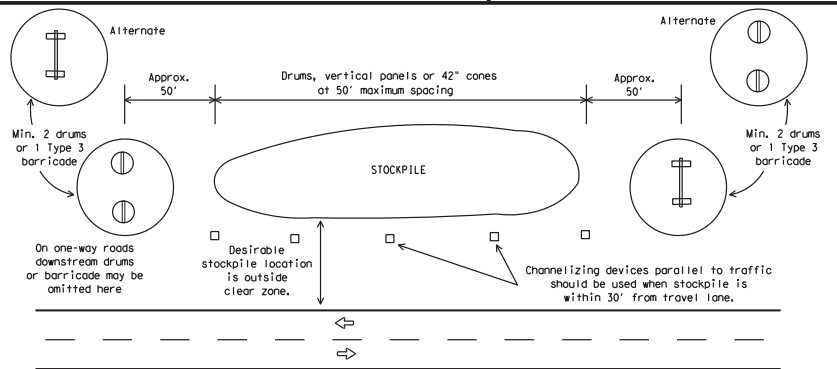


TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



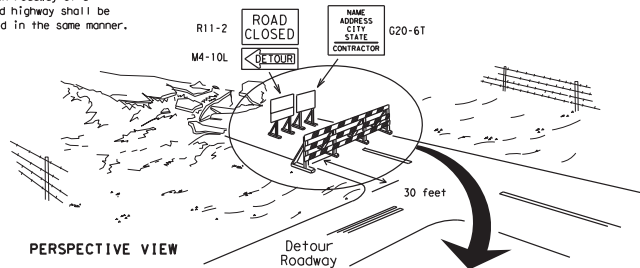
Stiffener may be inside or outside of support, but no more than 2 stiffeners shall be allowed on one barricade.

TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES



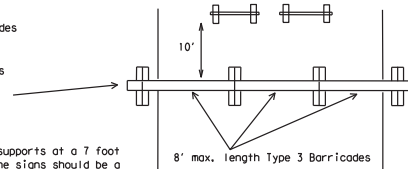
TRAFFIC CONTROL FOR MATERIAL STOCKPILES

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



PERSPECTIVE VIEW

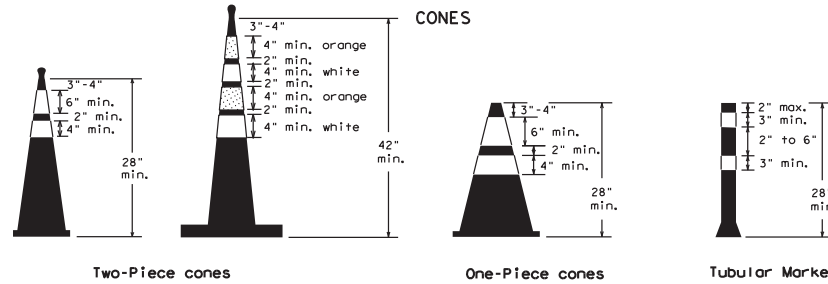
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic. Barricade striping should slant downward in the direction of detour.



PLAN VIEW

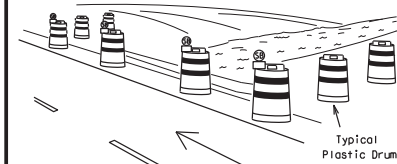
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



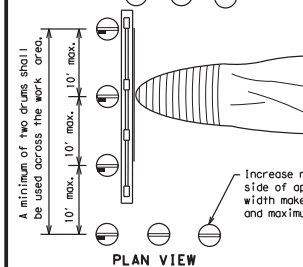
28" Cones shall have a minimum weight of 9 1/2 lbs.
 42" 2-piece cones shall have a minimum weight of 30 lbs. including base.

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 used at night 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.
5. 28" cones and tubular markers are generally suitable for short duration and short-term stationary work as defined on BC(14). 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.



PERSPECTIVE VIEW

These drums are not required on one-way roadway



PLAN VIEW

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)

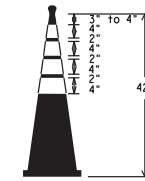
1. Where positive redirection capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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

LEGEND

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

CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS

THIS DEVICE SHALL NOT BE USED ON PROJECTS LET AFTER MARCH 2014.



EDGELINE CHANNELIZER

1. This device is intended only for use in place of a vertical panel to channelize traffic by indicating the edge of the travel lane. It is not intended to be used in transitions or tapers.
2. This device shall not be used to separate lanes of traffic (topposing or otherwise) or warn of objects.
3. This device is based on a 42 inch, two-piece cone with an alternate striping pattern: four 4 inch retroreflective bands, with an approximate 2 inch gap between bands. The color of the band should correspond to the color of the edgeline (yellow for left edgeline, white for right edgeline) for which the device is substituted or for which it supplements. The reflectorized bands shall be retroreflective Type A conforming to Departmental Material Specification DMS-8300, unless otherwise noted.
4. The base must weigh a minimum of 30 lbs.

SHEET 10 OF 12

		Texas Department of Transportation		<i>Traffic Operations Division Standard</i>	
BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES					
BC (10) - 14					
FILE:	DC-14.dgn	DWG:	TxDOT	CHK:	TxDOT
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DIST:	9-07	COUNTY:	001	JOB:	IH 44, ETC.
DIST:	7-13	COUNTY:	WFS	JOB:	WICHITA, ETC.
					SHEET NO. 18

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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

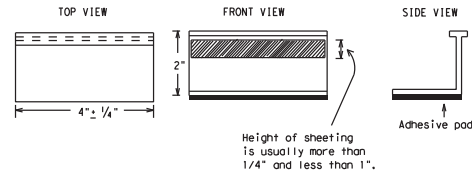
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

SHEET 11 OF 12



BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-14

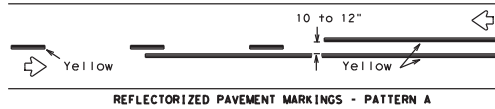
FILE: bc-14.dgn	DN: TxDOT	CR: TxDOT	DR: TxDOT	EX: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
2-98	9-07	6380	47	001
1-02	7-13	DIST	COUNTY	SHEET NO.
11-02	8-14	WFS	WICHITA, ETC.	19

105

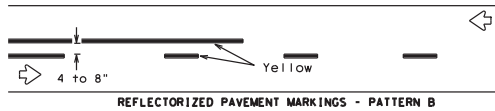
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by the Texas Department of Transportation for the use of this standard or for incorrect results or damages resulting from its use.

DATE: 5/21/2021 2:16:47 PM
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PAVEMENT MARKING PATTERNS

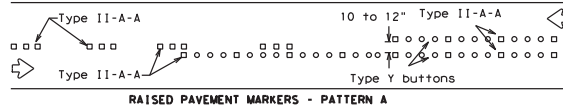


REFLECTORIZED PAVEMENT MARKINGS - PATTERN A

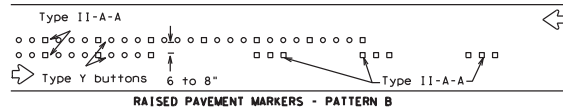


REFLECTORIZED PAVEMENT MARKINGS - PATTERN B

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

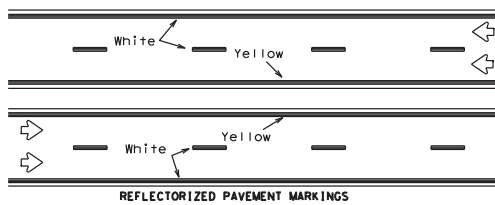


RAISED PAVEMENT MARKERS - PATTERN A



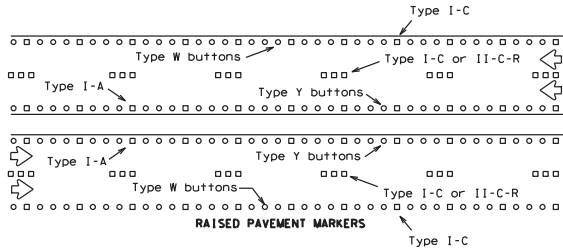
RAISED PAVEMENT MARKERS - PATTERN B

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



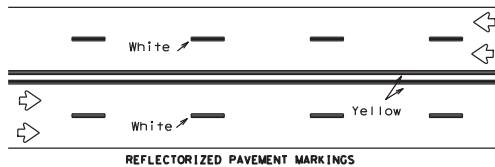
REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectORIZED pavement markings.



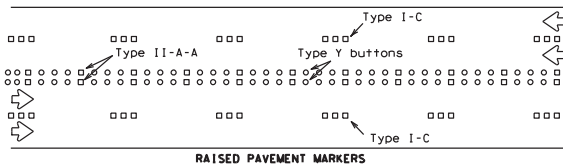
RAISED PAVEMENT MARKERS

EDGE & LANE LINES FOR DIVIDED HIGHWAY



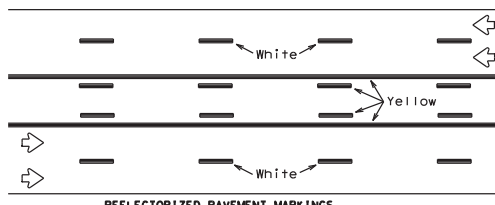
REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectORIZED pavement markings.



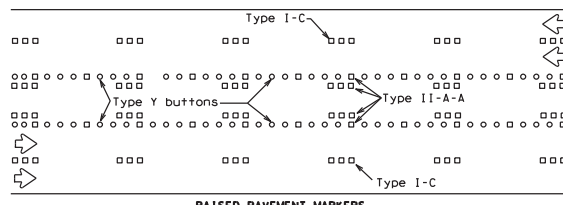
RAISED PAVEMENT MARKERS

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS

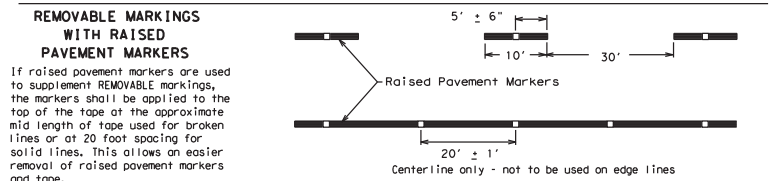
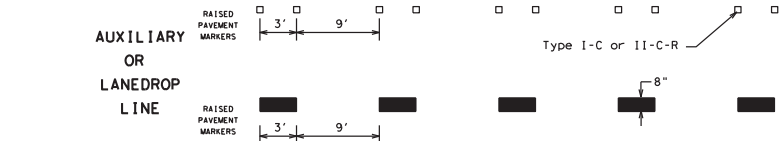
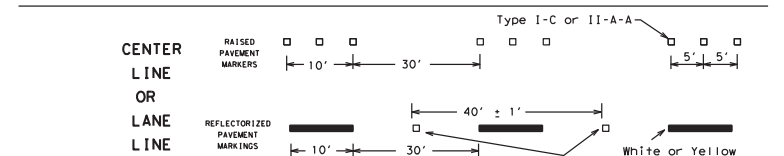
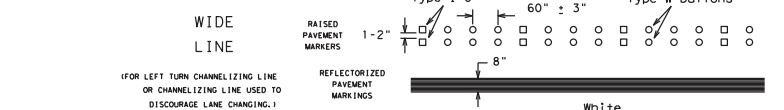
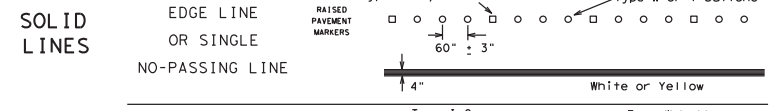
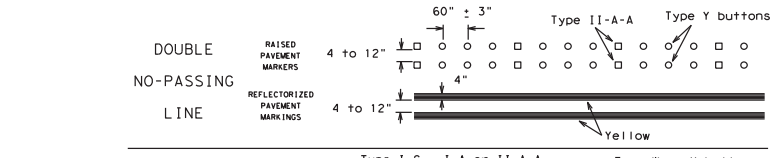
Prefabricated markings may be substituted for reflectORIZED pavement markings.



RAISED PAVEMENT MARKERS

TWO-WAY LEFT TURN LANE

STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS



SHEET 12 OF 12

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

Texas Department of Transportation
 Traffic Operations Division Standard

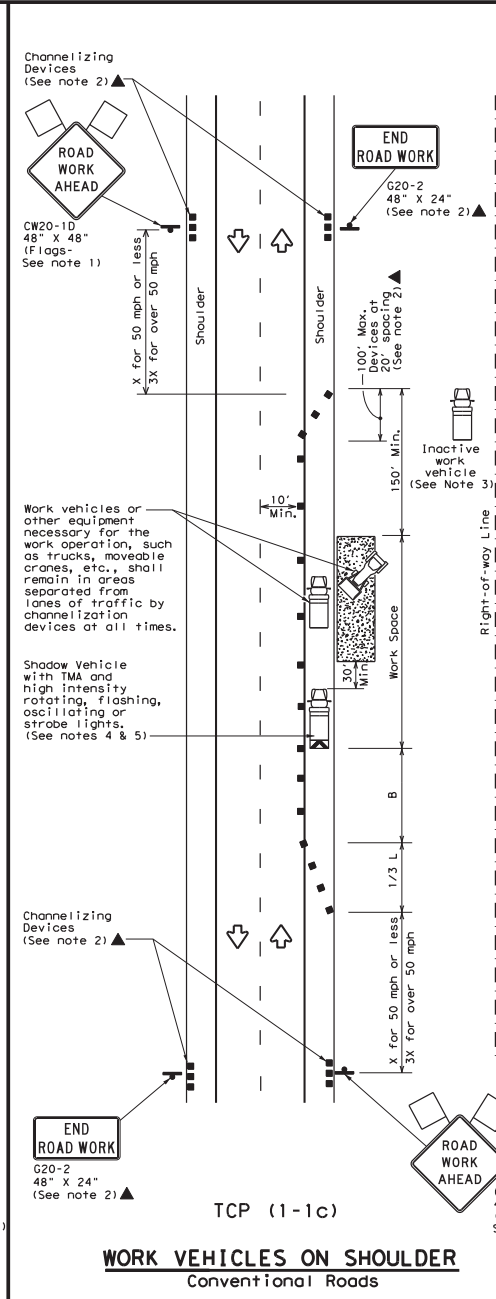
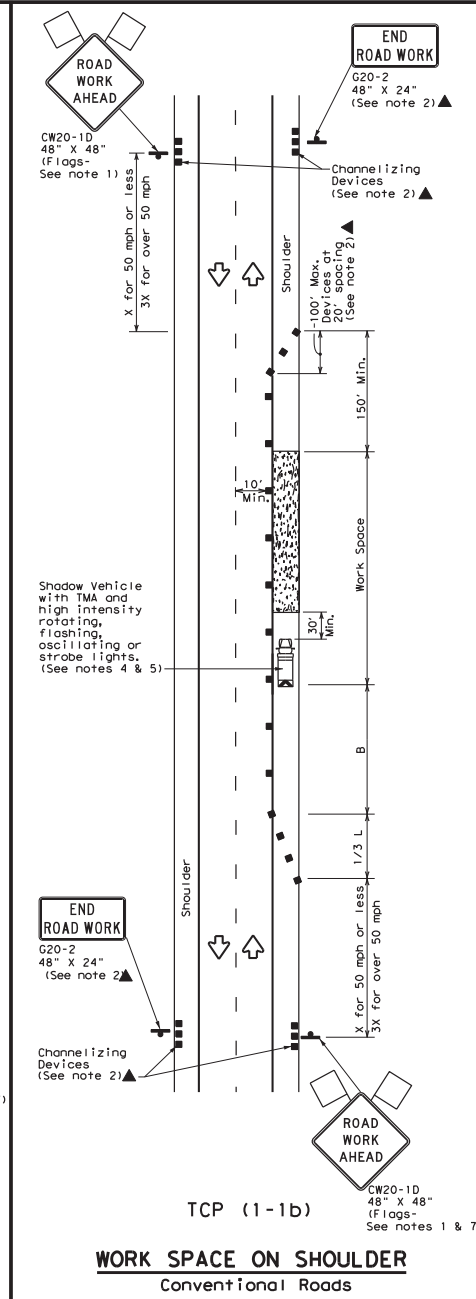
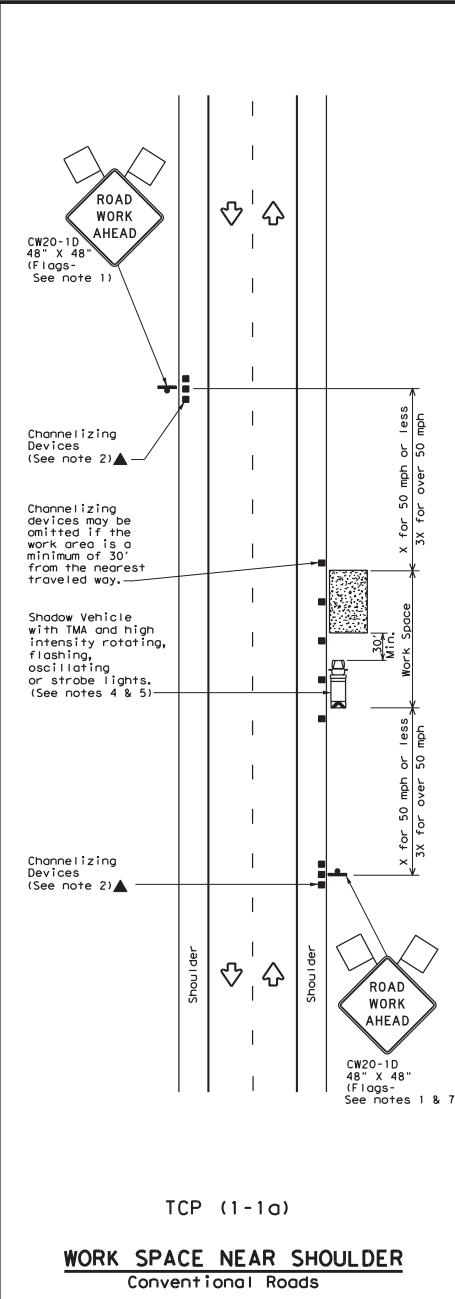
BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-14

FILE: dc-14.dgn	DN: TxDOT	CR: TxDOT	DR: TxDOT	EX: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
1-97 9-07 REVISIONS	6380	47	001	IH 44, ETC.
2-98 7-13	DIST	COUNTY		SHEET NO.
11-02 8-14	WFS	WICHITA, ETC.		20

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DATE: 5/21/2021 2:16:48 PM
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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		Minimum Sign Spacing Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L = WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

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

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

- GENERAL NOTES**
- 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 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
 - 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

TRAFFIC CONTROL PLAN
CONVENTIONAL ROAD
SHOULDER WORK

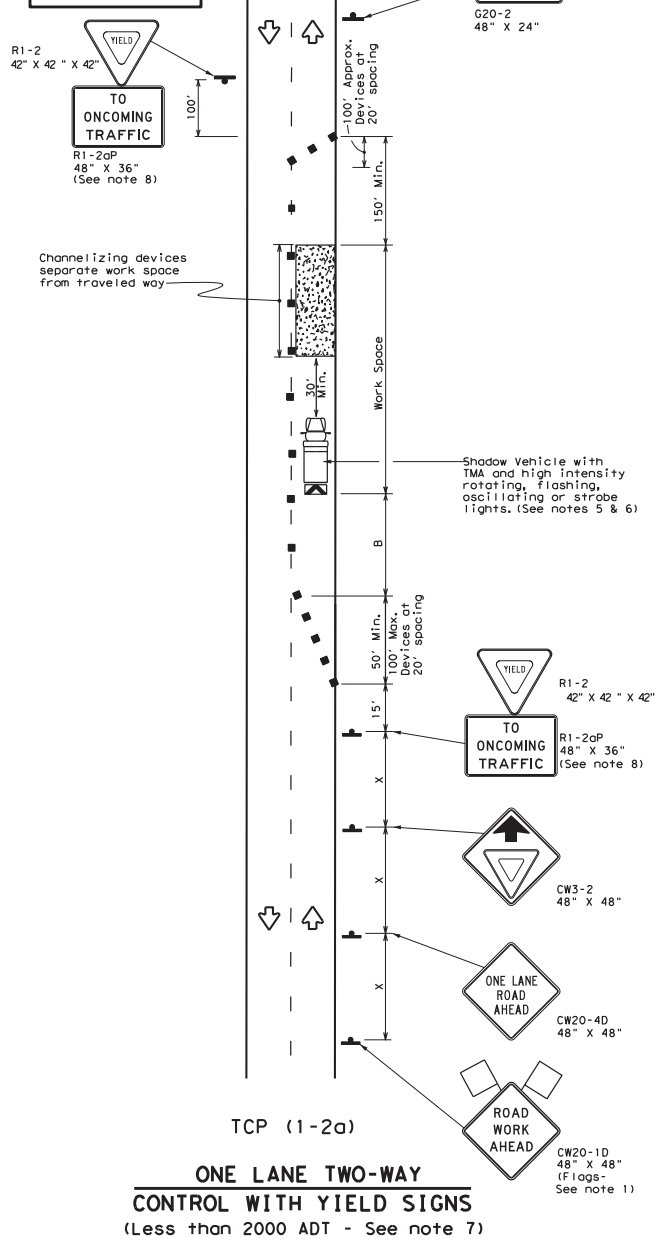
TCP (1-1) - 18

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REVISIONS:					
2-94 4-98					
8-95 2-12					
1-97 2-18					
DIST: WFS	COUNTY: WICHITA, ETC.	SHEET NO: 21			

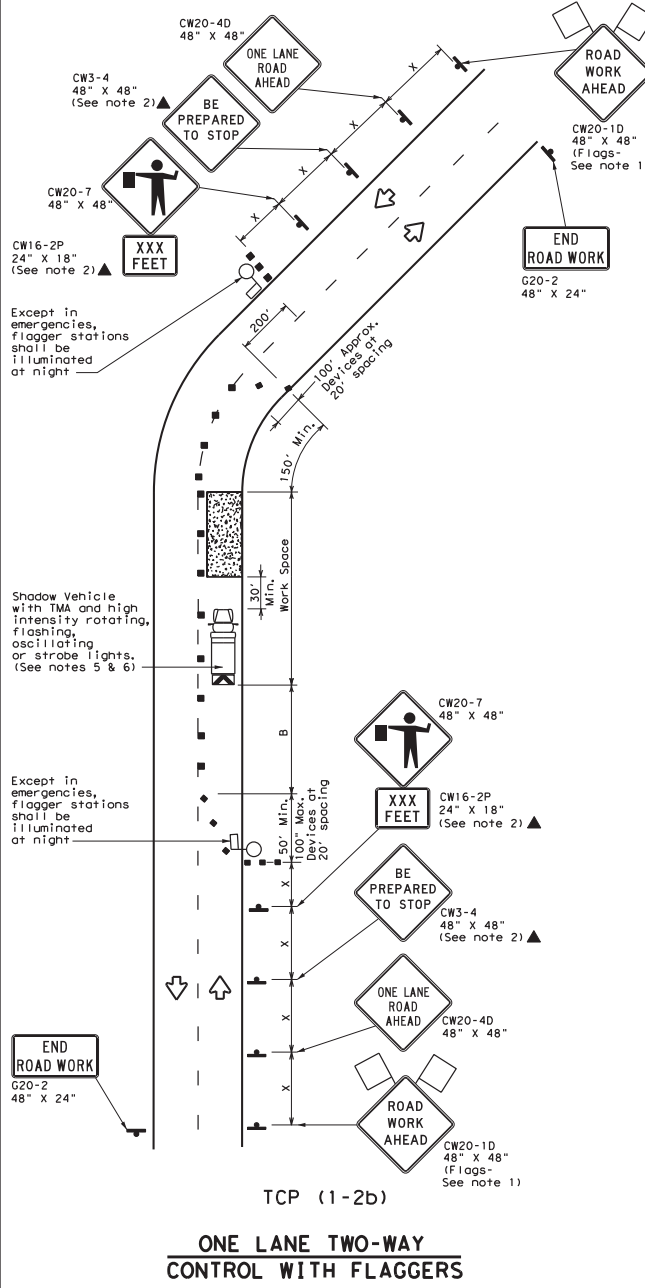
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion or use of this standard in any project. TxDOT is not responsible for any injuries, damages or losses resulting from its use.

DATE: 5/21/2021 2:16:50 PM
 FILE: T:\MFSMAINT\Maintenance Projects\6380-47-001 On Coll Guardrail - FY 22 of this project\signing\signing\1-2-18.dgn

Warning Sign Sequence in Opposite Direction Same as Below



TCP (1-2a)
ONE LANE TWO-WAY
CONTROL WITH YIELD SIGNS
 (Less than 2000 ADT - See note 7)



TCP (1-2b)
ONE LANE TWO-WAY
CONTROL WITH FLAGGERS

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X"	Suggested Longitudinal Buffer Space "B"	Stopping Distance
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent			
30	L = WS ² / 60	150'	165'	180'	30'	60'	120'	90'	200'
35		205'	225'	245'	35'	70'	160'	120'	250'
40		265'	295'	320'	40'	80'	240'	155'	305'
45	L = WS	450'	495'	540'	45'	90'	320'	195'	360'
50		500'	550'	600'	50'	100'	400'	240'	425'
55		550'	605'	660'	55'	110'	500'	295'	495'
60		600'	660'	720'	60'	120'	600'	350'	570'
65		650'	715'	780'	65'	130'	700'	410'	645'
70		700'	770'	840'	70'	140'	800'	475'	730'
75		750'	825'	900'	75'	150'	900'	540'	820'

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

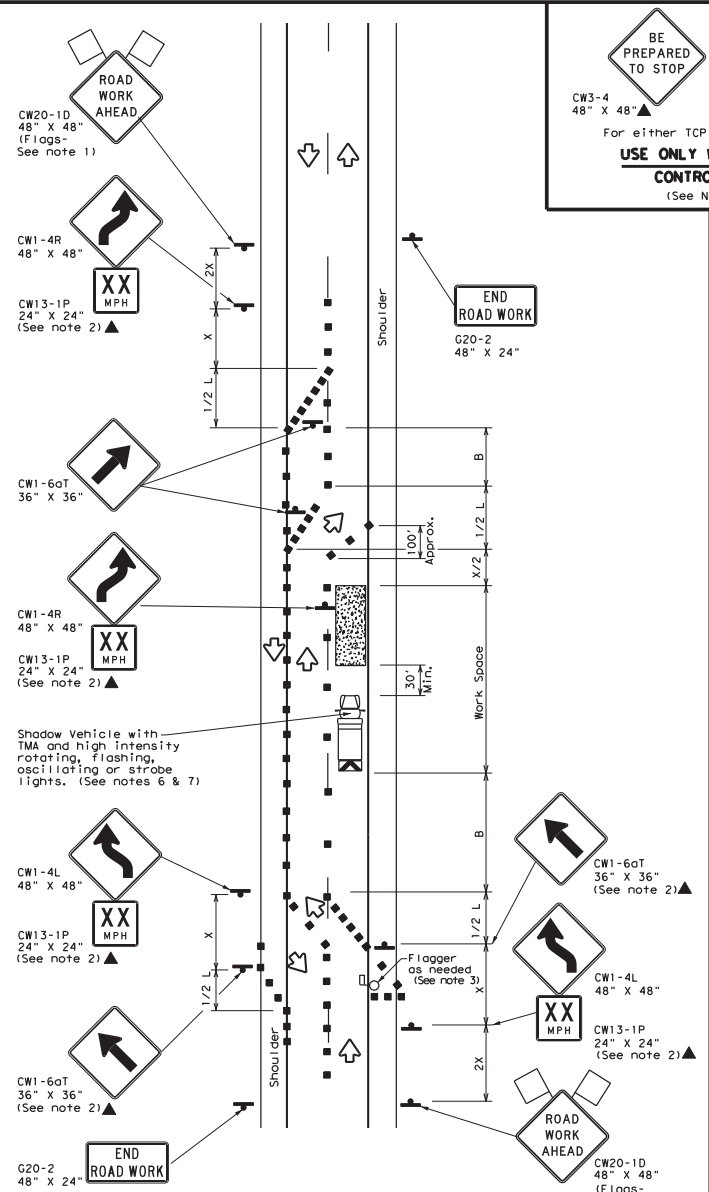
TYPICAL USAGE			
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	LONG TERM STATIONARY
	✓	✓	

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.
 - The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4D "ONE LANE ROAD AHEAD" sign, but proper sign spacing shall be maintained.
 - Sign spacing may be increased or an additional CW20-1D "ROAD WORK AHEAD" sign may be used if advance warning ahead of the flagger or R1-2 "YIELD" sign is less than 1500 feet.
 - A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
 - Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.
- TCP (1-2a)**
- R1-2 "YIELD" sign traffic control may be used on projects with approaches that have adequate sight distance. For projects in urban areas, work spaces should be no longer than one half city block. In rural areas on roadways with less than 2000 ADT, work spaces should be no longer than 400 feet.
 - R1-2 "YIELD" sign with R1-2P "TO ONCOMING TRAFFIC" plaque shall be placed on a support at a 7 foot minimum mounting height.
- TCP (1-2b)**
- Flaggers should use two-way radios or other methods of communication to control traffic.
 - Length of work space should be based on the ability of flaggers to communicate.
 - If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain adequate stopping sight distance to the flagger and a queue of stopped vehicles (see table above).
 - Channelizing devices on the center-line may be omitted when a pilot car is leading traffic and approved by the Engineer.
 - Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situations.

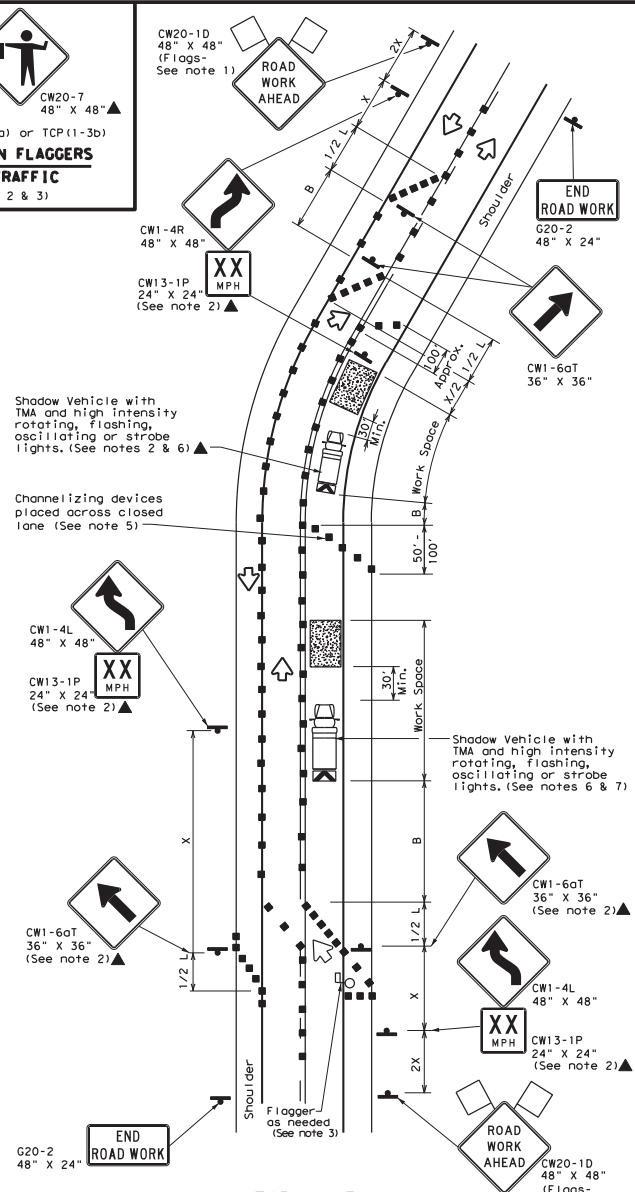
		Traffic Operations Division Standard			
TRAFFIC CONTROL PLAN					
ONE-LANE TWO-WAY					
TRAFFIC CONTROL					
TCP (1-2)-18					
FILE:	tcp1-2-18.dgn	DATE:	01/11/2018	BY:	001
© TxDOT	December 1985	CONT	6380	SECT	47
4-90 4-90 REVISIONS		JOB		001 IH 44, ETC.	
2-94 2-12		COUNTY		SHEET NO.	
1-97 2-18		WFS		WICHITA, ETC.	
152					

DATE: 5/21/2021 2:16:51 PM
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TCP (1-3a)
 2-LANE ROADWAY WITH PAVED SHOULDERS
ONE LANE CLOSED
ADEQUATE FIELD OF VIEW

BE PREPARED TO STOP
 CW3-4 48" X 48"
 CW20-7 48" X 48"
 For either TCP (1-3a) or TCP (1-3b)
USE ONLY WHEN FLAGGERS CONTROL TRAFFIC
 (See Notes 2 & 3)



TCP (1-3b)
 2-LANE ROADWAY WITH PAVED SHOULDERS
ONE LANE CLOSED
INADEQUATE FIELD OF VIEW

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

Posted Speed * *	Formula	Minimum Destructible Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
30	L = WS² / 60	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45		450'	495'	540'	45'	90'	320'	195'
50	L = WS	500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

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

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

- GENERAL NOTES**
- 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.
 - Flagger control should NOT be used unless roadway conditions or heavy traffic volume require additional emphasis to safely control traffic. Additional flaggers may be positioned in advance of traffic queues to alert traffic to reduce speed.
 - DO NOT PASS, PASS WITH CARE and construction regulatory speed zone signs may be installed downstream of the ROAD WORK AHEAD signs.
 - When the work zone is made up of several work spaces, channelizing devices should be placed laterally across the closed lane to re-emphasize closure. Laterally placed channelizing devices should be repeated every 500 to 1000 feet in urban areas and every 1/4 to 1/2 mile in rural areas.
 - A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
 - Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.
 - Where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20', or 15' if posted speed is 35 mph or slower, and for tangent sections, at 1/2S where S is the speed in mph. This tighter device spacing is intended for the area of conflicting markings not the entire work zone.

Traffic Operations Division Standard

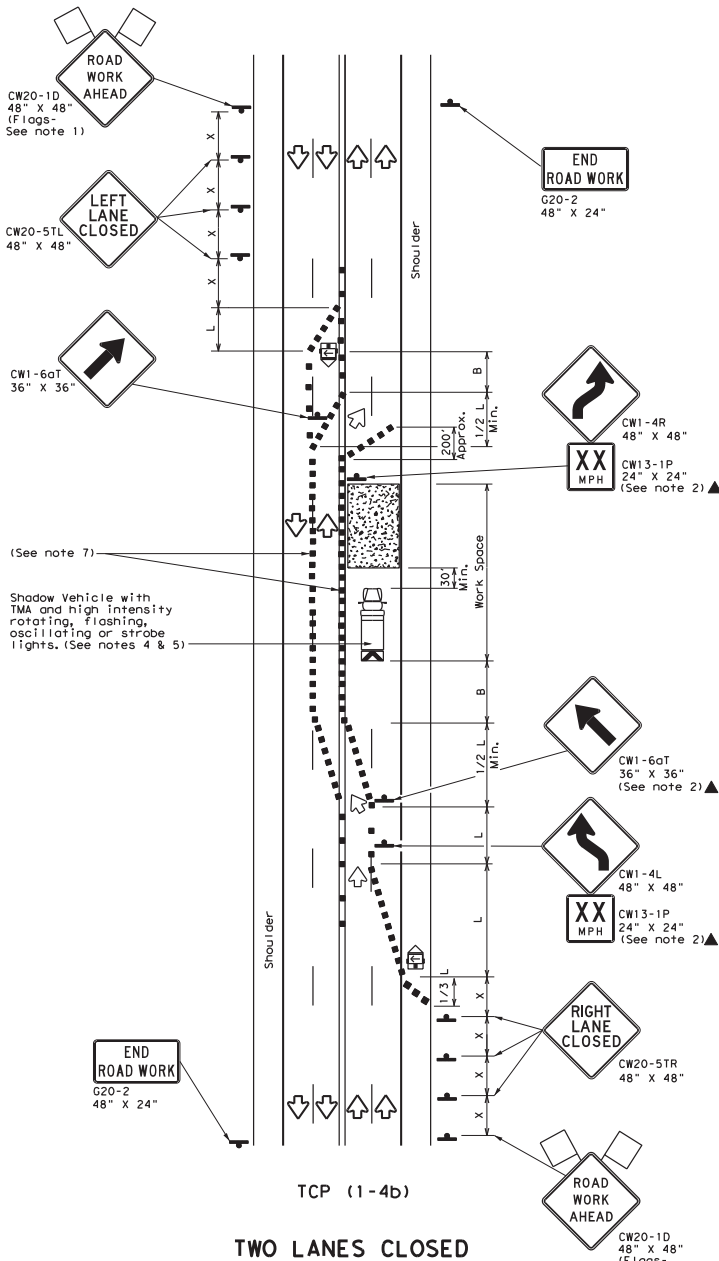
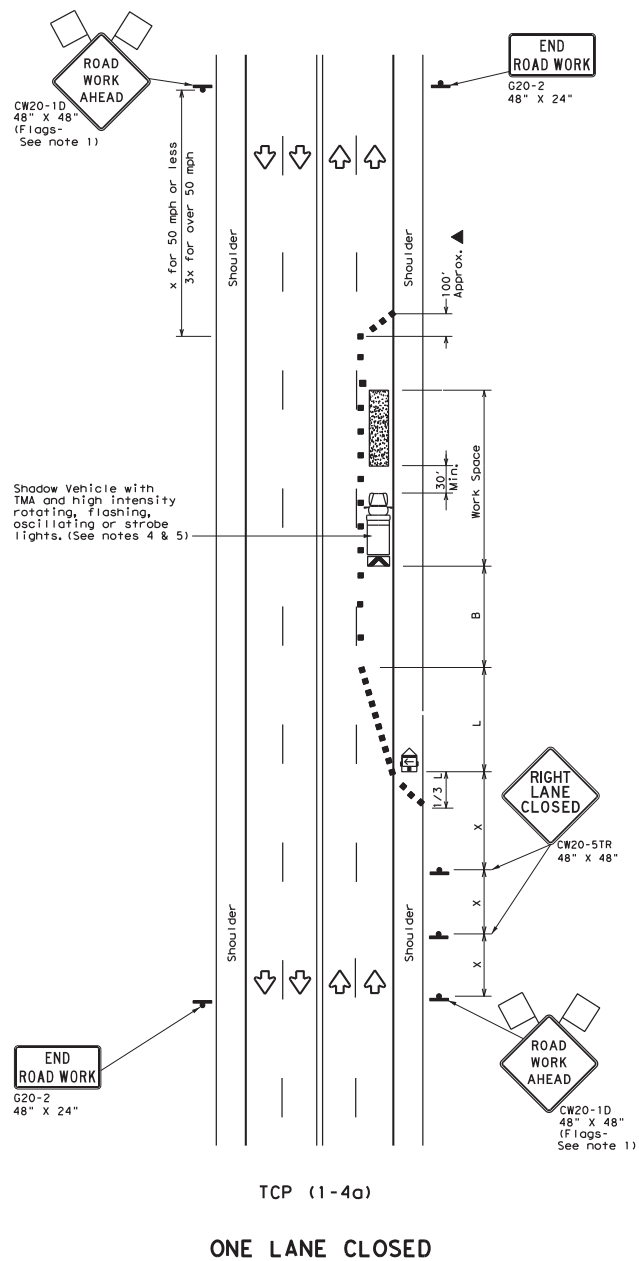
TRAFFIC CONTROL PLAN TRAFFIC SHIFTS ON TWO LANE ROADS TCP (1-3) - 18

FILE:	tcp1-3-18.dgn	DATE:	DEC 1985	CONTRACT NO.:	6380-47	JOB NO.:	001	SHEET NO.:	44 OF 44, ETC.
REVISIONS:		DATE:		DISTRICT:		COUNTY:		WICHITA, ETC.	23

[15]

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DATE: 5/21/2021 2:16:53 PM
FILE: T:\WFSMAINT\Maintenance Projects\6380-47-001 On Coll Guardrail - FY 22\21-0518\Signage\Signage\TCP (1-4) (1-18).dgn



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

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

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

- GENERAL NOTES**
- 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.
 - The CW20-1D "ROAD WORK AHEAD" sign may be repeated if the visibility of the work zone is less than 1500 feet.
 - A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
 - Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.
- TCP (1-4a)**
- If this TCP is used for a left lane closure, CW20-5TL "LEFT LANE CLOSED" signs shall be used and channelizing devices shall be placed on the centerline where needed to protect the work space from opposing traffic with the arrow panel placed in the closed lane near the end of the merging taper.
- TCP (1-4b)**
- Where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20' or 15' if posted speeds are 35 mph or slower, and for tangent sections, at 1/2S where S is the speed in mph. This tighter device spacing is intended for the areas of conflicting markings, not the entire work zone.

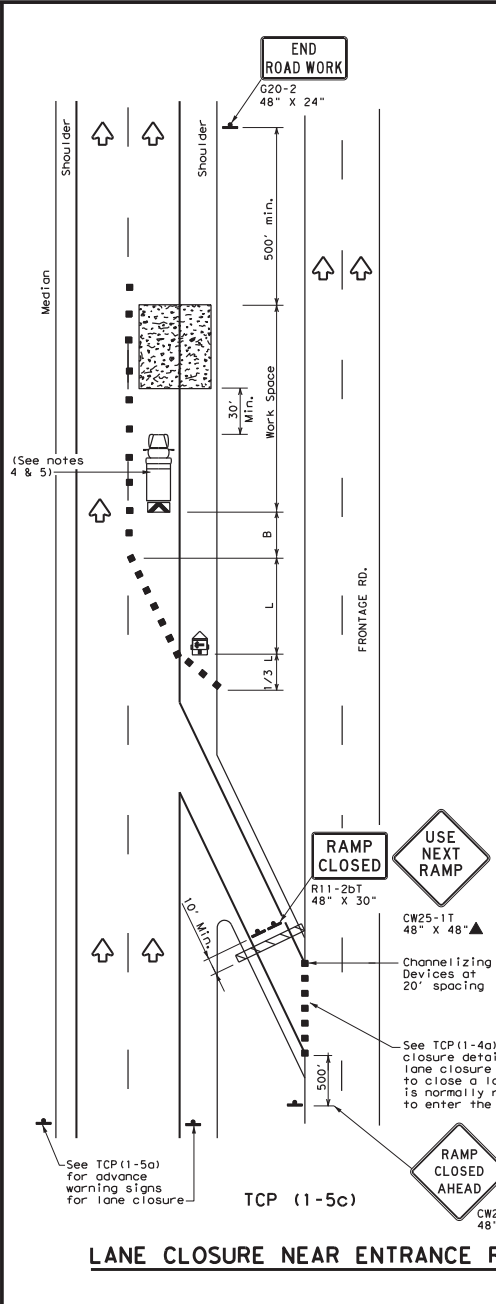
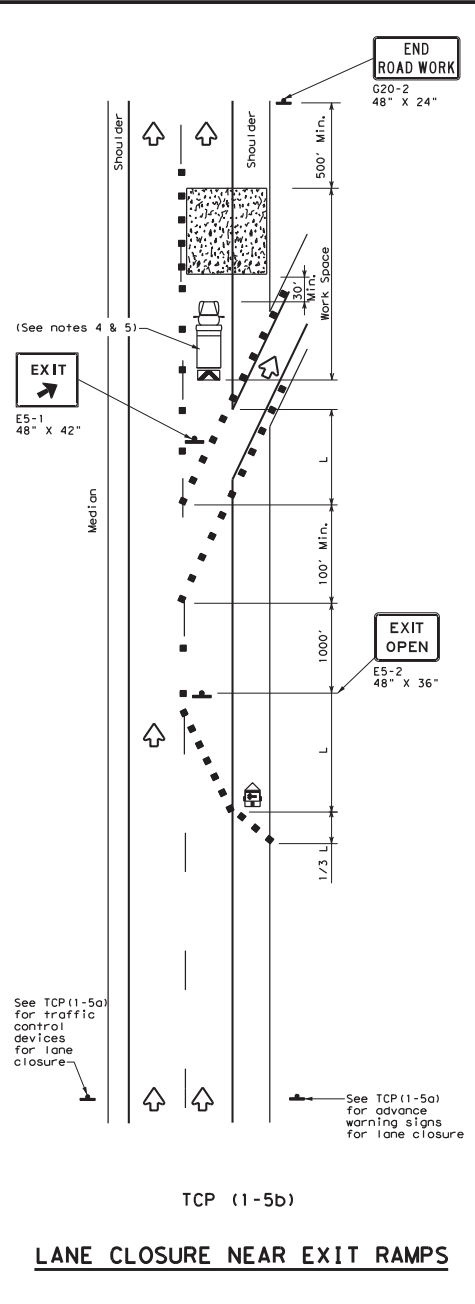
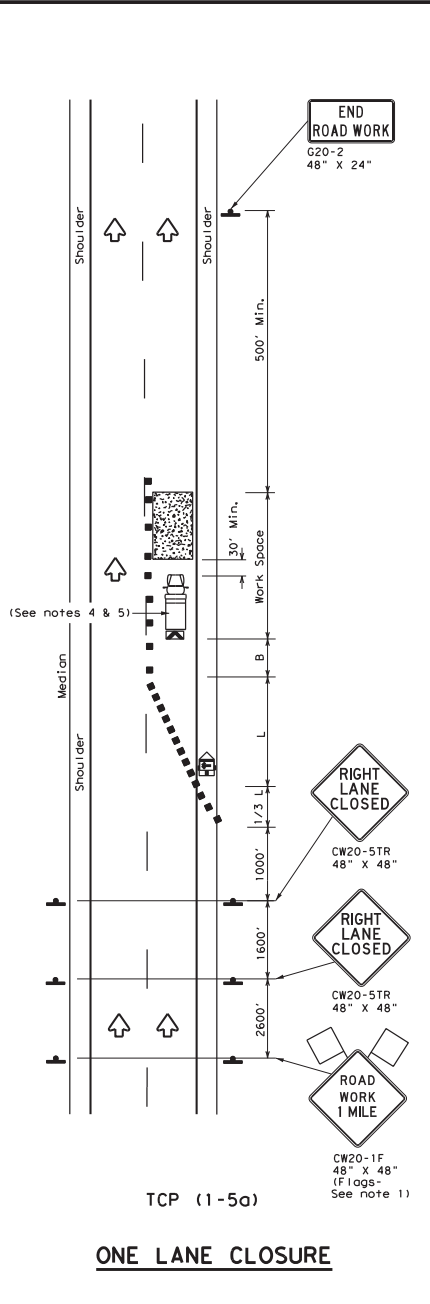
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

TCP (1-4) - 18

FILE: tcp1-4-18.dgn	DATE: December 1985	CONTRACT: 6380	SECTION: 47	JOB: 001	DATE: IH 44, ETC.
© TxDOT		REVISIONS		SHEET NO.	
2-94		4-98		DISTRICT	
8-95		2-12		COUNTY	
1-97		2-18		WFS WICHITA, ETC.	
				24	

DATE: 5/21/2021 2:16:54 PM
 FILE: T:\WFSMAINT\Maintenance Projects\6380-47-001 On Coll Guardrail FY 22\6380-47-001.dgn
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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		Minimum Sign Spacing "x" Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
30	L = WS ² / 60	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L = WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

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

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

- GENERAL NOTES**
- 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.
 - Channelizing devices used to close lanes may be supplemented with the Chevron Alignment Sign placed on every other channelizing device. Chevrons may be attached to plastic drums as per BC Standards.
 - Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
 - Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES FOR DIVIDED HIGHWAYS

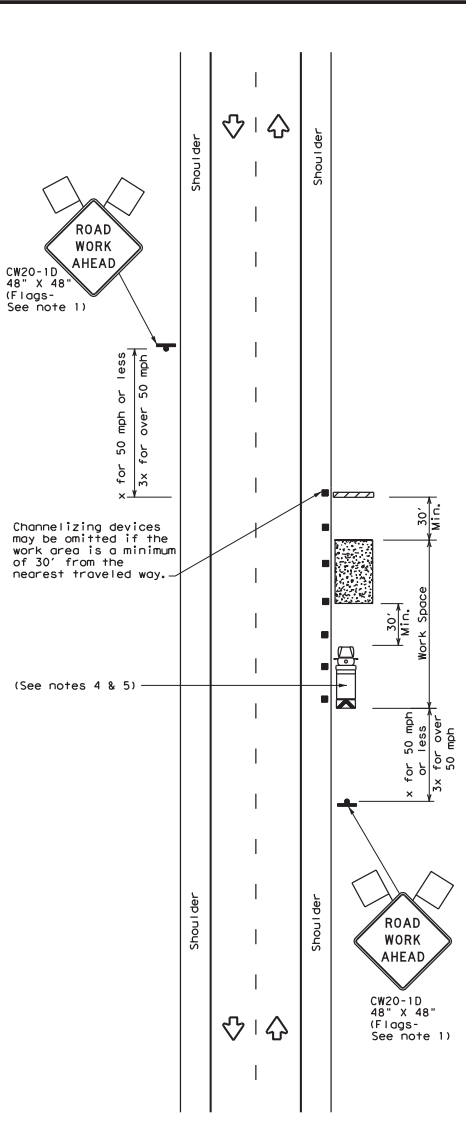
TCP (1-5) - 18

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6380	47	001	IH 44, ETC.	
2-18		WFS	WICHITA, ETC.	
				25

1155

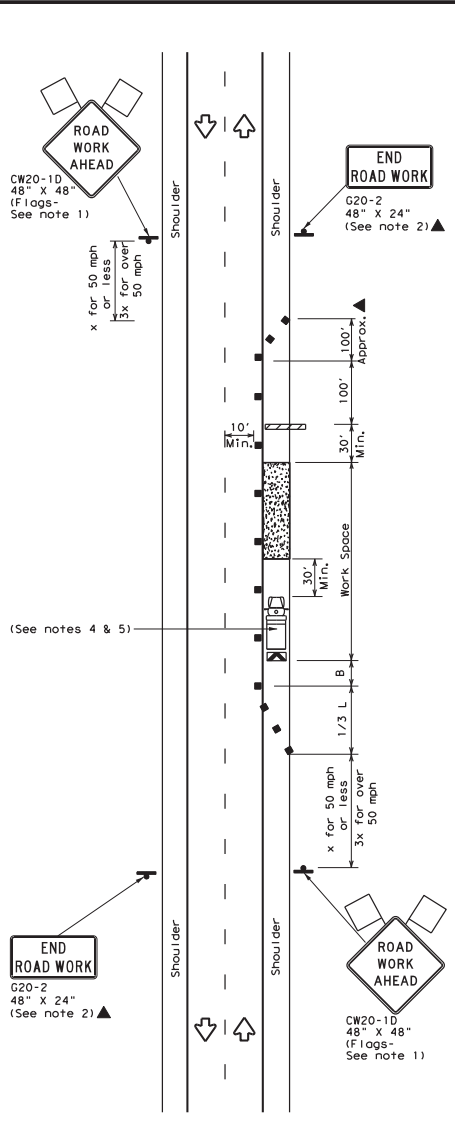
DISCLAIMER:
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DATE: 5/21/2021 2:16:55 PM
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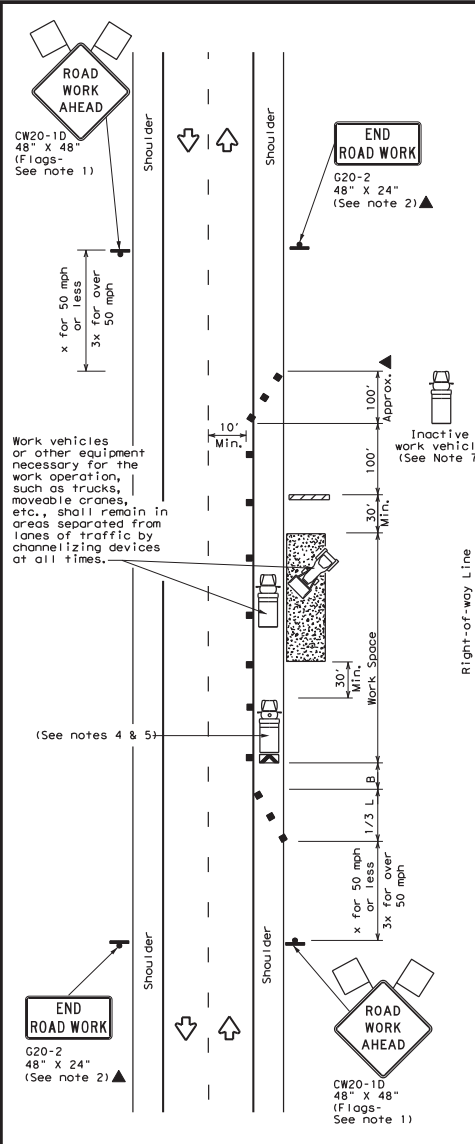
TCP (2-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

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

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



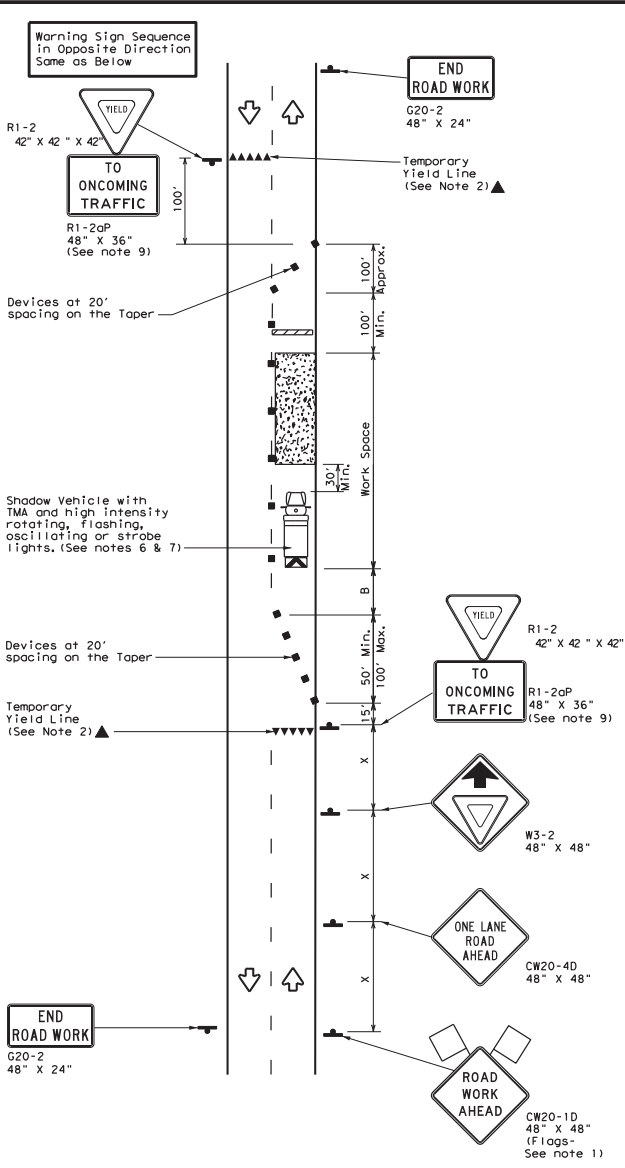
TRAFFIC CONTROL PLAN
CONVENTIONAL ROAD
SHOULDER WORK

TCP (2-1) - 18

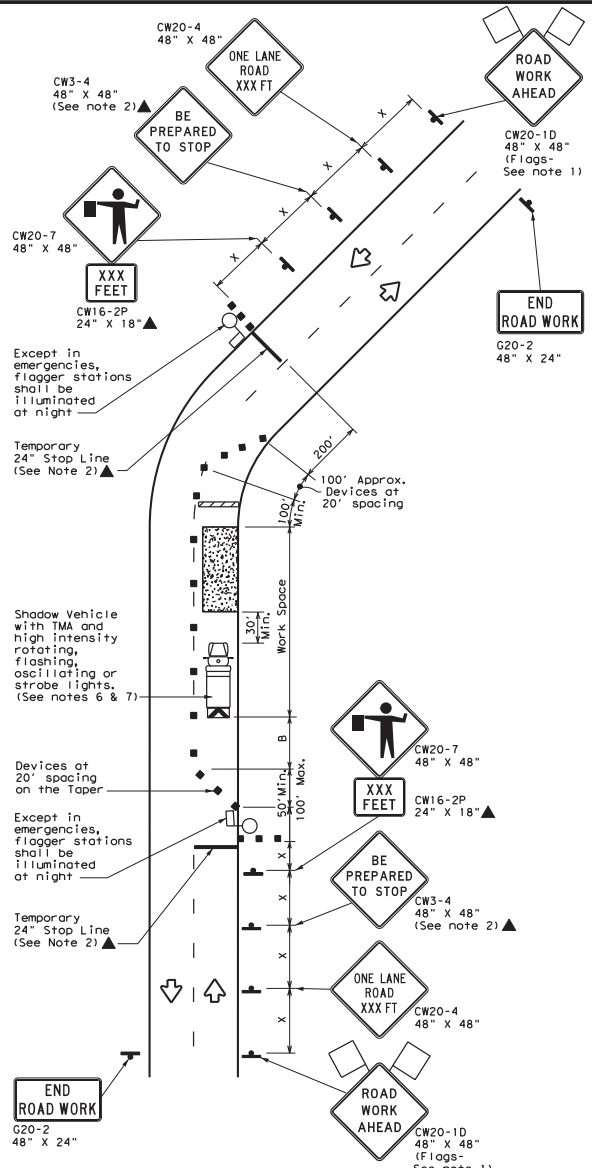
FILE: tcp2-1-18.dgn	DATE: December 1985	CONTRACT: 6380	SECTION: 47	JOB: 001	HIGHWAY: IH 44, ETC.
REVISIONS:					
2-94 4-98					
8-95 2-12					
1-97 2-18					
WFS WICHITA, ETC.				SHEET NO. 26	

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DATE: 5/21/2021 2:16:57 PM
 FILE: T:\WFSMAINT\Maintenance Projects\6380-47-001 On Coll Guardrail.FY 22 of 23



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



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

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "x" Distance	Suggested Longitudinal Buffer Space "b"	Stopping Sight Distance
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent			
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'	200'
35		205'	225'	245'	35'	70'	160'	120'	250'
40		265'	295'	320'	40'	80'	240'	155'	305'
45		450'	495'	540'	45'	90'	320'	195'	360'
50		500'	550'	600'	50'	100'	400'	240'	425'
55	L=WS	550'	605'	660'	55'	110'	500'	295'	495'
60		600'	660'	720'	60'	120'	600'	350'	570'
65		650'	715'	780'	65'	130'	700'	410'	645'
70		700'	770'	840'	70'	140'	800'	475'	730'
75		750'	825'	900'	75'	150'	900'	540'	820'

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

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

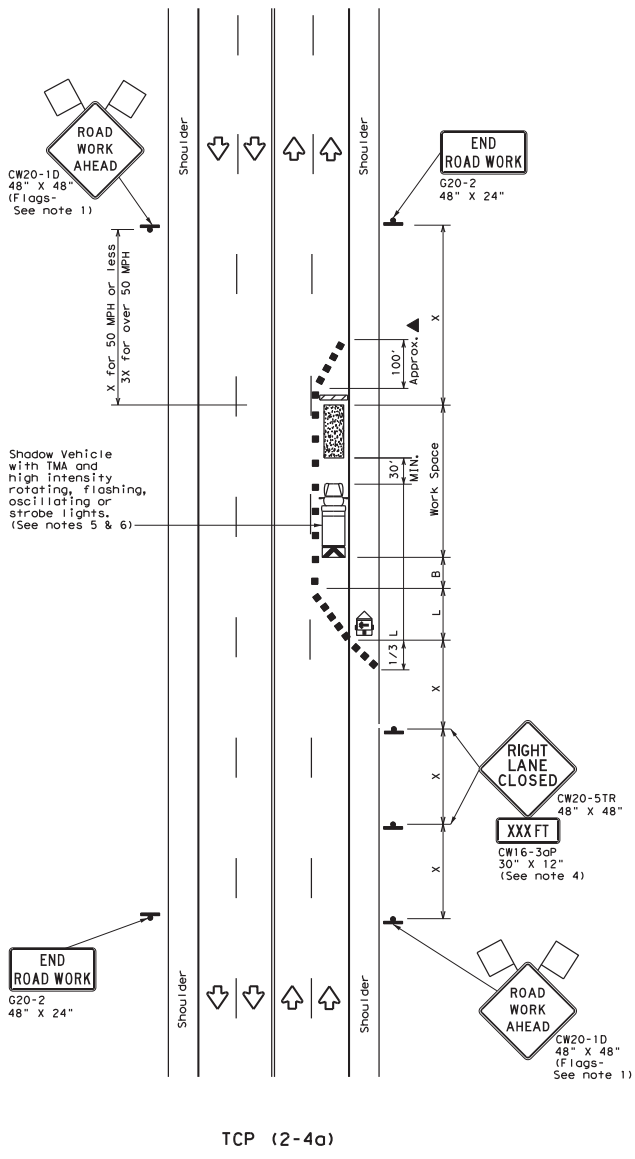
GENERAL NOTES

- 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.
 - The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4 "ONE LANE ROAD XXX FT" sign, but proper sign spacing shall be maintained.
 - Flaggers should use two-way radios or other methods of communication to control traffic.
 - Length of work space should be based on the ability of flaggers to communicate.
 - A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
 - Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.
- TCP (2-2a)**
- The R1-2 "YIELD" sign traffic control may be used on projects with approaches that have adequate sight distance. For projects in urban areas, work space should be no longer than one half city block. In rural areas, roadways with less than 2000 ADT, work space should be no longer than 400 feet.
 - The R1-2aP "YIELD TO ONCOMING TRAFFIC" sign shall be placed on a support at a 7 foot minimum mounting height.
- TCP (2-2b)**
- Channelizing devices on the center line may be omitted when a pilot car is leading traffic and approved by the Engineer.
 - If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain stopping sight distance to the flagger and a queue of stopped vehicles. (See table above).
 - Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situations.

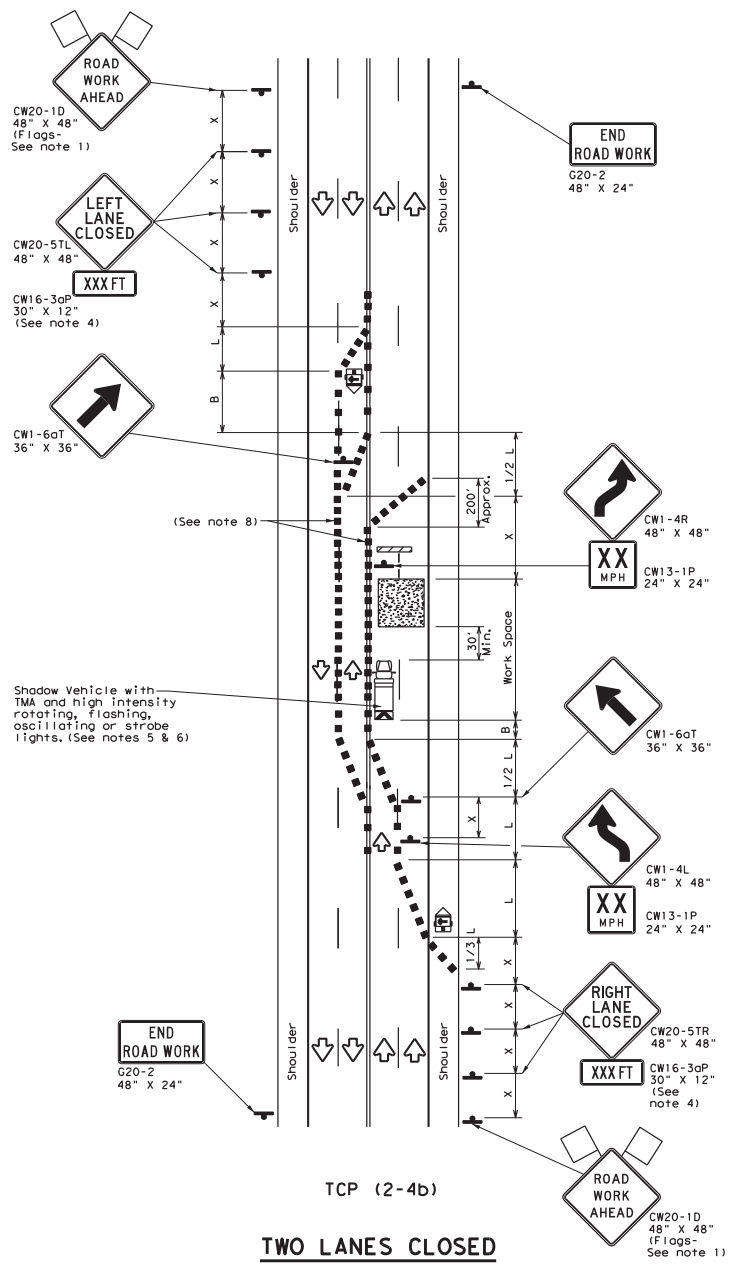
			Traffic Operations Division Standard		
TRAFFIC CONTROL PLAN ONE-LANE TWO-WAY TRAFFIC CONTROL TCP (2-2)-18					
FILE:	tcp2-2-18.dgn	DATE:	12/18/85	CONTRACT NO.:	6380-47
REVISIONS:		COUNT:	47	JOB NO.:	IH 44, ETC.
8-95	3-03	DIST:	001	COUNTY:	WICHITA, ETC.
1-97	2-12	WFS:		SHEET NO.:	27
4-98	2-18				

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DATE: 5/21/2021 2:16:58 PM
FILE: T:\WFSMAINT\Maintenance Projects\6380-47-001 On Coll Guardrail FY 22.dwg



TCP (2-4a)
ONE LANE CLOSED



TCP (2-4b)
TWO LANES CLOSED

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

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

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

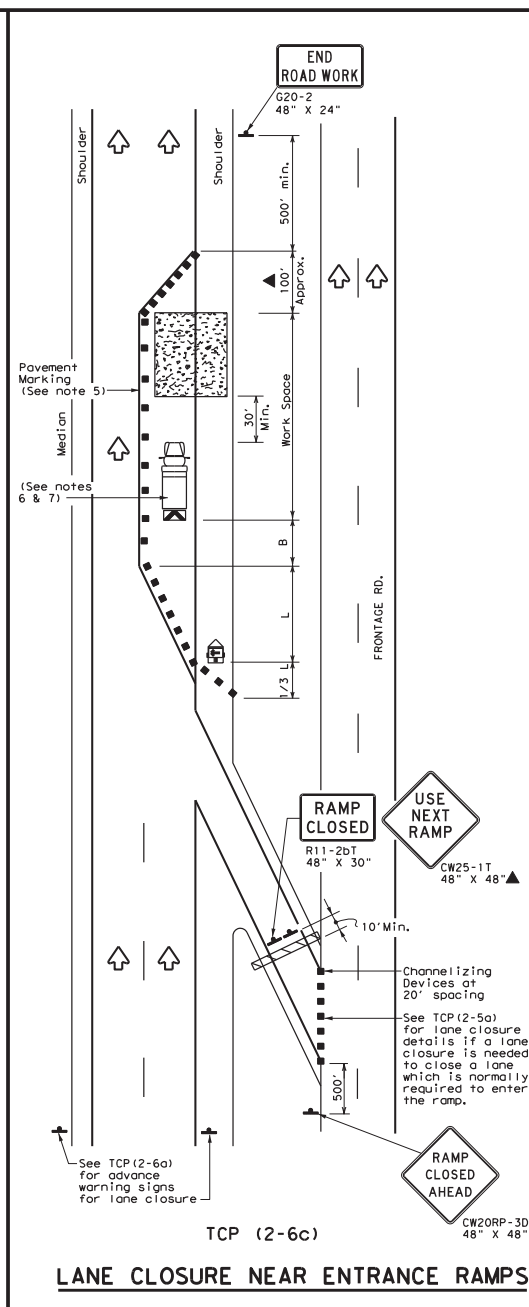
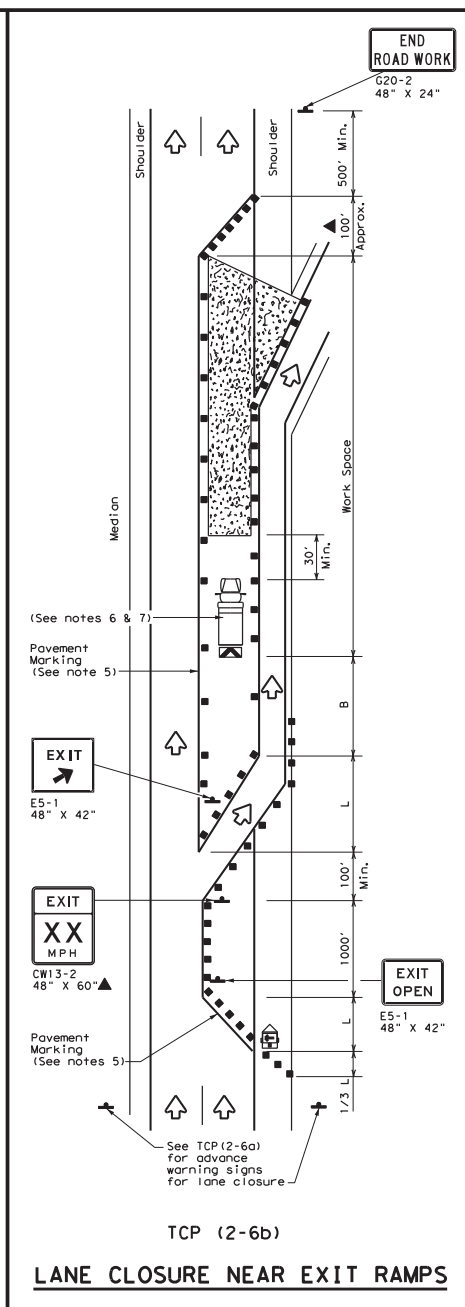
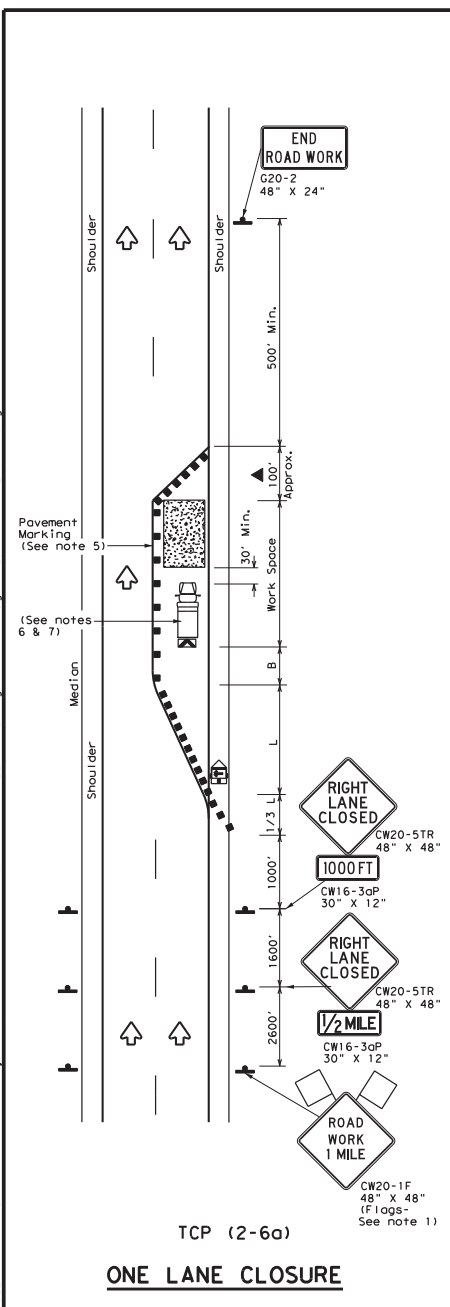
MOBILE	TYPICAL USAGE			
	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY

- 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.
 - The downstream taper is optional. When used, it should be 100 feet minimum length per lane.
 - For short term applications, when post mounted signs are not used, the distance legend may be shown on the sign face rather than on a CW16-3AP supplemental plaque.
 - A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
 - Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.
- TCP (2-4a)**
- If this TCP is used for a left lane closure, CW20-5TL "LEFT LANE CLOSED" signs shall be used and channelizing devices shall be placed on the centerline to protect the work space from opposing traffic with the arrow board placed in the closed lane near the end of the merging taper.
- TCP (2-4b)**
- For shorter durations where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20' or 15' if posted speeds are 35 mph or slower, and for tangent sections, at 1/2(S) where S is the speed in mph. This tighter device spacing is intended for the area of conflicting markings, not the entire work zone.

		Traffic Operations Division Standard	
TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS			
TCP (2-4) - 18			
FILE: tcp2-4-18.dgn	DATE: 12/01/95	DATE: 04/01/98	DATE: 02/18/01
© TxDOT	REVISIONS	6380	47
8-95	3-01	001	IH 44, ETC.
1-97	2-12		COUNTY SHEET NO.
4-98	2-18	WFS	WICHITA, ETC. 28

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 FILE: T:\WFM\MAINT\Maintenance Projects\6380-47-001 On Coll Guardrail FY 22 of this project\6380-47-001 On Coll Guardrail.dgn



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

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

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

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

Texas Department of Transportation
 Traffic Operations Division Standard

TRAFFIC CONTROL PLAN

LANE CLOSURES ON DIVIDED HIGHWAYS

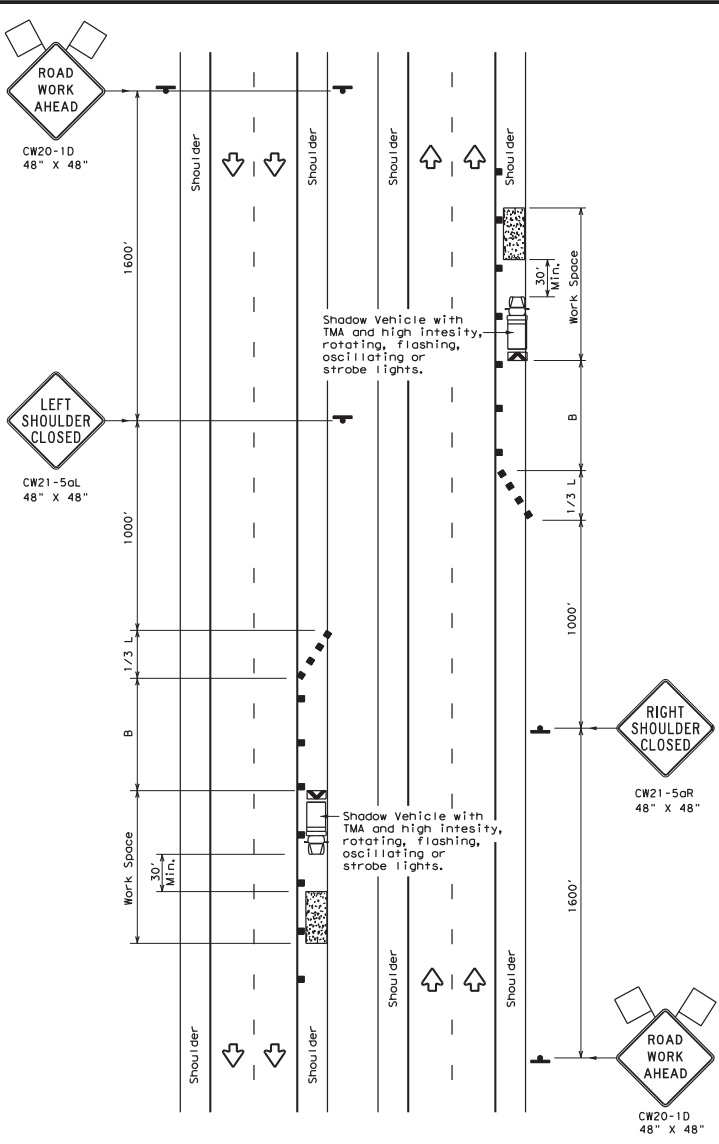
TCP (2-6) - 18

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© TxDOT	December 1985	CONT. SECT.	6380/47	JOB	001
2-94	4-98	REVISIONS	8-95	2-12	DIST
8-95	2-12		1-97	2-18	COUNTY
					WFS
					WICHITA, ETC.
					SHEET NO. 29

TJG

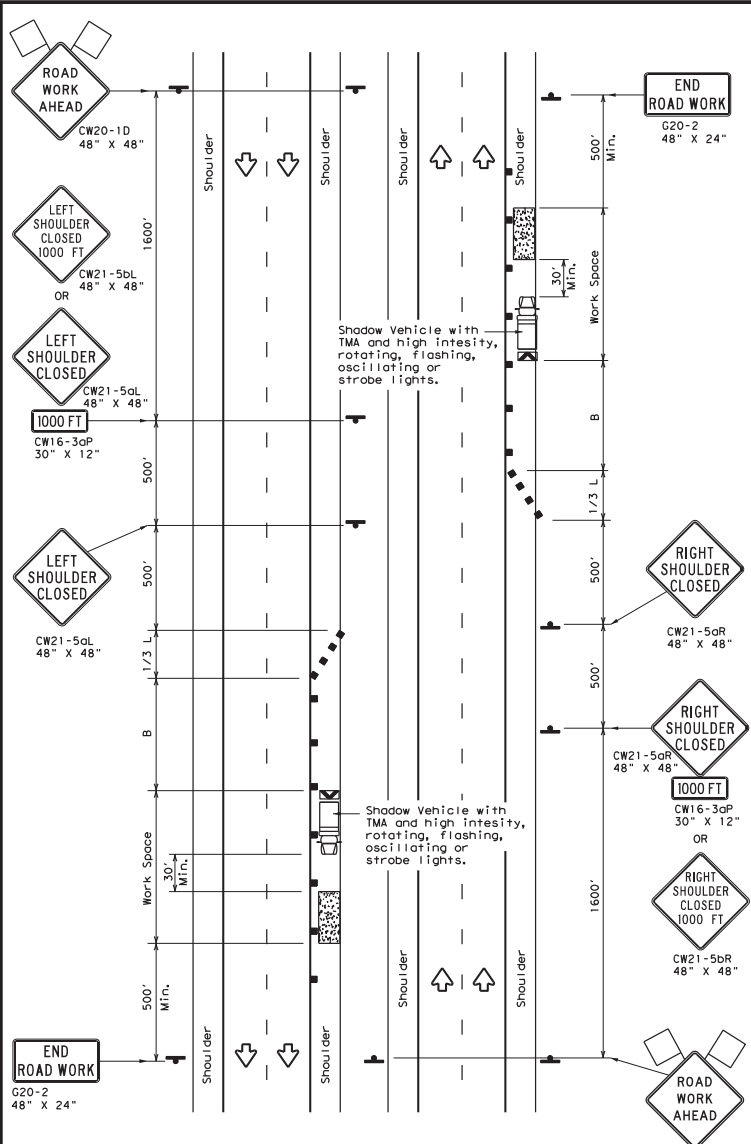
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 FILE: T:\WFSMAINT\Maintenance Projects\6380-47-001 On Coll Guardrail FY 22\6380-47-001.dgn



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 L = WS ² / 60	Minimum Desirable Taper Lengths			Suggested Maximum Spacing of Channelizing Devices		Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	
30		150'	165'	180'	30'	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		550'	605'	660'	55'	110'	295'
60		600'	660'	720'	60'	120'	350'
65		650'	715'	780'	65'	130'	410'
70		700'	770'	840'	70'	140'	475'
75		750'	825'	900'	75'	150'	540'
80		800'	880'	960'	80'	160'	615'

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

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

- GENERAL NOTES**
1. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30' to 100' in advance of the area of crew exposure without adversely 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.
 2. 28" tall or taller one-piece cones will be allowed only for Short Duration or Short Term stationary operations when workers are present to maintain the devices upright and in proper location. Intermediate Term stationary work areas should use Drums, Vertical Panels or 42" tall two-piece cones.

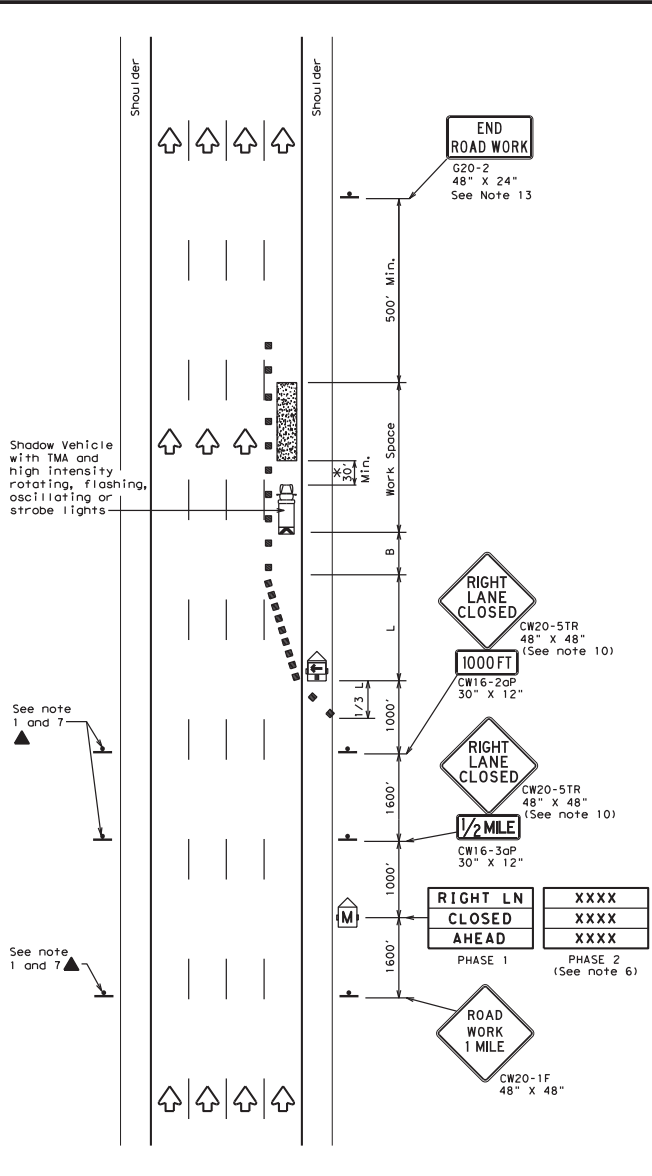


**TRAFFIC CONTROL PLAN
 SHOULDER WORK FOR
 FREEWAYS / EXPRESSWAYS**

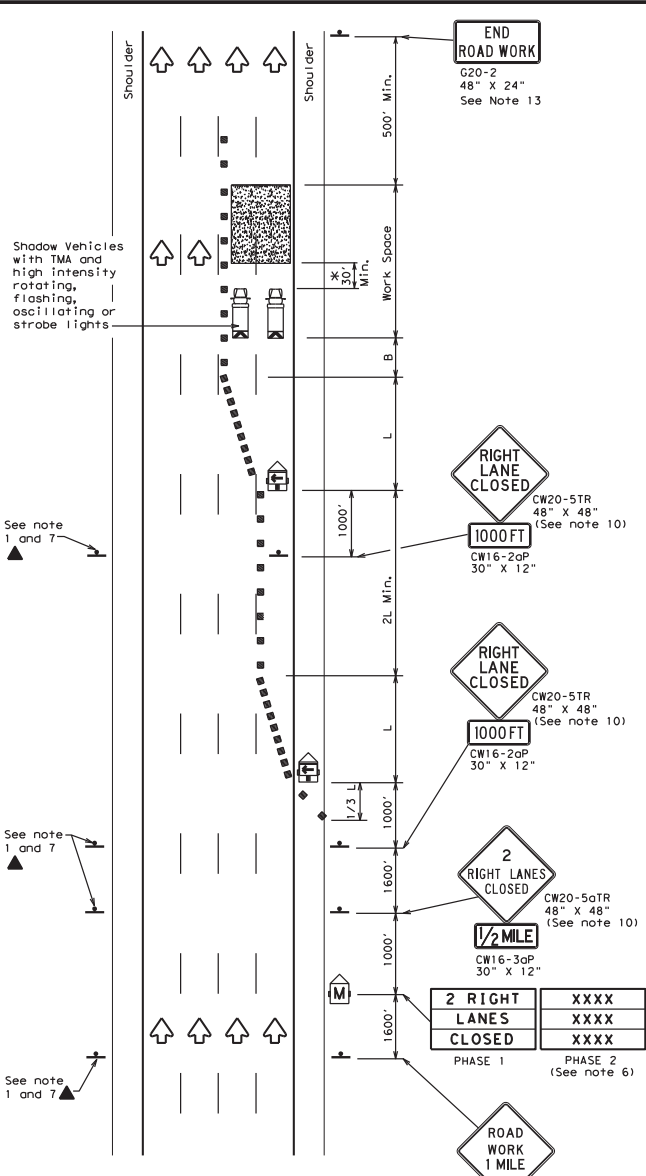
TCP (5-1) - 18

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2-18	DIST: WFS	COUNTY: WICHITA, ETC.	SHEET NO. 30		

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 DATE: 5/21/2021 2:11:03 PM
 FILE: T:\WFSMAINT\Maintenance Projects\6380-47-001 On Coll Guardrail FY 22 of this project\signing\signing\6380-47-001.dgn



TCP (6-1-a)
**TYPICAL FREEWAY
 ONE LANE CLOSURE**



TCP (6-1-b)
**TYPICAL FREEWAY
 TWO LANE CLOSURE**

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

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

TYPICAL USAGE

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

GENERAL NOTES

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

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



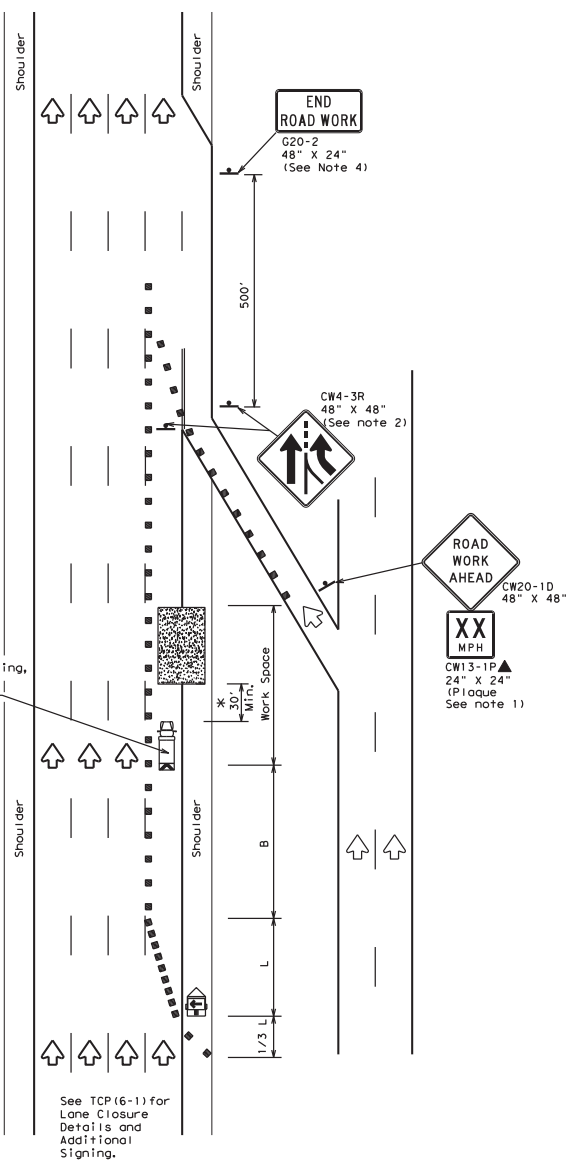
**TRAFFIC CONTROL PLAN
 FREEWAY LANE CLOSURES**

TCP (6-1) - 12

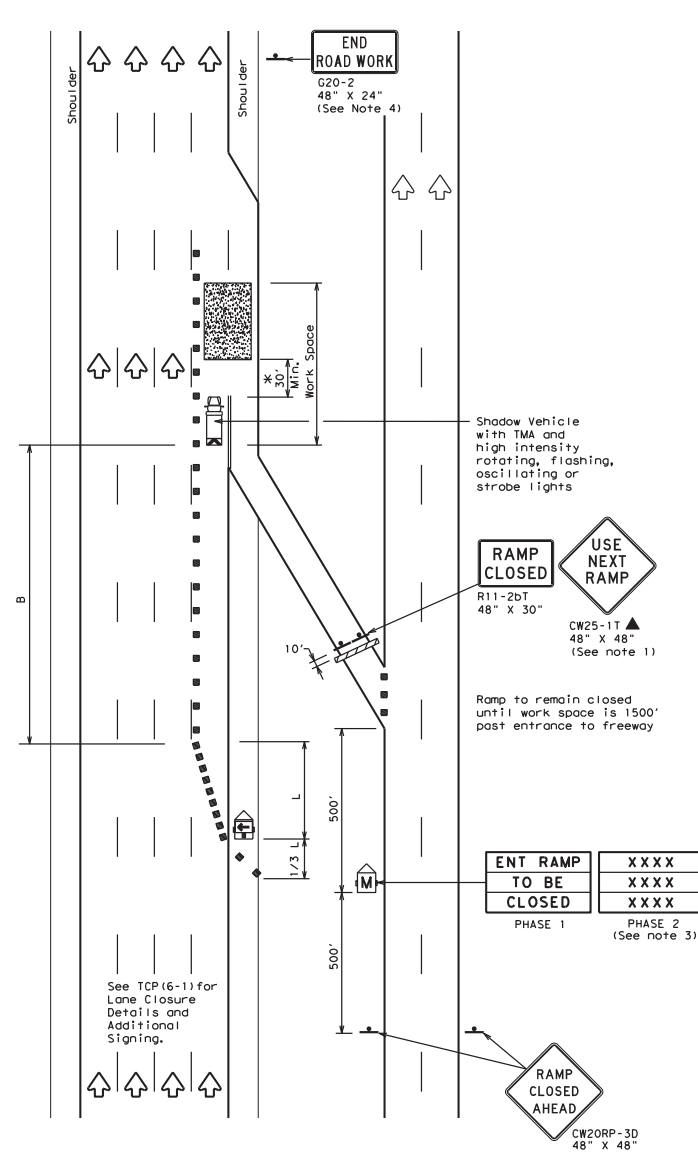
FILE: tcp6-1.dgn	DN: TxDOT	CR: TxDOT	DR: TxDOT	CR: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
6380	47	001	IH 44, ETC.	
8-12	DIST	COUNTY	SHEET NO.	
	WFS	WICHITA, ETC.	31	

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 FILE: T:\WFM\MAINT\Maintenance Projects\6380-47-001 On Coll Guardrail FY 22\6380-47-001.dgn



TCP (6-2a)
ENTRANCE RAMP OPEN
WORK WITHIN 500' OF RAMP



TCP (6-2b)
ENTRANCE RAMP CLOSED

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

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

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

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

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

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

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

Texas Department of Transportation
 Traffic Operations Division Standard

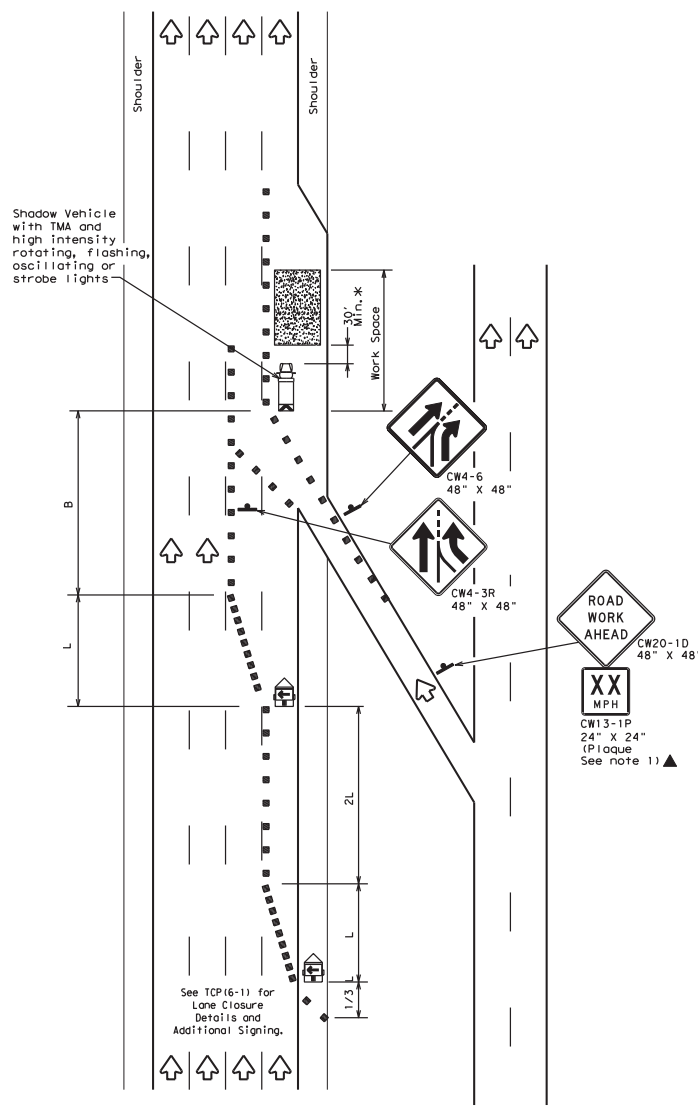
TRAFFIC CONTROL PLAN
WORK AREA NEAR RAMP

TCP (6-2) - 12

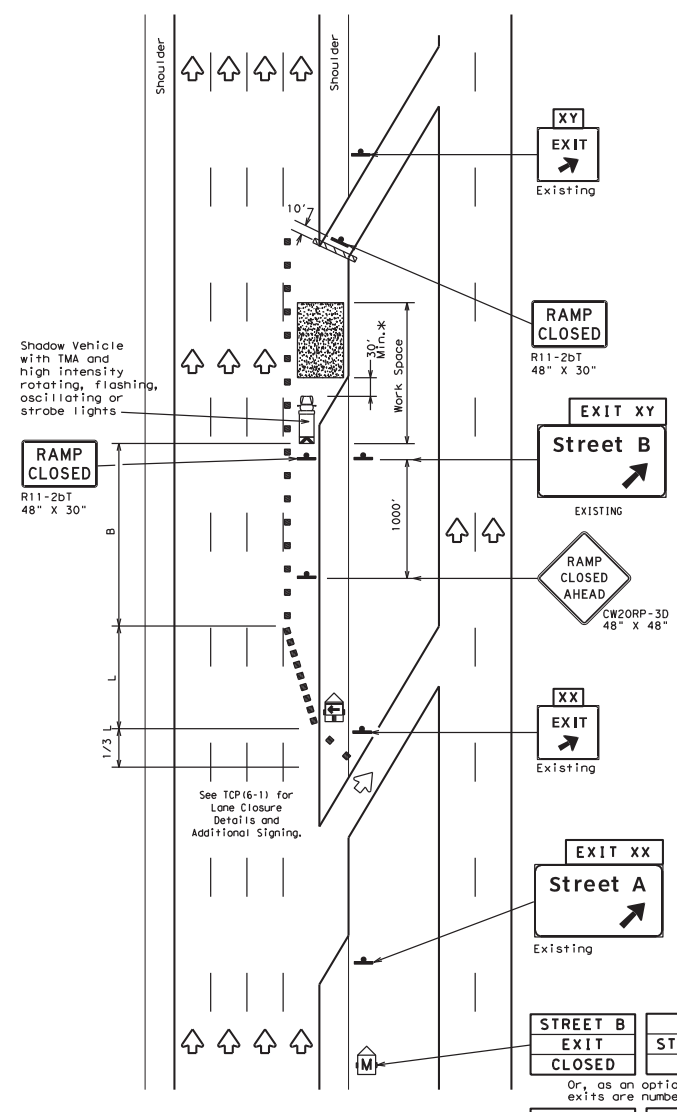
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REVISIONS: 1-97 8-98 4-98 8-12	DIST: WFS	COUNTY: WICHITA, ETC.	SHEET NO. 32		

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 FILE: T:\WFSMAINT\Maintenance Projects\6380-47-001 On Coll Guardrail - FY 22\6380-47-001.dgn



TCP (6-3a)
ENTRANCE RAMP OPEN



TCP (6-3b)
EXIT RAMP CLOSED
TRAFFIC EXITS PRIOR TO CLOSED RAMP

STREET B EXIT CLOSED

USE STREET A EXIT

Or, as an option when exits are numbered

EXIT XY EXIT CLOSED

USE EXIT XX

Place 1 mile (approx.) in advance of Street A exit.

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

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

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

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

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

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



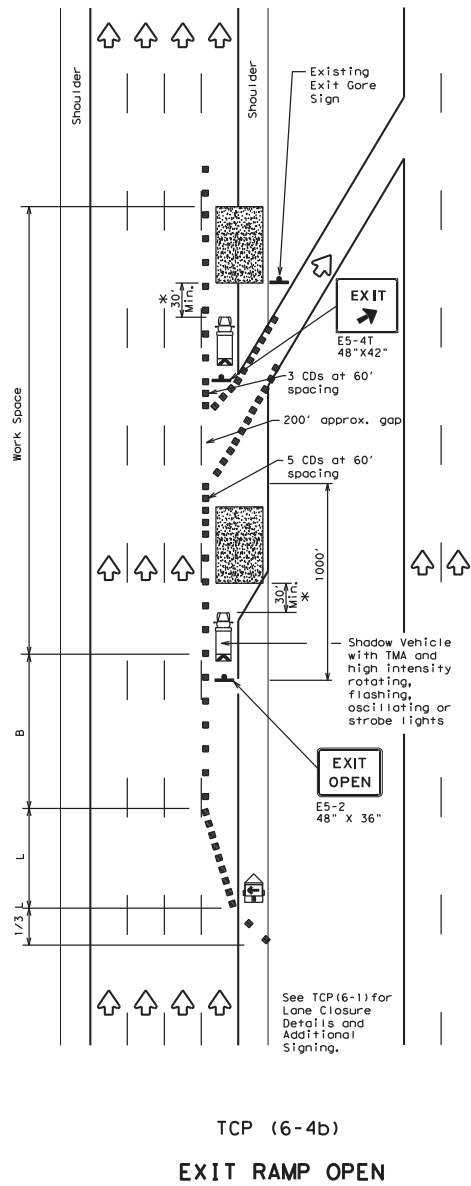
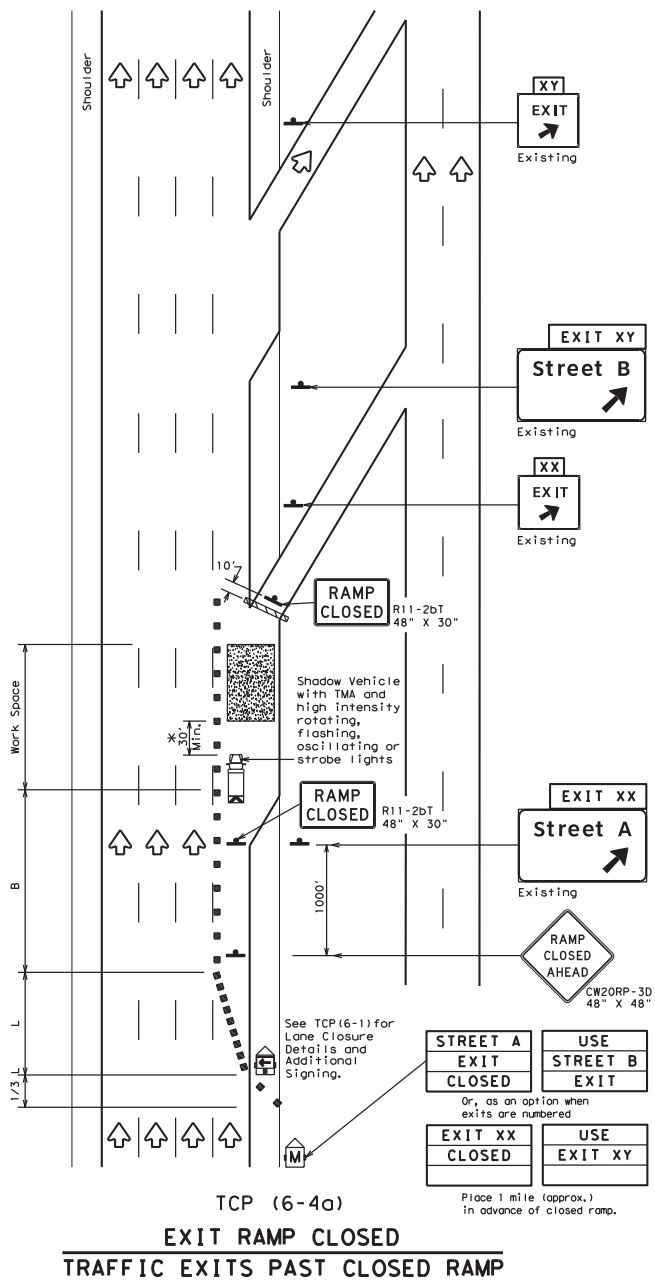
**TRAFFIC CONTROL PLAN
 WORK AREA BEYOND RAMP**

TCP (6-3) - 12

FILE: tcp6-3.dgn	DN: TxDOT	CR: TxDOT	DR: TxDOT	EX: TxDOT
© TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	6380	47	001	IH 44, ETC.
1-97 8-98	DIST	COUNTY	SHEET NO.	
4-98 8-12	WFS	WICHITA, ETC.	33	

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 FILE: T:\WFSMAINT\Maintenance Projects\6380-47-001 On Coll Guardrail



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

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

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

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

GENERAL NOTES

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

2. See BC Standards for sign details.

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

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



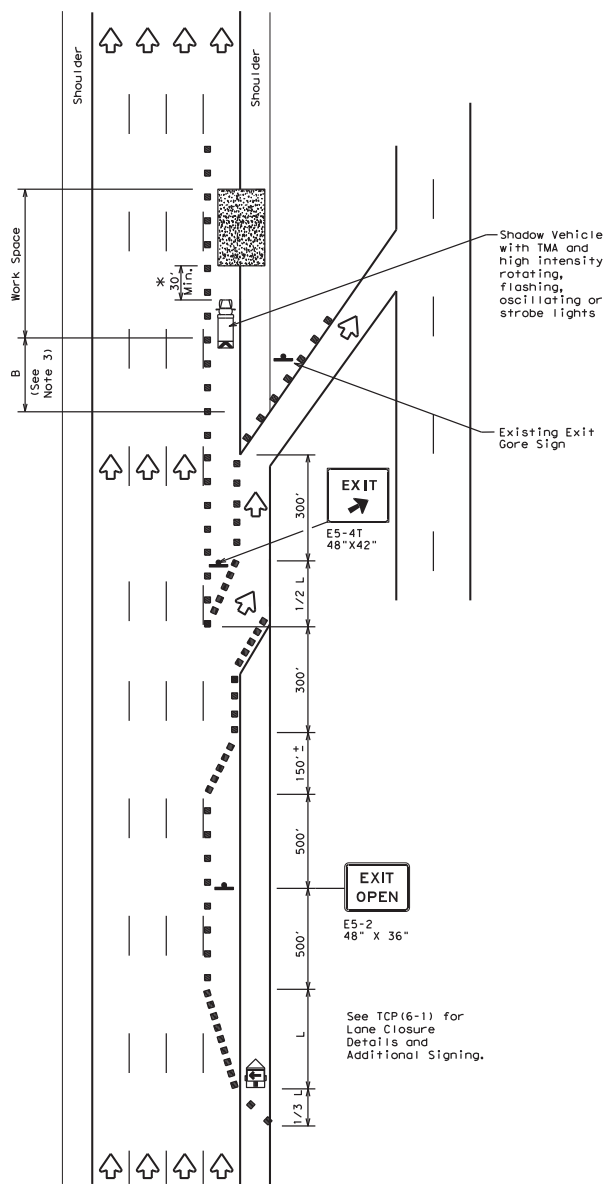
TRAFFIC CONTROL PLAN
WORK AREA AT EXIT RAMP

TCP (6-4) - 12

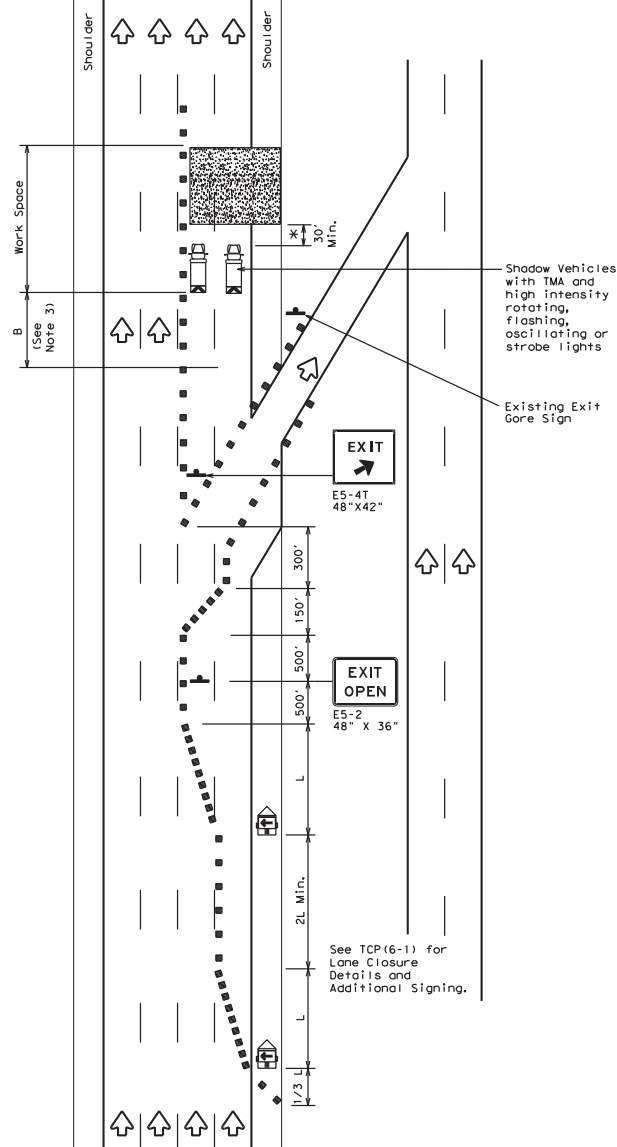
FILE: tcp6-4.dgn	DATE: TxDOT	CHK: TxDOT	DATE: TxDOT	CHK: TxDOT
© TxDOT February 1994	CONT: 6380	SECT: 47	JOB: 001	HIGHWAY: IH 44, ETC.
1-97 8-98 4-98 6-12	DIST: WFS	COUNTY: WICHITA, ETC.	SHEET NO.: 34	

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TCP (6-5a)
 EXIT RAMP OPEN



TCP (6-5b)
 EXIT RAMP OPEN
 TWO LANE CLOSURE WITHIN
 1500' PAST EXIT RAMP

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

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

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

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

GENERAL NOTES

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

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

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



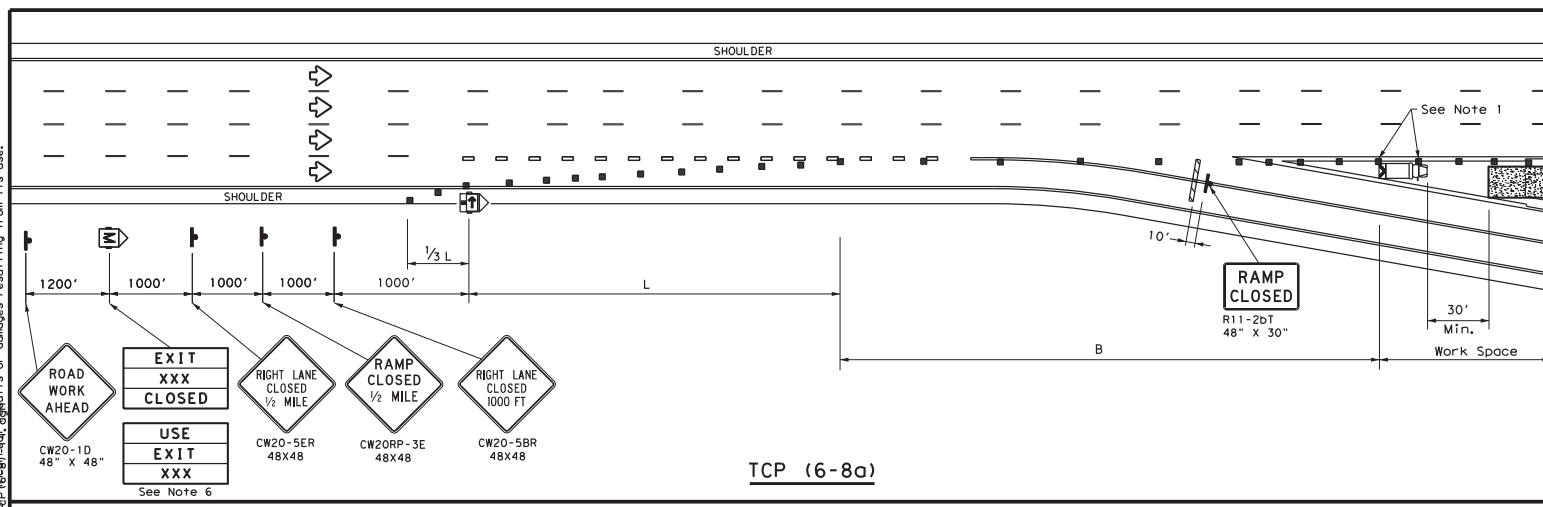
TRAFFIC CONTROL PLAN
 WORK AREA BEYOND EXIT RAMP

TCP (6-5) - 12

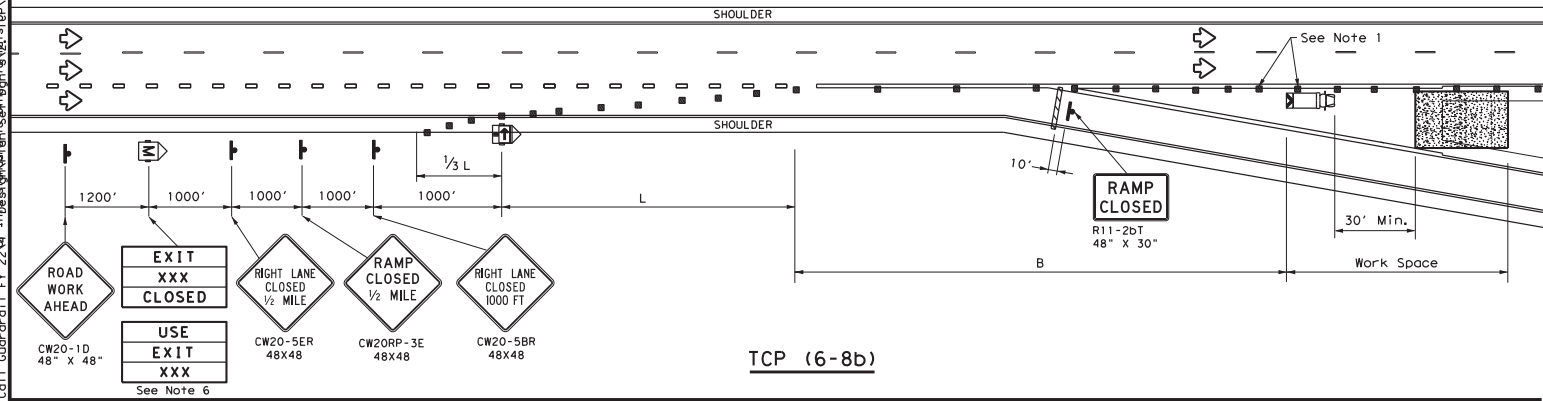
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© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	6380	47	001	IH 44, ETC.
1-97 8-98	DIST	COUNTY	SHEET NO.	
4-98 8-12	WFS	WICHITA, ETC.	35	

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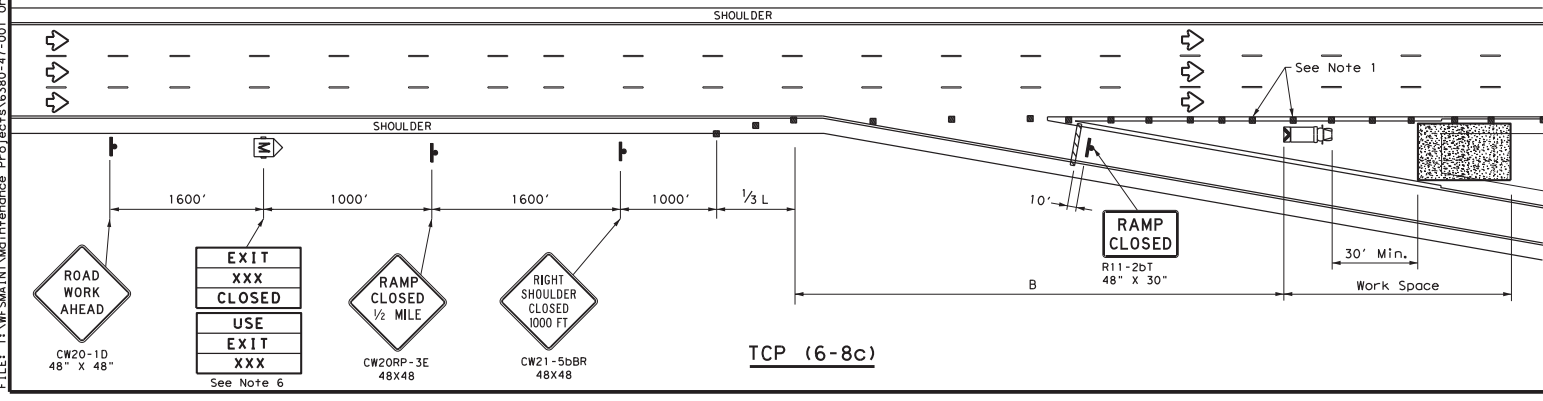
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TCP (6-8a)



TCP (6-8b)



TCP (6-8c)

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

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

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

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

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

Texas Department of Transportation
 Traffic Operations Division Standard

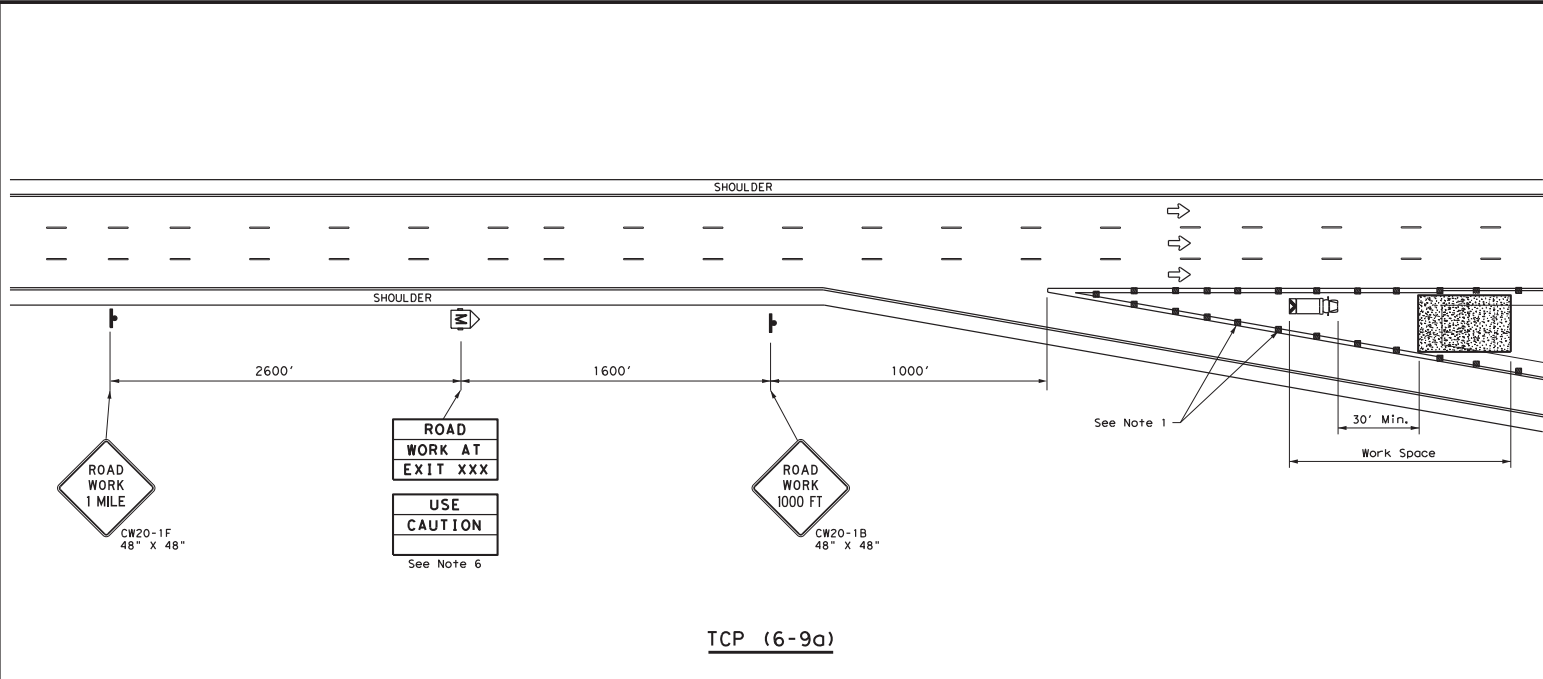
WORK IN EXIT GORE FOR ADT GREATER THAN 10,000

TCP (6-8) - 14

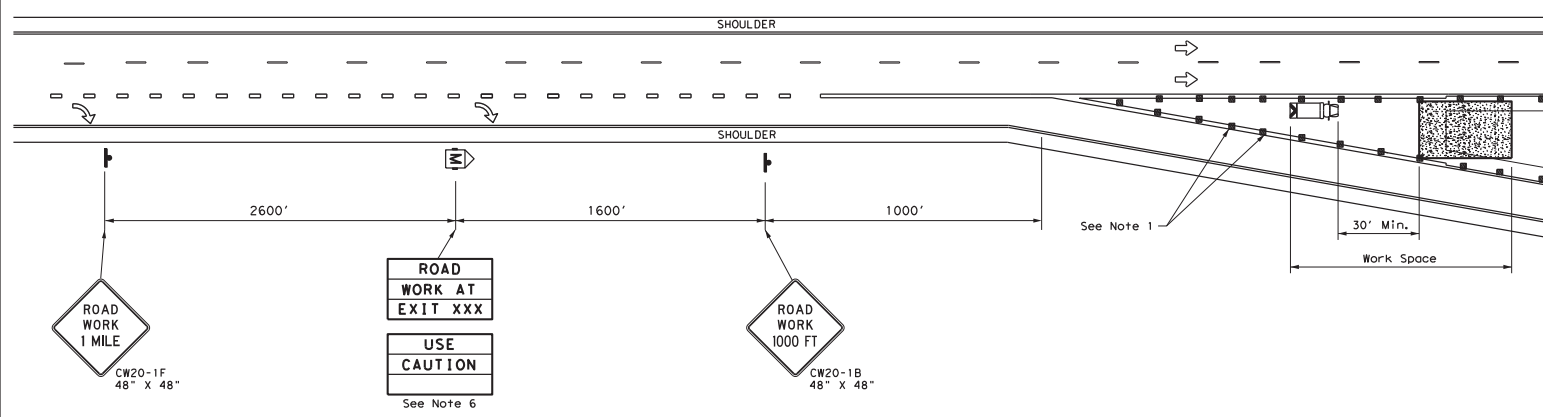
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REVISIONS	CONT	SECT	JOB	HIGHWAY
© TxDOT February 2014	6380	47	001	IH 44, ETC.
	DIST	COUNTY		SHEET NO.
	WFS	WICHITA, ETC.		36

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TCP (6-9a)



TCP (6-9b)

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

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

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

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

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



**WORK IN EXIT GORE
FOR ADT LESS THAN 10,000**

TCP (6-9) - 14

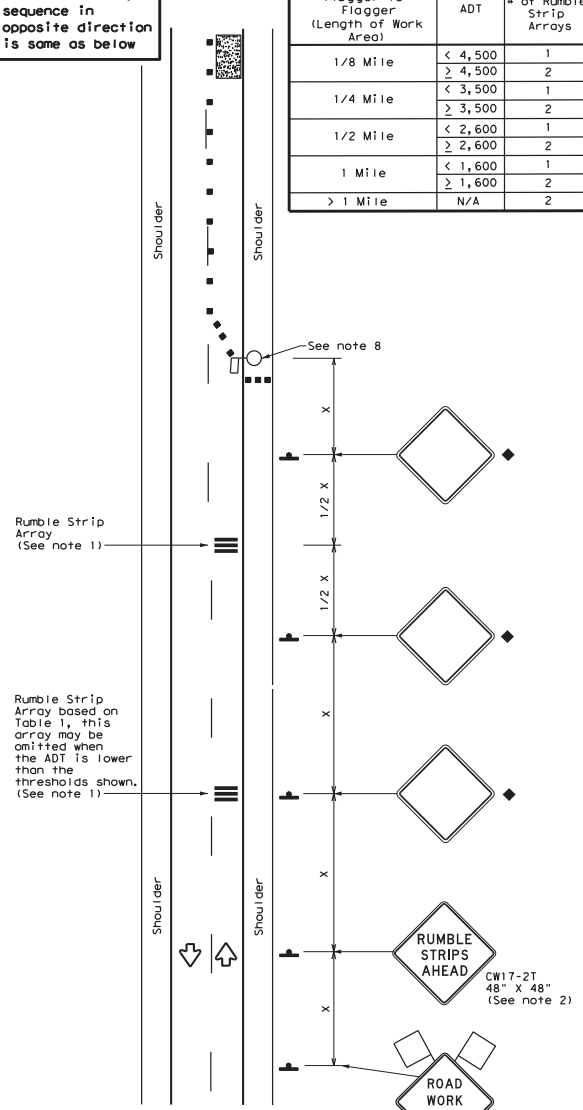
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© TxDOT February 2014	CONT: 6380	SECT: 47	JOB: 001	HIGHWAY: IH 44, ETC.
REVISIONS	DIST: WFS	COUNTY: WICHITA, ETC.	SHEET NO. 37	

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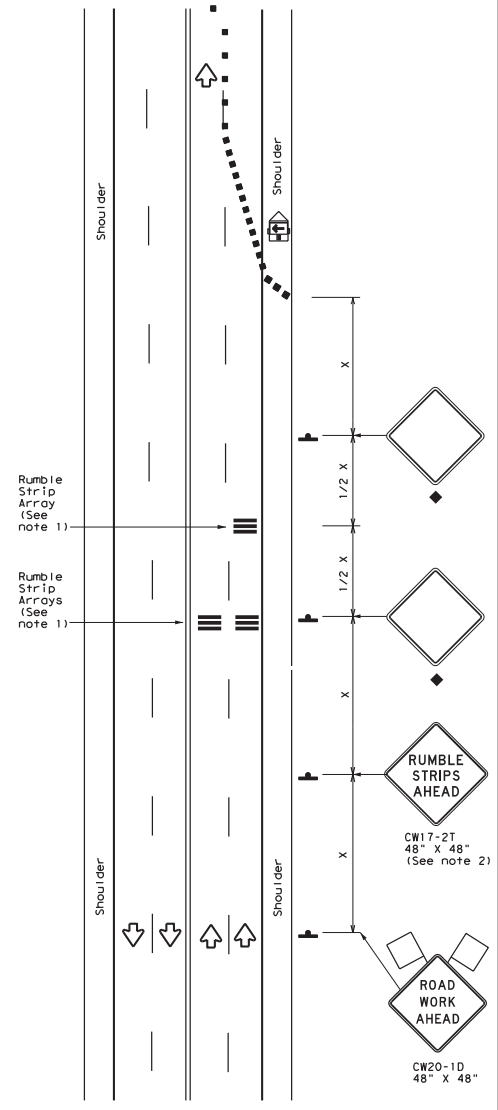
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Warning sign and rumble strip sequence in opposite direction is same as below

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



WZ (RS-1a)
75 mph or Less
RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION



WZ (RS-1b)
75 mph or Less
RUMBLE STRIPS FOR LANE CLOSURE ON CONVENTIONAL ROADWAY

GENERAL NOTES

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

Speed	Approximate distance between strips in an Array
≤ 40 MPH	10'
> 40 MPH & ≤ 55 MPH	15'
> 55 MPH	20'

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

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

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

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

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

Texas Department of Transportation
 Traffic Operations Division Standard

TEMPORARY RUMBLE STRIPS

WZ (RS) - 16

FILE: wzrs16.dgn	CON: TxDOT	CHK: TxDOT	DES: TxDOT	CHK: TxDOT
© TxDOT November 2012	CONT: 6380	SECT: 47	JOB: 001	HIGHWAY: IH 44, ETC.
REVISIONS	BIST: 4-16	COUNTY: WFS	WICHITA, ETC.	SHEET NO. 38

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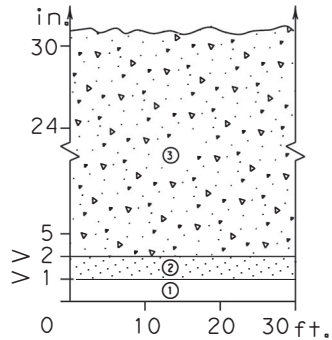
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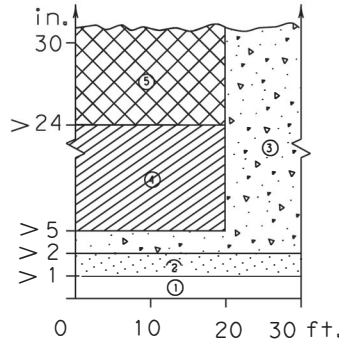
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DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

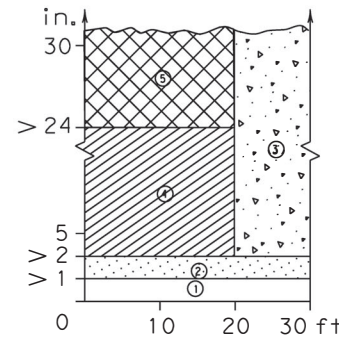
Edge Height (D) in Inches versus Lateral Clearance (Y) in Feet



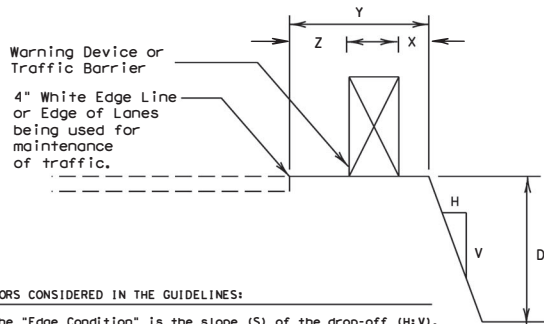
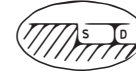
Edge Condition I
S = (3:1) (or flatter)



Edge Condition II
S = ((2.99):1) to (1:1)



Edge Condition III
S is steeper than (1:1)



FACTORS CONSIDERED IN THE GUIDELINES:

- The "Edge Condition" is the slope (S) of the drop-off (H:V). The "Edge Height" is the depth of the drop-off "D".
- Distance "X" is to be the maximum practical under job conditions. Two feet minimum for high speed conditions. Distance "Y" is the lateral clearance from edge of travel lane to edge of dropoff. Distance "Z" does not have a minimum.
- In addition to the factors considered in the guidelines, each construction zone drop-off situation should be analyzed individually, taking into account other variables, such as: traffic mix, posted speed in the construction zone, horizontal curvature, and the practicality of the treatment options.
- The conditions for indicating the use of positive or protective barriers are given by Zone-5 and Figure-1. Traffic barriers are primarily applicable for high speed conditions. Urban areas with speeds of 30 mph or less may have a lesser need for signing, delineation, and barriers. Right-angled edges, however, with "D" greater than 2 inches and located within a lateral offset of 6 feet, may indicate a higher level of treatment.
- If the distance "Y" must be less than 3 feet, the use of a positive barrier may not be feasible. In such a case, consider either: 1) narrowing the lanes to a desired 11 to 12 feet or 10 foot minimum (see CW20-8 sign), or 2) provide an edge slope such as Edge Condition I.

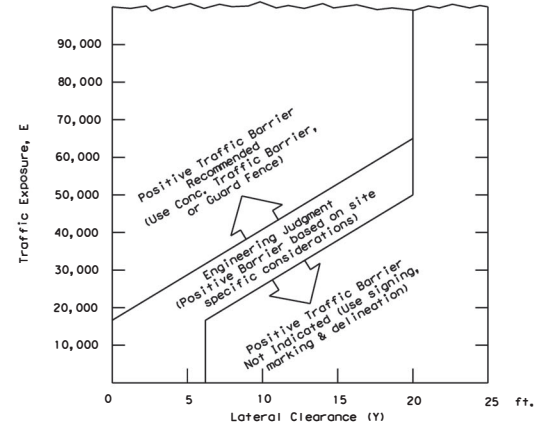
Zone Treatment Types Guidelines:

- No treatment.
- CW 8-11 "Uneven Lanes" signs.
- CW 8-9a "Shoulder Drop-Off" or CW 8-11 signs plus vertical panels.
- CW 8-9a or CW 8-11, signs plus drums. Where restricted space precludes the use of drums, use vertical panels. An edge fill may be provided to change the edge slope to that of the preferable Edge Condition I.
- Check indications (Figure-1) for positive barrier. Where positive barrier is not indicated, the treatment shown above for Zone-4 may be used after consideration of other applicable factors.

Edge Condition Notes:

- Edge Condition I: Most vehicles are able to traverse on edge condition with a slope rate of (3 to 1) or flatter. The slope must be constructed with a compacted material capable of supporting vehicles.
- Edge Condition II: Most vehicles are able to traverse on edge condition with a slope between (2.99 to 1) and (1 to 1) so long as "D" does not exceed 5 inches. Under-carriage drag on most automobiles will occur when "D" exceeds 6 inches. As "D" exceeds 24 inches, the possibility for rollover is greater in most vehicles.
- Edge Condition III: When slopes are greater than (1 to 1) and where "D" is greater than 2 inches, a more difficult control factor may exist for some vehicles, if not properly treated. For example, where "D" is greater than 2 inches and up to 24 inches different types of vehicles may experience different steering control at different edge heights. Automobiles might experience more steering control differential when "D" is greater than 2 inches and up to 5 inches. Trucks, particularly those with high loads, have more steering control differential when "D" is greater than 5 inches and up to 24 inches. When "D" exceeds 24 inches, the possibility of rollover is greater for most vehicles.
- Milling or overlay operations that result in Edge Condition III should not be in place without appropriate warning treatments, and these conditions should not be left in place for extended periods of time.

FIGURE-1: CONDITIONS INDICATING USE OF POSITIVE BARRIER FOR ZONE 5 ([hatched box])

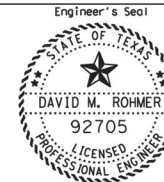


1 E = ADT x T

Where ADT is that portion of the average daily traffic volume traveling within 20 feet (generally two adjacent lanes) of the edge dropoff condition; and, T is the duration time in years of the dropoff condition.

- Figure-1 provides a practical approach to the use of positive barriers for the protection of vehicles from pavement drop-offs. Other factors, such as the presence of heavy machinery, construction workers, or the mix and volume of traffic may make the use of positive barriers appropriate, even when the edge condition alone may not justify the use of a barrier.
- An approved end treatment should be provided for any positive barrier end located within a lateral offset of 20 feet from the edge of the travel lane.

These guidelines apply to temporary traffic control areas or work zones where continuous pavement edges or drop-offs exists parallel and adjacent to a lane used by traffic. The edge conditions may be present between shoulders and travel lanes, between adjacent or opposing travel lanes, or at intermediate points across the width of the paved surface. Due to the variability in construction operations, tolerances in the variables may be allowed by the engineer. These guidelines do not apply to short term operations. These guidelines do not constitute a rigid standard or policy; rather, they are guidance to be used in conjunction with engineering judgement. These guidelines may be updated on the Design Division's on-line manuals.



D. M. Rohmer, P.E.
5/21/21

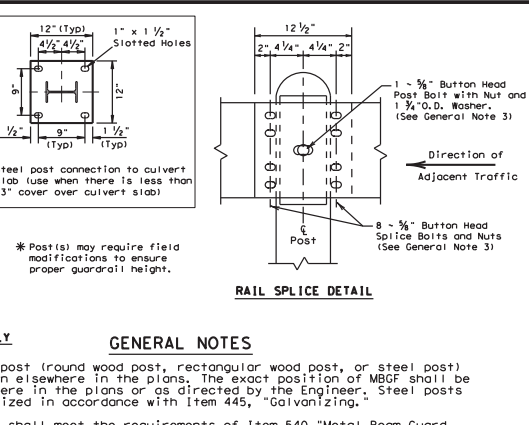
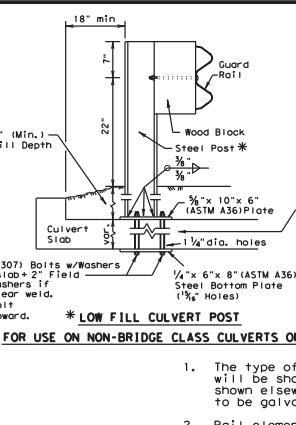
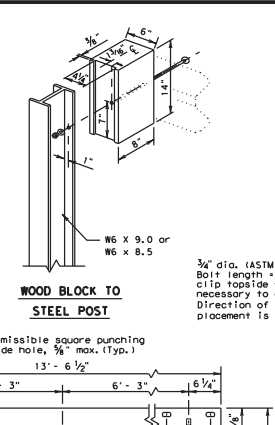
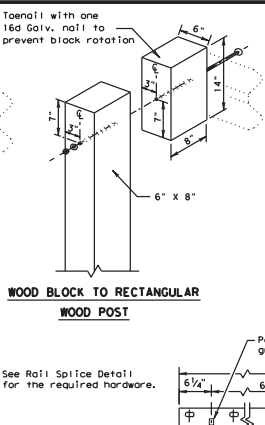
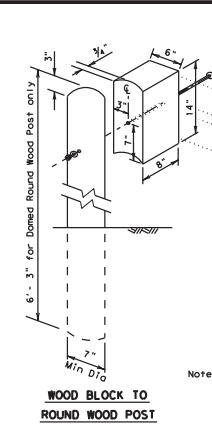
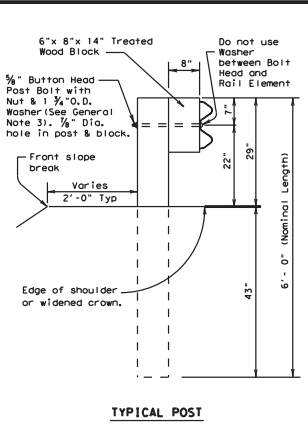


TREATMENT FOR VARIOUS EDGE CONDITIONS

© TxDOT AUGUST 2000		DN: TXDOT	OK: TXDOT	DN: TXDOT	OK: TXDOT
REVISIONS		CONT	SECT	JOB	HIGHWAY
03-01	63801	47	001	IH 44, ETC.	
08-01	DIST		COUNTY	SHEET NO.	
	WFS		WI CHI TA, ETC.	39	

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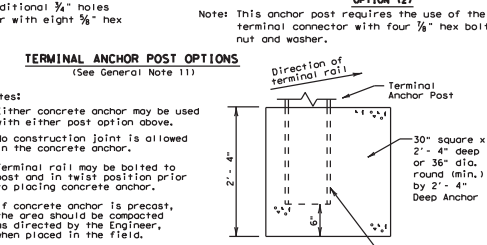
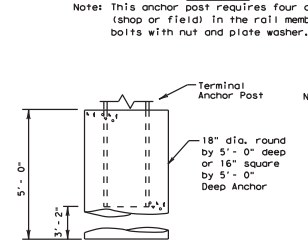
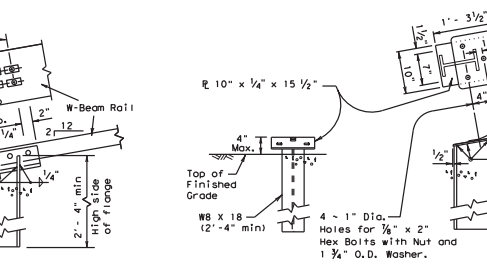
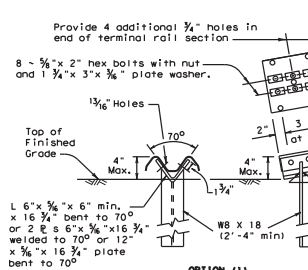
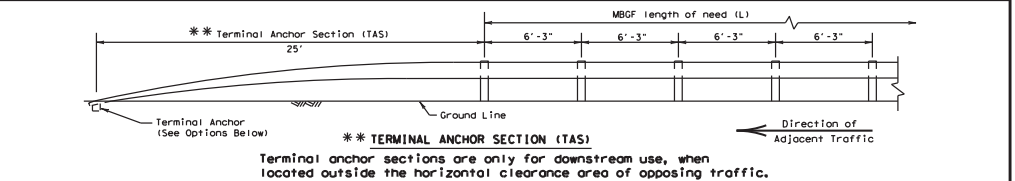
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FOR USE ON NON-BRIDGE CLASS CULVERTS ONLY

GENERAL NOTES

- The type of post (round wood post, rectangular wood post, or steel post) will be shown elsewhere in the plans. The exact position of MBGF shall be shown elsewhere in the plans or as directed by the Engineer. Steel posts to be galvanized in accordance with Item 445, "Galvanizing."
- Rail element shall meet the requirements of Item 540, "Metal Beam Guard Fence" except as modified on the plans. The Contractor may furnish rail elements of 12 1/2 or 25 foot nominal lengths.
- Button head "post" bolts (ASTM A307) shall be of sufficient length to extend through the full thickness of the nut (ASTM A563) and Type A (1 3/4" O.D.) washer and not more than 1" beyond it. Button head "splice" bolts (ASTM A307) are 3/4" x 1 1/4" (or 2" long at triple rail splices) with a 3/8" double recessed nut (ASTM A563).
- Fittings (bolts, nuts, and washers) shall be galvanized in accordance with Item 445, "Galvanizing." Fittings shall be subsidiary to the bid item.
- Crown shall be widened to accommodate the Metal Beam Guard Fence.
- The lateral approach to the guard fence, shall have a slope ratio of not more than 1V:10H.
- Unless otherwise shown in the plans, guard fence placed in the vicinity of curbs shall be positioned so that the face of curb is located directly below or behind the face of the block. Rail placed over curbs shall be installed so that the post bolt is located approximately 21 inches above the gutter pan or roadway surface.
- If solid rock is encountered within 0 to 18" of the finished grade, drill a 22" dia. hole, 24" into the rock, or drill two 12" dia. front to back overlapping holes, 24" into the rock. If solid rock is encountered below 18", drill a 12" dia. hole, 12" into the rock or to the standard embedment depth, whichever is less. Any excess post length, after meeting these depths, may be field cut to ensure proper guardrail mounting height. Backfill with a cohesionless material.
- Posts shall not be set in concrete, of any depth.
- Special fabrication will be required at installations having a curvature of less than 150 ft. radius.
- The terminal anchor section (TAS) post shall be set in Class A concrete (unless otherwise shown in the plans) in accordance with Item 421, "Hydraulic Cement Concrete." Concrete shall be subsidiary to the bid item requiring construction of the terminal anchor section (TAS). Terminal anchor post to be galvanized in accordance with Item 445, "Galvanizing."
- Unless otherwise shown in the plans, a composite material post and/or block that meets the requirements of DMS-7210, "Composite Material Posts and Blocks for Metal Beam Guard Fence" may be substituted for posts and/or blocks of similar dimensions. The Construction Division, TxDOT maintains a Material Producer List (MPL) for producers of materials conforming to DMS-7210. Only producers on the MPL can furnish composite material posts and/or blocks.



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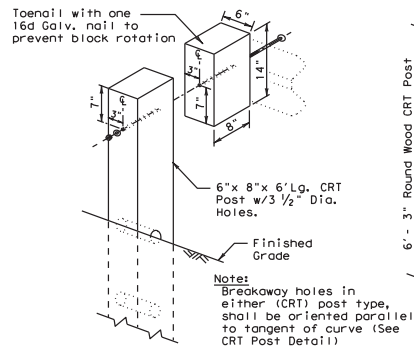
Texas Department of Transportation
 Design Division Standard

METAL BEAM GUARD FENCE
MBGF - 19

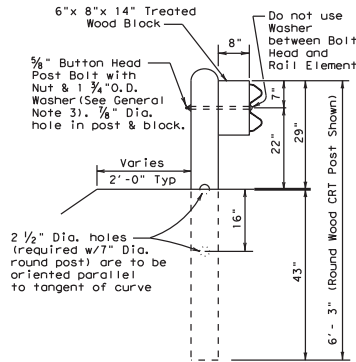
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DIST	COUNTY	SHEET NO.		
WFS	WICHITA, ETC.	40		

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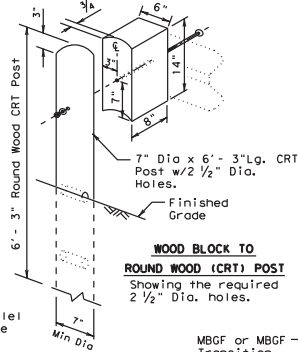


WOOD BLOCK TO RECTANGULAR WOOD (CRT) POST
Showing the required 3/2" Dia. holes.

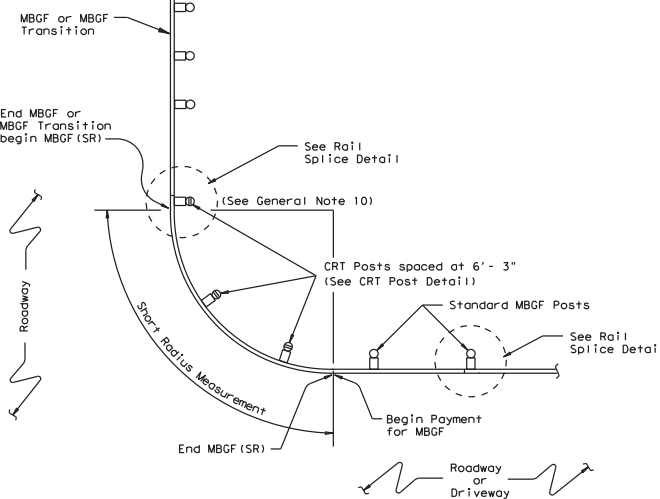


(CRT) POST DETAIL CONTROLLED RELEASE TERMINAL POST

Two or more wood CRT post(s) are required at any radius installation located at intersecting roadways or driveways.

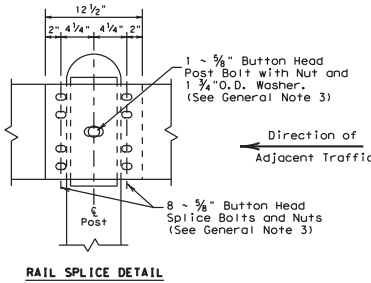


WOOD BLOCK TO ROUND WOOD (CRT) POST
Showing the required 2 1/2" Dia. holes.



PLAN VIEW SHOWING TYPICAL RADIUS

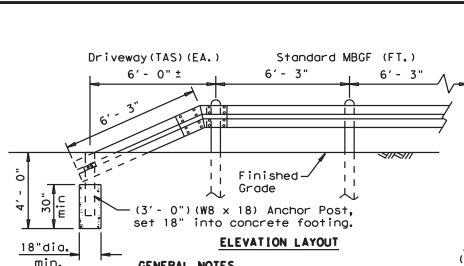
The required radius is shown elsewhere on the plans.



RAIL SPLICE DETAIL

GENERAL NOTES

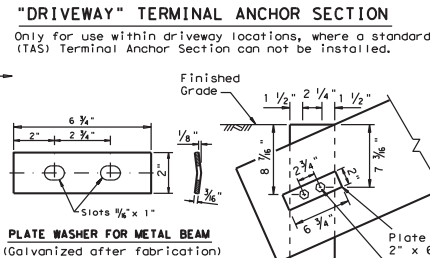
- The type of (CRT) post (round wood post, or rectangular wood post) will be shown elsewhere in the plans. The exact position of MBGF shall be shown elsewhere in the plans or as directed by the Engineer.
- Steel posts are not permitted at CRT post positions.
- Rail element shall meet the requirements of Item 540, "Metal Beam Guard Fence" except as modified on the plans. The Contractor may furnish rail elements of 12 1/2 or 25 foot nominal lengths.
- Button head "post" bolts (ASTM A307) shall be of sufficient length to extend through the full thickness of the nut (ASTM A563) and Type A (1 3/4" O.D.) washer and not more than 1" beyond it. Button head "splice" bolts (ASTM A307) are 3/8" x 1 1/4" (or 2" long at triple rail splices) with a 3/8" double recessed nut (ASTM A563).
- Fittings (bolts, nuts, and washers) shall be galvanized in accordance with Item 445, "Galvanizing." Fittings shall be subsidiary to the bid item.
- Crown shall be widened to accommodate the Metal Beam Guard Fence.
- The lateral approach to the guard fence, shall have a slope rate of not more than 1V:10H.
- Unless otherwise shown in the plans, guard fence placed in the vicinity of curbs shall be positioned so that the face of curb is located directly below or behind the face of the block. Rail placed over curbs shall be installed so that the post bolt is located approximately 21 inches above the gutter pan or roadway surface.
- If solid rock is encountered within 0 to 18" of the finished grade, drill a 22" dia. hole, 24" into the rock, or drill two 12" dia. front to back overlapping holes, 24" into the rock. If solid rock is encountered below 18", drill a 12" dia. hole, 12" into the rock or to the standard embedment depth, whichever is less. Any excess post length, after meeting these depths, may be field cut to ensure proper guardrail mounting height. Backfill with a cohesionless material.
- Guardrail posts shall not be set in concrete, of any depth.
- Special rail fabrication will be required at installations having a curvature of less than 150 ft. radius. The required radius shall be shown on the plans.
- The terminal anchor section (TAS) post shall be set in Class A concrete (unless otherwise shown in the plans) in accordance with Item 421, "Hydraulic Cement Concrete." Concrete shall be subsidiary to the bid item requiring construction of the terminal anchor section (TAS). Terminal anchor post to be galvanized in accordance with Item 445, "Galvanizing."
- Unless otherwise shown in the plans, a composite material post and/or block that meets the requirements of DMS-7210, "Composite Material Posts and Blocks for Metal Beam Guard Fence" may be substituted for posts and/or blocks of similar dimensions. The Construction Division, TxDOT maintains a Material Producer List (MPL) for producers of materials conforming to DMS-7210. Only producers on the MPL can furnish composite material posts and/or blocks.



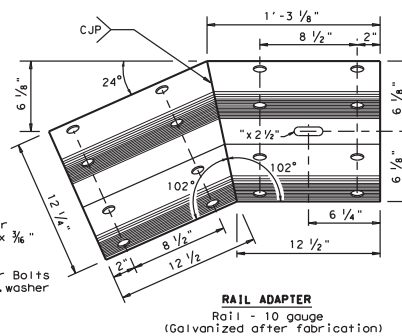
ELEVATION LAYOUT

GENERAL NOTES

- The "Driveway" Terminal Anchor Section is ONLY to be used within driveway locations, where the ROW is limited and a standard 25 ft. (TAS) Terminal Anchor Section, is too long.
- Terminal anchor post shall be set in Class A concrete.
- All steel shall be galvanized after fabrication in accordance with Item 445, "Galvanizing."



ANCHOR POST

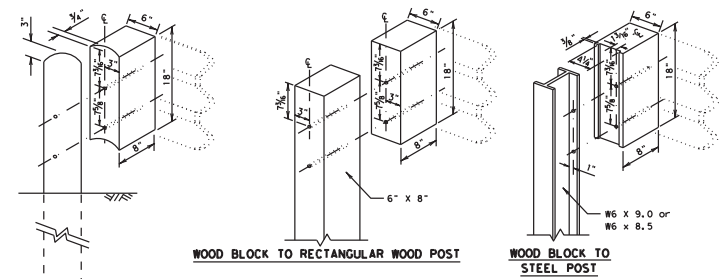
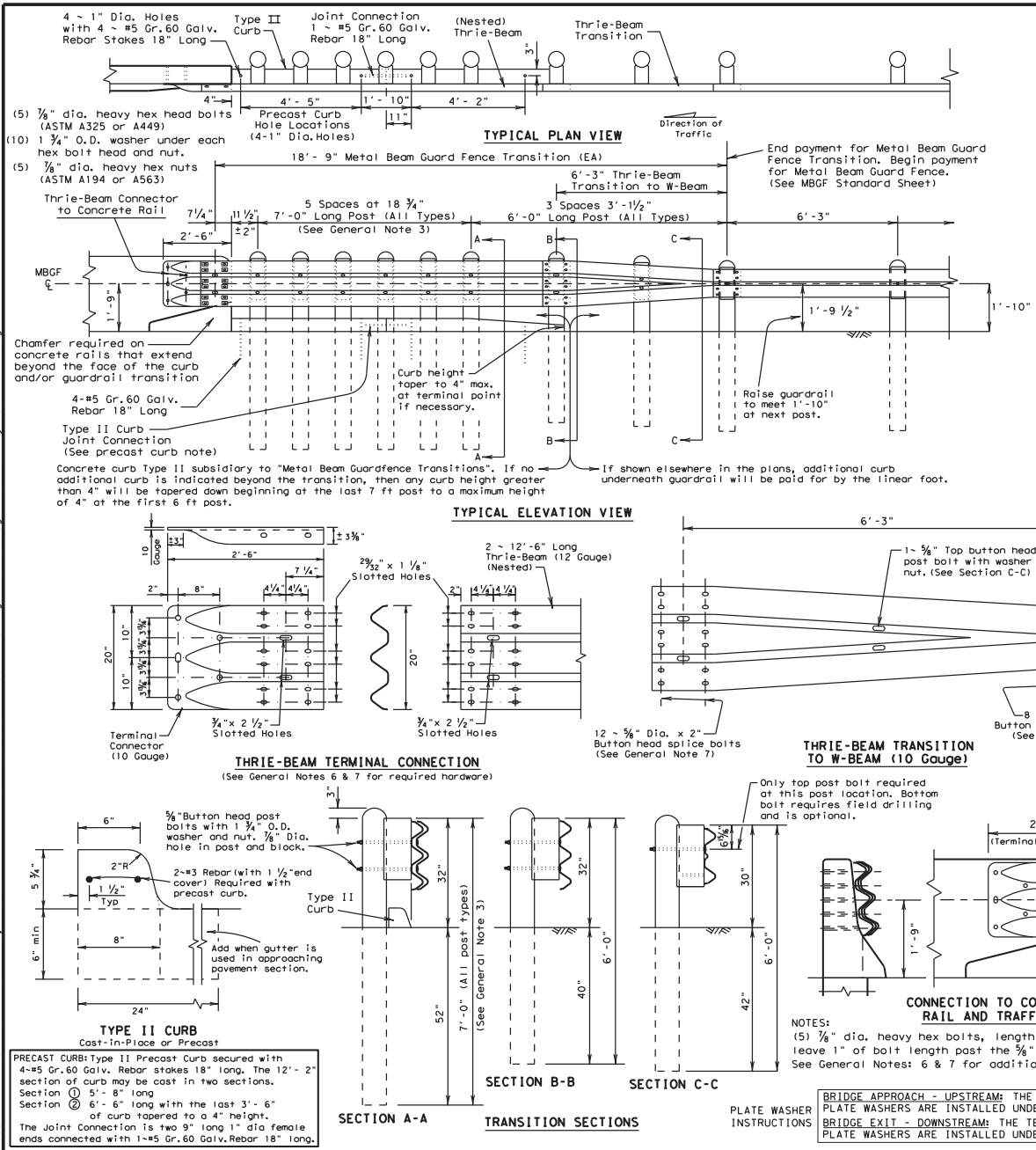


RAIL ADAPTER
Rail - 10 gauge
(Galvanized after fabrication)

ONLY FOR USE IN MAINTENANCE REPAIRS OR HIGHLY CONSTRAINED SITE CONDITIONS.

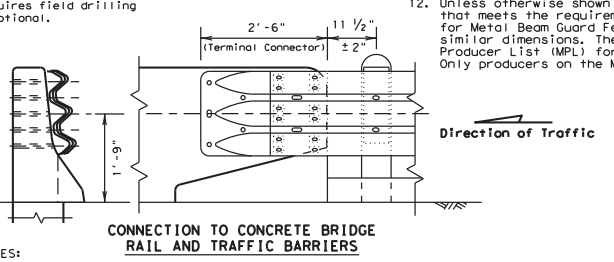
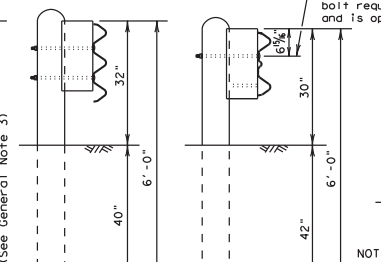
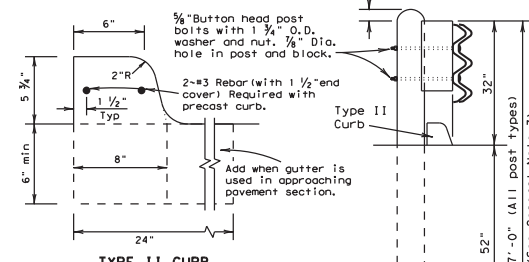
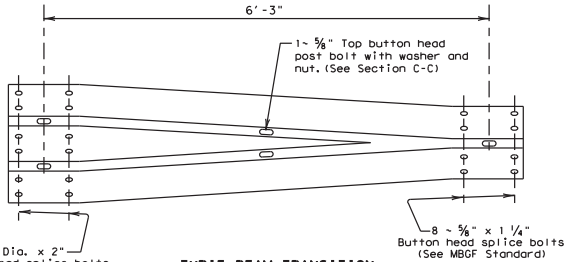
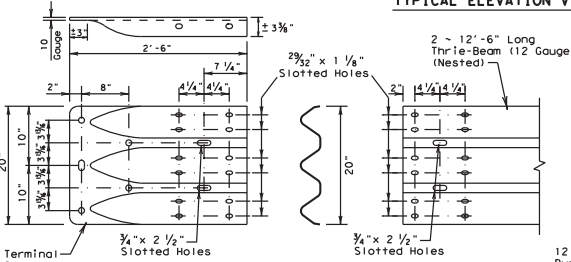
		Design Division Standard	
METAL BEAM GUARD FENCE (SHORT RADIUS) MBGF (SR) - 19			
FILE: mbgfr19.dgn	DATE: NOVEMBER 2019	CONT: 6380	SECT: 47
DESIGNER: WFS	CHECKER: WFS	JOB NO: 001	HIGHWAY: IH 44, ETC.
DIST: WFS	COUNTY: WICHITA, ETC.	SHEET NO: 41	

DATE: 5/21/2021
 FILE: I:\WF\MAINT\Maintenance Projects\6380-47-001 On Call Guardrail - Design\Plan Set\Drawings\MBGF (TR)-19.dgn
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GENERAL NOTES

- Concrete curb may be cast-in-place or precast as shown on this sheet. When used in conjunction with thrie-beam guard fence transitions, curb shall be Type II (Typically 5 3/4" height above surface; See CCCC standard sheet) unless otherwise shown in the plans. If other curb heights are shown in the plans in conjunction with the transition, the concrete curb shall be from 4" to 8" with a relatively vertical face. Concrete curb shall be continuous to the seventh post.
- Contact the Design Division for drainage cut options needed within the curb section of the transition.
- The type of post (round wood, rectangular wood or steel) will be shown elsewhere in the plans.
- The post length shall be marked on all 7'-0" long posts by the Manufacturer. The mark shall be located within the top 1 ft. region of the post, at least 3/8" in height, and visible after installation. Wooden posts shall be marked with a brand, and steel posts with a stencil before galvanizing.
- Rail element shall meet the requirements of Item 540, "Metal Beam Guard Fence" except as modified on the plans. The thrie-beam terminal connector and the thrie-beam transition to w-beam shall be of the same material, but shall not be less than 10 gauge.
- Contractor shall verify that the locations of bolt holes match those in the thrie-beam terminal connector prior to ordering materials.
- Unless otherwise shown in the plans, transitions shall be placed with the block face in front of or directly above the curb face.
- Install terminal connector with (12) rectangular guardrail plate washers (FWR03) and (12) 5/8" x 2" button head splice bolts with recessed nuts.
- Button head "post bolts & nuts" shall meet the requirements of (ASTM A307), and shall be of sufficient length to extend through the full thickness of the nut and 3/8" washer (FWC160) and not more than 1" beyond it. Trim remaining bolt length to meet required length.
- Fittings (bolts, nuts, and washers) shall be galvanized in accordance with Item 445, "Galvanizing". Fittings shall be subsidiary to the bid item.
- Crown shall be widened to accommodate transitions.
- If solid rock is encountered. See the MBGF standard sheet for the proper installation guidance.
- Posts shall not be set in concrete.
- Unless otherwise shown in the plans, a composite material post and/or block that meets the requirements of DMS-7210, "Composite Material Posts and Blocks for Metal Beam Guard Fence" may be substituted for posts and/or blocks of similar dimensions. The Construction Division, TxDOT, maintains a Material Producer List (MPL) for producers of materials conforming to DMS-7210. Only producers on the MPL can furnish composite material posts and/or blocks.



NOTES:

(5) 5/8" dia. heavy hex bolts, length will vary depending on width of concrete rail, leave 1" of bolt length past the 5/8" hex nut. Trim as required. See General Notes: 6 & 7 for additional connection details.

BRIDGE APPROACH - UPSTREAM: THE NESTED RAIL LAPS OVER THE TERMINAL CONNECTOR. PLATE WASHERS ARE INSTALLED UNDER THE SPLICE NUTS AGAINST INSIDE OF CONNECTOR.

BRIDGE EXIT - DOWNSTREAM: THE TERMINAL CONNECTOR LAPS OVER THE NESTED RAIL. PLATE WASHERS ARE INSTALLED UNDER THE BOLT HEAD AGAINST OUTSIDE OF CONNECTOR.

PLATE WASHER INSTRUCTIONS

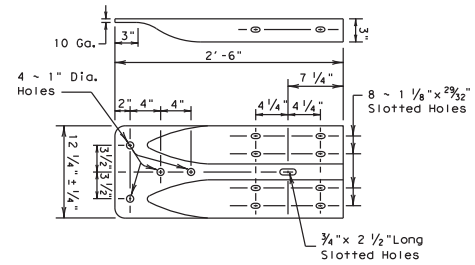
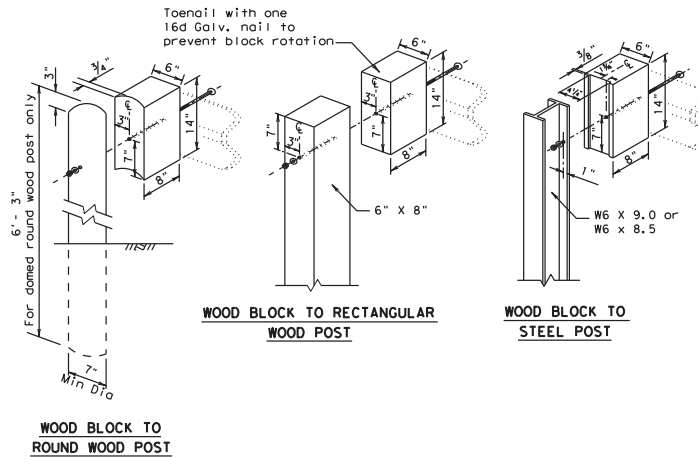
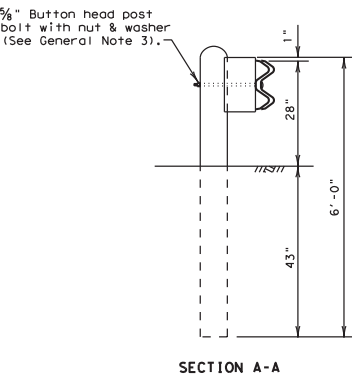
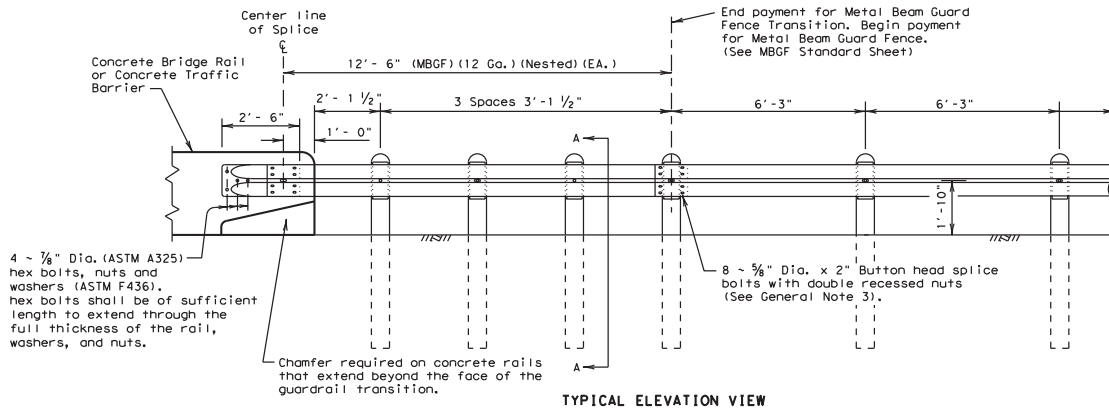
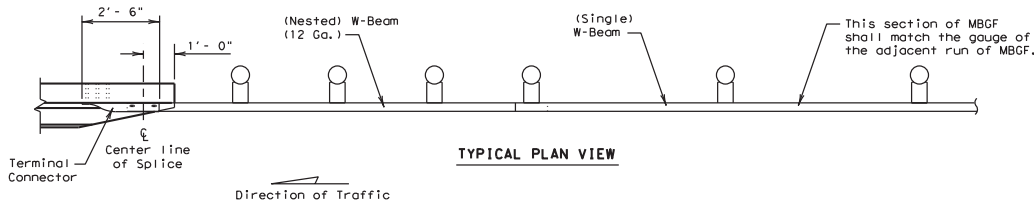
ONLY FOR USE IN MAINTENANCE REPAIRS.



METAL BEAM GUARD FENCE TRANSITION (THRIE-BEAM TRANSITION) MBGF (TR) - 19

FILE: mbgfr19.dgn	DATE: 11/01/2019	DESIGNER: CJK	CHECKER: CJK	DATE: 11/01/2019	DESIGNER: CJK
CONTRACT NO: 6380	SECTION: 47	JOB NO: 001	DATE: 11/01/2019	DESIGNER: CJK	DATE: 11/01/2019
DIST: WFS	COUNTY: WICHITA	SHEET NO: 42			

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 DATE: 5/21/2021
 FILE: T:\WFSMAINT\Maintenance Projects\6380-47-001 On Call Guardrail - Design\Plan Set\Drawings\Roadway\MBGF(TL2)-19.dgn



TERMINAL CONNECTOR
 FOR USE WITH MBGF CONNECTIONS TO CONCRETE BRIDGE RAILS AND TRAFFIC BARRIERS

GENERAL NOTES

- The type of post (round wood post, rectangular wood post, or steel post) will be shown elsewhere in the plans. The exact position of transitions shall be shown elsewhere in the plans or as directed by the Engineer.
- Rail element shall meet the requirements of Item 540, "Metal Beam Guard Fence" except as modified on the plans.
- Button head "post" bolts (ASTM A307) shall be of sufficient length to extend through the full thickness of the nut and Type A 1 1/4" O.D. washer and not more than 1" beyond it. Button head "splice" bolts (ASTM A307) are 5/8" x 2" (at triple rail splices) with 5/8" double recessed nuts (ASTM A563).
- Fittings (bolts, nuts, and washers) shall be galvanized in accordance with Item 445, "Galvanizing." Fittings shall be subsidiary to the bid item requiring construction of the transition.
- Crown will be widened to accommodate transitions.
- If solid rock is encountered. See the MBGF standard sheet for the proper installation guidance.
- Posts shall not be set in concrete.
- Unless otherwise shown in the plans, a composite material post and/or block that meets the requirements of DMS-7210, "Composite Material Posts and Blocks for Metal Beam Guard Fence" may be substituted for posts and/or blocks of similar dimensions. The Construction Division, TxDOT, maintains a Material Producer List (MPL) for producers of materials conforming to DMS-7210. Only producers on the MPL can furnish composite material posts and/or blocks.
- Refer to MBGF standard sheet for additional details.

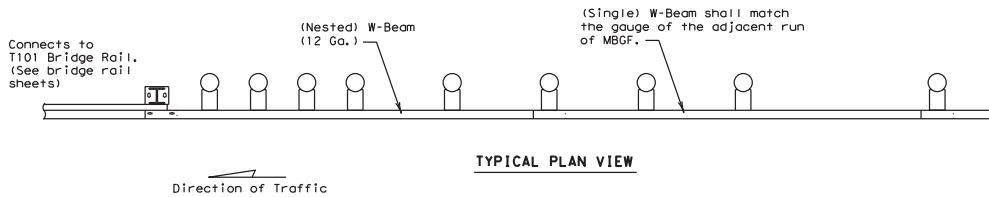
ONLY FOR USE IN MAINTENANCE REPAIRS.

Design Division Standard

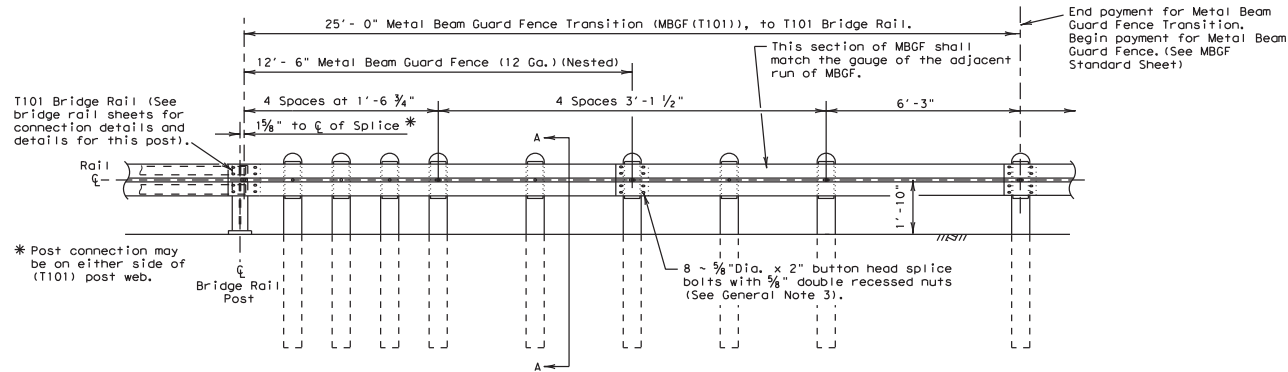
METAL BEAM GUARD FENCE
 TRANSITION (TL2)
 (Low Speed Transition)
 MBGF (TL2)-19

FILE: mbgff1219.dgn	DN: TxDOT	CR: KM	DN: BD	CR: VP
© TxDOT NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	6380	47	001	IH 44, ETC.
DIST	COUNTY		SHEET NO.	
WFS	WICHITA, ETC.		43	

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 DATE: 5/21/2021
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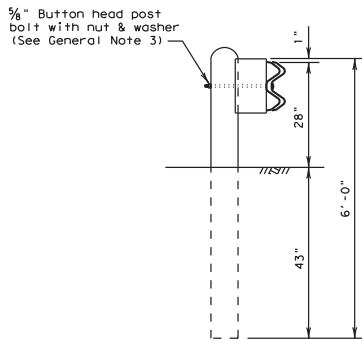


TYPICAL PLAN VIEW

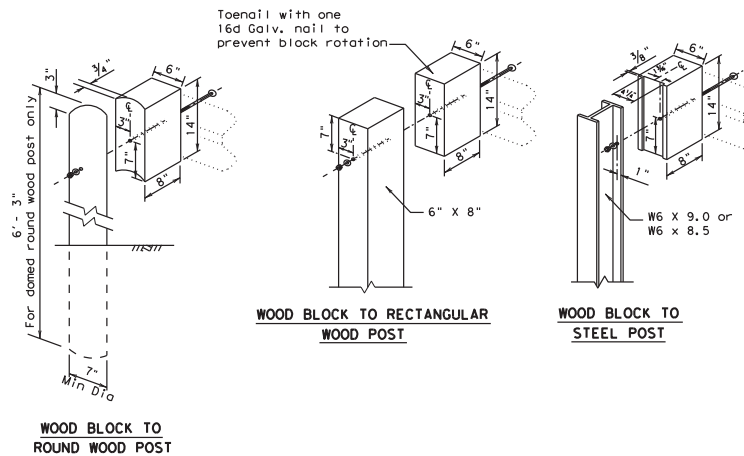


TYPICAL ELEVATION VIEW

* Post connection may be on either side of (T101) post web.



SECTION A-A



WOOD BLOCK TO RECTANGULAR WOOD POST

WOOD BLOCK TO STEEL POST

WOOD BLOCK TO ROUND WOOD POST

GENERAL NOTES

- The type of post (round wood post, rectangular wood post, or steel post) will be shown elsewhere in the plans. The exact position of transitions shall be shown elsewhere in the plans or as directed by the Engineer.
- Rail element shall meet the requirements of Item 540, "Metal Beam Guard Fence" except as modified on the plans.
- Button head "post" bolts (ASTM A307) shall be of sufficient length to extend through the full thickness of the nut (ASTM A563) and the Type A 1 1/4" O.D. washer and not more than 1" beyond it. Button head "splice" bolts (ASTM A307) are 5/8" x 2" (at triple rail splices) with a 3/8" double recessed nuts (ASTM A563).
- Fittings (bolts, nuts, and washers) shall be galvanized in accordance with Item 445, "Galvanizing." Fittings shall be subsidiary to the bid item requiring construction of the transition.
- Crown will be widened to accommodate transitions.
- If solid rock is encountered. See the MBGF standard sheet for proper installation guidance.
- Posts shall not be set in concrete.
- Unless otherwise shown in the plans, a composite material post and/or block that meets the requirements of DMS-7210, "Composite Material Posts and Blocks for Metal Beam Guard Fence" may be substituted for posts and/or blocks of similar dimensions. The Construction Division, TxDOT, maintains a Material Producer List (MPL) for producers of materials conforming to DMS-7210. Only producers on the MPL can furnish composite material posts and/or blocks.
- Refer to MBGF Standard Sheet for additional details.

ONLY FOR USE IN MAINTENANCE REPAIRS.

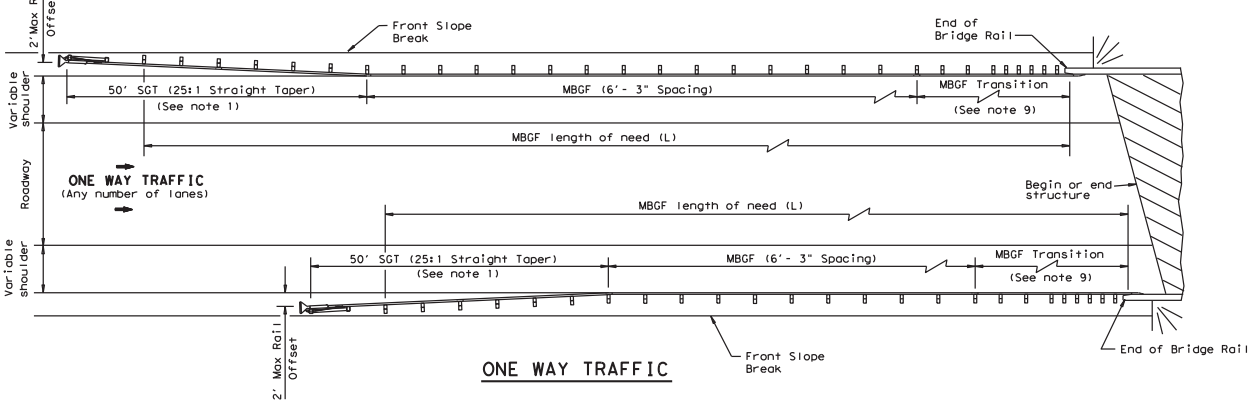
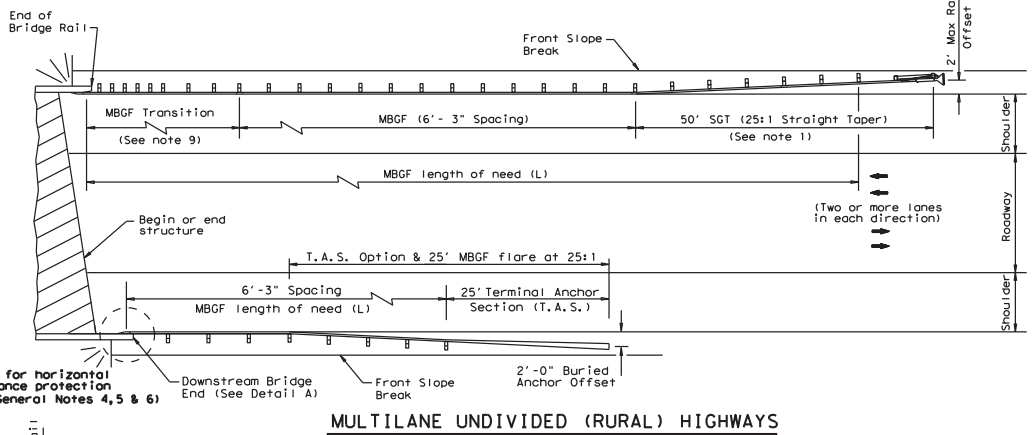
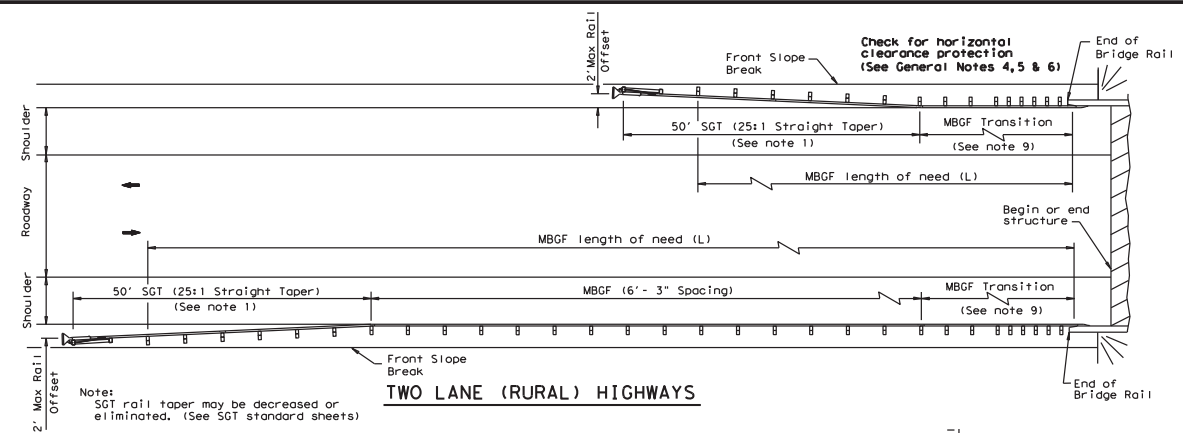


**METAL BEAM GUARD FENCE
TRANSITION (T101)
(T101 BRIDGE RAIL)
MBGF (T101)-19**

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© TxDOT NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	6380	47	001	IH 44, ETC.
DIST	WFS	COUNTY	WICHITA, ETC.	SHEET NO. 44

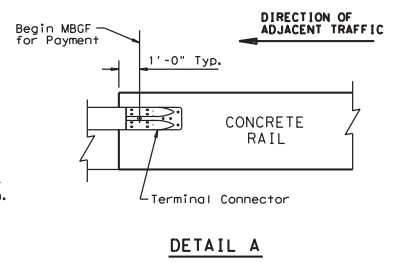
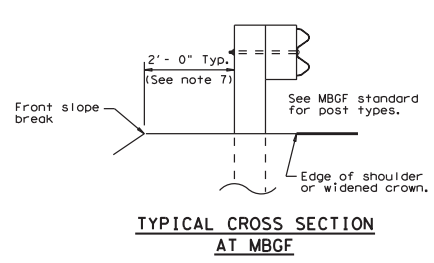
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DATE: 5/21/2021 2:11:22 PM
 FILE: T:\WFSMAINT\Maintenance Projects\6380-47-001 On Call Guardrail - Design\Plan Set\Drawings\Roadway\MED(28)-11.dgn



GENERAL NOTES

- For more detail: See MBSG, SGT, and MBSG Transition standard sheets.
- Quantities of metal beam guard fence (MBSG) at individual bridge ends are shown elsewhere in plans.
- Use average daily traffic (ADT) for the current year to determine MBSG length of need in accordance with the Roadway Design Manual unless otherwise specified. Where significant traffic volume growth is anticipated on low volume (0-750 ADT) highways, use length determinations for the higher volume category.
- MBSG may not be required to shield departure end of bridge unless other obstacles within the horizontal clearance limits or opposing traffic indicate a MBSG consideration.
- Terminal anchor sections (TAS) are only for downstream end anchorage use, outside the horizontal clearance area of opposing traffic.
- Direct connection of MBSG (at 6'-3" post spacing without transition) to concrete rail are only for downstream rail connections outside the horizontal clearance area of opposing traffic. (See Detail A)
- The crown shall be widened to accommodate MBSG. Typically the "front slope" break should be 2'-0" from the back of the MBSG post. This applies to new construction on new alignment or where existing roadway cross section is to be widened to increase roadway width. This does not apply to rehabilitation work where existing roadway crown width is to be retained (See Typical Cross Section of MBSG).
- For restrictive bridge widths: The MBSG should be properly transitioned from the existing bridge rail to the adjoining MBSG (See MBSG Transition Standards). Metal beam guard fence at these bridge location(s) shall be flared at the rate of 25:1 or flatter, and be of the length necessary to locate the terminal end at the 2 ft. "maximum" offset from the shoulder edge.
- Transition length and post spacing will vary depending on the transition type. Transition type will be shown elsewhere in the plans.



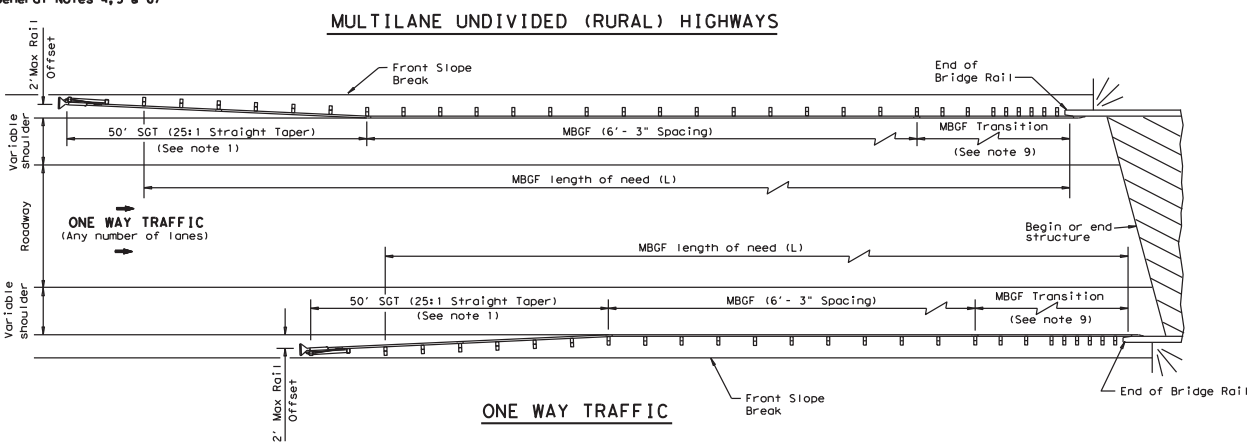
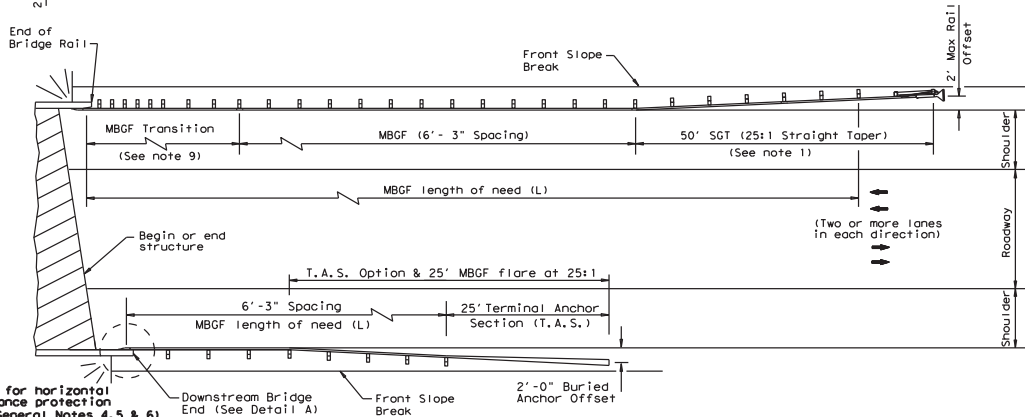
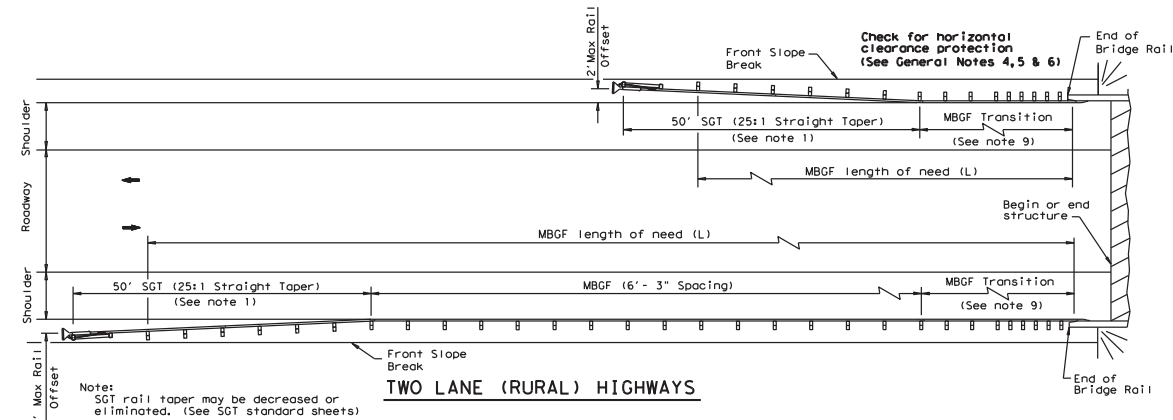
All rail elements shall be lapped in the direction of adjacent traffic.

		Design Division Standard	
BRIDGE END DETAILS (28" Metal Beam Guard Fence Applications to Rigid Rails) BED(28)-11			
FILE: bed2811.dgn	DN: TxDOT	CR: AM	DN: BD
© TxDOT December 2001	CONT SECT	JOB	HIGHWAY
6380	47	001	IH 44, ETC.
12-2011	DIST	COUNTY	SHEET NO.
	WFS	WICHITA, ETC.	45

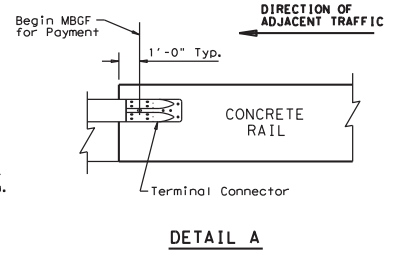
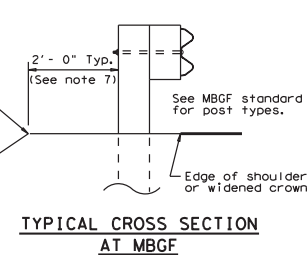
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Design: Plan Set: Dgn: s: 3. - Roadway: BED (28) - 19.dgn

DATE: 5/21/2021 2:11:24 PM
 FILE: T:\WFSMAINT\Maintenance Projects\6380-47-001 On Call Guardrail - FY 22-4 -



- GENERAL NOTES**
- For more detail: See MBOF, SGT, and MBOF Transition standard sheets.
 - Quantities of metal beam guard fence (MBOF) at individual bridge ends are shown elsewhere in plans.
 - Use average daily traffic (ADT) for the current year to determine MBOF length of need in accordance with the Roadway Design Manual unless otherwise specified. Where significant traffic volume growth is anticipated on low volume (0-750 ADT) highways, use length determinations for the higher volume category.
 - MBOF may not be required to shield departure end of bridge unless other obstacles within the horizontal clearance limits or opposing traffic indicate a MBOF consideration.
 - Terminal anchor sections (TAS) are only for downstream end anchorage use, outside the horizontal clearance area of opposing traffic.
 - Direct connection of MBOF (at 6'-3" post spacing without transition) to concrete rail are only for downstream rail connections outside the horizontal clearance area of opposing traffic. (See Detail A)
 - The crown shall be widened to accommodate MBOF. Typically the "front slope" break should be 2'-0" from the back of the MBOF post. This applies to new construction on new alignment or where existing roadway cross section is to be widened to increase roadway width. This does not apply to rehabilitation work where existing roadway crown width is to be retained (See Typical Cross Section of MBOF).
 - For restrictive bridge widths: The MBOF should be properly transitioned from the existing bridge rail to the adjoining MBOF (See MBOF Transition Standards). Metal beam guard fence at these bridge location(s) shall be flared at the rate of 25:1 or flatter, and be of the length necessary to locate the terminal end at the 2 ft. "maximum" offset from the shoulder edge.
 - Transition length and post spacing will vary depending on the transition type. Transition type will be shown elsewhere in the plans.



All rail elements shall be lapped in the direction of adjacent traffic.

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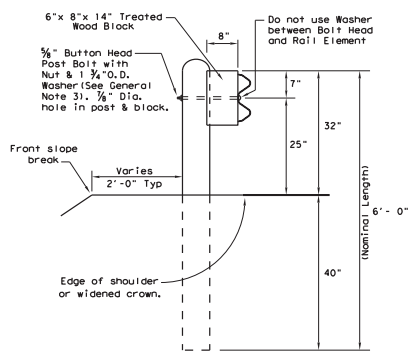
Texas Department of Transportation
 Design Division Standard

**BRIDGE END DETAILS
 (28" METAL BEAM GUARD FENCE
 APPLICATIONS TO RIGID RAILS)
 BED (28) - 19**

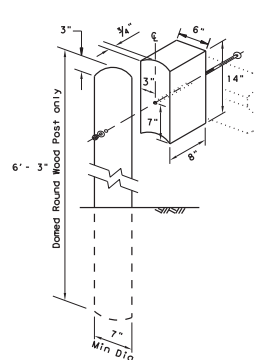
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NOVEMBER 2019	CONT: 6380	SECT: 47	JOB: 001	HIGHWAY: IH 44, ETC.
REVISIONS	DIST: WFS	COUNTY: WICHITA, ETC.	SHEET NO. 46	

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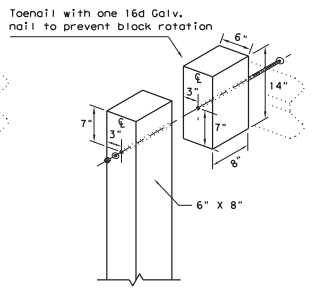
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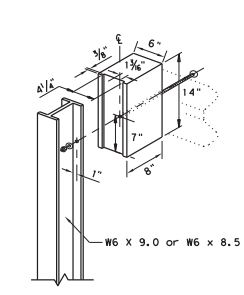
TYPICAL POST



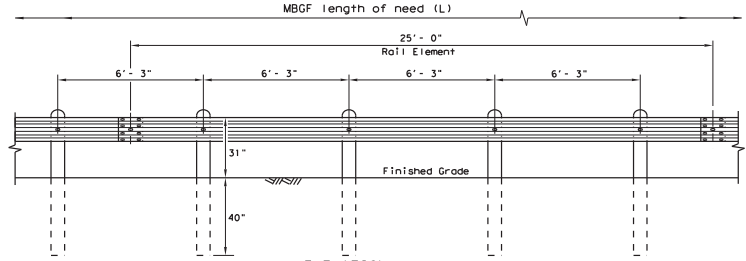
WOOD BLOCK TO ROUND WOOD POST



WOOD BLOCK TO RECTANGULAR WOOD POST

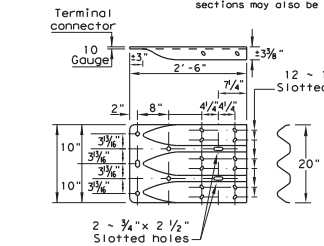


WOOD BLOCK TO STEEL POST



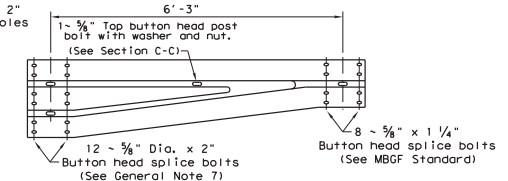
ELEVATION MID-SPAN RAIL SPLICE

Showing a 25'-0" section of W-Beam rail, 12'-6" rail sections may also be supplied (See General Note 2)

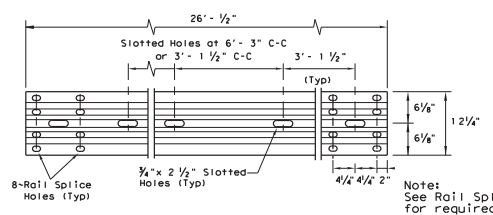


THREE-BEAM TERMINAL CONNECTION

(See General Notes 6 & 7 for required hardware)

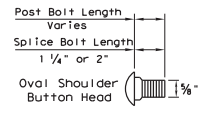


NON-SYMMETRICAL TRANSITION TO W-BEAM (10 GAUGE)



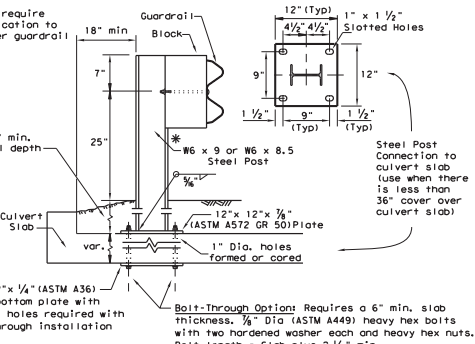
ELEVATION 25'-0" (NOM.) W-BEAM SECTION

12'-6" rail sections may also be supplied (See General Note 2)



BUTTON HEAD BOLT

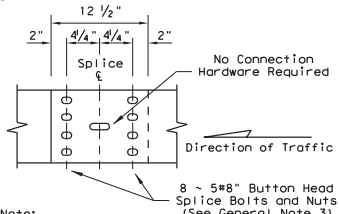
Post and Splice Bolts (See General Note 3)



LOW FILL CULVERT POST

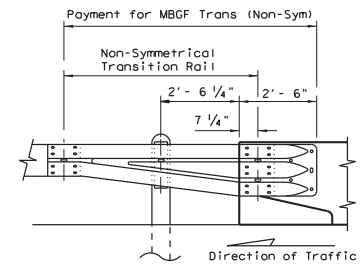
Culverts of 25 ft. or less, see GF(31)LS standard for "Long Span" option.

Epoxy Note:
 Epoxy Anchor Option: This option may only be used if the culvert slab is 8" min. thick. Threaded anchor rods must be 3/8" Dia. ASTM A449 or A193 Grade B7 with heavy hex nut, and one hardened washer each. Embed anchor rods 6" with HiTi HIT RE 500 epoxy adhesive. Other Type III Class C epoxy adhesives meeting the requirements of DMS-6100, "Epoxyes and Adhesives", may be used if it can be demonstrated that they meet or exceed the strength of HiTi HIT RE 500 with the same embedment depth and threaded rod dia. Follow the manufacturer's requirements for installing epoxied threaded rods. Extend rods 1/4" min. beyond nut.



MID-SPAN RAIL SPLICE DETAIL

Note: GF(31), Mid-Span rail splices are required with 6'-3" post spacings.



DOWNSTREAM RAIL ATTACHMENT

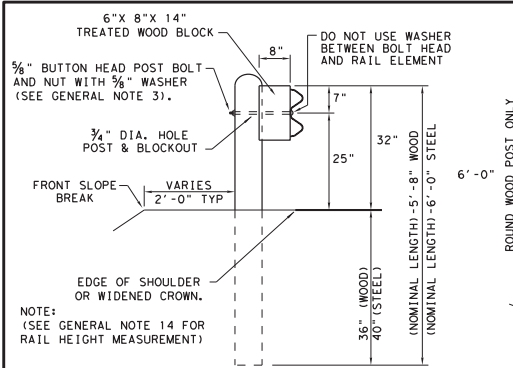
Note: All rail elements shall be lapped in the direction of adjacent traffic.

GENERAL NOTES

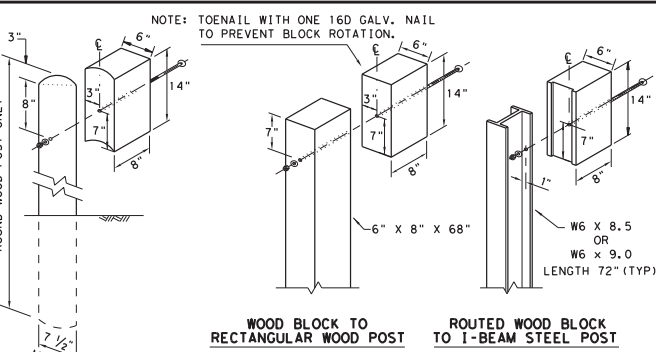
- The type of post (round wood post, rectangular wood post, or steel post) will be as shown in the plans. The exact position of MGBF shall be shown in the plans or as directed by the Engineer. Steel posts to be galvanized in accordance with Item 445, "Galvanizing."
- Rail element shall meet the requirements of Item 540, "Metal Beam Guard Fence" except as modified in the plans. The Contractor may furnish rail elements of 25'-0", or 12'-6" (nom.) lengths. Rail elements may have slotted holes of 3'-1 1/2" C-C or 6'-3" C-C. A special length of rail may be manufactured to accommodate the downstream anchor terminal (DAT) and the transition sections of guardrail.
- Button head "post" bolts (ASTM A307) shall be of sufficient length to extend through the full thickness of the nut (ASTM A563) and Type A (1 1/4" O.D.) washer and not more than 1" beyond it. Button head "splice" bolts (ASTM A307) are 3/8" x 1 1/2" (or 2" long at triple rail splices) with a 3/8" double recessed nut (ASTM A563). Thrift beam "connection" 1/2" dia. (ASTM A325) hex bolts shall be of sufficient length to extend through the full thickness of the rail, washers, and nuts.
- Fittings (bolts, nuts, and washers) shall be galvanized in accordance with Item 445, "Galvanizing." Fittings shall be subsidiary to the bid item.
- Crown shall be widened to accommodate the Metal Beam Guard Fence.
- The lateral approach to the guard fence, shall have a maximum slope of 1V:10H.
- If shown elsewhere in the plans or as directed by the Engineer, the guard fence may be flared at a rate of 25:1 or flatter.
- Unless otherwise shown in the plans, guard fence placed in the vicinity of curbs shall be positioned so that the face of curb is located directly below or behind the face of the rail. Rail placed over curbs shall be installed so that the post bolt is located approximately 25 inches above the gutter pan or edge of shoulder.
- If solid rock is encountered within 0 to 18" of the finished grade, drill a 22" dia. hole, or drill two 12" dia. front to back overlapping holes, 24" into the rock. If solid rock is encountered below 18", drill a 12" dia. hole, 12" into the rock or to the standard embedment depth, whichever maybe less. Any excess post length, after meeting these depths, may be field cut to ensure proper guardrail mounting height. Backfill with a cohesionless material.
- Posts shall not be set in concrete, of any depth.
- Special fabrication will be required at installations having a curvature of less than 150 ft. radius.
- Unless otherwise shown in the plans, a composite material post and/or block that meets the requirements of DMS-7210, "Composite Material Posts and Blocks for Metal Beam Guard Fence" may be substituted for posts and/or blocks of similar dimensions. The Construction Division, TxDOT maintains a Material Producer List (MPL) for producers of materials conforming to DMS-7210. Only producers on the MPL may furnish composite material posts and/or blocks.
- For posts located partially or wholly between precast box culvert units, the use of a cast-in-place concrete closure between boxes is required. See Detail "A" on Bridge Standard SCP-MD.

		Design Division Standard	
<h1>METAL BEAM GUARD FENCE</h1> <h2>GF(31)-14</h2>			
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REV: 01	CONF: 6380	SECT: 47	JOB: 001
REVISIONS		COUNTY	SHEET NO.
DIST: WFS		COUNTY: WICHITA, ETC.	SHEET NO.: 47

DATE: 5/21/2021
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TYPICAL POST PLACEMENT

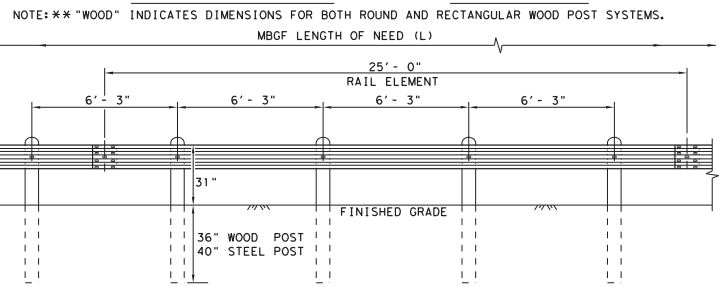


WOOD BLOCK TO ROUND WOOD POST

ROUTED WOOD BLOCK TO I-BEAM STEEL POST

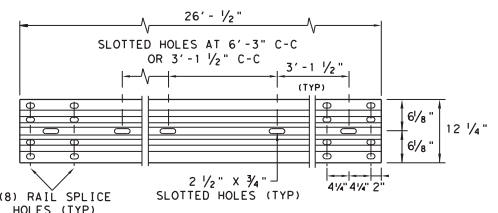
GENERAL NOTES

1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 25'-0", OR 12'-6" (NOM.) LENGTHS. RAIL ELEMENTS MAY HAVE SLOTTED HOLES AT 3'-1 1/2" C-C OR 6'-3" C-C. A SPECIAL LENGTH OF RAIL MAY BE MANUFACTURED TO ACCOMMODATE THE DOWNSTREAM ANCHOR TERMINAL (DAT) AND THE TRANSITION SECTIONS OF GUARDRAIL.
3. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND 3/8" WASHER (FWC160) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
4. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
5. CROWN SHALL BE WIDENED TO ACCOMMODATE THE METAL BEAM GUARD FENCE.
6. THE LATERAL APPROACH TO THE GUARD FENCE, SHALL HAVE A MAXIMUM SLOPE OF 1V:10H.
7. IF SHOWN ELSEWHERE IN THE PLANS OR AS DIRECTED BY THE ENGINEER, THE GUARD FENCE MAY BE FLARED AT A RATE OF 25:1 OR FLATTER.
8. UNLESS OTHERWISE SHOWN IN THE PLANS, GUARD FENCE PLACED IN THE VICINITY OF CURBS SHALL BE POSITIONED SO THAT THE FACE OF CURB IS LOCATED DIRECTLY BELOW OR BEHIND THE FACE OF THE RAIL. RAIL PLACED OVER CURBS SHALL BE INSTALLED SO THAT THE POST BOLT IS LOCATED APPROXIMATELY 25 INCHES ABOVE THE GUTTER PAN OR EDGE OF SHOULDER.
9. APPLICATIONS IN SOLID ROCK ARE ONLY ALLOWED WITH STEEL POSTS. IF SOLID ROCK IS ENCOUNTERED WITHIN 0 TO 18" OF THE FINISHED GRADE, DRILL A 24" DIA. HOLE, 24" INTO THE ROCK. IF SOLID ROCK IS ENCOUNTERED BELOW 18", DRILL A 12" DIA. HOLE, 12" INTO THE ROCK OR TO THE STANDARD EMBEDMENT DEPTH, WHICHEVER MAYBE LESS. ANY EXCESS POST LENGTH, AFTER MEETING THESE DEPTHS, MAY BE FIELD CUT TO ENSURE PROPER GUARDRAIL MOUNTING HEIGHT. BACKFILL WITH COARSE AGGREGATE MATERIAL.
10. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
11. SPECIAL FABRICATION WILL BE REQUIRED AT INSTALLATION LOCATIONS HAVING A CURVATURE OF LESS THAN 150 FT. RADIUS.
12. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. THE CONSTRUCTION DIVISION, TXDOT MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210 ONLY PRODUCERS ON THE MPL MAY FURNISH COMPOSITE MATERIAL BLOCKS.
13. FOR THE LOW FILL CULVERT OPTION, POSTS LOCATED PARTIALLY OR WHOLLY BETWEEN PRECAST BOX CULVERT UNITS, THE USE OF A CAST-IN-PLACE CONCRETE CLOSURE BETWEEN BOXES IS REQUIRED. THE LENGTH OF THE CAST-IN-PLACE CONCRETE CLOSURE SHALL ACCOMMODATE THE PLACEMENT OF THE LOW FILL CULVERT OPTION. SEE CONCRETE CLOSURE DETAILS ON BRIDGE STANDARD SCP-MD.
14. GUARDRAIL HEIGHT MEASUREMENT: WHEN THE GUARDRAIL IS LOCATED ABOVE PAVEMENT, MEASURE THE HEIGHT FROM THE PAVEMENT TO THE TOP OF THE W-BEAM RAIL. WHEN THE GUARDRAIL IS LOCATED UP TO 2 FT. OFF OF THE EDGE OF PAVEMENT OR FOR A PAVEMENT OVERLAY, USE A 10-FOOT STRAIGHTEDGE TO EXTEND THE PAVEMENT/SHOULDER SLOPE TO THE BACK OF RAIL, MEASURE FROM THE BOTTOM OF STRAIGHTEDGE TO THE TOP OF RAIL. FOR GUARDRAIL LOCATED DOWN A 10:1 SLOPE, MEASURE FROM THE NOMINAL TERRAIN.



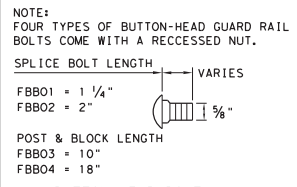
ELEVATION MID-SPAN RAIL SPLICE

SHOWING A 25'-0" SECTION OF W-BEAM RAIL. (SEE GENERAL NOTE 2)



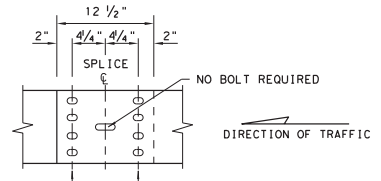
ELEVATION 25'-0" (NOM.) W-BEAM SECTION

NOTES: SEE GENERAL NOTE 2 FOR ALLOWABLE RAIL TYPES. SEE RAIL SPLICE DETAIL FOR REQUIRED HARDWARE.



BUTTON HEAD BOLT

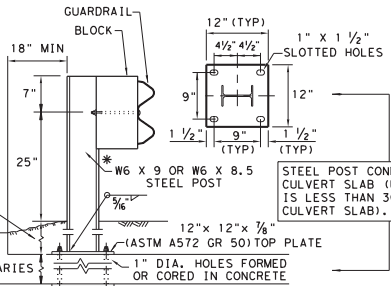
NOTE: SEE GENERAL NOTE 3 FOR SPLICE & POST BOLT DETAILS.



MID-SPAN RAIL SPLICE DETAIL

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

* POST(S) MAY REQUIRE FIELD MODIFICATION TO ENSURE PROPER GUARDRAIL HEIGHT.



LOW FILL CULVERT POST

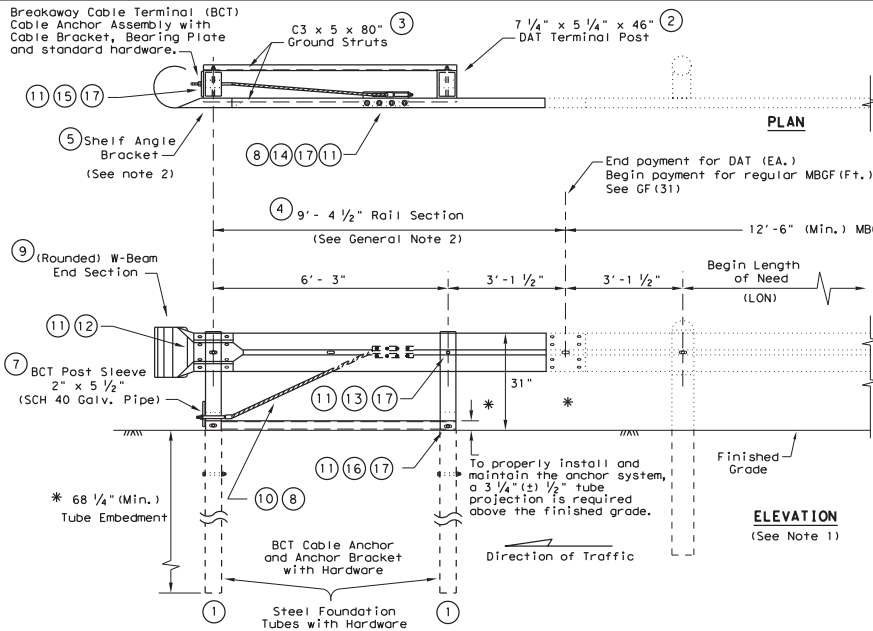
- NOTE: TWO INSTALLATION OPTIONS.
1. BOLT-THROUGH OPTION: REQUIRES A 6" MIN. SLAB THICKNESS. 7/8" DIA (ASTM A449) HEAVY HEX BOLTS WITH TWO HARDENED WASHER EACH AND HEAVY HEX NUTS. NOTE: BOLT LENGTH = SLAB PLUS 2 1/4" MIN.
 2. EPOXY ANCHOR OPTION: THIS OPTION MAY ONLY BE USED IF THE CULVERT SLAB IS 9" MIN. THICK. THREADED ANCHOR RODS MUST BE 7/8" DIA. ASTM A449 OR A193 GRADE B7 WITH HEAVY HEX NUT, AND ONE HARDENED WASHER EACH. OTHER TYPE III CLASS C EPOXY ADHESIVES MEETING THE REQUIREMENTS OF DMS-6100, "EPOXIES AND ADHESIVES", MAY BE USED IF IT CAN BE DEMONSTRATED THAT THEY MEET OR EXCEED THE STRENGTH OF HILTI HIT RE 500 WITH THE SAME EMBEDMENT DEPTH AND THREADED ROD DIA. FOLLOW THE MANUFACTURER'S REQUIREMENTS FOR INSTALLING EPOXIED THREADED RODS. EXTEND RODS 1/4" MIN. BEYOND NUT.

NOTE: CULVERTS OF 25 FT. OR LESS, SEE GF(31)LS STANDARD FOR "LONG SPAN" OPTION.

		Design Division Standard	
METAL BEAM GUARD FENCE TL-3 MASH COMPLIANT GF(31)-19			
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CONT SECT 47	JOB 001	HIGHWAY IH 44, ETC.	SHEET NO. 48

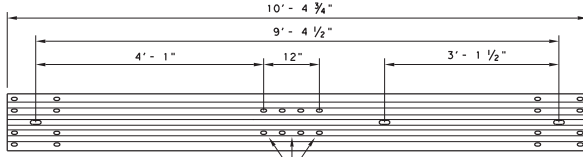
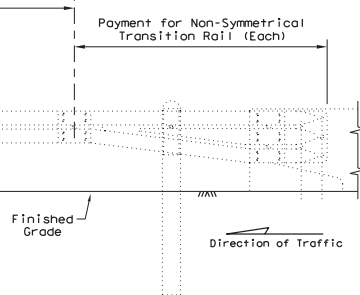
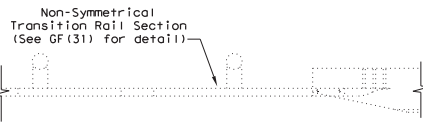
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DATE: 5/21/2021
 FILE: T:\WFSMAINT\Maintenance Projects\6380-47-001 On Call Guardrail - Design\Plan Set Dgn's\3 - Roadway\GF(31)\DAT-14.dgn



DOWNSTREAM ANCHOR TERMINAL (DAT)

Only for downstream use, when located outside the horizontal clearance area of opposing traffic.



④ TERMINAL RAIL ELEMENT FOR DAT

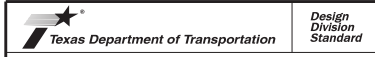
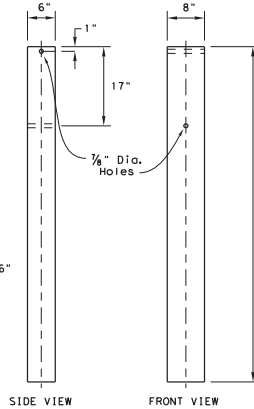
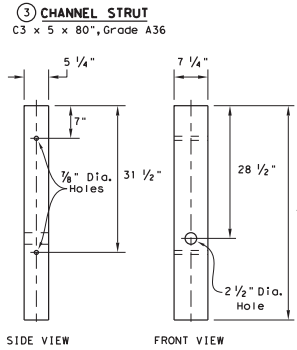
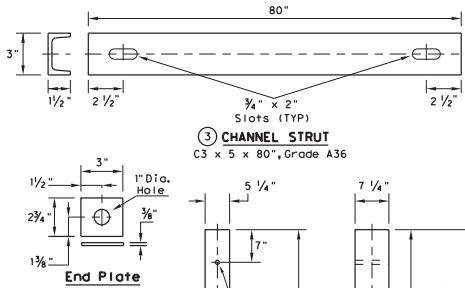
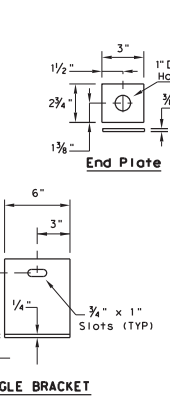
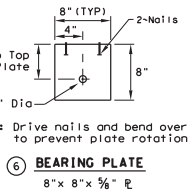
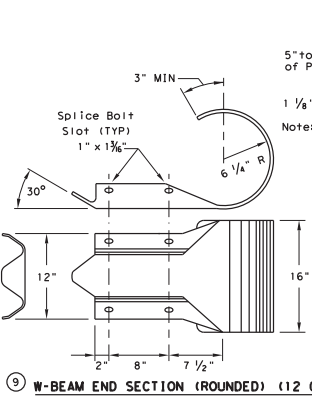
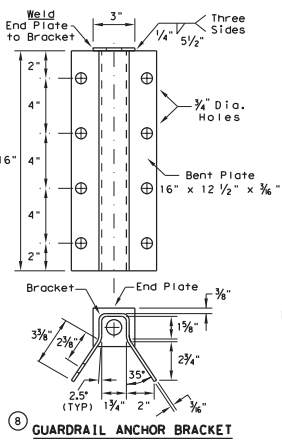
GENERAL NOTES

1. The detail shown is the minimum length of Need (LON) for a DAT connected to a concrete rail.
2. The rail section at the end post is supported by the Shelf Angle Bracket. The rail element is not attached to the end post.
3. The foundation tubes shall not project more than 3 3/4" above the finished grade.
4. All hardware for DAT shall be ASTM A307 unless otherwise shown.
5. Refer to GF(31) sheet for terminal connection details.

MOW STRIP INSTALLATION

If a mow strip is required with the DAT installation the leave-out area around the steel foundation tubes and the two channel struts may be omitted. This will require a full pour at the foundation tubes.

#	(DAT) PARTS LIST	QTY
①	Steel Foundation Tube	2
②	DAT Terminal Post	2
③	Channel Strut	2
④	Terminal Rail Element	1
⑤	Shelf Angle Bracket	1
⑥	BCT Bearing Plate	1
⑦	BCT Post Sleeve	1
⑧	Guardrail Anchor Bracket	1
⑨	(Rounded) W-Beam End Section	1
⑩	BCT Cable Anchor	1
⑪	Recessed Nut, Guardrail	20
⑫	1 1/4" Button Head Bolt	4
⑬	10" Button Head Bolt	2
⑭	3/8" x 2" Hex Head Bolt	8
⑮	3/8" x 8" Hex Head Bolt	4
⑯	3/8" x 10" Hex Head Bolt	2
⑰	3/8" Flat Washer	18



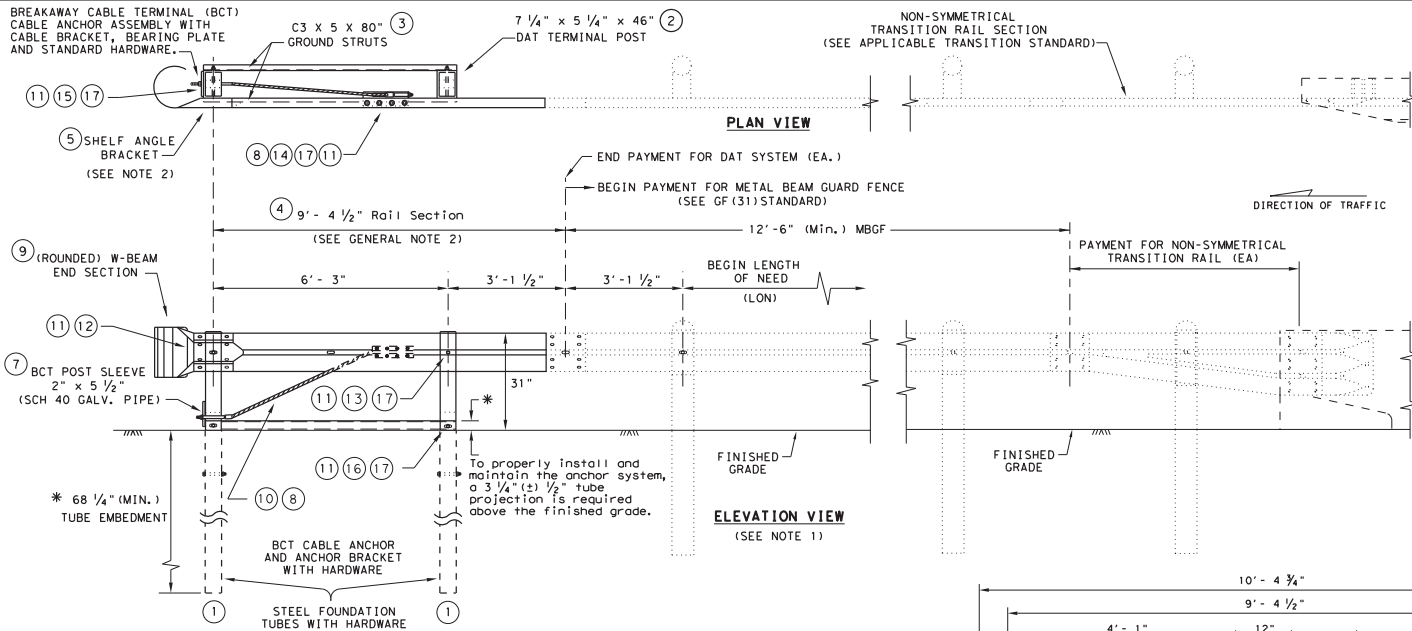
METAL BEAM GUARD FENCE (Downstream Anchor Terminal)

GF (31) DAT-14

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© TXDOT: December 2011	CONT SECT	JOB	HIGHWAY	
REVISIONS	6380 47	001	IH 44, ETC.	
	DIST	COUNTY	SHEET NO.	
	WFS	WICHITA, ETC.	49	

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DATE: 5/21/2021
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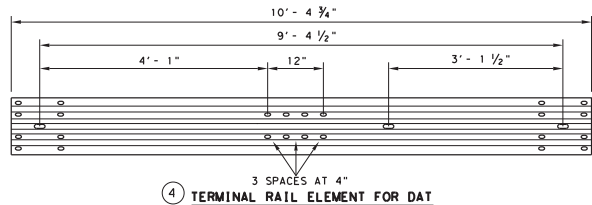
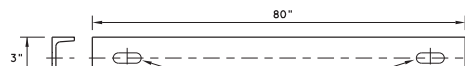
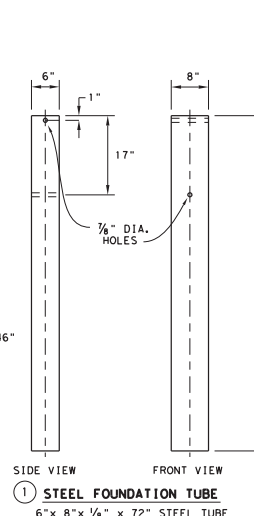
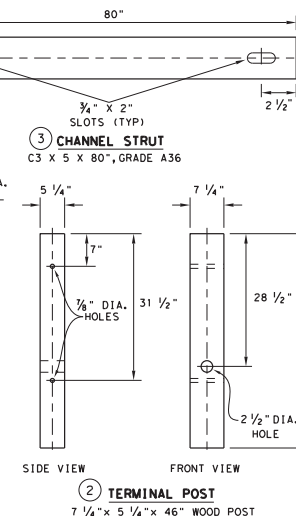
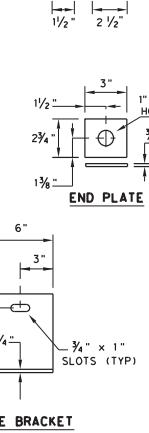
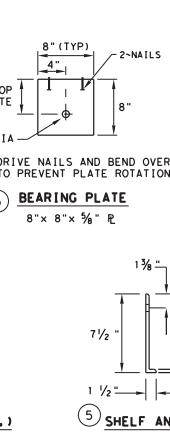
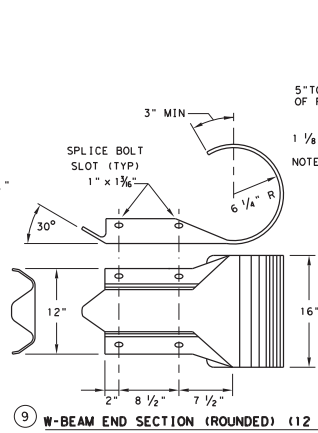
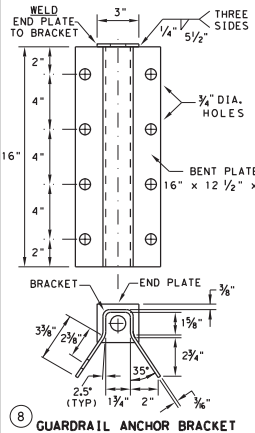


- GENERAL NOTES**
1. THE DETAIL SHOWN IS THE MINIMUM LENGTH OF NEED (LON) FOR A DOWNSTREAM ANCHOR TERMINAL (DAT) CONNECTED TO A CONCRETE RAIL.
 2. THE RAIL SECTION AT THE END POST IS SUPPORTED BY THE SHELF ANGLE BRACKET. THE RAIL ELEMENT IS NOT ATTACHED TO THE END POST.
 3. THE FOUNDATION TUBES SHALL NOT PROJECT MORE THAN 3 3/4" ABOVE THE FINISHED GRADE.
 4. ALL HARDWARE FOR DAT SHALL BE ASTM A307 UNLESS OTHERWISE SHOWN.
 5. REFER TO GF(31) SHEET FOR TERMINAL CONNECTION DETAILS.

MOW STRIP INSTALLATION
 IF A MOW STRIP IS REQUIRED WITH THE DAT INSTALLATION THE LEAVE-OUT AREA AROUND THE STEEL FOUNDATION TUBES AND THE TWO CHANNEL STRUTS MAY BE OMITTED. THIS WILL REQUIRE A FULL POUR AT THE FOUNDATION TUBES.

DOWNSTREAM ANCHOR TERMINAL (DAT)
 NOTE: ONLY FOR DOWNSTREAM USE, WHEN LOCATED OUTSIDE THE HORIZONTAL CLEARANCE AREA OF OPPOSING TRAFFIC.

#	(DAT) PARTS LIST	QTY
1	STEEL FOUNDATION TUBE	2
2	DAT TERMINAL POST	2
3	CHANNEL STRUT	2
4	TERMINAL RAIL ELEMENT	1
5	SHELF ANGLE BRACKET	1
6	BCT BEARING PLATE	1
7	BCT POST SLEEVE	1
8	GUARDRAIL ANCHOR BRACKET	1
9	(ROUNDED) W-BEAM END SECTION	1
10	BCT CABLE ANCHOR	1
11	RECESSED NUT, GUARDRAIL	20
12	1 1/4" BUTTON HEAD BOLT	4
13	10" BUTTON HEAD BOLT	2
14	5/8" X 2" HEX HEAD BOLT	8
15	5/8" X 8" HEX HEAD BOLT	4
16	5/8" X 10" HEX HEAD BOLT	2
17	5/8" FLAT WASHER	18

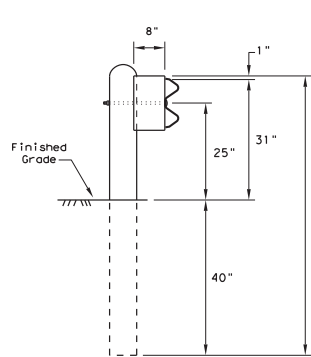


Design Division Standard
METAL BEAM GUARD FENCE (DOWNSTREAM ANCHOR TERMINAL) TL-3 MASH COMPLIANT GF(31) DAT-19

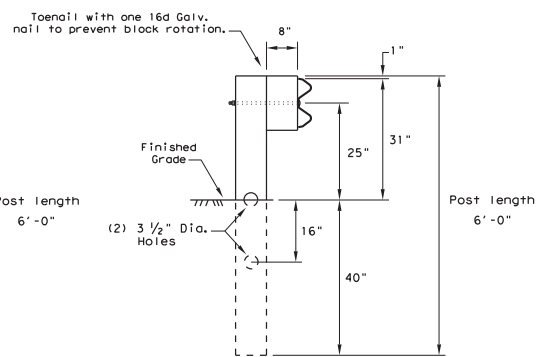
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REVISIONS	6380	47	001	IH 44, ETC.
	DIST	COUNTY		SHEET NO.
	WFS	WICHITA, ETC.		50

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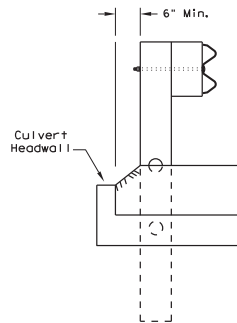
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Standard Line Post Installation



**Rectangular CRT Post
(6"x 8" x 6' Long)**
(6) CRT required.
See Elevation Detail for locations.

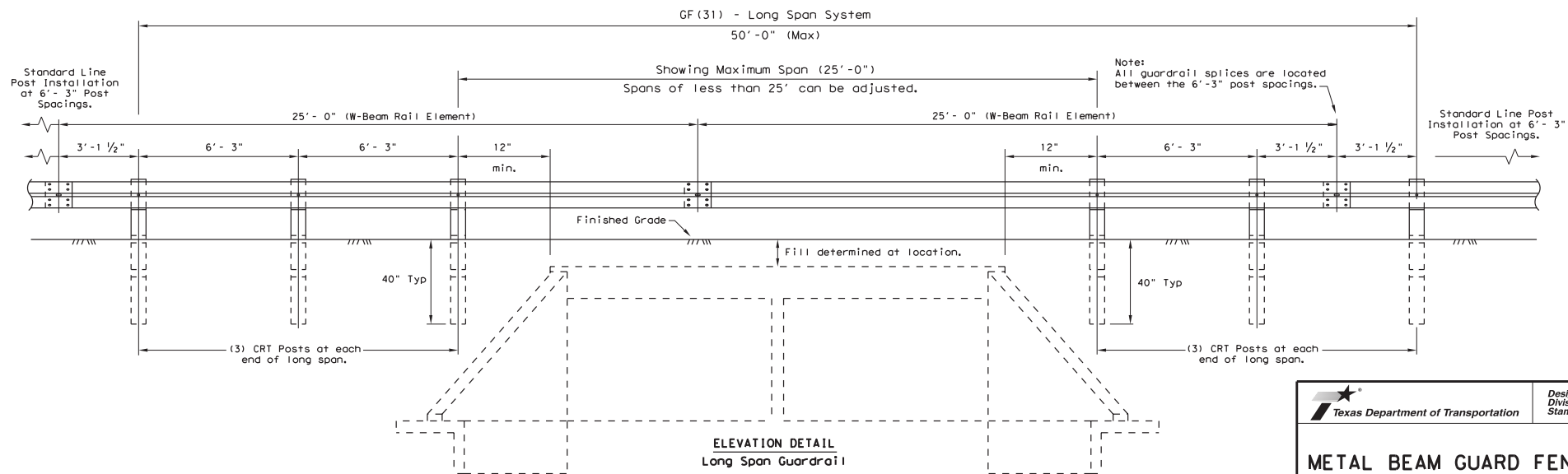


**Lateral Offset Between the
Guardrail and the Culvert Headwall**

GENERAL NOTES

- The type of line post (round wood post, rectangular wood post, or steel post) will be as shown in the plans. The exact position of the transitions shall be as shown in the plans or as directed by the Engineer. Steel posts to be galvanized in accordance with Item 445, "Galvanizing."
- Rail element shall meet all requirements of Item 540, "Metal Beam Guard Fence" except as modified on the plans. The Contractor may furnish rail elements of 12 1/2 or 25 foot nominal lengths.
- Rail post holes are offset 3'- 1 1/2" from standard guardrail to accommodate the midspan splicing.
- Button head post bolts (ASTM A307) shall be of sufficient length to extend through the full thickness of the nut (ASTM A563) and no more than 3/4" beyond it. Button head splice bolts (ASTM A307) are 3/4" x 1 1/4" with a 3/4" double recessed nut (ASTM A563). Galvanized fittings (bolts, nuts, and washers) shall be in accordance with Item, "Metal For Structures". Fittings shall be subsidiary to the bid item requiring construction of transition.
- Where solid rock is encountered or where shown on the plans, the diameter of the holes shall be approximately 12 inches, the backfilling shall be with a cohesionless material, and embedment depth shall be 1' - 6" or more as directed by the Engineer.
- Posts shall not be set in concrete, of any depth.
- Refer to GF(31) Standard Sheet for additional details.

NOTE: Field drilled holes shall be repaired in accordance with Item 445, "Galvanizing".
Flame cutting of holes in guardrail shall not be permitted.



**ELEVATION DETAIL
Long Span Guardrail**



Design
Division
Standard

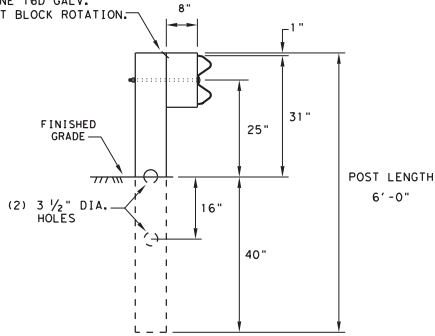
**METAL BEAM GUARD FENCE
(LONG SPAN)**

GF(31)LS-14

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© TxDOT: December 2011	CONT: 6380	SECT: 47	JOB: 001	HIGHWAY: IH 44, ETC.
REVISIONS		DIST: WFS	COUNTY: WICHITA, ETC.	SHEET NO.: 51

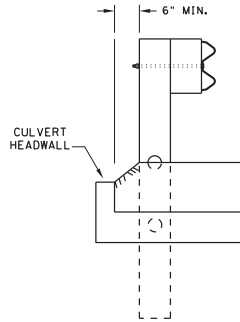
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 FILE: T:\WFSMAINT\Maintenance Projects\6380-47-001 On Call Guardrail - Design\Plan Set Dgn's\3 - Roadway\GF(31)LS-19.dgn

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



**RECTANGULAR CRT POST
(6' X 8' X 6' LONG)**

(6) CRT REQUIRED
SEE ELEVATION DETAIL FOR LOCATIONS

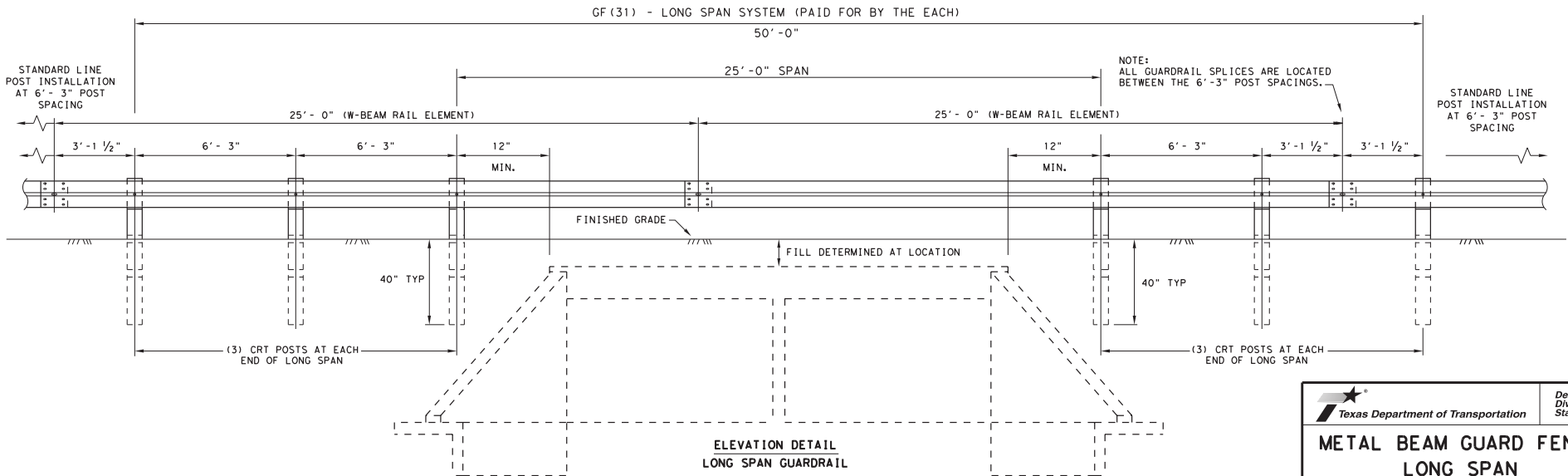


**LATERAL OFFSET BETWEEN THE
GUARDRAIL AND THE CULVERT HEADWALL**

- GENERAL NOTES**
1. THE TYPE OF LINE POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF THE TRANSITIONS SHALL BE AS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
 2. RAIL ELEMENT SHALL MEET ALL REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED ON THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 12' - 6" OR 25' - 0" NOMINAL LENGTHS.
 3. RAIL POST HOLES ARE OFFSET 3' - 1 1/2" FROM STANDARD GUARDRAIL TO ACCOMMODATE THE MIDSPAN SPLICING.
 4. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND 5/8" WASHER (FNC16g) AND NO MORE THAN 1" BEYOND IT.
 5. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
 6. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
 7. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
 8. REFER TO GF(31) STANDARD SHEET FOR ADDITIONAL DETAILS.
 9. FLAME CUTTING OF HOLES IN GUARDRAIL SHALL NOT BE PERMITTED. IF YOU ENCOUNTER MIS-ALIGNED BOLT HOLES IN GUARDRAIL CONTACT THE DESIGN DIVISION FOR ADDITIONAL INFORMATION & OPTIONS.

NOTE: SEE GF(31) STANDARD FOR STANDARD LINE POSTS.

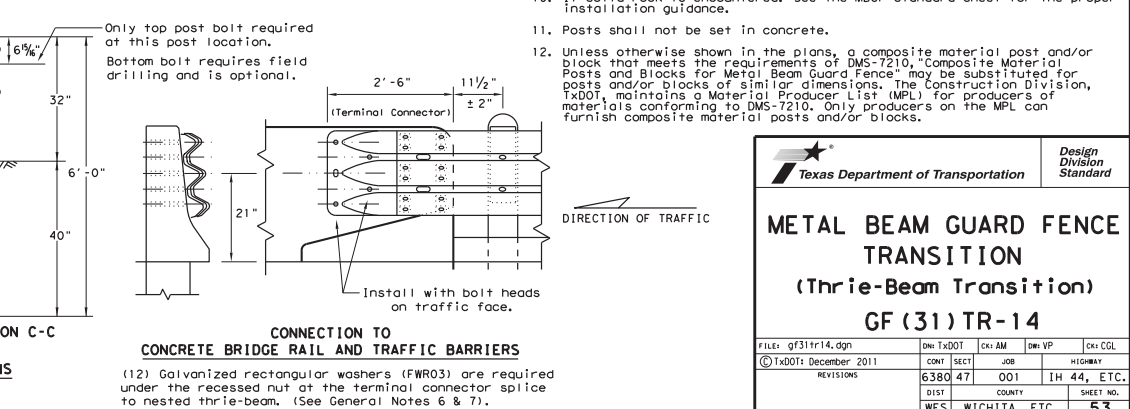
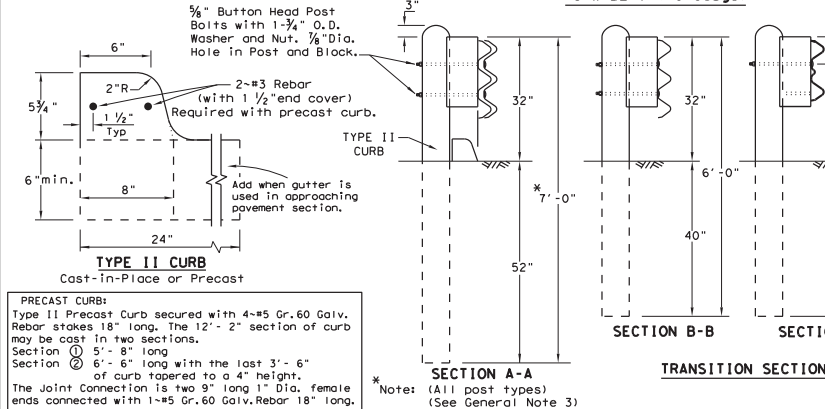
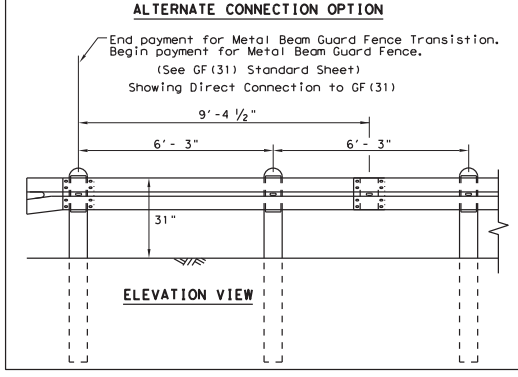
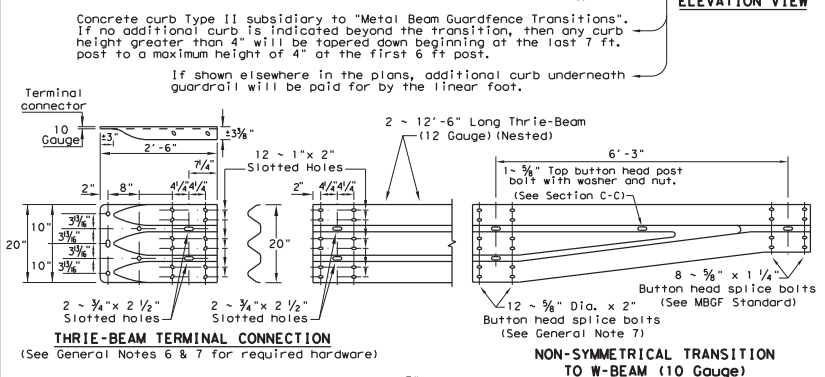
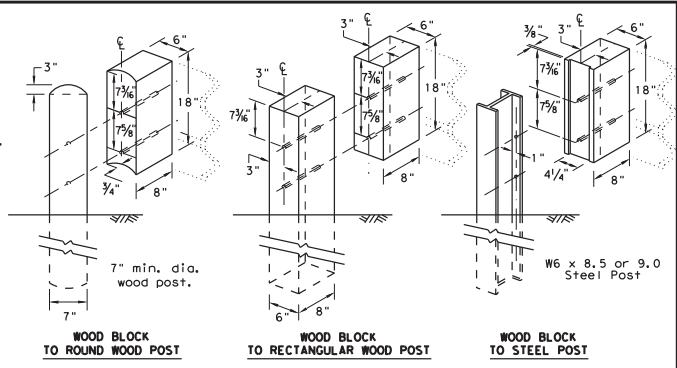
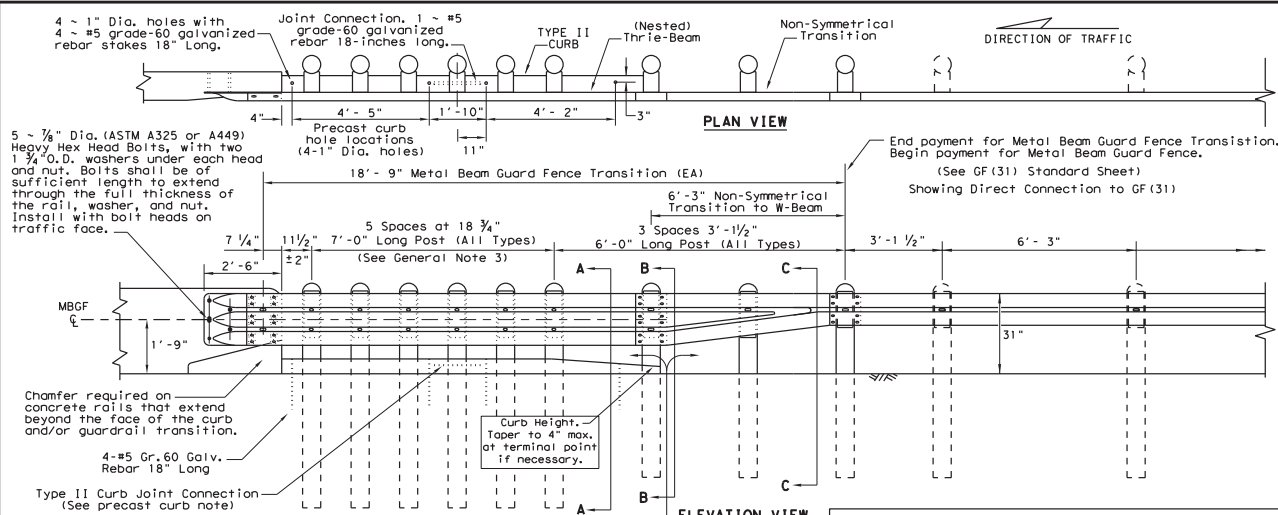
DIRECTION OF TRAFFIC



**ELEVATION DETAIL
LONG SPAN GUARDRAIL**

				Design Division Standard	
METAL BEAM GUARD FENCE LONG SPAN TL-3 MASH COMPLIANT GF(31)LS-19					
FILE: gf31ls19.dgn	DN: TxDOT	CK: KM	DR: VP	CK: CGL/AG	
© TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY	
REVISIONS	6380	47	001	IH 44, ETC.	
	DIST	COUNTY		SHEET NO.	
	WFS	WICHITA, ETC.		52	

DATE: 5/21/2021 2:11:33 PM
 FILE: I:\WFSMAINT\Maintenance Projects\6380-47-001 On Call Guardrail - F22 of this sheet\6380-47-001 On Call Guardrail - F22 of this sheet.dwg
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- GENERAL NOTES**
- Concrete curb may be cast-in-place or precast as shown on this sheet. When used in conjunction with thrie-beam guard fence transitions, curb shall be Type II (Typically 5 3/4" height above surface). See CCCC standard sheets unless otherwise shown in the plans. If other curb heights are shown in the plans, in conjunction with the transition, the curb height may be from 4" to 8" with a relatively vertical face. Concrete curb shall be continuous to the seventh post.
 - Contact the Design Division for drainage cut options needed within the curb section of the transition.
 - The type of post (round wood post, rectangular wood post or steel post) will be as shown in the plans.
 - The post length shall be marked on all 7' - 0" long posts by the Manufacturer. The mark shall be located within the top 1 ft. region of the post, or least 3/4" in height, and visible after installation. Wooden posts shall be marked with a brand, and steel posts with a stencil before galvanizing.
 - Rail element shall meet the requirements of Item 540, "Metal Beam Guard Fence" except as modified on the plans. The thrie-beam terminal connector and the thrie-beam transition to w-beam shall be of the same material, but shall not be less than 10 gauge.
 - Contractor shall verify that the locations of bolt holes match those in the thrie-beam terminal connector prior to ordering materials.
 - Unless otherwise shown in the plans, transitions shall be placed with the block face in front of or directly above the curb face.
 - Galvanized washers used with the 5/8" dia. post bolts shall be Type A 3/4" O.D. washers. The (12) plate washers (FWR03) required at the terminal connector splice.
 - Button head "post" bolts (ASTM A307) shall be of sufficient length to extend through the full thickness of the nut (ASTM A563) and washer and not more than 1" beyond it. Button head "splice" bolts (ASTM A307) 5/8" Dia. x 2" (at triple rail splices) with 3/8" double recessed nuts.
 - Fittings (bolts, nuts, and washers) shall be galvanized in accordance with Item 445, "Galvanizing". Fittings shall be subsidiary to the bid item.
 - Crown shall be widened to accommodate transitions.
 - If solid rock is encountered. See the MBGF standard sheet for the proper installation guidance.
 - Posts shall not be set in concrete.
 - Unless otherwise shown in the plans, a composite material post and/or block that meets the requirements of DMS-7210, "Composite Material Posts and Blocks for Metal Beam Guard Fence" may be substituted for posts and/or blocks of similar dimensions. The Construction Division, TxDOT, maintains a Material Producer List (MPL) for producers of materials conforming to DMS-7210. Only producers on the MPL can furnish composite material posts and/or blocks.

Design Division Standard

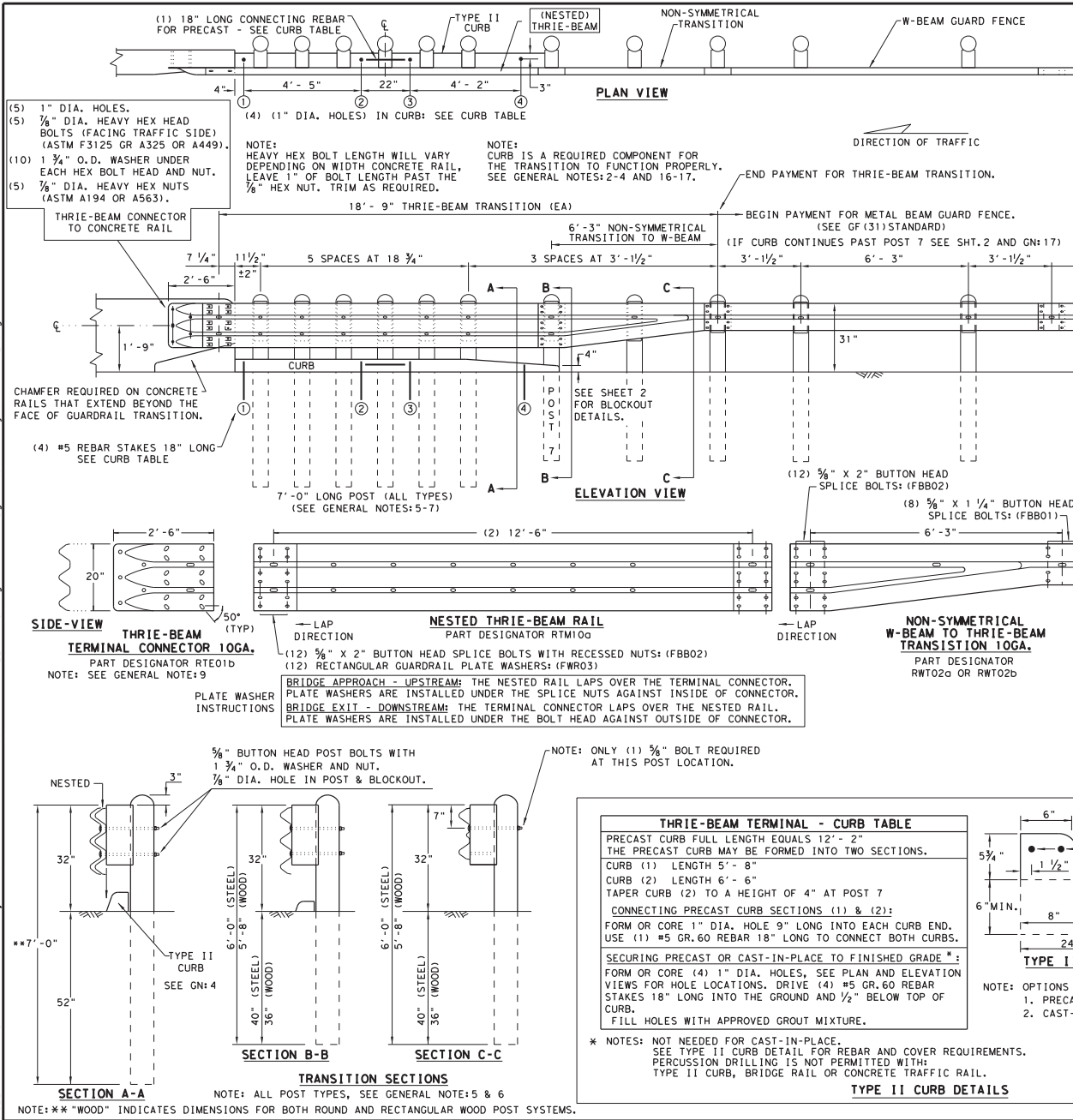
METAL BEAM GUARD FENCE TRANSITION

(Thrie-Beam Transition)

GF (31) TR-14

FILE: gf31tr14.dgn	DN: TxDOT	CR: AM	DN: VP	CR: CGL
6380 47	CONF SECT	JOB	HIGHWAY	
001	1H 44, ETC.			
DIST	COUNTY	SHEET NO.		
WFS	WICHITA, ETC.	53		

DATE: 5/21/2021
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- GENERAL NOTES**
1. CONTACT THE DESIGN DIVISION FOR DRAINAGE CUT OUT OPTIONS NEEDED WITHIN THE CURB SECTION OF THE THRIE-BEAM TRANSITION. (512) 416-2678
 2. CONCRETE CURB MAY BE CAST-IN-PLACE OR PRECAST AS SHOWN ON THIS SHEET. WHEN USED IN CONJUNCTION WITH THE THRIE-BEAM TRANSITIONS, CURB SHALL BE TYPE II (5'-8" HEIGHT); SEE CURRENT CCG STANDARD SHEET FOR FURTHER DETAILS. IF OTHER CURB HEIGHTS ARE SHOWN IN THE PLANS IN CONJUNCTION WITH THE TRANSITION, THE CURB HEIGHT MAY BE FROM 4" TO 8" WITH A RELATIVELY VERTICAL FACE. CONCRETE CURB SHALL BE CONTINUOUS TO THE SEVENTH POST UNLESS OTHERWISE SHOWN IN THE PLANS. SEE GENERAL NOTE:17 FOR CIRCUMSTANCES WHERE CURB CONTIGUES PAST POST 7.
 3. CONCRETE CURB TYPE II SUBSIDIARY TO "METAL BEAM GUARD FENCE TRANSITION". IF NO ADDITIONAL CURB IS INDICATED BEYOND THE TRANSITION, THEN ANY CURB HEIGHT GREATER THAN 4" WILL BE TAPERED DOWN BEGINNING AT THE LAST 7 FT. POST TO A MAXIMUM HEIGHT OF 4" AT POST 7. IF SHOWN ELSEWHERE IN THE PLANS, ADDITIONAL CURB UNDERNEATH GUARDRAIL WILL BE PAID FOR BY THE LINEAR FOOT.
 4. UNLESS OTHERWISE SHOWN IN THE PLANS, TRANSITIONS SHALL BE PLACED WITH THE BLOCKOUT FACE IN FRONT OF OR DIRECTLY ABOVE THE CURB FACE. SEE SECTION A-A.
 5. FOR ROUND WOOD POST SYSTEMS, ALL ROUND WOOD POSTS SHALL BE 7 1/2" DIA. MINIMUM THROUGHOUT THE THRIE-BEAM TRANSITION.
 6. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. REFER TO GF(31) STANDARD SHEET.
 7. THE POST LENGTH SHALL BE MARKED ON ALL 7'-0" LONG POSTS BY THE MANUFACTURER. THE MARK SHALL BE LOCATED WITHIN THE TOP 1 FT. REGION OF THE POST, AT LEAST 3/4" IN HEIGHT, AND VISIBLE AFTER INSTALLATION. WOODEN POSTS SHALL BE MARKED WITH A BRAND, AND STEEL POSTS WITH A STENCIL BEFORE GALVANIZING.
 8. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
 9. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED ON THE PLANS. THE THRIE-BEAM TERMINAL CONNECTOR AND THE THRIE-BEAM TRANSITION TO W-BEAM SHALL BE OF THE SAME MATERIAL, BUT SHALL NOT BE LESS THAN 10 GAUGE. CONTRACTOR SHALL VERIFY THAT THE LOCATIONS OF BOLT HOLES MATCH THOSE IN THE THRIE-BEAM TERMINAL CONNECTOR PRIOR TO ORDERING MATERIALS.
 10. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND 3/4" WASHER (FWC16G) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
 11. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
 12. CROWN SHALL BE WIDENED TO ACCOMMODATE TRANSITIONS.
 13. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
 14. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. TxDOT'S MATERIALS AND TESTS DIVISION MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210. ONLY PRODUCERS ON THE MPL CAN FURNISH COMPOSITE MATERIAL BLOCKS.
 15. REFER TO GF(31) STANDARD SHEET & BRIDGE RAILING DETAILS FOR ADDITIONAL DETAILS.
 16. THE INSTALLATION OF THE TYPE II CURB IS CRITICAL FOR THE PERFORMANCE OF THE THRIE-BEAM TRANSITION SYSTEM. THE CURB PREVENTS (VEHICLE WHEEL SNAGGING) AT THE CONCRETE RAIL AND IS REQUIRED TO MEET MASH CRASH TEST CRITERIA.
 17. IF CURB EXTENDS BEYOND POST 7, 25' OF NESTED W-BEAM GUARDRAIL SHALL BE INSTALLED BEYOND THE PAY LIMITS OF THRIE-BEAM TRANSITION SECTION. (SEE SHT.2). PAYMENT FOR THIS 25' SECTION WILL BE BY LINEAR FOOT, PAY ITEM "0540 6XXX MTL W-BEAM GD FEN (NESTED) (TIM POST)" OR "540 6XXX MTL W-BEAM GD FEN (NESTED) (STEEL POST)" AS APPLICABLE FOR POST TYPE. SEE SHT.2 FOR ADDITIONAL INFORMATION.

HIGH-SPEED TRANSITION

SHEET 1 OF 2

Design Division Standard

METAL BEAM GUARD FENCE
THRIE-BEAM TRANSITION
TL-3 MASH COMPLIANT

GF(31)TR TL3-20

FILE: gf31tr+1320.dgn	DW:TXDOT	CK:KM	DR:VP	CK:COL/AG
NOVEMBER 2020	CONT SECT	JOB	HIGHWAY	
REVISIONS	6380	47	001	IH 44, ETC.
	DIST	COUNTY		SHEET NO.
	WFS	WICHITA, ETC.		54

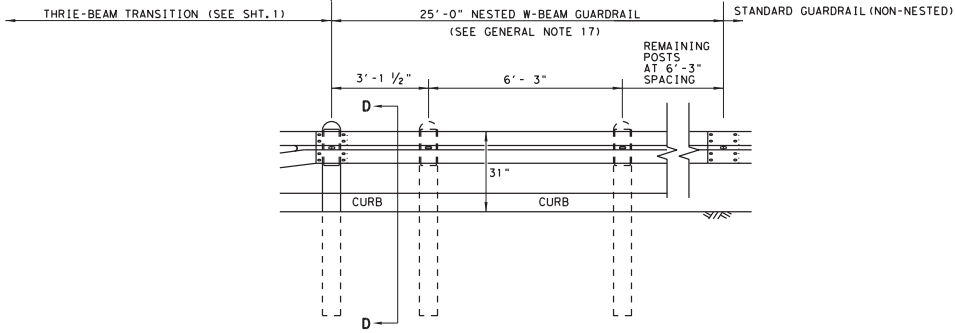
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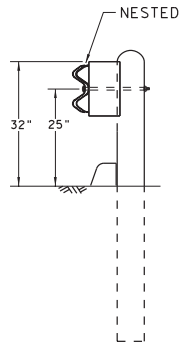
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)

END PAYMENT FOR METAL BEAM GUARD FENCE TRANSITION.
 BEGIN PAYMENT FOR METAL BEAM GUARD FENCE.

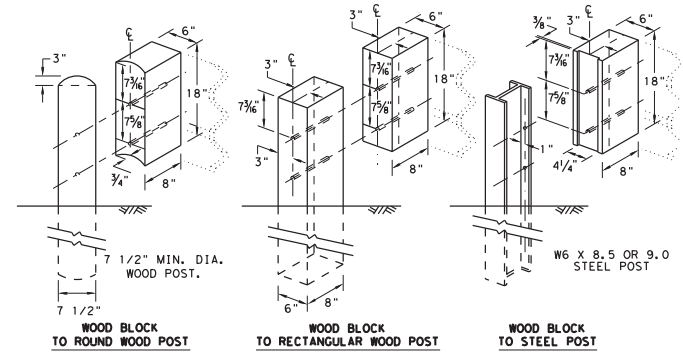
(SEE GF (31) STANDARD SHEET)



ELEVATION VIEW



SECTION D-D



THREE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

SHEET 2 OF 2

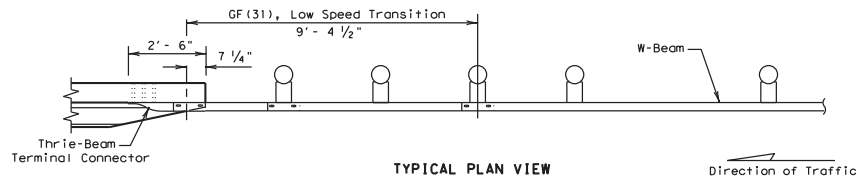


METAL BEAM GUARD FENCE
 THREE-BEAM TRANSITION
 TL-3 MASH COMPLIANT
 GF (31) TR TL3-20

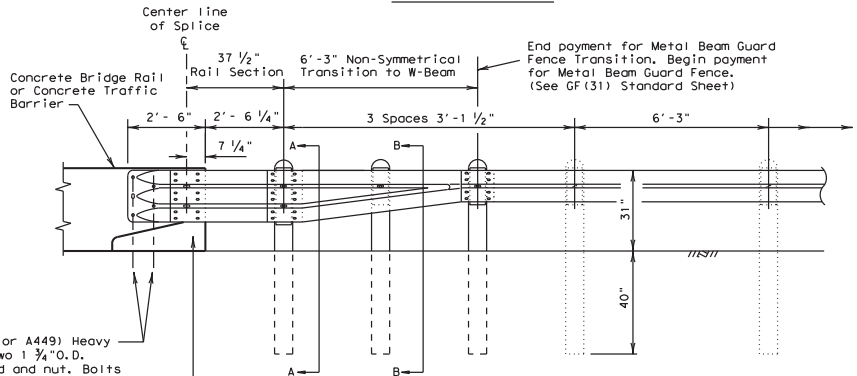
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©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	6380	47	001	IH 44, ETC.
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	WFS	WICHITA, ETC.	55	

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TYPICAL PLAN VIEW



TYPICAL ELEVATION VIEW

5 ~ 7/8" Dia. (ASTM A325 or A449) Heavy Hex Head Bolts, with two 1 3/4" O.D. washers under each head and nut. Bolts shall be of sufficient length to extend through the full thickness of the rail, washer, and nut. Install with bolt heads on traffic face.

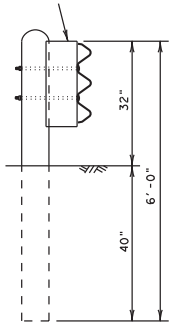
Chamfer required on concrete rails that extend beyond the face of the guardrail transition.

TERMINAL CONNECTION NOTE

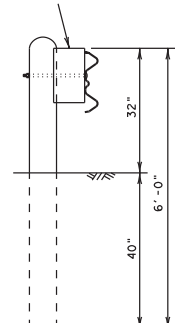
To ensure a stable connection, (12) Rectangular Washers (FRW03) are required under the recessed nuts of the Terminal Connection splice.

This post location requires a Thrie-Beam Block (6"x 8"x 22" Nom).

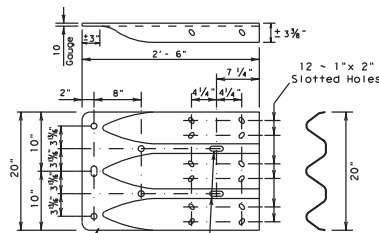
Standard Block (6"x 8"x 14" Nom)



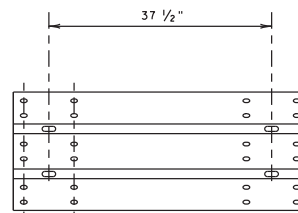
SECTION A-A



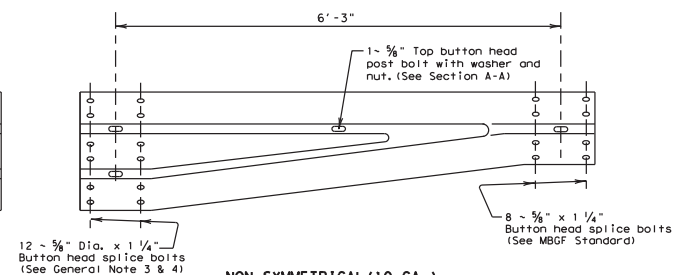
SECTION B-B



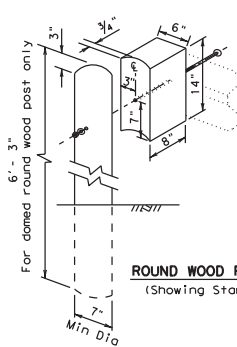
THRIE-BEAM TERMINAL CONNECTION
(See Terminal Connection Note)



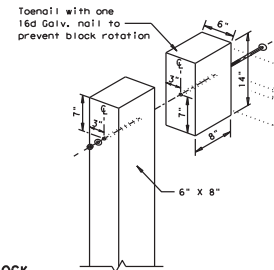
THRIE-BEAM (3'- 1 1/2")
(10 GA.) ELEMENT SECTION



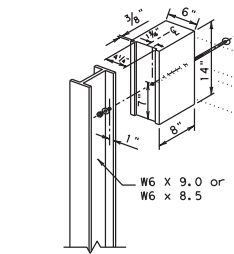
NON-SYMMETRICAL (10 GA.)
TRANSITION SECTION



ROUND WOOD POST & BLOCK
(Showing Standard Block)



WOOD BLOCK TO
RECTANGULAR WOOD POST



STEEL POST & BLOCK
(Showing Standard Block)

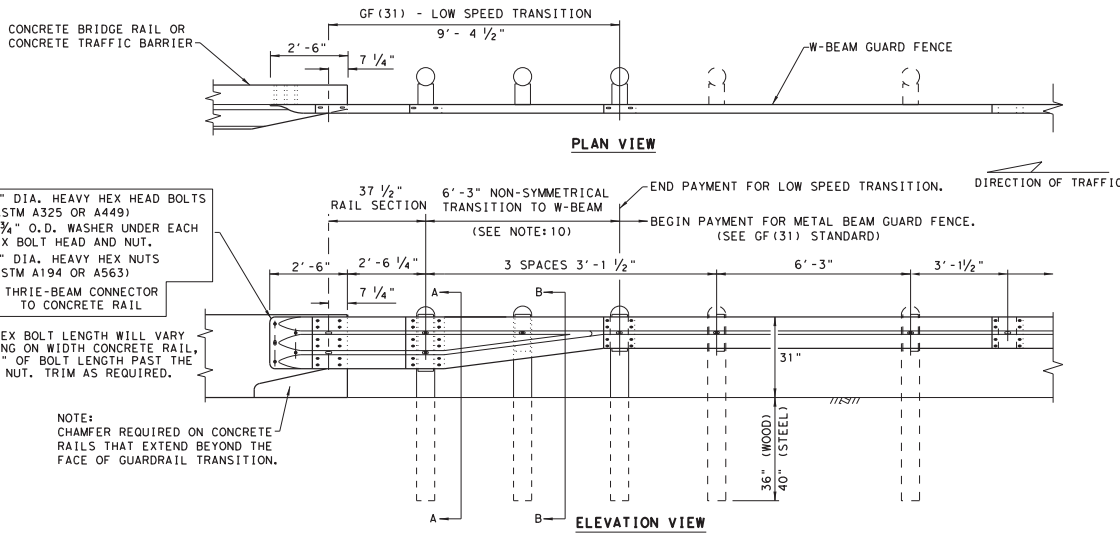
GENERAL NOTES

- The type of post (round wood post, rectangular wood post, or steel post) will be as shown in the plans. The exact position of transitions shall be as shown in the plans or as directed by the Engineer.
- Rail element shall meet the requirements of Item 540, "Metal Beam Guard Fence" except as modified in the plans.
- Button head "post" bolts (ASTM A307) shall be of sufficient length to extend through the full thickness of the nut and Type A 1 3/4" O.D. washer and not more than 1" beyond it. Button head "splice" bolts (ASTM A307) are 5/8" x 1 1/4" with 5/8" double recessed nuts (ASTM A563).
- Fittings (bolts, nuts, and washers) shall be galvanized in accordance with Item 445, "Galvanizing." Fittings shall be subsidiary to the bid item requiring construction of the transition.
- Crown will be widened to accommodate transitions.
- If solid rock is encountered. See the GF (31) standard sheet for the proper installation guidance.
- Posts shall not be set in concrete, of any depth.
- Unless otherwise shown in the plans, a composite material post and/or block that meets the requirements of DMS-7210, "Composite Material Posts and Blocks for Metal Beam Guard Fence" may be substituted for posts and/or blocks of similar dimensions. The Construction Division, TxDOT, maintains a Material Producer List (MPL) for producers of materials conforming to DMS-7210. Only producers on the MPL can furnish composite material posts and/or blocks.
- Refer to GF (31) standard sheet for additional details.

		Design Division Standard	
METAL BEAM GUARD FENCE TRANSITION (TL-2) (Low Speed Transition) GF (31) TL2-11			
FILE: gf31t211.dgn	DN: TxDOT	CR: AM	DN: BD
© TxDOT December 2011	CONT: 6380	SECT: 47	JOB: HIGHWAY
REVISIONS	6380	47	001 IH 44, ETC.
DIST	WFS	COUNTY	SHEET NO.
	WICHITA, ETC.		56

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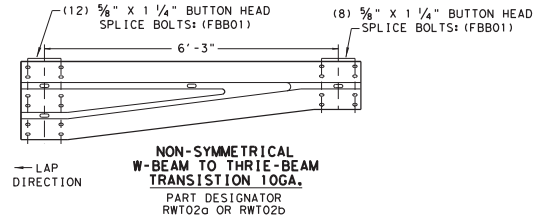
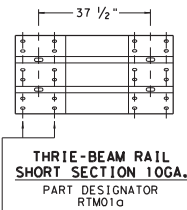
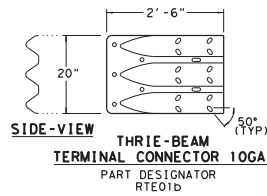
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- (5) 7/8" DIA. HEAVY HEX HEAD BOLTS (ASTM A325 OR A449)
- (10) 1 3/4" O.D. WASHER UNDER EACH HEX BOLT HEAD AND NUT.
- (5) 7/8" DIA. HEAVY HEX NUTS (ASTM A194 OR A563)

NOTE: HEAVY HEX BOLT LENGTH WILL VARY DEPENDING ON WIDTH CONCRETE RAIL. LEAVE 1" OF BOLT LENGTH PAST THE 7/8" HEX NUT. TRIM AS REQUIRED.

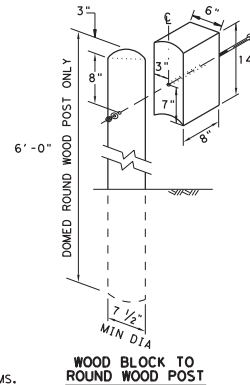
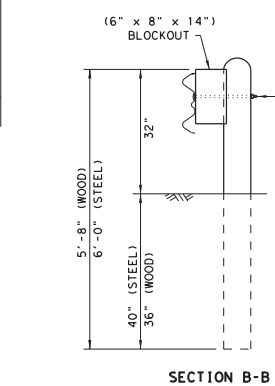
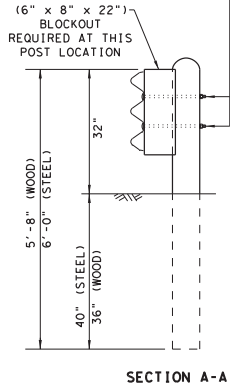
NOTE: CHAMFER REQUIRED ON CONCRETE RAILS THAT EXTEND BEYOND THE FACE OF GUARDRAIL TRANSITION.



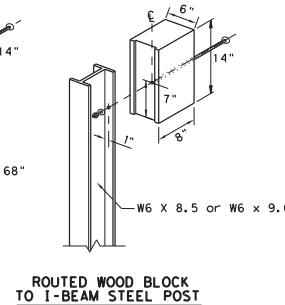
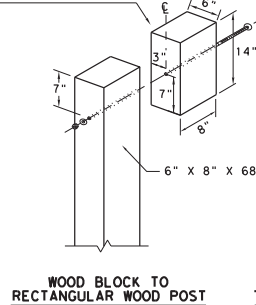
- (2) 5/8" BUTTON HEAD POST BOLTS & NUTS: (FBB04)
- (1) 3/8" FLAT WASHER: (FWC14g) UNDER EACH NUT

- (12) 5/8" x 1 1/4" BUTTON HEAD SPLICE BOLTS WITH RECESSED NUTS: (FBB01)
- (12) RECTANGULAR GUARDRAIL PLATE WASHERS: (FWR03)

PLATE WASHER INSTRUCTIONS
 BRIDGE APPROACH - UPSTREAM: THE SHORT RAIL LAPS OVER THE TERMINAL CONNECTOR. PLATE WASHERS ARE INSTALLED UNDER THE SPLICE NUTS AGAINST INSIDE OF CONNECTOR.
 BRIDGE EXIT - DOWNSTREAM: THE TERMINAL CONNECTOR LAPS OVER THE NESTED RAIL. PLATE WASHERS ARE INSTALLED UNDER THE BOLT HEAD AGAINST OUTSIDE OF CONNECTOR.



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



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

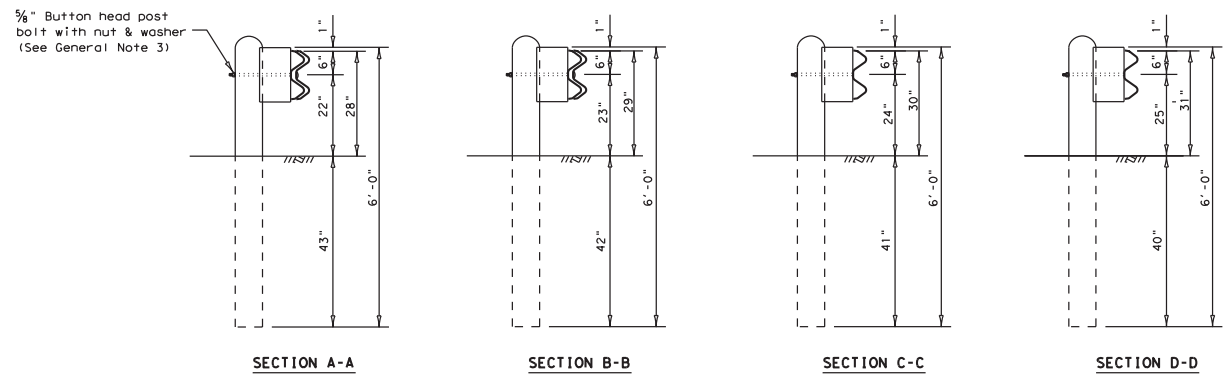
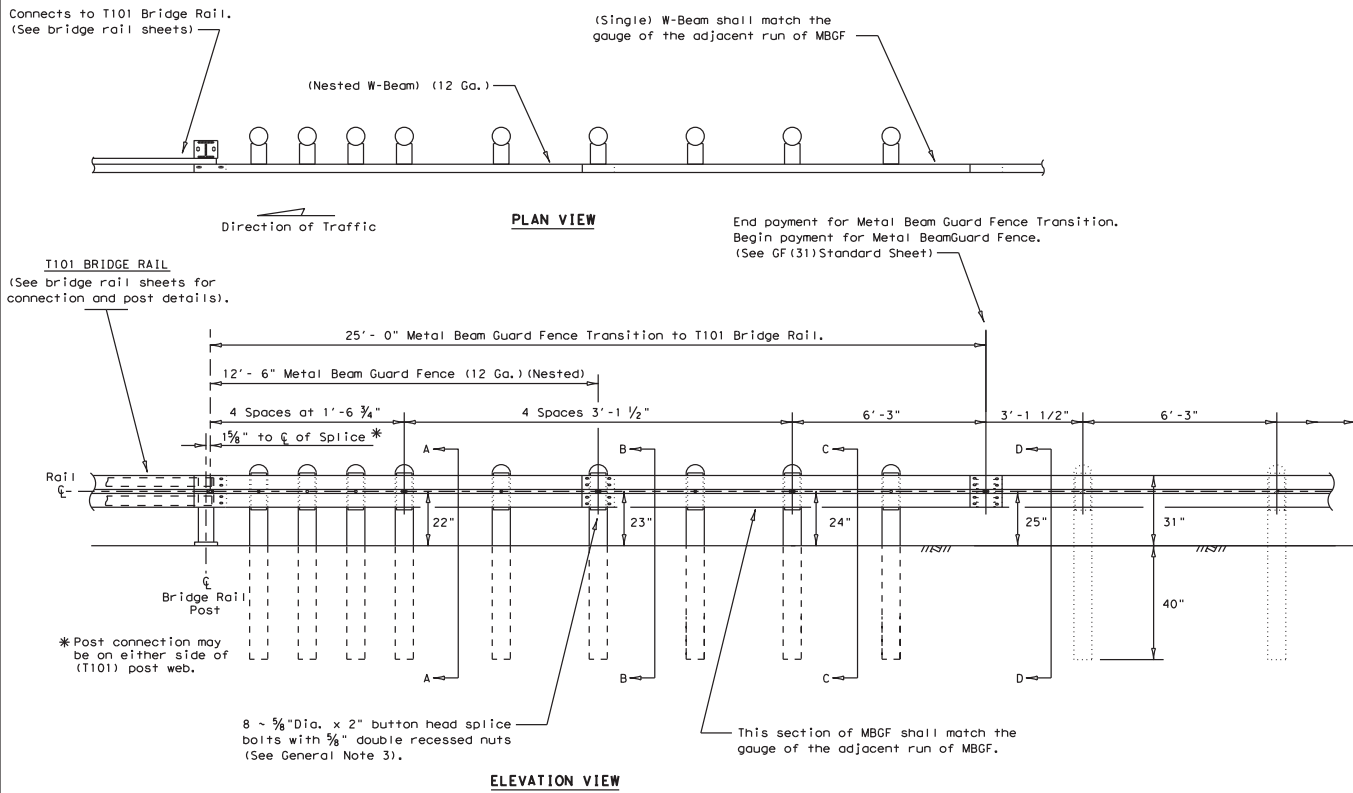
GENERAL NOTES

1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF TRANSITIONS SHALL BE AS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. REFER TO GF(31) STANDARD SHEET.
2. RAIL ELEMENT SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS.
3. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM REQUIRING CONSTRUCTION OF THE TRANSITION.
4. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND 3/8" WASHER (FWC16g) AND NOT MORE THAN 1" BEYOND IT. TRIM BOLT LENGTH TO MEET REQUIRED LENGTH.
5. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
6. CROWN SHALL BE WIDENED TO ACCOMMODATE TRANSITIONS.
7. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
8. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. THE CONSTRUCTION DIVISION, TXDOT, MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210. ONLY PRODUCERS ON THE MPL CAN FURNISH COMPOSITE MATERIAL BLOCKS.
9. REFER TO GF(31) STANDARD SHEET & BRIDGE RAILING DETAILS FOR ADDITIONAL DETAILS.
10. FOR ROUND WOOD POSTS SYSTEMS, ALL ROUND WOOD POSTS SHALL BE 7 1/2" DIA. MINIMUM THROUGHOUT THE TRANSITION.

LOW-SPEED TRANSITION

		Design Division Standard	
METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-2 MASH COMPLIANT GF(31) TR TL2-19			
FILE: gf31trtl219.dgn	DW:TXDOT	CK:KM	DW:VP
©TXDOT: NOVEMBER 2019	6380	47	001
REVISIONS	CON	SECT	JOB
	DIST	COUNTY	HIGHWAY
	WFS	WICHITA, ETC.	SHEET NO.
			57

DATE: 5/21/2021
 FILE: T:\WFSMAINT\Maintenance Projects\6380-47-001 On Call Guardrail FY 22-4 - Design\Plan Set\Drawings\Roadway\GF(31)T101-13.dwg
 DISCLAIMER: This standard is covered 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.

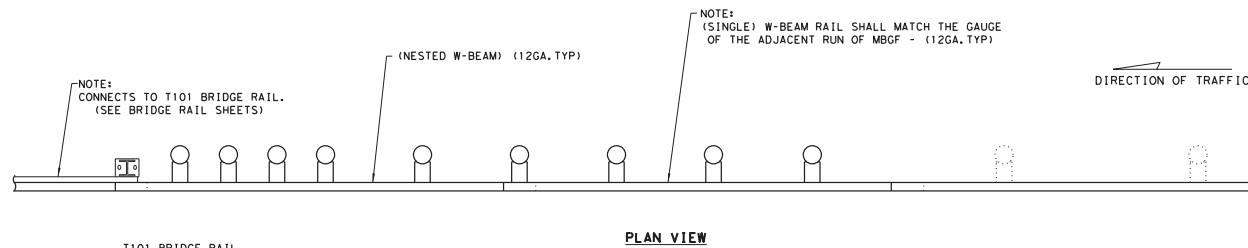


GENERAL NOTES

1. The type of post (round wood post, rectangular wood post, or steel post) will be shown elsewhere in the plans. The exact position of transitions shall be shown elsewhere in the plans or as directed by the Engineer.
2. Rail element shall meet the requirements of Item 540, "Metal Beam Guard Fence" except as modified on the plans.
3. Button head "post" bolts (ASTM A307) shall be of sufficient length to extend through the full thickness of the nut (ASTM A563) and the Type A 1 3/4" O.D. washer and not more than 1" beyond it. Button head "splice" bolts (ASTM A307) are 5/8" x 2" (at triple rail splices) with a 5/8" double recessed nuts (ASTM A563).
4. Fittings (bolts, nuts, and washers) shall be galvanized in accordance with Item 445, "Galvanizing." Fittings shall be subsidiary to the bid item requiring construction of the transition.
5. Crown will be widened to accommodate transitions.
6. If solid rock is encountered. See the GF(31) standard sheet for proper installation guidance.
7. Posts shall not be set in concrete.
8. Unless otherwise shown in the plans, a composite material post and/or block that meets the requirements of DMS-7210, "Composite Material Posts and Blocks for Metal Beam Guard Fence" may be substituted for posts and/or blocks of similar dimensions. The Construction Division, TxDOT, maintains a Material Producer List (MPL) for producers of materials conforming to DMS-7210. Only producers on the MPL can furnish composite material posts and/or blocks.
9. Refer to GF(31) and TYPE T101 Standard Sheet for additional details.

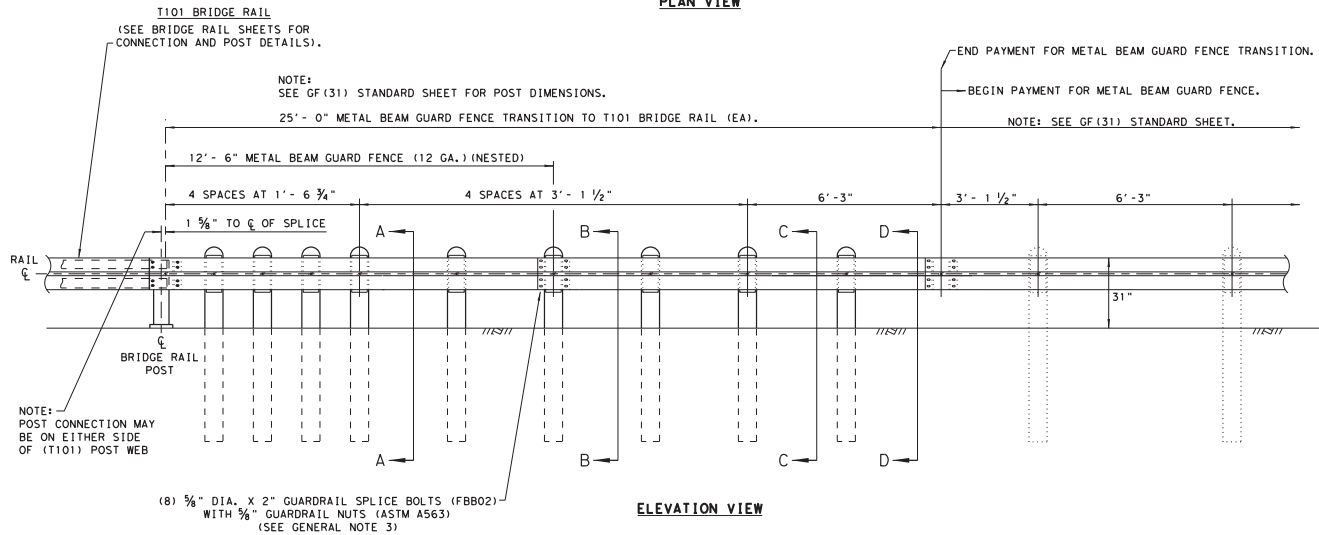
		Design Division Standard	
METAL BEAM GUARD FENCE TRANSITION (T101) GF (31) T101-13			
FILE: gf3110113	DR: AM	CHK: AM	DES: VP
© TxDOT January 2013	CONT: 6380	SECT: 47	JOB: 001
REVISIONS	COUNTY		HIGHWAY: IH 44, ETC.
	WFS		SHEET NO.: 58

DATE: 5/21/2021
 FILE: T:\WFSMAINT\Maintenance Projects\6380-47-001 On Coll Guardrail FY 22-4 - Design\Plan Set Dgn's\3. Roadway\GF(31)\T101-19.dgn
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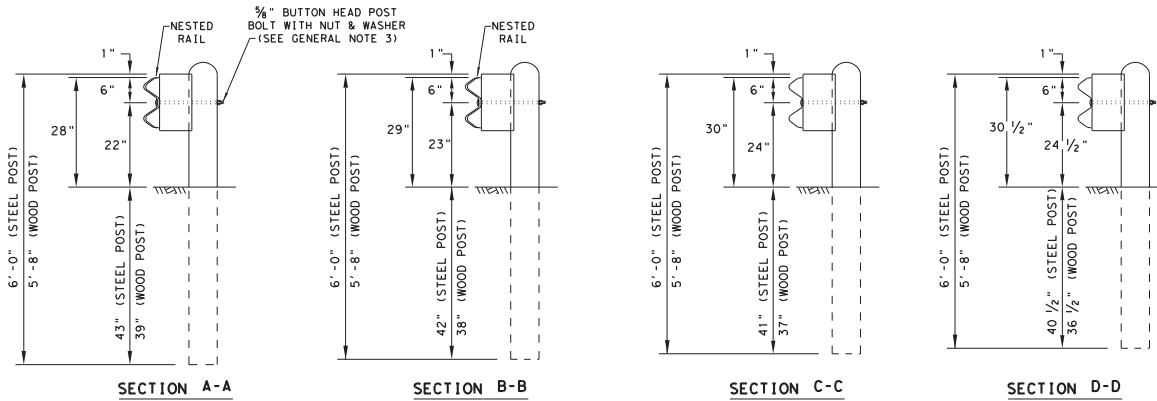
PLAN VIEW

- GENERAL NOTES**
1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
 2. RAIL ELEMENT SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 25'-0", OR 12'-6" (NOM.) LENGTHS. RAIL ELEMENTS MAY HAVE SLOTTED HOLES AT 3'-1 1/2" C-C OR 6'-3" C-C. A SPECIAL LENGTH OF RAIL MAY BE MANUFACTURED TO ACCOMMODATE THE TRANSITION SECTIONS OF GUARDRAIL.
 3. BUTTON HEAD "POST" BOLTS (ASTM A307 GR. A) SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT (ASTM A563) AND 3/8" ROUND WASHER (ASTM F436) AND NOT MORE THAN 1" BEYOND IT. BUTTON HEAD "SPLICE" BOLTS (ASTM A307) ARE 3/4" X 1-1/4" WITH 3/8" NUTS (ASTM A563).
 4. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM REQUIRING CONSTRUCTION OF THE TRANSITION.
 5. CROWN SHALL BE WIDENED TO ACCOMMODATE THE METAL BEAM GUARD FENCE.
 6. WHERE SOLID ROCK IS ENCOUNTERED. CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
 7. POSTS SHALL NOT BE SET IN CONCRETE.
 8. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. THE CONSTRUCTION DIVISION, TXDOT MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210. ONLY PRODUCERS ON THE MPL MAY FURNISH COMPOSITE MATERIAL BLOCKS.
 9. REFER TO STANDARD GF(31) AND APPLICABLE BRIDGE RAILING STANDARD FOR ADDITIONAL DETAILS.



ELEVATION VIEW

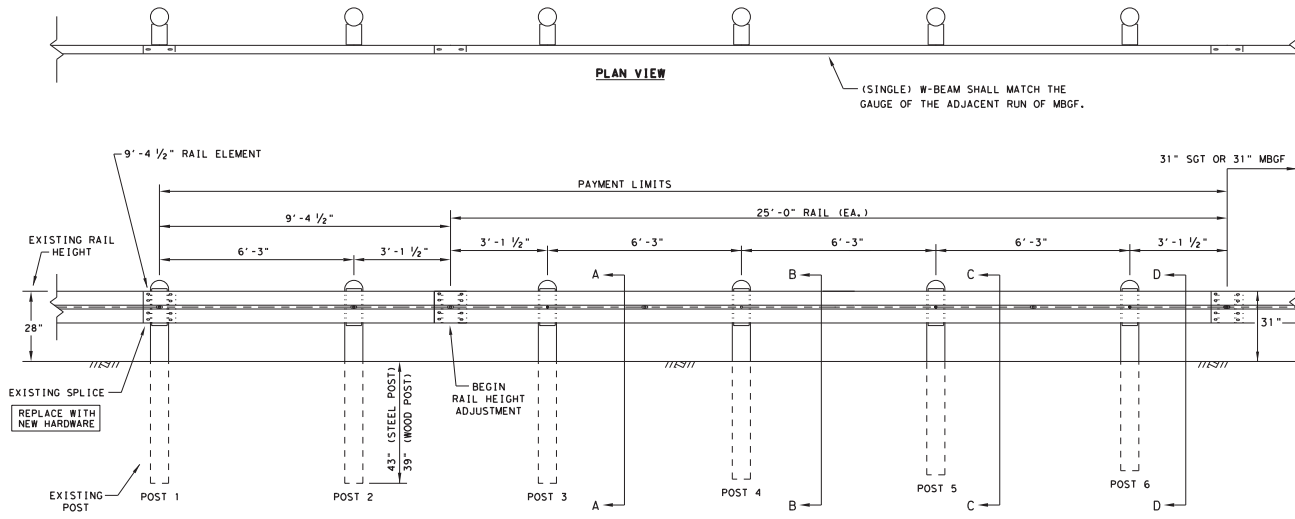
* "WOOD" INDICATES DIMENSIONS FOR BOTH ROUND AND RECTANGULAR WOOD POST SYSTEMS.



		Design Division Standard	
METAL BEAM GUARD FENCE TRANSITION (T101) GF (31) T101-19			
FILE: gf31t10119	DN:TXDOT	CK:KM	DR:VP
©TXDOT: NOVEMBER 2019	CONT SECT	JOB	HIGHWAY
REVISIONS	6380 47	001	IH 44, ETC.
	DIST	COUNTY	SHEET NO.
	WFS	WICHITA, ETC.	59

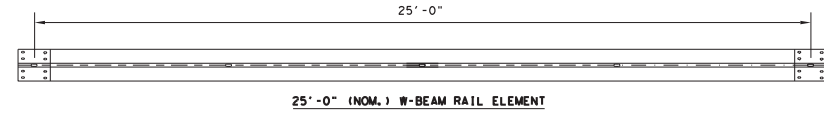
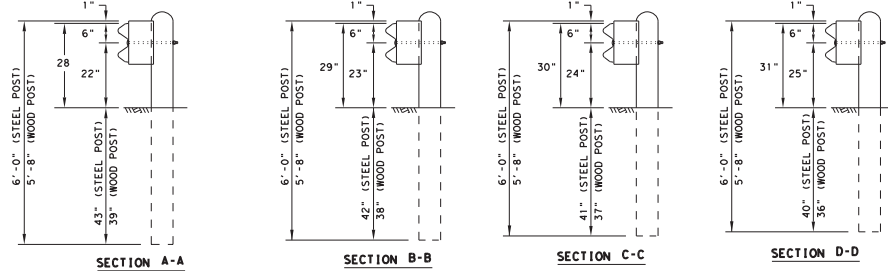
GENERAL NOTES

1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE AS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENT SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 25'-0", OR 12'-6" (NOM.) LENGTHS. RAIL ELEMENTS MAY HAVE SLOTTED HOLES AT 3'-1 1/2" C-C OR 6'-3" C-C. A SPECIAL LENGTH OF RAIL MAY BE MANUFACTURED TO ACCOMMODATE THE TRANSITION SECTIONS OF GUARDRAIL.
3. BUTTON HEAD "POST" BOLTS (ASTM A307) SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT (ASTM A563) AND 3/4" ROUND WASHER (ASTM F436) AND NOT MORE THAN 1" BEYOND IT. BUTTON HEAD "SPLICE" BOLTS (ASTM A307) ARE 3/8" X 1-1/4" WITH 3/8" NUTS (ASTM A563).
4. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM REQUIRING CONSTRUCTION OF THE TRANSITION.
5. CROWN SHALL BE WIDENED TO ACCOMMODATE THE METAL BEAM GUARD FENCE.
6. THE LATERAL APPROACH TO THE GUARD FENCE, SHALL HAVE A MAXIMUM SLOPE OF 1V:10H.
7. IF SHOWN ELSEWHERE IN THE PLANS OR AS DIRECTED BY THE ENGINEER, THE GUARD FENCE MAY BE FLARED AT A RATE OF 25:1 OR FLATTER.
8. APPLICATIONS IN SOLID ROCK ARE ONLY ALLOWED WITH STEEL POSTS. SEE GF (31) STANDARD FOR INSTALLATION GUIDANCE.
9. POSTS SHALL NOT BE SET IN CONCRETE.
10. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. THE CONSTRUCTION DIVISION, TXDOT MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210. ONLY PRODUCERS ON THE MPL MAY FURNISH COMPOSITE MATERIAL BLOCKS.
11. REFER TO STANDARD GF (31) FOR ADDITIONAL DETAILS.
12. RAIL HEIGHT ADJUSTMENT IS ASSESSED AT TL-3 MASH COMPLIANT FOR STEEL POST HEIGHT TRANSITION TO 28" STEEL POST GUARDRAIL.

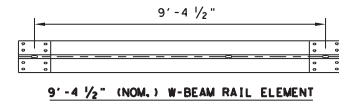


ELEVATION VIEW

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



25'-0" (NOM.) W-BEAM RAIL ELEMENT



9'-4 1/2" (NOM.) W-BEAM RAIL ELEMENT

HARDWARE LIST

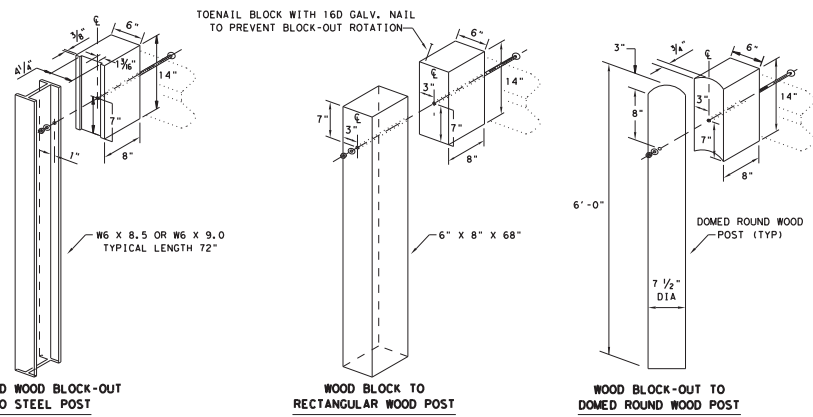
QTY	DESCRIPTION
1	9'-4 1/2" W-BEAM RAIL ELEMENT 12GA.
1	25'-0" W-BEAM RAIL ELEMENT 12GA. (TYP)
6	7 1/2" DIA X 6'-0" DOMED ROUND WOOD POSTS (TYP)
6	6" X 8" X 68" RECTANGULAR WOOD POSTS (TYP)
6	W6 X 8.5 OR W6 X 9 X 72" STEEL POSTS (TYP)
6	6" X 8" X 14" WOOD BLOCKS OR COMPOSITE (TYP)
6	3/8" X 18" GUARDRAIL BOLTS WITH NUTS (FBB04)
6	3/8" ROUND WASHERS (ASTM F436) (FWC160)
6	3/8" X 10" GUARDRAIL BOLTS WITH NUTS (FBB03)
24	3/8" X 1-1/4" GUARDRAIL SPLICE BOLTS WITH DOUBLE RECESSED NUTS (ASTM A563) (FBB01)

POST AND BLOCK-OUT TYPES AVAILABLE

FOR WOOD POST

FOR STEEL POST

NOTE: HARDWARE SHALL MEET THE FOLLOWING REQUIREMENTS.
 GUARDRAIL POST BOLTS (ASTM A307 GR. A)
 GUARDRAIL ROUND WASHERS (ASTM F436)
 GUARDRAIL DOUBLE RECESSED NUTS (ASTM A563)
 GUARDRAIL SPLICE BOLTS (ASTM A307 GR. A)
 GUARDRAIL SPLICE NUTS (ASTM A563)



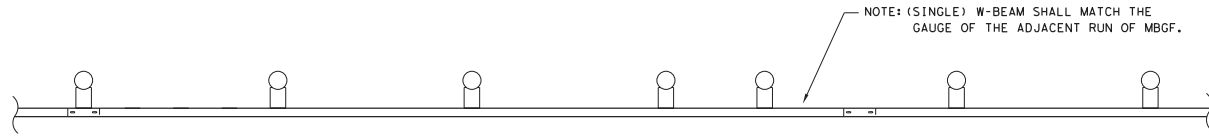
Texas Department of Transportation
 Design Division Standard

**METAL BEAM GUARD FENCE
 RAIL HEIGHT ADJUSTMENT
 (28" TO 31")
 TL-3 MASH COMPLIANT
 RAIL-ADJ(A)-19**

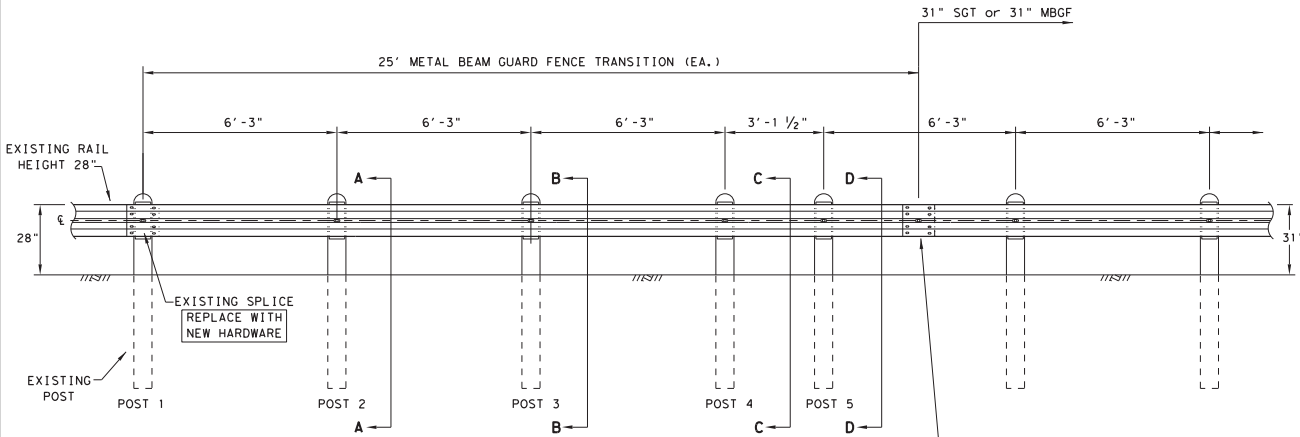
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NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	6380	47	001	1H 44, ETC.
	DIST	COUNTY		SHEET NO.
	WFS	WICHITA, ETC.		60

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DATE: 5/21/2021
 FILE: T:\WFM\MAINT\Maintenance Projects\6380-47-001 On Coll Guardrail - Design\Plan Set\6380-47-001.dgn

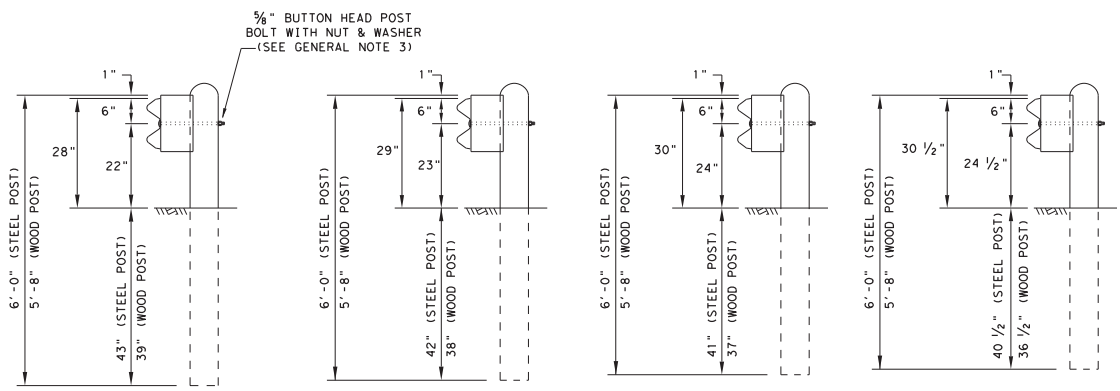


PLAN VIEW



ELEVATION VIEW

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



SECTION A-A

SECTION B-B

SECTION C-C

SECTION D-D

NOTE: HARDWARE SHALL MEET THE FOLLOWING REQUIREMENTS.
 GUARDRAIL POST BOLTS (ASTM A307 GR. A)
 GUARDRAIL ROUND WASHERS (ASTM F436)
 GUARDRAIL DOUBLE RECESSED NUTS (ASTM A563)
 GUARDRAIL SPLICE BOLTS (ASTM A307 GR. A)
 GUARDRAIL SPLICE NUTS (ASTM A563)

GENERAL NOTES

1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE AS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENT SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 25'-0" OR 12'-6" (NOM.) LENGTHS. RAIL ELEMENTS MAY HAVE SLOTTED HOLES AT 3'-1 1/2" C-C OR 6'-3" C-C. A SPECIAL LENGTH OF RAIL MAY BE MANUFACTURED TO ACCOMMODATE THE TRANSITION SECTIONS OF GUARDRAIL.
3. BUTTON HEAD "POST" BOLTS (ASTM A307) SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT (ASTM A563) AND 5/8" ROUND WASHER (ASTM F436) AND NOT MORE THAN 1" BEYOND IT. BUTTON HEAD "SPLICE" BOLTS (ASTM A307) ARE 5/8" X 1-1/4" WITH 5/8" NUTS (ASTM A563).
4. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM REQUIRING CONSTRUCTION OF THE TRANSITION.
5. CROWN SHALL BE WIDENED TO ACCOMMODATE THE METAL BEAM GUARD FENCE.
6. THE LATERAL APPROACH TO THE GUARD FENCE, SHALL HAVE A MAXIMUM SLOPE OF 1V:10H.
7. IF SHOWN ELSEWHERE IN THE PLANS OR AS DIRECTED BY THE ENGINEER, THE GUARD FENCE MAY BE FLARED AT A RATE OF 25:1 OR FLATTER.
8. APPLICATIONS IN SOLID ROCK ARE ONLY ALLOWED WITH STEEL POSTS. SEE GF(31) STANDARD FOR INSTALLATION GUIDANCE.
9. POSTS SHALL NOT BE SET IN CONCRETE.
10. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. THE CONSTRUCTION DIVISION, TxDOT MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210. ONLY PRODUCERS ON THE MPL MAY FURNISH COMPOSITE MATERIAL BLOCKS.
11. REFER TO STANDARD GF(31) FOR ADDITIONAL DETAILS.
12. RAIL HEIGHT ADJUSTMENT IS ASSESSED AT TL-3 MASH COMPLIANT FOR STEEL POST HEIGHT TRANSITION TO 28" STEEL POST GUARDRAIL.

HARDWARE LIST

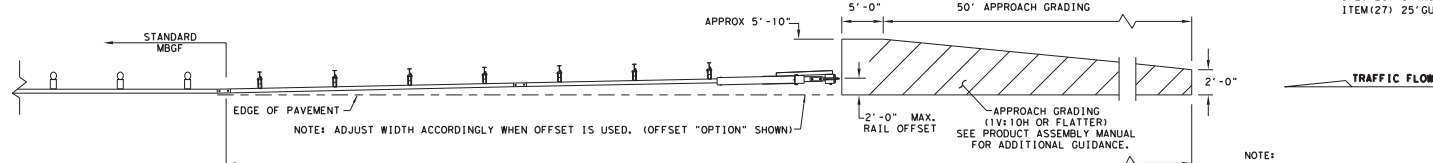
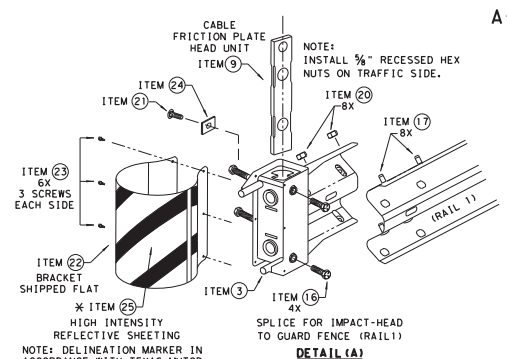
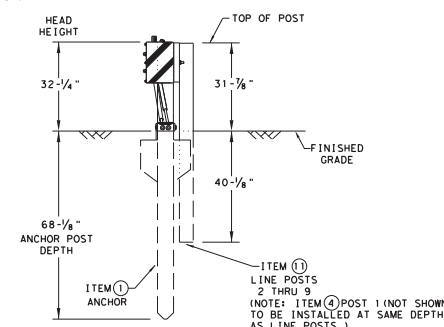
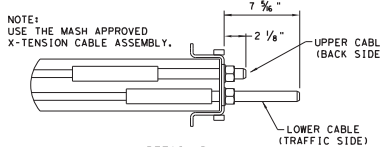
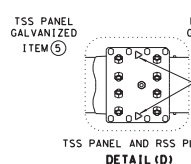
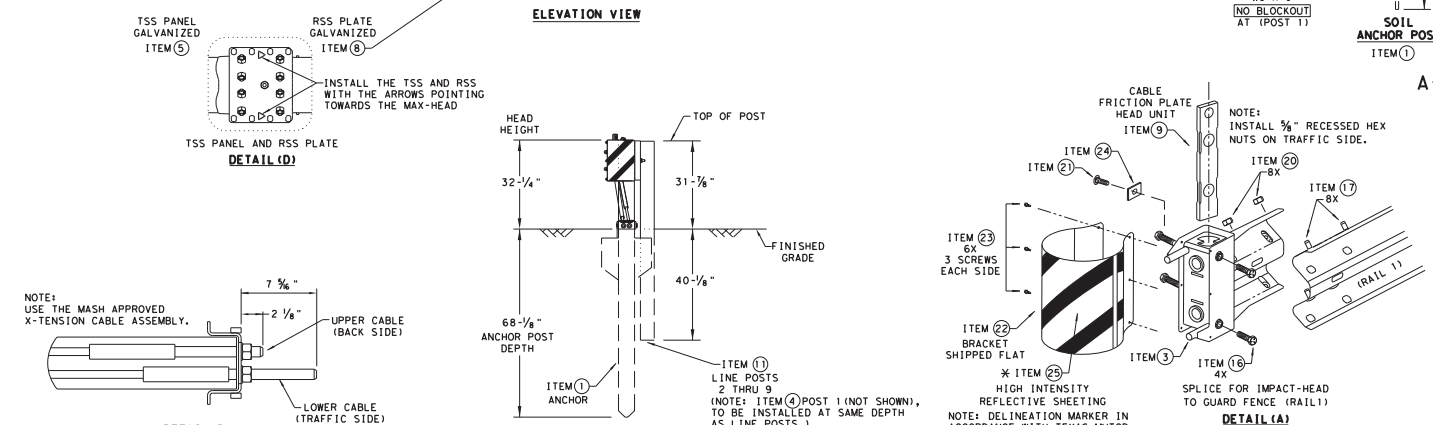
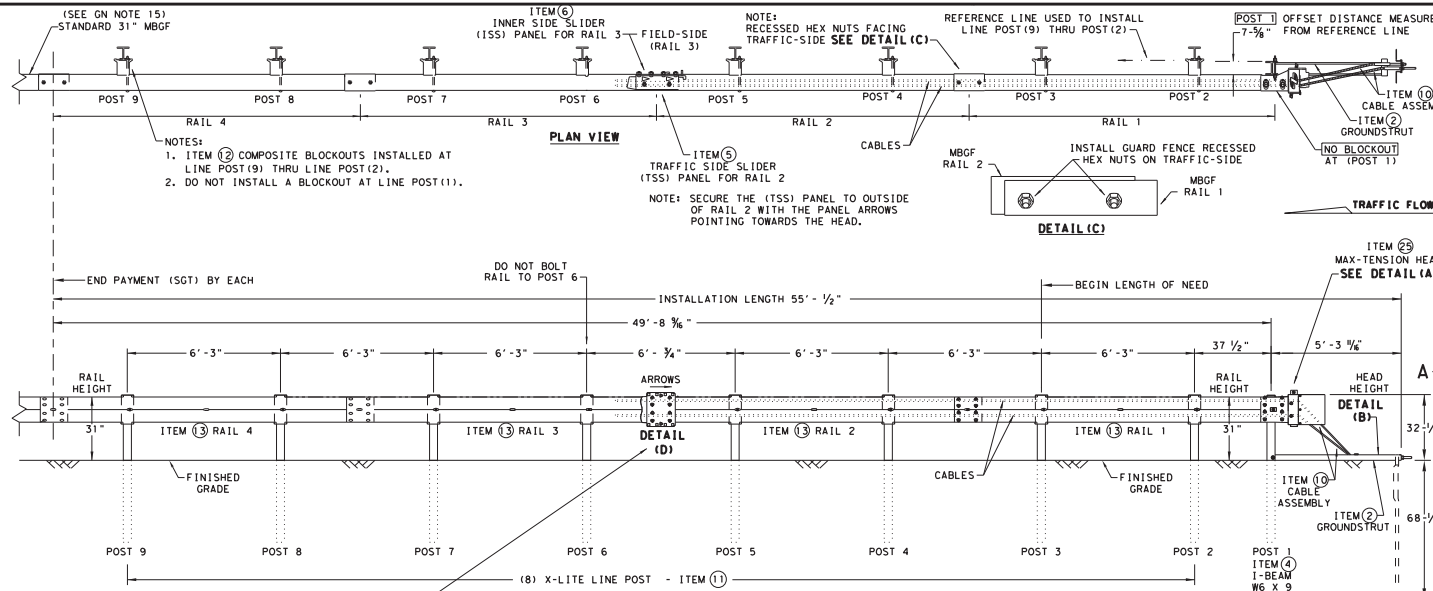
QTY	DESCRIPTION
1	25'-0" W-BEAM RAIL ELEMENT 12GA. (TYP)
5	7 1/2" DIA X 6'-0" DOMED ROUND WOOD POSTS (TYP)
5	6" X 8" X 68" RECTANGULAR WOOD POSTS (TYP)
5	W6 X 8.5 OR W6 X 9 X 72" STEEL POSTS (TYP)
5	6" X 8" X 14" WOOD BLOCKS OR COMPOSITE (TYP)
5	5/8" X 18" GUARDRAIL BOLTS AND NUTS (FBB04)
5	5/8" ROUND WASHERS (ASTM F436) (FWC16G)
5	5/8" X 10" GUARDRAIL BOLTS AND NUTS (FBB03)
16	5/8" X 1-1/4" GUARDRAIL SPLICE BOLTS WITH DOUBLE RECESSED NUTS (ASTM A563) (FBB01)

POST AND BLOCK-OUT TYPES AVAILABLE

- FOR WOOD POST
- FOR STEEL POST

		Design Division Standard	
METAL BEAM GUARD FENCE RAIL HEIGHT ADJUSTMENT (28" TO 31") TL-3 MASH COMPLIANT RAIL-ADJ(B)-19			
FILE: r01odj019	DIST: XDOT	CK: RM	DR: VP
NOVEMBER 2019	CONT: 47	SECT: 001	JOB: 1H 44, ETC.
DIST: WFS	COUNTY: WICHITA, ETC.	SHEET NO. 61	

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NOTE: TxDOT GENERIC APPROACH GRADING LAYOUT USED FOR ALL TANGENT TYPE END TREATMENTS.

NOTE: THIS STANDARD IS A BASIC REPRESENTATION OF THE MAX-TENSION END TERMINAL. IT IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

- GENERAL NOTES**
- FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: LINDSAY TRANSPORTATION SOLUTIONS (LTS) - BARRIER SYSTEMS, INC. AT (707) 374-6800
 - FOR INSTALLATION, REPAIR, & MAINTENANCE REFER TO THE MAX-TENSION INSTALLATION INSTRUCTION MANUAL. P/N MANMAX REV D (ECN 3516).
 - APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" ON THE FRONT FACE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
 - FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TxDOT'S LATEST ROADWAY MOW STRIP STANDARD.
 - ALL STEEL COMPONENTS ARE GALVANIZED PER ASTM A123 OR EQUIVALENT UNLESS OTHERWISE STATED.
 - SYSTEM SHOWN USING STEEL WIDE FLANGE POST WITH COMPOSITE BLOCKOUTS.
 - COMPOSITE MATERIAL BLOCKOUT THAT MEETS THE REQUIREMENTS OF DMS-7210, MAY BE SUBSTITUTED FOR BLOCKOUTS SIMILAR DIMENSIONS. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST (MPL) FOR CERTIFIED PRODUCERS.
 - REFER TO INSTALLATION MANUAL FOR SPECIFIC PANEL LAPPING GUIDANCE.
 - IF SOLID ROCK IS ENCOUNTERED SEE THE MANUFACTURER'S INSTALLATION MANUAL FOR INSTALLATION GUIDANCE.
 - POSTS SHALL NOT BE SET IN CONCRETE.
 - A DRIVING CAP WITH A TIMBER OR PLASTIC INSERT SHALL BE USED WHEN DRIVING POST TO PREVENT DAMAGE TO THE GALVANIZING ON TOP OF THE POST.
 - MAX-TENSION SYSTEM SHALL NEVER BE INSTALLED WITHIN A CURVED SECTION OF GUARDRAIL.
 - IF A DELINEATION MARKER IS REQUIRED, MARKER SHALL BE IN ACCORDANCE WITH TEXAS MUTCD.
 - THE SYSTEM IS SHOWN WITH 12'-6" MBGF PANELS, 25'-0" MBGF PANELS ARE ALSO ALLOWED.
 - A MINIMUM OF 12'-6" OF 12GA. MBGF IS REQUIRED IMMEDIATELY DOWNSTREAM OF THE MAX-TENSION SYSTEM.

ITEM #	PART NUMBER	DESCRIPTION	QTY
1	BS1-1610060-00	SOIL ANCHOR - GALVANIZED	1
2	BS1-1610061-00	GROUND STRUT - GALVANIZED	1
3	BS1-1610062-00	MAX-TENSION IMPACT HEAD	1
4	BS1-1610063-00	W6x9 I-BEAM POST 6FT.-GALVANIZED	1
5	BS1-1610064-00	TSS PANEL - TRAFFIC SIDE SLIDER	1
6	BS1-1610065-00	ISS PANEL - INNER SIDE SLIDER	1
7	BS1-1610066-00	TOOTH - GEOMET	1
8	BS1-1610067-00	RSS PLATE - REAR SIDE SLIDER	1
9	B061058	CABLE FRICTION PLATE - HEAD UNIT	1
10	BS1-1610069-00	CABLE ASSEMBLY - MASH X-TENSION	2
11	BS1-1012078-00	X-LITE LINE POST-GALVANIZED	8
12	B090534	8" W-BEAM COMPOSITE-BLOCKOUT XT110	8
13	BS1-4004386	12'-6" W-BEAM GUARD FENCE PANELS 12GA.	4
14	BS1-1102027-00	X-LITE SQUARE WASHER	1
15	BS1-2001886	3/8" x 7" THREAD BOLT HH (GR.5) GEOMET	1
16	BS1-2001885	3/4" x 3" ALL-THREAD BOLT HH (GR.5) GEOMET	4
17	4001115	3/8" x 1 1/2" GUARD FENCE BOLTS (GR.2)MGAL	48
18	2001840	3/8" x 10" GUARD FENCE BOLTS MGAL	8
19	2001636	3/8" WASHER F436 STRUCTURAL MGAL	2
20	4001116	3/8" RECESSED GUARD FENCE NUT (GR.2)MGAL	59
21	BS1-2001888	3/8" x 2" ALL THREAD BOLT (GR.5)GEOMET	1
22	BS1-1701063-00	DELINEATION MOUNTING (BRACKET)	1
23	BS1-2001887	1/4" x 3/4" SCREW SD HH 410SS	7
24	4002051	GUARDRAIL WASHER RECT AASHTO FWRO3	1
25	SEE NOTE BELOW	HIGH INTENSITY REFLECTIVE SHEETING	1
26	4002337	8" W-BEAM TIMBER-BLOCKOUT, POB018	8
27	BS1-4004431	25' W-BEAM GUARDRAIL PANEL, 8-SPACE, 12GA.	2
28	MANMAX Rev-(D)	MAX-TENSION INSTALLATION INSTRUCTIONS	1

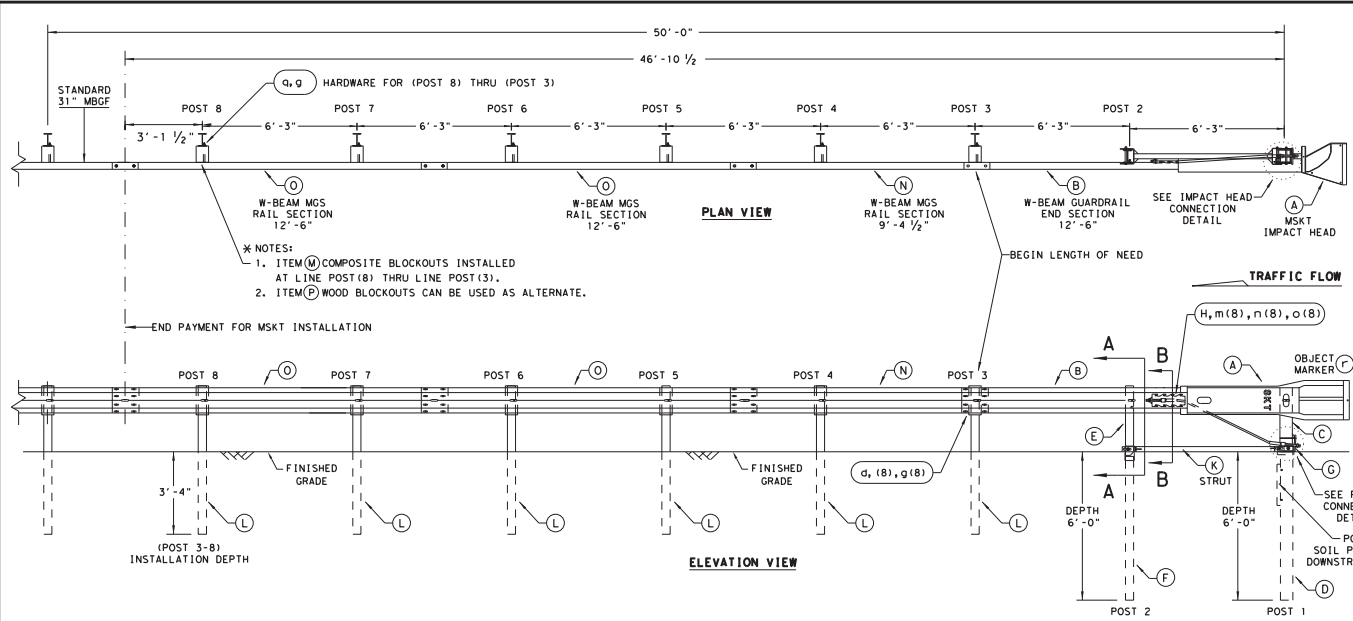
- * TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.
- * * ALTERNATIVE ITEMS NOT SHOWN.
 ITEM (26) 8" WOOD-BLOCKOUTS
 ITEM (27) 25' GUARD FENCE PANELS

MAX-TENSION END TERMINAL
MASH - TL-3
SGT(11S)31-18

FILE: sgt11s3118.dgn	DWG: TxDOT	CHK: KM	DWG: TxDOT	CHK: CL
© TxDOT: FEBRUARY 2018	CONT: 47	SECT: 001	JOB: IH 44, ETC.	HIGHWAY: 62
REVISIONS:		DIST: WFS	COUNTY: WICHITA, ETC.	SHEET NO. 62

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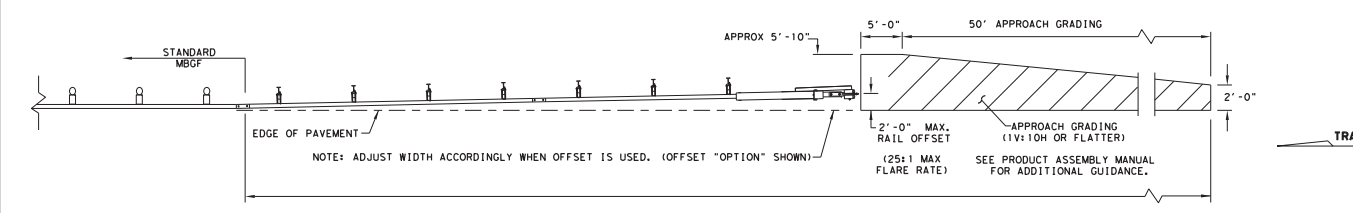
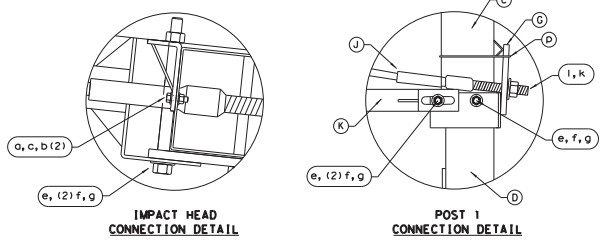
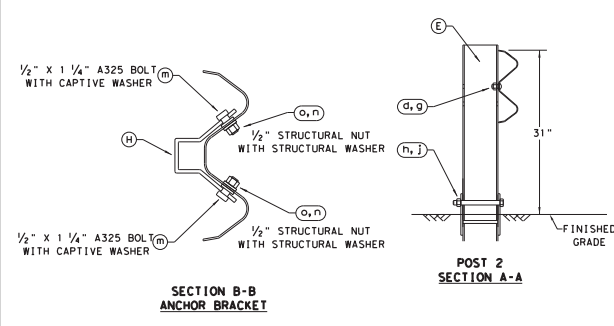
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- GENERAL NOTES**
- FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: ROAD SYSTEMS, INC. (432)263-2435. 3616 OLD HOWARD COUNTY AIRPORT, BIG SPRING, TX 79720
 - FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE: MSKT END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL (PUBLICATION-062717).
 - APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" ON THE FRONT FACE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
 - FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
 - HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
 - SYSTEM SHOWN USING STEEL WIDE FLANGE POSTS WITH COMPOSITE BLOCKOUTS.
 - A COMPOSITE MATERIAL BLOCKOUTS THAT MEETS THE REQUIREMENTS OF DMS-7210, MAY BE SUBSTITUTED FOR BLOCKOUTS OF SIMILAR DIMENSIONS. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST (MPL) FOR CERTIFIED PRODUCERS.
 - IF SOLID ROCK IS ENCOUNTERED IN THE AREA OF (POST 1) AND / OR (POST 2) CONTACT THE MANUFACTURER, & REFER TO THE LATEST ROADWAY MBGF STANDARD FOR INSTALLATION GUIDANCE.
 - POSTS SHALL NOT BE SET IN CONCRETE.
 - SYSTEM MUST BE ATTACHED TO STANDARD 31" MBGF.
 - UNDER NO CIRCUMSTANCES SHALL THE GUARDRAIL WITHIN THE MSKT SYSTEM BE CURVED.
 - A FLARE RATE OF UP TO 25:1 MAY BE USED TO PREVENT THE TERMINAL HEAD FROM ENCRANCHING ON THE SHOULDER, THE FLARE MAY BE DECREASED OR ELIMINATED FOR SPECIFIC INSTALLATIONS, IF DIRECTED BY THE ENGINEER.
 - THE SYSTEM IS SHOWN WITH TWO 12'-6" MBGF PANELS, ONE 25'-0" MBGF PANEL IS ALSO ALLOWED IN THEIR PLACE.
 - A DRIVING CAP WITH A TIMBER OR PLASTIC INSERT SHALL BE USED WHEN DRIVING POSTS 3-8 TO PREVENT DAMAGE TO THE GALVANIZING ON TOP OF THE POST. SPECIAL DRIVING CAP TO BE USED ON LOWER POSTS 1 & 2 TO PREVENT DAMAGE TO THE WELDED PLATES.

ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM NUMBERS
A	1	MSKT IMPACT HEAD	MS3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Gg.	SF1303
C	1	POST 1 - TOP (6" X 6" X 1/4" TUBE)	MTPHP1A
D	1	POST 1 - BOTTOM (6" W6X15)	MTPHP1B
E	1	POST 2 - ASSEMBLY TOP	UHP2A
F	1	POST 2 - ASSEMBLY BOTTOM (6" W6X9)	HP2B
G	1	BEARING PLATE	E750
H	1	CABLE ANCHOR BOX	S760
J	1	BCT CABLE ANCHOR ASSEMBLY	E770
K	1	GROUND STRUT	MS785
L	6	W6x9 OR W6x8.5 STEEL POST	P621
M	6	COMPOSITE BLOCKOUTS	CBSP-14
N	1	W-BEAM MGS RAIL SECTION (9'-4 1/2")	G12025
O	2	W-BEAM MGS RAIL SECTION (12'-6")	G1203A
P	6	WOOD BLOCKOUT 6" X 8" X 14"	P675
Q	1	W-BEAM MGS RAIL SECTION (25'-0")	G1209

SMALL HARDWARE			
o	2	3/8" x 1" HEX BOLT (GRD 5)	B5160104A
b	4	3/8" WASHER	W0516
c	2	3/8" HEX NUT	N0516
d	25	3/8" Dia. x 1 1/4" SPLICE BOLT (POST 2)	B580122
e	2	3/8" Dia. x 9" HEX BOLT (GRD A449)	B580904A
f	3	3/8" WASHER	W050
g	33	3/8" Dia. H.G.R. NUT	N050
h	1	3/4" Dia. x 8 1/2" HEX BOLT (GRD A449)	B340854A
j	1	3/4" Dia. HEX NUT	N030
k	2	1 ANCHOR CABLE HEX NUT	N100
l	2	1 ANCHOR CABLE WASHER	W100
m	8	1/2" x 1 1/4" A325 BOLT WITH CAPTIVE WASHER	SB12A
n	8	1/2" STRUCTURAL NUTS	NO12A
o	8	1 1/4" O.D. x 3/8" I.D. STRUCTURAL WASHERS	WO12A
p	1	BEARING PLATE RETAINER TIE	CT-1005T
q	6	3/4" x 10" H.G.R. BOLT	B581002
r	1	OBJECT MARKER 18" X 18"	E3151



NOTE: TXDOT GENERIC APPROACH GRADING LAYOUT USED FOR ALL TANGENT TYPE END TREATMENTS.

NOTE: THIS STANDARD IS A BASIC REPRESENTATION OF THE MSKT END TERMINAL, IT IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

Texas Department of Transportation Design Division Standard

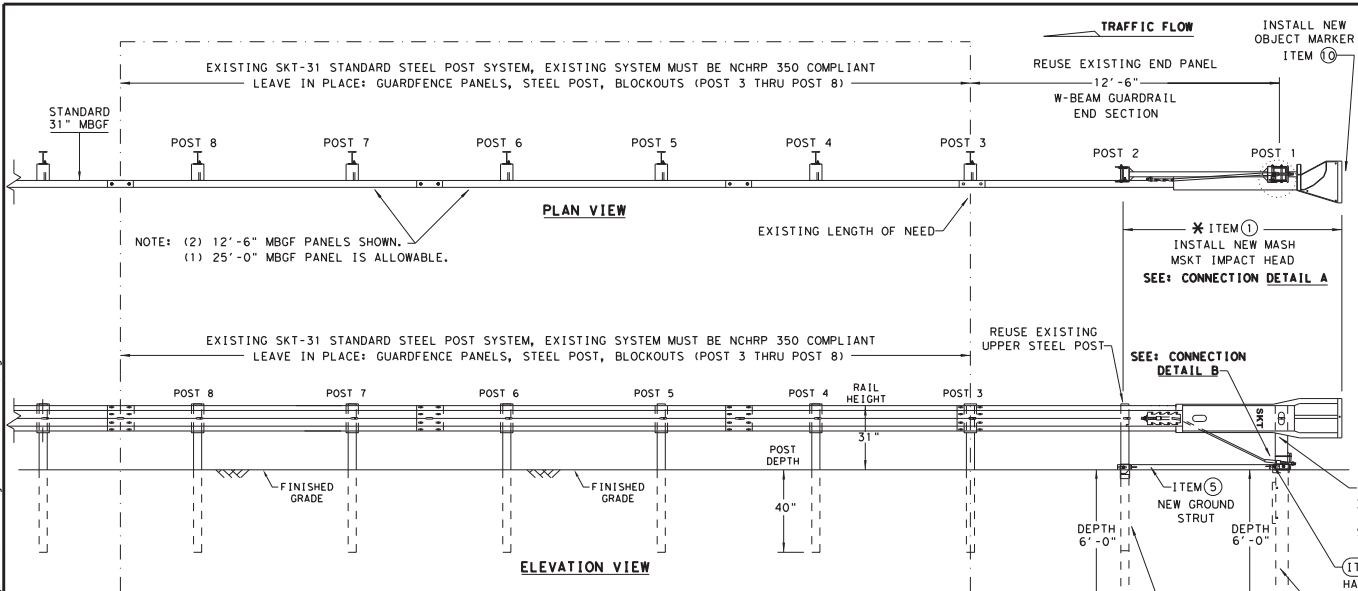
SINGLE GUARDRAIL TERMINAL

MSKT-MASH-TL-3

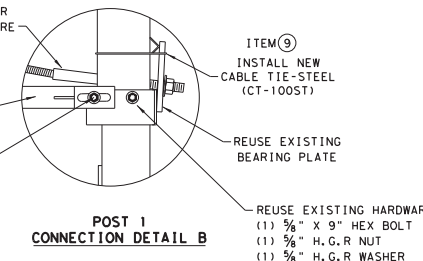
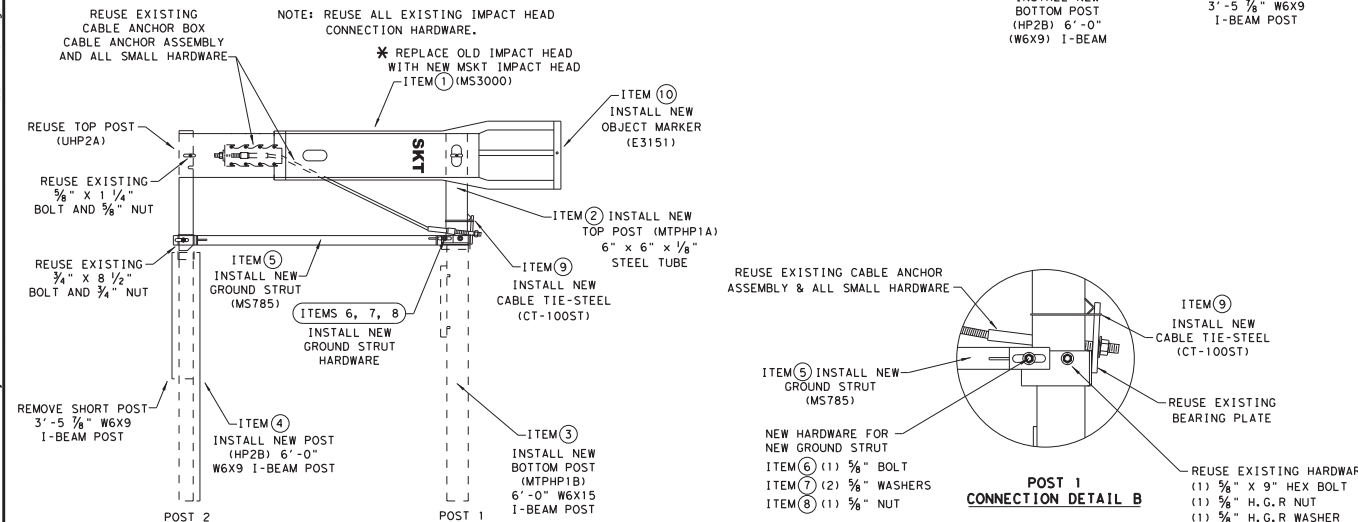
SGT (12S) 31-18

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© TXDOT: APRIL 2018	CONT: 47	SECT: 001	JOB: IH 44, ETC.	HIGHWAY: SHEET NO.
REVISITONS	5380	47	001	WFS WICHITA, ETC. 63

DATE: 5/21/2021
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 - IF SOLID ROCK IS ENCOUNTERED IN THE AREA OF (POST 1) AND / OR (POST 2) CONTACT THE MANUFACTURER, AND REFER TO THE LATEST ROADWAY MGF STANDARD FOR INSTALLATION GUIDANCE.
 - POSTS SHALL NOT BE SET IN CONCRETE.
 - THE EXISTING SKT 31" STANDARD STEEL POST SYSTEM MUST BE THOROUGHLY INSPECTED, AND DETERMINED TO BE INTACT, AND FREE OF ANY DAMAGE OR DEFECTS BEFORE RETROFITTING. THIS INSPECTION INCLUDES COMPLETING THE MSKT RETROFIT INSPECTION CHECKLIST FOR THE EXISTING SKT 31" STEEL POST NCHRP 350 SYSTEM. ALL EXISTING, AND REUSABLE PARTS MUST BE FREE OF ANY DAMAGE FOR A MASH COMPLIANT RETROFIT.
 - UNDER NO CIRCUMSTANCES SHALL THE GUARDRAIL WITHIN THE MSKT SYSTEM BE CURVED.
 - A FLARE RATE OF UP TO 25:1 MAY BE USED TO PREVENT THE TERMINAL HEAD FROM ENCRoACHING ON THE SHOULDER. THE FLARE MAY BE DECREASED OR ELIMINATED FOR SPECIFIC INSTALLATIONS, IF DIRECTED BY THE ENGINEER.
 - SPECIAL DRIVING CAP TO BE USED WHEN DRIVING (LOWER POSTS 1 & 2) TO PREVENT DAMAGE TO THE WELDED PLATES.



ITEMS	QTY	MAIN SYSTEM COMPONENTS	PART NUMBERS
* 1	1	MSKT IMPACT HEAD	MS3000
2	1	POST 1 - TOP (6" X 6" X 1/8" TUBE)	MTPHP1A
3	1	POST 1 - BOTTOM (6" W6X15)	MTPHP1B
4	1	POST 2 - ASSEMBLY BOTTOM (6" W6X9)	HP2B
5	1	GROUND STRUT	MS785
6	1	5/8" X 9" HEX BOLT (GRD A449)	B580904A
7	2	5/8" WASHERS	W050
8	1	5/8" H.G.R NUT	N050
9	1	CABLE TIE-STEEL	CT-100ST
* 10	1	OBJECT MARKER 18" X 18"	E3151

COMPONENTS REQUIRED TO RETROFIT: EXISTING 31" STEEL POST (NCHRP 350 SKT) GUARDRAIL TERMINAL WITH THE NEW 31" (MASH COMPLIANT MSKT IMPACT HEAD).

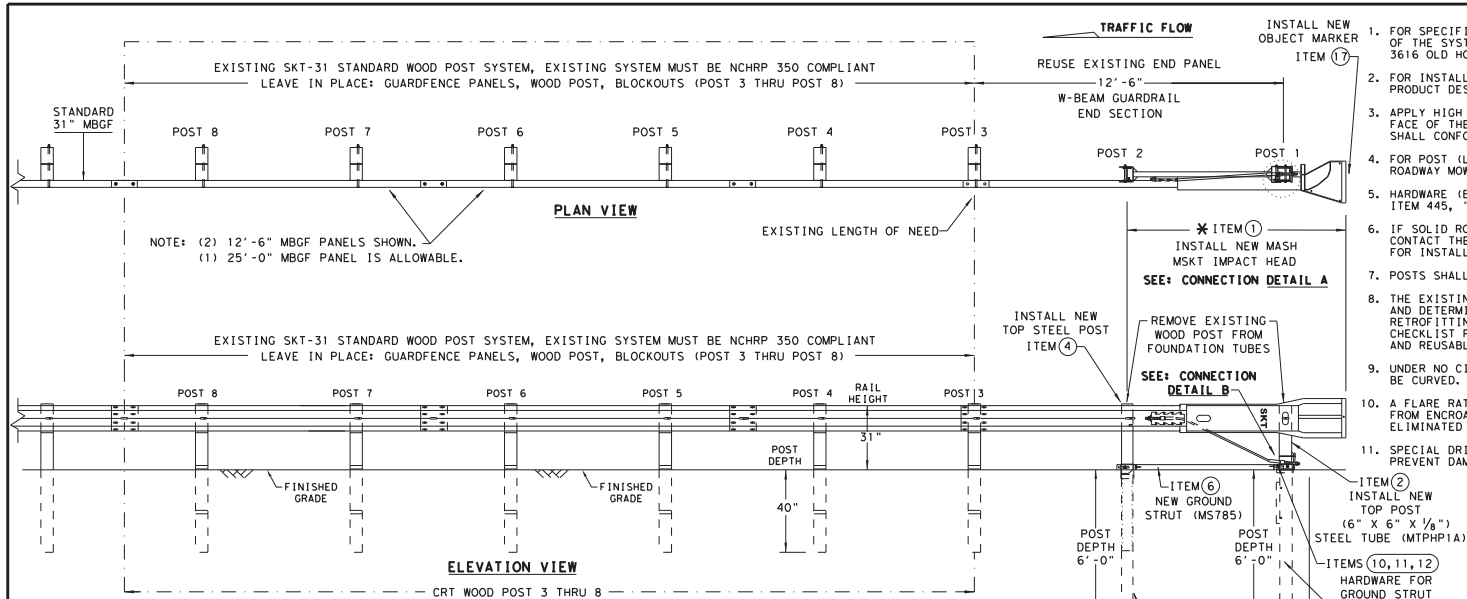
* IF THE EXISTING NCHRP 350 (31" STEEL POST SKT) ALREADY HAS THE MSKT IMPACT HEAD THERE IS NO NEED TO REPLACE THE IMPACT HEAD OR OBJECT MARKER AS LONG AS IT IS NOT DAMAGED.

RETROFIT STANDARD
SKT 31" STEEL POST SYSTEM
TO MASH MSKT
SGT (13S) 31-18

FILE: sq113s3118.dgn	DWG: TxDOT	CHK: KM	DRW: VP	CHK: CL
© TxDOT: APRIL 2018	6380	47	001	1H 44, ETC.
REVISIONS	DIST	COUNTY	SHEET NO.	
	WFS	WICHITA,	ETC.	64

NOTE: THIS STANDARD IS A BASIC REPRESENTATION OF THE EXISTING SKT END TERMINAL RETROFITTED TO THE MSKT MASH COMPLIANT TERMINAL. IT IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

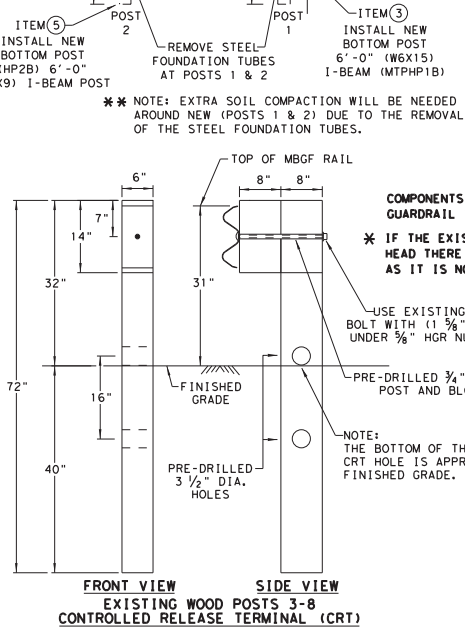
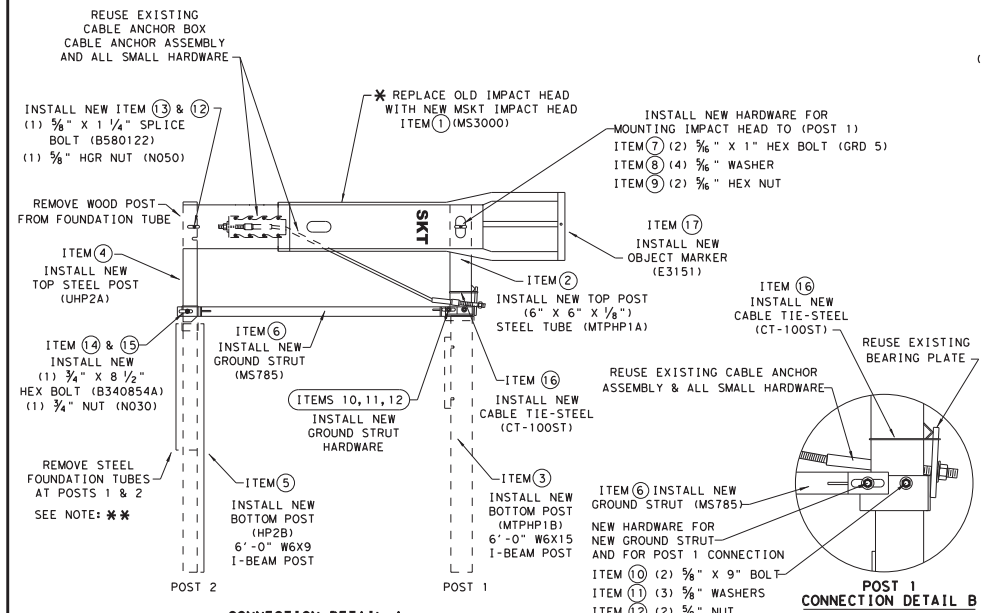
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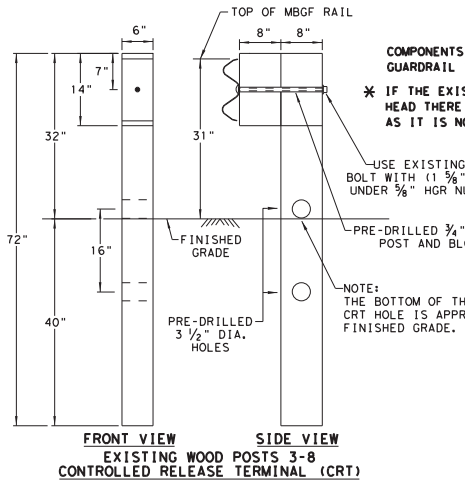
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- FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TxDOT'S LATEST ROADWAY MOW STRIP STANDARD.
- HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
- IF SOLID ROCK IS ENCOUNTERED IN THE AREA OF (POST 1) AND / OR (POST 2) CONTACT THE MANUFACTURER, AND REFER TO THE LATEST ROADWAY MASH STANDARD FOR INSTALLATION GUIDANCE.
- POSTS SHALL NOT BE SET IN CONCRETE.
- THE EXISTING SKT 31" STANDARD WOOD POST SYSTEM MUST BE THOROUGHLY INSPECTED, AND DETERMINED TO BE INTACT, AND FREE OF ANY DAMAGE OR DEFECTS BEFORE RETROFITTING. THIS INSPECTION INCLUDES COMPLETING THE MSKT RETROFIT INSPECTION CHECKLIST FOR THE EXISTING SKT 31" WOOD POST NCHRP 350 SYSTEM. ALL EXISTING, AND REUSABLE PARTS MUST BE FREE OF ANY DAMAGE FOR A MASH COMPLIANT RETROFIT.
- UNDER NO CIRCUMSTANCES SHALL THE GUARDRAIL WITHIN THE MSKT SYSTEM BE CURVED.
- A FLARE RATE OF UP TO 25:1 MAY BE USED TO PREVENT THE TERMINAL HEAD FROM ENCRANCHING ON THE SHOULDER. THE FLARE MAY BE DECREASED OR ELIMINATED FOR SPECIFIC INSTALLATIONS, IF DIRECTED BY THE ENGINEER.
- SPECIAL DRIVING CAP TO BE USED WHEN DRIVING (LOWER POSTS 1 & 2) TO PREVENT DAMAGE TO THE WELDED PLATES.

ITEMS	QTY	MAIN SYSTEM COMPONENTS	PART NUMBERS
1	1	MSKT IMPACT HEAD	MS3000
2	1	POST 1 - TOP (6" X 6" X 1/4" TUBE)	MTPHP1A
3	1	POST 1 - BOTTOM (6' W6X15)	MTPHP1B
4	1	POST 2 - ASSEMBLY TOP	UHP2A
5	1	POST 2 - ASSEMBLY BOTTOM (6' W6X9)	HP2B
6	1	GROUND STRUT	MS785
7	2	3/8" X 1" HEX BOLT (GRD 5)	B516014A
8	4	3/8" WASHERS	W0516
9	2	3/8" HEX NUT	N0516
10	2	3/4" X 9" HEX BOLT (GRD A449)	B580904A
11	3	3/8" WASHERS	W050
12	3	3/8" H.G.R NUT	N050
13	1	3/8" X 1 1/4" SPLICE BOLT	B580122
14	1	3/4" X 8 1/2" HEX BOLT (GRD 5)	B340854A
15	1	3/4" HEX NUT	N030
16	1	CABLE TIE-STEEL	CT-100ST
17	1	OBJECT MARKER 18" X 18"	E3151



**** NOTE: EXTRA SOIL COMPACTION WILL BE NEEDED AROUND NEW (POSTS 1 & 2) DUE TO THE REMOVAL OF THE STEEL FOUNDATION TUBES.**



COMPONENTS REQUIRED TO RETROFIT: EXISTING 31" WOOD POST (NCHRP 350 SKT) GUARDRAIL TERMINAL WITH THE NEW 31" (MASH COMPLIANT MSKT IMPACT HEAD).
**** IF THE EXISTING NCHRP 350 (31" WOOD POST SKT) ALREADY HAS THE MSKT IMPACT HEAD THERE IS NO NEED TO REPLACE THE IMPACT HEAD OR OBJECT MARKER AS LONG AS IT IS NOT DAMAGED.**



**RETROFIT STANDARD
 SKT 31" WOOD POST SYSTEM
 TO MASH MSKT
 SGT (14W) 31-18**

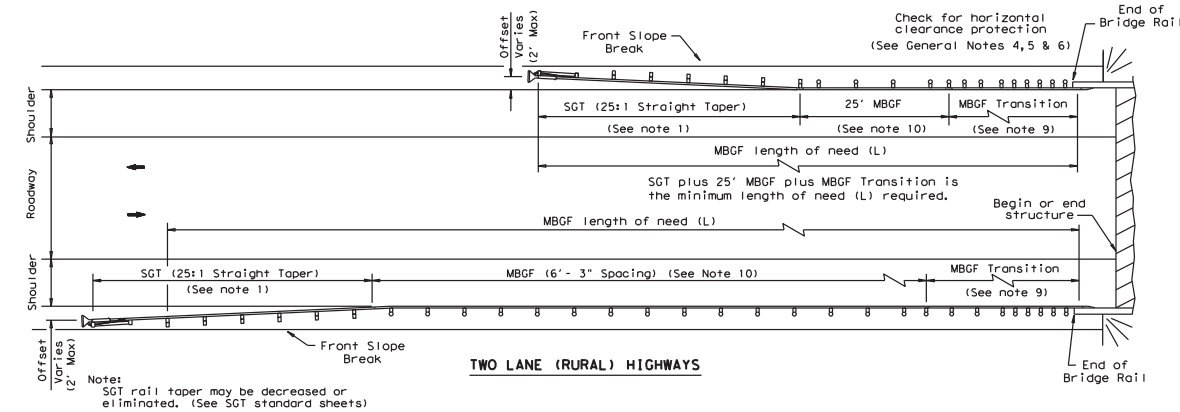
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	WFS	WICHITA, ETC.		65

NOTE: THIS STANDARD IS A BASIC REPRESENTATION OF THE EXISTING SKT END TERMINAL RETROFITTED TO THE MSKT MASH COMPLIANT TERMINAL. IT IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

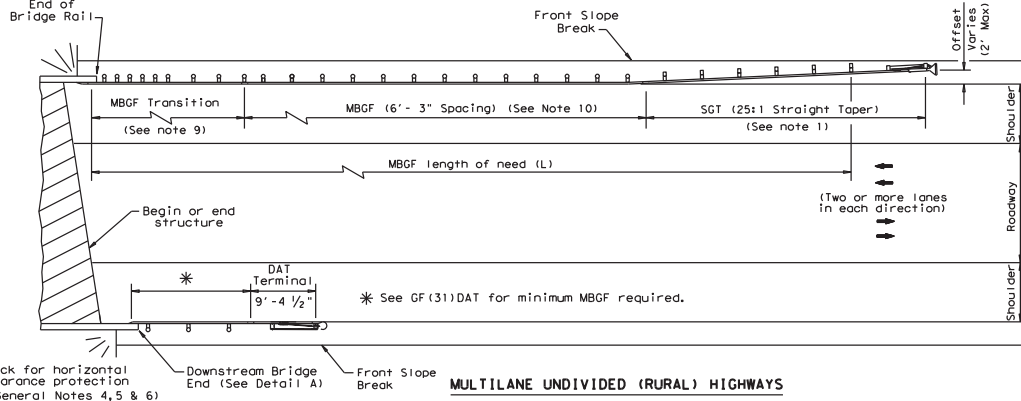
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DISCONTINUED
 The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to metric units.

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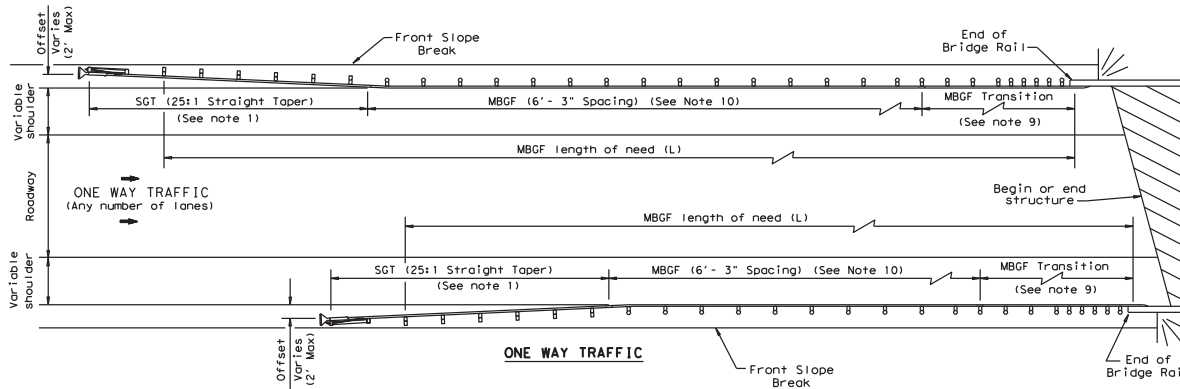


Note:
SGT rail taper may be decreased or eliminated. (See SGT standard sheets)



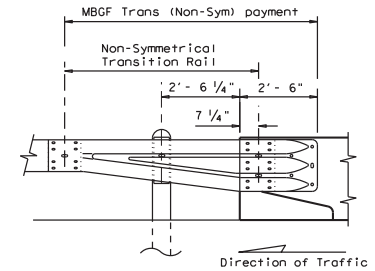
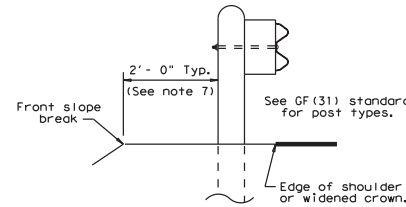
Check for horizontal clearance protection (See General Notes 4, 5 & 6)

* See GF (31) DAT for minimum MBGF required.



GENERAL NOTES

- For more detail: See GF (31), SGT () 31, GF (31) TR, and GF (31) TL2 standard sheets.
- Quantities of metal beam guard fence (MBGF) at individual bridge ends are as shown in the plans.
- Use average daily traffic (ADT) for the current year to determine MBGF length of need in accordance with the Roadway Design Manual unless otherwise specified. Where significant traffic volume growth is anticipated on low volume (0-750 ADT) highways, use length determinations for the higher volume category.
- MBGF may not be required to shield departure end of bridge unless other obstacles within the horizontal clearance limits or opposing traffic indicate a MBGF consideration.
- Downstream anchor terminals (DAT) are only for downstream end anchorage use, outside the horizontal clearance area of opposing traffic.
- Direct connection of MBGF to concrete rails are only for downstream rail connections outside the horizontal clearance area of opposing traffic. (This requires a minimum of three standard line posts plus the DAT terminal, See Detail A)
- The crown shall be widened to accommodate MBGF. Typically the "front slope" break should be 2'-0" from the back of the MBGF post. This applies to new construction on new alignment or where existing roadway cross section is to be widened to increase roadway width. This does not apply to rehabilitation work where existing roadway crown width is to be retained (See Typical Cross Section at MBGF).
- For restrictive bridge widths: The MBGF should be properly transitioned from the existing bridge rail to the adjoining MBGF (See MBGF Transition Standards). Metal beam guard fence at these bridge location(s) shall be flared at the rate of 25:1 or flatter, and be of the length necessary to locate the terminal end at the 2 ft. "maximum" offset from the shoulder edge in the approach direction.
- Transition length and post spacing will vary depending on the transition type. Transition type will be shown elsewhere in the plans.
- A minimum 25' length of MBGF will be required.

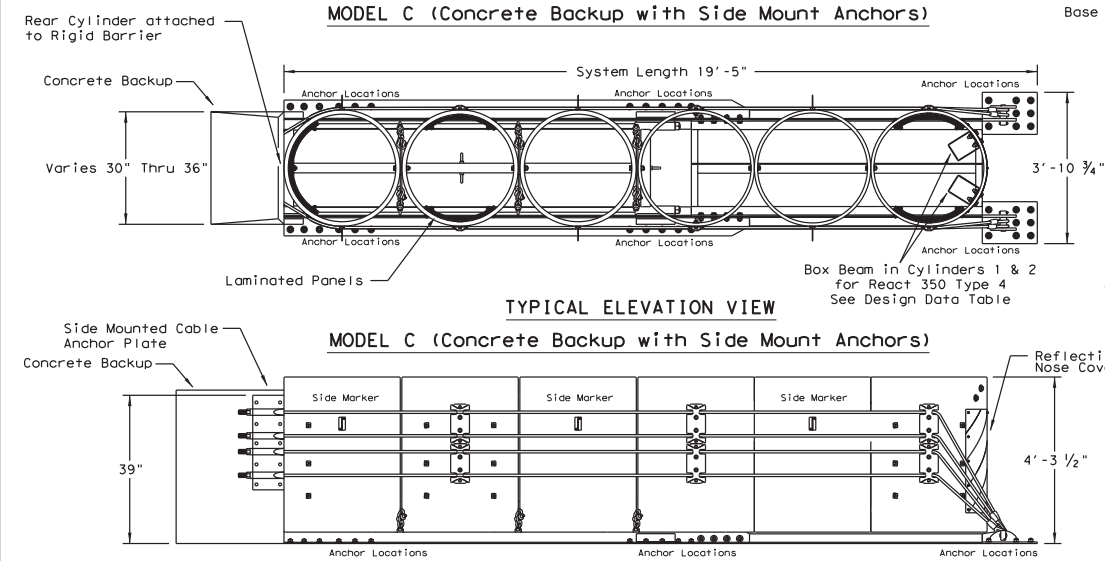
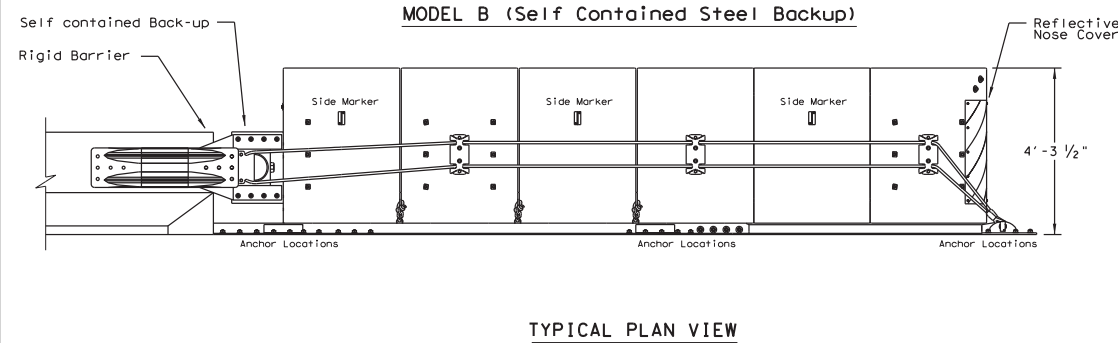
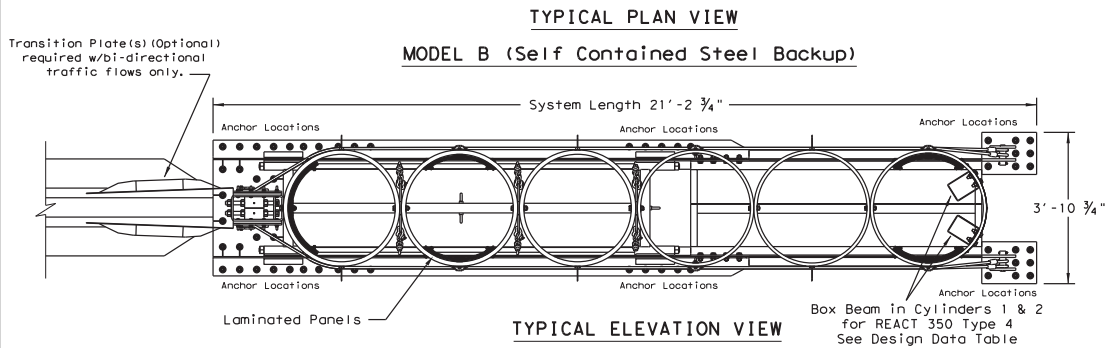


Note:
All rail elements shall be lapped in the direction of adjacent traffic.

BRIDGE END DETAILS
(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)
BED-14

FILE: bed14.dgn	DN: TxDOT	CR: AM	DN: BD/VP	CHK: CGL
© TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	6380	47	001	IH 44, ETC.
	DIST	COUNTY	SHEET NO.	
	WFS	WICHITA, ETC.	66	

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 FILE: T:\WFSMAINT\Maintenance Projects\6380-47-001 On Call Guardrail FY 22 v4 - Design\Plan Set\Drawings\6380-47-001.dgn
 DATE: 5/21/2021

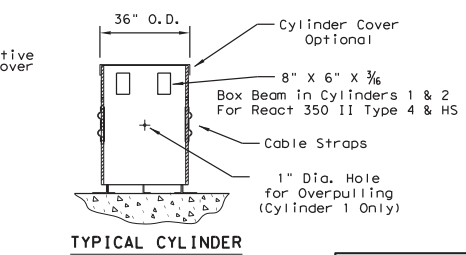
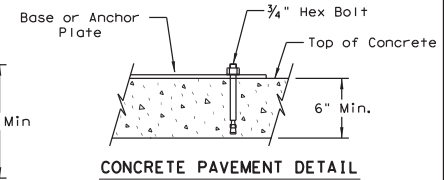
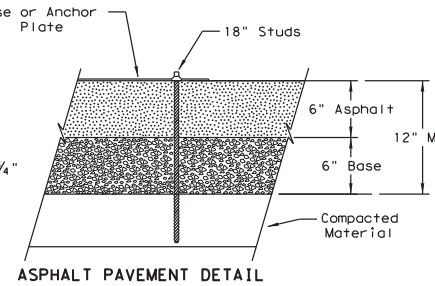


GENERAL NOTES

- For specific information regarding installation and technical guidance of the system, contact: Trinity Highway - Energy Absorption at (888)323-6374, 70 W. Madison St. Suite 2350, Chicago, IL 60602
- The nose of the REACT 350 shall be clad with a plastic wrap with standard delineation adhered to the wrap and shall have a series of side marker reflectors on both sides of the unit. See site plan views for marker and plastic wrap color orientation.
- All steel components to be hot dipped galvanized except stakes, drive spikes, threaded bolts in backup unit, and wedge fittings on cables.
- The installation area should be free from curbs, elevated objects, or depressions. If the REACT system is to span expansion joints contact the manufacturer.
- The REACT system should be approximately parallel with the barrier or $\frac{1}{4}$ of merging barriers. The maximum permissible cross-slope is 8%.
- REACT 350 II has laminated panels in cylinders 1, 5, & 6.

TYPE	REACT 350 4-B	REACT 350 4-C	REACT 350 II 6-B	REACT 350 II 6-C
Test Level	TL-2	TL-2	TL-3	TL-3
OVERALL LENGTH	15'-3"	13'-9"	21'-3"	19'-5"

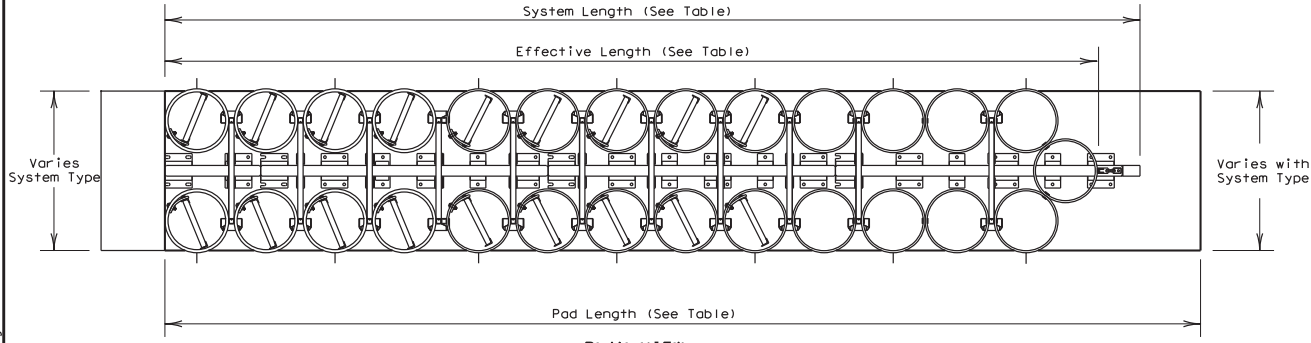
FOUNDATION TYPE	MINIMUM THICKNESS	ANCHORAGE
A CONCRETE PAD OR ROADWAY	6"	MP-3 WITH 7" STUDS [5.5" EMBEDMENT]
B ASPHALT OVER CONCRETE PAVEMENT	6" CONCRETE PAVEMENT	ANCHOR LENGTH REQUIRED IS 7" STUD PLUS ASPHALT THICKNESS
C ASPHALT OVER BASE	6" ACP + 6" BASE	MP-3 WITH 18" STUDS [16.5" EMBEDMENT]
D ASPHALT ONLY	8"	MP-3 WITH 18" STUDS [16.5" EMBEDMENT]



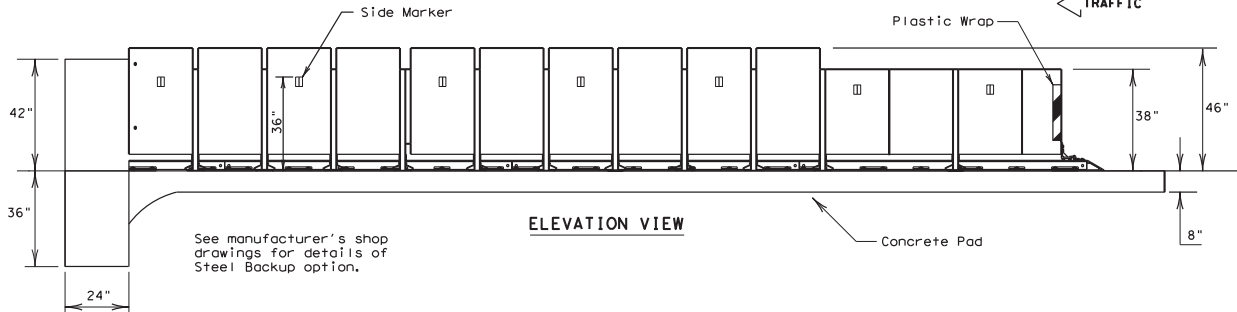
LOW MAINTENANCE

		Design Division Standard	
TRINITY HIGHWAY ENERGY ABSORPTION (REACT 350 NARROW) (REACT 350 II NARROW) REACT (N) - 16			
FILE: reactn16.dgn	DN: TxDOT	CR: KM	DN: VP
© TxDOT February 1998	CONT SECT	JOB	HIGHWAY
REVISIONS	6380 47	001	IH 44, ETC.
REVISED 06, 2013 (VP)	DIST	COUNTY	
REVISED 03, 2016 (VP)	WFS	WICHITA, ETC.	SHEET NO. 67

DATE: 5/21/2021
 FILE: T:\WFSMAINT\Maintenance Projects\6380-47-001 On Call Guardrail - Design\Plan Set Dgn's\3. Roadway\REACT (W) -16.dgn
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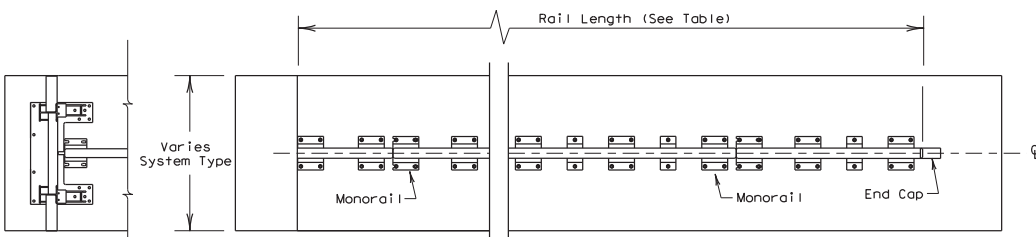


PLAN VIEW

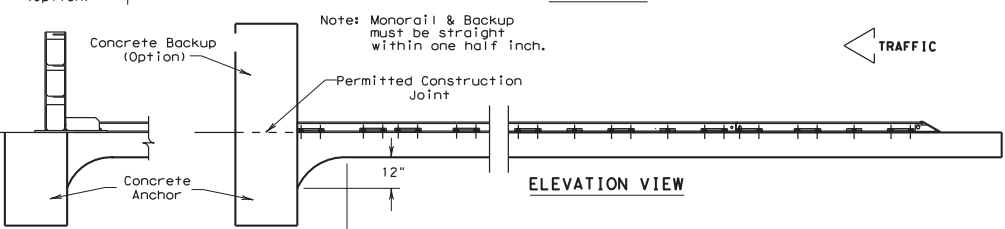


ELEVATION VIEW

See manufacturer's shop drawings for details of Steel Backup option.



PLAN VIEW



ELEVATION VIEW

MONORAIL ASSEMBLY DETAIL

(See the manufacturer's shop drawings for monorail hardware installation.)

GENERAL NOTES

- For specific information regarding installation and technical guidance of the system, contact: Trinity Highway - Energy Absorption at 1(888)323-6374, 70 W. Madison St. Suite 2350, Chicago, IL 60602
- The nose of the REACT 350 shall be clad with a plastic wrap with standard delineation adhered to the wrap and shall have a series of side marker reflectors on both sides of the unit. See site plan views for marker and plastic wrap color orientation.
- For bi-directional traffic, appropriate transition details will be as shown on the manufacturer's shop drawings.
- Details of components for the REACT(W) and backups and reinforcing details will be shown on the manufacturer's shop drawings furnished to the Engineer.
- If the cross-slope varies more than 2% over the length of the system, the concrete pad will require leveling. Maximum permissible cross-slope is 8%.
- The installation area should be free from curbs, elevated objects, or depressions.
- The REACT(W) system should be approximately parallel with the barrier or $\frac{1}{2}$ of merging barriers.
- All steel components to be hot dipped galvanized except stakes, drive spikes, threaded bolts in backup unit, and wedge fittings on cables.

WIDE REACT SYSTEMS

SYSTEM TYPE	BACKUP WIDTH	TEST LEVEL	SYSTEM LENGTH	EFFECTIVE LENGTH	PAD LENGTH
W60	60"	TL-2	18'-10"	16'-3"	19'-6"
		TL-3	30'-10"	29'-3"	32'-6"
W96	96"	TL-2	18'-10"	17'-6"	19'-7"
		TL-3	34'-9"	32'-10"	35'-6"
W120	120"	TL-3	33'-10"	32'-2"	35'-6"

(See the manufacturer's shop drawings for additional details.)

ANCHOR SYSTEM TYPE

MP-3[®] polyester anchoring system with 7.5" studs, 5.5" embedment

FOUNDATION TYPES

Minimum 8" Reinforced concrete pad (Required reinforcing steel for concrete pad shall be shown on the manufacturer's shop drawings.)

Minimum 8" Non-reinforced concrete roadway (Measuring at least 12' wide by 50' long)

Minimum 7" Concrete deck structure, or Minimum 6" Reinforced concrete roadway

Texas Department of Transportation
 Design Division Standard

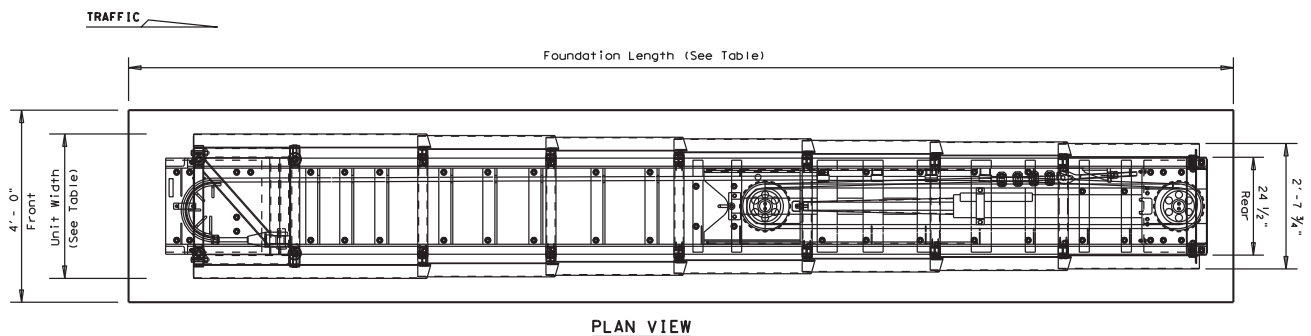
TRINITY HIGHWAY ENERGY ABSORPTION CRASH CUSHION (REACT 350 WIDE) REACT (W) -16

FILE: reactw16.dgn	DN: TxDOT	CR: KM	DN: VP	CR: VP
© TxDOT: October 2001	CONT	SECT	JOB	HIGHWAY
6380	47	001	IH 44, ETC.	
REVISED 03.2016 (VP)	DIST	COUNTY	SHEET NO.	
WFS	WICHITA, ETC.		68	

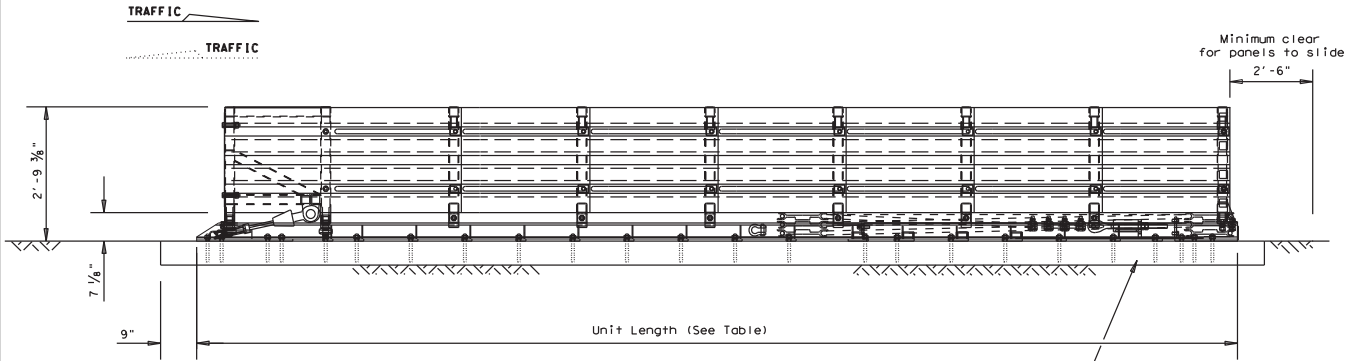
LOW MAINTENANCE

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PLAN VIEW



ELEVATION VIEW

MODEL	TEST LEVEL	UNIT LENGTH (approx.)	UNIT WIDTH	FOUNDATION LENGTH	OBSTACLE WIDTH
SCI70GM	TL-2	13'-6"	2'-10 5/8"	15'-6 1/4"	24" to 36"
SCI100GM	TL-3	21'-6"	3'-1 1/2"	23'-0"	24" to 36"

System and pad lengths vary depending on backup type.

FOUNDATION OPTIONS
6" Reinforced Concrete (5 1/2" Anchor Embedment)
8" Unreinforced Concrete (5 1/2" Anchor Embedment)
3" Min. Asphalt over 3" Min. Concrete (16 1/2" Anchor Embed.)
6" Asphalt over 6" Compact Subbase (16 1/2" Anchor Embed.)
8" Minimum Asphalt (16 1/2" Anchor Embedment)

For steel placement in concrete foundations, see manufacturer's product manual.

TRANSITION OPTIONS
Concrete Vertical Wall
Concrete Traffic Barriers
Guardrail (W-Beam)
Guardrail (Thrie-Beam)

Transition types are shown elsewhere on the plans (i.e. Attenuator location details or in the general notes).

For bi-directional transition panel and end shoe details, see manufacturer's product manual.

GENERAL NOTES

- For specific information regarding installation and technical guidance of the system, contact: Work Area Protection, Corp. at (800) 327-4417, or (630) 377-9100.
- For bi-directional traffic, appropriate transition panels will be required.
- Additional details for the transition option and foundation option will be shown on the manufacturer's shop drawings furnished to the Engineer.
- Concrete shall be class "S" with a minimum compressive strength of 4,000 psi.
- Maximum permissible cross-slope is 8%.
- The installation area should be free from curbs, elevated objects, or depressions.
- The SCI100GM & SCI70GM systems should be approximately parallel with the barrier or $\frac{1}{2}$ of merging barriers.

For attachment and transitions to other shapes, barriers, railings and bi-directional traffic flows are available. (See manufacturer's product manual)

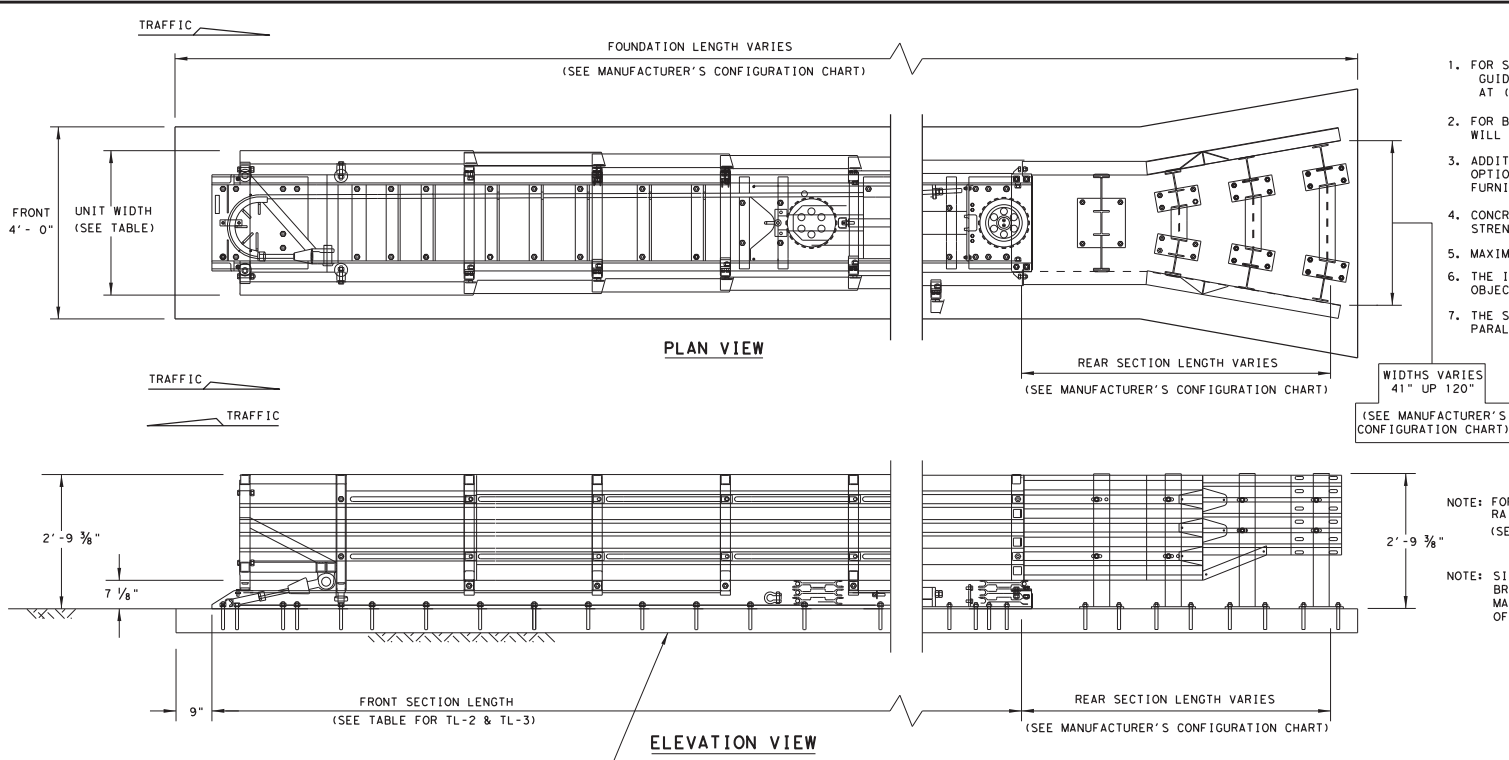
NOTE: Side Panels can travel 30" beyond the last terminal brace at the rear of the cushion. All objects that may interfere with this motion can affect performance of and may cause undue damage to the crash cushion.

				Design Division Standard	
WORK AREA PROTECTION CORP (SMART-NARROW) SMTc(N) - 16					
FILE: smtcn16.dgn	DN: TxDOT	CR: KM	DN: BD/VP	CR: VP	
© TxDOT: February 2006	CONT	SECT	JOB	HIGHWAY	
REVISIONS	6380	47	001	IH 44, ETC.	
REVISED 06, 2013 (VP)	DIST	COUNTY		SHEET NO.	
REVISED 03, 2016 (VP)	WFS	WICHITA, ETC.		69	

LOW MAINTENANCE

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 FILE: T:\WFSMAINT\Maintenance Projects\6380-47-001 On Call Guardrail - Design\Plan Set\Drawings\SMTC (W) -16.dgn



GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: WORK AREA PROTECTION, CORP. AT (800) 327-4417, OR (630) 377-9100.
2. FOR BI-DIRECTIONAL TRAFFIC, APPROPRIATE TRANSITION PANELS WILL BE REQUIRED.
3. ADDITIONAL DETAILS FOR THE TRANSITION OPTIONS AND FOUNDATION OPTIONS WILL BE SHOWN ON THE MANUFACTURER'S SHOP DRAWINGS FURNISHED TO THE ENGINEER.
4. CONCRETE SHALL BE CLASS "S" WITH A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI.
5. MAXIMUM PERMISSIBLE CROSS-SLOPE IS 8%.
6. THE INSTALLATION AREA SHOULD BE FREE FROM CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
7. THE SC1100GM & SC170GM SYSTEMS SHOULD BE APPROXIMATELY PARALLEL WITH THE BARRIER OR ϕ OF MERGING BARRIERS.

NOTE: FOR ATTACHMENT AND TRANSITIONS TO OTHER SHAPES, BARRIERS RAILINGS AND BI-DIRECTIONAL TRAFFIC FLOWS ARE AVAILABLE. (SEE MANUFACTURER'S PRODUCT MANUAL)

NOTE: SIDE PANELS CAN TRAVEL 30" BEYOND THE LAST TERMINAL BRACE AT THE REAR OF THE CUSHION. ALL OBJECTS THAT MAY INTERFERE WITH THIS MOTION CAN AFFECT PERFORMANCE OF AND MAY CAUSE UNDEE DAMAGE TO THE CRASH CUSHION.

WIDE TRANSITION LENGTHS		
GORE WIDTH	TL-2 OVERALL SYSTEM LENGTH	TL-3 OVERALL SYSTEM LENGTH
41"	20'-1"	28'-1"
48"	21'-10"	29'-10"
55"	23'-5"	31'-5"
60"	24'-7"	32'-7"
68"	26'-6"	34'-6"
69"	26'-8"	34'-8"
81"	29'-7"	37'-7"
88"	31'-2"	39'-2"
94"	32'-7"	40'-7"
100"	34'-1"	42'-1"
107"	35'-8"	43'-8"
112"	36'-11"	44'-11"
120"	38'-10"	46'-10"
126"	40'-2"	48'-2"
133"	41'-11"	49'-11"

FOUNDATION OPTIONS
6" Reinforced Concrete (5 1/2" Anchor Embedment)
8" Unreinforced Concrete (5 1/2" Anchor Embedment)
3" Min. Asphalt over 3" Min. Concrete (16 1/2" Anchor Embed.)
6" Asphalt over 6" Compact Subbase (16 1/2" Anchor Embed.)
8" Minimum Asphalt (16 1/2" Anchor Embedment)

FOR STEEL PLACEMENT IN CONCRETE FOUNDATIONS, SEE MANUFACTURER'S PRODUCT MANUAL.

TRANSITION OPTIONS
Concrete Vertical Wall
Concrete Traffic Barriers
Guardrail (W-Beam)
Guardrail (Thrie-Beam)

TRANSITION TYPES ARE SHOWN ELSEWHERE ON THE PLANS (I.E. ATTENUATOR LOCATION DETAILS OR IN THE GENERAL NOTES).

FOR BI-DIRECTIONAL TRANSITION PANEL AND END SHOE DETAILS, SEE MANUFACTURER'S PRODUCT MANUAL.

MODEL (WIDE)	TEST LEVEL	FRONT SECTION LENGTH	UNIT WIDTH	FOUNDATION LENGTH	GORE WIDTH
SC170GM	TL-2	13'-6"	2'-10 3/8"	OVERALL LENGTH PLUS 1'-6"	41" TO 133"
SC1100GM	TL-3	21'-6"	3'-1 1/2"	OVERALL LENGTH PLUS 1'-6"	41" TO 133"

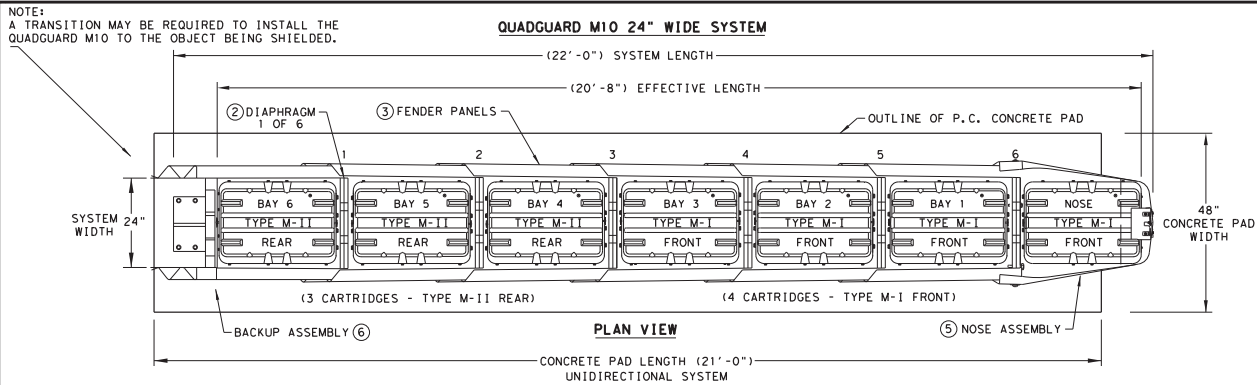
SYSTEM AND PAD LENGTHS VARY DEPENDING ON BACKUP TYPE.

LOW MAINTENANCE

				Design Division Standard	
WORK AREA PROTECTION CORP (SMART-WIDE) SMTC (W) - 16					
FILE: smtcw16.dgn	DN: TxDOT	CR: KM	DN: BO/VP	CR: VP	
© TxDOT: FEBRUARY 2006	CONT	SECT	JOB	HIGHWAY	
REVISIONS	6380	47	001	IH 44, ETC.	
REVISED 06 2015 VP	DIST	COUNTY		SHEET NO.	
REVISED 03 2016 VP	WFS	WICHITA, ETC.		70	

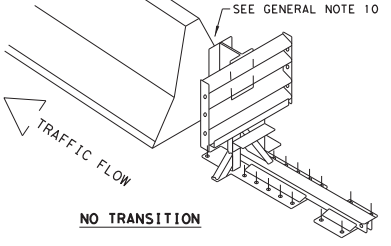
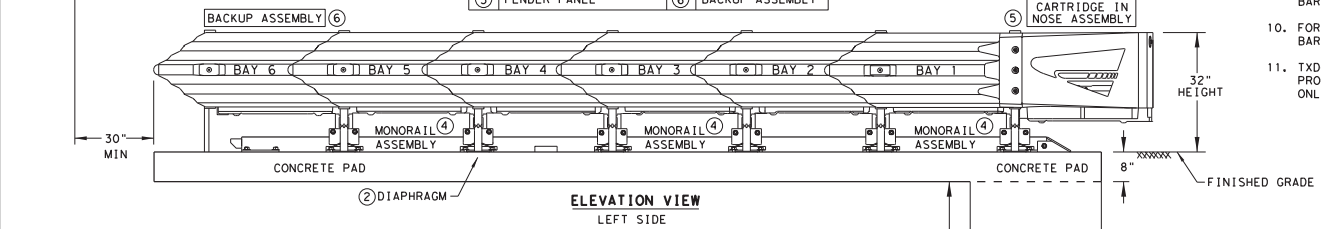
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DATE: 5/21/2021
 FILE: T:\WFSMAINT\Wgntenance Projects\6380-47-001 On Coll Guardrail - Design\Plan Set\Dgn's\3 - Roadway\QUADGUARD(M10) (N) -19.dgn



NOTE: PROVISION SHALL BE MADE FOR REAR FENDER PANELS TO SLIDE REARWARD UPON IMPACT, 30\"/>

KEY	KEY
① QUADGUARD CARTRIDGE	④ MONORAIL
② DIAPHRAGM	⑤ NOSE ASSEMBLY
③ FENDER PANEL	⑥ BACKUP ASSEMBLY



NOTE: AN ANCHOR BLOCK IS NOT REQUIRED WITH AN 8\"/>

GENERAL NOTES

- FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: TRINITY HIGHWAY - ENERGY ABSORPTION INC. AT 1(888)323-6374.
- SEE THE RECENT QUADGUARD (M10) PRODUCT DESCRIPTION ASSEMBLY MANUAL FOR IMPACT PERFORMANCE CHARACTERISTICS AND DESIGN LIMITATIONS AND THE DRAWING PACKAGE FOR THE NARROW 24\"/>

FOUNDATION & ANCHORING REQUIREMENTS	
FOUNDATION TYPES: A, B, C, & D	
FOUNDATION TYPE:A	REINFORCED CONCRETE PAD OR ROADWAY
FOUNDATION:	6\"/>
ANCHORAGE:	7\"/>
FOUNDATION TYPE:B	ASPHALT OVER P.C.C.
FOUNDATION:	3\"/>
ANCHORAGE:	18\"/>
FOUNDATION TYPE:C	ASPHALT OVER SUBBASE
FOUNDATION:	6\"/>
ANCHORAGE:	18\"/>
FOUNDATION TYPE:D	ASPHALT ONLY
FOUNDATION:	8\"/>
ANCHORAGE:	18\"/>

KEY:
 ASPHALT CONCRETE (A.C.)
 COMPACTED SUBBASE (C.S.)
 PORTLAND CEMENT CONCRETE (P.C.C.)

NOTES: SEE MANUAL FOR APPROVED TRINITY HIGHWAY ADHESIVE.

IF THE UNIT IS ANCHORED TO ASPHALTIC CONCRETE, IT SHOULD BE RELOCATED TO FRESH, UNDISTURBED ASPHALT AND RE-ANCHORED AFTER EACH IMPACT TO ENSURE ADEQUATE FUTURE PERFORMANCE. A ZERO CLEARANCE BETWEEN THE BACKUP AND BARRIER WALL IS RECOMMENDED IN NO CASE SHOULD THIS DISTANCE EXCEED 7 INCHES.

NOTE: THE PROPER TRANSITION PANEL OR SIDE PANEL MUST BE USED FOR BI-DIRECTIONAL INSTALLATIONS AT DIVIDED-HIGHWAY MEDIANS OR UNDIVIDED ROADWAYS WHERE THE SYSTEM IS EXPOSED TO IMPACTS FROM TWO DIFFERENT DIRECTIONS OF TRAFFIC FLOW. NCHRP 350 TRANSITIONS HAVE BEEN ACCEPTED FOR USE BY TRINITY HIGHWAY PRODUCTS, LLC AND TxDOT WITH THE MASH QUADGUARD M10 SYSTEM. MASH TRANSITIONS WHEN AVAILABLE FROM TRINITY HIGHWAY WILL BE REFLECTED IN FUTURE QUADGUARD M10 PRODUCT DESCRIPTION ASSEMBLY MANUALS.

SYSTEM TRANSITIONS TYPES	
1	QUAD-BEAM TO CONCRETE END-SHOE
2	QUAD-BEAM TO THRIE-BEAM RAIL
3	QUAD-BEAM TO W-BEAM RAIL

NOTE: TRANSITION ASSEMBLIES FOR THE QUAD-GUARD TO THRIE-BEAM OR W-BEAM FENCE REQUIRES:
 10 (W6X9) I-BEAM POSTS,
 POST 1 THRU 4 (84\"/>

THE QUADGUARD (M10) (N) 6-BAY 24\"/>

MODEL #	BAYS	CARTRIDGES
QM10024	6	TYPE-MII TYPE-MI
WIDTH 24"	DIAPHRAGMS	3 4
		REAR FRONT

NOTE: THIS STANDARD IS A BASIC REPRESENTATION OF THE QUADGUARD M10 SYSTEM AND IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

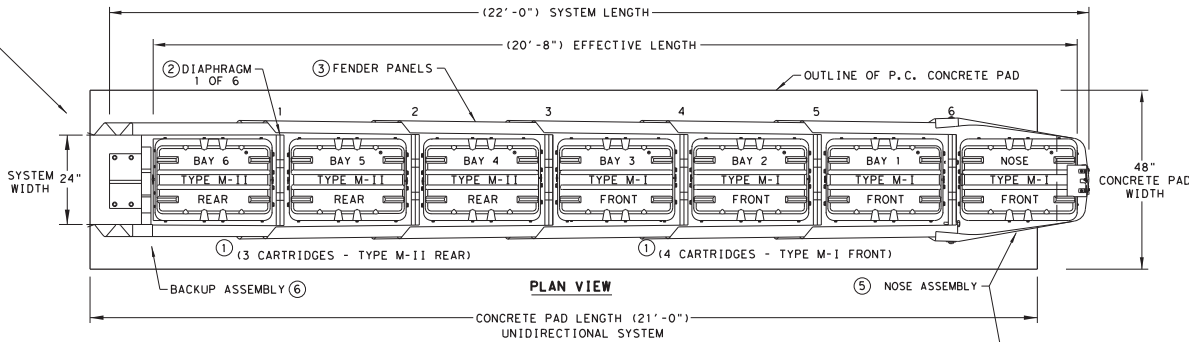
REUSABLE

		Design Division Standard	
TRINITY HIGHWAY ENERGY ABSORPTION QUADGUARD M10 (MASH TL-3 NARROW-24" ONLY) QUADGUARD (M10) (N) - 19			
FILE: quaguardm10n19.dgn	DW:TXDOT	CK:KRM	DR:VJP
© TXDOT: APRIL 2019	CONT SECT	JOB	HIGHWAY
REVISIONS	6380 47	001	IH 44, ETC.
	DIST	COUNTY	SHEET NO.
	WFS	WICHITA, ETC.	71

DATE: 5/21/2021
 FILE: T:\WFSMAINT\WgIntenence Projects\6380-47-001 On Call Guardrail - Design\Plan Set\Dgn\3 - Roadway\QUADGUARD(M10) (N)-20.dgn
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NOTE:
A TRANSITION MAY BE REQUIRED TO INSTALL THE QUADGUARD M10 TO THE OBJECT BEING SHIELDED.

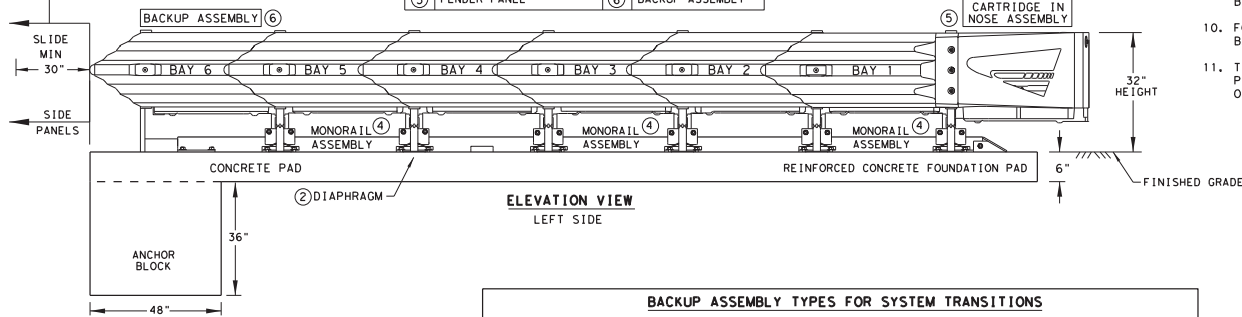
QUADGUARD M10 24" WIDE 6-BAY SYSTEM



PLAN VIEW

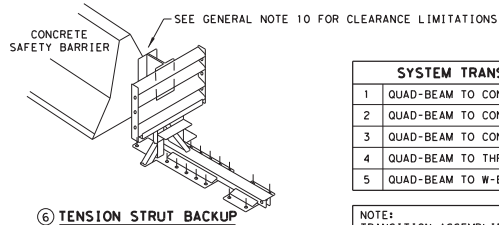
KEY	KEY
① QUADGUARD CARTRIDGE	④ MONORAILS
② DIAPHRAGM	⑤ NOSE ASSEMBLY
③ FENDER PANEL	⑥ BACKUP ASSEMBLY

NOTE:
PROVISION SHALL BE MADE FOR REAR FENDER SIDE PANELS TO SLIDE REARWARD UPON IMPACT, 30" MIN.



**ELEVATION VIEW
LEFT SIDE**

BACKUP ASSEMBLY TYPES FOR SYSTEM TRANSITIONS



SYSTEM TRANSITIONS TYPES	
1	QUAD-BEAM TO CONCRETE SAFETY BARRIER
2	QUAD-BEAM TO CONCRETE BRIDGE RAIL
3	QUAD-BEAM TO CONCRETE END SHOE
4	QUAD-BEAM TO THRIE-BEAM RAIL
5	QUAD-BEAM TO W-BEAM RAIL

NOTE:
TRANSITION ASSEMBLIES FOR THE QUADGUARD M10 TO THRIE-BEAM OR W-BEAM FENCE REQUIRES I-BEAM POSTS:
ALL POSTS W6X8, 5/9 I-BEAMS (78" LONG).

NOTES:
CONTACT THE MANUFACTURER WITH SITE SPECIFIC DATA (SSD) FOR THE CORRECT BACKUP ASSEMBLY AND TRANSITION PANELS OR SIDE PANELS USED FOR STANDARD AND BI-DIRECTIONAL INSTALLATIONS: AT DIVIDED-HIGHWAY MEDIANS OR UNDIVIDED ROADWAYS WHERE THE SYSTEM IS EXPOSED TO IMPACTS FROM ONE OR TWO DIFFERENT DIRECTIONS OF TRAFFIC FLOW.

NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE QUADGUARD M10 SYSTEM AND IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

GENERAL NOTES

- FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: TRINITY HIGHWAY - ENERGY ABSORPTION INC. AT 1(888)323-6374.
- SEE THE RECENT QUADGUARD M10 PRODUCT DESCRIPTION ASSEMBLY MANUAL FOR IMPACT PERFORMANCE CHARACTERISTICS AND DESIGN LIMITATIONS AND THE DRAWING PACKAGE FOR THE NARROW 24" SYSTEM BEFORE INSTALLING THE QUADGUARD M10 SYSTEM AT ANY GIVEN LOCATION.
- FOR BI-DIRECTIONAL TRAFFIC: THE PLACEMENT OF THE QUADGUARD M10 IS RESTRICTED. AS BI-DIRECTIONAL TRAFFIC APPROACHES THE REAR OF THE QUADGUARD M10 THE CRASH CUSHION MUST BE PLACED SUCH THAT THE TRAFFIC SIDE OF CRASH CUSHION IS AT LEAST AS FAR FROM ADJACENT TRAVEL LANE LINE AS THE TRAFFIC SIDE OF BARRIER/OBJECT BEING SHIELDED.
- SYSTEM TRANSITION: APPROPRIATE TRANSITION PANELS OR SIDE PANELS WILL BE REQUIRED FOR PROPER IMPACT PERFORMANCE. THE CORRECT PANEL(S) TO USE WILL DEPEND ON THE DIRECTION OF TRAFFIC FLOW AND WHAT TYPE OF BARRIER OR ROAD FEATURE THE QUADGUARD M10 SYSTEM IS SHIELDING. SEE THE QUADGUARD M10 PRODUCT DESCRIPTION & ASSEMBLY MANUAL FOR FURTHER DETAILS.
- COMPONENTS FOR THE QUADGUARD M10 BACKUP AND REINFORCING DETAILS ARE SHOWN ON THE QUADGUARD M10 PRODUCT DESCRIPTION & ASSEMBLY MANUAL.
- CONCRETE PAD SHALL BE 6" MIN. REINFORCED 28MPa (4,000 PSI) (P.C.) OR 8" MIN. NON-REINFORCED 28MPa (4,000 PSI) CONCRETE ROADWAY MEASURING AT LEAST 12'-0" WIDE BY 50'-0" LONG. ANCHOR BLOCK IS NOT REQUIRED WHEN USING 8" CONCRETE PAD INSTALLED AGAINST AN IMMOVABLE STRUCTURE, E.G. CONCRETE WALL.
- IF THE CROSS-SLOPE VARIES MORE THAN 2% OVER THE LENGTH OF THE SYSTEM, THE CONCRETE PAD WILL REQUIRE LEVELING. MAXIMUM PERMISSIBLE CROSS-SLOPE IS 8%.
- THE INSTALLATION AREA SHOULD BE FREE OF CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
- THE QUADGUARD M10 SYSTEM SHOULD BE INSTALLED APPROXIMATELY PARALLEL WITH THE BARRIER.
- FOR THE TENSION STRUT BACKUP THE DISTANCE BETWEEN THE BACK OF BACKUP AND THE BARRIER WALL SHOULD NOT EXCEED 7" IN ANY CASE.
- TxDOT HAS ONLY APPROVED THE 24" WIDE QUADGUARD M10 SYSTEM. THE QUADGUARD M10 PRODUCT DESCRIPTION AND ASSEMBLY MANUAL INCLUDES SYSTEM WIDTH OF 24". ONLY THE 24" SYSTEM IS ALLOWED TO BE INSTALLED ON TEXAS ROADWAYS.

**FOUNDATION & ANCHORING REQUIREMENTS
FOUNDATION TYPES: A, B, C, & D**

FOUNDATION TYPE:A	REINFORCED CONCRETE PAD OR ROADWAY
FOUNDATION:	6" MINIMUM DEPTH (P.C.C.)
ANCHORAGE:	7" STUDS EMBEDDED 5 1/2" - APPROVED ADHESIVE
FOUNDATION TYPE:B	ASPHALT OVER P.C.C.
FOUNDATION:	3" MIN. (A.C.) OVER 3" MIN. (P.C.C.)
ANCHORAGE:	18" THREADED ROD EMBEDDED 16 1/2" - APPROVED ADHESIVE
FOUNDATION TYPE:C	ASPHALT OVER SUBBASE
FOUNDATION:	6" MIN. (A.C.) OVER 6" MIN. (C.S.)
ANCHORAGE:	18" THREADED ROD EMBEDDED 16 1/2" - APPROVED ADHESIVE
FOUNDATION TYPE:D	ASPHALT ONLY
FOUNDATION:	8" MIN. (A.C.)
ANCHORAGE:	18" THREADED ROD EMBEDDED 16 1/2" - APPROVED ADHESIVE

KEY:
ASPHALT CONCRETE (A.C.)
COMPACTED SUBBASE (C.S.)
PORTLAND CEMENT CONCRETE (P.C.C.)

NOTE: SEE TRINITY'S PRODUCT DESCRIPTION ASSEMBLY MANUAL FOR THE APPROVED ADHESIVE.

IF THE UNIT IS ANCHORED TO ASPHALTIC CONCRETE, IT SHOULD BE RELOCATED TO FRESH, UNDISTURBED ASPHALT AND RE-ANCHORED AFTER EACH IMPACT TO ENSURE ADEQUATE FUTURE PERFORMANCE.

TENSION STRUT BACKUP MAY BE USED IN CONSTRUCTION ZONES ON ASPHALT CONCRETE (A.C.) FOR TEMPORARY USE ONLY.

TL-3 MODEL #	QM10024	CARTRIDGE TYPES IN BAYS			
BAYS	6	TYPE-MII	TYPE-MI	TYPE-MI	
DIAPHRAGMS	6	3	3	1	
WIDTH	24"	REAR	FRONT	NOSE	

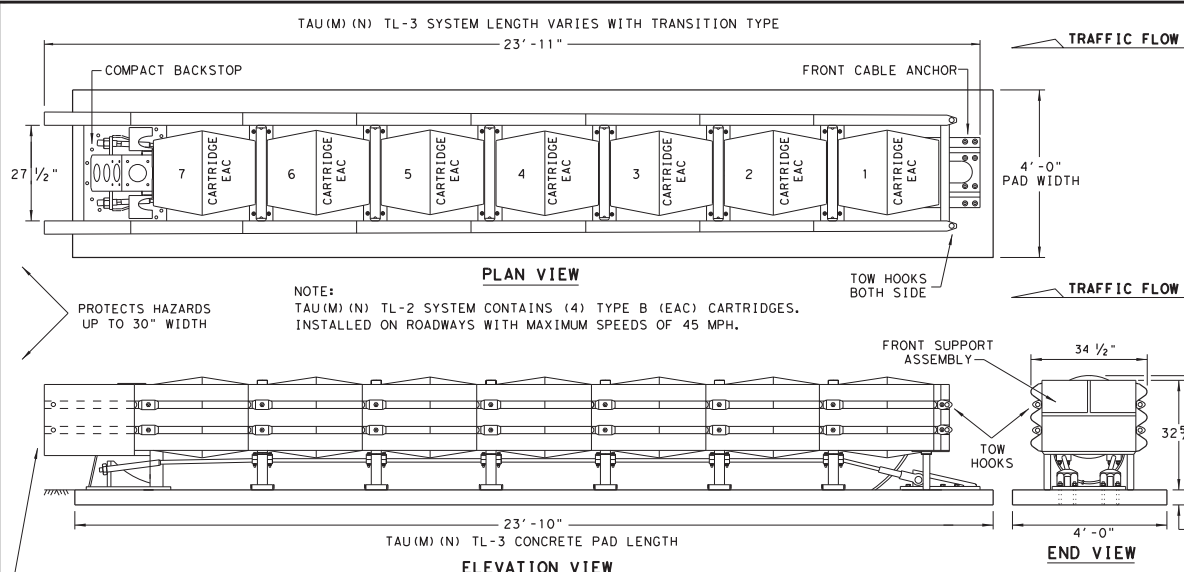
TL-2 MODEL #	QM7024	CARTRIDGE TYPES IN BAYS			
BAYS	3	TYPE-MII	TYPE-MI	TYPE-MI	
DIAPHRAGMS	3	1	2	1	
WIDTH	24"	REAR	FRONT	NOSE	

REUSABLE

		Design Division Standard	
TRINITY HIGHWAY ENERGY ABSORPTION QUADGUARD M10 (MASH TL-3 & TL-2 NARROW-24" ONLY)			
QUADGUARD (M10) (N) - 20			
FILE: qguardm10n20.dgn	DN:TxDOT	CK:KRM	DR:JVP
© TxDOT: NOVEMBER 2020	CONT SECT	JOB	HIGHWAY
REVISIONS	6380 47	001	IH 44, ETC.
	DIST	COUNTY	SHEET NO.
	WFS	WICHITA, ETC.	72

DISCLAIMER: THIS STANDARD IS COVERED 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.

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PLAN VIEW
 TAU(M)(N) TL-3 SYSTEM LENGTH VARIES WITH TRANSITION TYPE
 23'-11"
 COMPACT BACKSTOP
 FRONT CABLE ANCHOR
 CARTRIDGE EAC (1-7)
 4'-0" PAD WIDTH
 TOW HOOKS BOTH SIDE
 TRAFFIC FLOW

ELEVATION VIEW
 TAU(M)(N) TL-3 CONCRETE PAD LENGTH
 23'-10"
 FRONT SUPPORT ASSEMBLY
 TOW HOOKS
 34 1/2"
 32 5/8"
 34"
 4'-0"
 6"
 TRAFFIC FLOW

NOTE:
 TAU(M)(N) TL-2 SYSTEM CONTAINS (4) TYPE B (EAC) CARTRIDGES, INSTALLED ON ROADWAYS WITH MAXIMUM SPEEDS OF 45 MPH.

NOTE:
 CONCRETE FOUNDATION PAD LENGTH VARIES WITH TL-3 AND TL-2 SYSTEMS, SEE SYSTEM & FOUNDATION LENGTH TABLE.

FOUNDATION OPTIONS

6" REINFORCED CONCRETE
8" UNREINFORCED CONCRETE
ASPHALT OVER CONCRETE WITH MINIMUM 6" EMBEDMENT IN CONCRETE
6" ASPHALT OVER 6" COMPACT SUBBASE
8" MINIMUM ASPHALT

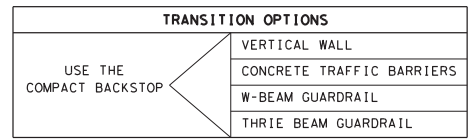
SYSTEM & FOUNDATION LENGTH TABLE

SYSTEM LENGTH	FOUNDATION LENGTH
TL-2 = 15'-5"	TL-2 = 15'-4"
TL-3 = 23'-11"	TL-3 = 23'-10"

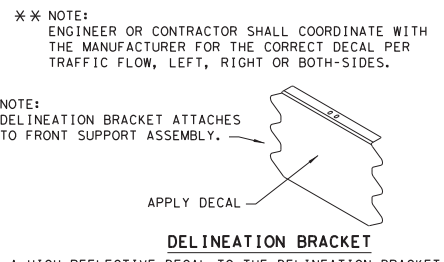
NOTES:
 TRANSITIONS AND ATTACHMENTS TO VARIOUS BARRIER SHAPES, RAILINGS AND BI-DIRECTIONAL TRAFFIC FLOWS ARE AVAILABLE. SEE MANUFACTURER'S INSTALLATION INSTRUCTIONS MANUAL FOR ADDITIONAL TRANSITION DETAILS.

* NOTE:
 REQUIRES AN ASPHALT ANCHORAGE PACKAGE: INCLUDES ADDITIONAL BRACES FOR THE FRONT CABLE ANCHOR AND THE COMPACT BACKSTOP, AND ASPHALT HARDWARE KIT. THE TL-3 ASPHALT CONFIGURATION ALSO REQUIRES NESTED SLIDER PANELS AND SHIMS AT THE LAST TWO BAYS. SEE MANUFACTURER'S INSTALLATION INSTRUCTION MANUAL FOR DETAILS.

NOTE:
 SEE MANUFACTURER'S INSTALLATION INSTRUCTION MANUAL FOR FOUNDATION SPECIFICATIONS THAT INCLUDE, STONE AGGREGATE MIX, COMPRESSION STRENGTH, STEEL SIZE, ANCHOR SIZE, AND EMBEDMENT DEPTH.



NOTE:
 FOR BI-DIRECTIONAL TRANSITION PANELS AND BRIDGE RAIL END SHOE DETAILS. SEE MANUFACTURER'S INSTALLATION INSTRUCTIONS MANUAL.



- GENERAL NOTES**
- FOR SPECIFIC INFORMATION REGARDING THE INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: LINDSAY TRANSPORTATION SOLUTIONS (LTS) - BARRIER SYSTEMS, INC. AT (707) 374-6800. 180 RIVER ROAD, RIO VISTA, CA 94571
 - REFER TO THE LATEST (LTS) INSTALLATION INSTRUCTION MANUAL FOR IMPORTANT SAFETY MESSAGES, COMPLETE SYSTEM ASSEMBLY, AND ANCHOR INSTALLATION REQUIREMENTS FOR THE NINE (9) DIFFERENT SITE TRANSITIONS.
 - INSTALLATION DETAILS FOR THE COMPACT BACKSTOP, FRONT CABLE ANCHOR AND FOUNDATION OPTIONS ARE SHOWN ON THE INSTALLATION INSTRUCTION MANUAL FURNISHED TO THE ENGINEER.
 - CONCRETE SHALL BE CLASS "S" WITH A MINIMUM COMPRESSIVE STRENGTH OF 4,000 P.S.I.
 - IF THE CROSS-SLOPES VARIES MORE THAN 2% OVER THE LENGTH OF THE SYSTEM, THE CONCRETE PAD WILL REQUIRE LEVELING. MAXIMUM PERMISSIBLE CROSS-SLOPE IS 8%
 - THE INSTALLATION AREA SHOULD BE FREE FROM CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
 - THE TAU(M)(N) SYSTEM SHOULD BE APPROXIMATELY PARALLEL WITH THE BARRIER OR CENTER LINE OF MERGING BARRIERS.
 - THIS DRAWING REPRESENTS THE UNIVERSAL TAU(M)(N) TL-3 SYSTEM, A RE-DIRECTIVE NON-GATING CRASH CUSHION THAT CAN PROTECT HAZARDS UP TO 30-INCHES IN WIDTH. ALSO AVAILABLE IN TL-2 CONFIGURATION.
- NOTE:
 PAD THICKNESS VARIES - SEE FOUNDATION OPTIONS

BILL OF MATERIALS FOR TAU(M)(N) TL-3 & TL-2 SYSTEMS

PART NUMBER	PART DESCRIPTION	TL-3 SYSTEM	TL-2 SYSTEM
BSI-1708019-00	SLIDING PANEL GALVANIZED TAU(M)(N)	14	8
BSI-1708030-00	END PANEL, THRIE BEAM, GALV, TAU(M)(N)	2	2
BSI-1706001-00	CABLE ASSEMBLY, 7 BAY, TAU(M)(N)	2	-
BSI-1805036-00	CABLE ASSEMBLY, 4 BAY, TAU(M)(N)	-	2
BSI-1708018-00	FRONT CABLE ANCHOR	1	1
BSI-1707034-00	COMPACT BACKSTOP	1	1
B030703	MIDDLE SUPPORT ASSEMBLY	6	3
B030704	FRONT SUPPORT	1	1
B010722	ENERGY ABSORBING CARTRIDGE, TYPE B	7	4
K001005	TAU-II FRONT SUPPORT LEG KIT	1	1
BSI-1709083-KT	TETHER KIT (INCLUDES ALL HARDWARE)	1	1
BSI-1809041-KT	SLIDER KIT (INCLUDES ALL HARDWARE)	7	4
BSI-1808033-KT	CABLE GUIDE KIT (INCLUDES ALL HARDWARE)	6	3
BSI-1809040-KT	TOW HOOK KIT (INCLUDES ALL HARDWARE)	1	1
BSI-1808034-KT	DELINEATION BRACKET KIT (INCLUDES ALL HARDWARE)	1	1
BSI-1808035-KT	END PANEL MOUNT KIT (INCLUDES ALL HARDWARE)	1	1
BSI-1808036-KT	CONCRETE ANCHORING KIT	1	1
** SEE NOTE	HIGH REFLECTIVE DECAL	1	1
ECN 3883	INSTALLATION AND INSTRUCTIONS MANUAL	1	1

NOTES:
 UPGRADE KITS ARE AVAILABLE TO RETROFIT EXISTING NCHRP 350 TAU-II SYSTEMS TO MASH COMPLIANT SYSTEMS. SEE MANUFACTURER'S PRODUCT INFORMATION.

THE TAU(M)(N) UNIDIRECTIONAL SYSTEM IS FREE STANDING AND IS NOT REQUIRED TO BE CONNECTED TO THE HAZARD.

TRANSITIONS TO GUARD FENCE, BRIDGE RAILS AND ROADSIDE BARRIERS SHALL BE IN ACCORDANCE WITH TxDOT'S POLICY.

NOTE:
 THIS STANDARD IS A BASIC REPRESENTATION OF THE UNIVERSAL TAU(M)(N) SYSTEM, IT IS NOT INTENDED TO REPLACE THE INSTALLATION INSTRUCTION MANUAL.

Texas Department of Transportation
 Design Division Standard

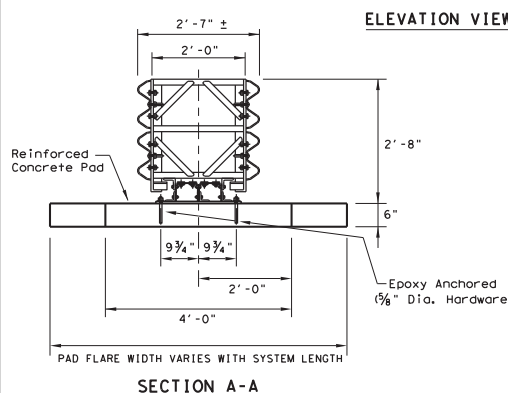
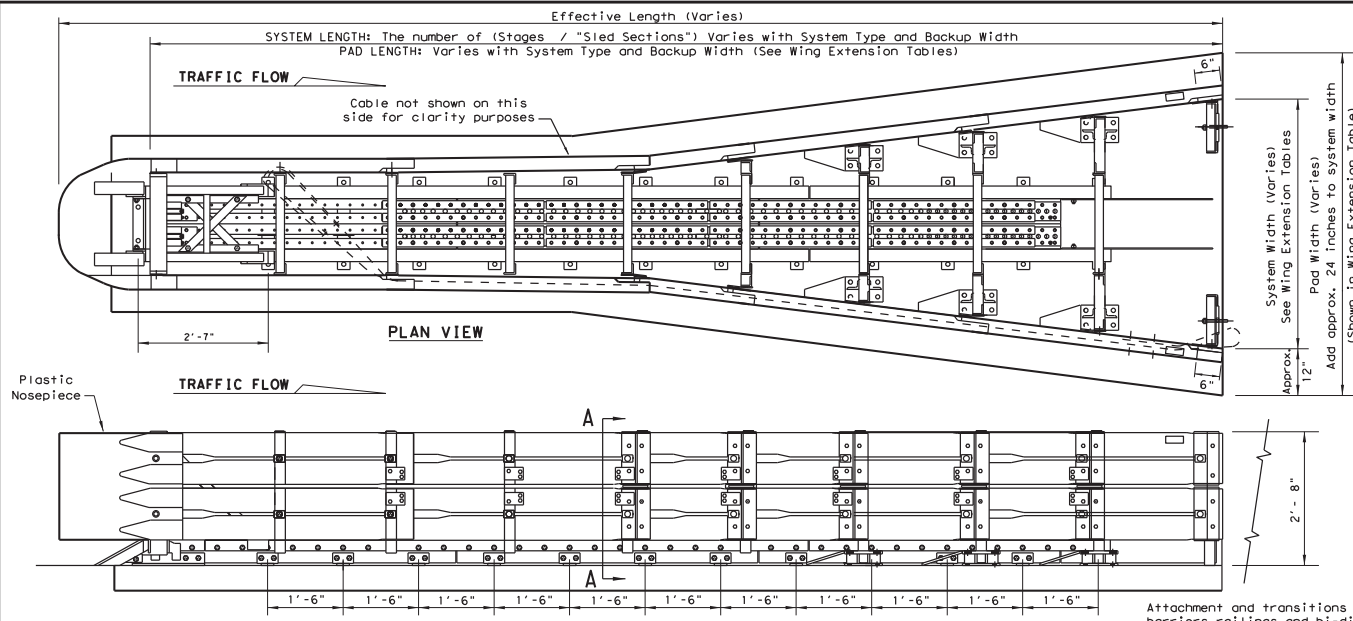
LINDSAY TRANSPORTATION SOLUTIONS
UNIVERSAL CRASH CUSHION
(MASH TL-3 & TL-2)
TAU(M)(N) - 19

FILE: t0um19.dgn	DN: TxDOT	CR: KM	DN: VP	CR:
© TxDOT: APRIL 2019	CONT: 6380	SECT: 47	JOB: 001	HIGHWAY: IH 44, ETC.
REVISIONS	DIST: WFS	COUNTY: WICHITA, ETC.	SHEET NO. 73	

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TYPE (WIDE)	TEST LEVEL
FASTRACC (4 Stage System)	70
TRACC (3 Stage System)	TL-3
SHORTTRACC (2 Stage System)	TL-2

NOTE: The Stage System refers to number of replaceable "sled sections" that could be replaced independently.

Wide-FASTRACC WING EXTENSIONS				
NUMBER OF WING EXTENSIONS	WIDTH	SYSTEM LENGTH	EFFECTIVE LENGTH	Wide-FASTRACC EXTENSION PART NUMBER (LEFT# / RIGHT#)
0 (BASE UNIT)	71"	25'-11"	27'-11"	33940
1	78"	28'-3"	30'-3"	33941 / 33942
2	85"	30'-7"	32'-7"	33943 / 33944
3	92"	32'-11"	34'-11"	33945 / 33946
4	99"	35'-2"	37'-2"	33947 / 33948
5	106"	37'-6"	39'-6"	33949 / 33950
6	113"	39'-10"	41'-10"	33951 / 33952
7	120"	42'-2"	44'-2"	33953 / 33954
8	127"	44'-5"	46'-5"	33955 / 33956
9	134"	46'-9"	48'-9"	33957 / 33958
10	141"	49'-1"	51'-1"	33959 / 33960
CONSULT TRINITY SALES PERSON				

Wide-TRACC WING EXTENSIONS				
NUMBER OF WING EXTENSIONS	WIDTH	SYSTEM LENGTH	EFFECTIVE LENGTH	Wide-TRACC EXTENSION PART NUMBER (LEFT# / RIGHT#)
0 (BASE UNIT)	58"	21'	23'	33940
1	65"	23'-4"	25'-4"	33941 / 33942
2	72"	25'-8"	27'-8"	33943 / 33944
3	79"	28'	30'-4"	33945 / 33946
4	86"	30'-4"	32'-4"	33947 / 33948
5	92"	32'-8"	34'-8"	33949 / 33950
6	99"	35'	37'	33951 / 33952
7	106"	37'-4"	39'-4"	33953 / 33954
8	113"	39'-8"	41'-8"	33955 / 33956
9	120"	42'	44'	33957 / 33958
10	127"	44'-4"	46'-4"	33959 / 33960
CONSULT TRINITY SALES PERSON				

Wide-SHORTTRACC WING EXTENSIONS				
NUMBER OF WING EXTENSIONS	WIDTH	SYSTEM LENGTH	EFFECTIVE LENGTH	Wide-SHORTTRACC EXTENSION PART NUMBER (LEFT# / RIGHT#)
0 (BASE UNIT)	39"	15'	17'	33940
1	46"	17'-4"	19'-4"	33941 / 33942
2	53"	18'-9"	20'-9"	33943 / 33944
3	60"	21'-1"	23'-1"	33945 / 33946
4	66"	23'-5"	25'-5"	33947 / 33948
5	73"	25'-8"	27'-8"	33949 / 33950
6	80"	28'-1"	30'-1"	33951 / 33952
7	87"	30'-4"	32'-4"	33953 / 33954
8	94"	32'-7"	34'-7"	33955 / 33956
9	101"	34'-11"	36'-11"	33957 / 33958
10	108"	37'-3"	39'-3"	33959 / 33960
CONSULT TRINITY SALES PERSON				

Attachment and transitions to other shapes, barriers railings and bi-directional traffic flows are available. (See manufacturer's product manual).

BACKUP SUPPORT OPTIONS	
SQUARE CONCRETE BACKUP	
CONCRETE BARRIER (CTB) BACKUP	
SINGLE SLOPE CONCRETE BARRIER(SSCB)	
GUARDRAIL BACKUP (BASE-PLATED POST)	
GUARDRAIL BACKUP (DRIVEN POST)	
TRANSITION OPTIONS	
VERTICAL WALL	
MODIFIED (CTB) TO VERTICAL WALL	
CONCRETE BARRIER (CTB)	
GUARDRAIL (W-BEAM)	
GUARDRAIL (THREE-BEAM)	

FOR BI-DIRECTIONAL TRANSITION PANEL DETAILS (SEE MANUFACTURER'S PRODUCT MANUAL).

BACKUP AND TRANSITION TYPES ARE SHOWN ELSEWHERE ON THE PLANS, (I.E. ATTENUATOR LOCATION DETAILS OR IN THE GENERAL NOTES).


FOUNDATION OPTIONS	
6" REINFORCED CONCRETE	
8" UNREINFORCED CONCRETE	
3" MIN. ASPHALT OVER 3" MIN. CONCRETE	
6" ASPHALT OVER 6" COMPACT SUBBASE	
8" MINIMUM ASPHALT	

FOR STEEL PLACEMENT IN CONCRETE FOUNDATIONS, (SEE MANUFACTURER'S PRODUCT MANUAL).

GENERAL NOTES

- For specific information regarding installation and technical guidance of the system, contact: Trinity Highway at (888)323-6374, 2525 N. Stemmons Freeway - Dallas, TX 75207
- Contact the company for: Custom widths from 31" up to 57" wide, and transition panels for bi-directional traffic applications.
- Details of components for the WideTRACC, Backups and re-inforcing details will be shown on the manufacturer's shop drawings furnished to the Engineer.
- Concrete shall be class "S" with a min. compressive strength 4,000 p.s.i.
- If the cross-slope varies more than 2% over the length of the system, the concrete pad will require leveling. Maximum permissible cross-slope 8%.
- The installation area should be free from curbs, elevated objects, or depressions.
- The WideTRACC system should be approximately parallel with the barrier or \pm of merging barriers.
- The unit shown is flared on both sides, but can be flared on a single side either left or right. The flares will effect the length and width of the system. (See Wing Extension Tables)

Wide-TRACC - BILL OF MATERIAL						
PART #	FAST TRACC QTY	TRACC QTY	SHORT TRACC QTY	DESCRIPTION		
25937A	1			WIDEFASTRACC UNIT ASSEMBLY		
25939A		1		WIDE TRACC UNIT ASSEMBLY		
25997A			1	WIDESHORTTRACC UNIT ASSEMBLY		
3310G	4	4	4	5/8" LOCKWASHER		
4372C	4	4	4	5/8" FLATWASHER		
4451G	4	4	4	5/8" DIA X 6" EXP. WEDGE ANCHOR		
6531B	1	1	1	PLASTIC NOSEPIECE		
6668B	4	4	4	REFLECTIVE SHEETING		
ANCHOR HARDWARE (CONCRETE BASE)						
5204B	72	50	18	5/8" DIA X 7-1/2" THD ANCHOR STUD		
4372C	72	50	18	5/8" FLATWASHER		
3310G	72	50	18	5/8" LOCKWASHER		
3361G	72	50	18	5/8" HEX NUT		
5206B	6	4	2	Adhesive, HILTI HIT HY-150		
ANCHOR HARDWARE (ASPHALT BASE)						
6380G	72	50	18	5/8" Dia x 18" Thd Anchor Stud		
4372C	72	50	18	5/8" Flatwasher		
3310G	72	50	18	5/8" Lockwasher		
3361G	72	50	18	5/8" HEX NUT		
5206B	15	11	4	ADHESIVE, HILTI HIT HY-150		
ANCHOR HARDWARE (OPTIONAL ITEMS, AS NEEDED)						
5207B	A/R	A/R	A/R	NOZZLE, MIXER, HILTI HIT HY-150		
5208B	A/R	A/R	A/R	EXT. TUBE, MIXER, HILTI HIT HY-150		
5205B	A/R	A/R	A/R	DISPENSER GUN, HILTI HIT HY-150		
5209B	A/R	A/R	A/R	DRILL BIT, 1/2", HILTI SDS		



Design Division Standard

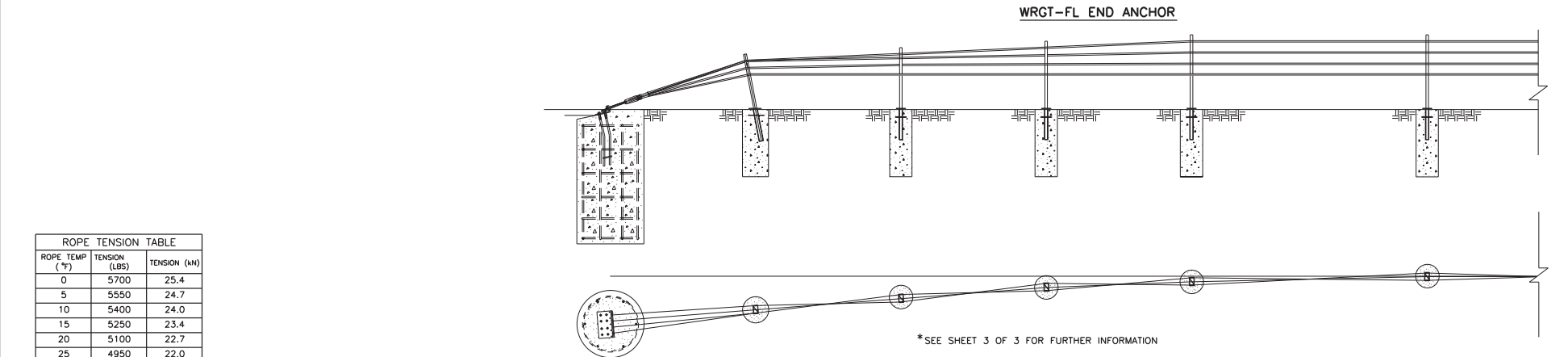
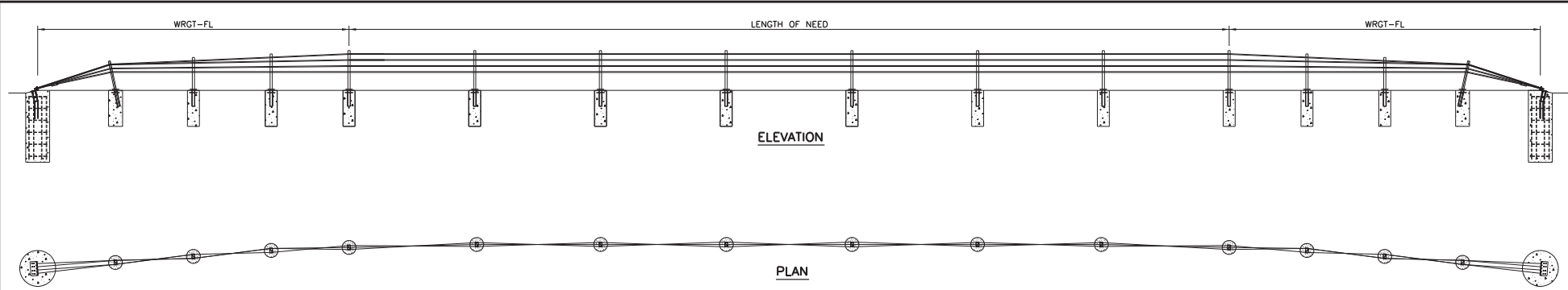
TRINITY HIGHWAY CRASH CUSHION (WIDE UNIT) TRACC (W) - 16

FILE: traccw16.dgn	DATE: 02/07/2016	DATE: 02/07/2016	DATE: 02/07/2016	DATE: 02/07/2016	DATE: 02/07/2016
© TxDOT February 2006	CONF	SECT	JOB	HIGHWAY	
REVISIONS	6380	47	001	IH 44, ETC.	
REVISED 06, 2015 (WPI)	DIST	COUNTY			
REVISED 03, 2016 (WPI)	WFS	WICHITA, ETC.			74

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*SEE SHEET 3 OF 3 FOR FURTHER INFORMATION

ROPE TENSION TABLE		
ROPE TEMP (°F)	TENSION (LBS)	TENSION (kN)
0	5700	25.4
5	5550	24.7
10	5400	24.0
15	5250	23.4
20	5100	22.7
25	4950	22.0
30	4800	21.4
35	4650	20.74
40	4500	20.0
45	4350	19.3
50	4200	18.7
55	4050	18.0
60	3900	17.3
65	3750	16.7
70	3600	16.0
75	3450	15.3
80	3300	14.7
85	3150	14.0
90	3000	13.3
95	2850	12.7
100	2700	12.0
105	2550	11.3
110	2400	10.7
115	2250	10.0
120	2100	9.3
125	1950	8.7
130	1800	8.0
135	1650	7.3
140	1500	6.7

*ROPE TENSION: ± 20% AFTER 2-WEEK INTERVAL

GENERAL NOTES:

- BRIFEN DRAWINGS, SPECIFICATIONS, AND PRODUCT MANUAL SHOULD BE REVIEWED PRIOR TO STARTING AN INSTALLATION. FOR ADDITIONAL INFORMATION OR QUESTIONS, CONTACT BRIFEN USA, INC. AT 1-866-427-4336.
- THE BRIFEN WRSF HAS BEEN SUCCESSFULLY TESTED TO NCHRP 350 TL-4 CONDITIONS ON SLOPES 6:1 OR FLATTER AND NCHRP 350 TL-3 CONDITIONS ON SLOPES 4:1 TO 6:1.
- THE POST SPACING SHALL BE DETERMINED BY THE SPECIFYING AGENCY. POST SPACING MAY BE DECREASED TO AVOID OBSTRUCTIONS OR UTILITIES. IN NO EVENT SHALL THE POST SPACING EXCEED 21'-0".
- BRIFEN WRSF SHALL BE PLACED ON A SMOOTH SURFACE, WITHOUT HUMPS, DROP-OFFS, HOLES, ETC THAT WOULD INTERFERE WITH THE STABILITY OF THE ERRANT VEHICLE. GRADING, FILL AND COMPACT MAY BE REQUIRED TO ASSURE THAT ROPES ARE INSTALLED AT THE DESIGN HEIGHT.
- THE WRGT-FL END ANCHOR HAS BEEN SUCCESSFULLY TESTED TO NCHRP 350 TL-3 CONDITIONS. THE LENGTH OF NEED BEGINS 31'-0" FROM THE END ANCHOR. POSTS A THROUGH POST B3, SPACED 6'-6" APART, HAVE WEAKENED CUTS AT THE GROUND THAT SHALL FACE THE ANCHOR.
- ANCHOR AND LINE POST DIMENSIONS AND STEEL REINFORCEMENT WILL BE DETERMINED ON PROJECT SPECIFIC SOIL CLASSIFICATION, PROPERTIES AND TEMPERATURE EXTREMES. CONTACT BRIFEN USA, INC. FOR ADDITIONAL INFORMATION.
- ALL REINFORCEMENT AND CONCRETE FOR THE ANCHORS AND LINE POSTS PROVIDED BY OTHERS.
- REINFORCEMENT AND CONCRETE PROPERTIES SHALL MEET AGENCY SPECIFICATIONS.
- FOR PLACEMENT NEAR GUARDRAIL OR OTHER OBSTACLES CONTACT BRIFEN USA, INC. FOR ADDITIONAL DRAWINGS AND SUPPORT.
- TAPER RATES FOR THE BRIFEN WRSF ARE AS FOLLOWS:
 HORIZONTAL: 25:1 MAXIMUM, 50:1 PREFERABLE
 VERTICAL: 25:1 MAXIMUM, 50:1 PREFERABLE

SHEET 1 OF 3

Design Division Standard

BRIFEN WIRE ROPE SAFETY FENCE (TL-4)

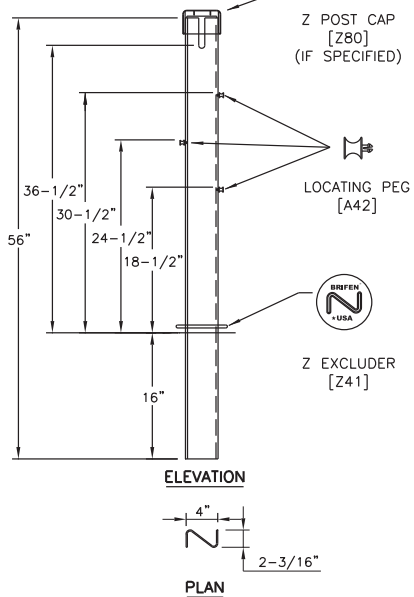
BRIFEN(TL4)-14

FILE: brifentl4.dgn	DN: TxDOT	CR: RM	DN: VP	CR:
© TxDOT: MARCH 2014	CONT: 6380	SECT: 47	JOB: 001	HIGHWAY: IH 44, ETC.
REVISIONS	DIST: WFS	COUNTY: WICHITA, ETC.	SHEET NO. 75	

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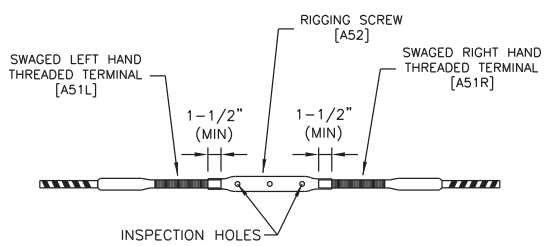
DATE: 5/21/2021
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LINE POST ASSEMBLY [Z11]



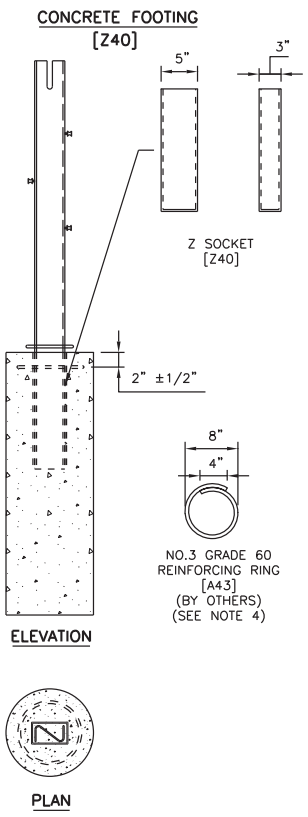
- NOTES SPECIFIC TO LINE POST ASSEMBLY**
1. ROPE HEIGHTS SHALL BE $\pm 1"$ TO GROUND LINE.
 2. POST SHALL BE $\pm 4"$ FROM VERTICAL PLUMB.
 3. POST CAPS SHALL BE USED IF SPECIFIED.
 4. REFLECTORS SHALL BE SPACED ACCORDING TO AGENCY SPECIFICATIONS.
 5. REFLECTORS CAN BE PLACED ON THE POST CAP OR POST.

ROPE CONNECTION DETAIL



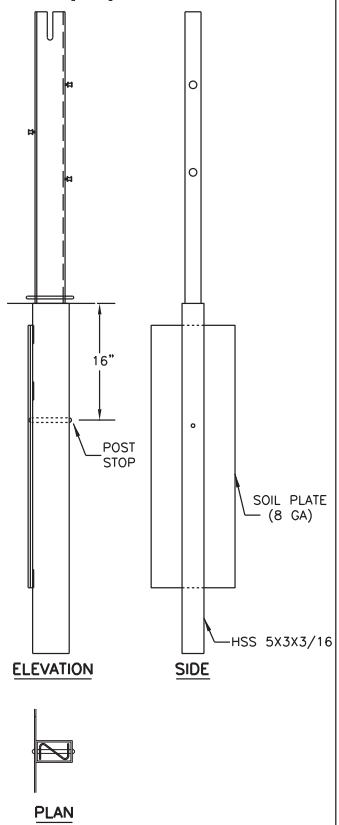
- NOTES SPECIFIC TO ROPE CONNECTION DETAIL**
1. THE WIRE ROPE TERMINALS SHALL BE THREADED A MINIMUM OF 1-1/2" INTO RIGGING SCREW.
 2. AFTER FINAL TENSIONING, THE TERMINALS SHALL BE VISIBLE IN THE INSPECTION HOLES.

SOCKET ASSEMBLY



- NOTES SPECIFIC TO CONCRETE FOOTING**
1. SIZE OF FOOTING WILL BE DETERMINED BY SOIL CONDITIONS, FOUNDATION TYPE AND PROJECT CONDITIONS.
 2. CONCRETE BASED ON AGENCY SPECIFICATIONS.
 3. CONCRETE BY OTHERS.
 4. REINFORCING RING (BY OTHERS) WILL BE USED ACCORDING TO FOUNDATION SIZE AND TYPE. THE REINFORCING RING MAY BE OMITTED IF THE FOOTING IS PLACED IN A CONTINUOUS CONCRETE MOW STRIP.
 5. FOOTING SHALL BE FLUSH WITH THE GROUND LINE, TO A MAXIMUM OF 1 INCH BELOW OR ABOVE GROUND LINE.
 6. SOCKET SHALL BE $\pm 2"$ OF VERTICAL PLUMB.

DRIVE SOCKET [Z44]



- NOTES SPECIFIC TO DRIVE SOCKETS**
1. SIZE OF SOIL PLATE WILL BE DETERMINED BY SOIL CONDITIONS AND PROJECT CONDITIONS.
 2. THE SOIL PLATE SHALL BE PARALLEL TO ROADWAY AND CAN FACE TOWARD OR AWAY FROM THE TRAVEL LANE.
 3. FOOTING SHALL BE FLUSH WITH THE GROUND LINE, TO A MAXIMUM OF 1 INCH BELOW OR ABOVE GROUND LINE.
 4. SOCKET SHALL BE $\pm 2"$ OF VERTICAL PLUMB.
 5. SOCKETS SHALL BE DRIVEN IN A MANNER TO NOT DISTORT OR DESTROY THE TOP OF SOCKET TO A DEGREE THAT PLACES THE SOCKET OR LINE POST OUT OF CONSTRUCTION TOLERANCES.

- GENERAL NOTES:**
1. BRIFEN DRAWINGS, SPECIFICATIONS, AND PRODUCT MANUAL SHOULD BE REVIEWED PRIOR TO STARTING AN INSTALLATION. FOR ADDITIONAL INFORMATION OR QUESTIONS, CONTACT BRIFEN USA, INC. 1-866-427-4336.
 2. THE BRIFEN WRSF HAS BEEN SUCCESSFULLY TESTED TO NCHRP 350 TL-4 CONDITIONS ON SLOPES 6:1 OR FLATTER AND NCHRP 350 TL-3 CONDITIONS ON SLOPES 4:1 TO 6:1.
 3. THE POST SPACING SHALL BE DETERMINED BY THE SPECIFYING AGENCY. POST SPACING MAY BE DECREASED TO AVOID OBSTRUCTIONS OR UTILITIES. IN NO EVENT SHALL THE POST SPACING EXCEED 21'-0".
 4. BRIFEN WRSF SHALL BE PLACED ON A SMOOTH SURFACE, WITHOUT HUMPS, DROP-OFFS, HOLES, ETC THAT WOULD INTERFERE WITH THE STABILITY OF THE ERRANT VEHICLE. GRADING, FILL AND COMPACTION MAY BE REQUIRED TO ASSURE THAT ROPES ARE INSTALLED AT THE DESIGN HEIGHT.

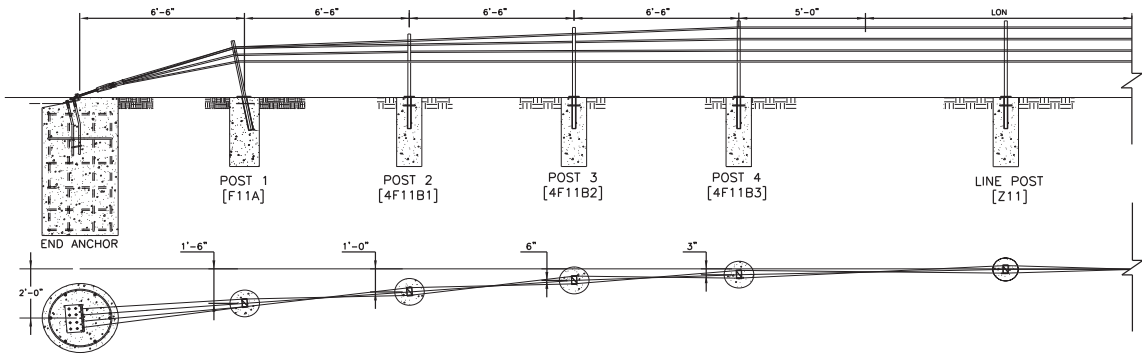
SHEET 2 OF 3

		Design Division Standard	
BRIFEN WIRE ROPE SAFETY FENCE (TL-4) BRIFEN(TL4)-14			
FILE: brifen1414.dgn	DN: TXDOT	CR: RM	DN: VP
© TXDOT: MARCH 2014	CONT: 6380	SECT: 47	JOB: IH 44, ETC.
REVISIONS	DIST: WFS	COUNTY: WICHITA, ETC.	SHEET NO: 76

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DATE: 5/21/2021
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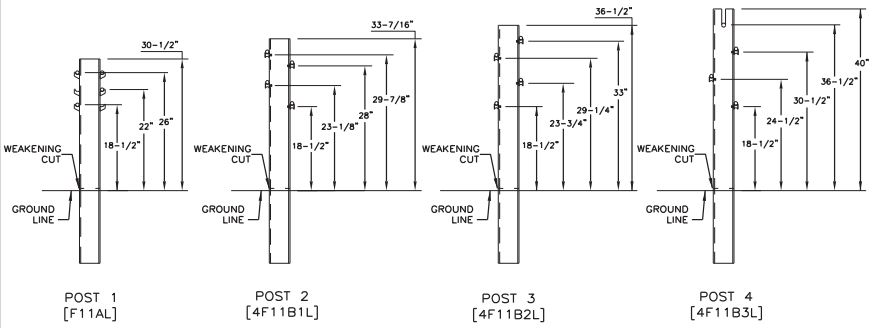
WRGT-FL END ANCHOR LAYOUT



GENERAL NOTES:

- BRIFEN DRAWINGS, SPECIFICATIONS, AND PRODUCT MANUAL SHOULD BE REVIEWED PRIOR TO STARTING AN INSTALLATION. FOR ADDITIONAL INFORMATION OR QUESTIONS, CONTACT BRIFEN USA, INC. AT 1-866-427-4336.
- THE WRGT-FL END ANCHOR HAS BEEN SUCCESSFULLY TESTED TO NCHRP 350 TL-3 CONDITIONS. THE LENGTH OF NEED BEGINS 31'-0" FROM THE END ANCHOR. POSTS A THROUGH POST B3, SPACED 6'-6" APART, HAVE WEAKENED CUTS AT THE GROUND THAT SHALL FACE THE ANCHOR.
- ANCHOR AND LINE POST DIMENSIONS AND STEEL REINFORCEMENT WILL BE DETERMINED ON PROJECT SPECIFIC SOIL CLASSIFICATION, PROPERTIES AND TEMPERATURE EXTREMES. CONTACT BRIFEN USA, INC. FOR ADDITIONAL INFORMATION.
- ALL REINFORCEMENT AND CONCRETE FOR THE ANCHORS AND LINE POSTS PROVIDED BY OTHERS.
- REINFORCEMENT AND CONCRETE PROPERTIES SHALL MEET AGENCY SPECIFICATIONS.
- FOR PLACEMENT NEAR GUARDRAIL OR OTHER OBSTACLES CONTACT BRIFEN USA, INC. FOR ADDITIONAL DRAWINGS AND SUPPORT.

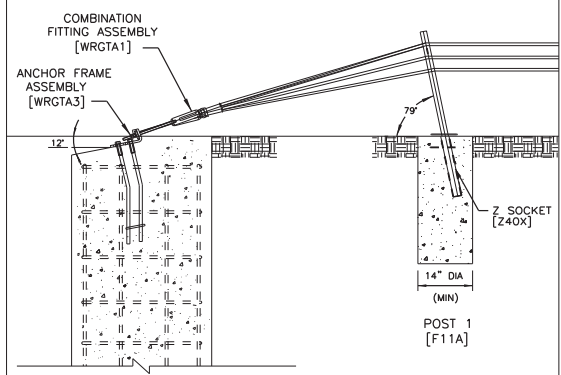
WRGT-FL POST DETAILS



NOTES SPECIFIC TO WRGT-FL POST DETAIL

- ROPE HEIGHTS SHALL BE $\pm 1"$ TO GROUND LINE.
- POST SHALL BE $\pm 4"$ FROM VERTICAL PLUMB.
- POST CAPS SHALL BE USED IF SPECIFIED.
- REFLECTORS SHALL BE SPACED ACCORDING TO AGENCY SPECIFICATIONS.
- REFLECTORS CAN BE PLACED ON THE POST CAP OR POST.
- Z EXCLUDER (Z41) SHALL BE USED.
- POST A & SOCKET SHALL BE PLACED 79' ($\pm 4'$) TOWARD END ANCHOR FROM THE HORIZONTAL PLANE.
- POST A SOCKET SHALL BE PLACED IN 14" (MIN) CONCRETE FOUNDATION. DEPTH TO BE DETERMINED FROM SOIL CONDITIONS AND PROJECT CONDITIONS.
- FOUNDATIONS FOR POST 2 THRU 4 SHALL BE THE SAME AS THE LINE POST ASSEMBLY'S FOR THE PROJECT.
- WEAKENED CUTS SHALL FACE END ANCHOR.

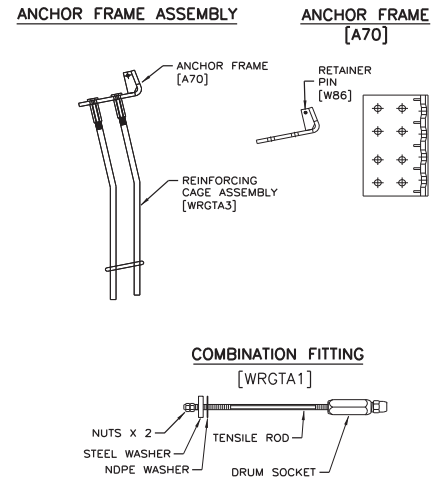
END ANCHOR DETAILS



NOTES SPECIFIC TO END ANCHOR DETAIL

- THE END ANCHOR ASSEMBLY SHALL BE PLACED 12" (+3", -1") BELOW HORIZONTAL PLANE.
- POST 1 & SOCKET SHALL BE PLACED 79" ($\pm 4'$) TOWARD END ANCHOR FROM THE HORIZONTAL PLANE.
- POST 1 SOCKET SHALL BE PLACED IN 14" (MIN) CONCRETE FOUNDATION. DEPTH TO BE DETERMINED FROM SOIL CONDITIONS AND PROJECT CONDITIONS.

END ANCHOR COMPONENTS

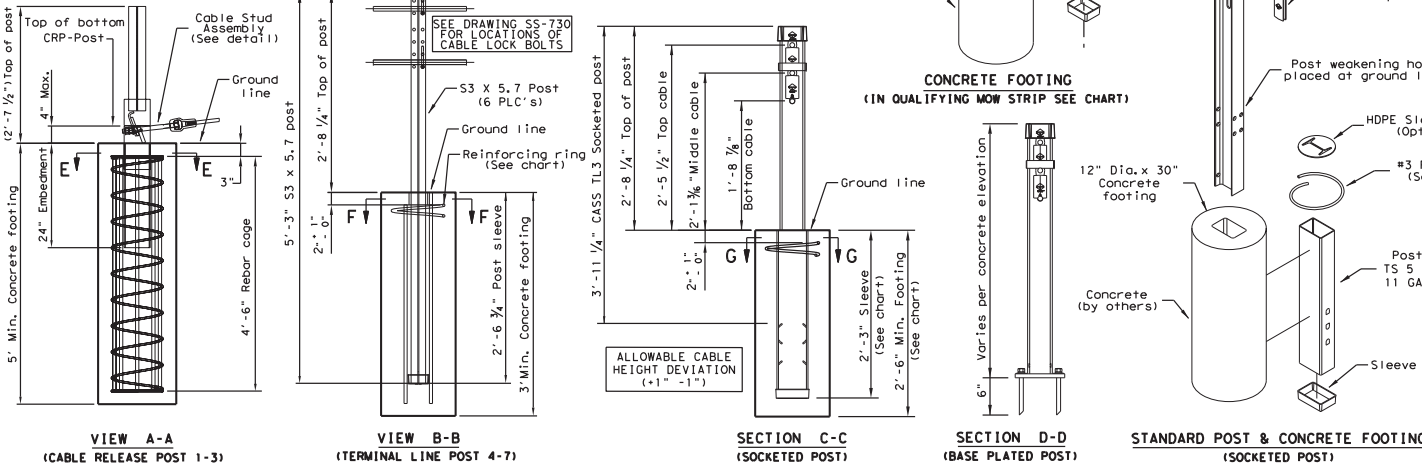
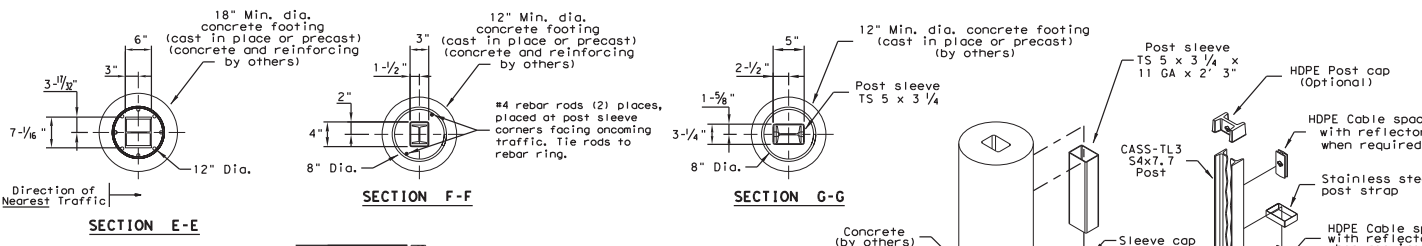
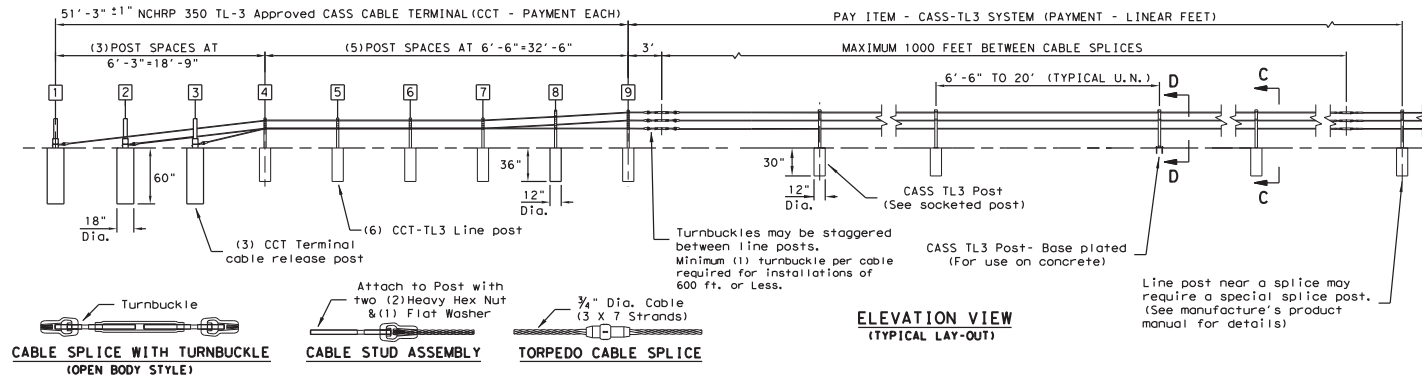
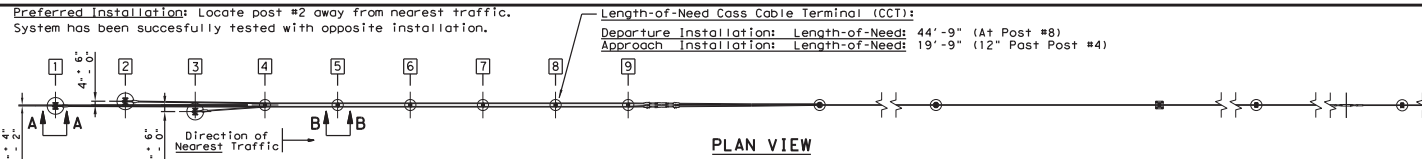


SHEET 3 OF 3

		Design Division Standard	
BRIFEN WIRE ROPE SAFETY FENCE (TL-4) BRIFEN(TL4)-14			
FILE: brifentl4.dgn	DWG: TxDOT	CR: RM	DN: VP
© TxDOT: MARCH 2014	CONT: 6380	SECT: 47	JOB: 001
REVISIONS		001	IH 44, ETC.
DIST: WFS	COUNTY: WICHITA, ETC.	SHEET NO. 77	

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- GENERAL NOTES**
- This drawing is a general overview of CASS TL-3 Barrier System. See SS-730 (latest version) for specific details of CASS cable terminal (CCT) and cable safety system (CASS) requirements, proper installation, options and specification.
 - CASS is designed for bi-directional traffic flows and can be installed on either side of the median. Contact Trinity (800-521-6050) or consult the design, installation, or repair manual(s) for additional information.
 - All concrete for CASS footings shall be TxDOT class A. If class A or stronger concrete is utilized for the mowstrip, please see chart below for allowable footing depth and sleeve deviations.
 - All posts shall be socketed unless otherwise specified. All cables shall be pre-stretched unless otherwise specified.
 - For payment see Special Specification "Cable Barrier System".
 - CASS TL-3 shall be installed on shoulders or medians with slopes of 6:1 or flatter without obstructions, depressions, etc. that may significantly affect the stability of an errant vehicle. Grading of site and/or appropriate fill materials may be required. The designer/installer shall "flatten" or "round" various topographical inconsistencies that could interfere with the ability of the installer to consistently maintain the design height (in relation to the terrain) of the cables. Please consult manual(s) and/or TxDOT Memo(s) for installations in "Ditch Sections".
 - CASS TL-3 post spacing may be modified to avoid obstacles that conflict with the installation of CASS TL-3 line posts or to reduce deflection on radiuses. No post space can exceed the maximum post TxDOT space limit of 20'. Reducing or increasing post spacing affects deflection. CASS TL-3 may be laterally transferred at a rate not to exceed 30:1.
 - Post foundations may be drilled through existing pavement. Please see line post foundation chart for minimum footing requirements in various applications.
 - For aesthetic purposes Trinity recommends all sleeves, driven posts, and lower cable release posts to be installed reasonably plumb (approximately 1/4" per foot).
 - CASS TL-3 shall be installed in well-drained, compacted, NCHRP Report 350 Standard Soil. If soil does not meet this classification, if solid rock/concrete is encountered below grade or if soil is susceptible to severe freeze/thaw cycles, please contact Trinity about alternate footing design(s). Trinity suggests the use of "Mow strips" for erosion prevention and ease of maintenance / installation.
 - See the Texas MUTCD for proper "Barrier" Delineation.

MOW STRIP DETAIL*		CONCRETE FOOTING CHART			
MOW STRIP	DEPTH	WIDTH	FOOTING TUBE	SLEEVE REBAR RING	
NONE			30" Min.	27" Min.	YES
HMA	6" Min.	3' Min.	27" Min.	15" Min.	NO
HMA	8" Min.	3' Min.	24" Min.	15" Min.	NO
RC	3" Min.	3' Min.	24" Min.	15" Min.	NO

Chart does not apply to Terminal Posts 1 thru 9.
 * Mow strip or pavement.
 HMA = Hot Mix Asphalt (Not Recycled Asphalt Pavement).
 RC = Reinforced Concrete (TxDOT Class A Minimum).

CABLE TENSION CHART	
FAHRENHEIT DEGREES	PRE-STRETCHED LB / FORCE
-10	7300
0	7000
10	6600
20	6300
30	6000
40	5600
50	5300
60	5000
70	4600
80	4300
90	4000
100	3600
110	3300
120	3000
130	2700
140	2500
150	2300

Trinity Highway Products, LLC.
 2525 Stemmons Freeway
 Dallas, TX 75207
 Phone: (800) 644-7976
 Product.INFO@TRIN.NET

Allowable deviation from chart in tangent sections: +800, -200 pounds/force. Cable tension readings are typically higher in curved cable sections.

Texas Department of Transportation Design Division Standard

TRINITY CABLE SAFETY SYSTEM (TL-3)

CASS (TL3) - 14

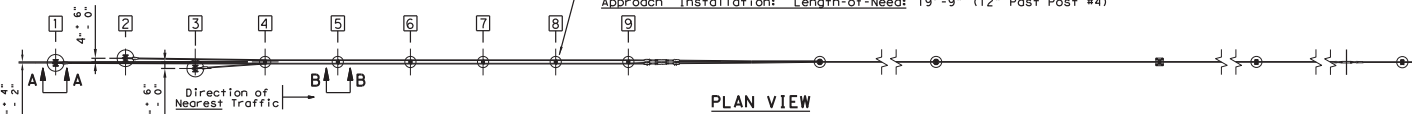
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© TxDOT: MARCH 2014	CONT: 47	SECT: 001	JOB: IH 44, ETC.	
REVISIONS				
DIST	COUNTY		SHEET NO.	
WFS	WICHITA, ETC.		78	

DATE: 5/21/2021
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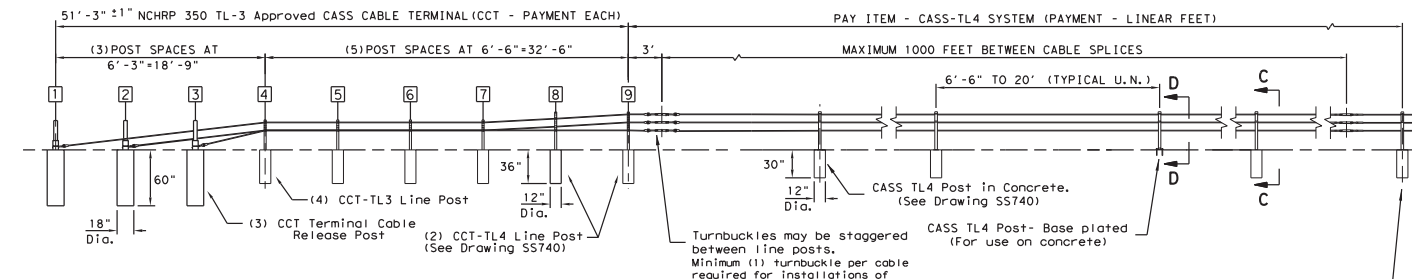
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Preferred Installation: Locate post #2 away from nearest traffic.
 System has been successfully tested with opposite installation.

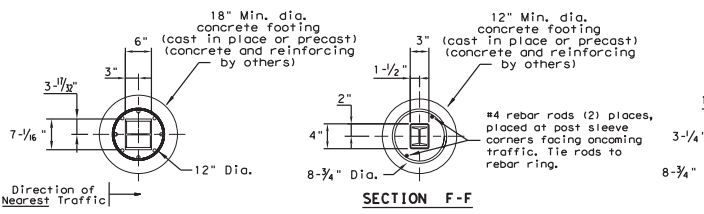
Length-of-Need Cass Cable Terminal (CCT):
 Departure Installation: Length-of-Need: 44'-9" (At Post #8)
 Approach Installation: Length-of-Need: 19'-9" (12" Post Post #4)



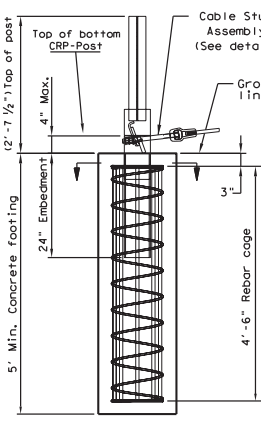
PLAN VIEW



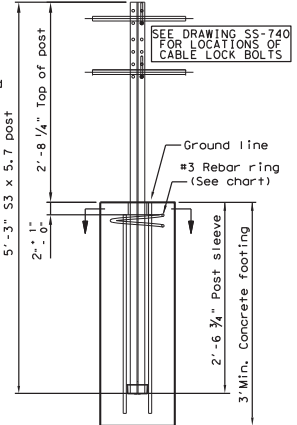
ELEVATION VIEW (TYPICAL LAY-OUT)



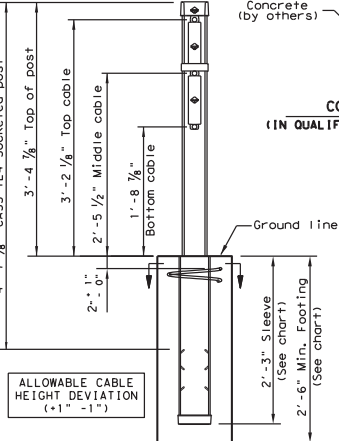
SECTION E-E



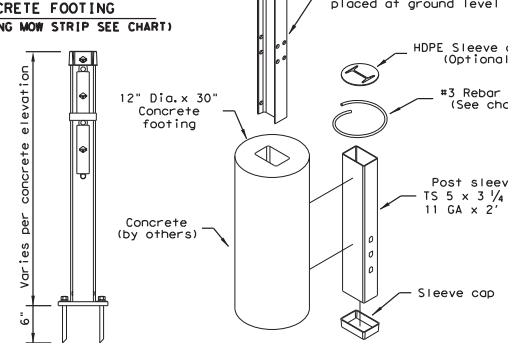
VIEW A-A (CABLE RELEASE POST 1-3)



VIEW B-B (TERMINAL LINE POST 4-7)

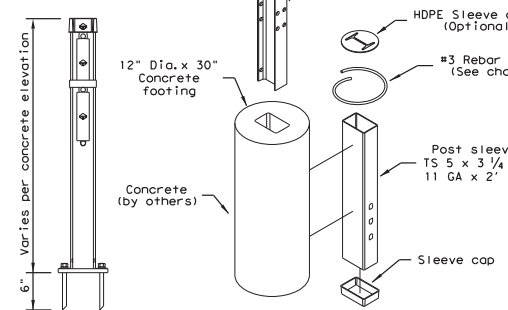


SECTION C-C (SOCKETED POST)



SECTION D-D (BASE PLATED POST)

CONCRETE FOOTING (IN QUALIFYING MOW STRIP SEE CHART)



STANDARD POST & CONCRETE FOOTING (SOCKETED POST)

GENERAL NOTES

- This drawing is a general overview of CASS TL-4 Barrier System. See SS-740 (latest version) for specific details of CASS cable terminal (CCT) and cable safety system (CASS) requirements, proper installation, options and specification.
- CASS is designed for bi-directional traffic flows and can be installed on either side of the median; contact Trinity (800-521-6050) or consult the design, installation, or repair manual(s) for additional information.
- All concrete for CASS footings shall be TxDOT class A. If class A or stronger concrete is utilized for the mowstrip, please see chart below for allowable footing depth and sleeve deviations.
- All posts shall be socketed unless otherwise specified. All cables shall be pre-stretched unless otherwise specified.
- For payment see Special Specification "Cable Barrier System".
- CASS-TL4 shall be installed on shoulders or medians with slopes of 6:1 or flatter without obstructions, depressions, etc. That may significantly affect the stability of an errant vehicle. Grading of site and/or appropriate fill materials may be required. The designer/installer shall "flatten" or "round" various topographical inconsistencies that could interfere with the ability of the installer to consistently maintain the design height (in relation to the terrain) of the cables. Please consult manual(s) and / or TxDOT Memo(s) for installations in "Ditch Sections".
- CASS TL-4 post spacing may be modified to avoid obstacles that conflict with the installation of CASS-TL4 line posts or to reduce deflection on radiuses. No post space can exceed the maximum post TxDOT space limit of 20'. Reducing or increasing post spacing affects deflection. CASS TL-4 may be laterally transferred at a rate not to exceed 30:1.
- Post foundations may be drilled through existing pavement. Please see line post foundation chart for minimum footing requirements in various applications.
- For aesthetic purposes Trinity recommends all sleeves, driven posts, and lower cable release posts to be installed reasonably blind (approximately 1/8" per foot).
- CASS TL-4 shall be installed in well-drained, compacted, NCHRP Report 350 Standard Soil. If soil does not meet this classification, if solid rock/concrete is encountered below grade or if soil is susceptible to severe freeze/thaw cycles, please contact Trinity about alternate footing design(s). Trinity suggests the use of "Mow strips" for erosion prevention and ease of maintenance / installation.
- See the Texas MUTCD for proper "Barrier" Delineation.

MOW STRIP DETAIL*		CONCRETE FOOTING CHART		
MOW STRIP	DEPTH	WIDTH	FOOTING TUBE	SLEEVE REBAR RING
NONE		30" Min.	27" Min.	YES
HMA	6" Min.	3' Min.	27" Min.	NO
HMA	8" Min.	3' Min.	24" Min.	15" Min.
RC	3" Min.	3' Min.	24" Min.	15" Min.

Chart does not apply to Terminal Posts 1 thru 9.
 * Mow strip or pavement.
 HMA = Hot Mix Asphalt (Not Recycled Asphalt Pavement).
 RC = Reinforced Concrete (TxDOT Class A Minimum).

CABLE TENSION CHART	
FAHRENHEIT DEGREES	PRE-STRETCHED LB / FORCE
-10	7300
0	7000
10	6600
20	6300
30	6000
40	5600
50	5300
60	5000
70	4600
80	4300
90	4000
100	3600
110	3300
120	3000
130	2700
140	2500
150	2300

Trinity Highway Products, LLC.
 2525 Stemmons Freeway
 Dallas, TX 75207
 Phone: (800) 644-7976
 Product.INFO@TRIN.NET

Allowable deviation from chart in tangent sections: +800, -200 pounds/force. Cable tension readings are typically higher in curved cable sections.

Texas Department of Transportation
 Design Division Standard

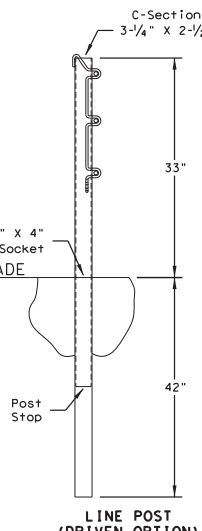
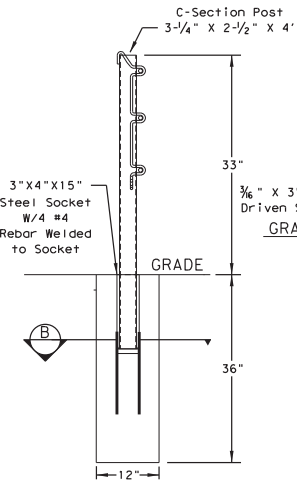
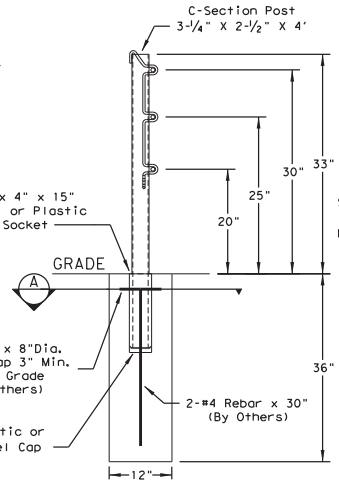
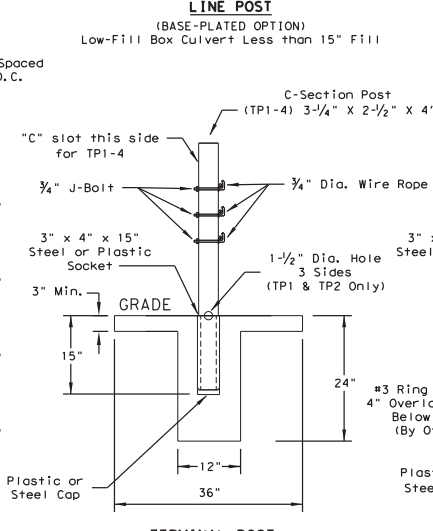
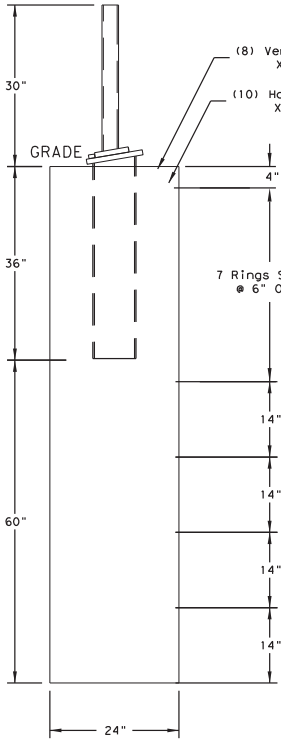
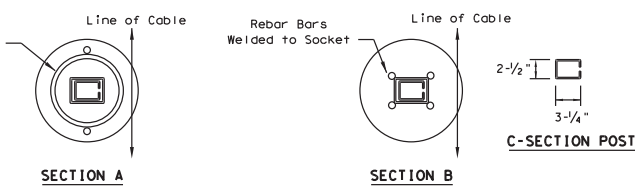
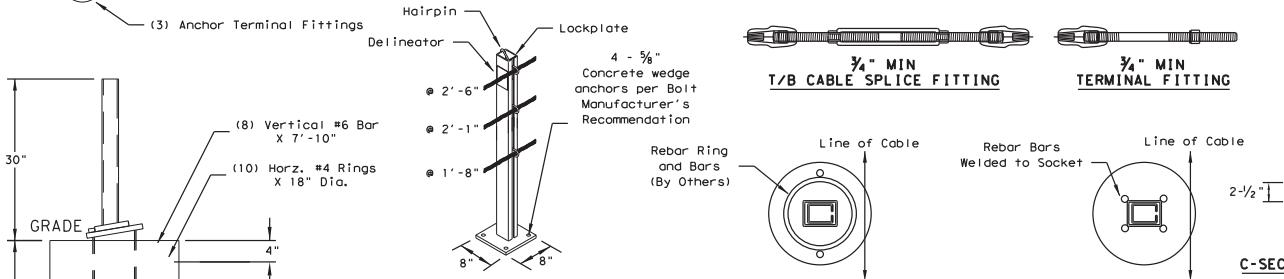
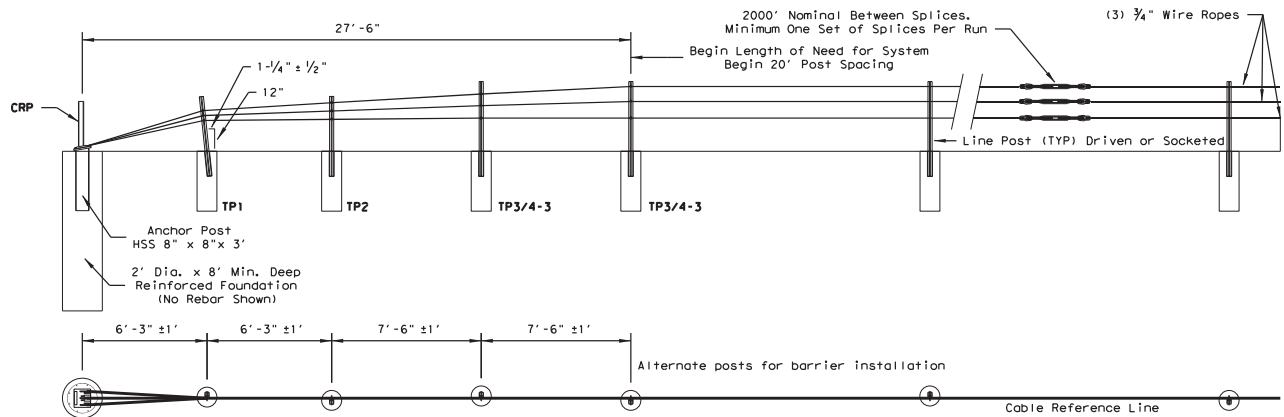
TRINITY CABLE SAFETY SYSTEM (TL-4)

CASS (TL4) - 14

FILE: casst1414.dgn	DN: TxDOT	CR: RM	DN: VP	DK:
© TxDOT: March 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	6380	47	001	1H 44, ETC.
DIST	REVISIONS	COUNTY	SHEET NO.	
WFS	WICHITA, ETC.		79	

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CABLE RELEASE AND ANCHOR POST
 (Shown with Tube Plate Option)
 (See Note 9)

TERMINAL POST
 (Shown with Concrete Mowstrip)
 (See Note 9)

LINE POST SOCKETED
 (Shown with Rebar Ring/Bars Socket Option)
 (See Note 9)

LINE POST SOCKETED
 (Shown with Welded Rebar Socket Option)
 (See Note 9)

LINE POST (DRIVEN OPTION)
 (Shown with Driven Socket Option)
 (See Note 9)

GENERAL NOTES

- For additional information contact Gibraltar, Inc. at 1-800-495-8957, 830-798-5444, or see the manufacturer's product manual.
- All concrete shall be CLASS A.
- The Cable Barrier System shall be installed on shoulders or on medians with slopes of 6:1 or flatter.
- The Cable Barrier System is accepted by the FHWA Test Level - 3.
- See the Texas MUTCD for proper "Barrier" delineation.
- Rock Clause: Where solid rock is encountered:
 - For socketed post, continue digging 12" diameter, 15" deep into rock or the required plan depth, whichever comes first.
 - For driven post, core drill a 4" diameter hole 18" deep into rock or the required plan depth, whichever comes first.
 - For Anchor post, continue digging 24" diameter, 30" deep into rock or the required plan depth, whichever comes first.
- Tolerances:
 - LP = 3" out of plumb, at top
 - Cable height = 1"
 - Anchor Post = 5" off of Cable Reference Line
- The Gibraltar cable barrier system shall be installed in NCHRP Report 350 standard compacted soil. Soil must be well drained.
- All non-welded rebar by others.
- Minimum recommended line post foundation.
 - Without mowstrip, 36" Deep x 12" diameter foundations with #3 rebar ring x 8" diameter with two #4 rebar vertical bars 30" long
 - With 4" minimum depth hot mix asphalt, 30" deep x 12" diameter foundations with #3 rebar ring x 8" diameter with two #4 rebar vertical bars 30" long.
 - With 3" minimum depth concrete mowstrip, 24" deep x 12" diameter foundations. (No rebar required)
 - Direct drive post 42" deep.

CABLE TENSION CHART#	
-10 °F	8000
0 °F	7600
10 °F	7200
20 °F	6800
30 °F	6400
40 °F	6000
50 °F	5600
60 °F	5200
70 °F	4800
80 °F	4400
90 °F	4000
100 °F	3600
110 °F	3200

DEFLECTION	
Deflection	Post Spacing
8'-0"	20 FT
7'-0"	12 FT
6'-8"	10 FT

Allowable Deviation from Chart +/- 10%

Texas Department of Transportation
 Design Division Standard

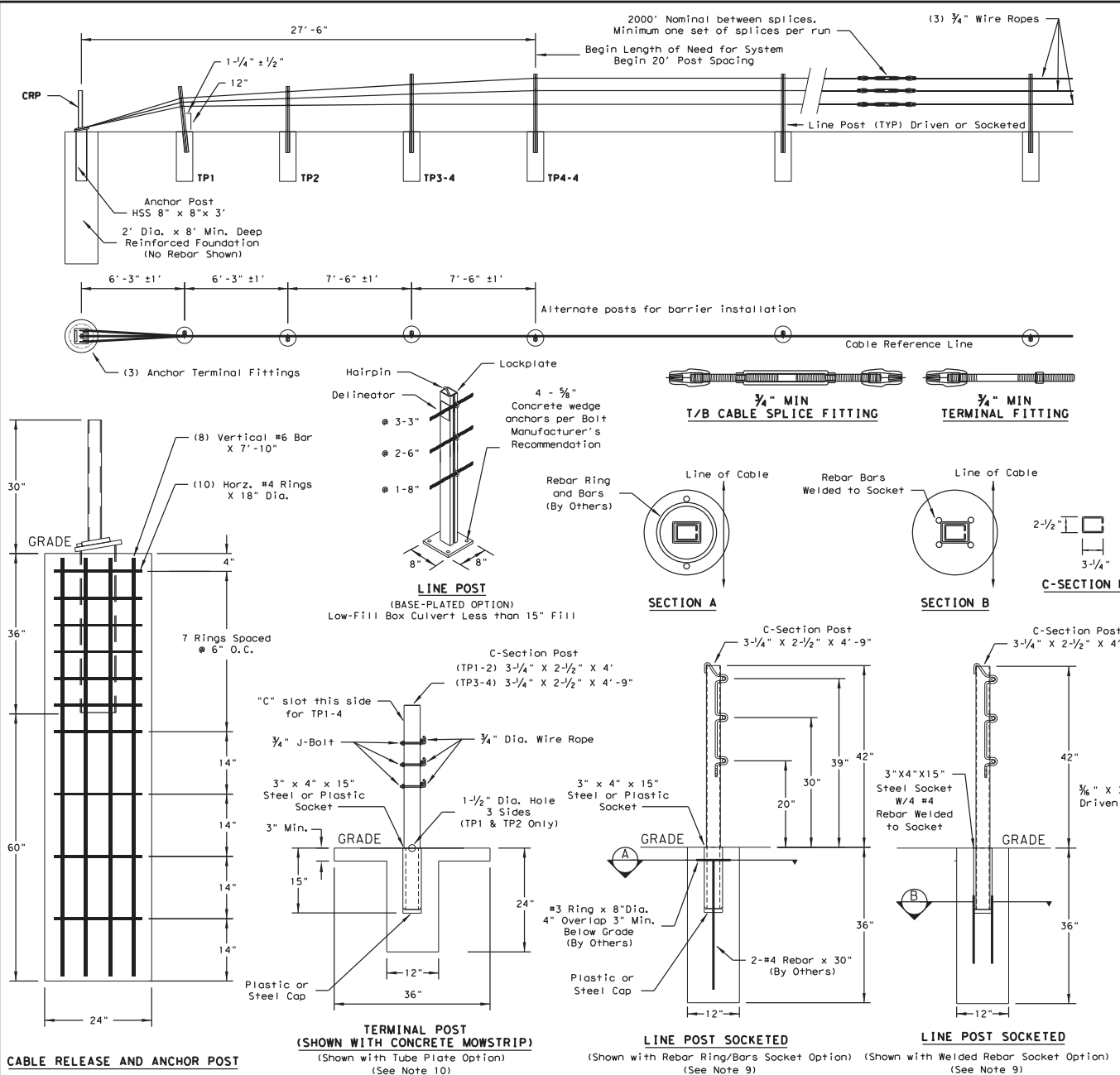
GIBRALTAR CABLE BARRIER SYSTEM (TL-3)

GBRL TR (TL3) - 14

FILE: gbrltr1314.dgn	DN: TxDOT	CR: RM	DN: VP	CR:
REVISIONS	CONT	SECT	JOB	HIGHWAY
© TxDOT: March 2014	638047	001	IH 44,	ETC.
DIST	COUNTY	CITY	SHEET NO.	
WFS		\$CST\$	80	

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DATE: 5/21/2021
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GENERAL NOTES

- For additional information contact Gibraltar, Inc. at 1-800-495-8957, 830-798-5444, or see the manufacturer's product manual.
- All concrete shall be CLASS A.
- The Cable Barrier System shall be installed on shoulders or on medians with slopes of 6:1 or flatter. If installed on slopes steeper than 6:1 up to 4:1 the TL-4 system performs as a TL-3 and Gibraltar must be contacted for various guidelines related to placement.
- The Cable Barrier System is accepted by the FHWA Test Level - 4.
- See the Texas MUTCD for proper "Barrier" delineation.
- Rock Clause: Where solid rock is encountered:
 - For socketed post, continue digging 12" diameter, 15" deep into rock or the required plan depth, whichever comes first.
 - For driven post, core drill a 4" diameter hole 18" deep into rock or the required plan depth, whichever comes first.
 - For Anchor post, continue digging 24" diameter, 30" deep into rock or the required plan depth, whichever comes first.
- Tolerances:
 - LP = 3" out of plumb, at top
 - Cable height = 1"
 - Anchor Post = 5" off of Cable Reference Line
- The Gibraltar cable barrier system shall be installed in NCHRP Report 350 standard compacted soil. Soil must be well drained.
- All non-welded rebar by others.
- Minimum recommended line post foundation.
 - Without mowstrip, 36" Deep x 12" diameter foundations with #3 rebar ring x 8" diameter with two #4 rebar vertical bars 30" long
 - With 4" minimum depth hot mix asphalt, 30" deep x 12" diameter foundations with #3 rebar ring x 8" diameter with two #4 rebar vertical bars 30" long.
 - With 3" minimum depth concrete mowstrip, 24" deep x 12" diameter foundations. (No rebar required)
 - Direct drive post 42" deep.

CABLE TENSION CHART*

-10 °F	8000
0 °F	7600
10 °F	7200
20 °F	6800
30 °F	6400
40 °F	6000
50 °F	5600
60 °F	5200
70 °F	4800
80 °F	4400
90 °F	4000
100 °F	3600
110 °F	3200

DEFLECTION

Deflection	Post Spacing
8'-0"	20 FT
7'-0"	12 FT
6'-8"	10 FT

* Allowable Deviation from Chart +/- 10%

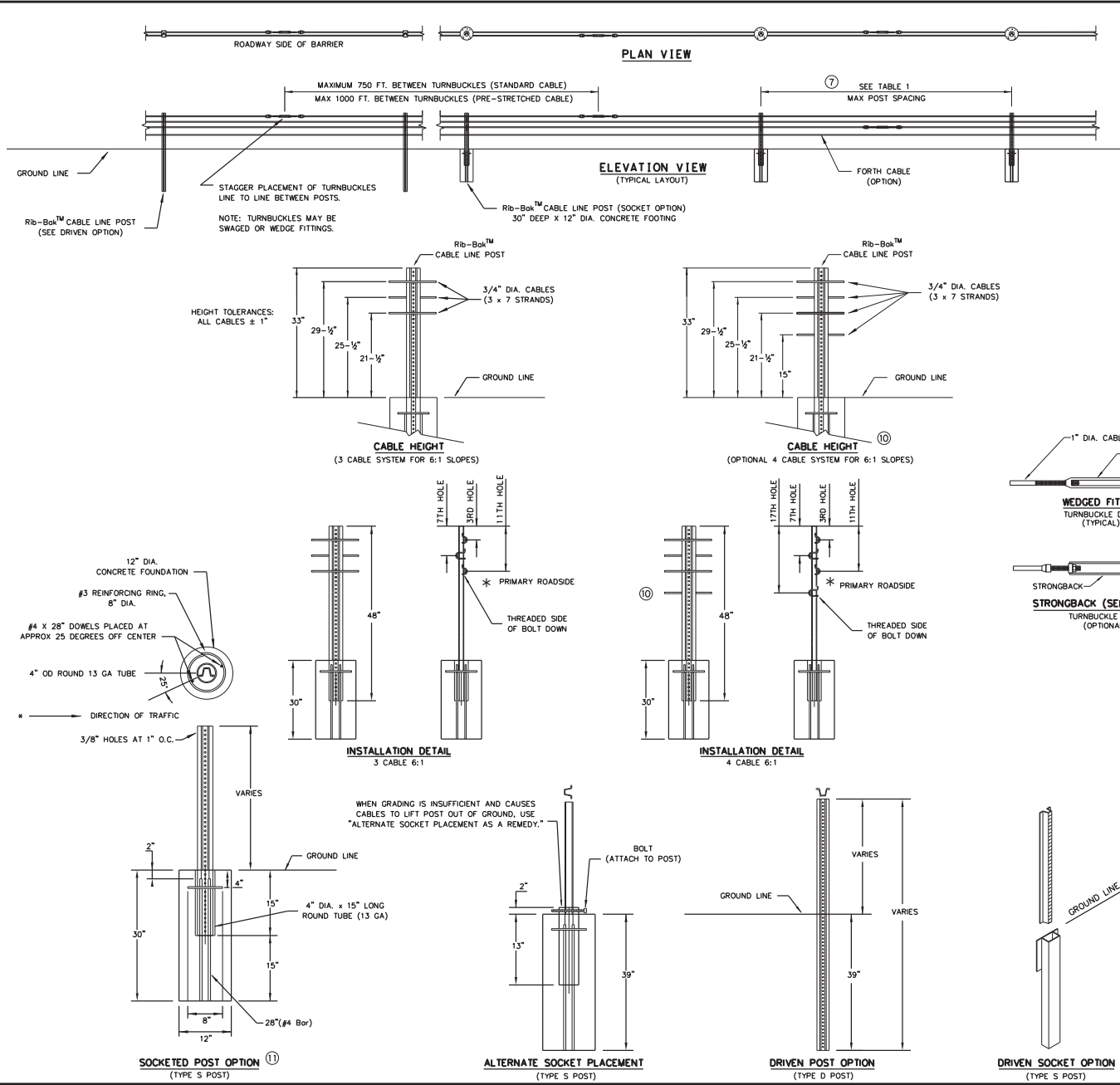
Texas Department of Transportation
 Design Division Standard

GIBRALTAR CABLE BARRIER SYSTEM (TL-4)

GBRL TR (TL4) - 14

FILE: gbdltrtl4.dgn	DN:TxDOT	CR:RM	DN:VP	DK:
REVISIONS	CONT	SECT	JOB	HIGHWAY
6380	47	001	IH 44, ETC.	
DIST	COUNTY	SHEET NO.		
WFS	WICHITA, ETC.	81		

DATE: 5/21/2021
 FILE: I:\WFSMAINT\Maintenance Projects\6380-47-001 On-Call Guardrail FY 22-4 - Design\P10N Set-Dep-s.3 - Roadway\NU-CABLE (TL3)-14.dgn
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GENERAL NOTES

- FOR ADDITIONAL INFORMATION CONTACT YOUR DISTRIBUTOR OR NUCOR STEEL MARION, INC. AT (603) 430-9350.
- FOR PAYMENT SEE SPECIAL SPECIFICATION "CABLE BARRIER SYSTEM".
- FOR ADDITIONAL INFORMATION SEE THE MANUFACTURER'S PRODUCT MANUAL.
- THE NU-CABLE SYSTEM IS DESIGNED FOR BI-DIRECTIONAL TRAFFIC FLOWS. SEE THE MANUFACTURER'S PRODUCT MANUAL FOR PLACEMENT ADJACENT TO GUARDRAIL END TREATMENTS.
- THE NU-CABLE SYSTEM SHALL BE INSTALLED ON SHOULDERS OR MEDIANS WITH SLOPES OF 6:1 OR FLATTER WITHOUT OBSTRUCTIONS, DEPRESSIONS, ETC. THAT MAY SIGNIFICANTLY AFFECT THE STABILITY OF AN ERRANT VEHICLE.
- THE NU-CABLE SYSTEM MAY BE INSTALLED ON EITHER SIDE OF THE ROADWAY. Rib-Bok™ CABLE LINE POSTS MAY BE SOCKETED OR DRIVEN DESIGN.
- THE TL-3 THREE-CABLE AND FOUR-CABLE FOR 6:1 SLOPES CAN USE EITHER A 4# /LF OR 5# /LF POST. SEE TABLE # 1 FOR POST SIZE PER SPACING.
- SEE (TABLE 2) FOR TENSION AMOUNT AT SPECIFIC CABLE TEMPERATURE FOR INITIAL INSTALLATION.
- SEE (TABLE 3) FOR TENSION AMOUNT AT SPECIFIC CABLE TEMPERATURE FOR MAINTENANCE.
- FOURTH (LOWEST) CABLE IS OPTIONAL. SEE PROJECT SPECIFICATIONS FOR REQUIREMENT OF FOURTH CABLE.
- CONSULT YOUR PROJECT PLAN SHEET AND CABLE BARRIER SPECIFICATIONS FOR DESIRED SOCKET MATERIAL.
- ALL FOUNDATION DESIGNS ARE BASED ON NCHRP 350 STRONG (S1) SOIL. CONSULT THE MANUFACTURER FOR SPECIFIC FOUNDATION DESIGN IF SOIL TYPES DIFFER.

TABLE 1

POST SIZE TABLE	
POST SPACING	POST SIZE
0' - 17'-6"	4# / LF X 4' OR 6' POST
17'-6" - 20'	5# / LF X 4' POST

POST SPACING IS PER 8 FOOT DEFLECTION REQUIREMENTS. CONSULT PRODUCT MANUAL IF GREATER DEFLECTION IS PERMISSIBLE.

TABLE 2

CABLE TENSION CHART	
INITIAL INSTALL	
F	LBF
120	4624
110	4986
100	5350
90	5713
80	6077
70	6440
60	7167
50	7894
40	8619
30	9346
20	10073
10	10800
0	11525
-10	12252
-20	12979
-30	13706

TABLE 3

CABLE TENSION CHART	
MAINTENANCE	
F	LBF
120	4021
110	4336
100	4652
90	4968
80	5284
70	5600
60	6232
50	6864
40	7495
30	8127
20	8759
10	9391
0	10022
-10	10654
-20	11286
-30	11918

Design Division Standard

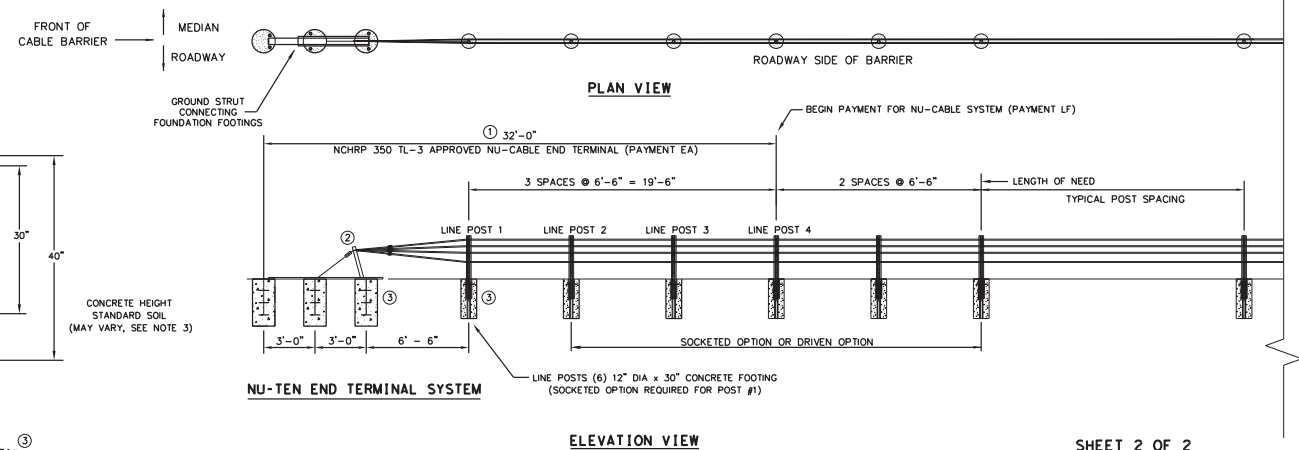
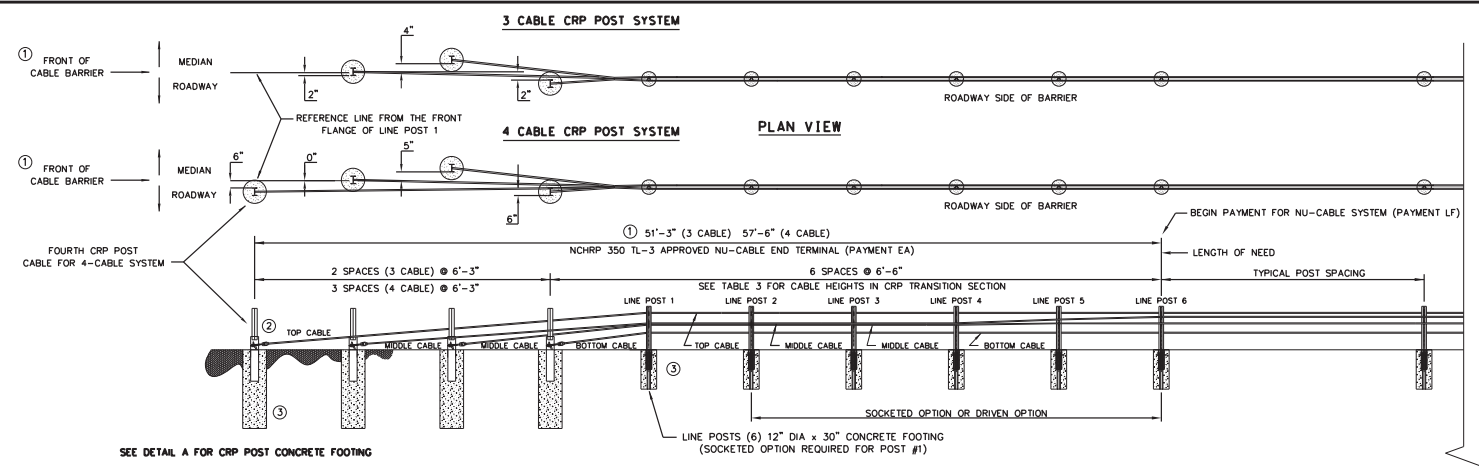
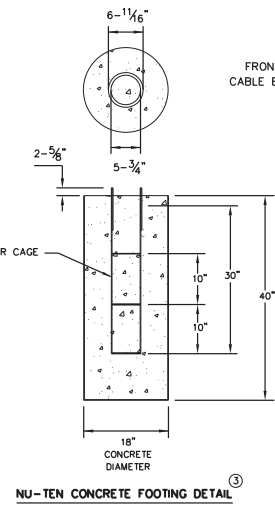
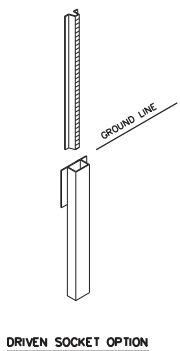
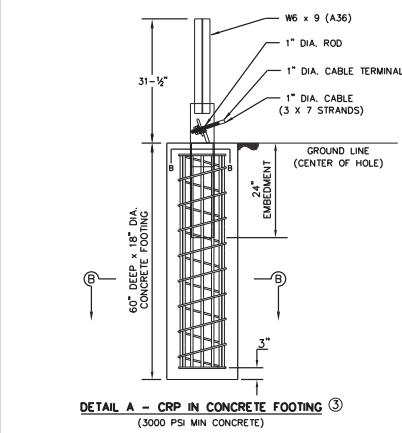
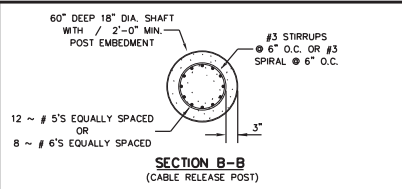
NU-CABLE BARRIER SYSTEM
 (TL-3)
 (3 OR 4 CABLE)

 NU-CABLE (TL3) - 14

FILE:	DN:	CK:	DN:	CK:
① TxDOT:	CONT	SECT	JOB	HIGHWAY
REVISIONS	6380	47	001	IH 44, ETC.
	DIST	COUNTY	SHEET NO.	
	WFS	WICHITA, ETC.	82	

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DATE: 5/21/2021
 FILE: T:\WFSM\INT\Maintenance Projects\6380-47-001 On Coll Guardrail - Design\Plan Set Dgn's\3 - Roadway\NU-CABLE (TL3)-14.dgn



4 TABLE 4

CRP END TERMINAL CABLE HEIGHTS - TL-3- THREE CABLE						
	LP 1	LP 2	LP 3	LP 4	LP 5	LP 6
TOP CABLE	28"	28"	28"	28"	30"	30"
MIDDLE CABLE	22"	22"	22"	23"	25"	25"
BOTTOM CABLE	19"	19"	19"	20"	20"	21"

CRP END TERMINAL CABLE HEIGHTS - TL-3- FOUR CABLE 6:1						
	LP 1	LP 2	LP 3	LP 4	LP 5	LP 6
TOP CABLE	28"	28"	28"	28"	30"	30"
UPPER-MIDDLE CABLE	22"	22"	22"	23"	25"	25"
BOTTOM-MIDDLE CABLE	19"	19"	19"	20"	20"	21"
BOTTOM CABLE	15"	15"	15"	15"	15"	15"

- NOTES:
1. THE OPPOSING END TREATMENTS ON A PARTICULAR RUN ARE MIRRORED IN THEIR LAYOUT. SYSTEM PAYMENT IS PER EACH (EA). REFER TO PROJECT SPECIFICATIONS FOR ADDITIONAL PAYMENT INFORMATION.
 2. REFER TO INSTALLATION MANUAL FOR CABLE END ASSEMBLY DETAIL.
 3. ALL FOUNDATION DESIGNS ARE BASED ON NCHRP 350 STRONG (S1)SOIL. CONSULT THE MANUFACTURER FOR SPECIFIC FOUNDATION DESIGNS IF SOIL TYPES DIFFER.
 4. SEE TABLE 2 CABLE HEIGHTS IN CRP TRANSITION SECTION.

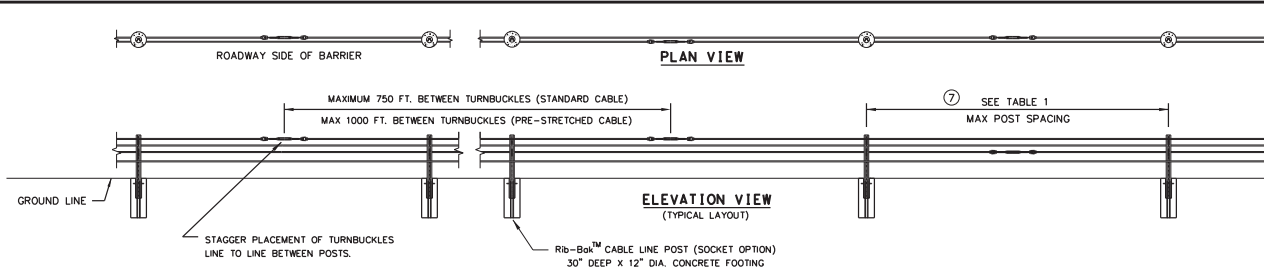
REFER TO SHEET 1 OF 2 FOR LENGTH OF NEED CABLE HEIGHTS.

SHEET 2 OF 2

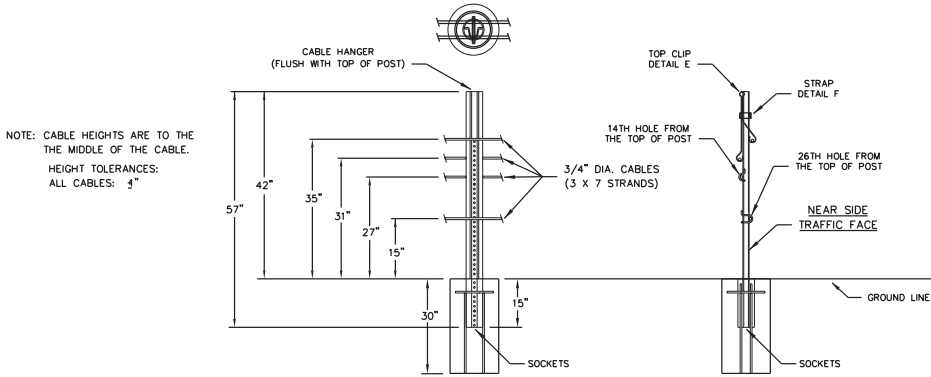
**NU-CABLE BARRIER SYSTEM
(TL-3)
(3 OR 4 CABLE)
NU-CABLE (TL3) - 14**

FILE:	DW:	CK:	DW:	CK:
① TxDOT:	6380	47	001	IH 44, ETC.
REVISIONS	CONT	SECT	JOB	HIGHWAY
			COUNTY	SHEET NO.
	WFS		WICHITA, ETC.	83

DATE: 5/21/2021
 FILE: T:\WFSMAINT\Maintenance Projects\6380-47-001 On Coll Guardrail - Design\Plan Set Dgn's\3 - Roadway-NU-CABLE (TL-4)-14.dgn
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 - FOR PAYMENT SEE SPECIAL SPECIFICATION "CABLE BARRIER SYSTEM".
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 - THE NU-CABLE SYSTEM MAY BE INSTALLED ON EITHER SIDE OF THE ROADWAY. Rib-Bok™ CABLE LINE POSTS MAY BE SOCKETED OR DRIVEN DESIGN.
 - THE TL-4 FOR 6:1 SLOPES CAN USE 4# / LF POST. SEE TABLE #1 FOR POST SIZE PER SPACING.
 - SEE (TABLE 2) FOR TENSION AMOUNT AT SPECIFIC CABLE TEMPERATURE FOR INITIAL INSTALLATION.
 - SEE (TABLE 3) FOR TENSION AMOUNT AT SPECIFIC CABLE TEMPERATURE FOR MAINTENANCE.
 - FOURTH (LOWEST) CABLE IS NOT OPTIONAL ON THE TL-4 SYSTEM.
 - CONSULT YOUR PROJECT PLAN SHEETS AND CABLE BARRIER SPECIFICATIONS FOR DESIRED SOCKET MATERIAL.
 - ALL FOUNDATION DESIGNS ARE BASED ON NCHRP 350 STRONG (S1) SOIL. CONSULT THE MANUFACTURER FOR SPECIFIC FOUNDATION DESIGN IF SOIL TYPES DIFFER.



7 TABLE 1

POST SIZE TABLE	
POST SPACING	POST SIZE
0' - 17'-6"	4# / LF X 4' OR 6' POST
17'-6" - 20'	5# / LF X 4' POST

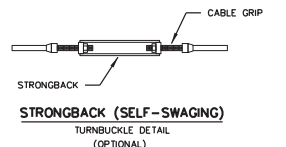
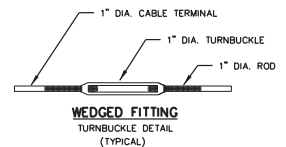
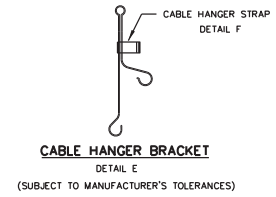
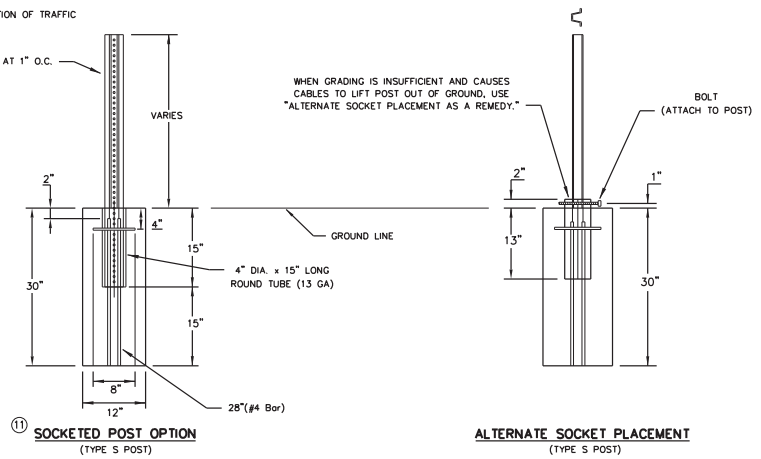
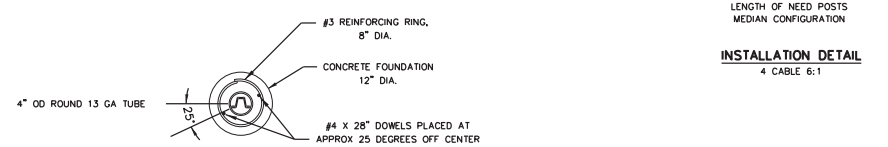
POST SPACING IS PER 8 FOOT DEFLECTION REQUIREMENTS. CONSULT PRODUCT MANUAL IF GREATER DEFLECTION IS PERMISSIBLE.

8 TABLE 2

CABLE TENSION CHART	
INITIAL INSTALL	
F	LBF
120	4624
110	4986
100	5350
90	5713
80	6077
70	6440
60	7167
50	7894
40	8619
30	9346
20	10073
10	10800
0	11525
-10	12252
-20	12979
-30	13706

9 TABLE 3

CABLE TENSION CHART	
MAINTENANCE	
F	LBF
120	4021
110	4336
100	4652
90	4968
80	5284
70	5600
60	6232
50	6864
40	7495
30	8127
20	8759
10	9391
0	10022
-10	10654
-20	11286
-30	11918



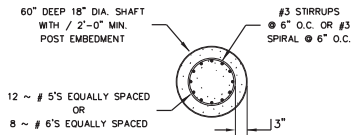
Texas Department of Transportation
 Design Division Standard

NU-CABLE BARRIER SYSTEM (TL-4) (4 CABLE)

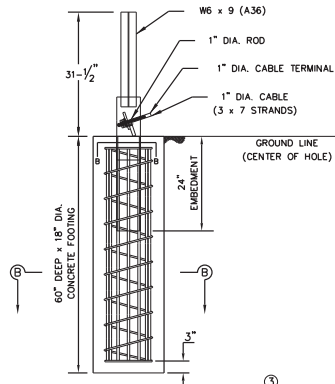
NU-CABLE (TL4) - 14

FILE:	DW:	CK:	DN:	CK:
6380	47	001	IH 44, ETC.	
REVISIONS	CONT	SECT	JOB	HIGHWAY
			COUNTY	SHEET NO.
			WFS	WICHITA, ETC. 84

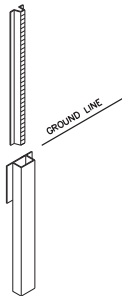
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 FILE: I:\WFSMAINT\Maintenance Projects\6380-47-001 On Coll Guardrail - Design\Plan Set\Dgn's\3 - Roadway\NU-CABLE (TL-4)-14.dgn
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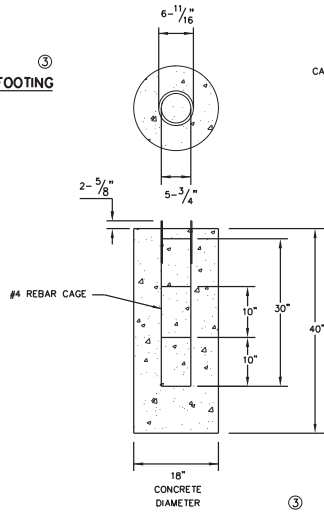
SECTION B-B
(CABLE RELEASE POST)



DETAIL A - CRP IN CONCRETE FOOTING
(3000 PSI MIN CONCRETE)



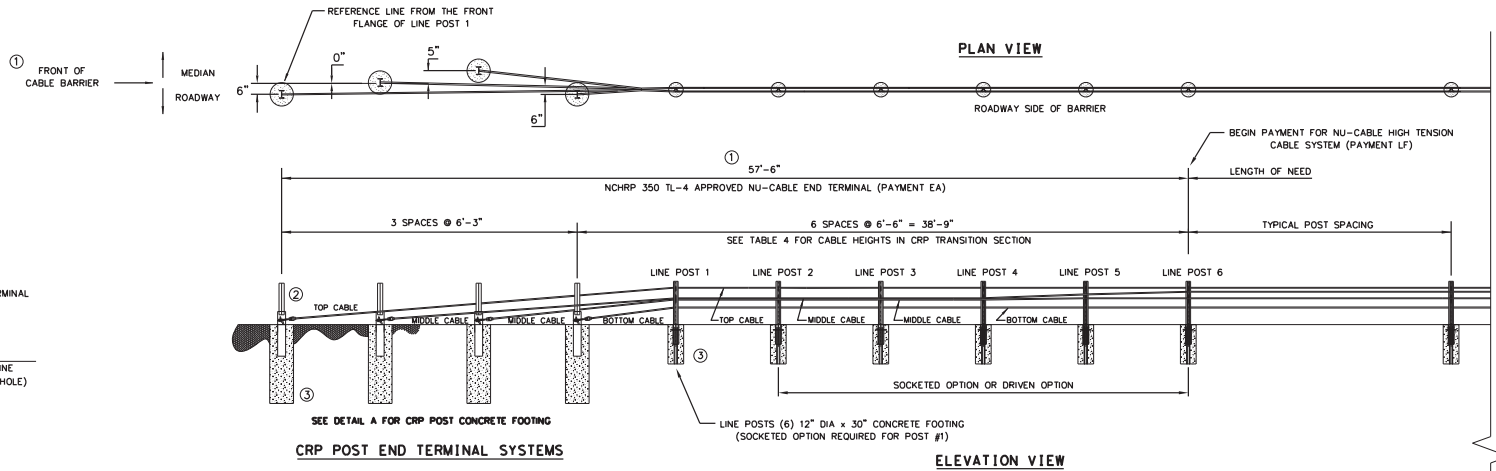
DRIVEN SOCKET OPTION



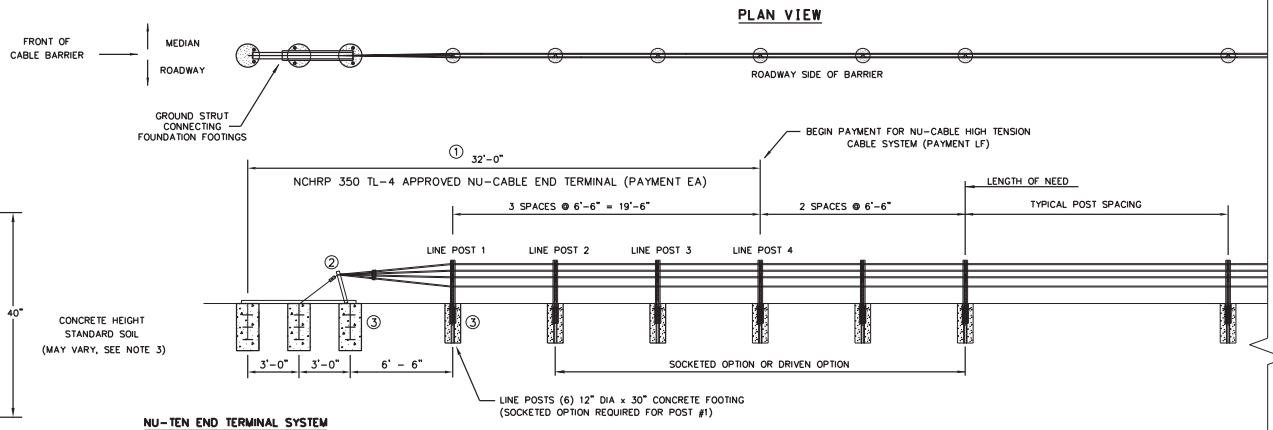
NU-TEN CONCRETE FOOTING DETAIL

TABLE 4

CRP END TERMINAL CABLE HEIGHTS - TL-4						
	LP 1	LP 2	LP 3	LP 4	LP 5	LP 6
TOP CABLE	34"	34"	34"	34"	34"	34"
UPPER-MIDDLE CABLE	27"	27"	27"	27"	28"	31"
BOTTOM-MIDDLE CABLE	24"	24"	24"	24"	24"	24"
BOTTOM CABLE	15"	15"	15"	15"	15"	15"



1 THE OPPOSING END TREATMENTS ON A PARTICULAR RUN ARE MIRRORED IN THEIR LAYOUT.



NOTES

1. THE OPPOSING END TREATMENTS ON A PARTICULAR RUN ARE MIRRORED IN THEIR LAYOUT. SYSTEM PAYMENT IS PER EACH (EA). REFER TO PROJECT SPECIFICATIONS FOR ADDITIONAL PAYMENT INFORMATION
2. REFER TO INSTALLATION MANUAL FOR CABLE END ASSEMBLY DETAIL.
3. ALL FOUNDATION DESIGNS ARE BASED ON NCHRP 350 STRONG (S1) SOIL. CONSULT THE MANUFACTURER FOR SPECIFIC FOUNDATION DESIGNS IF SOIL TYPES DIFFER.
4. SEE TABLE 4 CABLE HEIGHTS IN CRP TRANSITION SECTION.



NU-CABLE BARRIER SYSTEM (TL-4) (4 CABLE)

NU-CABLE (TL4) - 14

FILE:	DW:	CK:	DW:	CK:
TxDOT:	CONT	SECT	JOB	HIGHWAY
REVISIONS	6380	47	001	IH 44, ETC.
	DIST	COUNTY		SHEET NO.
	WFS	WICHITA, ETC.		85

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DATE: 5/21/2021 2:18:22 PM
 FILE: T:\VFSMAINT\Maintenance Projects\6380-47-001 On Coll Guardrail

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS					DELINEATORS				D & OM DESCRIPTIVE CODES	
DEVICE	SIZE 1	SIZE 2	SIZE 3	SIZE 4	DEVICE	SINGLE		DOUBLE		INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX (XX) NUMBER OF REFLECTORS S = Single D = Double COLOR OF REFLECTORS W = White Y = Yellow R = Red REFLECTOR UNIT SIZE 1 or 2 TYPE OF POST OR DELINEATOR WC = Wing Channel Post YFLX = Yellow Flexible Post WFLX = White Flexible Post BR = Barrier Reflector TYPE OF MOUNT GND = Embedded (drivable or set in concrete) CTB = Concrete Barrier Mount GF1 or GF2 = Guard Fence Attachment SRF = Surface Mount DIRECTION If Required BI = Bi-Directional BR = Bi-Directional with red on back
SHEETING	Yellow, White or Red Type B or C reflective sheeting				SHEETING	Yellow, White or Red Type B or C Reflective Sheeting				
NOTE	1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.				POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX	
					MOUNT TYPE	GND	GND, SRF	GND	GND, SRF	

OBJECT MARKERS								
DEVICE	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
SHEETING	Yellow-Type B _{FL} or C _{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroreflective yellow - Type B _{FL} or C _{FL} Sheeting			Red -Type B _{FL} or C _{FL} Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

DEPARTMENTAL MATERIAL SPECIFICATIONS	
FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

BARRIER REFLECTORS (BRF)			CHEVRONS				ONE DIRECTION LARGE ARROW		NOTE: Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.		
GF1	GF2	CTB	W1-8		W1-6						
								Texas Department of Transportation Traffic Safety Division Standard			
1. Barrier reflectors shall meet the requirements of DMS 8600. 2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.			SIZE (W x L)	18" x 24" (Conventional)	24" x 30" (Conventional Oversize)	30" x 36" (Expressway)	36" x 48" (Freeway)		SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
			MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only		MOUNTING HEIGHT	7'-0"		
SHEETING			NOTE								
Yellow, White, Red			1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies). 2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).								
NOTE			1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.								

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

FILE: ddm1-20.dgn	DN: TXDOT	CR: TXDOT	DN: TXDOT	CR: TXDOT
TXDOT August 2004	CONT	SECT	JOB	HIGHWAY
6380	47	001	IH 44, ETC.	
10-09 3-15	DIST	COUNTY	SHEET NO.	
4-10 7-20	WFS	WICHITA, ETC.	86	

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DATE: 5/21/2021 2:18:24 PM
 FILE: T:\WFSMAINT\Maintenance Projects\6380-47-001 On Coll. Guardrail. FY 22 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 metric units.

POST TYPE AND SUPPORT FOUNDATION DETAILS					TYPE OF BARRIER MOUNTS	
WING CHANNEL (WC)	FLEXIBLE POSTS (YFLX, WFLX)			WEDGE ANCHOR SYSTEMS		GUARD FENCE ATTACHMENT
GND	GND	SRF	WAS	WAP	GF 1	GF 2
	EMBEDDED	SURFACE MOUNT	STEEL	PLASTIC	CONCRETE TRAFFIC BARRIER (CTB)	
NOTES 1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only. 2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.			NOTES 1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices. 2. Install per manufacturer's recommendations. 3. Post length may vary to meet field conditions. 4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline or median use, the flexible posts shall be yellow.		GENERAL NOTES 1. Place delineators on a section of roadway at a consistent distance from the edge of pavement. 2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction. 3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible. 4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation. 5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface. 6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.	
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS 			CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN 		DELINEATORS AND TYPE 2 OBJECT MARKERS 	
NOTE Mounting at 4 feet to the bottom of the chevron is permitted for chevrons that will not exceed a height of 6'-6" to the top of the chevron (sizes 24" x 30" and smaller)			NOTE Chevrons 30" x 36" and larger shall be mounted at a height of 7' to the bottom of the chevron. Chevron sign and ONE DIRECTION LARGE ARROW sign (W1-9T) shall be installed per SMD standard sheets and paid under item 644.		NOTE See general notes 1, 2 and 3.	

Texas Department of Transportation
Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2) - 20

FILE: ddm2-20.dgn	DN: TXDOT	CK: TXDOT	DN: TXDOT	CK: TXDOT
TXDOT August 2004	CONT: 6380	SECT: 47	JOB: 001	HIGHWAY: IH 44, ETC.
10-09 3-15	DIST: WFS	COUNTY: WICHITA, ETC.	SHEET NO. 87	
4-10 7-20	20B			

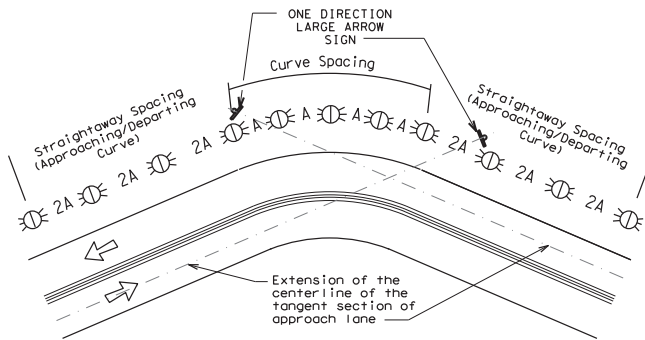
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DATE: 5/21/2021 2:18:25 PM
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MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

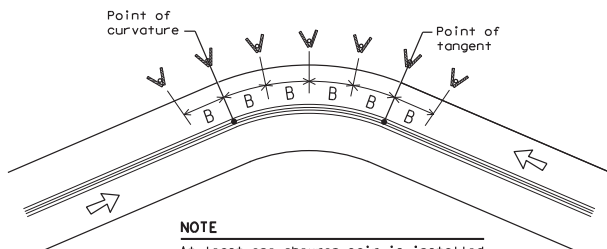
Amount by which Advisory Speed is less than Posted Speed	Curve Advisory Speed	
	Turn (30 MPH or less)	Curve (35 MPH or more)
5 MPH & 10 MPH	• RPMs	• RPMs
15 MPH & 20 MPH	• RPMs and One Direction Large Arrow sign	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons.
25 MPH & more	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons	• RPMs and Chevrons

SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE
 ONE DIRECTION LARGE ARROW (W1-6) sign should be located at approximately and perpendicular to the extension of the centerline of the tangent section of approach lane.

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE
 At least one chevron pair is installed beyond the point of tangent in tangent section.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN				
Degree of Curve	FEET			
	Radius of Curve	Spacing in Curve	Spacing in Straightway	
			A	B
1	5730	225	450	—
2	2865	160	320	—
3	1910	130	260	200
4	1433	110	220	160
5	1146	100	200	160
6	955	90	180	160
7	819	85	170	160
8	716	75	150	160
9	637	75	150	120
10	573	70	140	120
11	521	65	130	120
12	478	60	120	120
13	441	60	120	120
14	409	55	110	80
15	382	55	110	80
16	358	55	110	80
19	302	50	100	80
23	249	40	80	80
29	198	35	70	40
38	151	30	60	40
57	101	20	40	40

Curve delineator approach and departure spacing should include 3 delineators spaced at 2A. This spacing should be used during design preparation or when the degree of curve is known.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN			
Advisory Speed (MPH)	Spacing in Curve	Spacing in Straightway	
		A	B
65	130	260	200
60	110	220	160
55	100	200	160
50	85	170	160
45	75	150	120
40	70	140	120
35	60	120	120
30	55	110	80
25	50	100	80
20	40	80	80
15	35	70	40

If the degree of curve is not known, delineator spacing may be determined based on the Advisory Speed of the curve. Use the delineator curve spacing for each Advisory Speed (MPH).

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

CONDITION	REQUIRED TREATMENT	MINIMUM SPACING
Frdwy./Exp. Tangent	RPMs	See PM-series and FPM-series standard sheets
Frdwy./Exp. Curve	Single delineators on right side	See delineator spacing table
Frdwy./Exp. Ramp	Single delineators on at least one side of ramp (should be on outside of curves) (see Detail 3 on D&OM(4))	100 feet on ramp tangents Use delineator spacing table for ramp curves ("straightway spacing" does not apply to ramp curves)
Acceleration/Deceleration Lane	Double delineators (see Detail 3 on D&OM(4))	100 feet (See Detail 3 on D & OM (4))
Truck Escape Ramp	Single red delineators on both sides	50 feet
Bridge Rail (steel or concrete) and Metal Beam Guard Fence	Bi-Directional Delineators when undivided with one lane each direction Single Delineators when multiple lanes each direction	Equal spacing (100' max) but not less than 3 delineators
Concrete Traffic Barrier (CTB) or Steel Traffic Barrier	Barrier reflectors matching the color of the edge line	Equal spacing 100' max
Cable Barrier	Reflectors matching the color of the edge line	Every 5th cable barrier post (up to 100' max)
Guard Rail Terminus/Impact Head	Divided highway - Object marker on approach end Undivided 2-lane highways - Object marker on approach and departure end	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5) and D & OM (6)
Bridges with no Approach Rail	Type 3 Object Marker (OM-3) at end of rail and 3 single delineators approaching rail	See D & OM(5)
Reduced Width Approaches to Bridge Rail	Type 2 and Type 3 Object Markers (OM-3) and 3 single delineators approaching bridge	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5)
Culverts without MBGF	Type 2 Object Markers	See Detail 2 on D & OM(4)
Crossovers	Double yellow delineators and RPMs	See Detail 1 on D & OM (4)
Pavement Narrowing (Lane merge) on Freeways/Expressway	Single delineators adjacent to affected lane for full length of transition	100 feet

NOTES

- Unless indicated otherwise, the delineator or barrier reflector color shall conform to the color of the pavement edge line on the side of the road where the delineators or barrier reflectors are placed.
- Barrier reflectors may be used to replace required delineators.
- Single red delineators may be mounted on the back side of delineator posts for wrong way driver applications

LEGEND	
	Bi-directional Delineator
	Delineator
	Sign

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

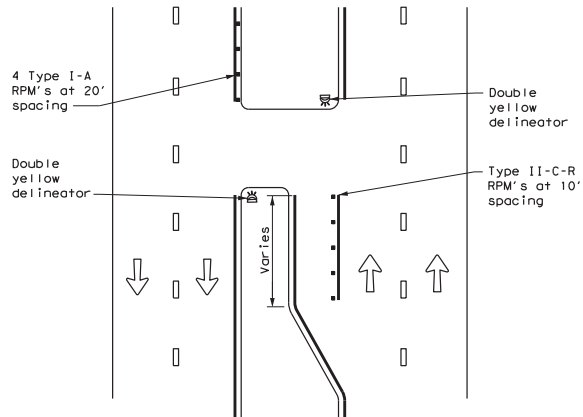
D & OM(3) -20

FILE: dam3-20.dgn	DN: TXDOT	CR: TXDOT	DN: TXDOT	CR: TXDOT
© TXDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	6380	47	001	IH 44, ETC.
3-15 8-15	DIST	COUNTY	SHEET NO.	
8-15 7-20	WFS	WICHITA, ETC.	88	

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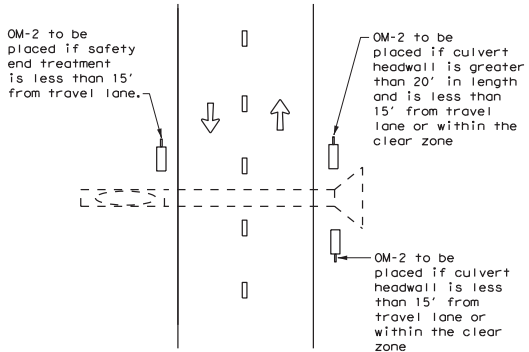
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CROSSOVERS



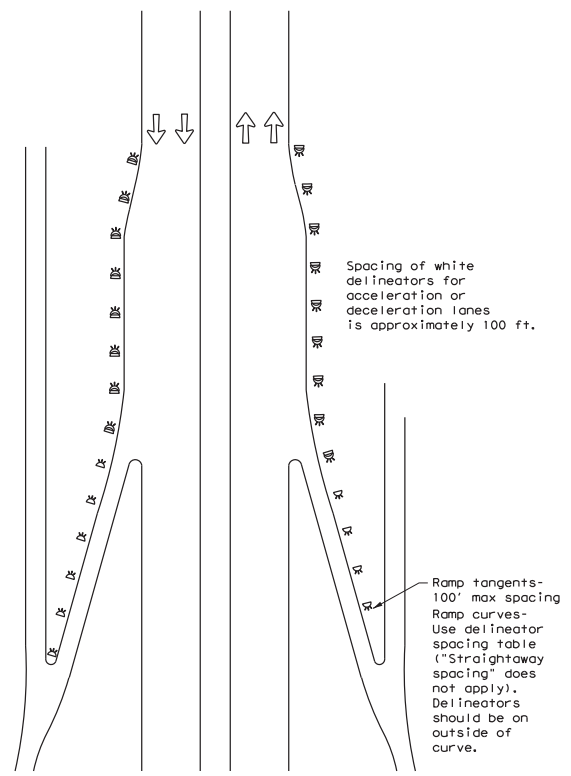
DETAIL 1

FOR CULVERTS WITHOUT MBGF



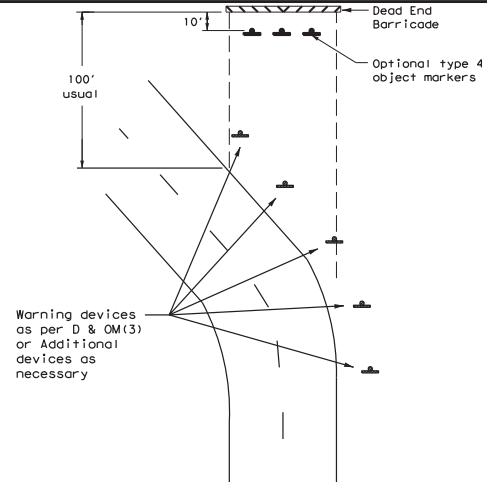
DETAIL 2

FREEWAY DELINEATION FOR RAMP AND ACCELERATION/DECELERATION LANES



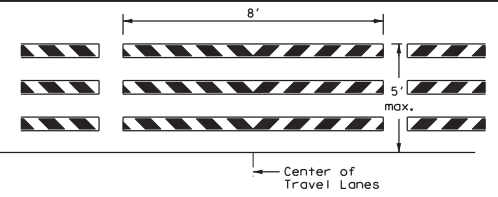
DETAIL 3

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 4

TYPICAL DEAD END BARRICADE INSTALLATION



NOTES

1. Barricade striping shall be red and white reflective sheeting for all permanent road closures.
2. Barricade striping is red and white sloping toward the center of the roadway.
3. Type 3 Barricade Supports should be anchored to soil or pavement as described in compliant Work Zone Traffic Control Devices List, section D.2.f and D.2.g.

DETAIL 5

LEGEND	
	Bidirectional Delineator
	Delineator
	OM-3
	Barricade
	Sign
	OM-2
	Double Delineator



Texas Department of Transportation
 Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

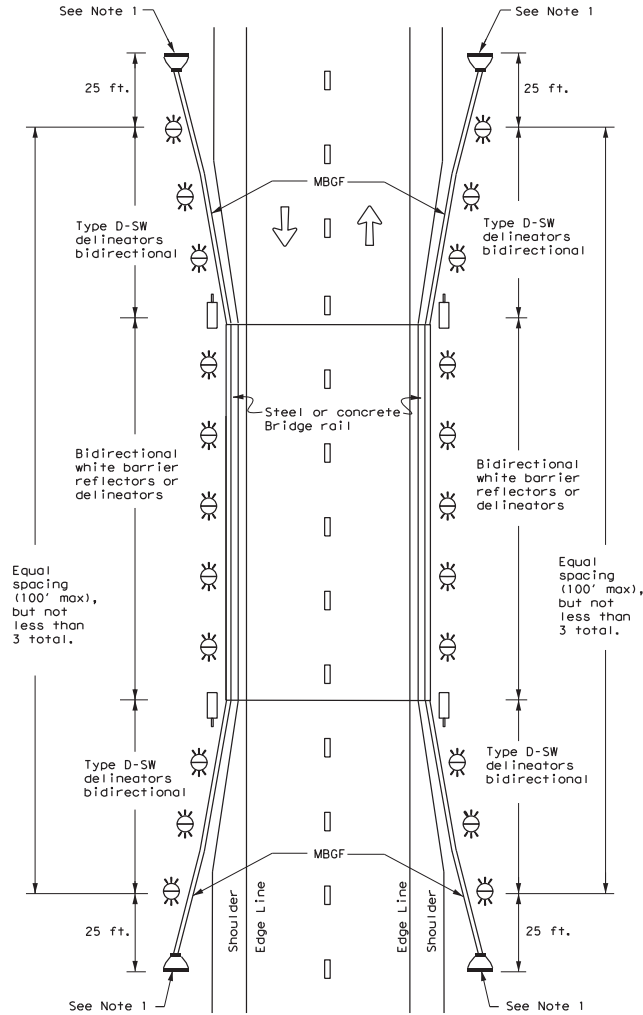
D & OM(4) - 20

FILE: ddm-20.dgn	DN: TXDOT	CR: TXDOT	DN: TXDOT	CR: TXDOT
TXDOT August 2004	CONT	SECT	JOB	HIGHWAY
3-15 REVISIONS	6380	47	001	IH 44, ETC.
7-20	DIST	COUNTY	SHEET NO.	
	WFS	WICHITA, ETC.	89	

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DATE: 5/21/2021 2:18:28 PM
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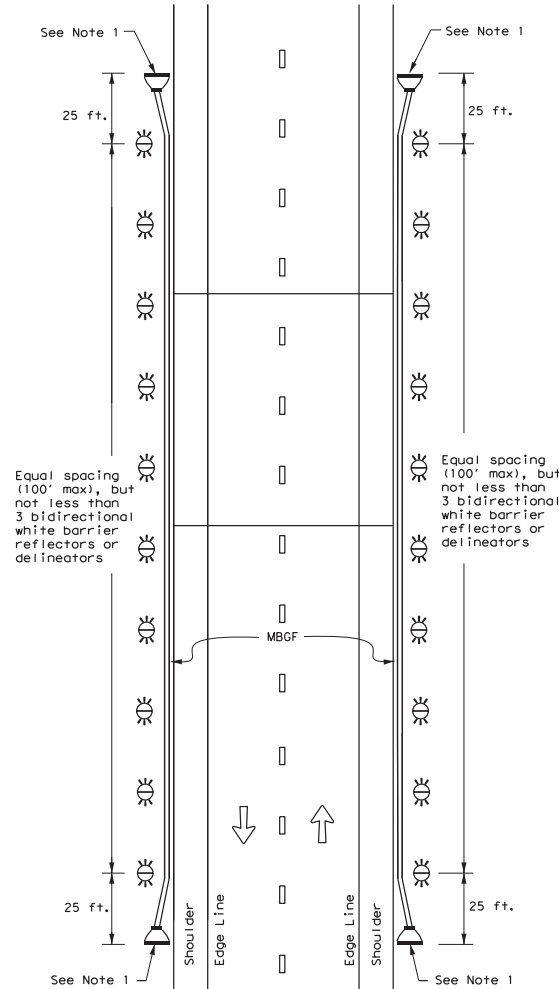
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

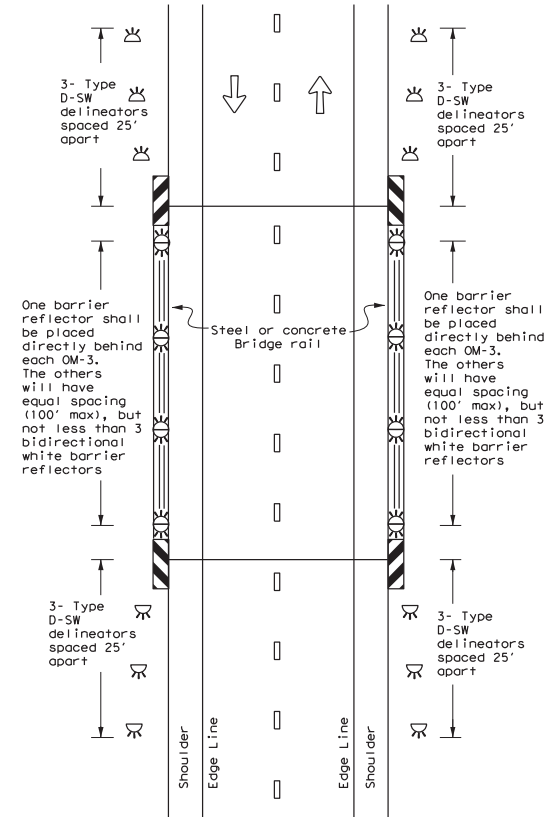
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

TWO-WAY, TWO LANE ROADWAY BRIDGE WITH NO APPROACH RAIL



LEGEND

	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow



Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

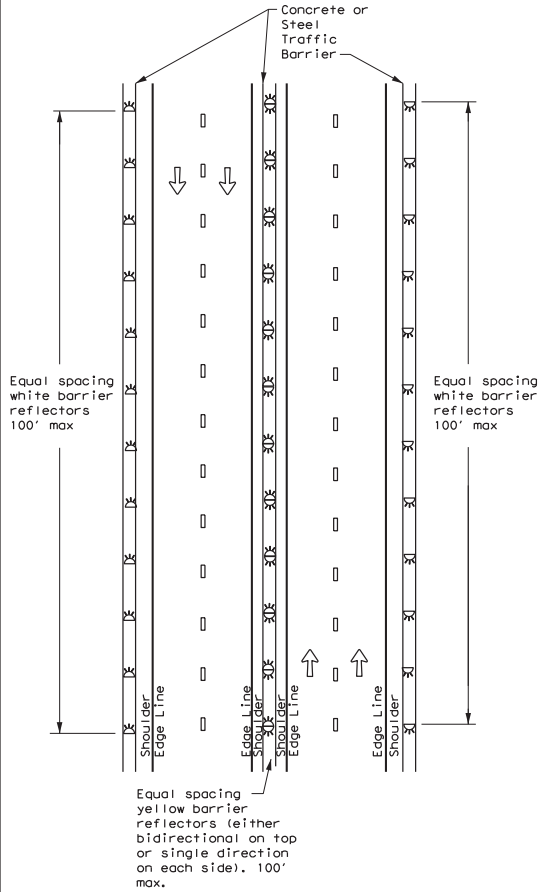
D & OM(5)-20

FILE: dam-20.dgn	DATE: TxDOT	CHK: TxDOT	DATE: TxDOT	CHK: TxDOT
© TxDOT August 2015	CONT: 6380	SECT: 47	JOB: 001	HIGHWAY: IH 44, ETC.
7-20	DIST: WFS	COUNTY: WICHITA, ETC.	SHEET NO.: 90	

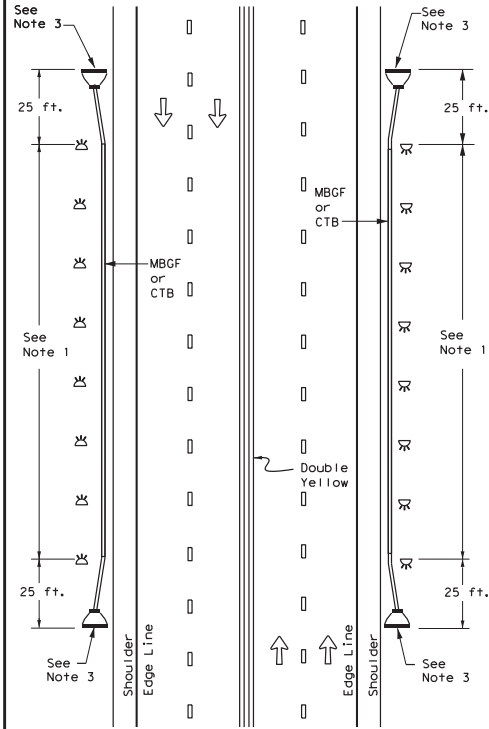
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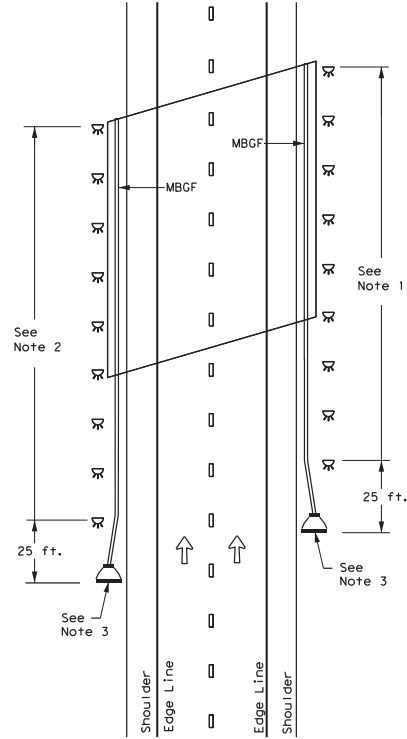
CONTINUOUS CONCRETE OR STEEL BARRIER



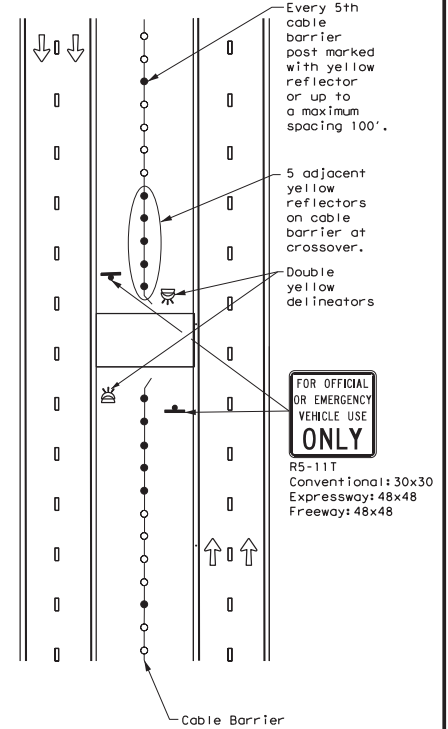
MULTI-LANE UNDIVIDED, TWO-WAY ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



DIVIDED ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



EMERGENCY CROSSOVER



NOTES

1. Equal spacing (100' max), but not less than 3 single directional white barrier reflectors or delineators. On Continuous Barrier, equal spacing (100' max.)
2. Equal spacing (100' max), but not less than 3 single directional yellow barrier reflectors or delineators.
3. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

LEGEND

	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow

Texas Department of Transportation
 Traffic Safety Division Standard

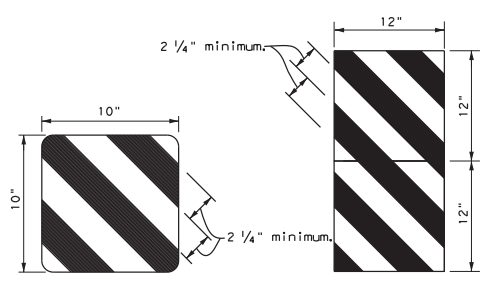
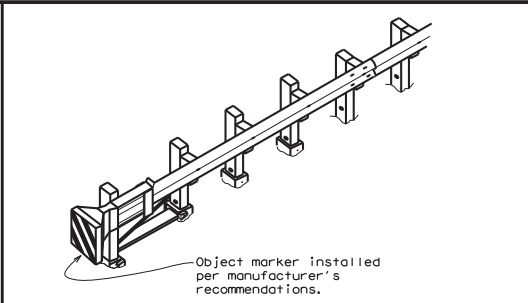
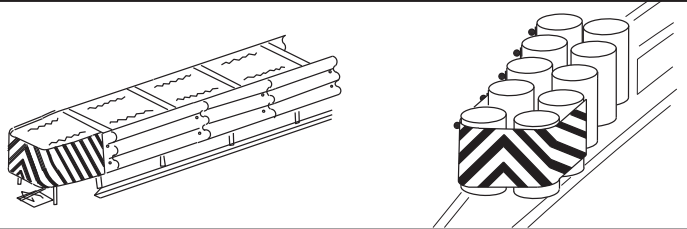
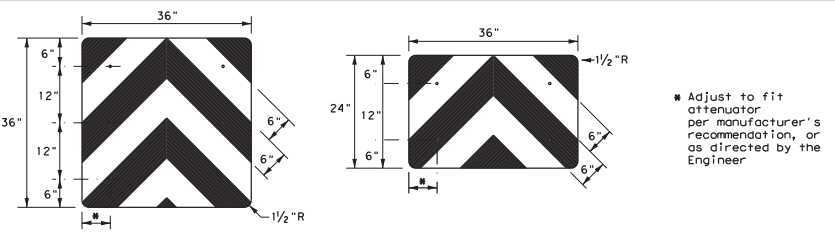
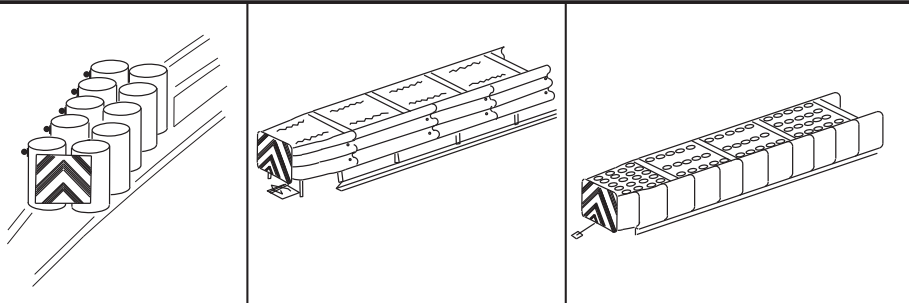
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(6)-20

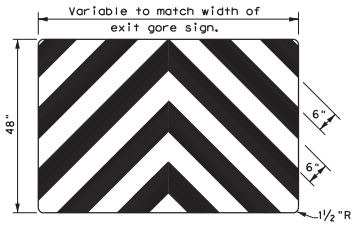
FILE: dom6-20.dgn	DATE: TxDOT	CHK: TxDOT	DATE: TxDOT	CHK: TxDOT
© TxDOT August 2015	CONT: 6380	SECT: 47	JOB: 001	HIGHWAY: IH 44, ETC.
7-20 REVISIONS	DIST: WFS	COUNTY: WICHITA, ETC.	SHEET NO. 91	

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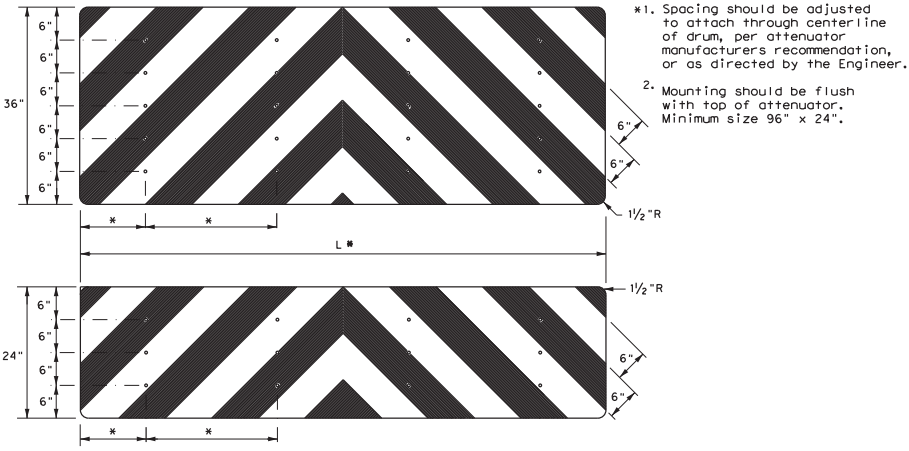
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OBJECT MARKERS SMALLER THAN 3 FT²



NOTES



- *1. Spacing should be adjusted to attach through centerline of drum, per attenuator manufacturer's recommendation, or as directed by the Engineer.
- 2. Mounting should be flush with top of attenuator. Minimum size 96" x 24".

NOTES

1. Object Markers shall conform to the Texas MUTCD and meet the color and reflectivity requirement of Department Material Specification DMS 8300. Background shall be yellow reflective sheeting (Type B or C) and Chevron shall be black.
2. Object Markers may be fabricated from adhesive backed reflective sheeting applied directly to guardrail end treatment, or applied directly to an "end cap" as per the manufacturer's recommendation. Direct applied sheeting shall provide a smooth surface and have no wrinkles, air bubbles, cuts or tears. A radius at the corners is not required for direct applied sheeting.
3. Object Marker size may be reduced to fit smaller devices. Width of alternating black and yellow stripes are typically 6". Object Markers smaller than 3ft may have reduced width stripes of a minimum of 2 1/4".
4. Pop rivets, screws, or nuts and bolts may be used to attach object markers and reflectors. Holes, slots or other openings may be cut or drilled through object markers to allow cable or other attachments.
5. Object Marker at nose of attenuator is subsidiary to the attenuator.
6. See D & OM (1-4) for required barrier reflectors.

		Traffic Safety Division Standard	
DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS			
D & OM (VIA) -20			
FILE:	dcmvia20.dgn	D#: TXDOT	C#: TXDOT
© TXDOT	December 1989	CONT SECT	JOB HIGHWAY
4-92	8-04	6380	47
REVISIONS		DIST	COUNTY
8-95	3-15	WFS	WICHITA, ETC.
4-98	7-20	SHEET NO. 92	
206			