

STATE OF TEXAS  
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED  
STATE HIGHWAY IMPROVEMENT

FEDERAL AID PROJECT NO. STP 2023(511)HES

IH-40  
WHEELER COUNTY

FOR THE CONSTRUCTION OF SAFETY IMPROVEMENTS.  
CONSISTING OF INSTALLING CABLE MEDIAN BARRIER  
& EMERGENCY CROSSOVERS

LIMITS: FROM 2000' W OF FM 2474, E. TO US 83  
NET LENGTH OF ROADWAY = 14,324.64 FT. = 2.713 MI.      LIMITS: FROM FROM US 83, E. TO CR 18  
NET LENGTH OF ROADWAY = 9,218.88 FT. = 1.746 MI.

LIMITS: FROM CR 18 E. TO 7,650 FT WEST OF THE OKLAHOMA STATE LINE  
NET LENGTH OF ROADWAY = 57,579.00 FT. = 10.905 MI.

FEDERAL AID PROJECT NO.			
STP 2023(511)HES			
CONT	SECT	JOB	HIGHWAY
0275	12	083, ETC	IH-40
DIST	COUNTY		SHEET NO.
CHS	WHEELER		1

DESIGN SPEED - N/A  
A.D.T. (20<sup>23</sup>) - 15,700  
A.D.T. (20<sup>43</sup>) - 21,900  
RURAL INTERSTATE

THE TCP HAS BEEN REVIEWED BY  
TRAFFIC SAFETY COMMITTEE

*Joseph R. Lewis, P.E.*  
TRAFFIC SAFETY CHAIRMAN

REQUIRED SIGNS SHALL BE IN ACCORDANCE WITH  
BC (1)-21 THRU BC (12)-21 AND THE "TEXAS  
MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES".

FINAL PLANS

CONTRACTOR NAME: \_\_\_\_\_

CONTRACTOR ADDRESS: \_\_\_\_\_

LETTING DATE: \_\_\_\_\_

DATE TIME CHARGES BEGAN: \_\_\_\_\_

DATE WORK BEGAN: \_\_\_\_\_

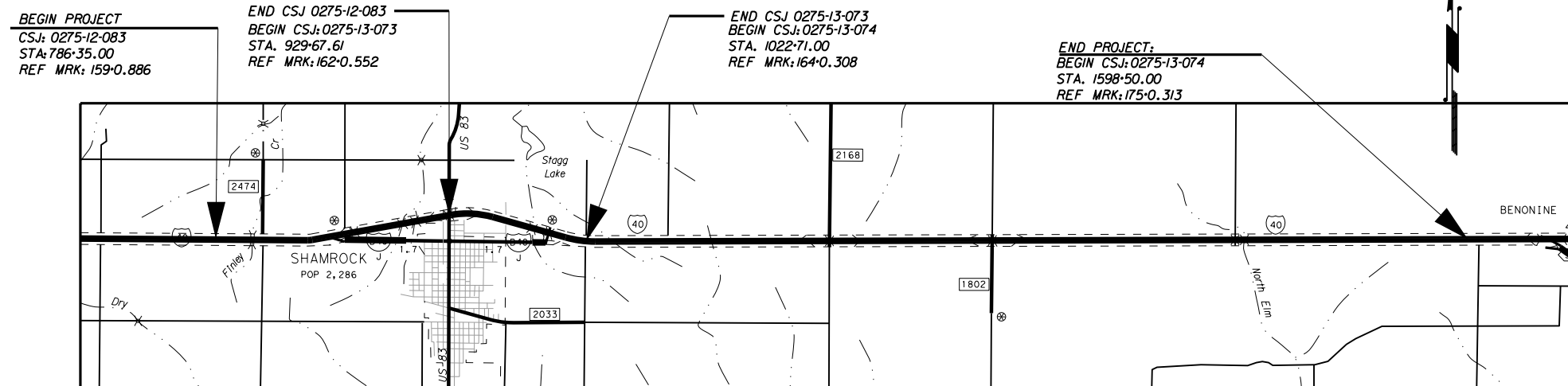
DATE WORK COMPLETED: \_\_\_\_\_

DATE OF WORK ACCEPTANCE: \_\_\_\_\_

I, \_\_\_\_\_, P.E. DO HEREBY CERTIFY  
THAT THE CONSTRUCTION WORK WAS PERFORMED IN ACCORDANCE WITH  
THE PLANS, CONTRACT, AND CHANGES THERETO.

AREA ENGINEER

DATE



EXCEPTIONS: NONE  
EQUATIONS: NONE  
RAILROAD CROSSINGS: NONE

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION,  
NOVEMBER 1, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS,  
SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL  
FEDERAL-AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, JULY 5, 2022)



RECOMMENDED FOR LETTING: 01/05/2023

*Matthew G. Hebert, P.E.*

AREA ENGINEER

SUBMITTED FOR LETTING: 01/05/2023

*Chad B. Stein, P.E.*

TP&D DIRECTOR

RECOMMENDED FOR LETTING: 01/05/2023

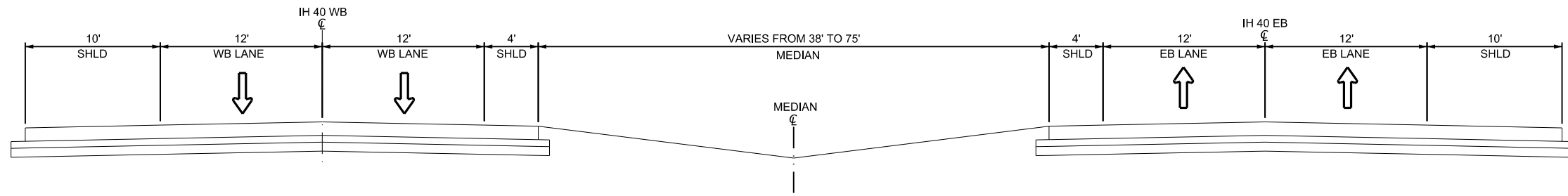
*[Signature]*

DISTRICT ENGINEER

DATE: \$DATE\$ \$TIME\$  
FILE: \$FILE\$

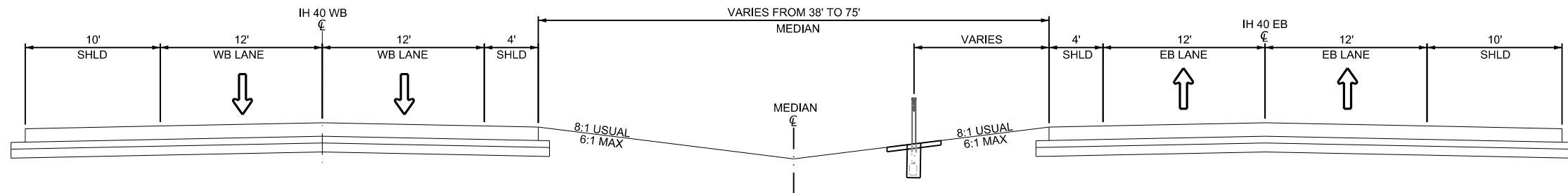


CK:  
DW:  
CK:  
DN:



① EXISTING TYPICAL SECTION

CSJ: 0275-12-083  
 STA. 786+35.00 TO STA. 929+67.61 = 14,332.61 FT.  
 CSJ: 0275-13-073  
 STA. 929+67.61 TO STA. 1022+71.00 = 9,303.39 FT.  
 CSJ: 0275-13-074  
 STA. 1022+71.00 TO STA. 1598+32.66 = 57,561.66 FT.

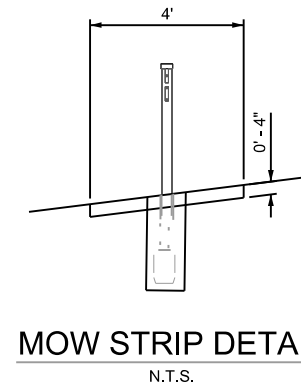


CABLE BARRIER OFFSETS

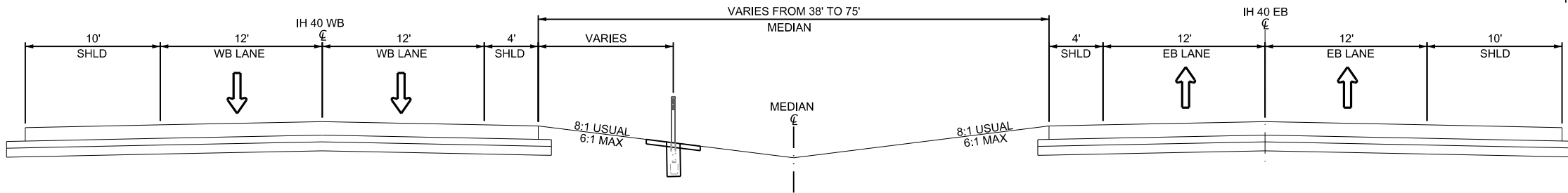
STATION	OFFSET (FROM EOP)
786+35.00 TO 930+09.25	12'
929+09.25 TO 1500+95.16	15'

①A PROPOSED TYPICAL SECTION

CSJ: 0275-12-083  
 STA. 786+35.00 TO STA. 844+20.06 = 5,785.06 FT.  
 STA. 854+18.38 TO STA. 865+71.63 = 1,153.25 FT.  
 STA. 892+39.63 TO STA. 930+09.25 = 3,769.62 FT.  
 TOTAL = 10,707.93 FT.  
 CSJ: 0275-13-073  
 STA. 964+53.48 TO STA. 998+56.03 = 3,402.55 FT.  
 CSJ: 0275-13-074  
 STA. 1086+37.50 TO STA. 1181+40.33 = 9,502.83 FT.  
 STA. 1231+34.71 TO STA. 1287+69.90 = 5,635.19 FT.  
 STA. 1359+33.68 TO STA. 1443+86.34 = 8,452.66 FT.  
 STA. 1498+32.66 TO STA. 1598+32.66 = 10,000.00 FT.  
 TOTAL = 33,590.68 FT.



MOW STRIP DETAIL  
N.T.S.



①B PROPOSED TYPICAL SECTION

CSJ: 0275-12-083  
 STA. 842+67.62 TO STA. 855+80.38 = 1,312.76 FT.  
 STA. 871+20.44 TO STA. 895+02.13 = 2,381.69 FT.  
 TOTAL = 3,694.45 FT.  
 CSJ: 0275-13-073  
 STA. 929+09.25 TO STA. 967+15.98 = 3,806.73 FT.  
 STA. 997+56.03 TO STA. 1022+71.00 = 2,514.97 FT.  
 TOTAL = 6,321.70 FT.  
 CSJ: 0275-13-074  
 STA. 1022+71.00 TO STA. 1088+98.70 = 6,627.70 FT.  
 STA. 1179+90.33 TO STA. 1233+97.21 = 5,406.88 FT.  
 STA. 1285+86.90 TO STA. 1361+96.18 = 7,609.28 FT.  
 STA. 1448+22.31 TO STA. 1500+95.16 = 5,272.85 FT.  
 TOTAL = 24,916.71 FT.



Ryan J. Reid P.E.  
12/29/2022

DATE: 12/29/2022 12:57:52 PM  
 FILE: T:\PROJECTS\8035\WHEELER\0275-12-083 (Cable Barrier)\Plan Set\General\TYPICAL SECTIONS.dgn

Texas Department of Transportation

IH-40

TYPICAL SECTIONS

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0275	12	083,ETC	IH-40
DIST	COUNTY	SHEET NO.	
CHS	WHEELER	3	

**GENERAL NOTES AND SUPPLEMENTAL INFORMATION**

*BASIS FOR ESTIMATE		
ITEM	DESCRIPTION	RATE
314	EMULSIFIED ASPH (CSS-1H) (EROSION CONTROL)	0.20 GAL/SY

\*RATES SHOWN IN THIS TABLE HAVE BEEN USED FOR PLAN QUANTITY CALCULATIONS AND MAY BE ADJUSTED BY THE ENGINEER DURING CONSTRUCTION FOR APPLICATION PURPOSES.

CONTRACTOR QUESTIONS ON THIS PROJECT ARE TO BE ADDRESSED TO THE FOLLOWING INDIVIDUAL(S):

[MATTHEW.HERBSTTRITT@TXDOT.GOV](mailto:MATTHEW.HERBSTTRITT@TXDOT.GOV)  
[JEREMY.HAGAR@TXDOT.GOV](mailto:JEREMY.HAGAR@TXDOT.GOV)

CONTRACTOR QUESTIONS WILL BE ACCEPTED THROUGH EMAIL, PHONE, AND IN PERSON TO THE ABOVE INDIVIDUAL(S). ALL CONTRACTOR QUESTIONS WILL BE REVIEWED BY THE RESPONSIBLE AREA ENGINEER OR DISTRICT DIRECTOR. 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 RESPONSES/](https://ftp.dot.state.tx.us/pub/txdot-info/pre-letting-responses/)

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, CCSJ/PROJECT NAME.

**ITEM 5 - CONTROL OF THE WORK**

CONSTRUCTION SURVEYING ON THIS CONTRACT WILL BE IN ACCORDANCE WITH ARTICLE 5.9.3, "METHOD C". THE CONTRACTOR SHALL PLACE CONSTRUCTION STAKES NEAR THE RIGHT-OF-WAY LINE AT INTERVALS OF NO MORE THAN 200', OR AS DIRECTED, WITH STATIONING.

CORRECT ANY DEFICIENCIES IDENTIFIED DURING FINAL INSPECTION, INCLUDING REQUIRED PAPERWORK. SUBMIT ALL REQUIRED DOCUMENTATION WITHIN 14 DAYS OF FINAL ACCEPTANCE AS DIRECTED BY THE ENGINEER.

**ITEM 6 – CONTROL OF MATERIALS**

WHEN A PRECAST OR CAST-IN-PLACE CONCRETE ELEMENT IS INCLUDED IN THE PLANS, A PRECAST CONCRETE ALTERNATE MAY BE SUBMITTED IN ACCORDANCE WITH "STANDARD OPERATING PROCEDURE FOR ALTERNATE PRECAST PROPOSAL SUBMISSION" FOUND ONLINE AT THE FOLLOWING ADDRESS:

[HTTPS://FTP.TXDOT.GOV/PUB/TXDOT-INFO/BRG/DESIGN/ALTERNATE-PRECAST-PROPOSAL-SUBMISSION.PDF](https://ftp.txdot.gov/pub/txdot-info/brg/design/alternate-precast-proposal-submission.pdf)

AN ACCEPTANCE OR DENIAL OF AN ALTERNATE IS AT THE SOLE DISCRETION OF THE ENGINEER. IMPACTS TO THE PROJECT SCHEDULE AND ANY ADDITIONAL COSTS RESULTING FROM THE USE OF ALTERNATES ARE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.

TO COMPLY WITH THE LATEST PROVISIONS OF BUILD AMERICA, BUY AMERICA ACT (BABA ACT) OF THE BIPARTISAN INFRASTRUCTURE LAW, THE CONTRACTOR MUST SUBMIT A NOTARIZED ORIGINAL OF THE TXDOT CONSTRUCTION MATERIAL BUY AMERICA CERTIFICATION FORM FOR ALL ITEMS CLASSIFIED AS CONSTRUCTION MATERIALS. THIS FORM IS NOT REQUIRED FOR MATERIALS CLASSIFIED AS A MANUFACTURED PRODUCT.

REFER TO THE BUY AMERICA MATERIAL CLASSIFICATION SHEET FOR CLARIFICATION ON MATERIAL CATEGORIZATION.

THE BUY AMERICA MATERIAL CLASSIFICATION SHEET IS LOCATED AT THE BELOW LINK.

[HTTPS://WWW.TXDOT.GOV/BUSINESS/RESOURCES/MATERIALS/BUY-AMERICA-MATERIAL-CLASSIFICATION-SHEET.HTML](https://www.txdot.gov/business/resources/materials/buy-america-material-classification-sheet.html) FOR CLARIFICATION ON MATERIAL CATEGORIZATION.

**ITEM 7 - LEGAL RELATIONS AND RESPONSIBILITIES**

PROVIDE INGRESS & EGRESS TO THE ADJACENT PROPERTIES IN AREAS UNDER CONSTRUCTION. PHASED CONSTRUCTION OF DRIVEWAYS AND STREETS SHALL BE REQUIRED TO PROVIDE UNINTERRUPTED ACCESS TO ADJACENT PROPERTIES. COORDINATE WORK WITH THE PROPERTY OWNERS BEFORE BEGINNING ANY CONSTRUCTION IN THE VICINITY OF THE DRIVE.

DO NOT INITIATE ACTIVITIES IN A PROJECT SPECIFIC LOCATION (PSL) ASSOCIATED WITH A U.S. ARMY CORPS OF ENGINEERS (USACE) PERMIT AREA THAT HAS NOT BEEN PREVIOUSLY EVALUATED BY THE USACE AS PART OF THE PERMIT REVIEW FOR THIS PROJECT. SUCH ACTIVITIES INCLUDE BUT ARE NOT LIMITED TO, HAUL ROADS, EQUIPMENT STAGING AREAS, BORROW AND DISPOSAL SITES. "ASSOCIATED", AS DEFINED HEREIN, INCLUDES MATERIALS DELIVERED TO OR FROM THE PSL. THE PERMIT AREA INCLUDES ALL WATERS OF THE U.S. OR ASSOCIATED WETLANDS AFFECTED BY PROJECT ACTIVITIES. SPECIAL RESTRICTIONS MAY BE REQUIRED FOR SUCH WORK. CONSULT WITH THE USACE REGARDING ACTIVITIES, INCLUDING PROJECT SPECIFIC LOCATIONS (PSLS) THAT HAVE NOT BEEN PREVIOUSLY EVALUATED BY THE USACE. PROVIDE THE DEPARTMENT WITH A COPY OF ALL CONSULTATION(S) OR APPROVAL(S) FROM THE USACE PRIOR TO INITIATING ACTIVITIES.

PROCEED WITH ACTIVITIES IN PSLS THAT DO NOT AFFECT A USACE PERMIT AREA IF A SELF DETERMINATION HAS BEEN MADE THAT THE PSL IS NON-JURISDICTIONAL OR PROPER USACE CLEARANCES HAVE BEEN OBTAINED IN JURISDICTIONAL AREAS OR HAVE BEEN PREVIOUSLY EVALUATED BY THE USACE AS PART OF THE PERMIT REVIEW FOR THIS PROJECT. DOCUMENT ANY DETERMINATION(S) THAT PROJECT ACTIVITIES DO NOT AFFECT A USACE PERMIT AREA. MAINTAIN COPIES OF DETERMINATION(S) FOR REVIEW BY THE DEPARTMENT OR ANY REGULATORY AGENCY.

DOCUMENT AND COORDINATE WITH THE USACE, IF REQUIRED, PRIOR TO ANY EXCAVATION HAULED FROM OR EMBANKMENT HAULED INTO A USACE PERMIT AREA BY EITHER (1) OR (2) BELOW.

**1. RESTRICTED USE OF MATERIALS FOR THE PREVIOUSLY EVALUATED PERMIT AREAS.**

COUNTY: Wheeler

HIGHWAY: IH-40

DOCUMENT BOTH THE PROJECT SPECIFIC LOCATION (PSL) AND AUTHORIZATION. MAINTAIN COPIES FOR REVIEW BY THE DEPARTMENT OR ANY REGULATORY AGENCY. WHEN AN AREA WITHIN THE PROJECT LIMITS HAS BEEN EVALUATED BY THE USACE AS PART OF THE PERMIT PROCESS FOR THIS PROJECT:

- SUITABLE EXCAVATION OF REQUIRED MATERIAL IN THE AREAS SHOWN ON THE PLANS AND CROSS SECTIONS AS SPECIFIED IN ITEM 110 IS USED FOR PERMANENT OR TEMPORARY FILL (ITEM 132, EMBANKMENT) WITHIN A USACE PERMIT AREA;
- SUITABLE EMBANKMENT (ITEM 132) FROM WITHIN THE USACE PERMIT AREA IS USED AS FILL WITHIN A USACE EVALUATED AREA; AND,
- UNSUITABLE EXCAVATION OR EXCESS EXCAVATION [“WASTE”] (ITEM 110) THAT IS DISPOSED OF AT A LOCATION APPROVED BY THE ENGINEER WITHIN A USACE EVALUATED AREA.

**2. CONTRACTOR MATERIALS FROM AREAS OTHER THAN PREVIOUSLY EVALUATED AREAS.**

PROVIDE THE DEPARTMENT WITH A COPY OF ALL USACE COORDINATION OR APPROVAL(S) PRIOR TO INITIATING ANY ACTIVITIES FOR AN AREA WITHIN THE PROJECT LIMITS THAT HAS NOT BEEN EVALUATED BY THE USACE OR FOR ANY OFF RIGHT OF WAY LOCATIONS USED FOR THE FOLLOWING, BUT NOT LIMITED TO, HAUL ROADS, EQUIPMENT STAGING AREAS, BORROW AND DISPOSAL SITES:

- ITEM 132, EMBANKMENT, USED FOR TEMPORARY OR PERMANENT FILL WITHIN A USACE PERMIT AREA; AND,
- UNSUITABLE EXCAVATION OR EXCESS EXCAVATION [“WASTE”] (ITEM 110, EXCAVATION) THAT IS DISPOSED OF OUTSIDE A USACE EVALUATED AREA.

THE DISTURBED AREA IN THIS PROJECT, ALL PROJECT LOCATIONS IN THE CONTRACT, AND THE CONTRACTOR’S PROJECT SPECIFIC LOCATIONS (PSLS), WITHIN ONE (1) MILE OF THE PROJECT LIMITS, FOR THE CONTRACT WILL FURTHER ESTABLISH THE AUTHORIZATION REQUIREMENTS FOR STORM WATER DISCHARGES. THE DEPARTMENT WILL OBTAIN AN AUTHORIZATION TO DISCHARGE STORM WATER FROM THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ) FOR THE CONSTRUCTION ACTIVITIES SHOWN ON THE PLANS. THE CONTRACTOR IS TO OBTAIN REQUIRED AUTHORIZATION FROM THE TCEQ FOR CONTRACTOR PSLs FOR CONSTRUCTION SUPPORT ACTIVITIES ON OR OFF THE ROW. WHEN THE TOTAL AREA DISTURBED IN THE CONTRACT AND PSLs WITHIN ONE (1) MILE OF THE PROJECT LIMITS EXCEEDS FIVE (5) ACRES, PROVIDE A COPY OF THE CONTRACTOR’S NOI FOR PSLs ON THE ROW TO THE ENGINEER AND TO THE LOCAL GOVERNMENT THAT OPERATES A SEPARATE STORM SEWER SYSTEM.

NO SIGNIFICANT TRAFFIC GENERATOR EVENTS IDENTIFIED.

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**ITEM 8 – PROSECUTION AND PROGRESS**

WORKING DAYS WILL BE CHARGED IN ACCORDANCE WITH ARTICLE 8.3.1.4, STANDARD WORKWEEK.

PROVIDE A MINIMUM OF 2 WORKING DAYS ADVANCED NOTICE TO THE ENGINEER FOR REQUESTS TO PERFORM WORK ON SATURDAYS. NO WORK ON SUNDAYS OR NATIONAL HOLIDAYS WILL BE ALLOWED.

SUBMIT WRITTEN REQUESTS TO THE ENGINEER FOR CONSIDERATION OF TEMPORARY SUSPENSION OF WORK AND/OR WORKING DAY CHARGES DUE TO CONDITIONS NOT UNDER THE CONTROL OF THE CONTRACTOR. SUCH REQUESTS WILL BE EVALUATED BY THE ENGINEER ON A CASE-BY-CASE BASIS AND A WRITTEN RESPONSE WILL BE PROVIDED TO THE CONTRACTOR.

COORDINATE WITH THE ENGINEER TO DETERMINE THE APPROPRIATE PROJECT SCHEDULE TYPE IN ACCORDANCE WITH ARTICLE 5.5 PRIOR TO SUBMISSION OF THE BASELINE SCHEDULE.

**ITEM 502 - BARRICADES, SIGNS, AND TRAFFIC HANDLING**

THE CONTRACTOR’S RESPONSIBLE PERSON FOR TCP COMPLIANCE SHALL BE AVAILABLE BY PHONE AND SHALL HAVE A RESPONSE TIME WITHIN 45 MINUTES.

WORK WILL NOT BE ALLOWED ON BOTH SIDES OF THE ROAD AT THE SAME TIME UNLESS OTHERWISE APPROVED BY THE ENGINEER.

ALL EQUIPMENT AND MATERIALS SHALL BE STORED OUTSIDE THE ROADWAY CLEAR ZONE.

EQUIP ALL WORK VEHICLES WITHIN 30 FEET OF THE TRAVELED WAY WITH A FUNCTIONING AMBER STROBE LIGHT OR ROTATING BEACON VISIBLE FROM ALL DIRECTIONS.

THE CONTRACTOR SHALL TAKE ACTION AT THE TIME OF RECEIPT OF THE BARRICADE INSPECTION IN ACORDANCE WITH THE DEFICIENCY PRIORITY. MAKE CORRECTIONS WITHIN 1 CALENDAR DAY FOR A PRIORITY 1 DEFICIENCY, OR WITHIN 7 CALENDAR DAYS FOR A PRIORITY 2 DEFICIENCY. THE ENGINEER MAY REQUIRE THE TEMPORARY SUSPENSION OF WORK WITHOUT SUSPENSION OF TIME CHARGES FOR FAILURE TO MAKE CORRECTIONS WITHIN THE APPROPRIATE TIME FRAMES.

THE CONTRACTOR FORCE ACCOUNT “SAFETY CONTINGENCY” THAT HAS BEEN ESTABLISHED FOR THIS PROJECT IS INTENDED TO BE UTILIZED FOR WORK ZONE ENHANCEMENTS AND TO IMPROVE THE EFFECTIVENESS OF THE TRAFFIC CONTROL PLAN. THESE ENHANCEMENTS WILL BE MUTUALLY AGREED UPON BY THE ENGINEER AND THE CONTRACTOR’S RESPONSIBLE PERSON IN WRITING. THE ENGINEER MAY CHOOSE TO USE EXISTING BID ITEMS IF IT DOES NOT SLOW THE IMPLEMENTATION OR ENHANCEMENT.

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**ITEM 506 – TEMPORARY EROSION, SEDIMENTATION, AND ENVIRONMENTAL CONTROLS**

THE ENGINEER MAY REQUIRE THE TEMPORARY SUSPENSION OF WORK WITHOUT SUSPENSION OF TIME CHARGES FOR FAILURE TO MAKE CORRECTIONS TO DEFICIENCIES NOTED ON FORM 2118 WITHIN THE APPROPRIATE TIME FRAMES.

**ITEM 644 –SMALL ROADSIDE SIGN SUPPORTS AND ASSEMBLIES**

USE THE TEXAS TRIANGULAR UNIVERSAL SLIP BASE. CONTRACTOR WILL PROVIDE SIGN POST SUPPORT CASTINGS FOR THE TEXAS TRIANGULAR UNIVERSAL SLIP BASE SYSTEM WHICH WILL CONTAIN CLAMPING BOLTS. TEXAS TRIANGULAR UNIVERSAL SLIP BASE SYSTEMS WHICH CONTAIN SET SCREWS WILL NOT BE PERMITTED. CONSTRUCTION OF REQUIRED CONCRETE FOOTINGS SHALL BE SUBSIDIARY.

REUSE EXISTING SUPPORTS WHERE POSSIBLE OR PROVIDE NEW SUPPORTS. REUSE SIGNS IF DEEMED SUITABLE BY THE ENGINEER.

REMOVE ALL OLD POSTS, STUBS AND/OR CONCRETE FROM THE RIGHT OF WAY AT THE END OF EACH DAY.

THE CONTRACTOR SHALL COORDINATE WITH THE ENGINEER PRIOR TO PLACEMENT OF PERMANENT SIGNS TO VERIFY AND APPROVE ALL SIGN LOCATIONS. THE CONTRACTOR WILL MARK THE PROPOSED LOCATIONS.

**ITEM 6185 – TRUCK MOUNTED ATTENUATOR (TMA) AND TRAILER ATTENUATOR (TA)**

THERE WILL BE NO ADDITIONAL SHADOW VEHICLES OR TMA REQUIRED IN ADDITION TO THE SHADOW VEHICLES WITH TRUCK MOUNTED ATTENUATOR (TMA) THAT ARE SPECIFIED AS BEING REQUIRED ON THE TRAFFIC CONTROL PLAN STANDARDS FOR THIS PROJECT.

REFERENCE THE TABLE BELOW FOR TMA REQUIRED PER TCP STANDARD OPERATION. THE CONTRACTOR WILL BE RESPONSIBLE FOR DETERMINING IF ONE OR MORE OF THESE OPERATIONS WILL BE ONGOING AT THE SAME TIME TO DETERMINE THE TOTAL NUMBER OF TMA’S NEEDED FOR THE PROJECT.

BASIS OF ESTIMATE FOR STATIONARY TMA:				
TMA (STATIONARY)				
PHASE	STANDARD	REQUIRED	ADDITIONAL	TOTAL
EMERGENCY CROSSOVERS	TCP(5-18) & TCP(6) SERIES	1	0	1
CABLE BARRIER	TCP(5-18) & TCP(6) SERIES	1	0	1



# Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0275-12-083

DISTRICT Childress  
HIGHWAY IH 40

COUNTY Wheeler

CONTROL SECTION JOB				0275-12-083		0275-13-073		0275-13-074		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00188841		A00184274		A00188603			
COUNTY				Wheeler		Wheeler		Wheeler			
HIGHWAY				IH 40		IH 40		IH 40			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL	EST.	FINAL	EST.	FINAL		
	110-6001	EXCAVATION (ROADWAY)	CY	6.000		3.000		15.000		24.000	
	132-6003	EMBANKMENT (FINAL)(ORD COMP)(TY B)	CY	90.000		45.000		225.000		360.000	
	150-6002	BLADING	HR	35.000		25.000		90.000		150.000	
	164-6033	DRILL SEEDING (PERM) (RURAL) (SANDY)	SY	667.000		406.000		2,287.000		3,360.000	
	164-6051	DRILL SEED (TEMP)(WARM OR COOL)	SY	667.000		406.000		2,287.000		3,360.000	
	314-6013	EMULS ASPH (EROSN CONT)(CSS-1H)	GAL	133.000		82.000		457.000		672.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY	685.000		480.000		2,889.000		4,054.000	
	464-6030	RC PIPE (ARCH)(CL III)(DES 1)	LF	88.000		44.000		220.000		352.000	
	467-6519	SET (TY II) (DES 1) (RCP) (6: 1) (P)	EA	4.000		2.000		10.000		16.000	
	500-6001	MOBILIZATION	LS	1.000						1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	11.000						11.000	
	506-6042	BIODEG EROSN CONT LOGS (INSTL) (18")	LF	200.000		100.000		500.000		800.000	
	530-6007	TURNOUTS (CONC)	SY	299.000		178.000		920.000		1,397.000	
	543-6002	CABLE BARRIER SYSTEM (TL-4)	LF	13,362.000		8,973.000		56,125.000		78,460.000	
	543-6020	CABLE BARRIER TERMINAL SECTION (TL-4)	EA	10.000		6.000		18.000		34.000	
	644-6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	4.000		2.000		10.000		16.000	
	658-6068	INSTL DEL ASSM (D-DY)SZ 1(BRF)GF2	EA	134.000		90.000		422.000		646.000	
	658-6099	INSTL OM ASSM (OM-2Z)(WFLX)GND	EA	4.000		2.000		10.000		16.000	
	18	EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000						1.000	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000						1.000	

DWG:   
 CHK:   
 DWF:   
 CKE:

ROADWAY SUMMARY

LOCATION	LENGTH (FT)	110	132	150	530	658	432	543	543	658
		6001	6003	6002	6007	6099	6045	6002	6002	6068
		EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (ORD COMP) (TY B)	BLADING	TURNOUTS (CONC)	INSTL OM ASSM (OM-2Z) (WFL) GND	RIPRAP (MOW STRIP) (4 IN)	CABLE BARRIER SYSTEM (TL-4)	CABLE BARRIER TERMINAL SECTION (TL-4)	INSTL DEL ASSM (D-DY) SZ 1 (BRG) GF2
CSJ		CY	CY	HR	SY	EA	CY	LF	EA	EA
0275-12-083	13,362.00	6	90	35	299	4	685	13,362	10	134
0275-13-073	8,973.00	3	45	25	178	2	458	8,973	6	90
0275-13-074	56,125.00	15	225	90	920	10	2,822	56,125	18	422
<b>PROJECT TOTALS:</b>	<b>78,460.00</b>	<b>24</b>	<b>360</b>	<b>150</b>	<b>1,397</b>	<b>16</b>	<b>3,965</b>	<b>78,460</b>	<b>34</b>	<b>646</b>

DRAINAGE SUMMARY

LOCATION	464	467
	6030	6519
	RC PIPE (ARCH) (CL III) (DES 1)	SET (TY II) (DES 1) (RCP) (6:1) (P)
CSJ	LF	EA
0275-12-083	88	4
0275-13-073	44	2
0275-13-074	220	10
<b>PROJECT TOTALS:</b>	<b>352</b>	<b>16</b>

SIGN SUMMARY

CSJ	644
	6004
	INSM RD SN SUP&AM TY10BWG (1) SA (T)
	EA
0275-12-083	4
0275-13-073	2
0275-13-074	10
<b>PROJECT TOTAL:</b>	<b>16</b>

EROSION CONTROL SUMMARY

LOCATION	164	164	314	506
	6033	6051	6013	6042
	DRILL SEEDING (PERM) (RURAL) (SANDY)	DRILL SEEDING (TEMP) (WARM OR COOL)	EMUL ASPH (EROSN CONT) (CSS-1H)	BIODEG EROSN CONT LOGS (INSTL) (18")
CSJ	SY	SY	GAL	LF
0275-12-083	667	667	133	200
0275-13-073	406	406	82	100
0275-13-074	2,287	2,287	457	500
<b>PROJECT TOTALS:</b>	<b>3,360</b>	<b>3,360</b>	<b>672</b>	<b>800</b>

**IH 40  
QUANTITY SUMMARY**



CONT	SECT	JOB	HIGHWAY
0275	12	083, ETC	IH-40
DIST	COUNTY		SHEET NO.
CHS	WHEELER		6

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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.
- Where highway construction or maintenance work is being undertaken, other than mobile operations as defined by the Texas Manual on Uniform Traffic Control Devices, CSJ limit signs are required. CSJ limit signs are shown on BC(2). The OBEY WARNING SIGNS STATE LAW sign, STAY ALERT TALK OR TEXT LATER and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits. For mobile operations, CSJ limit signs are not required.
- Traffic control devices should be in place only while work is actually in progress or a definite need exists.
- The Engineer has the final decision on the location of all traffic control devices.
- Inactive equipment and work vehicles, including workers' private vehicles must be parked away from travel lanes. They should be as close to the right-of-way line as possible, or located behind a barrier or guardrail, or as approved by the Engineer.

**WORKER SAFETY NOTES:**


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

**COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES**

- Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources.
- Work zone traffic control devices shall be compliant with the Manual for Assessing safety Hardware (MASH).

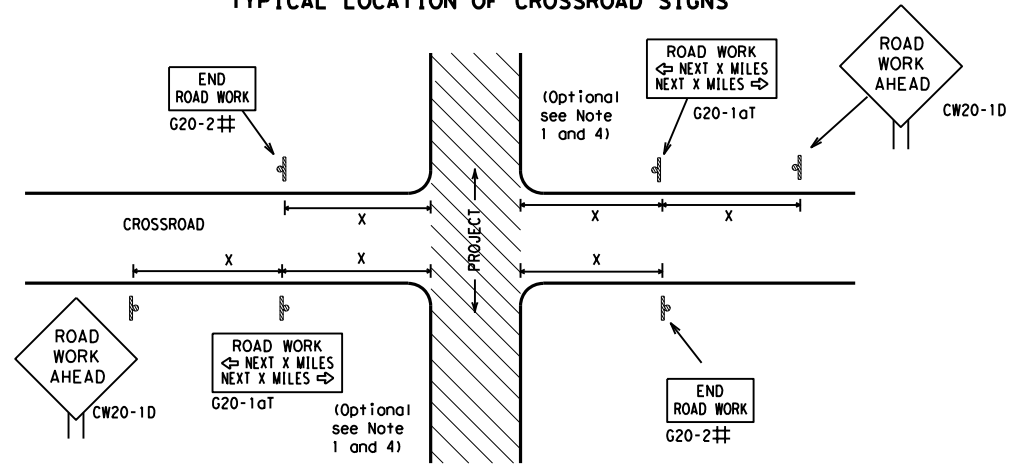
<b>THE DOCUMENTS BELOW CAN BE FOUND ON-LINE AT</b> <a href="http://www.txdot.gov">http://www.txdot.gov</a>
COMPLIANT WORK ZONE TRAFFIC CONTROL DEVICES LIST (CWZTCD)
DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS)
MATERIAL PRODUCER LIST (MPL)
ROADWAY DESIGN MANUAL - SEE "MANUALS (ONLINE MANUALS)"
STANDARD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

SHEET 1 OF 12

 Texas Department of Transportation		Traffic Safety Division Standard	
<b>BARRICADE AND CONSTRUCTION          GENERAL NOTES          AND REQUIREMENTS</b>			
<b>BC (1) - 21</b>			
FILE: bc-21.dgn	DN: TxDOT	CR: TxDOT	DW: TxDOT
© TxDOT November 2002	CONT	SECT	JOB
REVISIONS	0275	12	083, ETC
4-03 7-13			
9-07 8-14			
5-10 5-21			
	DIST	COUNTY	SHEET NO.
	CHS	WHEELER	7

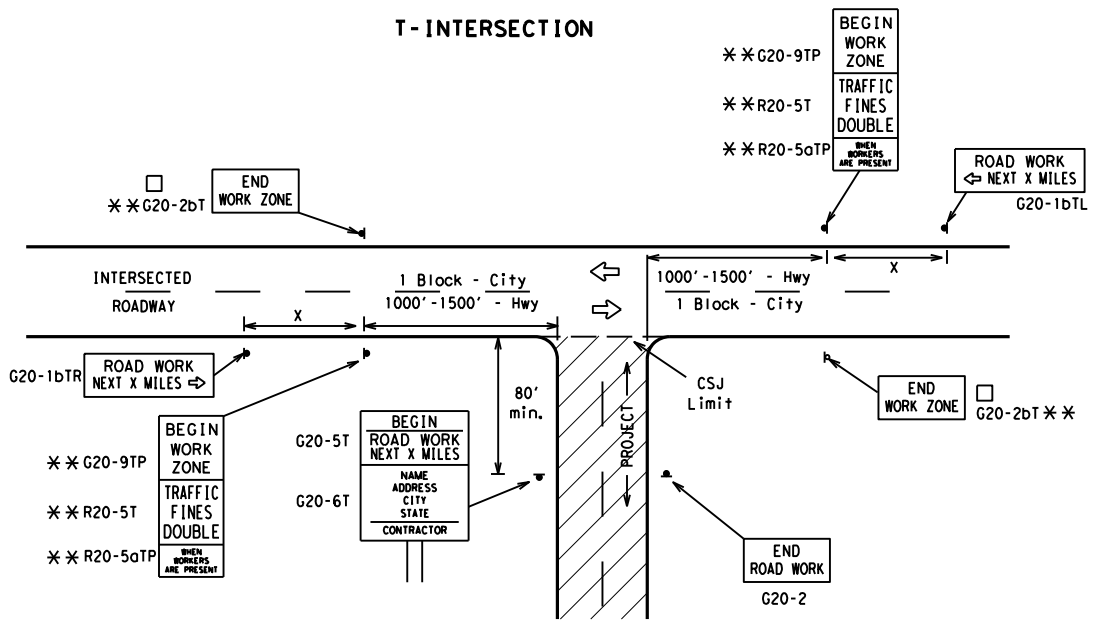
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**TYPICAL LOCATION OF CROSSROAD SIGNS**



- ## 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 as per TMUTCD Part 5. This information shall be shown in the plans.
  - Based on existing field conditions, the Engineer/Inspector may require additional signs such as FLAGGER AHEAD, LOOSE GRAVEL, or other appropriate signs. When additional signs are required, these signs will be considered part of the minimum requirements. The Engineer/Inspector will determine the proper location and spacing of any sign not shown on the BC sheets, Traffic Control Plan sheets or the Work Zone Standard Sheets.
  - The "ROAD WORK NEXT X MILES" (G20-1aT) sign shall be required at high volume crossroads to advise motorists of the length of construction in either direction from the intersection. The Engineer will determine whether a roadway is considered high volume.
  - Additional traffic control devices may be shown elsewhere in the plans for higher volume crossroads.
  - When work occurs in the intersection area, appropriate traffic control devices, as shown elsewhere in the plans or as determined by the Engineer/Inspector, shall be in place.

**T-INTERSECTION**



**CSJ LIMITS AT T-INTERSECTION**

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

**TYPICAL CONSTRUCTION WARNING SIGN SIZE AND SPACING<sup>1,5,6</sup>**

Sign Number or Series	SIZE		SPACING	
	Conventional Road	Expressway/Freeway	Posted Speed MPH	Sign Δ Spacing "x" Feet (Apprx.)
CW20 <sup>4</sup>	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 <sup>2</sup>
CW3, CW4, CW5, CW6, CW8-3, CW10, CW12	48" x 48"	48" x 48"	60	600 <sup>2</sup>
			65	700 <sup>2</sup>
			70	800 <sup>2</sup>
			75	900 <sup>2</sup>
			80	1000 <sup>2</sup>
			*	* <sup>3</sup>

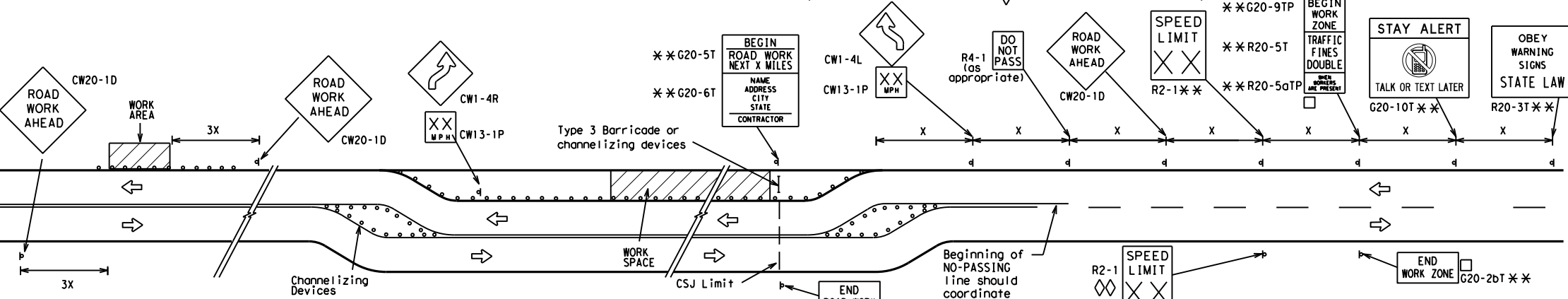
\* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

**GENERAL NOTES**

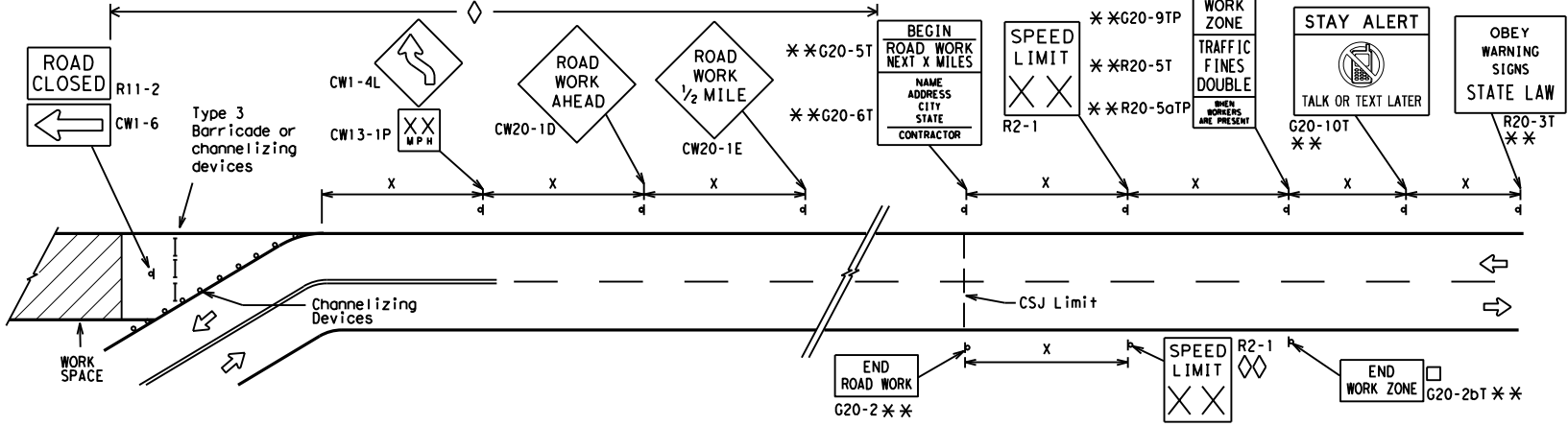
- Special or larger size signs may be used as necessary.
- Distance between signs should be increased as required to have 1500 feet advance warning.
- Distance between signs should be increased as required to have 1/2 mile or more advance warning.
- 36" x 36" "ROAD WORK AHEAD" (CW20-1D) signs may be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

**WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS**

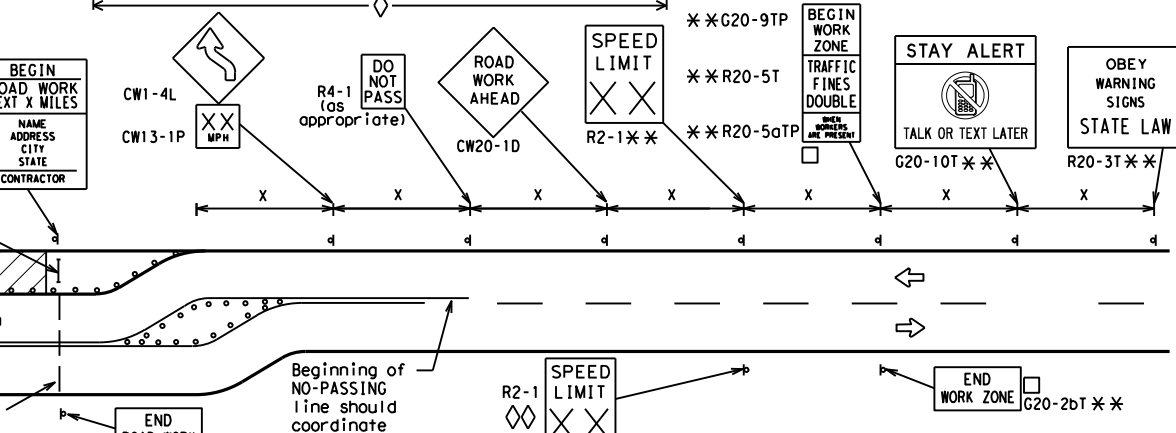


When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD" (CW20-1D) signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing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

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



**SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS**



**NOTES**

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

**LEGEND**

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

SHEET 2 OF 12

Texas Department of Transportation  
Traffic Safety Division Standard

**BARRICADE AND CONSTRUCTION PROJECT LIMIT**

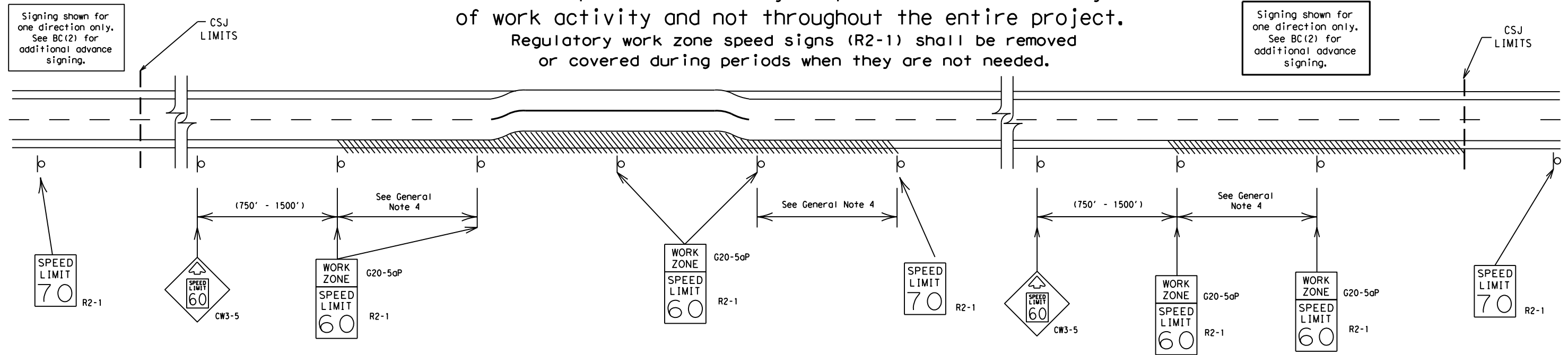
**BC (2) - 21**

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0275 12		083, ETC	IH-40
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	CHS	WHEELER		8

# 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 traveled way.

Short Term Work Zone Speed Limit signs should be posted and visible to the motorists only when work activity is present. When work activity is not present, signs shall be removed or covered. (See Removing or Covering on BC(4)).

## GENERAL NOTES

- 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.

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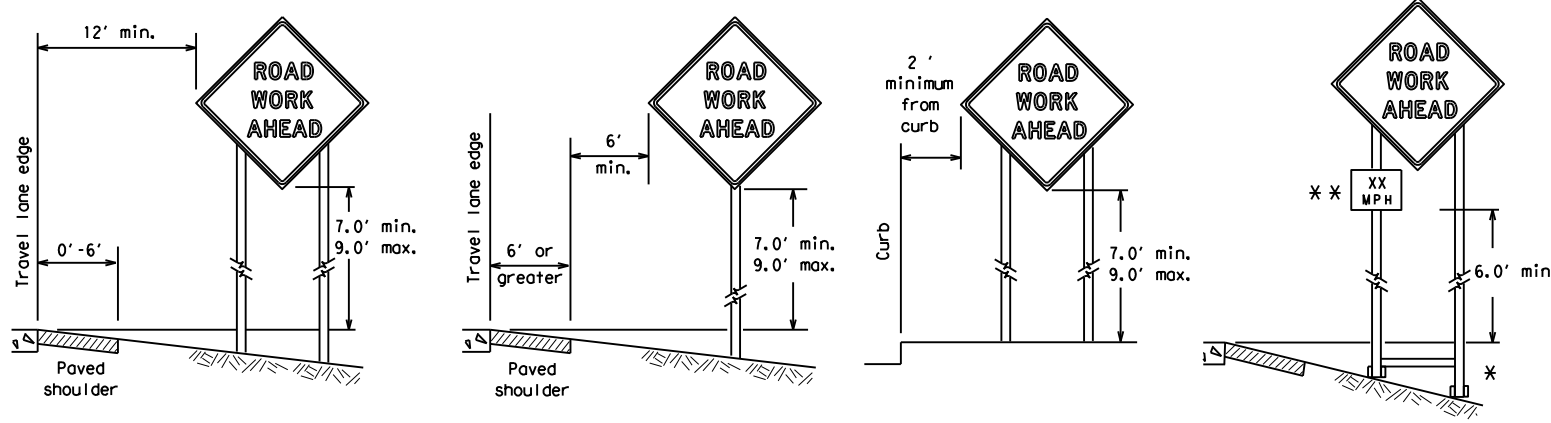
SHEET 3 OF 12

		Traffic Safety Division Standard	
<h2>BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT</h2>			
<h3>BC (3) - 21</h3>			
FILE:	bc-21.dgn	DW:	TxDOT
© TxDOT	November 2002	CONT:	0275 12
REVISIONS		SECT:	083, ETC
9-07	8-14	JOB:	IH-40
7-13	5-21	DIST:	WHEELER
		COUNTY:	
		SHEET NO.:	9

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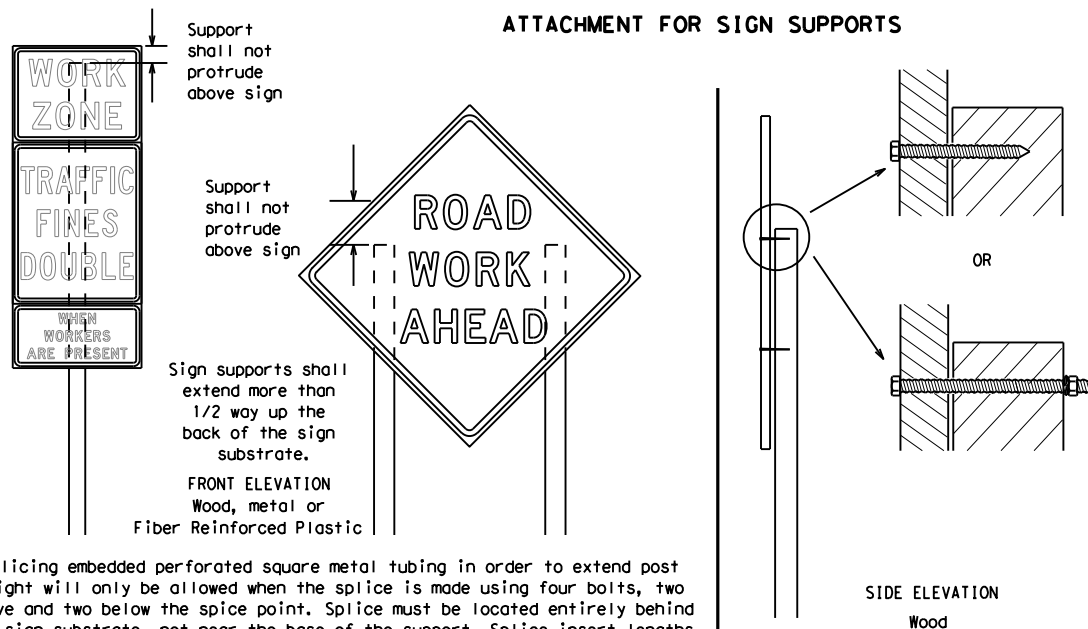
**TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS**



\* 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) for small roadside signs. Supports for temporary large roadside signs shall meet the requirements detailed on the Temporary Large Roadside Signs (TLRS) standard sheets. The Contractor shall install the sign support in accordance with the manufacturer's recommendations. If there is a question regarding installation procedures, the Contractor shall furnish the Engineer a copy of the manufacturer's installation recommendations so the Engineer can verify the correct procedures are being followed.
- The Contractor is responsible for installing signs on approved supports and replacing signs with damaged or cracked substrates and/or damaged or marred reflective sheeting as directed by the Engineer/Inspector.
- Identification markings may be shown only on the back of the sign substrate. The maximum height of letters and/or company logos used for identification shall be 1 inch.
- The Contractor shall replace damaged wood posts. New or damaged wood sign posts shall not be spliced.

**DURATION OF WORK (as defined by the "Texas Manual on Uniform Traffic Control Devices" Part 6)**

- The types of sign supports, sign mounting height, the size of signs, and the type of sign substrates can vary based on the type of work being performed. The Engineer is responsible for selecting the appropriate size sign for the type of work being performed. The Contractor is responsible for ensuring the sign support, sign mounting height and substrate meets manufacturer's recommendations in regard to crashworthiness and duration of work requirements.
  - Long-term stationary - work that occupies a location more than 3 days.
  - Intermediate-term stationary - work that occupies a location more than one daylight period up to 3 days, or nighttime work lasting more than one hour.
  - Short-term stationary - daytime work that occupies a location for more than 1 hour in a single daylight period.
  - Short, duration - work that occupies a location up to 1 hour.
  - Mobile - work that moves continuously or intermittently (stopping for up to approximately 15 minutes.)

**SIGN MOUNTING HEIGHT**

- The bottom of Long-term/Intermediate-term signs shall be at least 7 feet, but not more than 9 feet, above the paved surface, except as shown for supplemental plaques mounted below other signs.
- The bottom of Short-term/Short Duration signs shall be a minimum of 1 foot above the pavement surface but no more than 2 feet above the ground.
- Long-term/Intermediate-term Signs may be used in lieu of Short-term/Short Duration signing.
- Short-term/Short Duration signs shall be used only during daylight and shall be removed at the end of the workday or raised to appropriate Long-term/Intermediate sign height.
- Regulatory signs shall be mounted at least 7 feet, but not more than 9 feet, above the paved surface regardless of work duration.

**SIZE OF SIGNS**

- The Contractor shall furnish the sign sizes shown on BC (2) unless otherwise shown in the plans or as directed by the Engineer.

**SIGN SUBSTRATES**

- The Contractor shall ensure the sign substrate is installed in accordance with the manufacturer's recommendations for the type of sign support that is being used. The CWZTCD lists each substrate that can be used on the different types and models of sign supports.
- "Mesh" type materials are NOT an approved sign substrate, regardless of the tightness of the weave.
- All wooden individual sign panels fabricated from 2 or more pieces shall have one or more plywood cleat, 1/2" thick by 6" wide, fastened to the back of the sign and extending fully across the sign. The cleat shall be attached to the back of the sign using wood screws that do not penetrate the face of the sign panel. The screws shall be placed on both sides of the splice and spaced at 6" centers. The Engineer may approve other methods of splicing the sign face.

**REFLECTIVE SHEETING**

- All signs shall be retroreflective and constructed of sheeting meeting the color and retro-reflectivity requirements of DMS-8300 for rigid signs or DMS-8310 for roll-up signs. The web address for DMS specifications is shown on BC(1).
- White sheeting, meeting the requirements of DMS-8300 Type A, shall be used for signs with a white background.
- Orange sheeting, meeting the requirements of DMS-8300 Type B<sub>FL</sub> or Type C<sub>FL</sub>, 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 stubs shall be removed and holes backfilled upon completion of work.

**SIGN SUPPORT WEIGHTS**

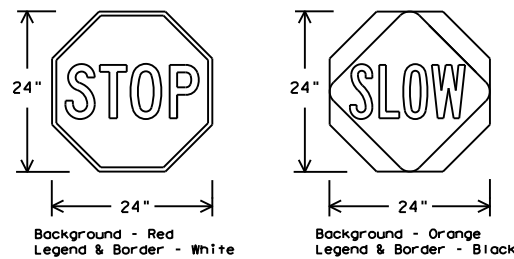
- Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand should be used.
- The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
- Rock, concrete, iron, steel or other solid objects shall not 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 ballasts designed for channelizing devices should not be used for ballast on portable sign supports. Sign supports designed and manufactured with rubber bases may be used when shown on the CWZTCD list.
- Sandbags shall only be placed along or laid over the base supports of the traffic control device and shall not be suspended above ground level or hung with rope, wire, chains or other fasteners. Sandbags shall be placed along the length of the skids to weigh down the sign support.
- Sandbags shall NOT be placed under the skid and shall not be used to level sign supports placed on slopes.

**FLAGS ON SIGNS**

- Flags may be used to draw attention to warning signs. When used, the flag shall be 16 inches square or larger and shall be orange or fluorescent red-orange in color. Flags shall not be allowed to cover any portion of the sign face.

**STOP/SLOW PADDLES**

- STOP/SLOW paddles are the primary method to control traffic by flaggers. The STOP/SLOW paddle size should be 24" x 24".
- STOP/SLOW paddles shall be retroreflective when used at night.
- STOP/SLOW paddles may be attached to a staff with a minimum length of 6' to the bottom of the sign.
- Any lights incorporated into the STOP or SLOW paddle faces shall only be as specifically described in Section 6E.03 Hand Signaling Devices in the TMUTCD.



SHEETING REQUIREMENTS (WHEN USED AT NIGHT)		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	ORANGE	TYPE B <sub>FL</sub> OR C <sub>FL</sub> SHEETING
LEGEND & BORDER	WHITE	TYPE B OR C SHEETING
LEGEND & BORDER	BLACK	ACRYLIC NON-REFLECTIVE FILM

**CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS**

- Permanent signs are used to give notice of traffic laws or regulations, call attention to conditions that are potentially hazardous to traffic operations, show route designations, destinations, directions, distances, services, points of interest, and other geographical, recreational, specific service (LOGO), or cultural information. Drivers proceeding through a work zone need the same, if not better route guidance as normally installed on a roadway without construction.
- When permanent regulatory or warning signs conflict with work zone conditions, remove or cover the permanent signs until the permanent sign message matches the roadway condition. For details for covering large guide signs see the TS-CD standard.
- When existing permanent signs are moved and relocated due to construction purposes, they shall be visible to motorists at all times.
- If existing signs are to be relocated on their original supports, they shall be installed on crashworthy bases as shown on the SMD Standard sheets. The signs shall meet the required mounting heights shown on the BC Sheets or the SMD Standards. This work should be paid for under the appropriate pay item for relocating existing signs.
- If permanent signs are to be removed and relocated using temporary supports, the Contractor shall use crashworthy supports as shown on the BC standard sheets, TLRS standard sheets or the CWZTCD list. The signs shall meet the required mounting heights shown on the BC, or the SMD standard sheets during construction. This work should be paid for under the appropriate pay item for relocating existing signs.
- Any sign or traffic control device that is struck or damaged by the Contractor or his/her construction equipment shall be replaced as soon as possible by the Contractor to ensure proper guidance for the motorists. This will be subsidiary to Item 502.

SHEET 4 OF 12

Texas Department of Transportation
Traffic Safety Division Standard

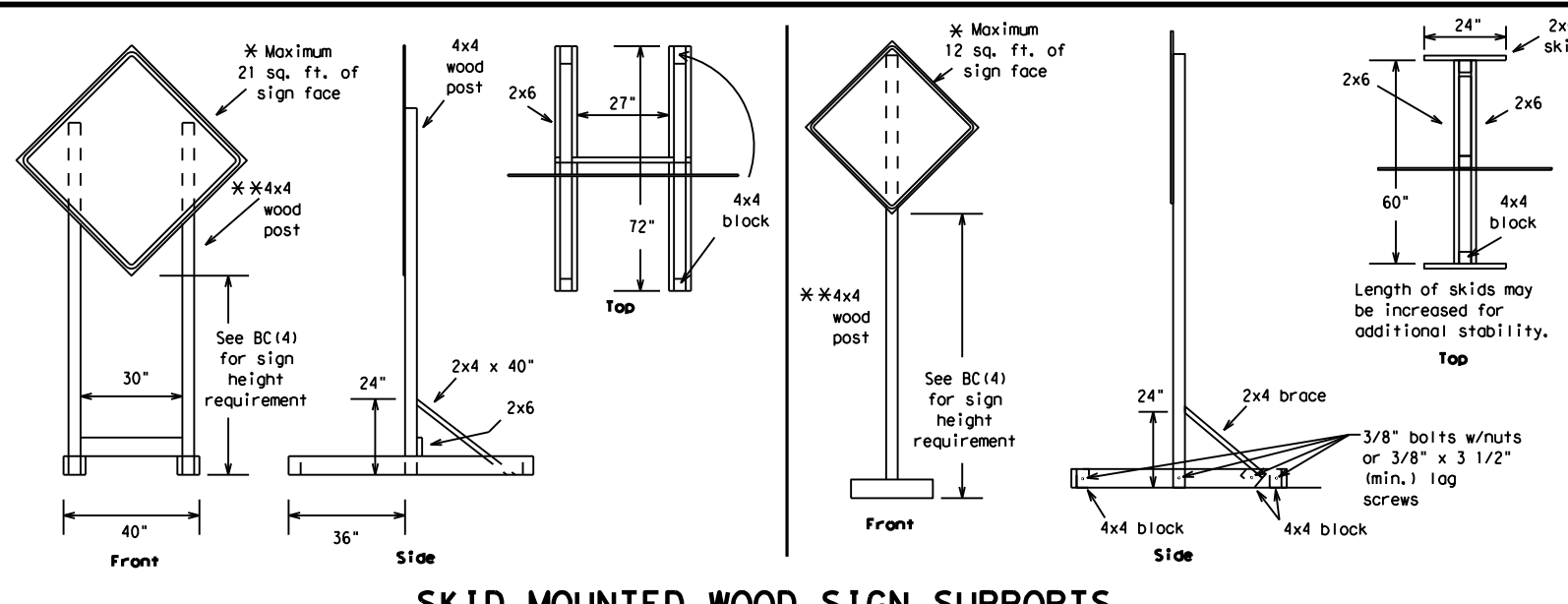
BARRICADE AND CONSTRUCTION  
TEMPORARY SIGN NOTES

BC(4)-21

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© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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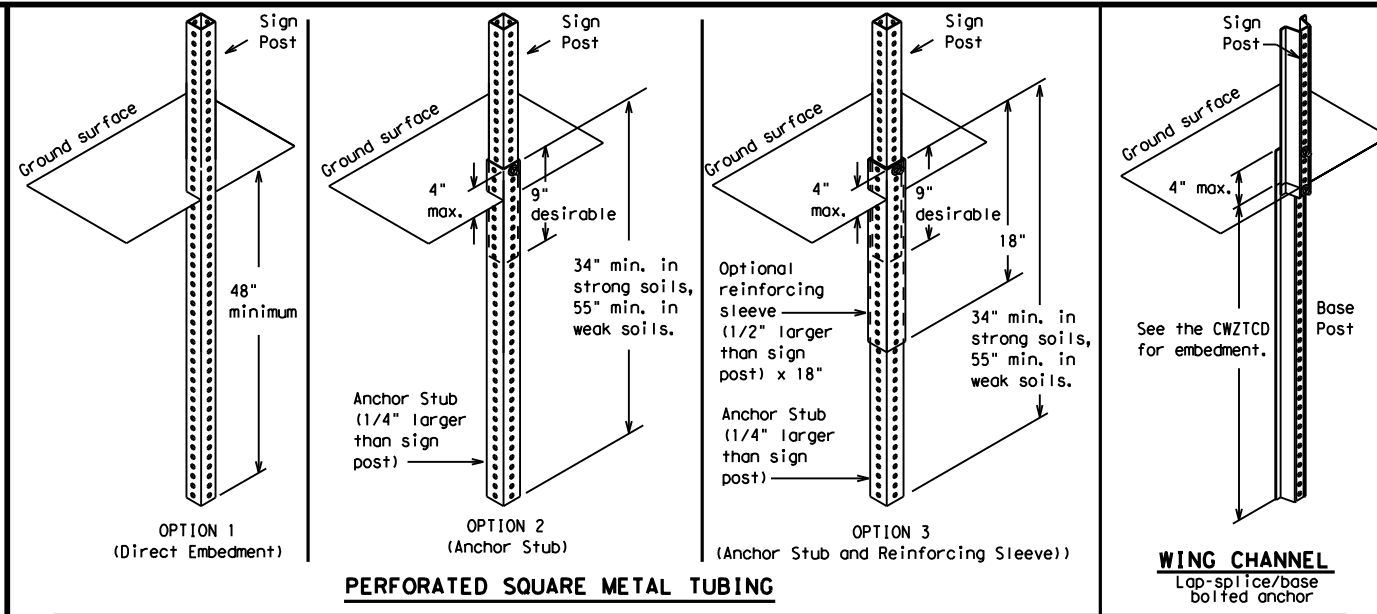
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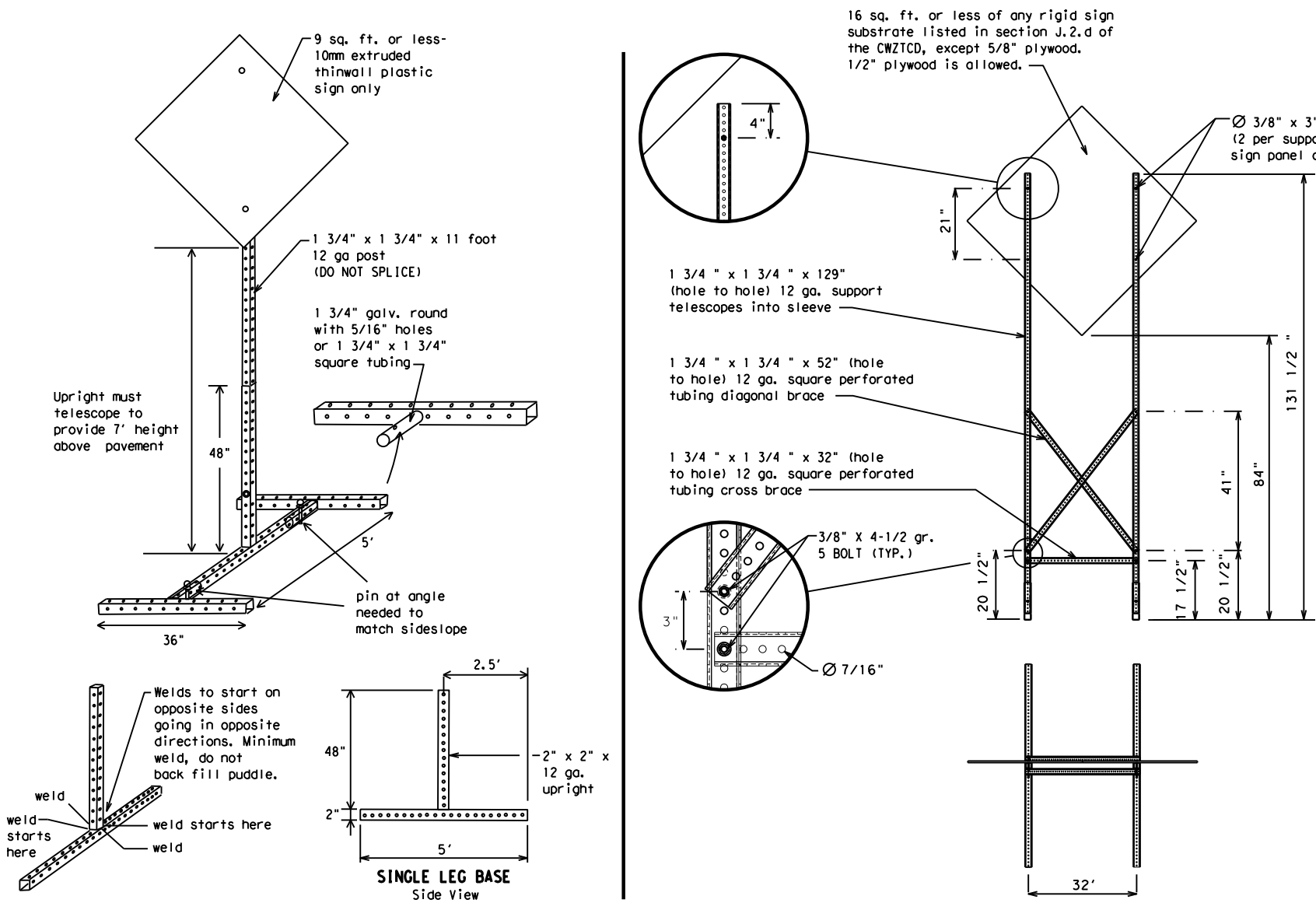
### SKID MOUNTED WOOD SIGN SUPPORTS

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



### GROUND MOUNTED SIGN SUPPORTS

Refer to the CWZTCD and the manufacturer's installation procedure for each type sign support.  
 The maximum sign square footage shall adhere to the manufacturer's recommendation.  
 Two post installations can be used for larger signs.



### SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

### WEDGE ANCHORS

Both steel and plastic Wedge Anchor Systems as shown on the SMD Standard Sheets may be used as temporary sign supports for signs up to 10 square feet of sign face. They may be set in concrete or in sturdy soils if approved by the Engineer. (See web address for "Traffic Engineering Standard Sheets" on BC(1)).

### OTHER DESIGNS

MORE DETAILS OF APPROVED LONG/INTERMEDIATE AND SHORT TERM SUPPORTS CAN BE FOUND ON THE CWZTCD LIST. SEE BC(1) FOR WEBSITE LOCATION.

### GENERAL NOTES

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

SHEET 5 OF 12



## BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5) - 21

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9-07	8-14	DIST	COUNTY	SHEET NO.					
7-13	5-21	CHS	WHEELER	11					

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

# RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

(The Engineer may approve other messages not specifically covered here.)

## 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 TMUTCD.
- 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.

## Phase 1: Condition Lists

### Road/Lane/Ramp Closure List

FREEWAY CLOSED X MILE	FRONTAGE ROAD CLOSED
ROAD CLOSED AT SH XXX	SHOULDER CLOSED XXX FT
ROAD CLSD AT FM XXXX	RIGHT LN CLOSED XXX FT
RIGHT X LANES CLOSED	RIGHT X LANES OPEN
CENTER LANE CLOSED	DAYTIME LANE CLOSURES
NIGHT LANE CLOSURES	I-XX SOUTH EXIT CLOSED
VARIOUS LANES CLOSED	EXIT XXX CLOSED X MILE
EXIT CLOSED	RIGHT LN TO BE CLOSED
MALL DRIVEWAY CLOSED	X LANES CLOSED TUE - FRI
XXXXXXXX BLVD CLOSED	

### Other Condition List

ROADWORK XXX FT	ROAD REPAIRS XXXX FT
FLAGGER XXXX FT	LANE NARROWS XXXX FT
RIGHT LN NARROWS XXXX FT	TWO-WAY TRAFFIC XX MILE
MERGING TRAFFIC XXXX FT	CONST TRAFFIC XXX FT
LOOSE GRAVEL XXXX FT	UNEVEN LANES XXXX FT
DETOUR X MILE	ROUGH ROAD XXXX FT
ROADWORK PAST SH XXXX	ROADWORK NEXT FRI-SUN
BUMP XXXX FT	US XXX EXIT X MILES
TRAFFIC SIGNAL XXXX FT	LANES SHIFT *

\* LANES SHIFT in Phase 1 must be used with STAY IN LANE in Phase 2.

## Phase 2: Possible Component Lists

### Action to Take/Effect on Travel List

MERGE RIGHT	FORM X LINES RIGHT
DETOUR NEXT X EXITS	USE XXXXX RD EXIT
USE EXIT XXX	USE EXIT I-XX NORTH
STAY ON US XXX SOUTH	USE I-XX E TO I-XX N
TRUCKS USE US XXX N	WATCH FOR TRUCKS
WATCH FOR TRUCKS	EXPECT DELAYS
EXPECT DELAYS	PREPARE TO STOP
REDUCE SPEED XXX FT	END SHOULDER USE
USE OTHER ROUTES	WATCH FOR WORKERS
STAY IN LANE *	

### Location List

AT FM XXXX
BEFORE RAILROAD CROSSING
NEXT X MILES
PAST US XXX EXIT
XXXXXXXX TO XXXXXXX
US XXX TO FM XXXX

### Warning List

SPEED LIMIT XX MPH
MAXIMUM SPEED XX MPH
MINIMUM SPEED XX MPH
ADVISORY SPEED XX MPH
RIGHT LANE EXIT
USE CAUTION
DRIVE SAFELY
DRIVE WITH CARE

### \*\* Advance Notice List

TUE-FRI XX AM-X PM
APR XX-XX X PM-X AM
BEGINS MONDAY
BEGINS MAY XX
MAY X-X XX PM - XX AM
NEXT FRI-SUN
XX AM TO XX PM
NEXT TUE AUG XX
TONIGHT XX PM-XX AM

\*\* See Application Guidelines Note 6.

## APPLICATION GUIDELINES

- 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.

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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 DWNTN
Hazardous Driving	HAZ DRIVING	Traffic	TRAF
Hazardous Material	HAZMAT	Travelers	TRVLR
High-Occupancy Vehicle	HOV	Tuesday	TUES
Hour(s)	HR, HRS	Time Minutes	TIME MIN
Information	INFO	Upper Level	UPR LEVEL
It Is	ITS	Vehicles (s)	VEH, VEHS
Junction	JCT	Warning	WARN
Left	LFT	Wednesday	WED
Left Lane	LFT LN	Weight Limit	WT LIMIT
Lane Closed	LN CLOSED	West	W
Lower Level	LWR LEVEL	Westbound	(route) W
Maintenance	MAINT	Wet Pavement	WET PVMT
		Will Not	WONT

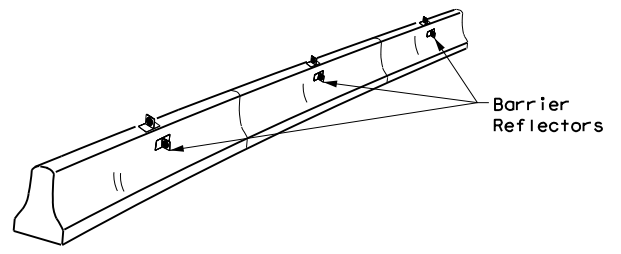
Roadway designation # IH-number, US-number, SH-number, FM-number

<h3>BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)</h3>			
<h2>BC(6)-21</h2>			
FILE:	bc-21.dgn	DN:	TxDOT
© TxDOT	November 2002	CONT:	SECT:
REVISIONS	0275	12	083, ETC
9-07	8-14	DIST:	COUNTY:
7-13	5-21	CHS:	WHEELER
		SHEET NO.:	12

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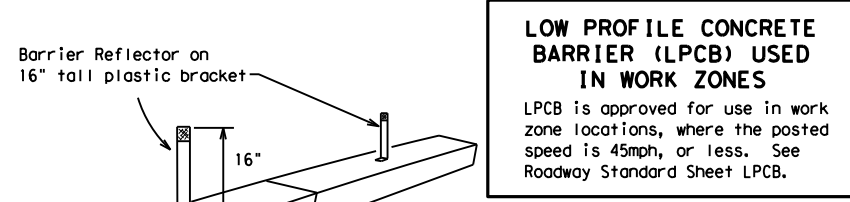
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- Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
- Color of Barrier Reflectors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



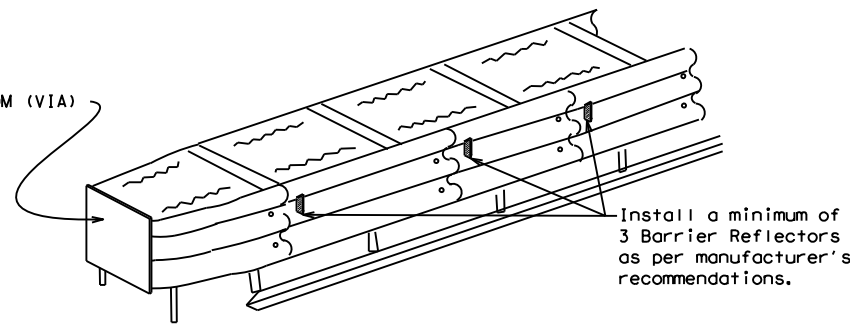
**CONCRETE TRAFFIC BARRIER (CTB)**

- 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) USED IN WORK ZONES**  
 LPCB is approved for use in work zone locations, where the posted speed is 45mph, or less. See Roadway Standard Sheet LPCB.

**LOW PROFILE CONCRETE BARRIER (LPCB)**



**DELINEATION OF END TREATMENTS**

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

**BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS**

**WARNING LIGHTS**

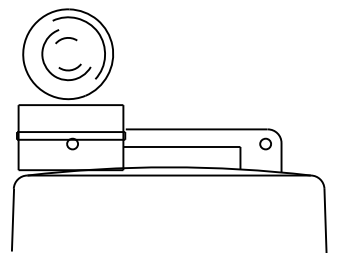
- Warning lights shall meet the requirements of the TMUTCD.
- Warning lights shall NOT be installed on barricades.
- Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "FL". The Type A Warning Lights shall not be used with signs manufactured with Type B<sub>FL</sub> or C<sub>FL</sub> Sheeting meeting the requirements of Departmental Material Specification DMS-8300.
- Type-C and Type D 360 degree Steady Burn Lights are intended to be used in a series for delineation to supplement other traffic control devices. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "SB".
- The Engineer/Inspector or the plans shall specify the location and type of warning lights to be installed on the traffic control devices.
- When required by the Engineer, the Contractor shall furnish a copy of the warning lights certification. The warning light manufacturer will certify the warning lights meet the requirements of the latest ITE Purchase Specifications for Flashing and Steady-Burn Warning Lights.
- When used to delineate curves, Type-C and Type D Steady Burn Lights should only be placed on the outside of the curve, not the inside.
- The location of warning lights and warning reflectors on drums shall be as shown elsewhere in the plans.

**WARNING LIGHTS MOUNTED ON PLASTIC DRUMS**

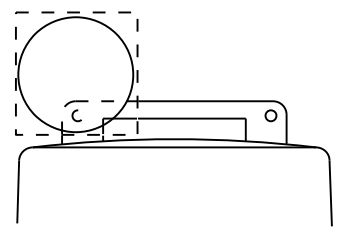
- Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
- Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
- A series of sequential flashing warning lights placed on channelizing devices to form a merging taper may be used for delineation. If used, the successive flashing of the sequential warning lights should occur from the beginning of the taper to the end of the merging taper in order to identify the desired vehicle path. The rate of flashing for each light shall be 65 flashes per minute, plus or minus 10 flashes.
- Type C and D steady-burn warning lights are intended to be used in a series to delineate the edge of the travel lane on detours, on lane changes, on lane closures, and on other similar conditions.
- Type A, Type C and Type D warning lights shall be installed at locations as detailed on other sheets in the plans.
- Warning lights shall not be installed on a drum that has a sign, chevron or vertical panel.
- The maximum spacing for warning lights on drums should be identical to the channelizing device spacing.

**WARNING REFLECTORS MOUNTED ON PLASTIC DRUMS AS A SUBSTITUTE FOR TYPE C (STEADY BURN) WARNING LIGHTS**

- A warning reflector or approved substitute may be mounted on a plastic drum as a substitute for a Type C, steady burn warning light at the discretion of the Contractor unless otherwise noted in the plans.
- The warning reflector shall be yellow in color and shall be manufactured using a sign substrate approved for use with plastic drums listed on the 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.



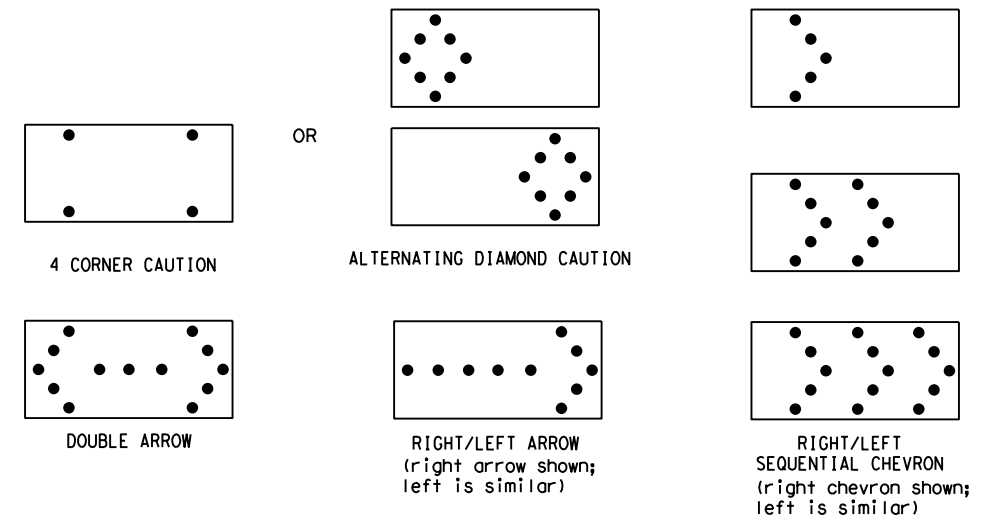
Type C Warning Light or approved substitute mounted on a drum adjacent to the travel way.



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

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 PCMS may be used to simulate a Flashing Arrow Board provided it meets visibility, flash rate and dimming requirements on this sheet for the same size arrow.
- 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 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.



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

**BC (7) -21**

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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**

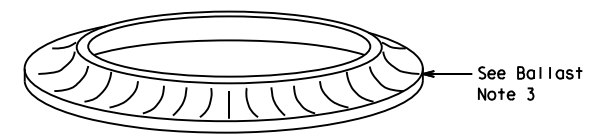
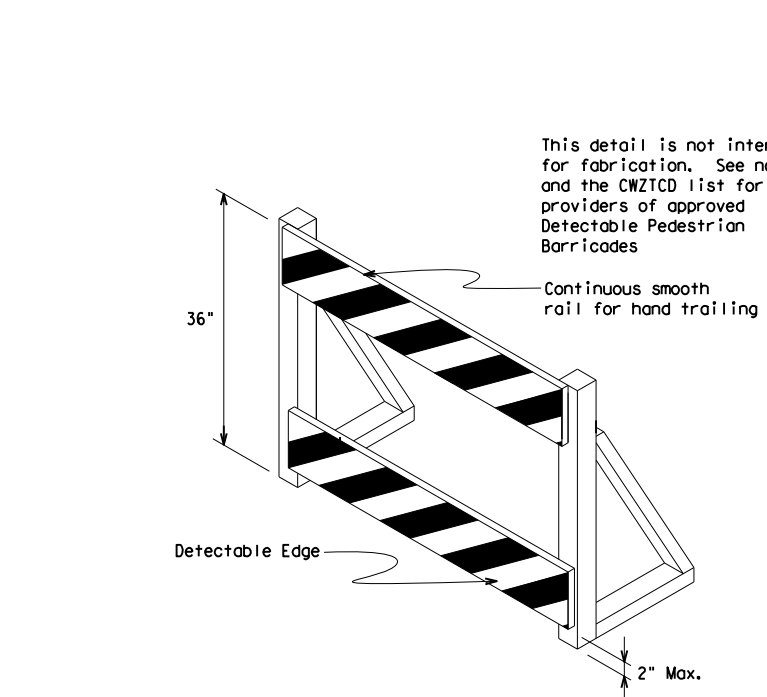
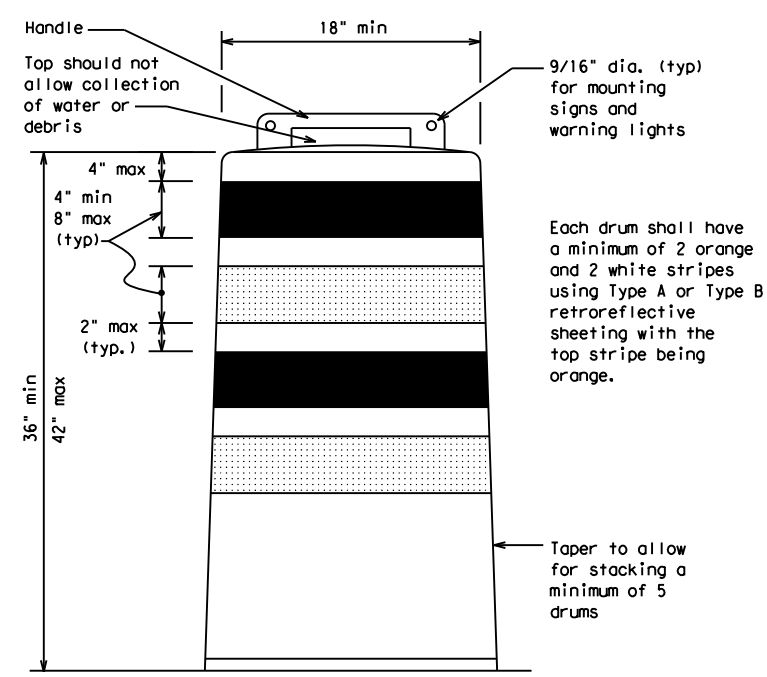
- Pre-qualified plastic drums shall meet the following requirements:
- Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
  - The body and base shall lock together in such a manner that the body separates from the base when impacted 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 unballasted weight of 11 lbs.
  - Drum and base shall be marked with manufacturer's name and model number.

**RETROREFLECTIVE SHEETING**

- The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
- The sheeting shall be suitable for use on and shall adhere to the drum surface such that, upon vehicular impact, the sheeting shall remain adhered in-place and exhibit no delaminating, cracking, or loss of retroreflectivity other than that loss due to abrasion of the sheeting surface.

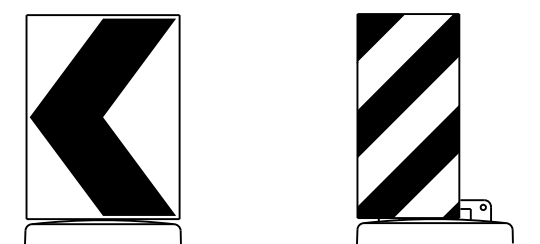
**BALLAST**

- Unballasted bases shall be large enough to hold up to 50 lbs. of sand. This base, when filled with the ballast material, should weigh between 35 lbs (minimum) and 50 lbs (maximum). The ballast may be sand in one to three sandbags separate from the base, sand in a sand-filled plastic base, or other ballasting devices as approved by the Engineer. Stacking of sandbags will be allowed, however height of sandbags above pavement surface may not exceed 12 inches.
- Bases with built-in ballast shall weigh between 40 lbs. and 50 lbs. Built-in ballast can be constructed of an integral crumb rubber base or a solid rubber base.
- Recycled truck tire sidewalls may be used for ballast on drums approved for this type of ballast on the CWZTCD list.
- The ballast shall not be heavy objects, water, or any material that would become hazardous to motorists, pedestrians, or workers when the drum is struck by a vehicle.
- When used in regions susceptible to freezing, drums shall have drainage holes in the bottoms so that water will not collect and freeze becoming a hazard when struck by a vehicle.
- Ballast shall not be placed on top of drums.
- Adhesives may be used to secure base of drums to pavement.



**DETECTABLE PEDESTRIAN BARRICADES**

- When existing pedestrian facilities are disrupted, closed, or relocated in a TTC zone, the temporary facilities shall be detectable and include accessibility features consistent with the features present in the existing pedestrian facility. Refer to WZ(BTS-2) for Pedestrian Control requirements for Sidewalk Diversions, Sidewalk Detours and Crosswalk Closures.
- Where pedestrians with visual disabilities normally use the closed sidewalk, a Detectable Pedestrian Barricade shall be placed across the full width of the closed sidewalk instead of a Type 3 Barricade.
- Detectable pedestrian barricades similar to the one pictured above, longitudinal channelizing devices, 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 (ADAAG)" and should not be used as a control for pedestrian movements.
- Warning lights shall not be attached to detectable pedestrian barricades.
- Detectable pedestrian barricades should use 8" nominal barricade 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.
- Chevrons and other work zone signs with an orange background shall be manufactured with Type B<sub>FL</sub> or Type C<sub>FL</sub> Orange sheeting meeting the color and retroreflectivity requirements of DMS-8300, "Sign Face Material," unless otherwise specified in the plans.
- Vertical Panels shall be manufactured with orange and white sheeting meeting the requirements of DMS-8300 Type A or Type B. Diagonal stripes on Vertical Panels shall slope down toward the intended traveled lane.
- Other sign messages (text or symbolic) may be used as approved by the Engineer. Sign dimensions shall not exceed 18 inches in width or 24 inches in height, except for the R9 series signs discussed in note 8 below.
- Signs shall be installed using a 1/2 inch bolt (nominal) and nut, two washers, and one locking washer for each connection.
- Mounting bolts and nuts shall be fully engaged and adequately torqued. Bolts should not extend more than 1/2 inch beyond nuts.
- Chevrons may be placed on drums on the outside of curves, on merging tapers or on shifting tapers. When used in these locations, they may be placed on every drum or spaced not more than on every third drum. A minimum of three (3) should be used at each location called for in the plans.
- R9-9, R9-10, R9-11 and R9-11a Sidewalk Closed signs which are 24 inches wide may be mounted on plastic drums, with approval of the Engineer.

SHEET 8 OF 12



**BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES**

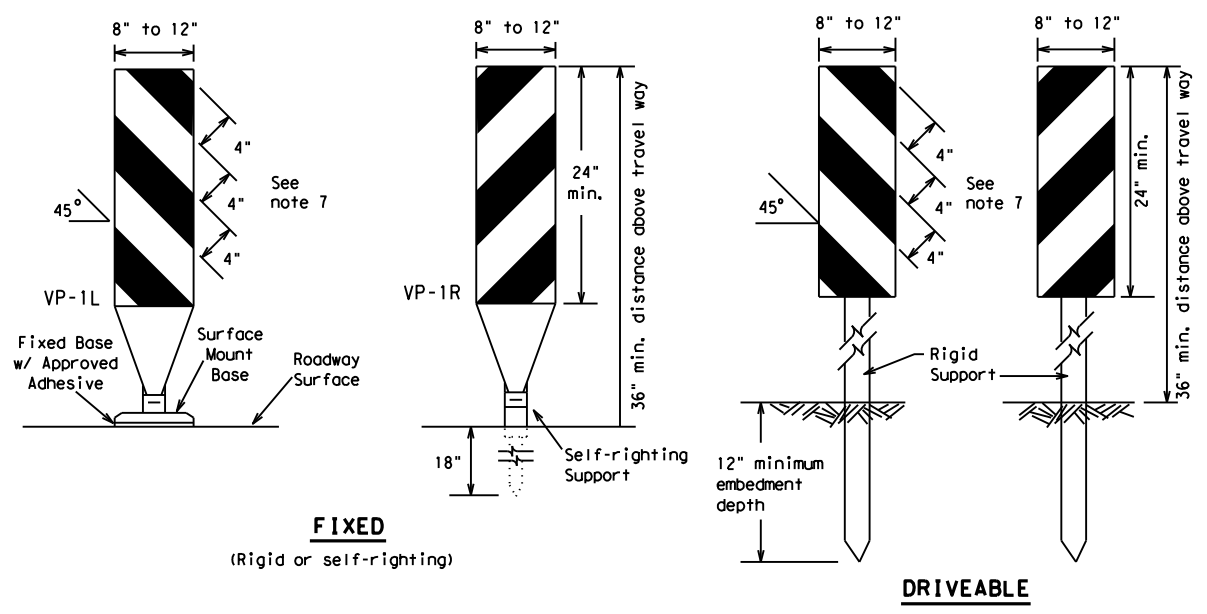
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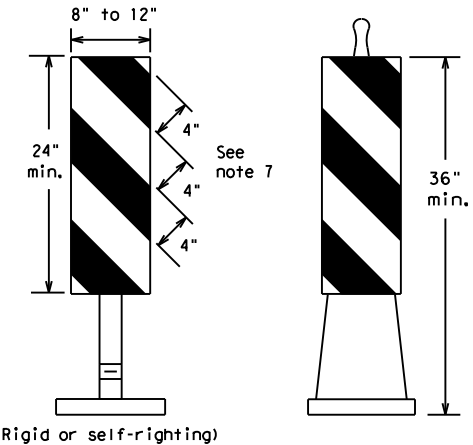
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**FIXED**  
(Rigid or self-righting)

**DRIVEABLE**

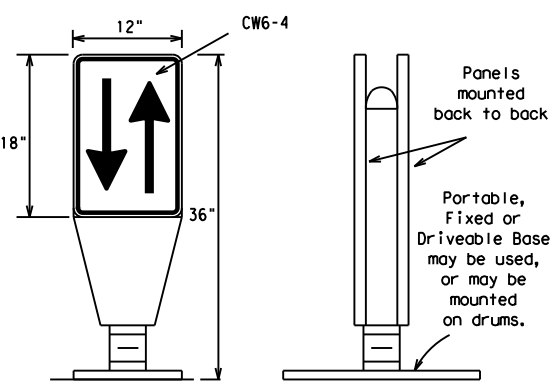


(Rigid or self-righting)

**PORTABLE**

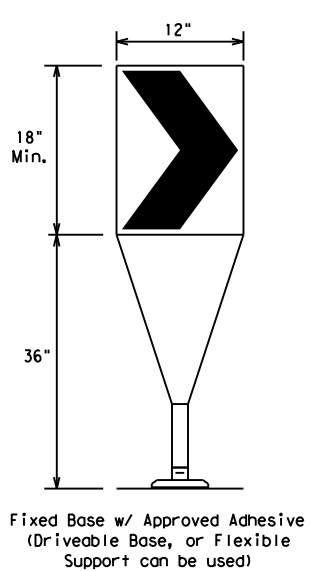
**VERTICAL PANELS (VPs)**

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



**OPPOSING TRAFFIC LANE DIVIDERS (OTLD)**

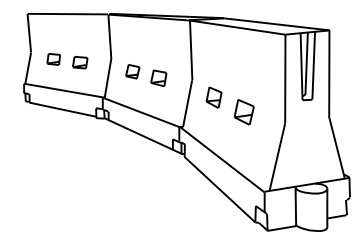
- Opposing Traffic Lane Dividers (OTLD) are delineation devices designed to convert a normal one-way roadway section to two-way operation. OTLD's are used on temporary centerlines. The upward and downward arrows on the sign's face indicate the direction of traffic on either side of the divider. The base 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 B<sub>FL</sub> or Type C<sub>FL</sub> 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 B<sub>FL</sub> or Type C<sub>FL</sub> 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 placed perpendicular to traffic should have at least one row of reflective sheeting meeting the requirements for barricade rails as shown on BC(10). Place reflective sheeting near the top of the LCD along the full length of the device.

**WATER BALLASTED SYSTEMS USED AS BARRIERS**

- Water ballasted systems used as barriers shall not be used solely to channelize road users, but also to protect the work space per the appropriate Manual for Assessing Safety Hardware (MASH) crashworthiness requirements based on roadway speed and barrier application.
- Water ballasted systems used to channelize vehicular traffic shall be supplemented with retroreflective delineation or channelizing devices to improve daytime/nighttime visibility. They may also be supplemented with pavement markings.
- Water ballasted systems used as barriers shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
- Water ballasted systems used as barriers should not be used for a merging taper 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 canes and the top of the unit shall not be less than 32 inches in height.

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

**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 <sup>2</sup> / 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) - 21**

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9-07 8-14	DIST	COUNTY	SHEET NO.	
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**TYPE 3 BARRICADES**

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

Barricades shall NOT be used as a sign support.

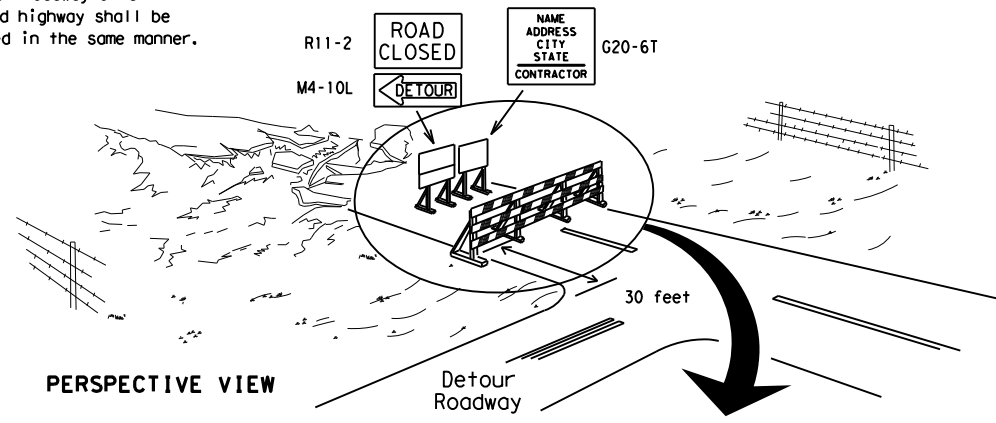


**TYPICAL STRIPING DETAIL FOR BARRICADE RAIL**



**TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES**

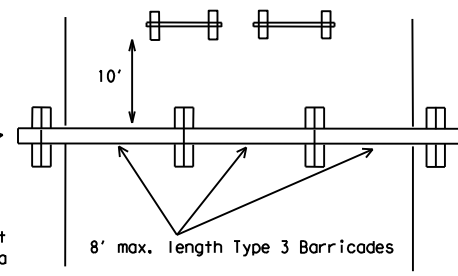
Each roadway of a divided highway shall be barricaded in the same manner.



PERSPECTIVE VIEW

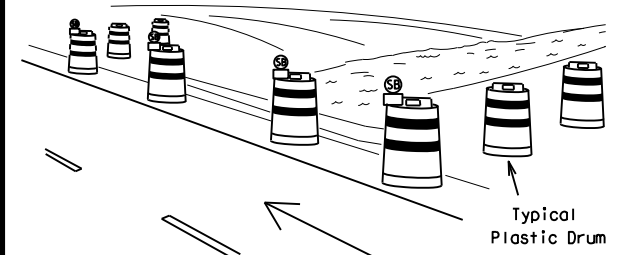
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic. Barricade striping should slant downward in the direction of detour.

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.

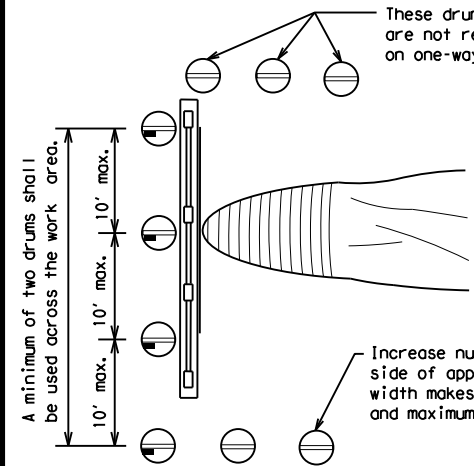


PLAN VIEW

**TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION**



PERSPECTIVE VIEW

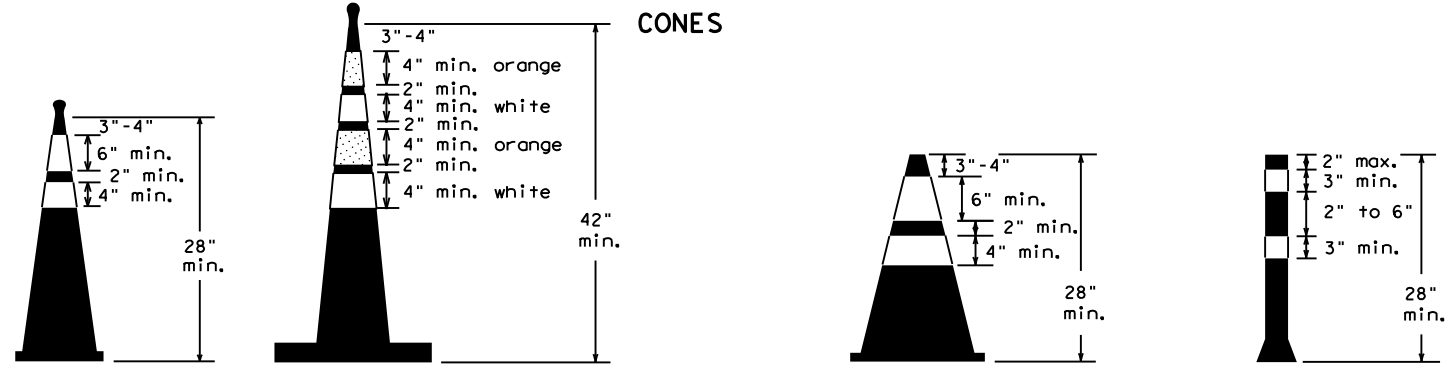


PLAN VIEW

**CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS**

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



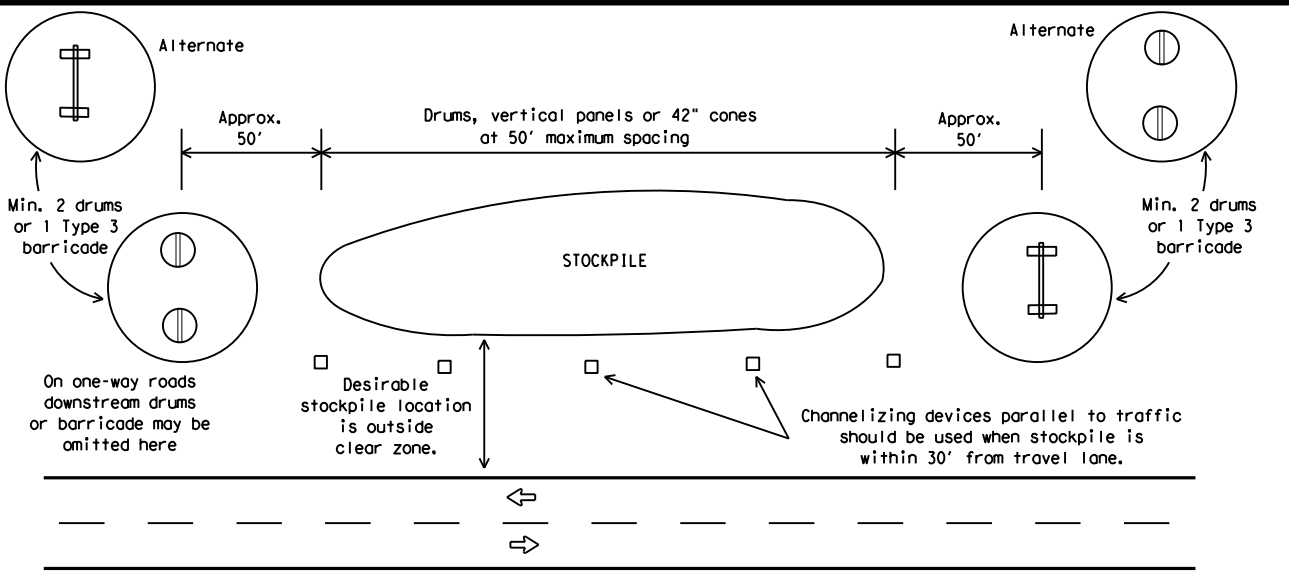
Two-Piece cones

One-Piece cones

Tubular Marker

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

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



**TRAFFIC CONTROL FOR MATERIAL STOCKPILES**



**BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES**

**BC (10) - 21**

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7-13 5-21	CHS	WHEELER	16	

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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(STPM).
- 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.

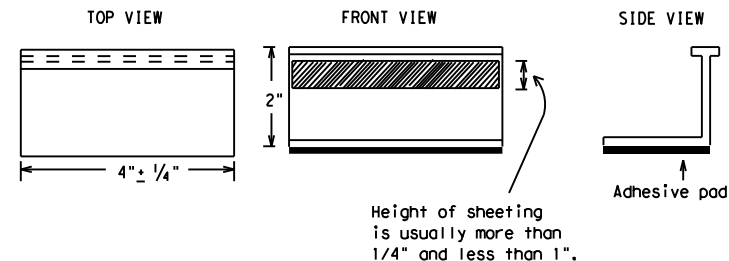
### MAINTAINING WORK ZONE PAVEMENT MARKINGS

- 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(STPM) for tab placement on new pavements. See Standard Sheet TCP(7-1) for tab placement on seal coat work.

### RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

- 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)-21**

FILE: bc-21.dgn	DN: TxDOT	CR: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0275	12	083, ETC	IH-40
2-98 9-07 5-21	DIST	COUNTY	SHEET NO.	
1-02 7-13	CHS	WHEELER	17	
11-02 8-14				

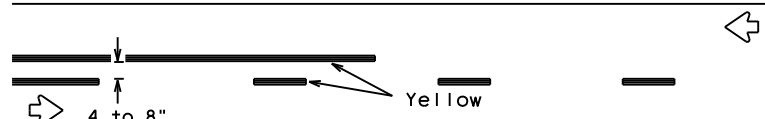
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DATE: 12/27/2022 11:11:37 AM  
 FILE: I:\CHSDES\PROJECTS\WHEELER\0275-12-083 (Cable Barrier)\Plan Set\TCP\BC(11)-21.dgn

## PAVEMENT MARKING PATTERNS

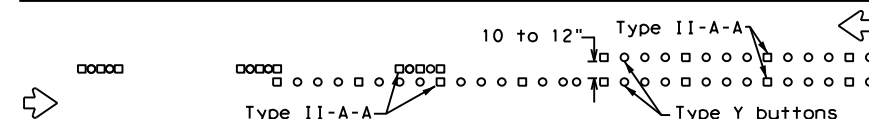


REFLECTORIZED PAVEMENT MARKINGS - PATTERN A

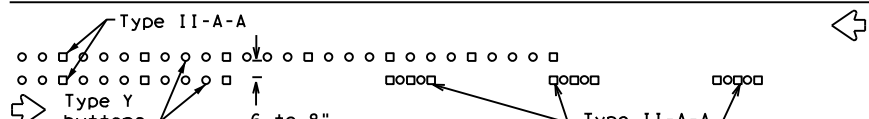


REFLECTORIZED PAVEMENT MARKINGS - PATTERN B

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.

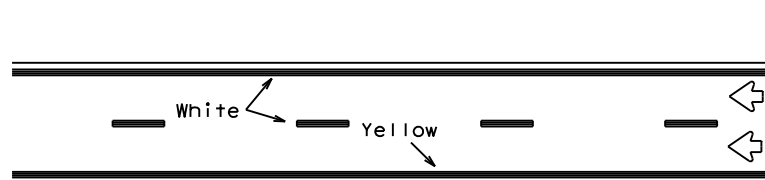


RAISED PAVEMENT MARKERS - PATTERN A



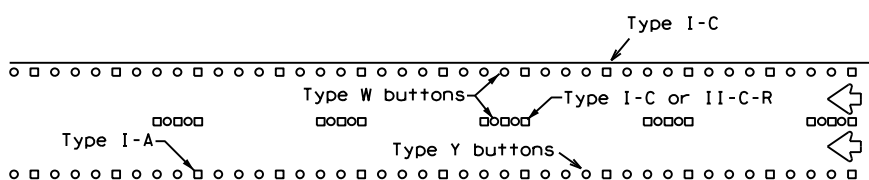
RAISED PAVEMENT MARKERS - PATTERN B

## 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.



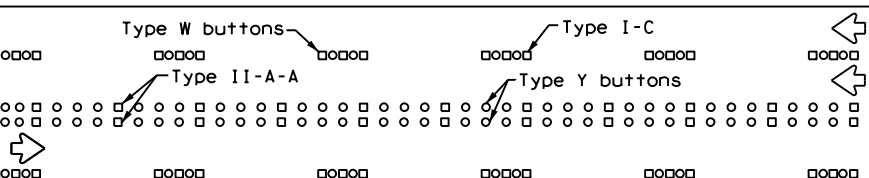
RAISED PAVEMENT MARKERS

## EDGE & LANE LINES FOR DIVIDED HIGHWAY



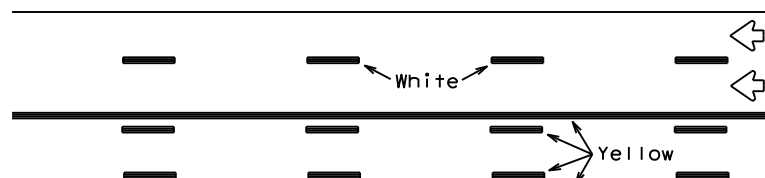
REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectORIZED pavement markings.



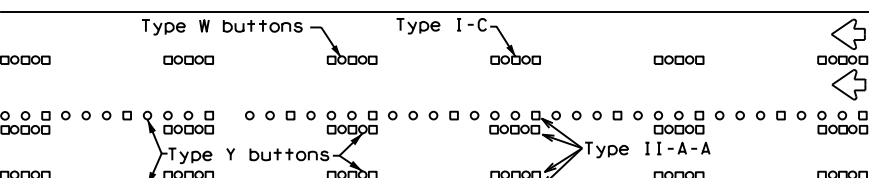
RAISED PAVEMENT MARKERS

## LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS

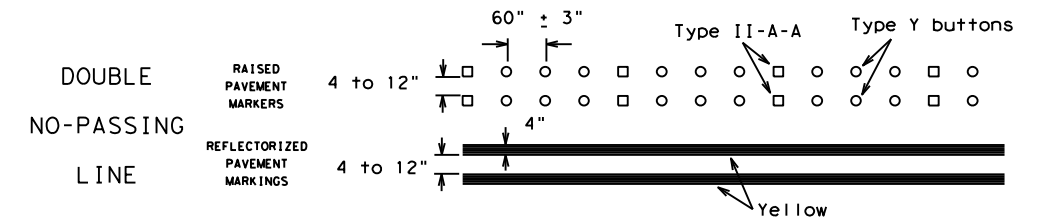
Prefabricated markings may be substituted for reflectORIZED pavement markings.



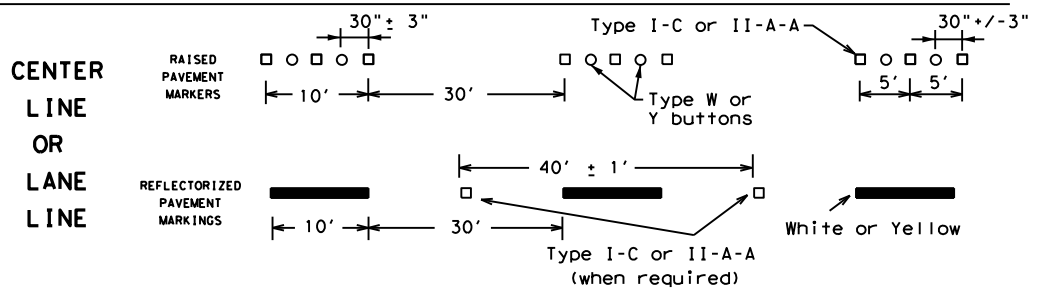
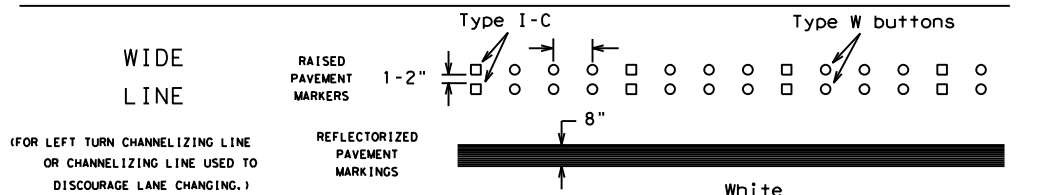
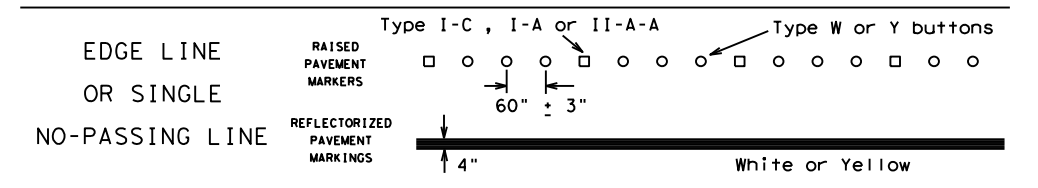
RAISED PAVEMENT MARKERS

## TWO-WAY LEFT TURN LANE

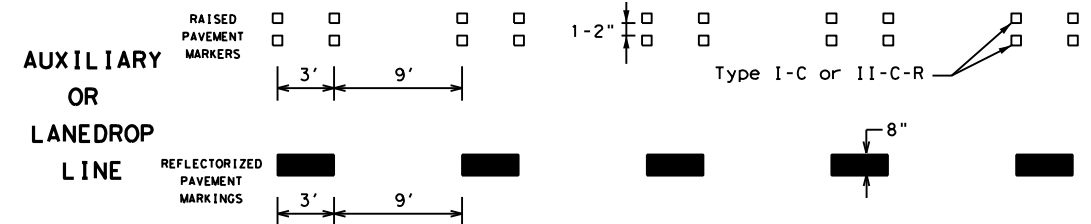
## STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS



### SOLID LINES

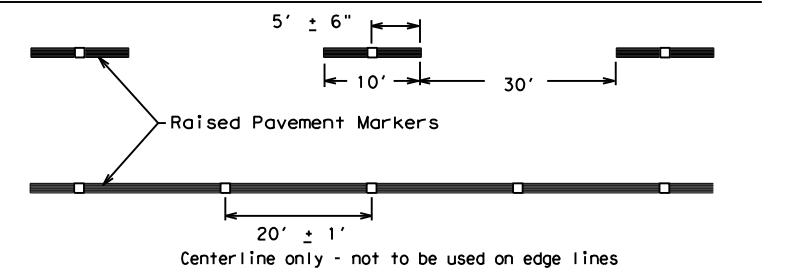


### BROKEN LINES



### REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



SHEET 12 OF 12



## BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

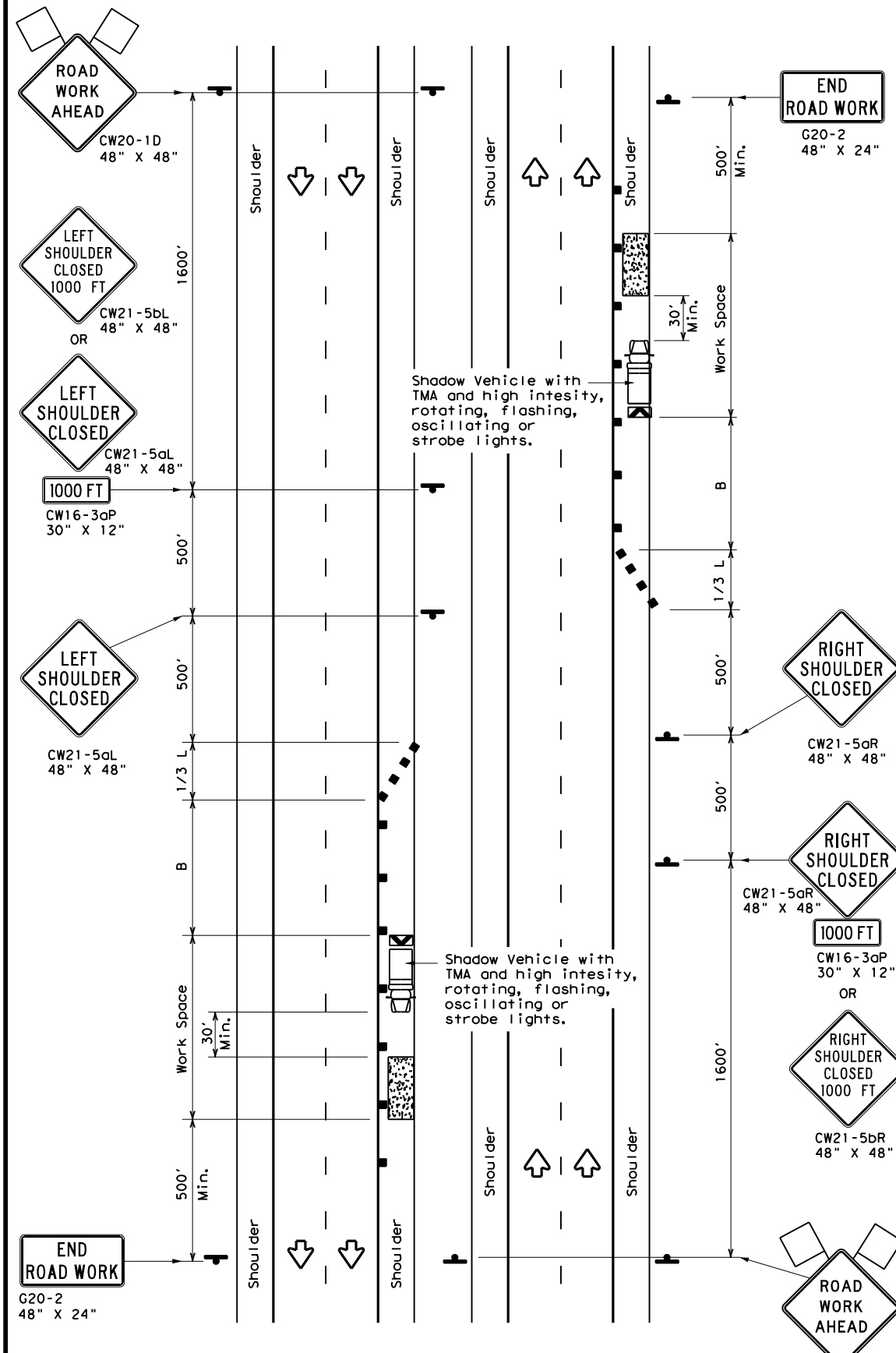
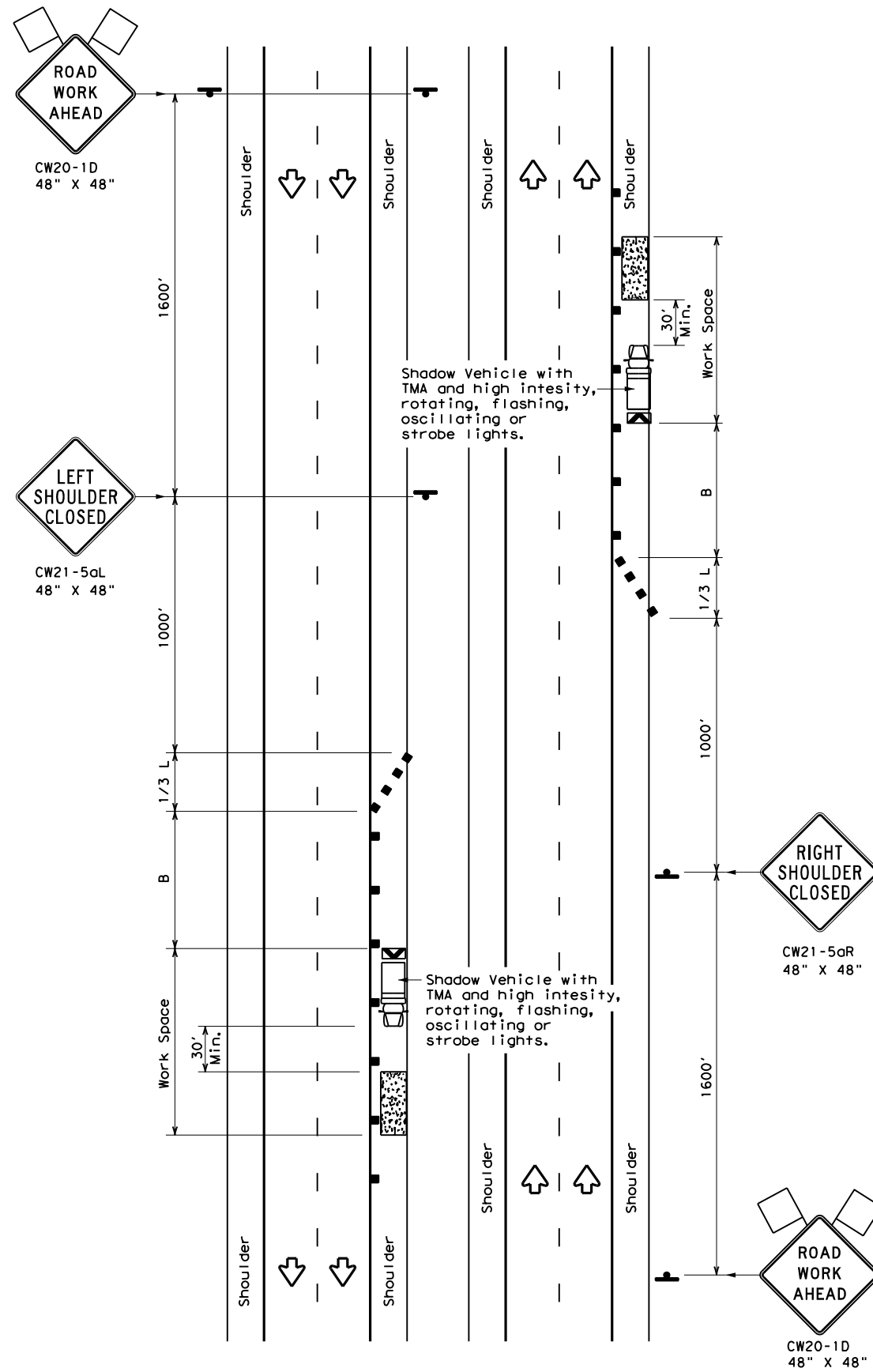
Raised pavement markers used as standard pavement markings shall be from the approved products list and meet the requirements of Item 672 "RAISED PAVEMENT MARKERS."

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	OW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0275	12	083, ETC	IH-40
1-97 9-07 5-21	DIST	COUNTY	SHEET NO.	
2-98 7-13	CHS	WHEELER	18	
11-02 8-14				

DATE: 12/27/2022 11:11:49 AM  
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DATE: 12/27/2022 11:32:08 AM  
 FILE: T:\CHSD\PROJECTS\WHEELER\0275-12-083 (Cable Barrier)\Plan Set\TCP\TCP (5-1a) - 18.dwg



**LEGEND**

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	
30	L = WS <sup>2</sup> / 60	150'	165'	180'	30'	60'	90'
35		205'	225'	245'	35'	70'	120'
40		265'	295'	320'	40'	80'	155'
45	L = WS	450'	495'	540'	45'	90'	195'
50		500'	550'	600'	50'	100'	240'
55		550'	605'	660'	55'	110'	295'
60	L = WS	600'	660'	720'	60'	120'	350'
65		650'	715'	780'	65'	130'	410'
70		700'	770'	840'	70'	140'	475'
75	L = WS	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**
- A Shadow Vehicle with a TMA should be used anytime it can be positioned 30' to 100' in advance of the area of crew exposure without adversely affecting the performance or quality of the work. Type 3 barricades or drums may be substituted when workers on foot are no longer present when approved by the Engineer.
  - 28" tall or taller one-piece cones will be allowed only for Short Duration or Short Term stationary operations when workers are present to maintain the devices upright and in proper location. Intermediate Term stationary work areas should use Drums, Vertical Panels or 42" tall two-piece cones.

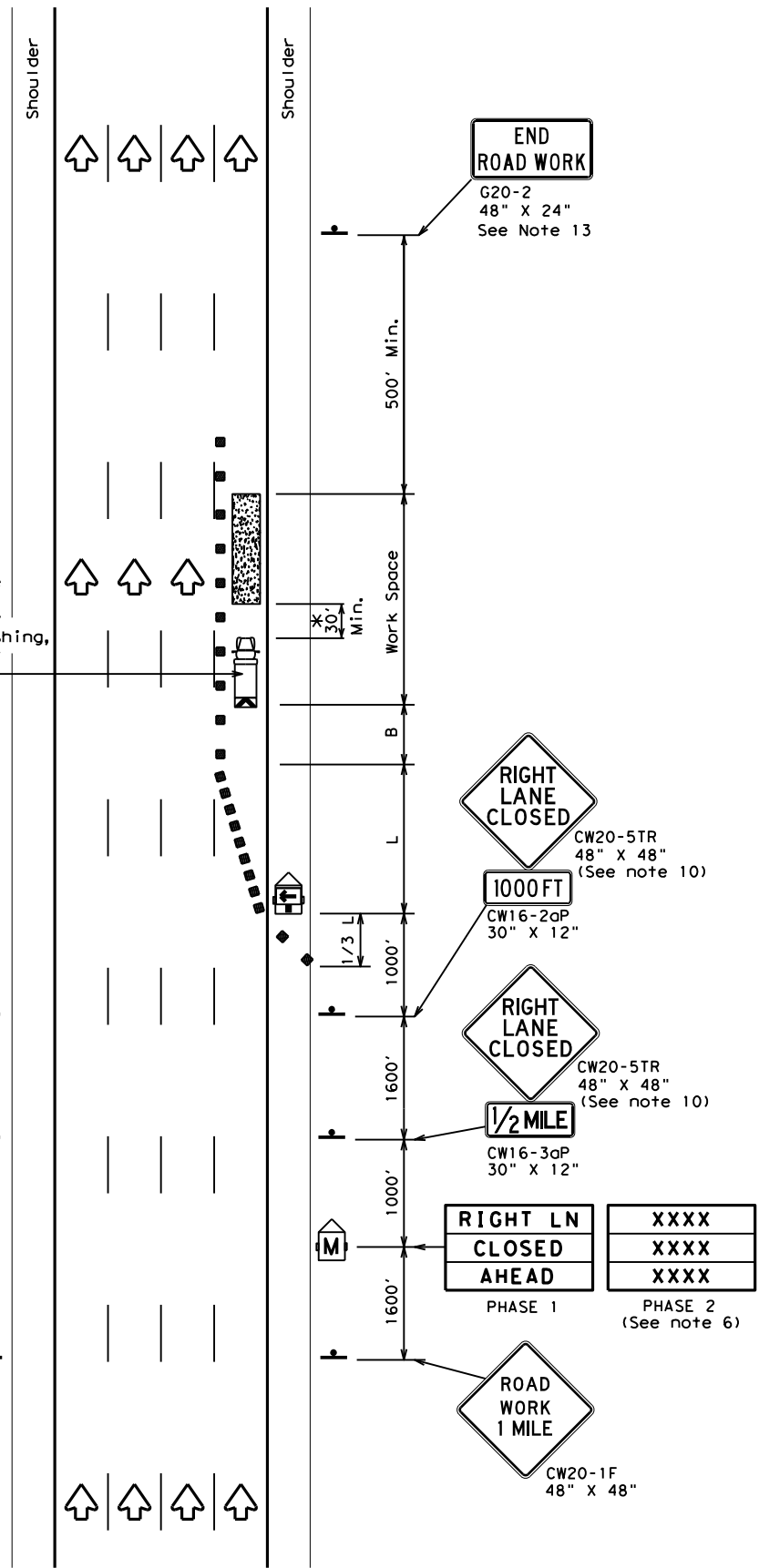
Texas Department of Transportation  
 Traffic Operations Division Standard

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

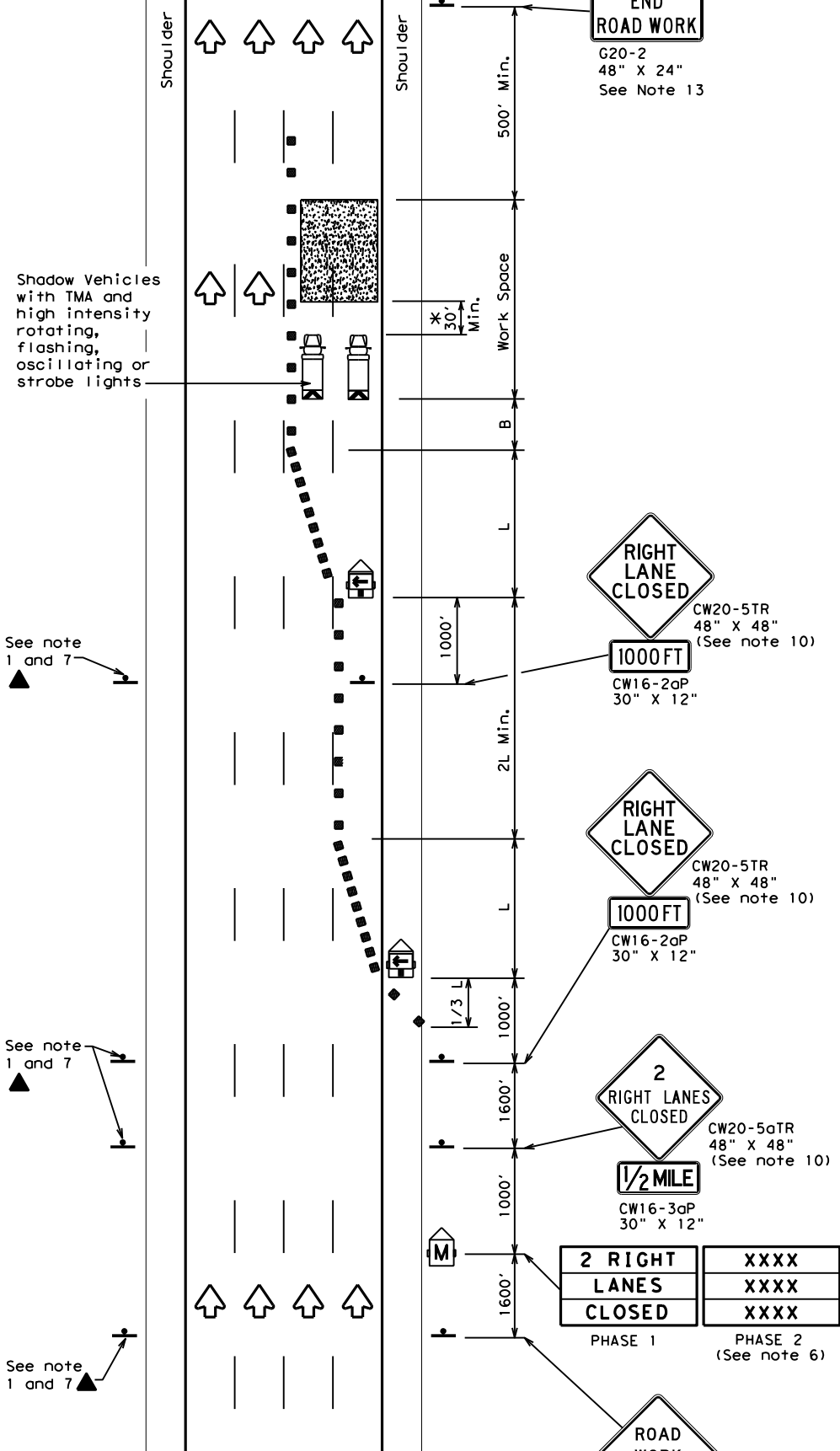
**TCP (5-1) - 18**

FILE: tcp5-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT February 2012	CONT	SECT	JOB	HIGHWAY
2-18	REVISIONS	0275 12	083, ETC	IH-40
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	CHS	WHEELER	19	

DATE: 12/27/2022 11:39:37 AM  
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TCP (6-1a)  
**TYPICAL FREEWAY  
 ONE LANE CLOSURE**



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

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		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 TMUTCD.
- 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.



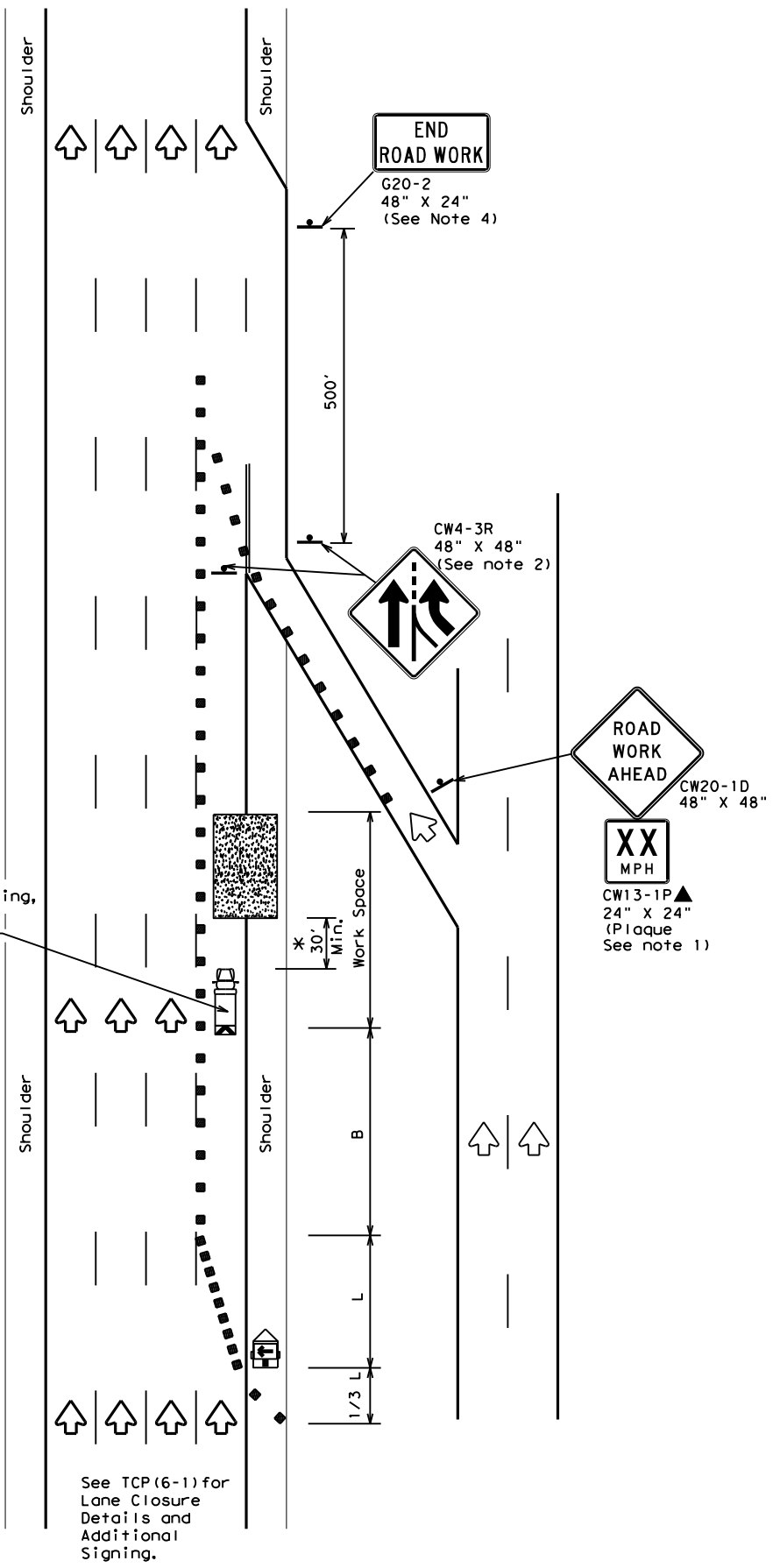
**TRAFFIC CONTROL PLAN  
 FREEWAY LANE CLOSURES**

**TCP (6-1) - 12**

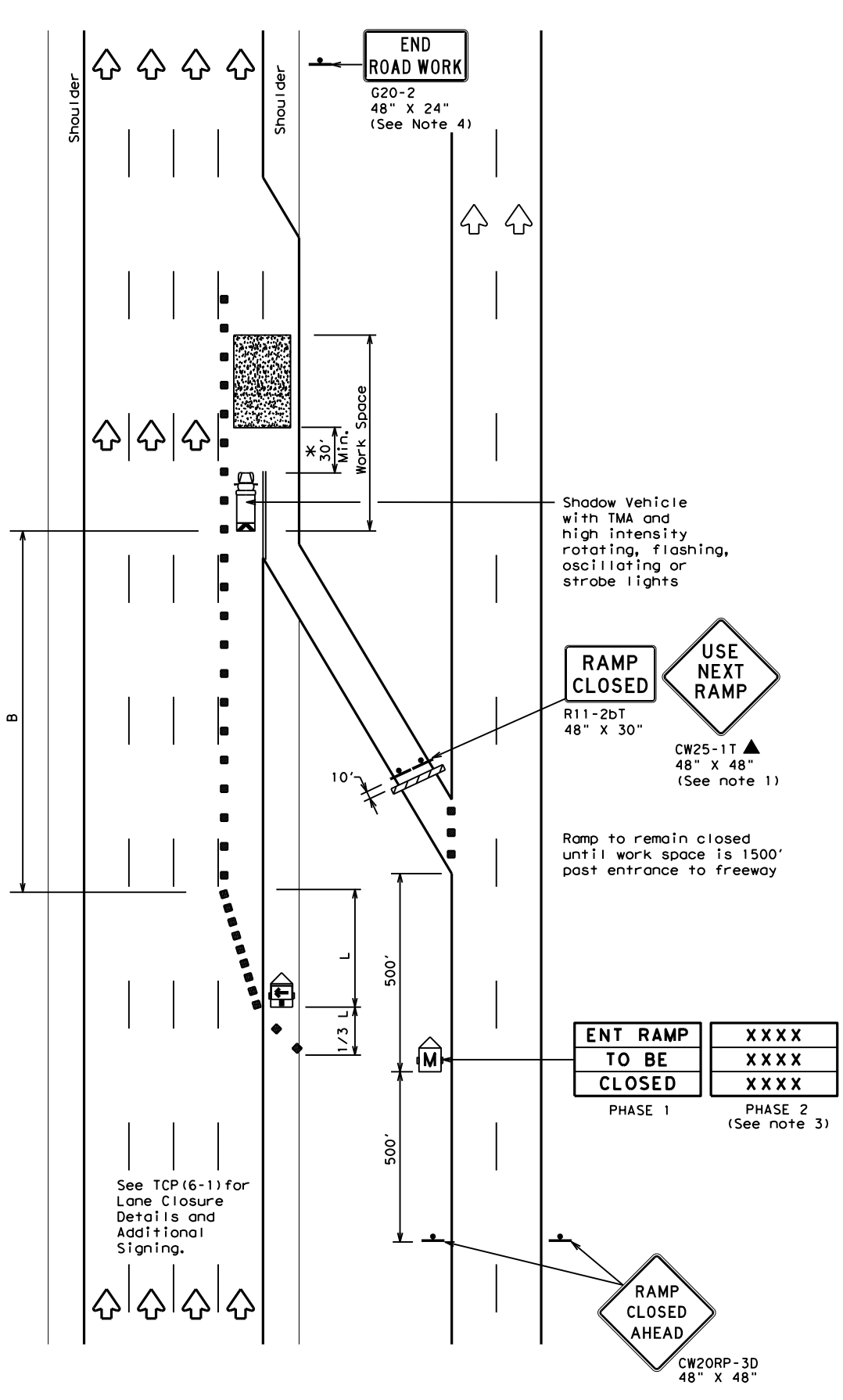
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© TxDOT	February 1998	CONT	SECT	JOB	HIGHWAY				
8-12	REVISIONS	0275	12	083, ETC	IH-40				
	DIST	COUNTY	SHEET NO.						
	CHS	WHEELER	20						

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



TCP (6-2b)  
**ENTRANCE RAMP CLOSED**

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		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.
- 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.



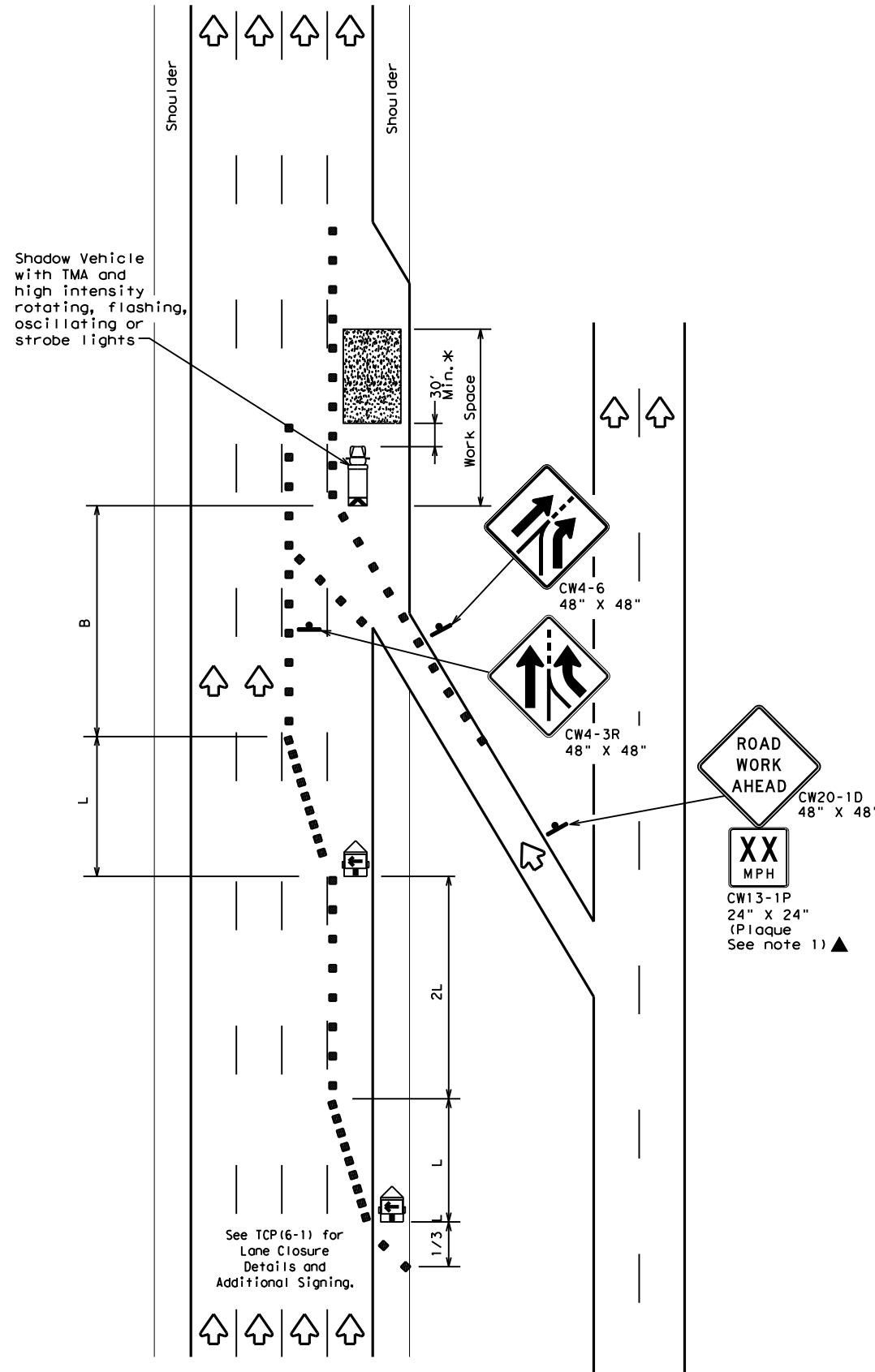
**TRAFFIC CONTROL PLAN**  
**WORK AREA NEAR RAMP**

**TCP (6-2) - 12**

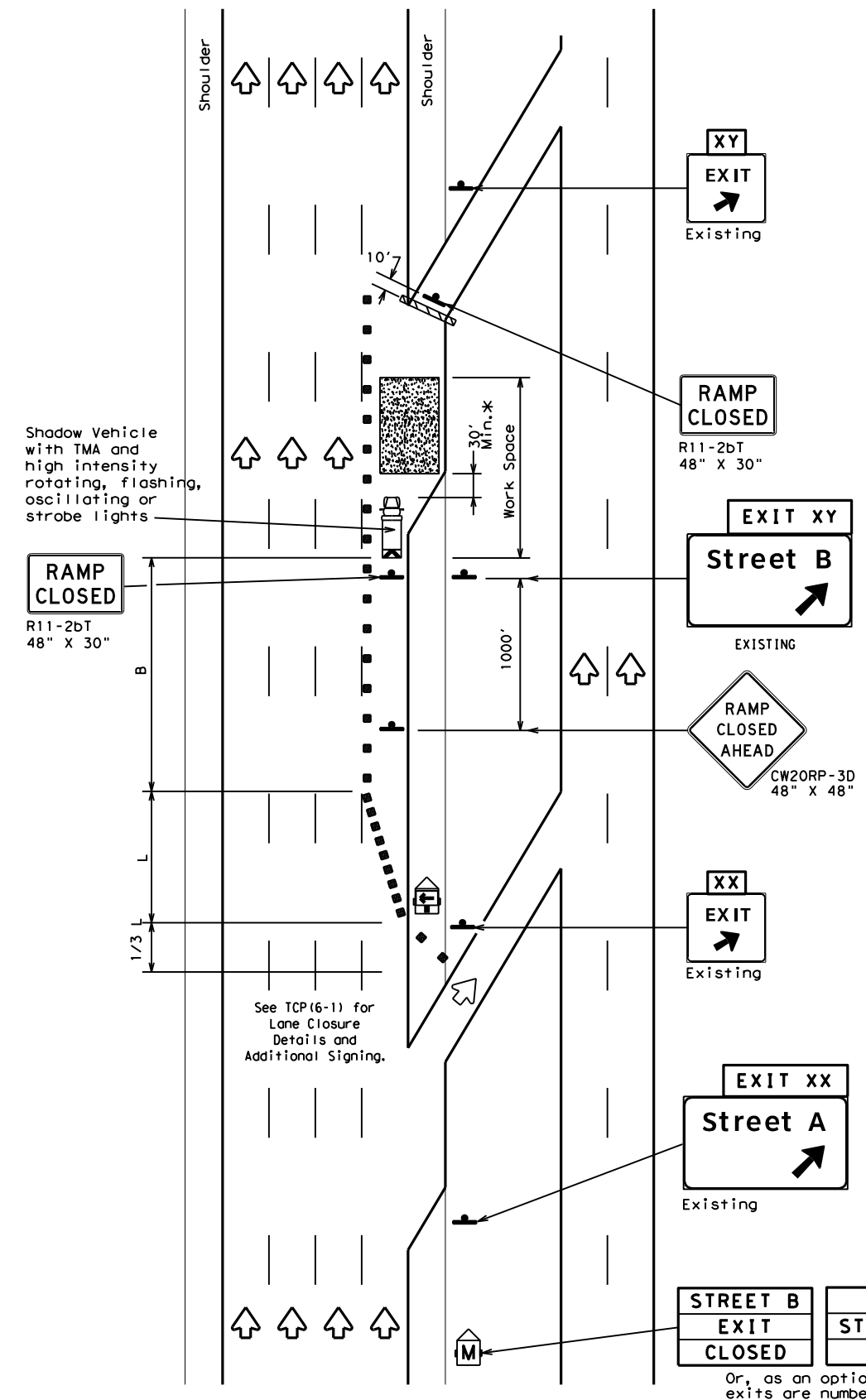
FILE:	tcp6-2.dgn	DN:	TxDOT	CK:	TxDOT	DW:	TxDOT	CR:	TxDOT
©TxDOT	February 1994	CONT	SECT	JOB	HIGHWAY				
REVISIONS		0275	12	083, ETC	IH-40				
1-97	8-98			DIST	COUNTY	SHEET NO.			
4-98	8-12	CHS	WHEELER			21			

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DATE: 12/27/2022 12:00:54 PM  
 FILE: T:\CHSD\DESIGN\PROJECTS\WHEELER\0275-12-083 (Cable Barrier)\Plan Set\TCP\22 TCP (6-3) (a) (b) (c) (d) (e) (f) (g) (h) (i) (j) (k) (l) (m) (n) (o) (p) (q) (r) (s) (t) (u) (v) (w) (x) (y) (z) (aa) (ab) (ac) (ad) (ae) (af) (ag) (ah) (ai) (aj) (ak) (al) (am) (an) (ao) (ap) (aq) (ar) (as) (at) (au) (av) (aw) (ax) (ay) (az) (ba) (bb) (bc) (bd) (be) (bf) (bg) (bh) (bi) (bj) (bk) (bl) (bm) (bn) (bo) (bp) (bq) (br) (bs) (bt) (bu) (bv) (bw) (bx) (by) (bz) (ca) (cb) (cc) (cd) (ce) (cf) (cg) (ch) (ci) (cj) (ck) (cl) (cm) (cn) (co) (cp) (cq) (cr) (cs) (ct) (cu) (cv) (cw) (cx) (cy) (cz) (da) (db) (dc) (dd) (de) (df) (dg) (dh) (di) (dj) (dk) (dl) (dm) (dn) (do) (dp) (dq) (dr) (ds) (dt) (du) (dv) (dw) (dx) (dy) (dz) (ea) (eb) (ec) (ed) (ee) (ef) (eg) (eh) (ei) (ej) (ek) (el) (em) (en) (eo) (ep) (eq) (er) (es) (et) (eu) (ev) (ew) (ex) (ey) (ez) (fa) (fb) (fc) (fd) (fe) (ff) (fg) (fh) (fi) (fj) (fk) (fl) (fm) (fn) (fo) (fp) (fq) (fr) (fs) (ft) (fu) (fv) (fw) (fx) (fy) (fz) (ga) (gb) (gc) (gd) (ge) (gf) (gg) (gh) (gi) (gj) (gk) (gl) (gm) (gn) (go) (gp) (gq) (gr) (gs) (gt) (gu) (gv) (gw) (gx) (gy) (gz) (ha) (hb) (hc) (hd) (he) (hf) (hg) (hh) (hi) (hj) (hk) (hl) (hm) (hn) (ho) (hp) (hq) (hr) (hs) (ht) (hu) (hv) (hw) (hx) (hy) (hz) (ia) (ib) (ic) (id) (ie) (if) (ig) (ih) (ii) (ij) (ik) (il) (im) (in) (io) (ip) (iq) (ir) (is) (it) (iu) (iv) (iw) (ix) (iy) (iz) (ja) (jb) (jc) (jd) (je) (jf) (jg) (jh) (ji) (jj) (jk) (jl) (jm) (jn) (jo) (jp) (jq) (jr) (js) (jt) (ju) (jv) (jw) (jx) (jy) (jz) (ka) (kb) (kc) (kd) (ke) (kf) (kg) (kh) (ki) (kj) (kk) (kl) (km) (kn) (ko) (kp) (kq) (kr) (ks) (kt) (ku) (kv) (kw) (kx) (ky) (kz) (la) (lb) (lc) (ld) (le) (lf) (lg) (lh) (li) (lj) (lk) (ll) (lm) (ln) (lo) (lp) (lq) (lr) (ls) (lt) (lu) (lv) (lw) (lx) (ly) (lz) (ma) (mb) (mc) (md) (me) (mf) (mg) (mh) (mi) (mj) (mk) (ml) (mm) (mn) (mo) (mp) (mq) (mr) (ms) (mt) (mu) (mv) (mw) (mx) (my) (mz) (na) (nb) (nc) (nd) (ne) (nf) (ng) (nh) (ni) (nj) (nk) (nl) (nm) (nn) (no) (np) (nq) (nr) (ns) (nt) (nu) (nv) (nw) (nx) (ny) (nz) (oa) (ob) (oc) (od) (oe) (of) (og) (oh) (oi) (oj) (ok) (ol) (om) (on) (oo) (op) (oq) (or) (os) (ot) (ou) (ov) (ow) (ox) (oy) (oz) (pa) (pb) (pc) (pd) (pe) (pf) (pg) (ph) (pi) (pj) (pk) (pl) (pm) (pn) (po) (pp) (pq) (pr) (ps) (pt) (pu) (pv) (pw) (px) (py) (pz) (qa) (qb) (qc) (qd) (qe) (qf) (qg) (qh) (qi) (qj) (qk) (ql) (qm) (qn) (qo) (qp) (qq) (qr) (qs) (qt) (qu) (qv) (qw) (qx) (qy) (qz) (ra) (rb) (rc) (rd) (re) (rf) (rg) (rh) (ri) (rj) (rk) (rl) (rm) (rn) (ro) (rp) (rq) (rr) (rs) (rt) (ru) (rv) (rw) (rx) (ry) (rz) (sa) (sb) (sc) (sd) (se) (sf) (sg) (sh) (si) (sj) (sk) (sl) (sm) (sn) (so) (sp) (sq) (sr) (ss) (st) (su) (sv) (sw) (sx) (sy) (sz) (ta) (tb) (tc) (td) (te) (tf) (tg) (th) (ti) (tj) (tk) (tl) (tm) (tn) (to) (tp) (tq) (tr) (ts) (tt) (tu) (tv) (tw) (tx) (ty) (tz) (ua) (ub) (uc) (ud) (ue) (uf) (ug) (uh) (ui) (uj) (uk) (ul) (um) (un) (uo) (up) (uq) (ur) (us) (ut) (uu) (uv) (uw) (ux) (uy) (uz) (va) (vb) (vc) (vd) (ve) (vf) (vg) (vh) (vi) (vj) (vk) (vl) (vm) (vn) (vo) (vp) (vq) (vr) (vs) (vt) (vu) (vv) (vw) (vx) (vy) (vz) (wa) (wb) (wc) (wd) (we) (wf) (wg) (wh) (wi) (wj) (wk) (wl) (wm) (wn) (wo) (wp) (wq) (wr) (ws) (wt) (wu) (wv) (ww) (wx) (wy) (wz) (xa) (xb) (xc) (xd) (xe) (xf) (xg) (xh) (xi) (xj) (xk) (xl) (xm) (xn) (xo) (xp) (xq) (xr) (xs) (xt) (xu) (xv) (xw) (xx) (xy) (xz) (ya) (yb) (yc) (yd) (ye) (yf) (yg) (yh) (yi) (yj) (yk) (yl) (ym) (yn) (yo) (yp) (yq) (yr) (ys) (yt) (yu) (yv) (yw) (yx) (yy) (yz) (za) (zb) (zc) (zd) (ze) (zf) (zg) (zh) (zi) (zj) (zk) (zl) (zm) (zn) (zo) (zp) (zq) (zr) (zs) (zt) (zu) (zv) (zw) (zx) (zy) (zz)



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  
 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)

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

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

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

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

Texas Department of Transportation  
 Traffic Operations Division Standard

**TRAFFIC CONTROL PLAN**  
**WORK AREA BEYOND RAMP**

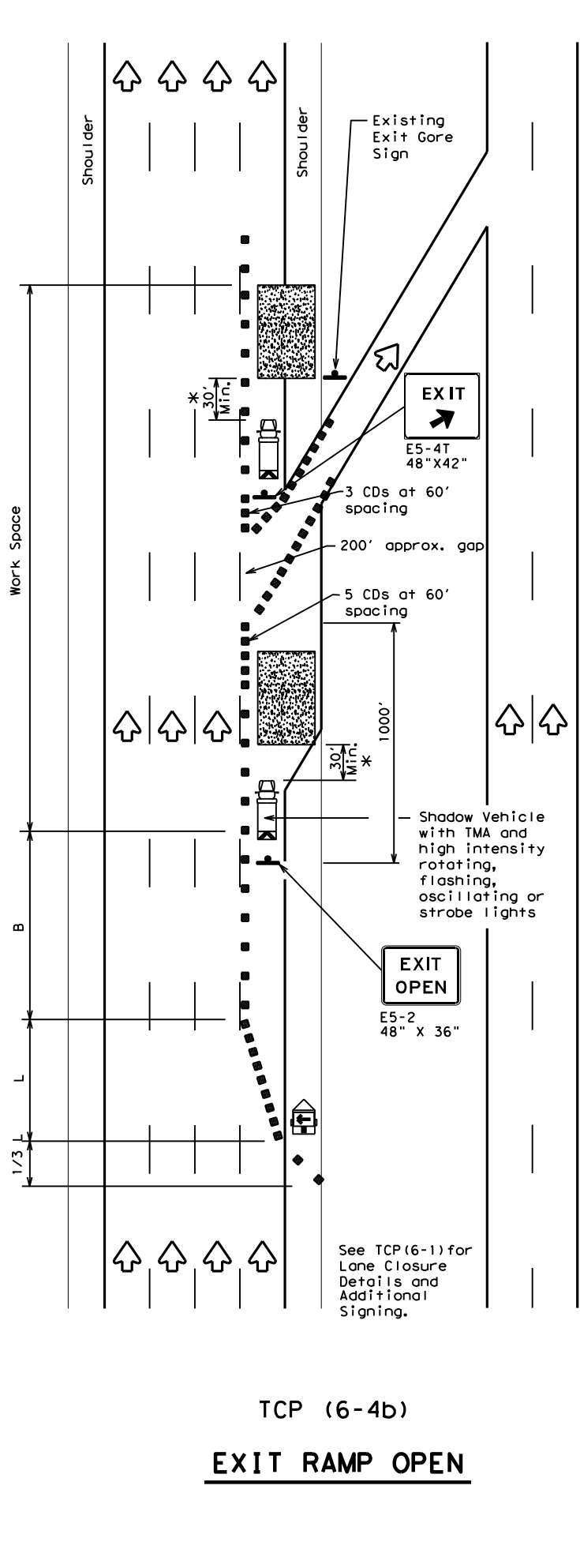
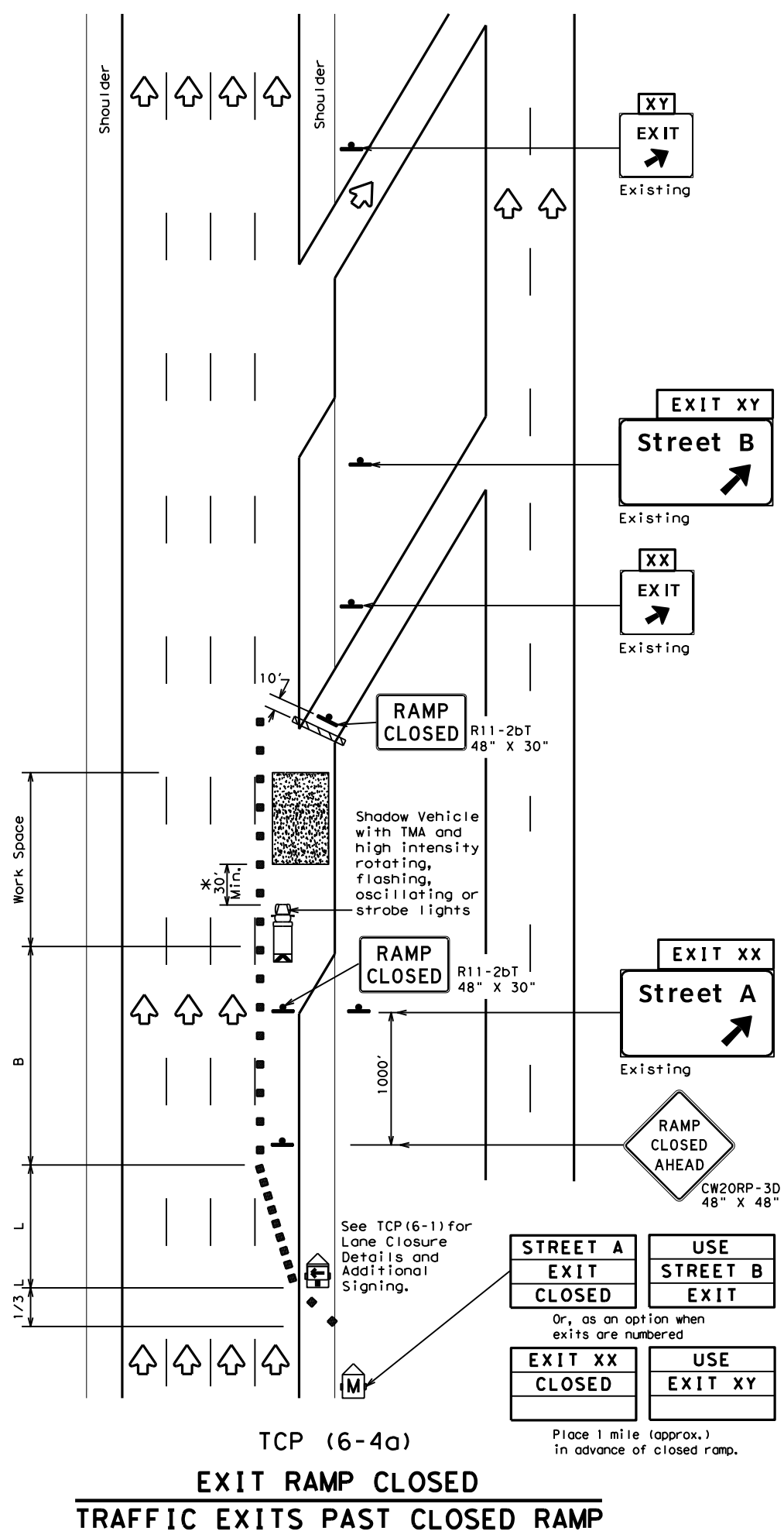
TCP (6-3) - 12

FILE: tcp6-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT
©TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	0275 12		083, ETC	IH-40
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	CHS	WHEELER		22



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DATE: 12/27/2022 1:05:31 PM  
 FILE: I:\CHSD\PROJECTS\WHEELER\0275-12-083 (Cable Barrier)\Plan Set\TCP\2022\0275-12-083\TCP (6-4) (Exit Ramp Closed).dgn



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	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.

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

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

Texas Department of Transportation  
 Traffic Operations Division Standard

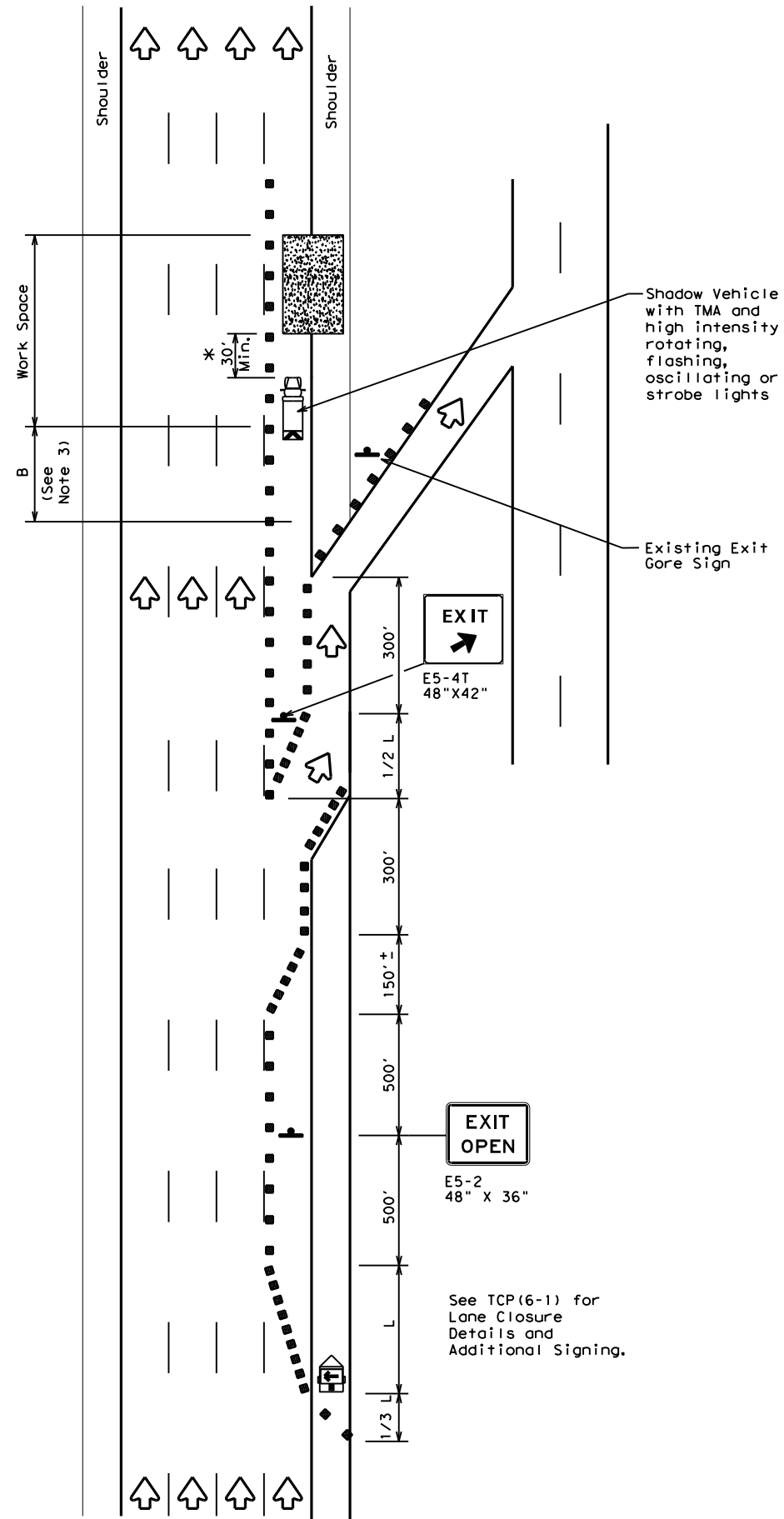
**TRAFFIC CONTROL PLAN**  
**WORK AREA AT EXIT RAMP**

**TCP (6-4) - 12**

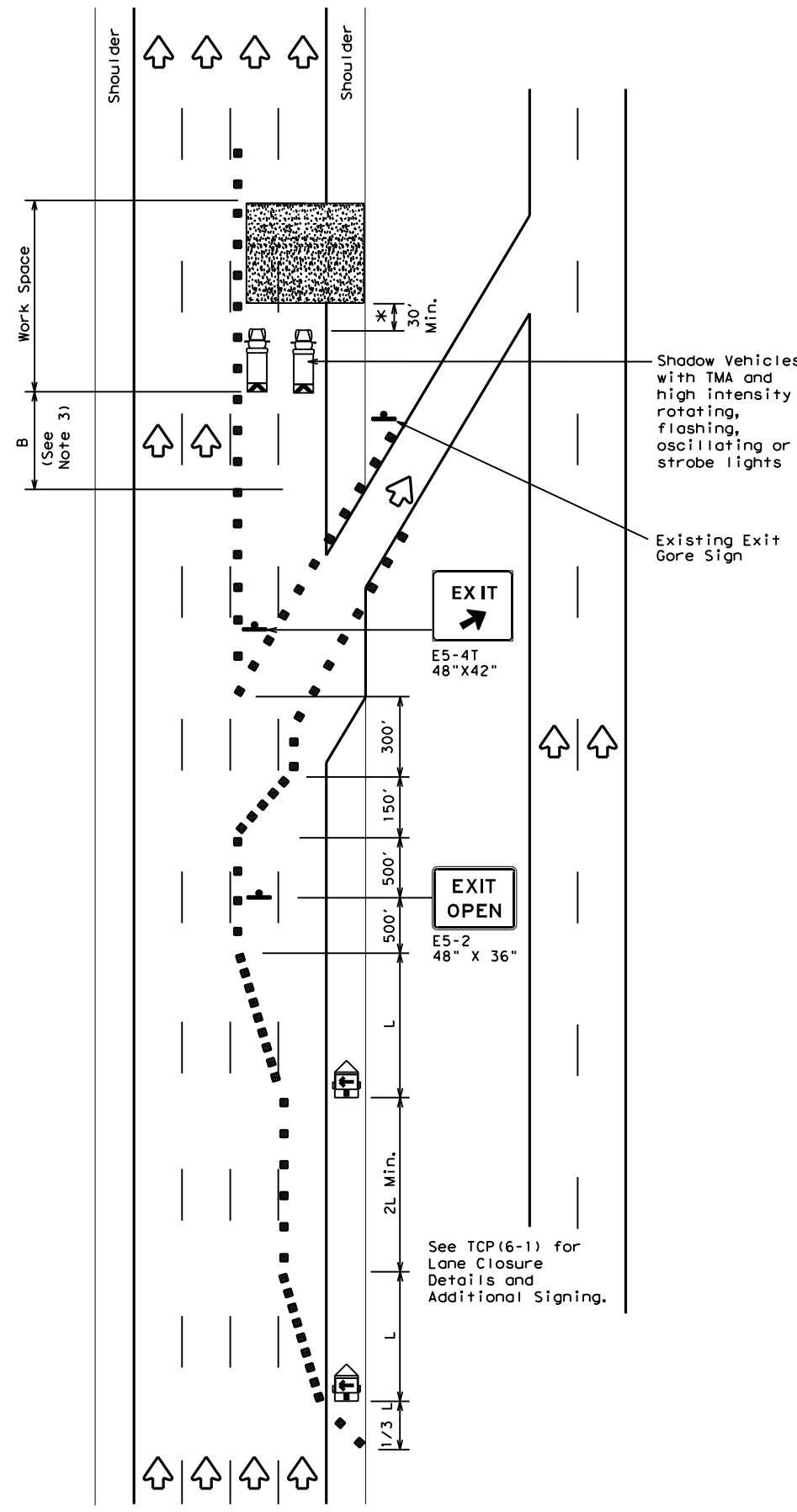
FILE: tcp6-4.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT
© TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	0275 12	083, ETC	IH-40	
1-97 8-98	DIST	COUNTY	SHEET NO.	
4-98 8-12	CHS	WHEELER	23	

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DATE: 12/27/2022 1:09:05 PM  
 FILE: I:\CHSD\PROJECTS\WHEELER\0275-12-083 (Cable Barrier)\Plan Set\TCP\TCP(6-5).dgn



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.

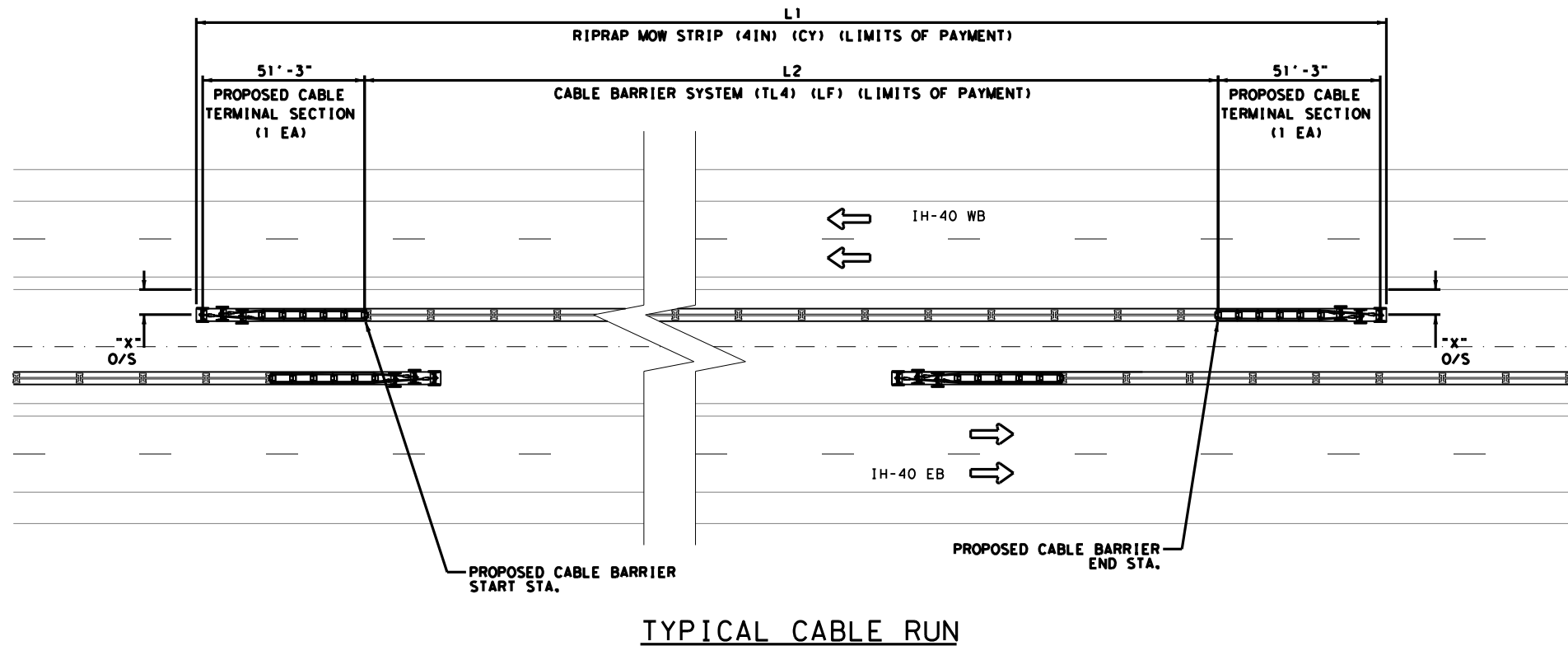
Additional requirements for lane closures and advance signing shall be as shown on TCP (6-1) or as directed by the Engineer.



**TRAFFIC CONTROL PLAN**  
**WORK AREA BEYOND EXIT RAMP**

**TCP (6-5) - 12**

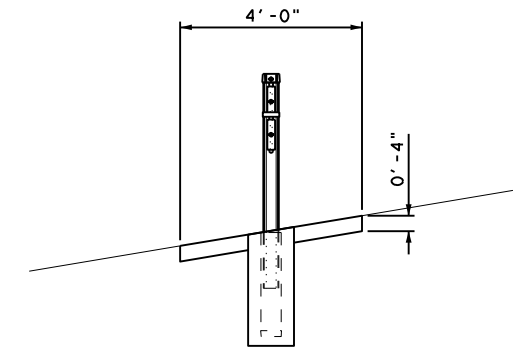
FILE:	tcp6-5.dgn	DN:	TxDOT	CK:	TxDOT	DW:	TxDOT	CK:	TxDOT
©TxDOT	February 1998	CONT	SECT	JOB	HIGHWAY				
REVISIONS	0275	12	083, ETC	IH-40					
1-97	8-98	DIST	COUNTY	SHEET NO.					
4-98	8-12	CHS	WHEELER	24					



TYPICAL CABLE RUN

**NOTES:**

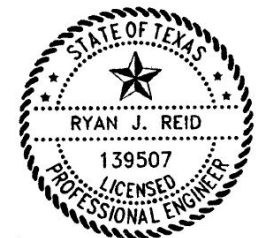
1. INSTALL CABLE BARRIER SYSTEM & CABLE TERMINAL SECTION AS PER STANDARD & MANUFACTURERS RECOMMENDATIONS.



MOW STRIP DETAIL

ROADWAY SUMMARY

LOCATION				LENGTH (FT)	432	543	543	658
					6045	6002	6002	6068
STATION	OFFSET ("X") (FT)	SIDE		RIPRAP (MOW STRIP) (4 IN) CY	CABLE BARRIER SYSTEM (TL-4) LF	CABLE BARRIER TERMINAL SECTION (TL-4) EA	INSTR DEL ASSM (D-DY) SZ 1 (BRG) GF2 EA	
786+35.00 TO 843+70.00	12	EB	5,735.00	288	5,735	2	57	
845+20.00 TO 854+20.00	12	WB	900.00	50	900	2	9	
854+20.00 TO 865+20.00	12	EB	1,100.00	59	1,100	2	11	
871+68.00 TO 891+35.00	12	WB	1,967.00	102	1,967	2	20	
892+90.00 TO 929+50.00	14	EB	3,660.00	186	3,660	2	37	
<b>CSJ: 0275-12-083 TOTALS:</b>				<b>13,362.00</b>	<b>685</b>	<b>13,362</b>	<b>10</b>	<b>134</b>
929+50.00 TO 965+30.00	15	WB	3,580.00	182	3,580	2	36	
968+78.00 TO 997+70.00	15	EB	2,892.00	148	2,892	2	29	
997+70.00 TO 1022+71.00	22	WB	2,501.00	129	2,501	2	25	
<b>CSJ: 0275-13-073 TOTALS:</b>				<b>8,973.00</b>	<b>458</b>	<b>8,973</b>	<b>6</b>	<b>90</b>
1022+71.00 TO 1086+45.00	15	WB	6,374.00	320	6,374	2	64	
1088+00.00 TO 1180+50.00	15	EB	9,250.00	462	9,250	2	93	
1180+70.00 TO 1232+50.00	15	WB	5,180.00	261	5,180	2	52	
1234+00.00 TO 1286+70.00	15	EB	5,270.00	265	5,270	2	53	
1286+90.00 TO 1359+15.00	15	WB	7,225.00	362	7,225	2	72	
1359+80.00 TO 1415+50.00	20	EB	5,570.00	280	5,570	2	56	
1417+08.00 TO 1443+41.00	15	EB	2,636.00	135	2,636	2	26	
1448+70.00 TO 1456+00.00	25	WB	730.00	41	730	1	7	
1457+00.00 TO 1499+90.00	23	WB	4,290.00	217	4,290	1	43	
1501+50.00 TO 1597+50.00	25	EB	9,600.00	479	9,600	2	96	
<b>CSJ: 0275-13-074 TOTALS:</b>				<b>56,125.00</b>	<b>2,822</b>	<b>56,125</b>	<b>18</b>	<b>422</b>
<b>PROJECT TOTALS:</b>				<b>78,460.00</b>	<b>3,965</b>	<b>78,460</b>	<b>34</b>	<b>646</b>

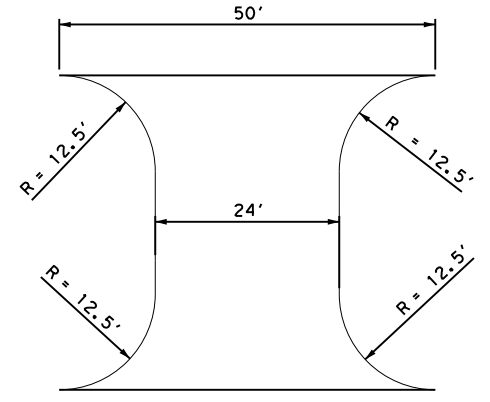
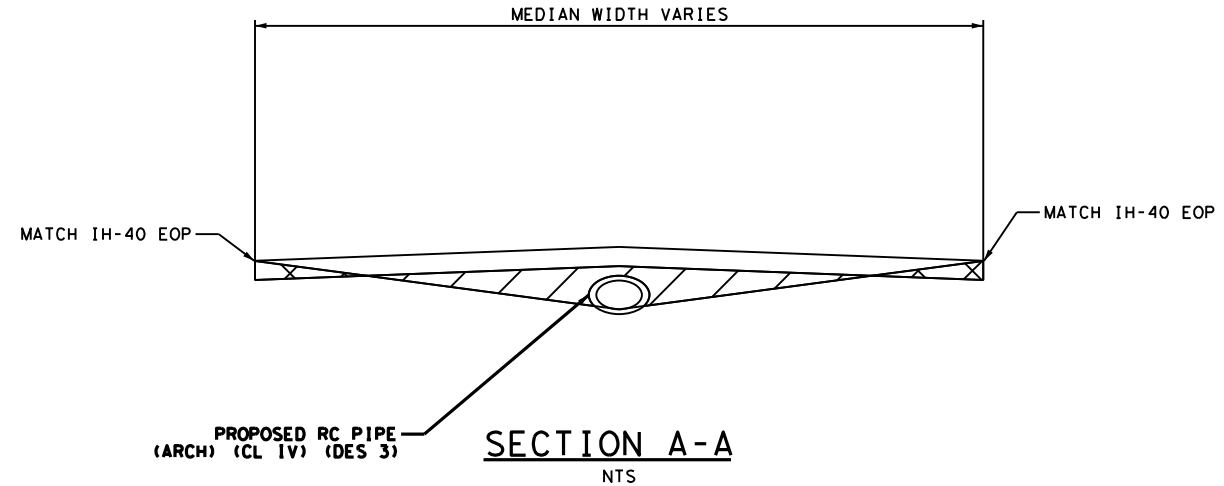
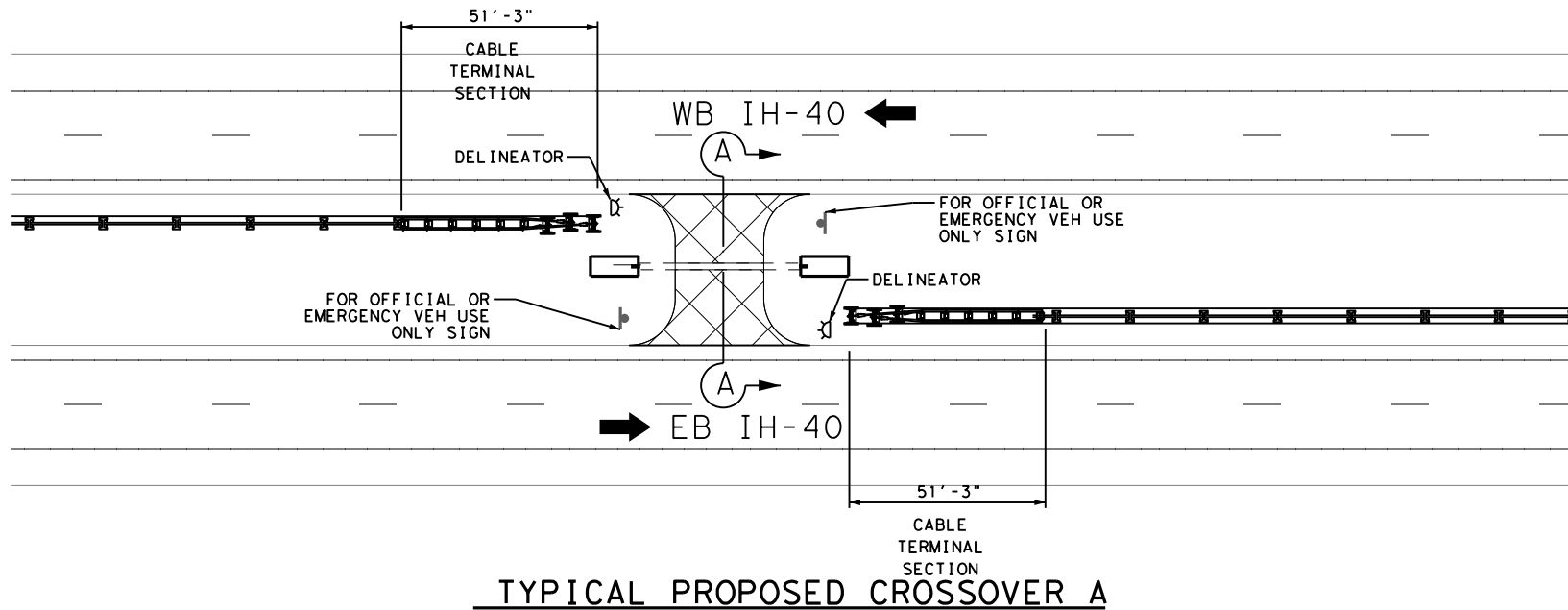


Ryan J. Reid P.E.  
12/29/2022

IH-40  
PROPOSED CABLE BARRIER DETAIL

NOTE: 1. CABLE BARRIER OFFSET TRANSITIONS FROM 25' TO 23' FROM STATION 1456+00.00 TO STA. 1457+00.00  
2. MOWSTRIP SHALL BE PLACED ADJACENT TO EXISTING MEDIAN CONCRETE FLUMES OR AS DIRECTED BY THE ENGINEER

DATE: 1/5/2023 8:54:47 AM  
 FILE: I:\CHSD\DESIGN\PROJECTS\WHEELER\0275-12-083 (Cable Barrier)\3D\_Model\new\_master\_layoutcopy.dgn



**LEGEND**

TURNOUTS (CONC) (6 IN)  
(SEE NOTE 2)

**NOTES:**

1. SEE D&OM(6)-20. FOR SIGN AND DELINEATION PLACEMENT.
2. USE CLASS A CONCRETE FOR TURNOUT (CONC). REINFORCING FIBERS WILL NOT BE ALLOWED FOR CROSSOVER. USE NO. 4 REINFORCING BARS AT A MAXIMUM OF 18 INCHES IN EACH DIRECTION.

**SHEET SUMMARY**

STA	MEDIAN WIDTH (FT)	110	132	464	467	530	658
		6001	6003	6030	6519	6007	6099
		EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (ORD COMP) (TY B)	RC PIPE (ARCH) (CL III) (DES 1)	SET (TY II) (DES 1) (RCP) (6:1) (P)	TURNOUTS (CONC)	INSTL OM ASSM (OM-2Z) (WFL) GND
		CY	CY	LF	EA	SY	EA
892+15.00	57	3	45	44	2	168	2
966+00.00	61	3	45	44	2	178	2
1087+25.00	69	3	45	44	2	199	2
1233+20.00	68	3	45	44	2	196	2
1359+50.00	67	3	45	44	2	195	2



Ryan J. Reid P.E.  
 01/05/2023

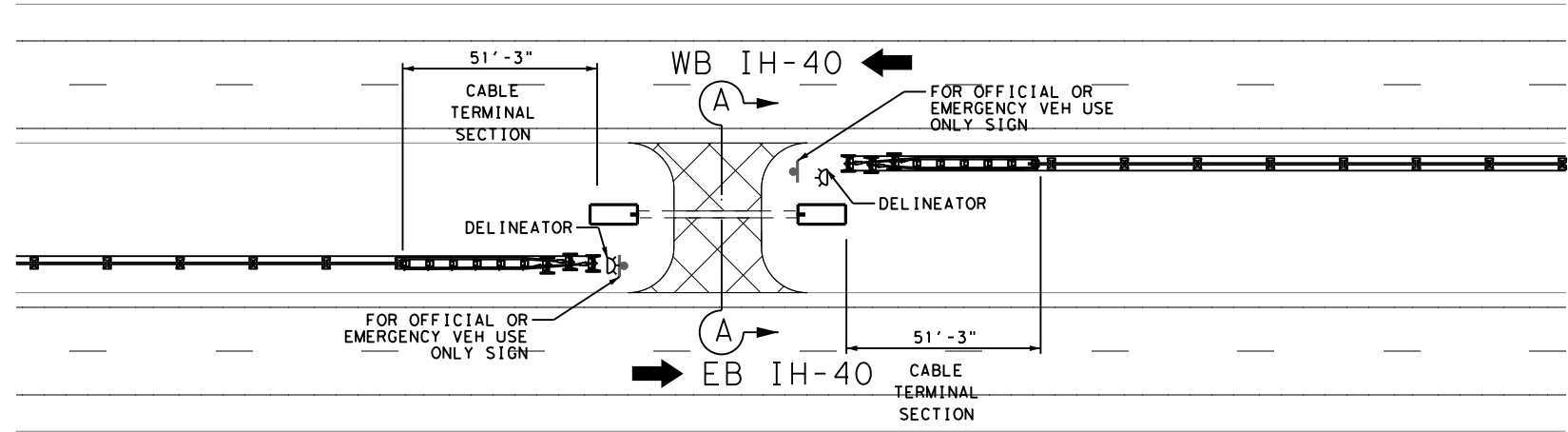
**IH 40  
 PROPOSED MEDIAN  
 CROSSOVER  
 DETAIL**



SHEET 1 OF 3

CONT	SECT	JOB	HIGHWAY
0275	12	083, ETC	IH-40
DIST	COUNTY		SHEET NO.
CHS	WHEELER		26

DATE: 1/5/2023 8:54:32 AM  
 FILE: I:\CHSD\DESIGN\PROJECTS\WHEELER\0275-12-083 (Cable Barrier)\3D Model\new\_master\_layoutcopy.dgn



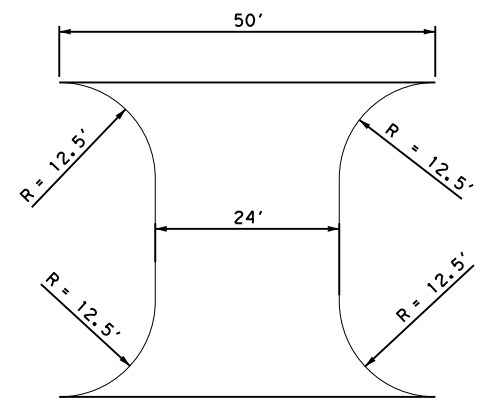
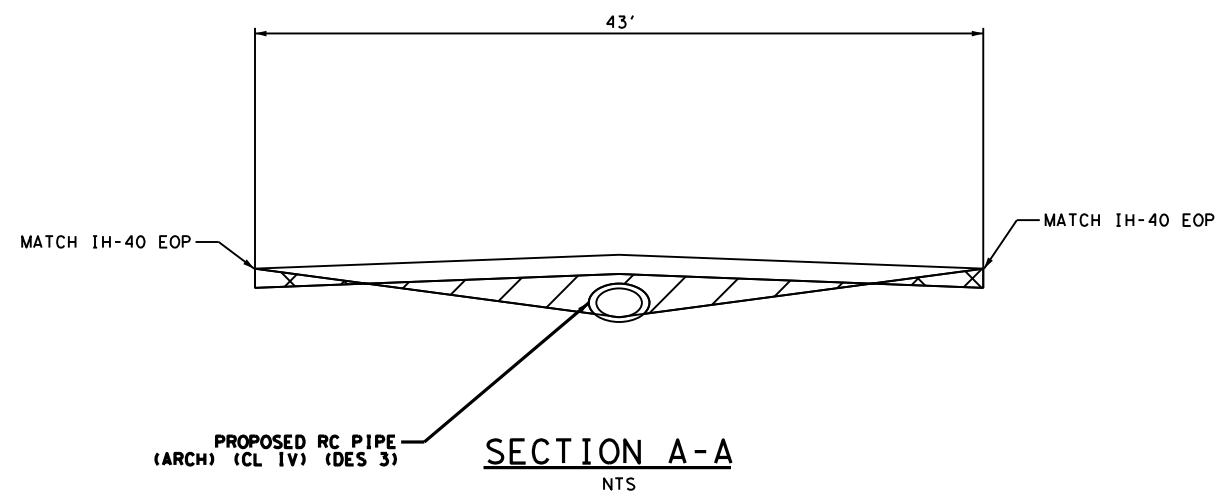
**LEGEND**

TURNOUTS (CONC) (6 IN)  
(SEE NOTE 2)

**NOTES:**

- SEE D&OM(6)-20. FOR SIGN AND DELINEATION PLACEMENT.
- USE CLASS A CONCRETE FOR TURNOUT (CONC). REINFORCING FIBERS WILL NOT BE ALLOWED FOR CROSSOVER. USE NO. 4 REINFORCING BARS AT A MAXIMUM OF 18 INCHES IN EACH DIRECTION.

**TYPICAL PROPOSED CROSSOVER B**



**TYPICAL CROSS OVER DETAIL**



*Ryan J. Reid P.E.*  
 01/05/2023

**SHEET SUMMARY**

STA	MEDIAN WIDTH (FT)	110	132	464	467	530	658
		6001	6003	6030	6519	6007	6099
		EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (ORD COMP) (TY B)	RC PIPE (ARCH) (CL III) (DES 1)	SET (TY II) (DES 1) (RCP) (6:1) (P)	TURNOUTS (CONC)	INSTL OM ASSM (OM-2Z) (WFL) GND
		CY	CY	LF	EA	SY	EA

**IH-40  
 PROPOSED MEDIAN  
 CROSSOVER  
 DETAIL**




SHEET 2 OF 3

CONT	SECT	JOB	HIGHWAY
0275	12	083, ETC	IH-40
DIST	COUNTY		SHEET NO.
CHS	WHEELER		27

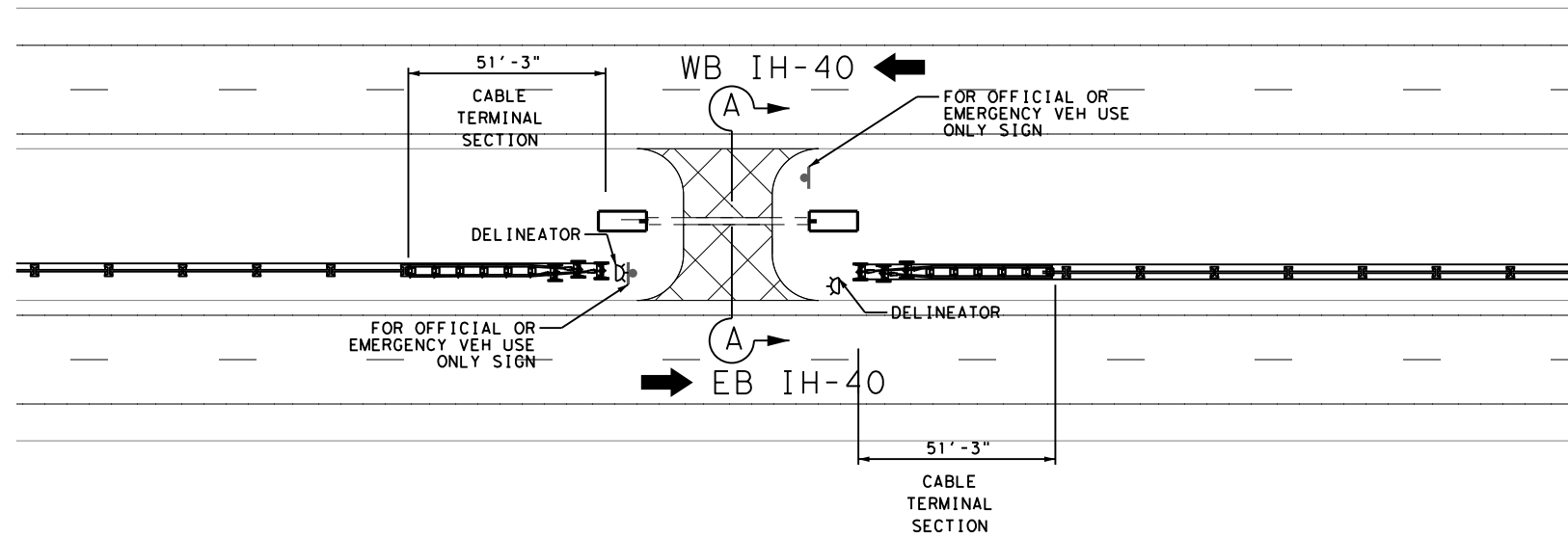
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**LEGEND**

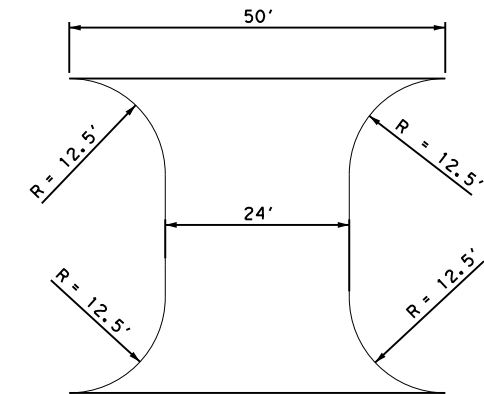
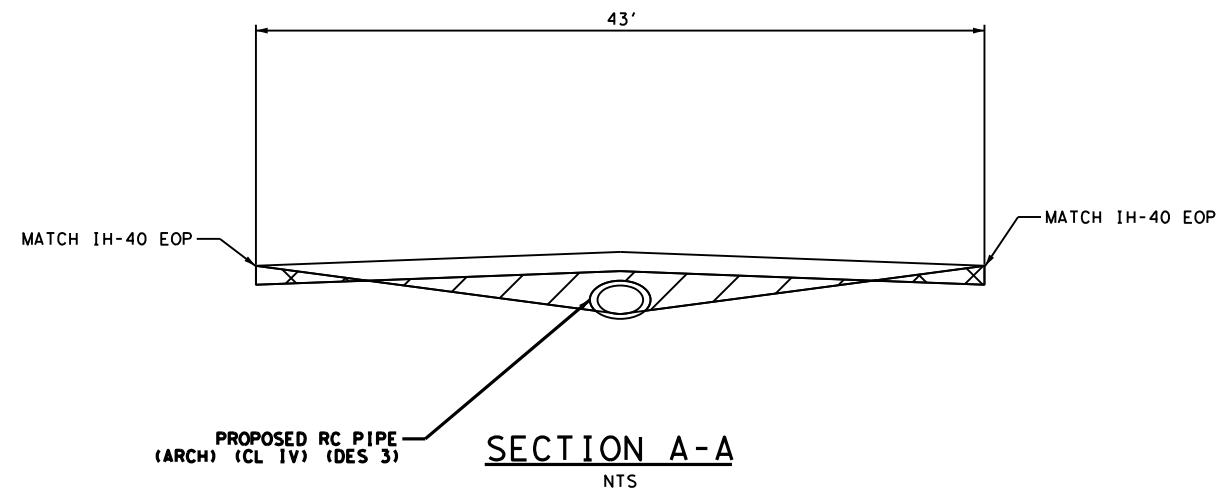
 TURNOUTS (CONC) (6 IN)  
(SEE NOTE 2)

**NOTES:**

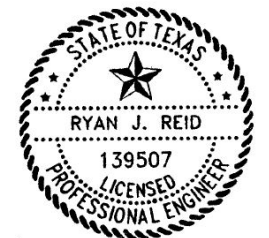
1. SEE D&OM(6)-20. FOR SIGN AND DELINEATION PLACEMENT.
2. USE CLASS A CONCRETE FOR TURNOUT (CONC). REINFORCING FIBERS WILL NOT BE ALLOWED FOR CROSSOVER. USE NO. 4 REINFORCING BARS AT A MAXIMUM OF 18 INCHES IN EACH DIRECTION.



**TYPICAL PROPOSED CROSSOVER B**



**TYPICAL CROSS OVER DETAIL**



*Ryan J. Reid P.E.*  
01/05/2023

**SHEET SUMMARY**

STA	MEDIAN WIDTH (FT)	110	132	464	467	530	658
		6001	6003	6030	6519	6007	6099
		EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (ORD COMP) (TY B)	RC PIPE (ARCH) (CL III) (DES 1)	SET (TY II) (DES 1) (RCP) (6:1) (P)	TURNOUTS (CONC)	INSTL OM ASSM (OM-22) (WFL) GND
		CY	CY	LF	EA	SY	EA
1416+30.00	70	3	45	44	2	131	2

**IH-40  
PROPOSED MEDIAN  
CROSSOVER  
DETAIL**

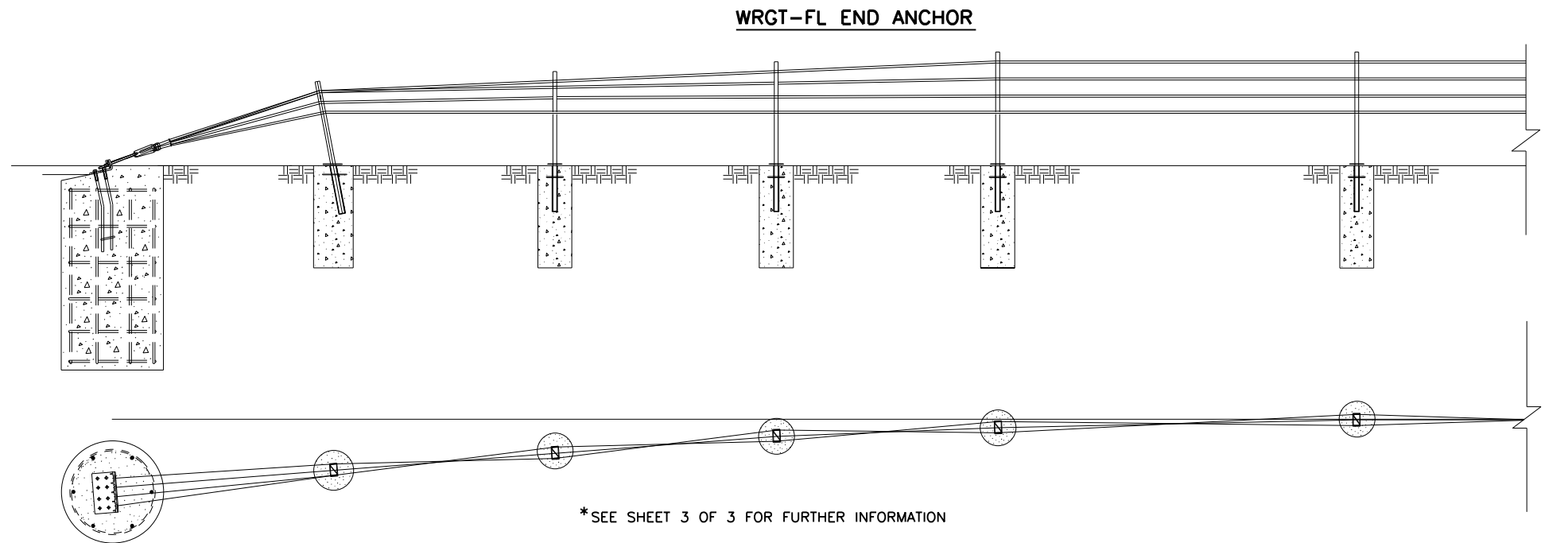
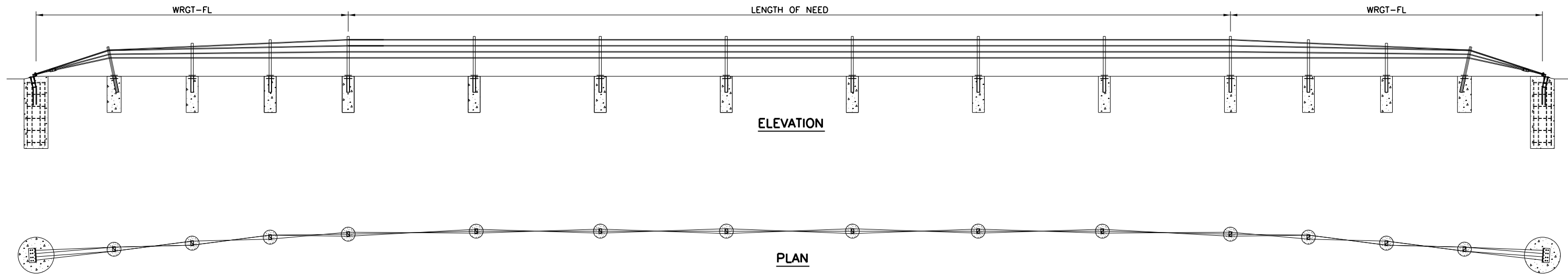


SHEET 3 OF 3

CONT	SECT	JOB	HIGHWAY
0275	12	083, ETC	IH-40
DIST	COUNTY		SHEET NO.
CHS	WHEELER		28

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DATE: 12/27/2022  
FILE: I:\CHSD\DESIGN\PROJECTS\WHEELER\0275-12-083 (Cable Barrier)\Plan Set\TCP\29\_31\_BRIFEN(TL4)-14.dgn



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



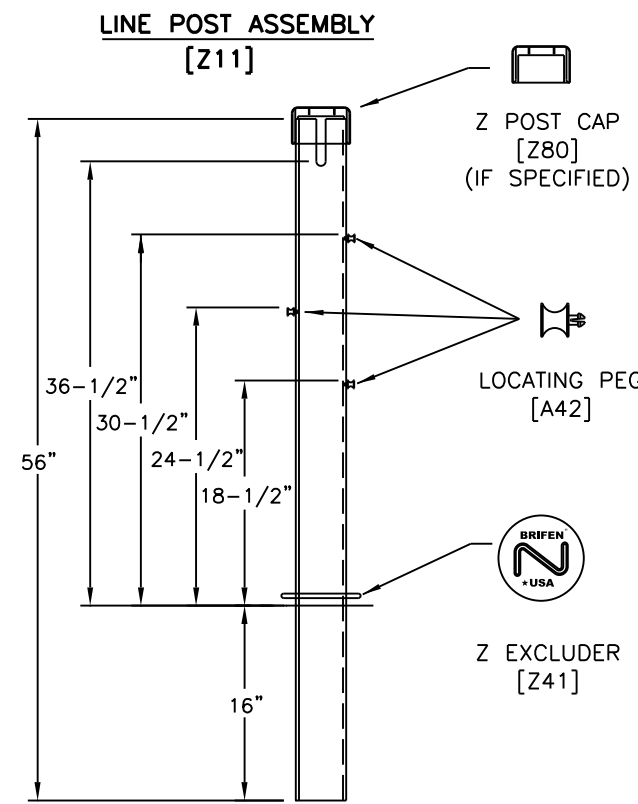
**BRIFEN  
WIRE ROPE SAFETY FENCE  
(TL-4)**

**BRIFEN(TL4)-14**

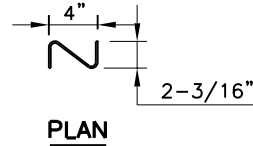
FILE: brifent1414.dgn	DN: TxDOT	CK: RM	DW: VP	CK:
© TxDOT: MARCH 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0275	12	083, ETC	IH-40
	DIST	COUNTY	SHEET NO.	
	CHS	WHEELER	29	

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DATE: 12/27/2022  
FILE: T:\CHSD\PROJECTS\WHEELER\0275-12-083 (Cable Barrier)\Plan Set\TCP\29\_31\_BRIFEN(TL4)-14.dgn



ELEVATION

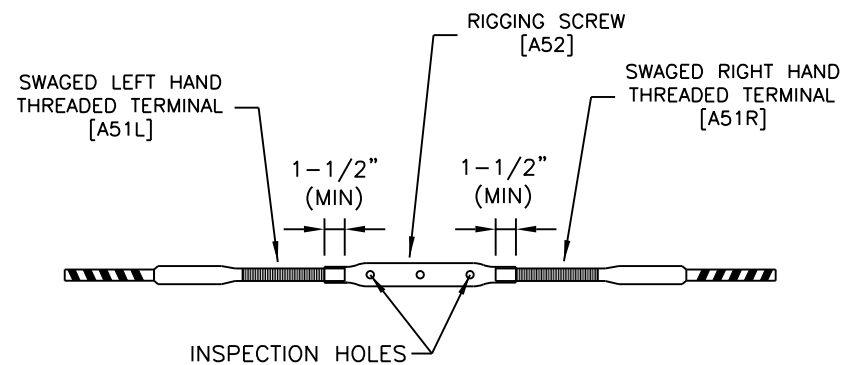


PLAN

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.

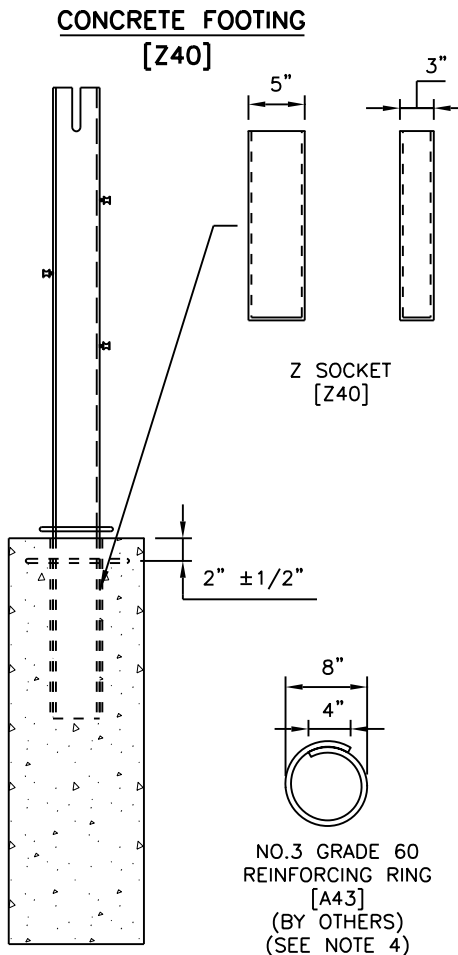
ROPE CONNECTION DETAIL



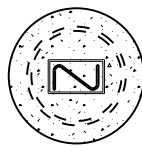
NOTES SPECIFIC TO ROPE CONNECTION DETAIL

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



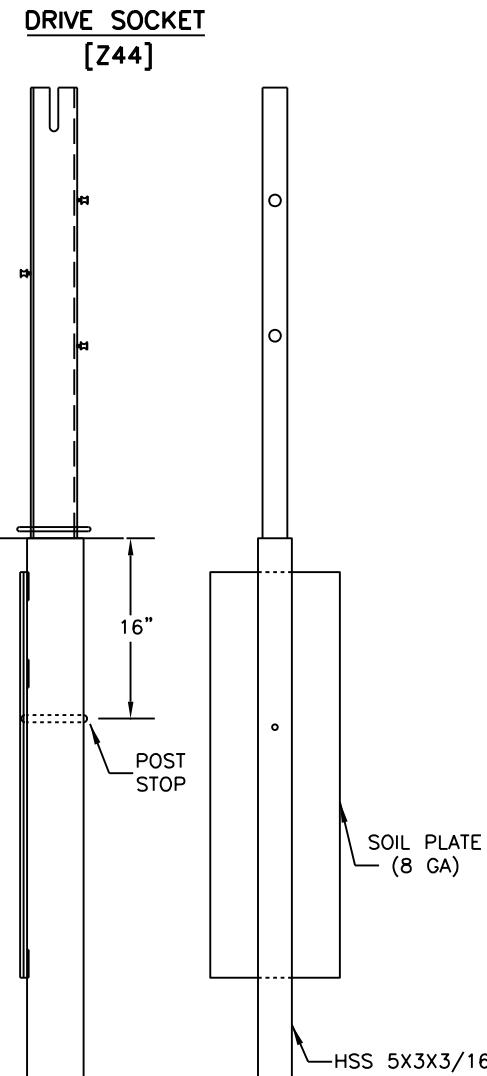
ELEVATION



PLAN

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  $\pm 2^\circ$  OF VERTICAL PLUMB.



ELEVATION

SIDE



PLAN

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  $\pm 2^\circ$  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:

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SHEET 2 OF 3



**BRIFEN**  
**WIRE ROPE SAFETY FENCE**  
**(TL-4)**

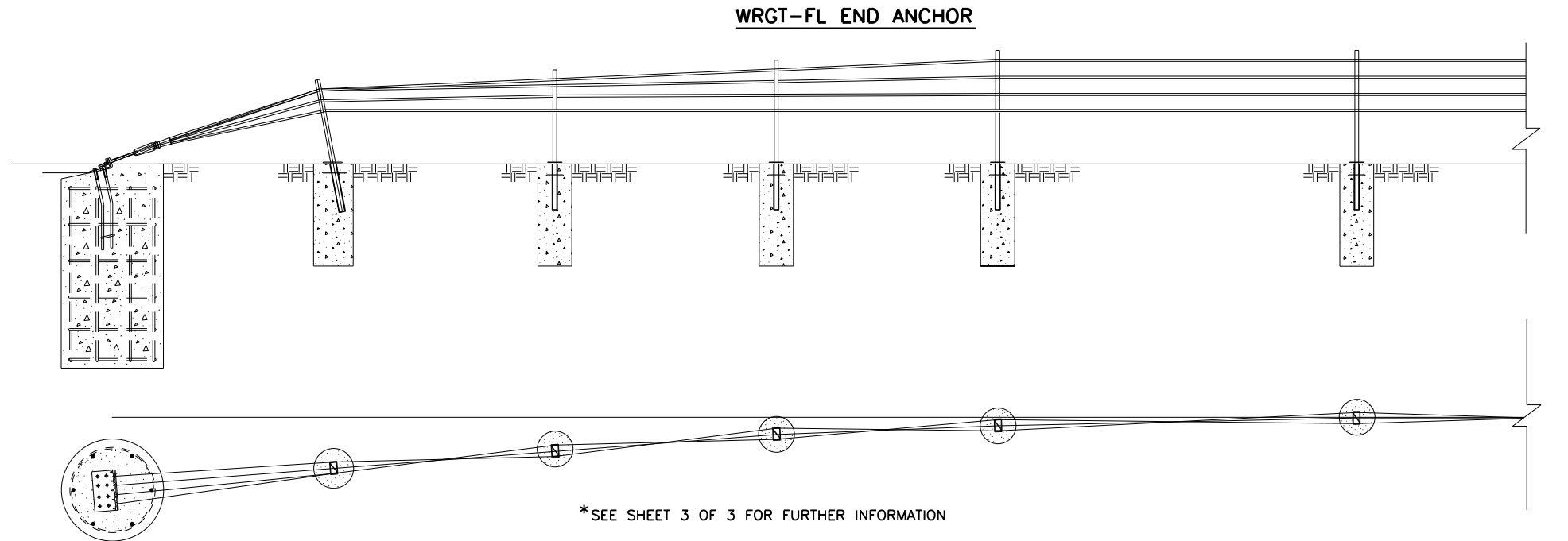
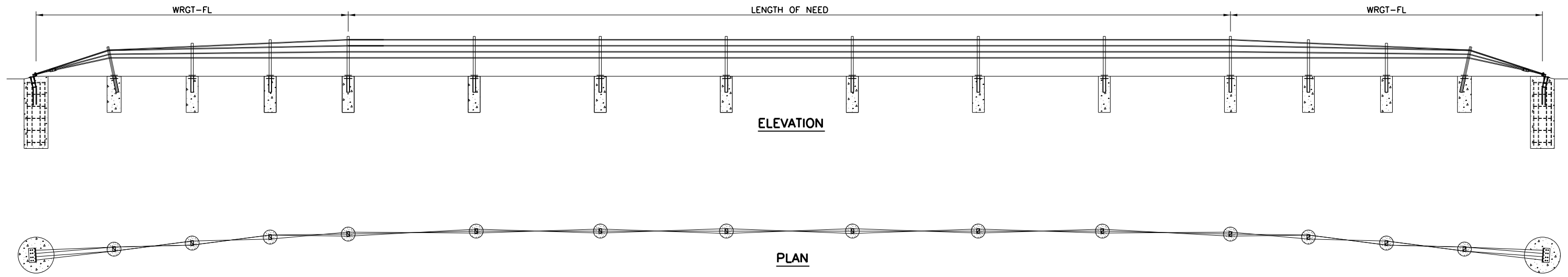
**BRIFEN(TL4)-14**

FILE: brifent1414.dgn	DN: TxDOT	CK: RM	DW: VP	CK:
© TxDOT: MARCH 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0275	12	083, ETC	IH-40
	DIST	COUNTY	SHEET NO.	
	CHS	WHEELER	30	



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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
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55	4050	18.0
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75	3450	15.3
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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

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SHEET 1 OF 3

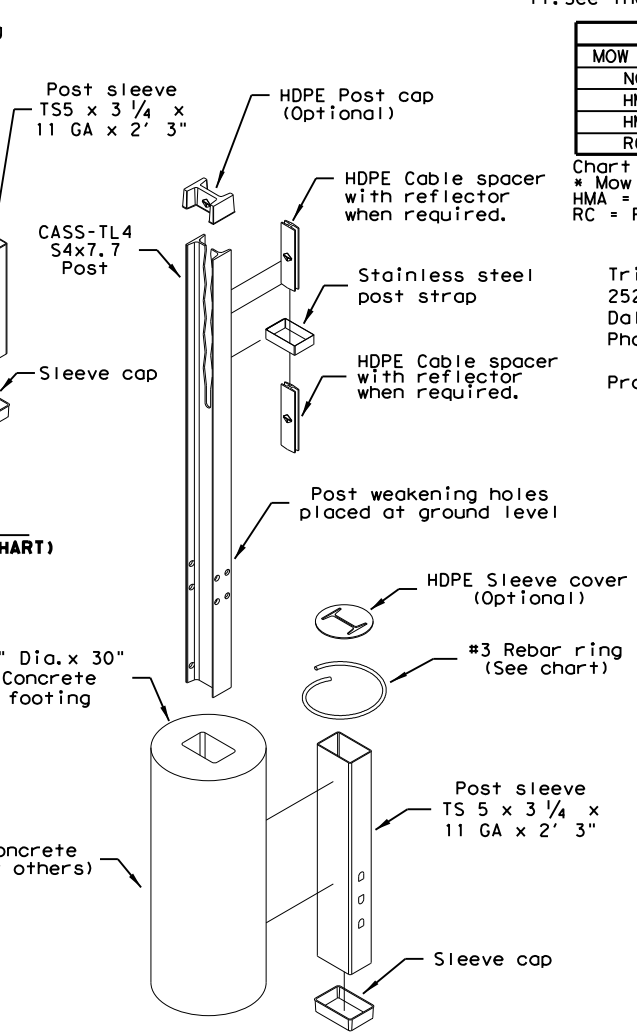
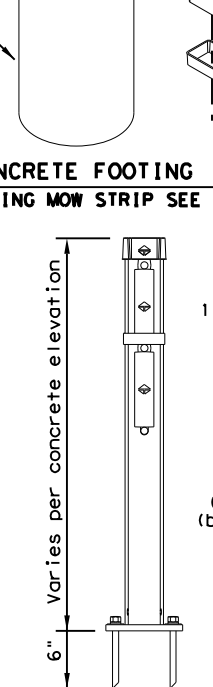
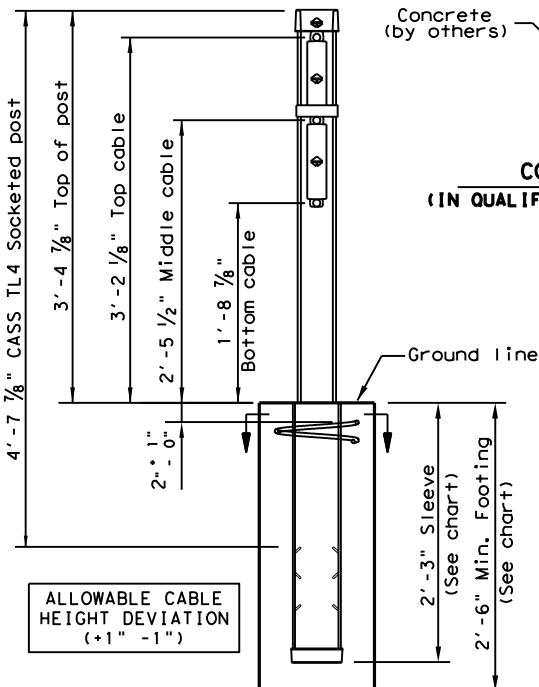
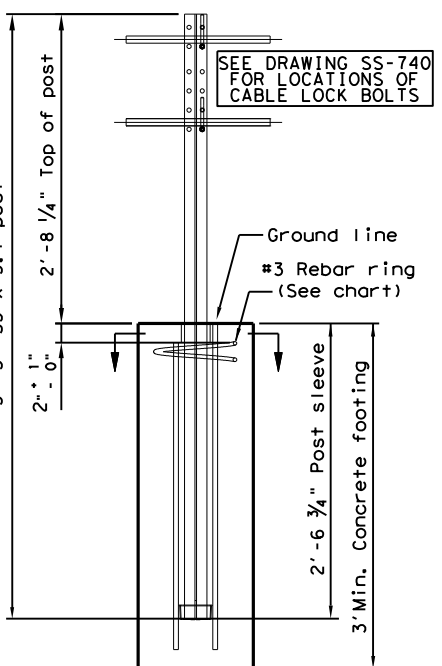
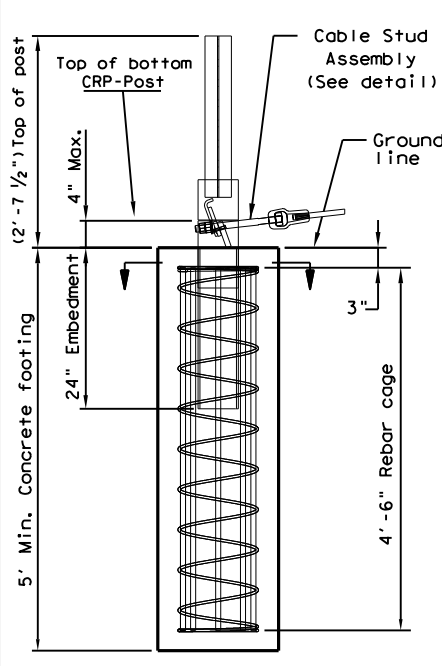
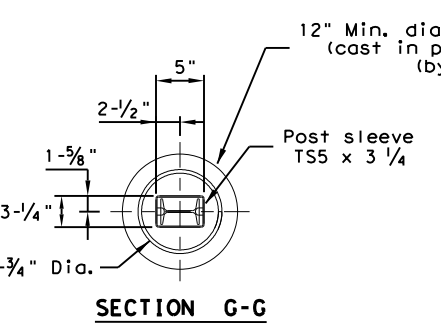
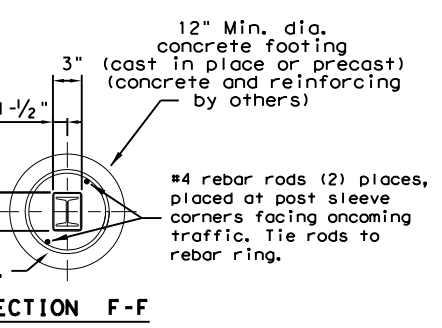
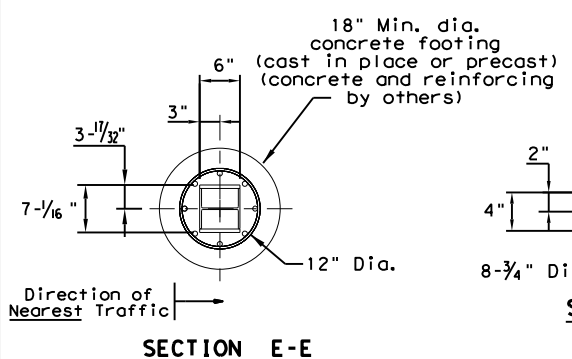
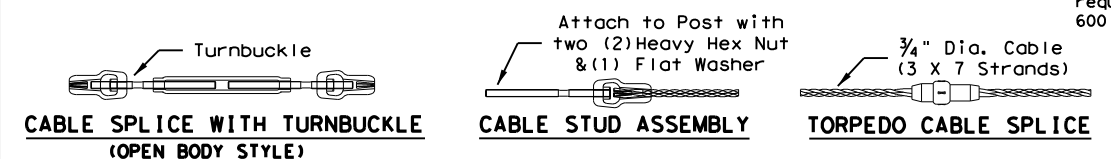
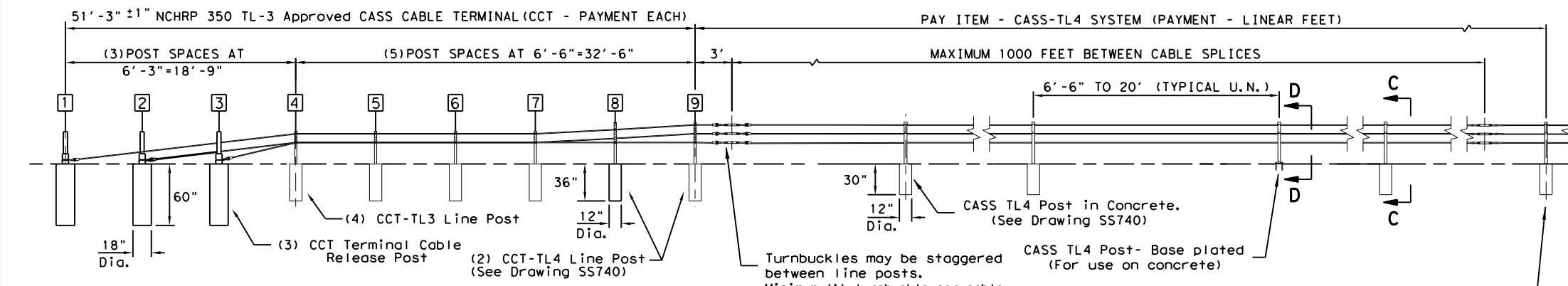
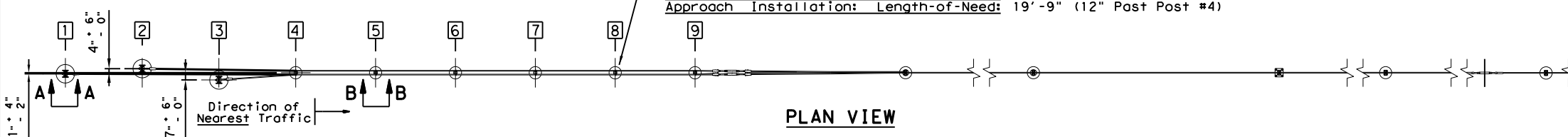
		<i>Design Division Standard</i>	
<b>BRIFEN WIRE ROPE SAFETY FENCE (TL-4)</b>			
<b>BRIFEN(TL4)-14</b>			
FILE: brifent1414.dgn	DN: TxDOT	CK: RM	DW: VP
© TxDOT: MARCH 2014	CONT: 0275	SECT: 12	JOB: 083, ETC
REVISIONS		DIST: CHS	COUNTY: WHEELER
		HIGHWAY: IH-40	
		SHEET NO.: 31	

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DATE: 12/27/2022  
 FILE: I:\CHSD\PROJECTS\WHEELER\0275-12-083 (Cable Barrier)\Plan Set\TCP\32 CASS(TL4)-14.dgn

**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)



**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 (800-527-6050) 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 plumb (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.	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).

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

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

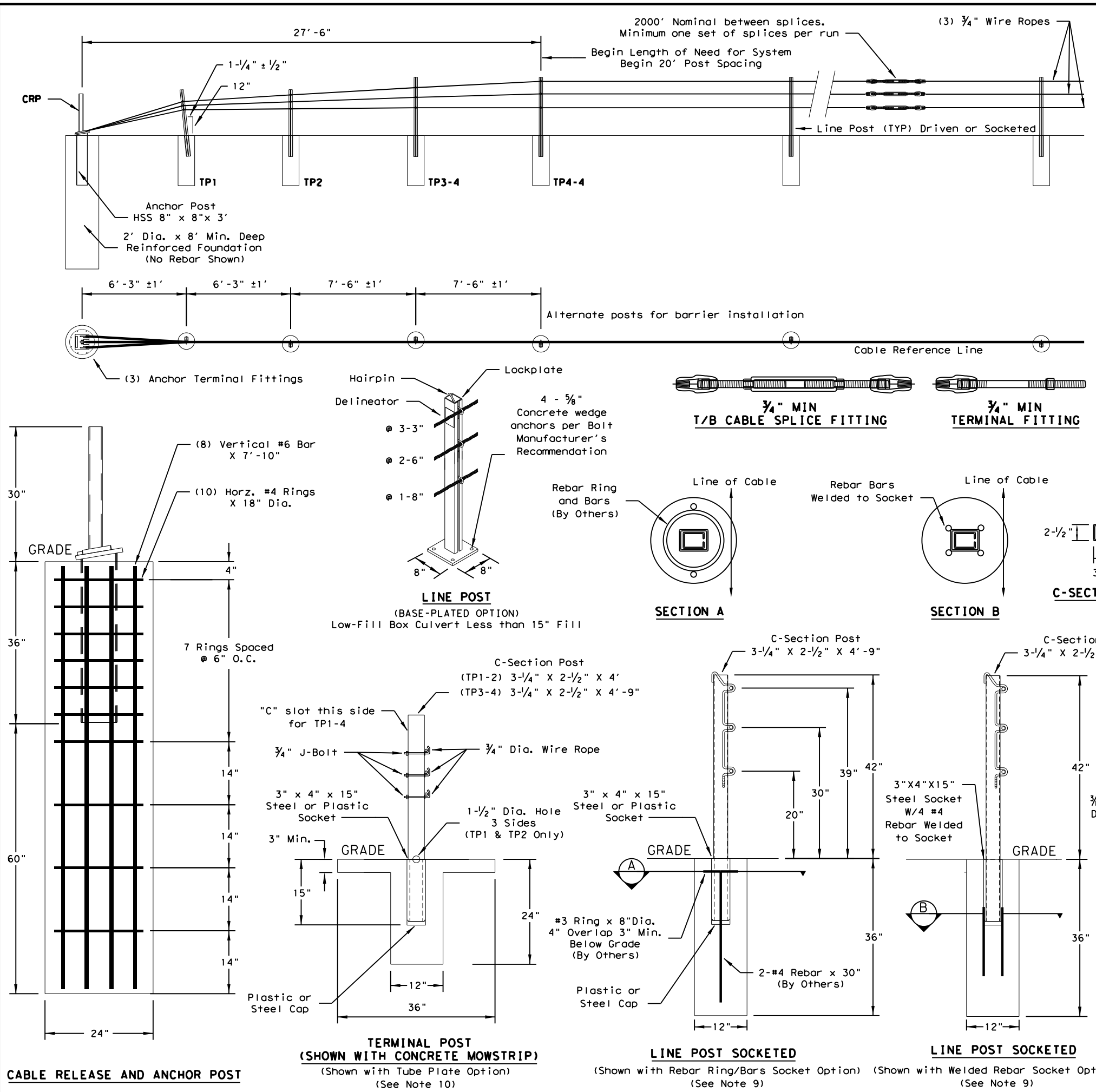
Allowable deviation from chart in tangent sections: +800, -200 pounds/force. Cable tension readings are typically higher in curved cable sections.

Texas Department of Transportation  
**TRINITY CABLE SAFETY SYSTEM (TL-4)**  
**CASS (TL4) - 14**

FILE: casst1414.dgn	DN: TxDOT	CK: RM	DW: VP	CK:
©TxDOT: March 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0275	12	083, ETC	IH-40
	DIST	COUNTY	SHEET NO.	
	CHS	WHEELER	32	

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DATE: 12/27/2022  
 FILE: I:\CHSD\PROJECTS\WHEELER\0275-12-083 (Cable Barrier)\Plan Set\TCP\33 GBRLTR(TL4)-14.dgn



**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

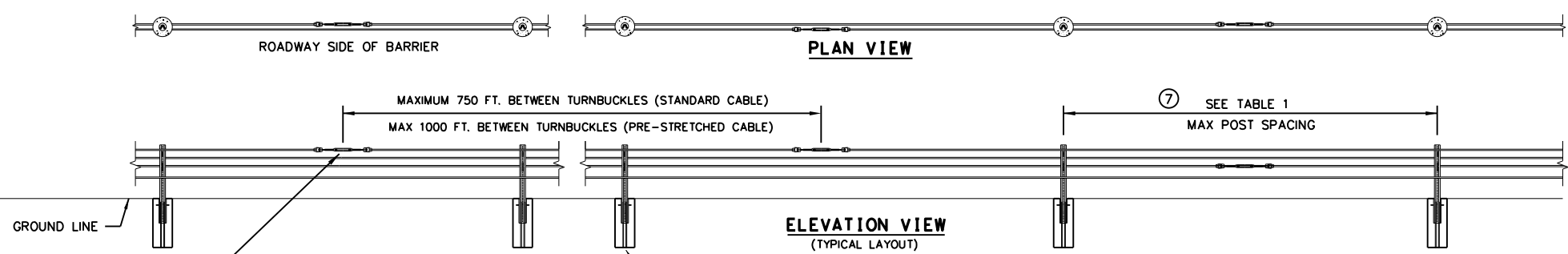
\* Allowable Deviation from Chart +/- 10%

**GIBRALTAR CABLE BARRIER SYSTEM (TL-4)**  
**GBRLTR(TL4) - 14**

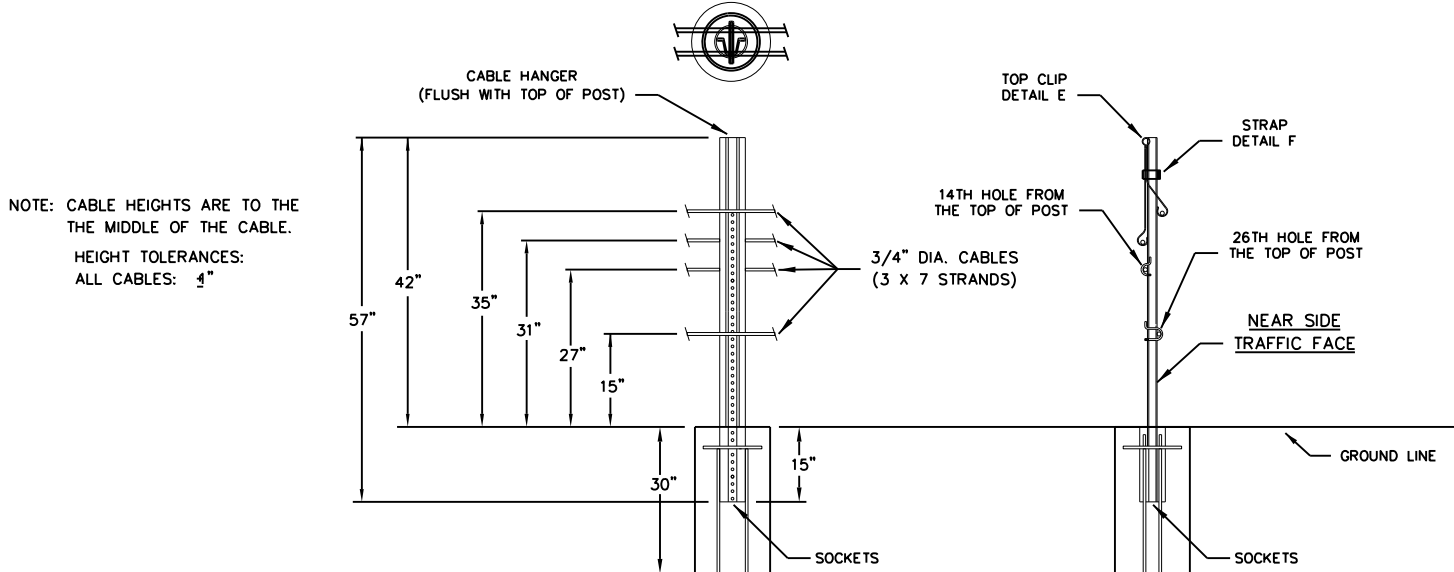
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REVISIONS	DIST: CHS	COUNTY: WHEELER	SHEET NO.:	33

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 FILE: T:\CHSD\PROJECTS\WHEELER\0275-12-083 (Cable Barrier)\Plan Set\TCP\34\_35 NU-CABLE (TL4) -14.dgn



- GENERAL NOTES**
- FOR ADDITIONAL INFORMATION CONTACT YOUR DISTRIBUTOR OR NUCOR STEEL MARION, INC. AT (740) 383-4011.
  - 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 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-Bak™ 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

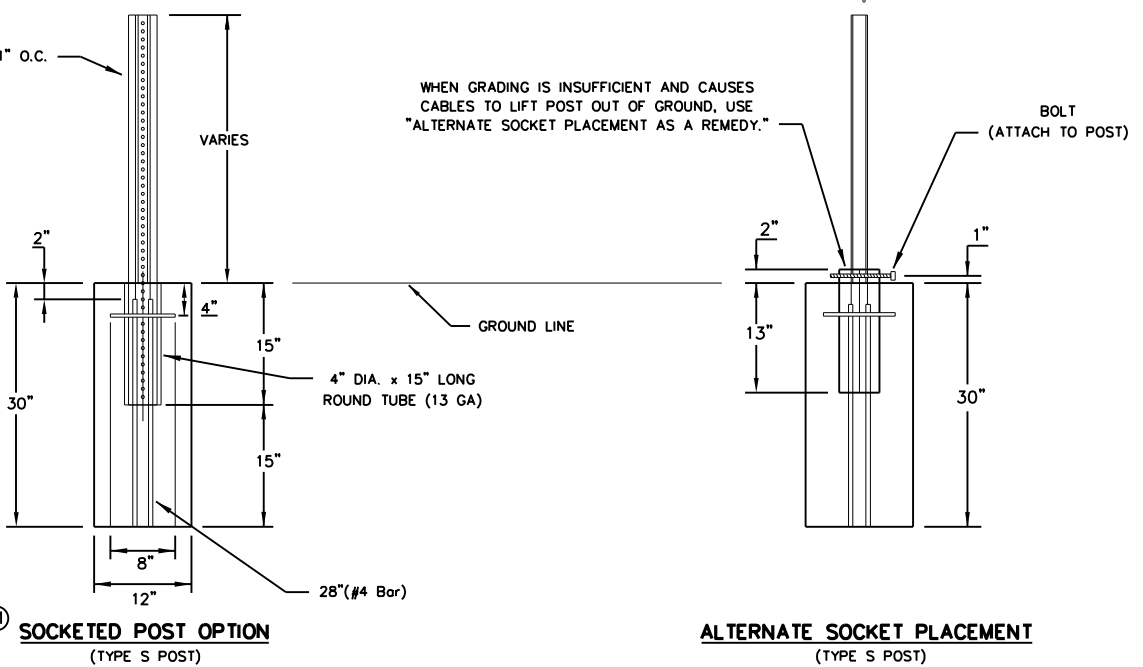
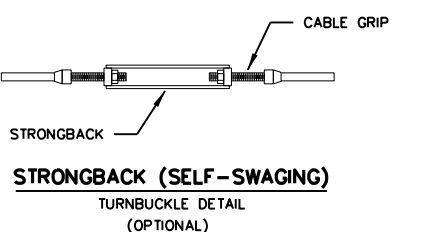
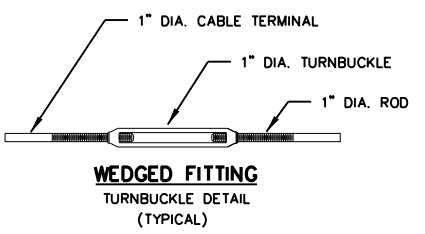
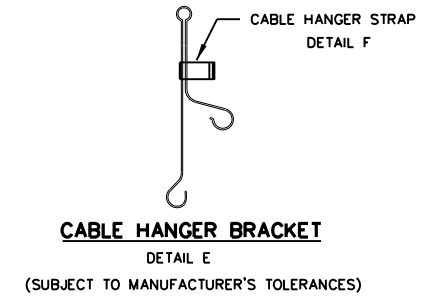
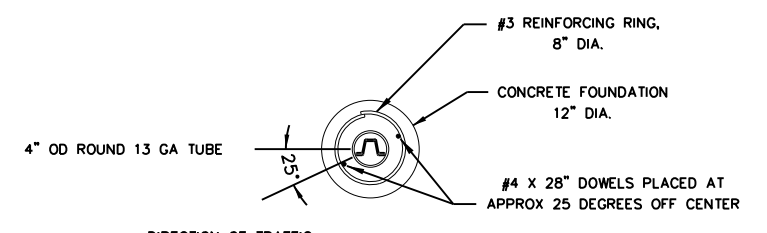
**CABLE TENSION CHART**

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



SHEET 1 OF 2

Texas Department of Transportation  
 Design Division Standard

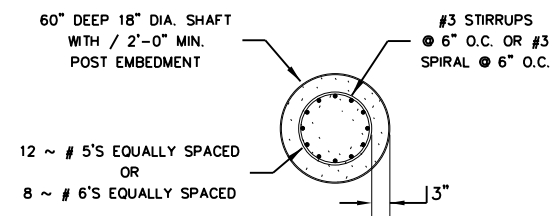
**NU-CABLE BARRIER SYSTEM (TL-4) (4 CABLE)**

**NU-CABLE (TL4) - 14**

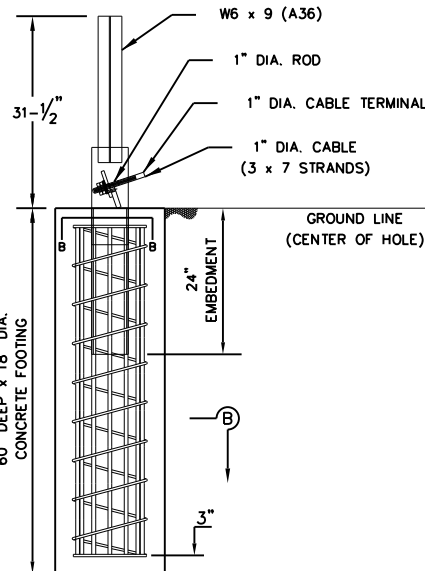
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	DIST	COUNTY	SHEET NO.	
	CHS	WHEELER	34	

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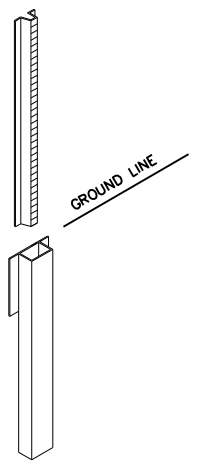
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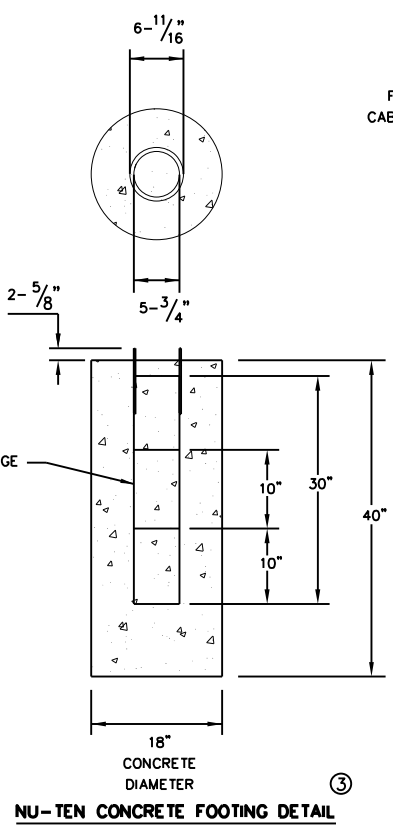
**SECTION B-B**  
(CABLE RELEASE POST)



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



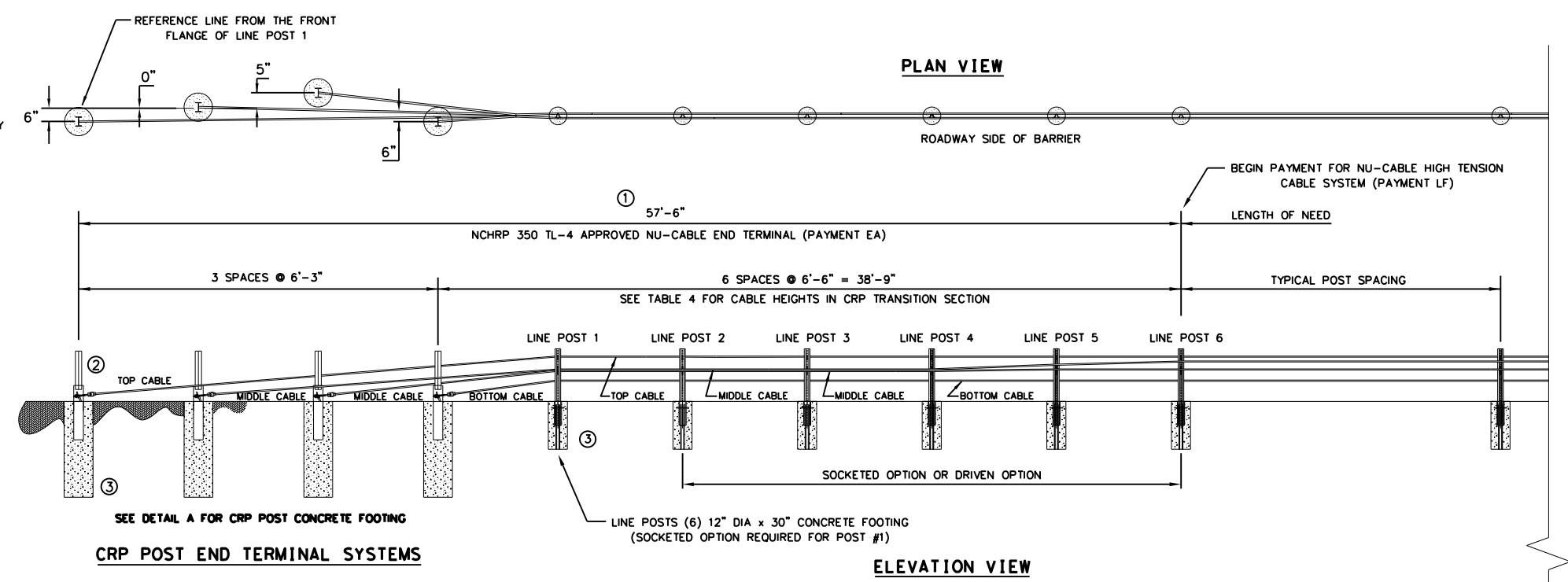
**DRIVEN SOCKET OPTION**



**NU-TEN CONCRETE FOOTING DETAIL**

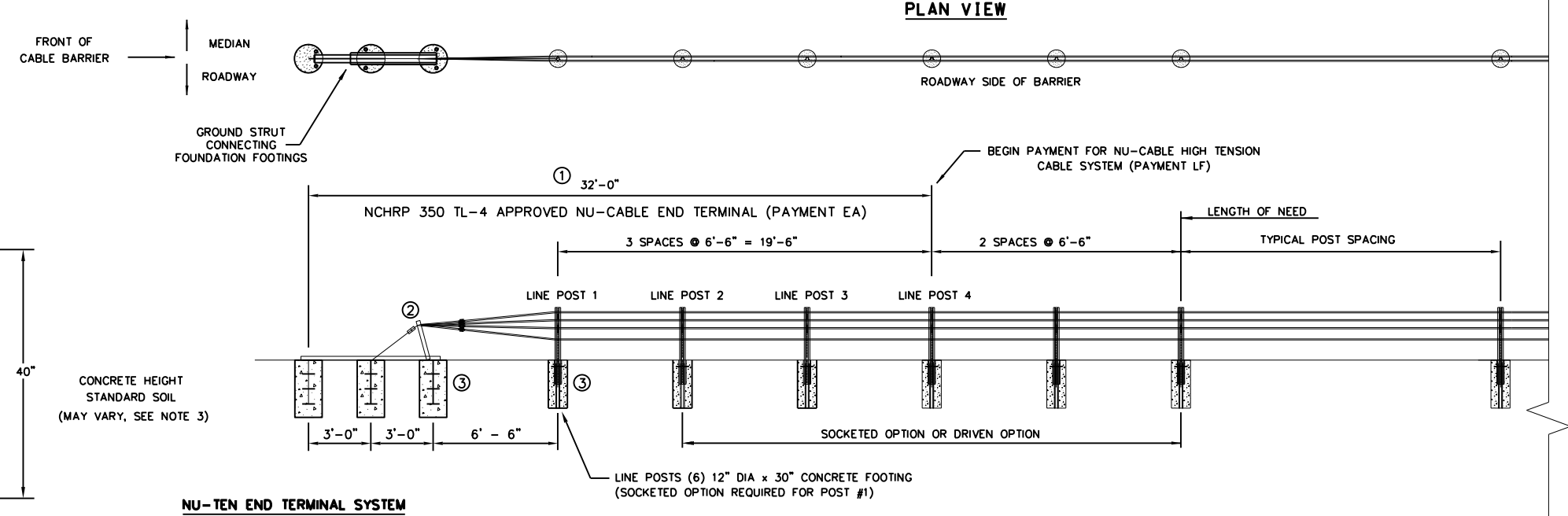
**TABLE 4**

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"



**CRP POST END TERMINAL SYSTEMS**

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



**NU-TEN END TERMINAL SYSTEM**

**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.

SHEET 2 OF 2

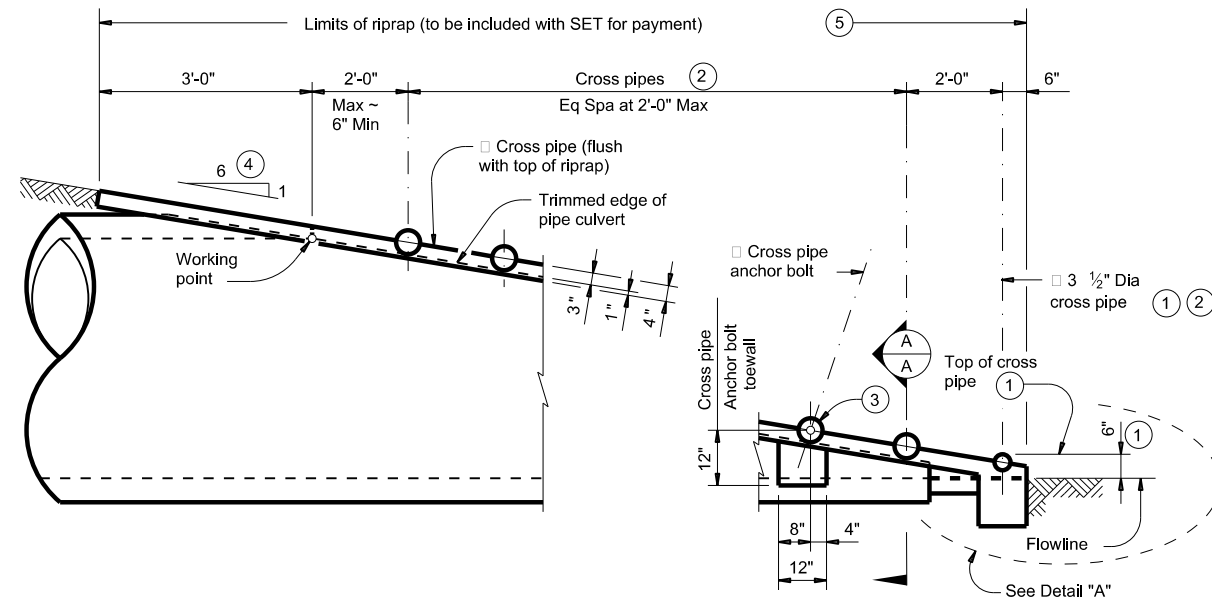
Design Division Standard

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

**NU-CABLE (TL4) - 14**

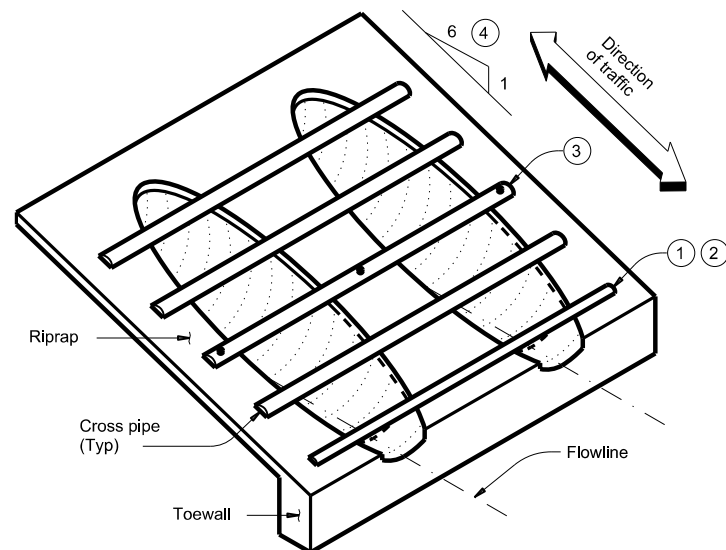
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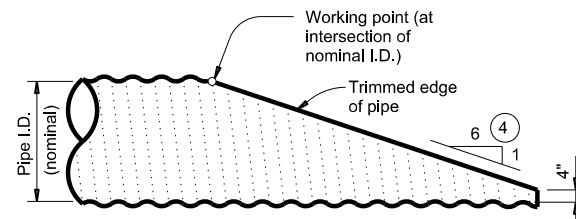


**SIDE ELEVATION OF CAST-IN-PLACE CONCRETE**

(Showing reinforced concrete pipe (RCP) culvert. Details of corrugated metal pipe (CMP) culvert are similar. pipe runners not shown for clarity.)



**ISOMETRIC VIEW OF TYPICAL INSTALLATION**



NOTE: All cross pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

**SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER**

(Showing corrugated metal pipe (CMP) culvert. Details of reinforced concrete pipe (RCP) culvert are similar.)

**CROSS PIPE LENGTHS AND REQUIRED PIPE SIZES**

②

Corrugated Metal Pipe (CMP) Culverts									
Design	Conc Riprap (CY) (6)	Pipe Culvert Span	Pipe Culvert Rise	Pipe Culvert Spa ~ G	Single Barrel ~ Q1	Multi-Barrel ~ Q1	Q2	Conditions for Use of Cross Pipes	Cross Pipe Sizes
1	0.6	17"	13"	1' - 0"	N/A	2' - 8"	2' - 5"	3 or more pipe culverts	3" Std (3.500" O.D.)
2	0.7	21"	15"	1' - 2"	N/A	3' - 1"	2' - 11"		
3	0.9	28"	20"	1' - 5"	N/A	3' - 9"	3' - 9"		
4	1.0	35"	24"	1' - 8"	4' - 4"	4' - 6"	4' - 7"	All pipe culverts	4" Std (4.500" O.D.)
5	1.2	42"	29"	1' - 11"	4' - 11"	5' - 2"	5' - 5"	All pipe culverts	5" Std (5.563" O.D.)
6	1.4	49"	33"	2' - 2"	5' - 6"	5' - 11"	6' - 3"		
7	1.6	57"	38"	2' - 5"	6' - 2"	6' - 8"	7' - 2"		
8	1.8	64"	43"	2' - 10"	6' - 9"	7' - 6"	8' - 2"		
9	1.9	71"	47"	3' - 2"	7' - 4"	8' - 3"	9' - 1"		
Reinforced Concrete Pipe (RCP) Culverts									
Design	Conc Riprap (CY) (6)	Pipe Culvert Span	Pipe Culvert Rise	Pipe Culvert Spa ~ G	Single Barrel ~ Q1	Multi-Barrel ~ Q1	Q2	Conditions for Use of Cross Pipes	Cross Pipe Sizes
1	0.6	22"	13 1/2"	1' - 0"	N/A	3' - 1"	2' - 10"	3 or more pipe culverts	3" Std (3.500" O.D.)
2	0.7	26"	15 1/2"	1' - 2"	N/A	3' - 6"	3' - 4"		
3	0.9	28 1/2"	18"	1' - 5"	N/A	3' - 10"	3' - 9 1/2"		
4	1.0	36 1/4"	22 1/2"	1' - 8"	4' - 5"	4' - 7"	4' - 8 1/4"	All pipe culverts	4" Std (4.500" O.D.)
5	1.2	43 3/4"	26 b"	1' - 11"	5' - 1"	5' - 4"	5' - 6 3/4"	All pipe culverts	5" Std (5.563" O.D.)
6	1.4	51 5/8"	31 5/8"	2' - 2"	5' - 8"	6' - 1"	6' - 5 1/4"		
7	1.6	58 1/2"	36"	2' - 5"	6' - 4"	6' - 10"	7' - 3 1/2"		
8	1.8	65"	40"	2' - 10"	6' - 10"	7' - 7"	8' - 3"		
9	1.9	73"	45"	3' - 2"	7' - 6"	8' - 5"	9' - 3"		

- ① The proper installation of the first cross pipe is critical for vehicle safety. Place the top of the first cross pipe no more than 6" above the flow line.
- ② Provide cross pipes, except the first bottom pipe, of the size shown in the table. Provide a 3 1/2" standard pipe (4" O.D.) for the first bottom pipe.
- ③ Install the third Cross Pipe from the bottom of the culvert using a bolted connection. Ensure that riprap concrete does not flow into the cross pipe so as to permit disassembly of the bolted connection to allow cleanout access. At the Contractor's option, install all other cross pipes using the bolted connection details.
- ④ Match cross slope as shown elsewhere in the plans. Cross slope of 6:1 or flatter is required for vehicle safety.
- ⑤ Riprap placed beyond the limits shown will be paid as concrete riprap in accordance with Item 432, "Riprap".
- ⑥ Quantities shown are for one end of one pipe culvert. For multiple Pipe Culverts, quantities will need to be adjusted. Riprap quantities are for Contractor's information only.

**MATERIAL NOTES:**

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.  
 Provide cross pipes that meet the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.  
 Provide ASTM A307 bolts and nuts.  
 Galvanize all steel components, except concrete reinforcing, after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

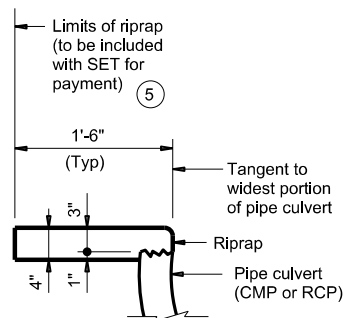
**GENERAL NOTES:**

Pipe runners are designed for a traversing load of 10,000 pounds at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.  
 Safety end treatments (SET) shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the Pipe Runners.  
 Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap".  
 Payment for riprap and toewall is included in the price bid for each safety end treatment.

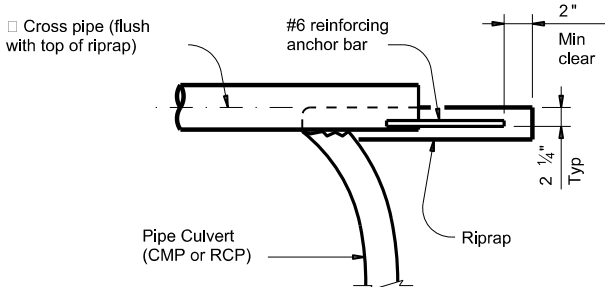
SHEET 1 OF 2

				<b>Bridge Division Standard</b>	
<b>SAFETY END TREATMENT</b> FOR DESIGN 1 TO 9 ARCH PIPE CULVERTS TYPE II ~ PARALLEL DRAINAGE					
<b>SETP-PD-A</b>					
FILE: setppase-20.dgn	DN: GAF	CK: TxDOT	DW: JRP	CK: GAF	
©TxDOT	February 2020	CONT	SECT	JOB	HIGHWAY
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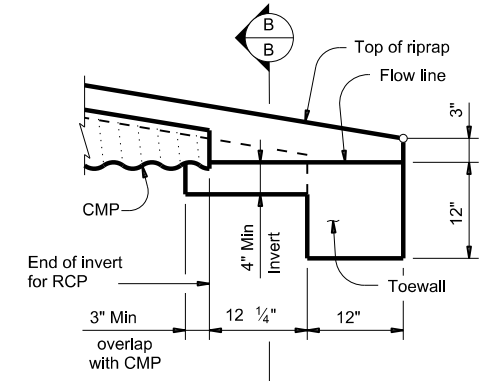
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SHOWING TYPICAL PIPE CULVERT AND RIPRAP

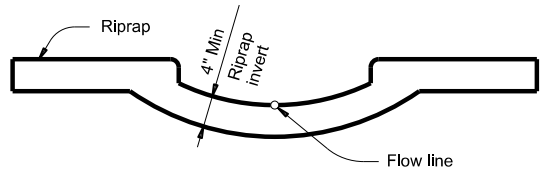


SHOWING CROSS PIPE WITH ANCHOR BAR



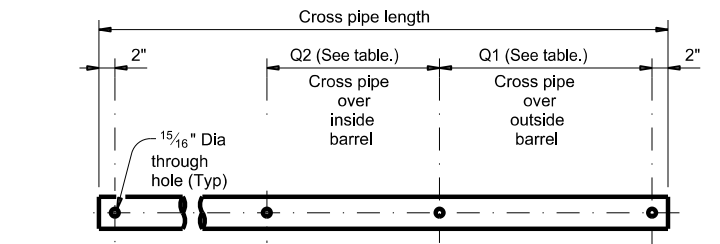
DETAIL "A"

(Showing invert with corrugated metal pipe (CMP) culvert. Reinforced concrete pipe (RCP) culvert details are similar. Cross pipes not shown for clarity.)

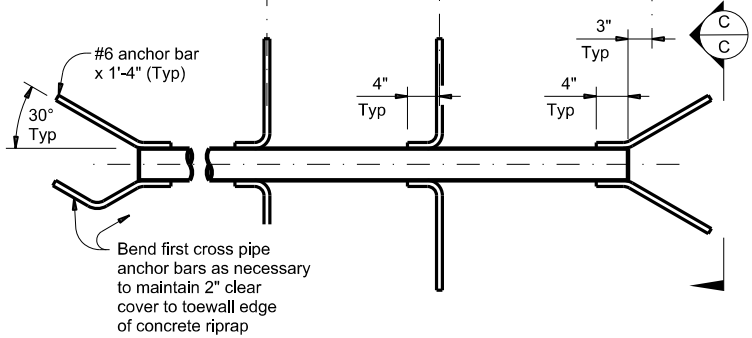


SECTION B-B

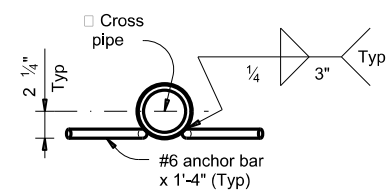
(Cross pipes not shown for clarity.)



PIPE WITH BOLTED ANCHOR

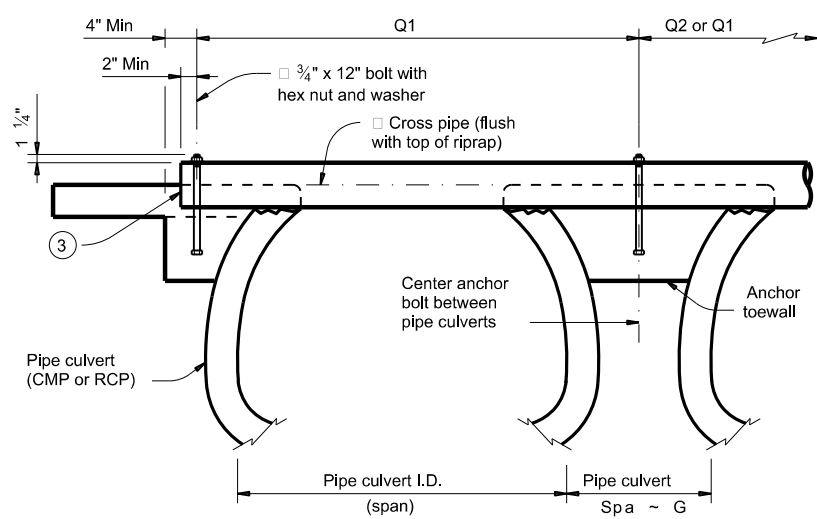


PIPE WITH ANCHOR BARS



SECTION C-C

CROSS PIPE DETAILS



SHOWING CROSS PIPE WITH BOLTED ANCHOR

SECTION A-A



**SAFETY END TREATMENT**  
 FOR DESIGN 1 TO 9  
 ARCH PIPE CULVERTS  
 TYPE II ~ PARALLEL DRAINAGE

SETP-PD-A

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©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0275	12	083, ETC	IH-40
DIST	COUNTY		SHEET NO.	
CHS	WHEELER		37	

# SUMMARY OF SMALL SIGNS

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STA.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX)				BRIDGE MOUNT CLEARANCE SIGNS (See Note 2)
							POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION	
							FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	1 or 2	UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	PREFABRICATED P = "Plain" T = "T" U = "U"	
844+25	1	R5-11T	FOR OFFICIAL OR EMERGENCY VEH USE ONLY	48 X 48	X		10BWG	1	SA	T	
844+65	2	R5-11T	FOR OFFICIAL OR EMERGENCY VEH USE ONLY	48 X 48	X		10BWG	1	SA	T	
891+90	3	R5-11T	FOR OFFICIAL OR EMERGENCY VEH USE ONLY	48 X 48	X		10BWG	1	SA	T	
892+35	4	R5-11T	FOR OFFICIAL OR EMERGENCY VEH USE ONLY	48 X 48	X		10BWG	1	SA	T	
965+80	5	R5-11T	FOR OFFICIAL OR EMERGENCY VEH USE ONLY	48 X 48	X		10BWG	1	SA	T	
966+25	6	R5-11T	FOR OFFICIAL OR EMERGENCY VEH USE ONLY	48 X 48	X		10BWG	1	SA	T	
087+00	7	R5-11T	FOR OFFICIAL OR EMERGENCY VEH USE ONLY	48 X 48	X		10BWG	1	SA	T	
087+50	8	R5-11T	FOR OFFICIAL OR EMERGENCY VEH USE ONLY	48 X 48	X		10BWG	1	SA	T	
233+00	9	R5-11T	FOR OFFICIAL OR EMERGENCY VEH USE ONLY	48 X 48	X		10BWG	1	SA	T	
233+50	10	R5-11T	FOR OFFICIAL OR EMERGENCY VEH USE ONLY	48 X 48	X		10BWG	1	SA	T	
359+20	11	R5-11T	FOR OFFICIAL OR EMERGENCY VEH USE ONLY	48 X 48	X		10BWG	1	SA	T	
359+70	12	R5-11T	FOR OFFICIAL OR EMERGENCY VEH USE ONLY	48 X 48	X		10BWG	1	SA	T	
416+00	13	R5-11T	FOR OFFICIAL OR EMERGENCY VEH USE ONLY	48 X 48	X		10BWG	1	SA	T	
416+50	14	R5-11T	FOR OFFICIAL OR EMERGENCY VEH USE ONLY	48 X 48	X		10BWG	1	SA	T	
500+50	15	R5-11T	FOR OFFICIAL OR EMERGENCY VEH USE ONLY	48 X 48	X		10BWG	1	SA	T	
501+00	16	R5-11T	FOR OFFICIAL OR EMERGENCY VEH USE ONLY	48 X 48	X		10BWG	1	SA	T	

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

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.  
<http://www.txdot.gov/>

- NOTE:**
- Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
  - For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS) Standard Sheet.
  - For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).



## SUMMARY OF SMALL SIGNS

### SOSS

FILE: slums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT
© TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0275	12	083, ETC	IH-40
4-16	DIST	COUNTY	SHEET NO.	
8-16	CHS	WHEELER		38

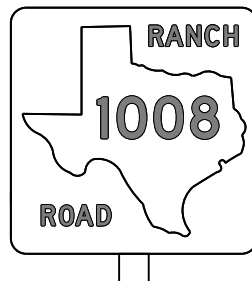
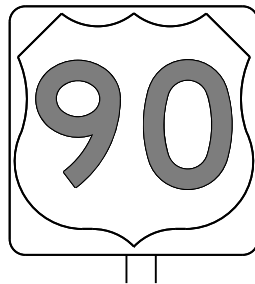


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 FILE: T:\CHSDES\PROJECTS\WHEELER\0275-12-083 (Cable Barrier)\Plan Set\Standard\0275-12-083.dwg

## REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

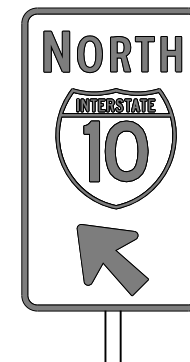
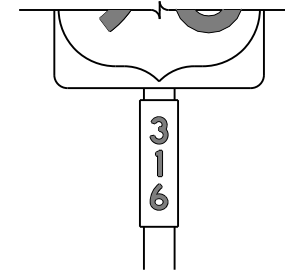
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



TYPICAL EXAMPLES

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

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



TYPICAL EXAMPLES

## GENERAL NOTES

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

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

- Route sign legend (ie. IH, US, SH and FM shields) shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets B, C, D, E, Emod or F).
- Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
- Independent mounted route sign with white or colored legend and borders shall be applied by screening process with transparent color ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof. White legend, symbols and borders on all other signs shall be cut-out white sheeting applied to colored background sheeting.
- Information regarding borders and radii for signs is found in the "Standard Highway Sign Designs for Texas". Dimensions shown and described for borders and corner radii on parent sign are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in width as much as 1 inch. Borders and corner radii within a parent sign must be of matching widths. The sign area outside the corner radius should be trimmed or rounded.
- Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
- Mounting details of roadside signs are shown in the "SMD series" Standard Plan Sheets.

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

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

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

<http://www.txdot.gov/>



## TYPICAL SIGN REQUIREMENTS

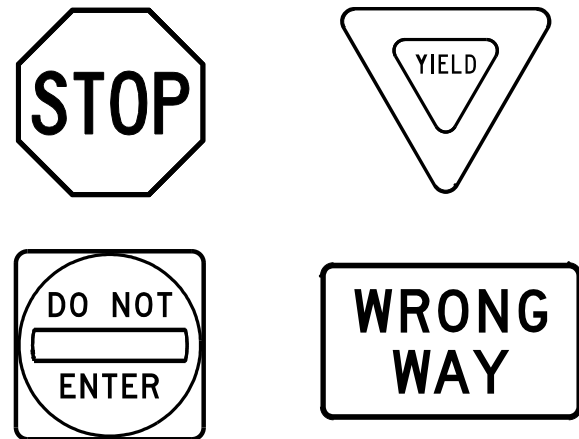
### TSR(3) - 13

FILE:	tsr3-13.dgn	DN:	TxDOT	CK:	TxDOT	DW:	TxDOT	CK:	TxDOT
© TxDOT	October 2003	CONT	SECT	JOB	HIGHWAY				
REVISIONS		0275	12	083, ETC	IH-40				
12-03	7-13	DIST	COUNTY	SHEET NO.					
9-08		CHS	WHEELER	39					

DATE: 12/27/2022 1:59:47 PM  
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### REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS

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



#### REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

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

### REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

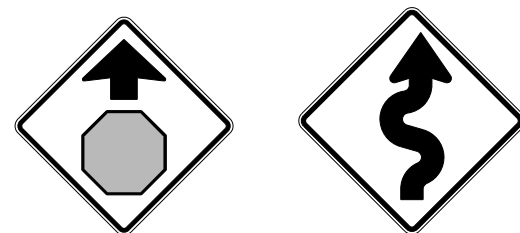
(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



#### TYPICAL EXAMPLES

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

### REQUIREMENTS FOR WARNING SIGNS



#### TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLOURESCENT YELLOW	TYPE B <sub>FL</sub> OR C <sub>FL</sub> SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

### REQUIREMENTS FOR SCHOOL SIGNS



#### TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	FLOURESCENT YELLOW GREEN	TYPE B <sub>FL</sub> OR C <sub>FL</sub> SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

### GENERAL NOTES

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

#### ALUMINUM SIGN BLANKS THICKNESS

Square Feet	Minimum Thickness
Less than 7.5	0.080
7.5 to 15	0.100
Greater than 15	0.125

#### DEPARTMENTAL MATERIAL SPECIFICATIONS

ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

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

<http://www.txdot.gov/>



## TYPICAL SIGN REQUIREMENTS

### TSR(4) - 13

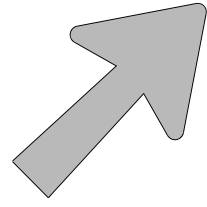
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© TxDOT	October 2003	CONT	SECT	JOB	HIGHWAY				
REVISIONS		0275	12	083, ETC	IH-40				
12-03	7-13	DIST	COUNTY	SHEET NO.					
9-08		CHS	WHEELER	40					

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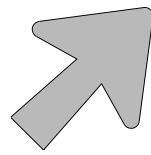
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### ARROW DETAILS

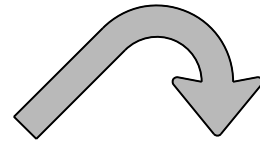
for Large Ground-Mounted and Overhead Guide Signs



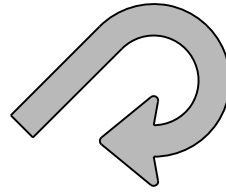
Type A



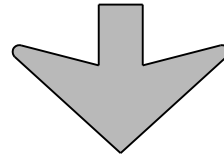
Type B



E-3



E-4



Down Arrow

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

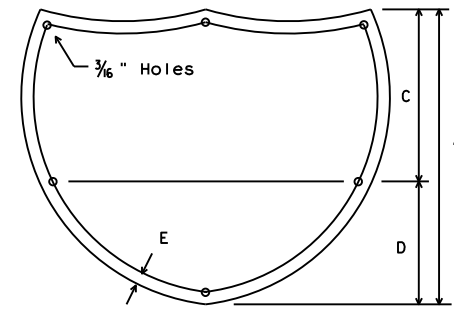
CODE	USED ON SIGN NO.
E-3	E5-1aT
E-4	E5-1bT

**NOTE**

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

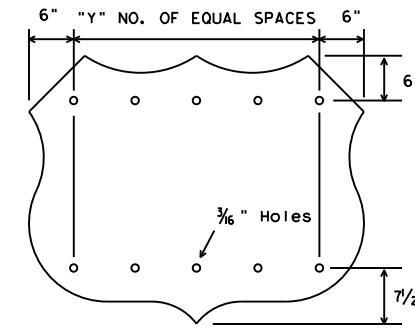
The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website:  
<http://www.txdot.gov/>

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



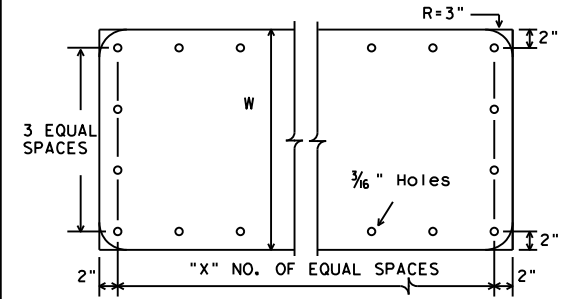
INTERSTATE ROUTE MARKERS

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



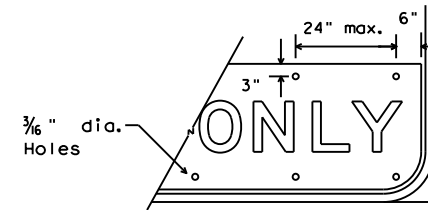
U.S. ROUTE MARKERS

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



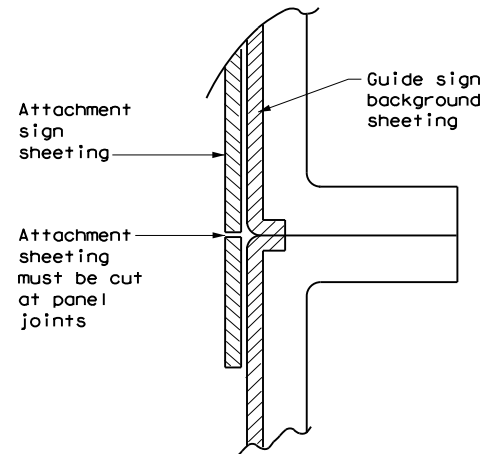
STATE ROUTE MARKERS

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



EXIT ONLY PANEL

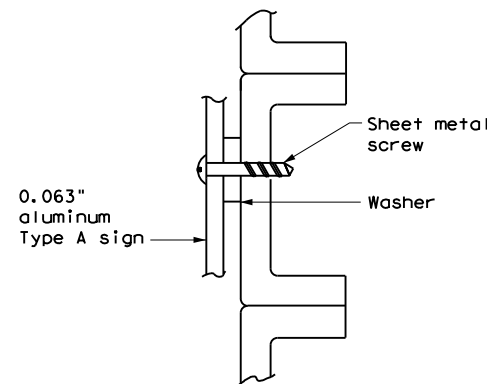
### MOUNTING DETAILS OF ATTACHMENTS TO GUIDE SIGN FACE ("EXIT ONLY" AND "LEFT EXIT" PANELS, ROUTE MARKERS AND OTHER ATTACHMENTS)



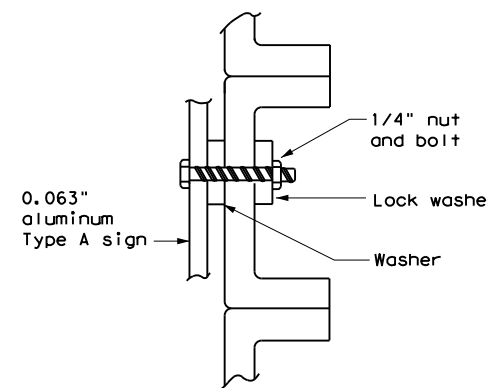
DIRECT APPLIED ATTACHMENT

**NOTE:**

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



SCREW ATTACHMENT

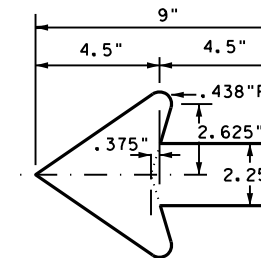


NUT/BOLT ATTACHMENT

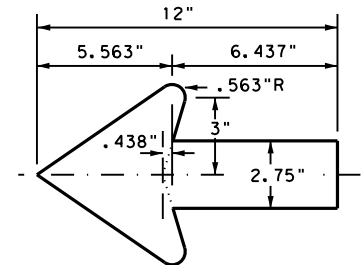
**NOTE:**

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

### ARROW DETAILS for Destination Signs (Type D)



Standard arrow to be used with 6 inch letters.



Standard arrow to be used with 8 inch letters.



## TYPICAL SIGN REQUIREMENTS

### TSR (5) - 13

FILE: tsr5-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT
© TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0275 12	083, ETC	IH-40	
12-03 7-13	DIST	COUNTY	SHEET NO.	
9-08	CHS	WHEELER	41	

DATE: 12/29/2022 9:04:44 AM  
 FILE: I:\CHSD\PROJECTS\WHEELER\0275-12-083 (Cable Barrier)\Plan Set\Standards\42\_SMD(GEN)-08.dgn  
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## SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

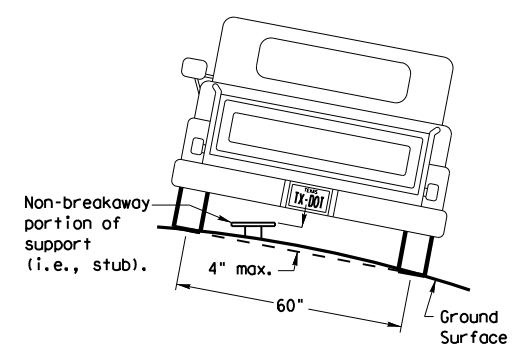
**Post Type**  
 FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))  
 TWT = Thin-Walled Tubing (see SMD(TWT))  
 10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))  
 S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

**Number of Posts (1 or 2)**

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

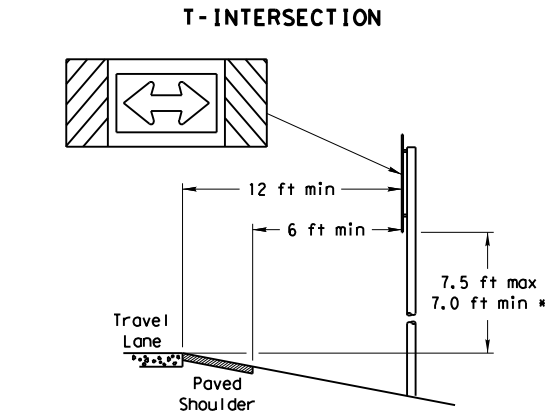
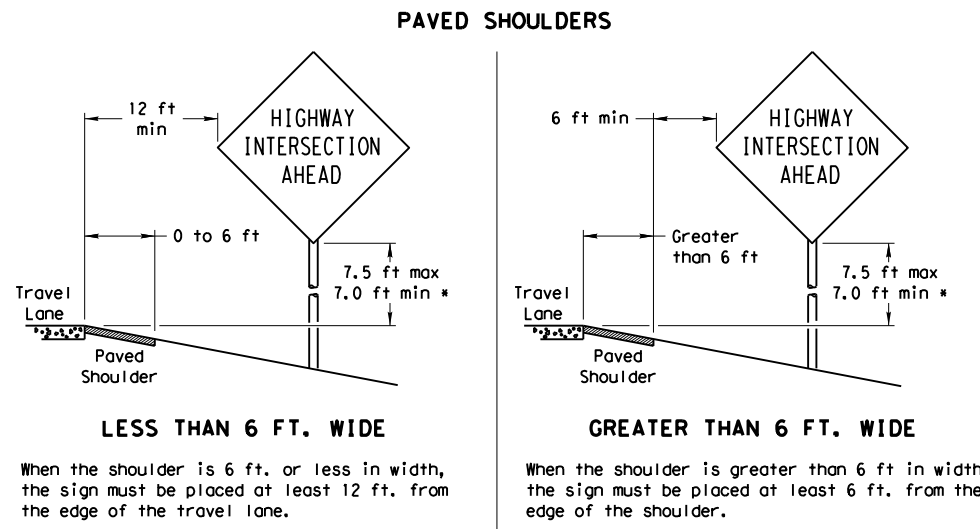
**Sign Mounting Designation**  
 P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))  
 T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))  
 U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))  
 IF REQUIRED  
 1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))  
 BM =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

## REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



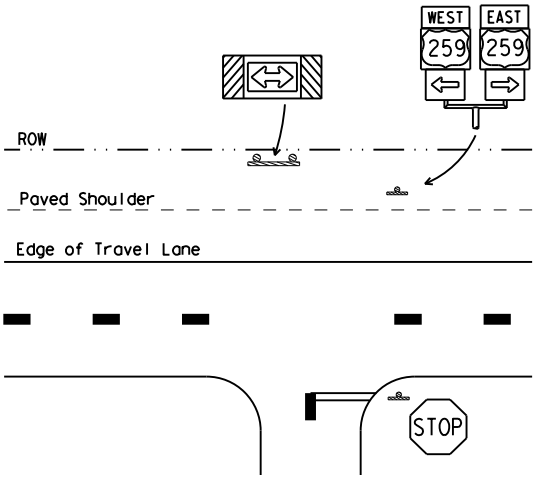
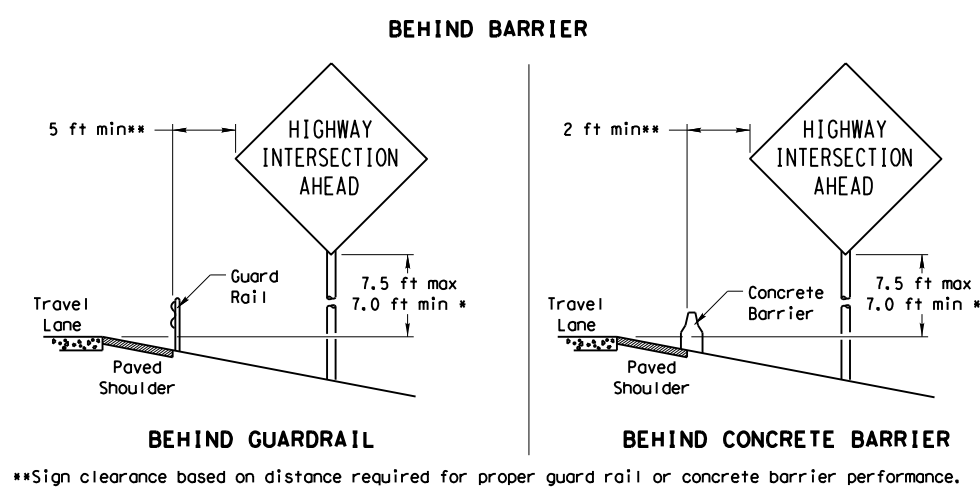
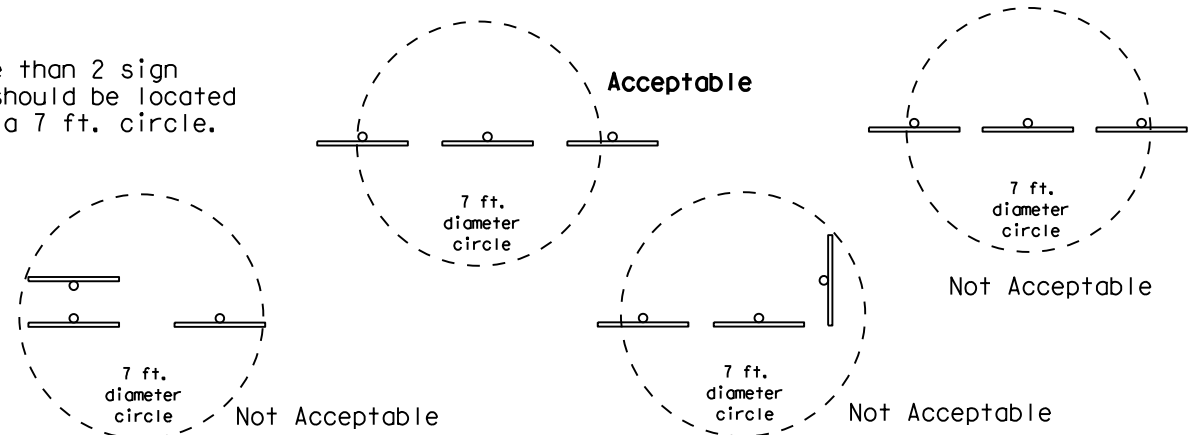
To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

## SIGN LOCATION



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

No more than 2 sign posts should be located within a 7 ft. circle.



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

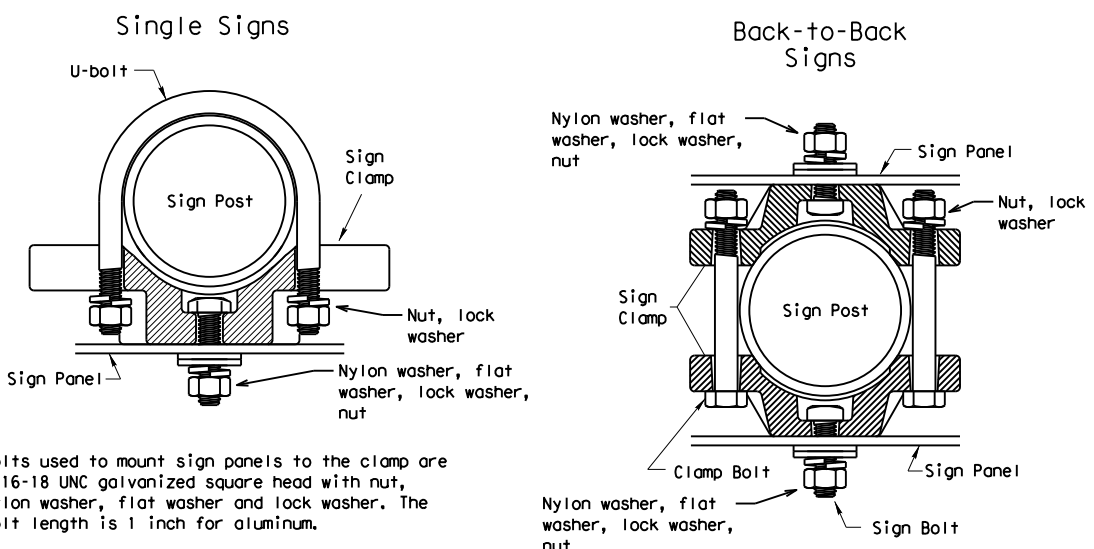
- (1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or
- (2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

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

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

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

## TYPICAL SIGN ATTACHMENT DETAIL



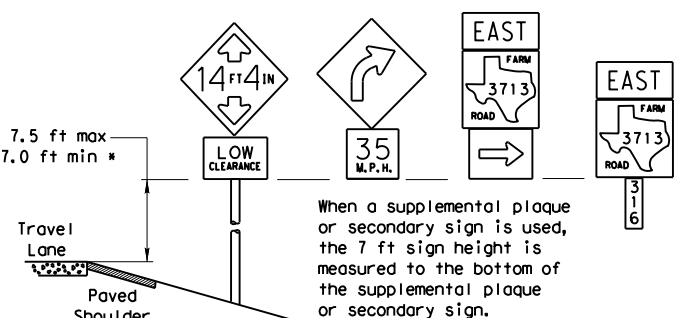
Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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

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

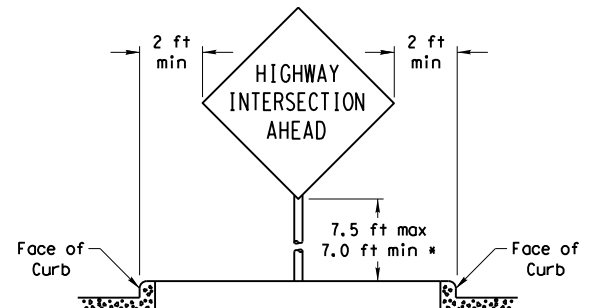
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

## SIGNS WITH PLAQUES

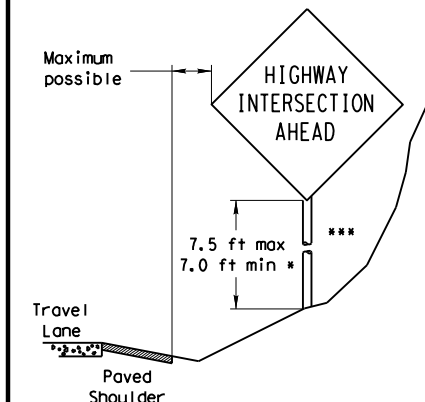


When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

## CURB & GUTTER OR RAISED ISLAND



## RESTRICTED RIGHT-OF-WAY (When 6 ft min. is not possible.)



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

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

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



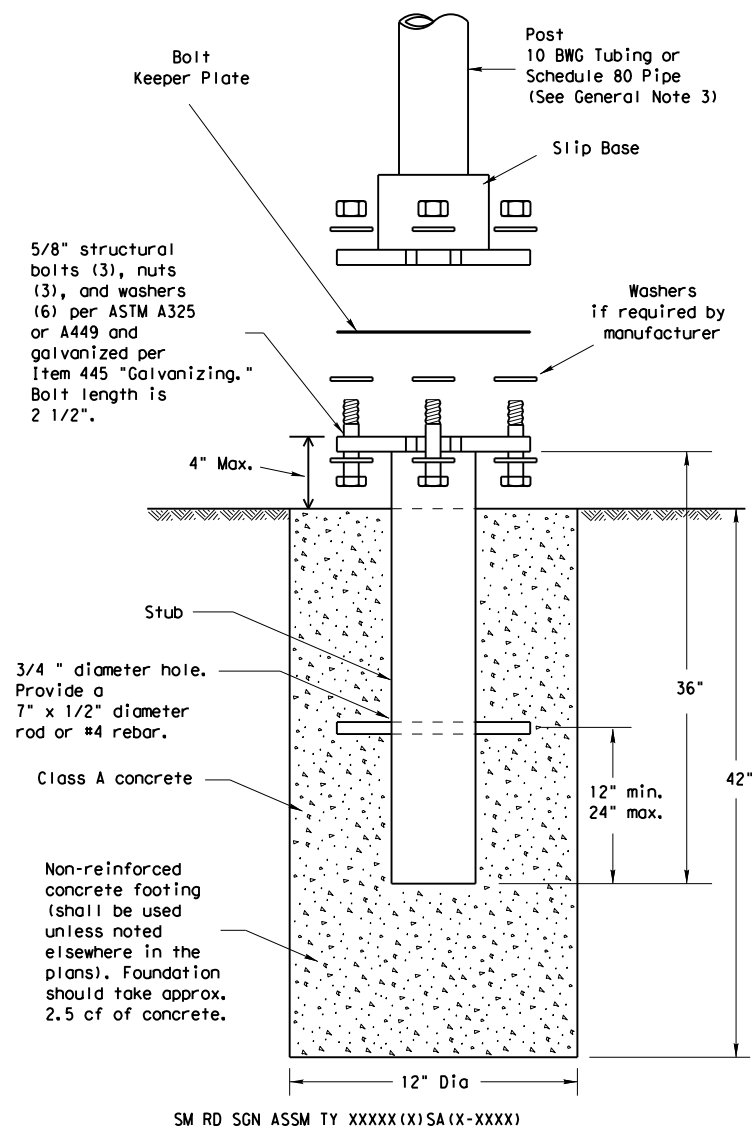
## SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

© TxDOT July 2002		DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
9-08	REVISIONS	CONT	SECT	JOB	HIGHWAY
		0275 12		083, ETC	IH-40
		DIST	COUNTY		SHEET NO.
		CHS	WHEELER		42

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## TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



### NOTE

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

### GENERAL NOTES:

- Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
- Material used as post with this system shall conform to the following specifications:
  - 10 BWG Tubing (2.875" outside diameter)
    - 0.134" nominal wall thickness
    - Seamless or electric-resistance welded steel tubing or pipe
    - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
    - Other steels may be used if they meet the following:
      - 55,000 PSI minimum yield strength
      - 70,000 PSI minimum tensile strength
      - 20% minimum elongation in 2"
    - Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
    - Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
    - Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.
  - Schedule 80 Pipe (2.875" outside diameter)
    - 0.276" nominal wall thickness
    - Steel tubing per ASTM A500 Gr C
    - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
      - 46,000 PSI minimum yield strength
      - 62,000 PSI minimum tensile strength
      - 21% minimum elongation in 2"
    - Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
    - Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
    - Galvanization per ASTM A123
- See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is: <http://www.txdot.gov/publications/traffic.htm>
- Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

### ASSEMBLY PROCEDURE

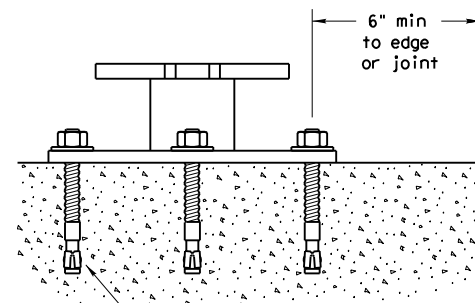
#### Foundation

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

#### Support

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

### CONCRETE ANCHOR



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



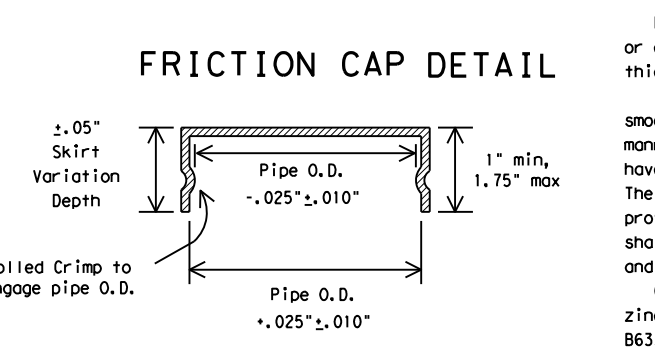
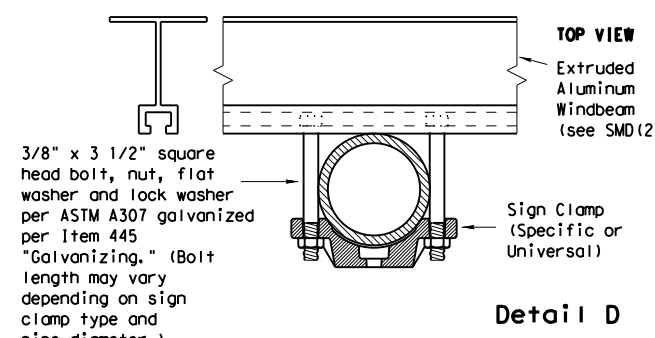
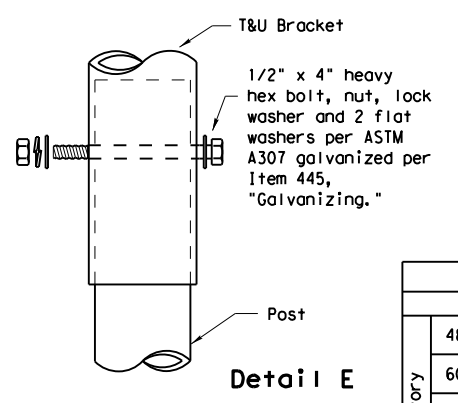
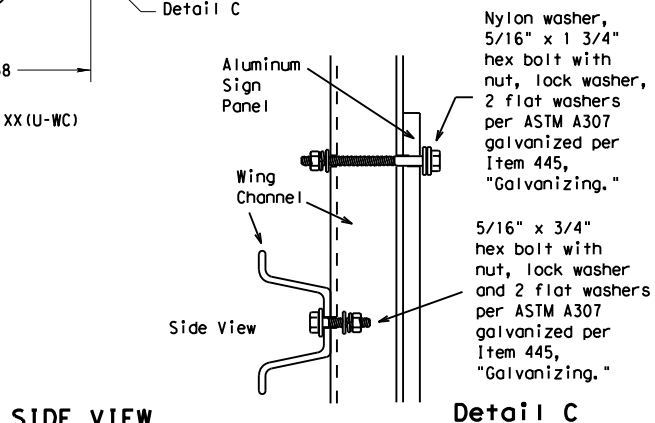
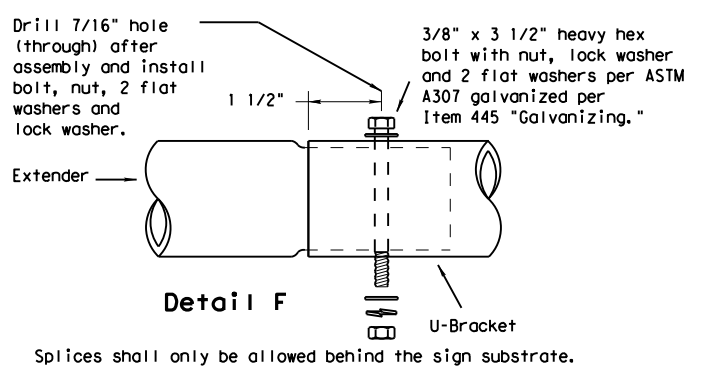
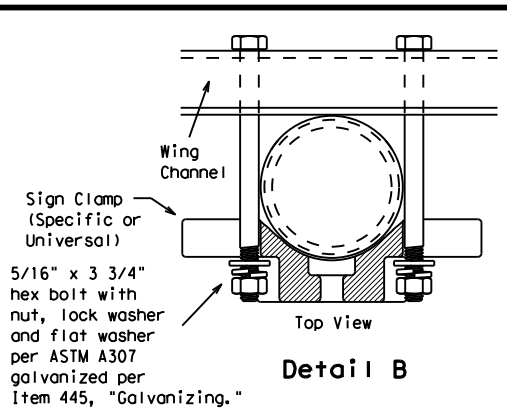
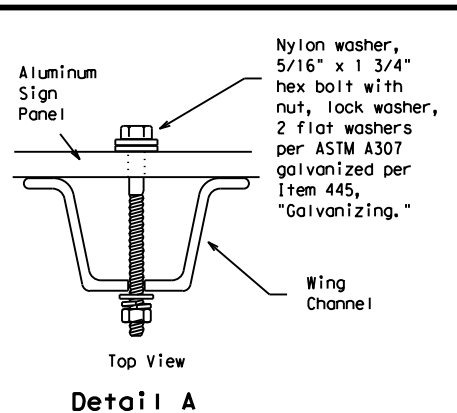
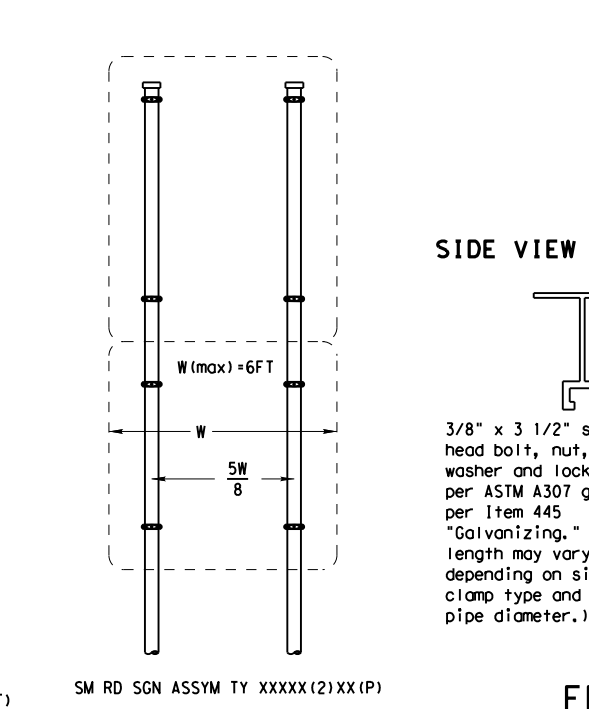
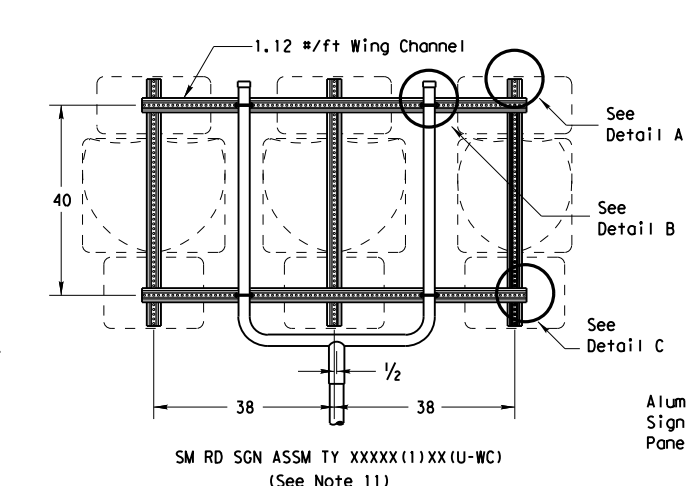
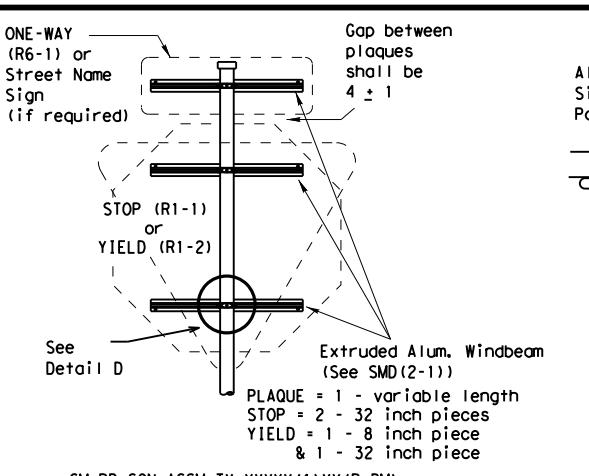
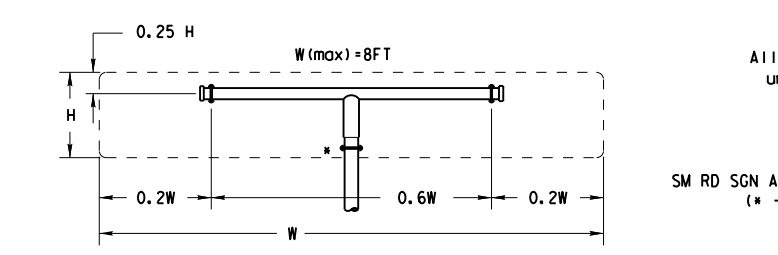
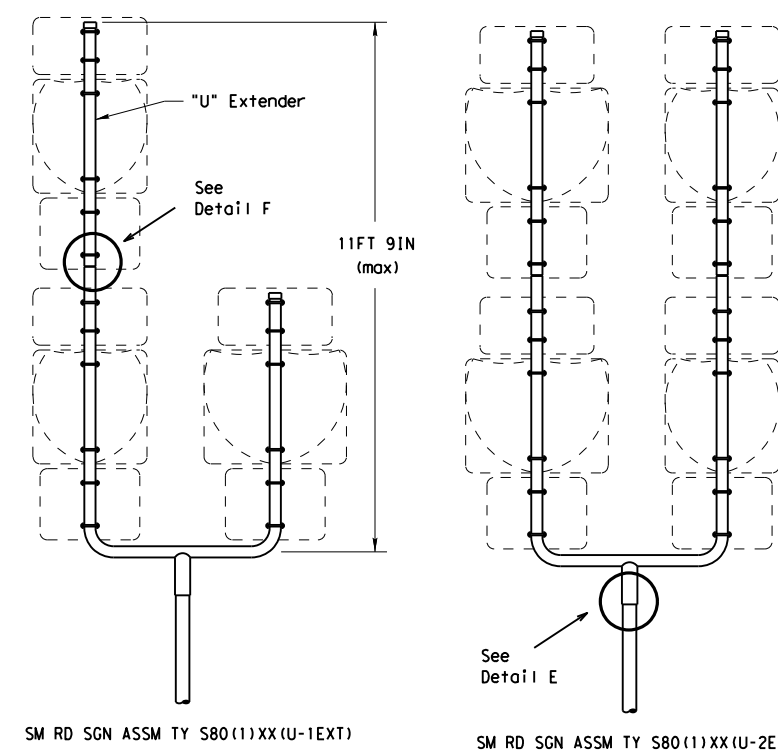
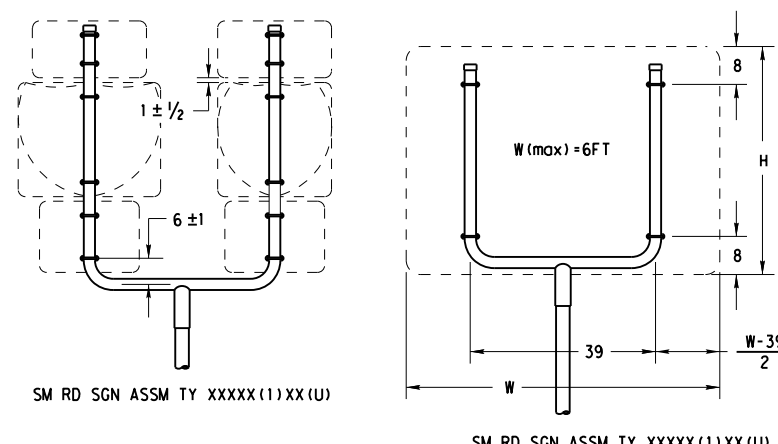
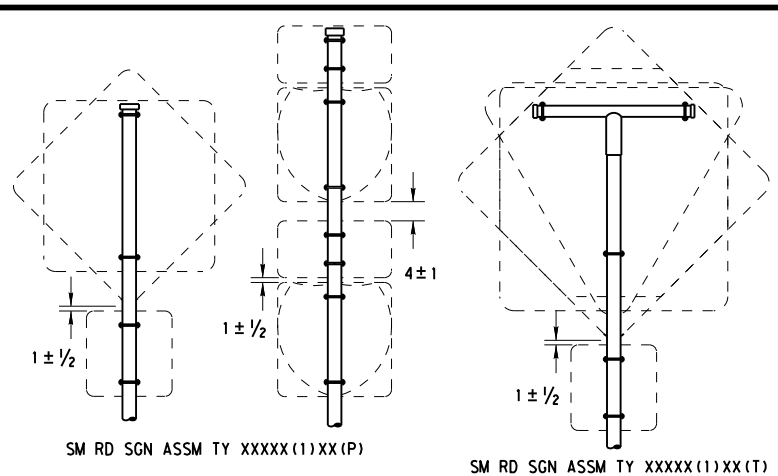
## SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

© TxDOT July 2002		DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT	
9-08	REVISIONS		CONT	SECT	JOB	HIGHWAY
			0275	12	083, ETC	IH-40
			DIST		COUNTY	SHEET NO.
		CHS		WHEELER	43	

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All dimensions are in english unless detailed otherwise.

Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes. The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture. Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

**GENERAL NOTES:**

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

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

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

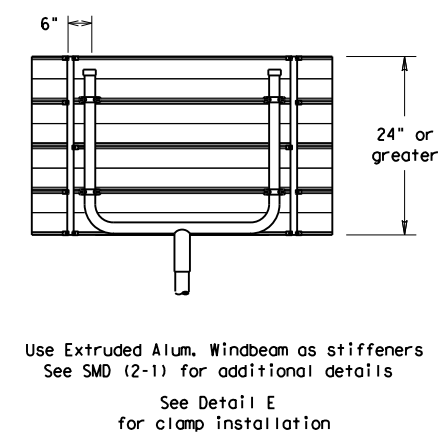
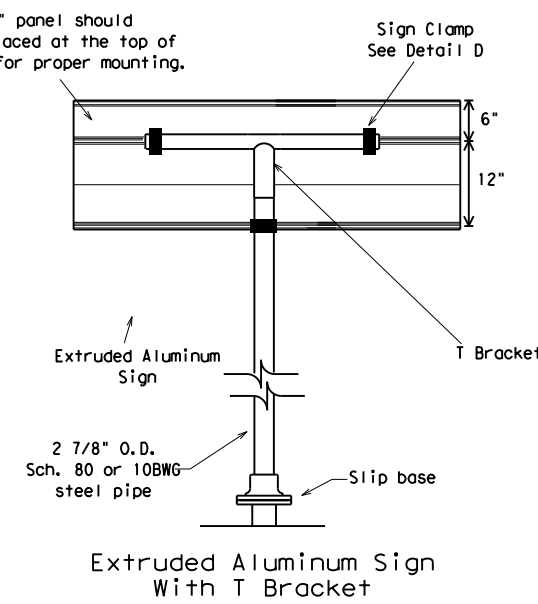
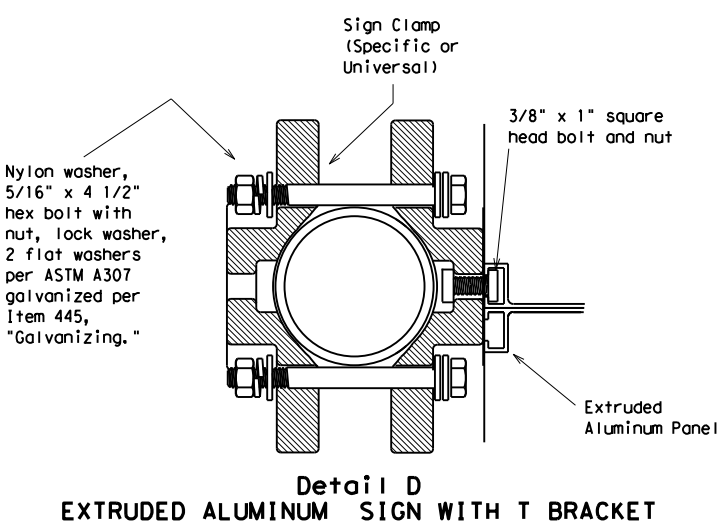
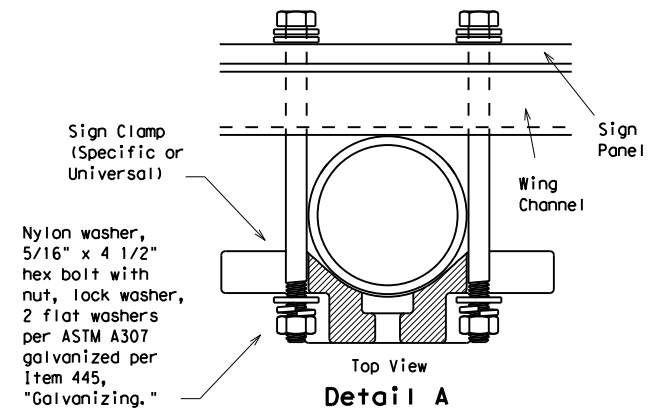
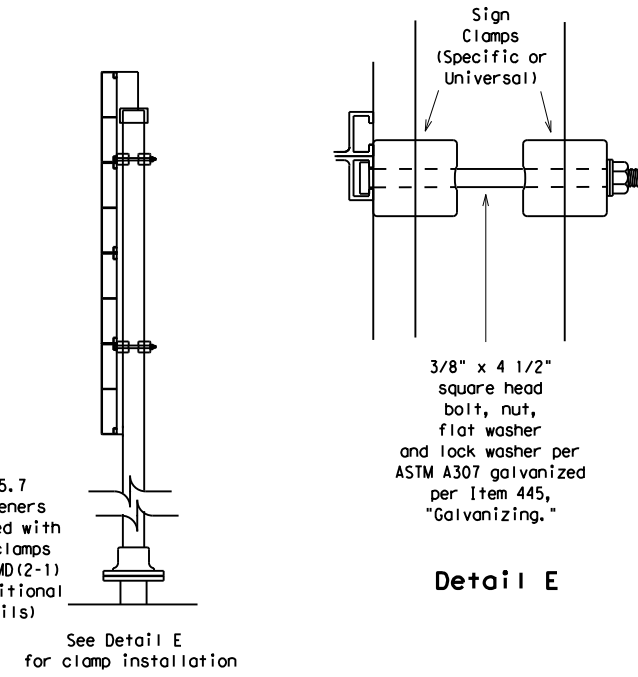
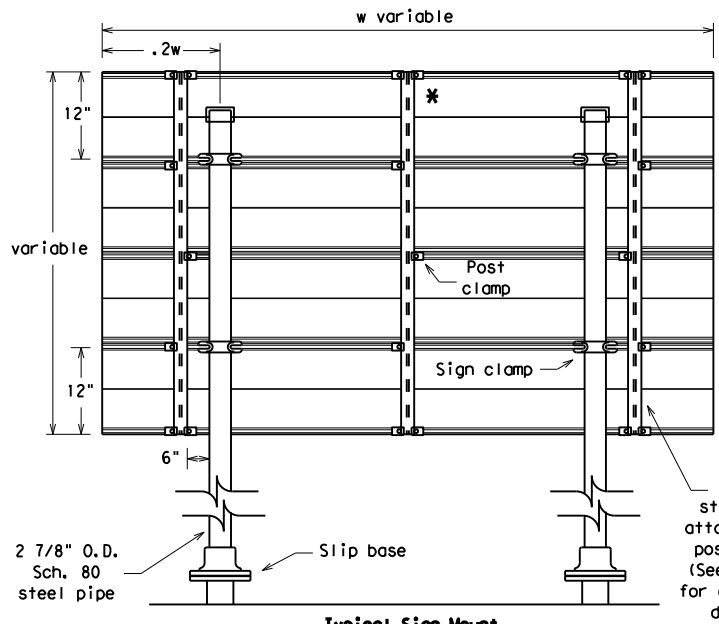
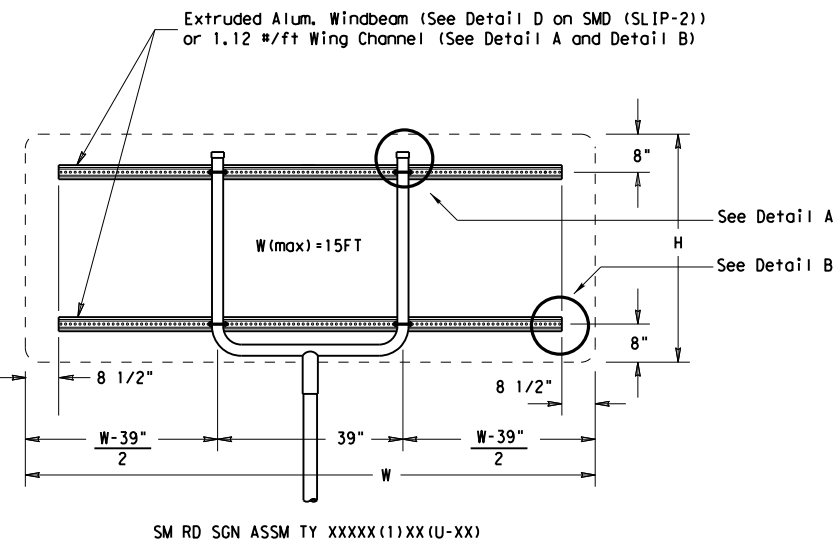
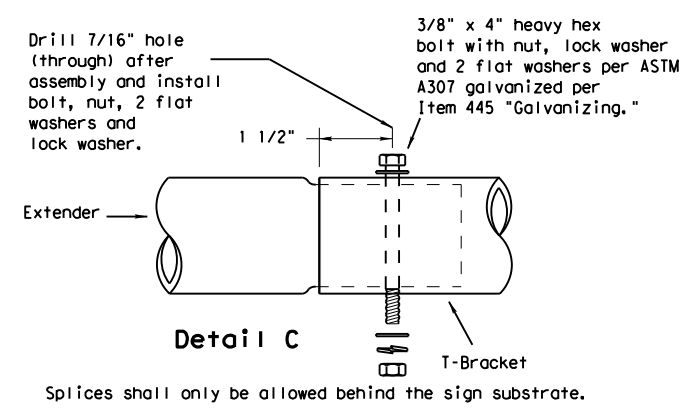
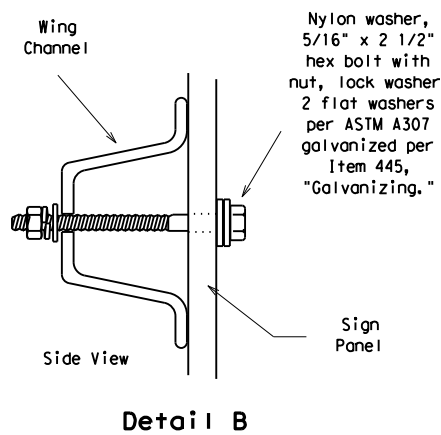
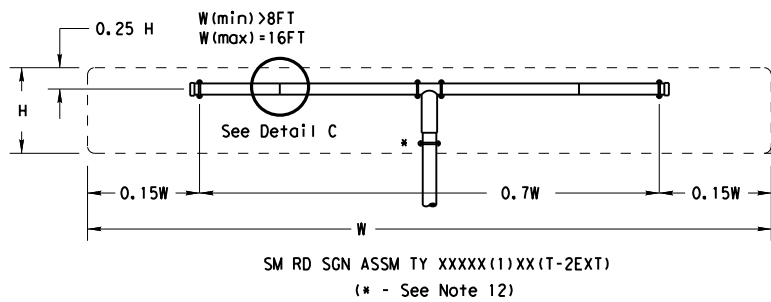
**Texas Department of Transportation**  
 Traffic Operations Division

**SIGN MOUNTING DETAILS**  
**SMALL ROADSIDE SIGNS**  
**TRIANGULAR SLIPBASE SYSTEM**  
**SMD(SLIP-2)-08**

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9-08	REVISIONS	CONT	SECT	JOB	HIGHWAY
		0275	12	083, ETC	IH-40
		DIST	COUNTY	SHEET NO.	
		CHS	WHEELER	44	

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GENERAL NOTES:

- | SIGN SUPPORT | # OF POSTS | MAX. SIGN AREA |
|--------------|------------|----------------|
| 10 BWG       | 1          | 16 SF          |
| 10 BWG       | 2          | 32 SF          |
| Sch 80       | 1          | 32 SF          |
| Sch 80       | 2          | 64 SF          |
- The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
- Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
- Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
- Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
- For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
- When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
- Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
- Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
- Sign blanks shall be the sizes and shapes shown on the plans.
- Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
- Post open ends shall be fitted with Friction Caps.

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



**SIGN MOUNTING DETAILS  
 SMALL ROADSIDE SIGNS  
 TRIANGULAR SLIPBASE SYSTEM  
 SMD(SLIP-3)-08**

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9-08	REVISIONS	CONT	SECT	JOB	HIGHWAY
		0275	12	083, ETC	IH-40
		DIST	COUNTY		SHEET NO.
		CHS	WHEELER		45

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REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS				DELINEATORS				D & OM DESCRIPTIVE CODES	
DEVICE	SIZE 1	SIZE 2	SIZE 3	SIZE 4	SINGLE		DOUBLE		
									<b>INSTL DEL ASSM</b> (D-XX)SZ X (XXXX)XXX(XX) <b>NUMBER OF REFLECTORS</b> S = Single D = Double <b>COLOR OF REFLECTORS</b> W = White Y = Yellow R = Red <b>REFLECTOR UNIT SIZE</b> 1 or 2 <b>TYPE OF POST OR DELINEATOR</b> WC = Wing Channel Post YFLX = Yellow Flexible Post WFLX = White Flexible Post BRF = Barrier Reflector <b>TYPE OF MOUNT</b> GND = Embedded (drivable or set in concrete) CTB = Concrete Barrier Mount GF1 or GF2 = Guard Fence Attachment SRF = Surface Mount <b>DIRECTION</b> 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 (fix). 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, SRF	

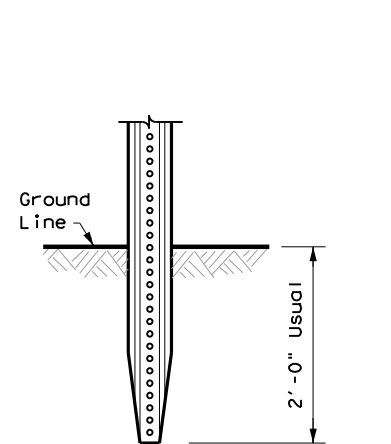
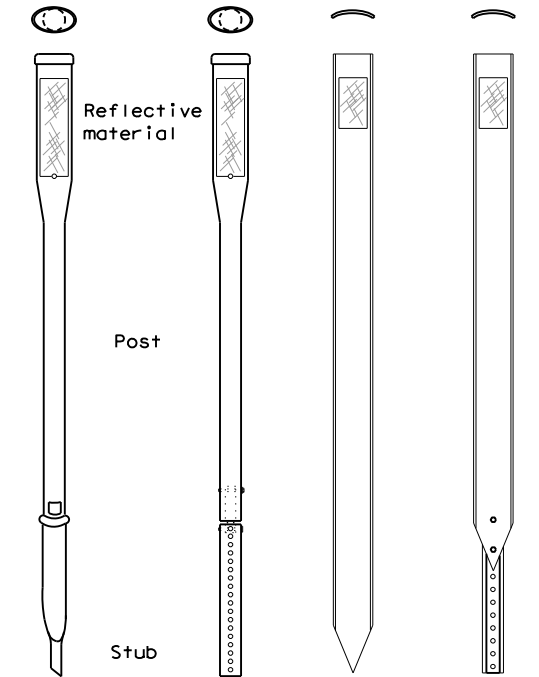
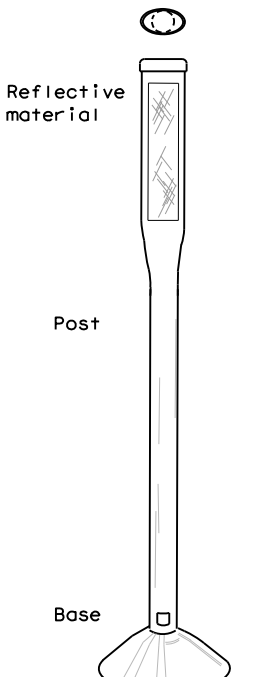
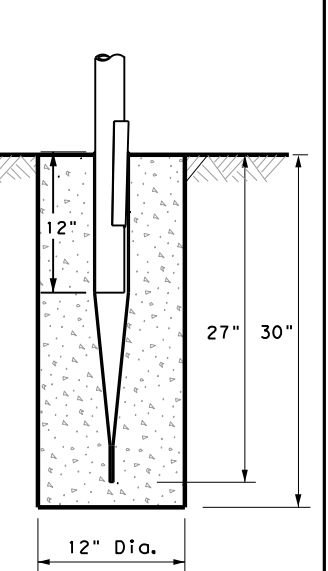
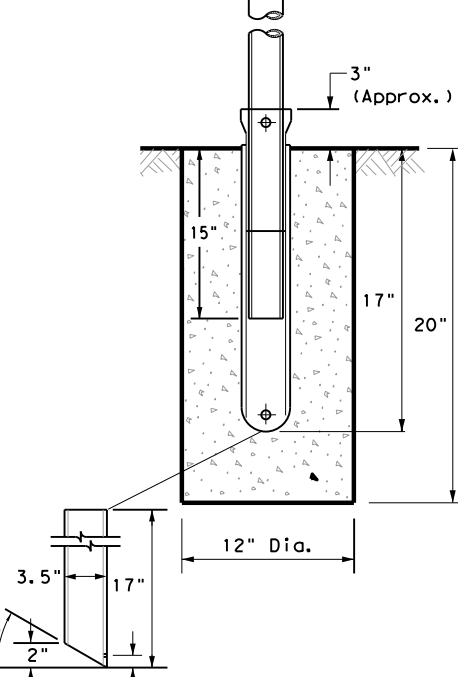
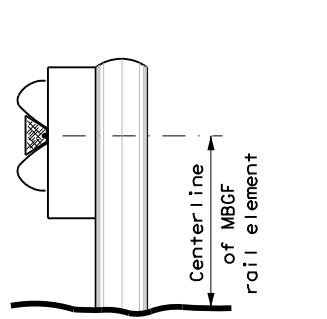
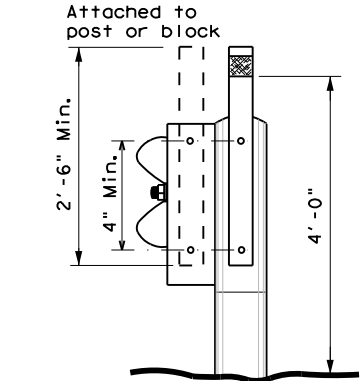
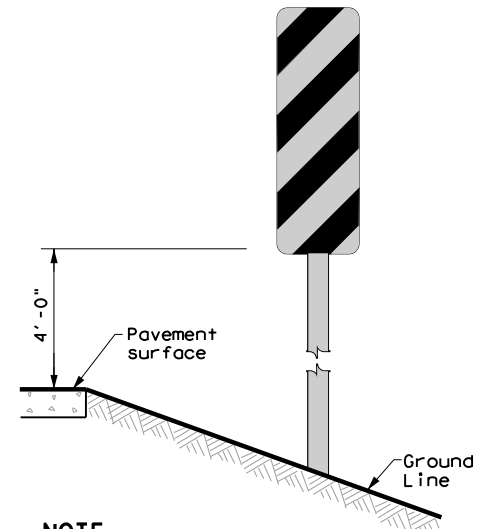
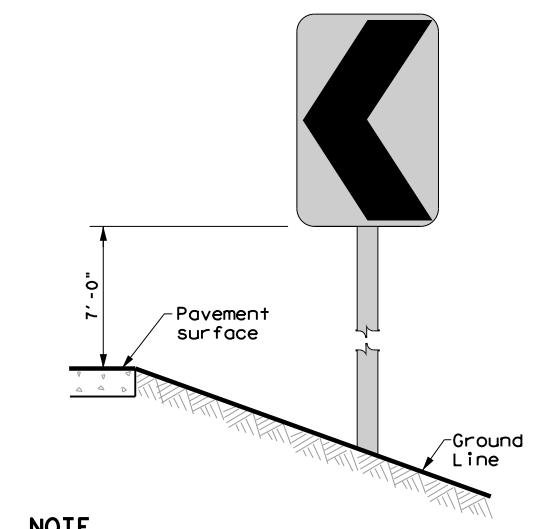
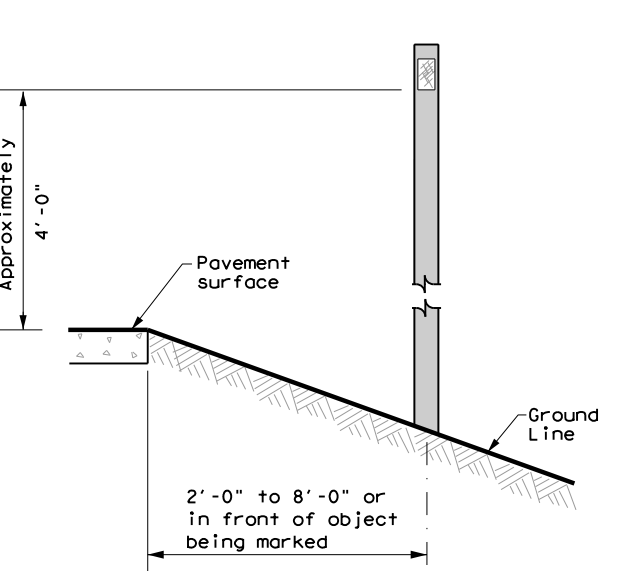
OBJECT MARKERS								D & OM DESCRIPTIVE CODES		
DEVICE	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)	INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)	
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4	<b>TYPE OF OBJECT MARKER</b> 1, 2, 3, or 4 <b>NUMBER OF REFLECTORS OR DIRECTION</b> X = 3-Size 2 reflector unit (Type 2 only) Y = 1-Size 3 reflector unit (Type 2 only) Z = 3-Size 1 or 1-Size 4 reflector unit(s) (Type 2 only) L = Left Side (Type 3 Object Marker only) R = Right Side (Type 3 Object Marker only) C = Center (Type 3 Object Marker only) <b>TYPE OF POST</b> WC = Wing Channel Post WFLX = White Flexible Post TWT = Thin Walled Tubing <b>TYPE OF MOUNT</b> GND = Embedded (drivable) SRF = Surface Mount WAS = Wedge Anchor Steel WAP = Wedge Anchor Plastic <b>DIRECTION</b> If Required BI = Bi-Directional	
								<b>DEPARTMENTAL MATERIAL SPECIFICATIONS</b> FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES) DMS-4400 SIGN FACE MATERIALS DMS-8300 DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS DMS-8600		
SHEETING: Yellow-Type B <sub>FL</sub> or C <sub>FL</sub> Sheeting		SHEETING: Yellow - Type B or C Sheeting			SHEETING: Alternating acrylic black and retroreflective yellow - Type B <sub>FL</sub> or C <sub>FL</sub> Sheeting			SHEETING: Red -Type B <sub>FL</sub> or C <sub>FL</sub> Sheeting		
POST TYPE: TWT		POST TYPE: WC			POST TYPE: WFLX			POST TYPE: TWT		
MOUNT TYPE: WAS, WAP		MOUNT TYPE: GND			MOUNT TYPE: GND, SRF			MOUNT TYPE: WAS, WAP		


BARRIER REFLECTORS (BRF)			CHEVRONS				ONE DIRECTION LARGE ARROW		NOTE:	
DEVICE				 <b>W1-8</b>				 <b>W1-6</b>		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.
SHEETING: Yellow, White, Red			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)		<b>DELINEATOR &amp; OBJECT MARKER MATERIAL DESCRIPTION</b> <b>D &amp; OM(1)-20</b>	
NOTE: 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.			MOUNTING HEIGHT: 4'-0" or 7'-0"				MOUNTING HEIGHT: 7'-0"		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.			NOTE						FILE: dom1-20.dgn DNE: TXDOT CK: TXDOT DW: TXDOT CR: TXDOT © TXDOT August 2004 REVISIONS: 0275 12 083, ETC IH-40 10-09 3-15 4-10 7-20 DIST: COUNTY SHEET NO. CHS WHEELER 46	



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DATE: 12/29/2022 9:09:16 AM  
 FILE: I:\CHSD\PROJECTS\WHEELER\0275-12-083 (Cable Barrier)\Plan Set\Standard\0275-12-083.dwg

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
 <p style="text-align: center;">2'-0" Usual</p>						
	EMBEDDED	SURFACE MOUNT	STEEL	PLASTIC	CONCRETE TRAFFIC BARRIER (CTB)	
<b>NOTES</b> 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.			<b>NOTE</b> 1. Install per manufacturer's recommendations.		<b>GENERAL NOTES</b> 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.	
<b>NOTES</b> 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.						
<b>TYPES 1,3, AND 4 OBJECT MARKERS AND CHEVRONS</b>		<b>CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN</b>		<b>DELINEATORS AND TYPE 2 OBJECT MARKERS</b>		
 <p style="text-align: center;">4'-0" Pavement surface Ground Line</p>		 <p style="text-align: center;">7'-0" Pavement surface Ground Line</p>		 <p style="text-align: center;">Approximately 4'-0" Pavement surface Ground Line 2'-0" to 8'-0" or in front of object being marked</p>		
<b>NOTE</b> 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)		<b>NOTE</b> 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.		<b>NOTE</b> See general notes 1, 2 and 3.		



Traffic Safety Division Standard

## DELINEATOR & OBJECT MARKER INSTALLATION

### D & OM(2)-20

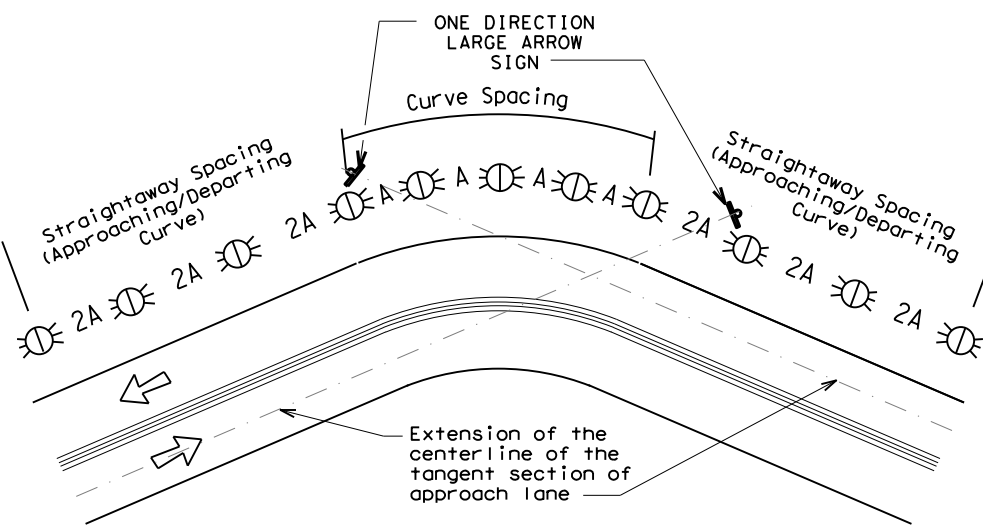
FILE: dom2-20.dgn	DW: TxDOT	CK: TxDOT	DN: TxDOT	CR: TxDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0275	12	083, ETC	IH-40
10-09 3-15	DIST	COUNTY	SHEET NO.	
4-10 7-20	CHS	WHEELER	<b>47</b>	

DATE: 12/29/2022 9:09:58 AM  
 FILE: I:\CHSD\PROJECTS\WHEELER\0275-12-083 (Cable Barrier)\Plan Set\Standard\0275-12-083.dwg  
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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

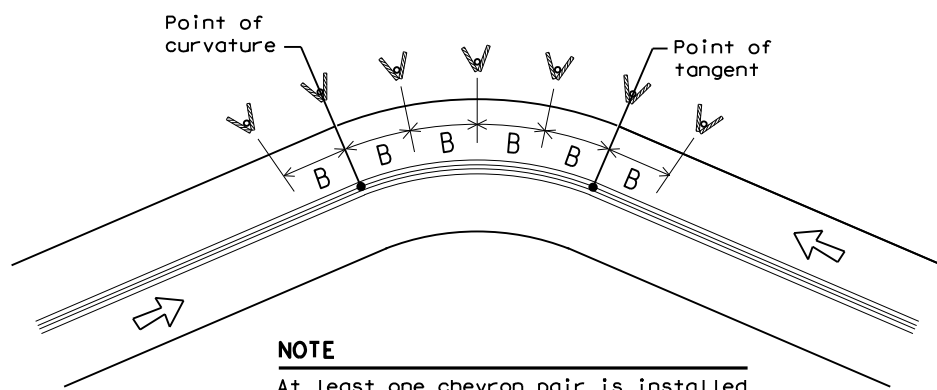
### SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



**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 Straightaway	Chevron Spacing in Curve
		A	2A	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 Straightaway	Chevron Spacing in Curve
	A	2xA	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
Frwy./Exp. Tangent	RPMs	See PM-series and FPM-series standard sheets
Frwy./Exp. Curve	Single delineators on right side	See delineator spacing table
Frwy/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

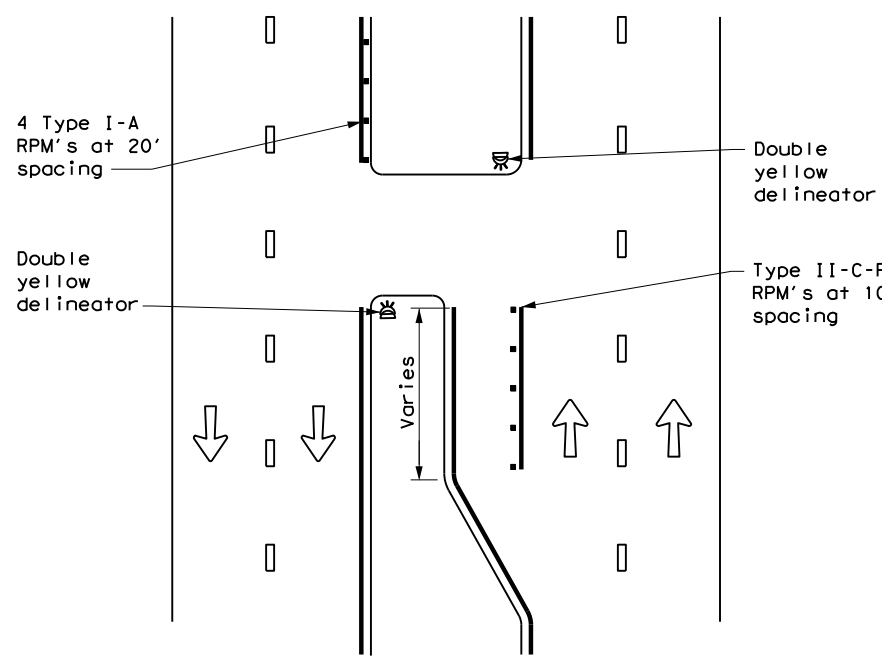
FILE: dom3-20.dgn	DW: TxDOT	CK: TxDOT	OW: TxDOT	CR: TxDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS		0275 12	083, ETC	IH-40
3-15 8-15	DIST	COUNTY	SHEET NO.	
8-15 7-20	CHS	WHEELER	48	

20C

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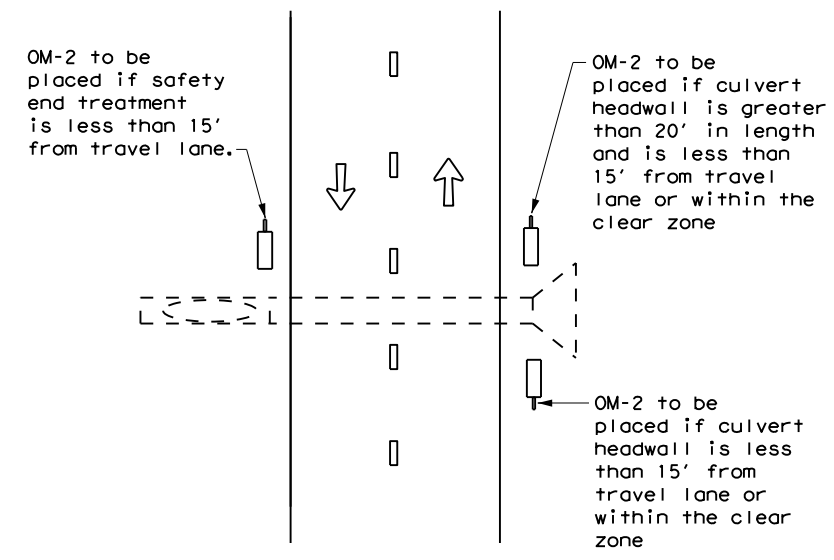
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**CROSSOVERS**



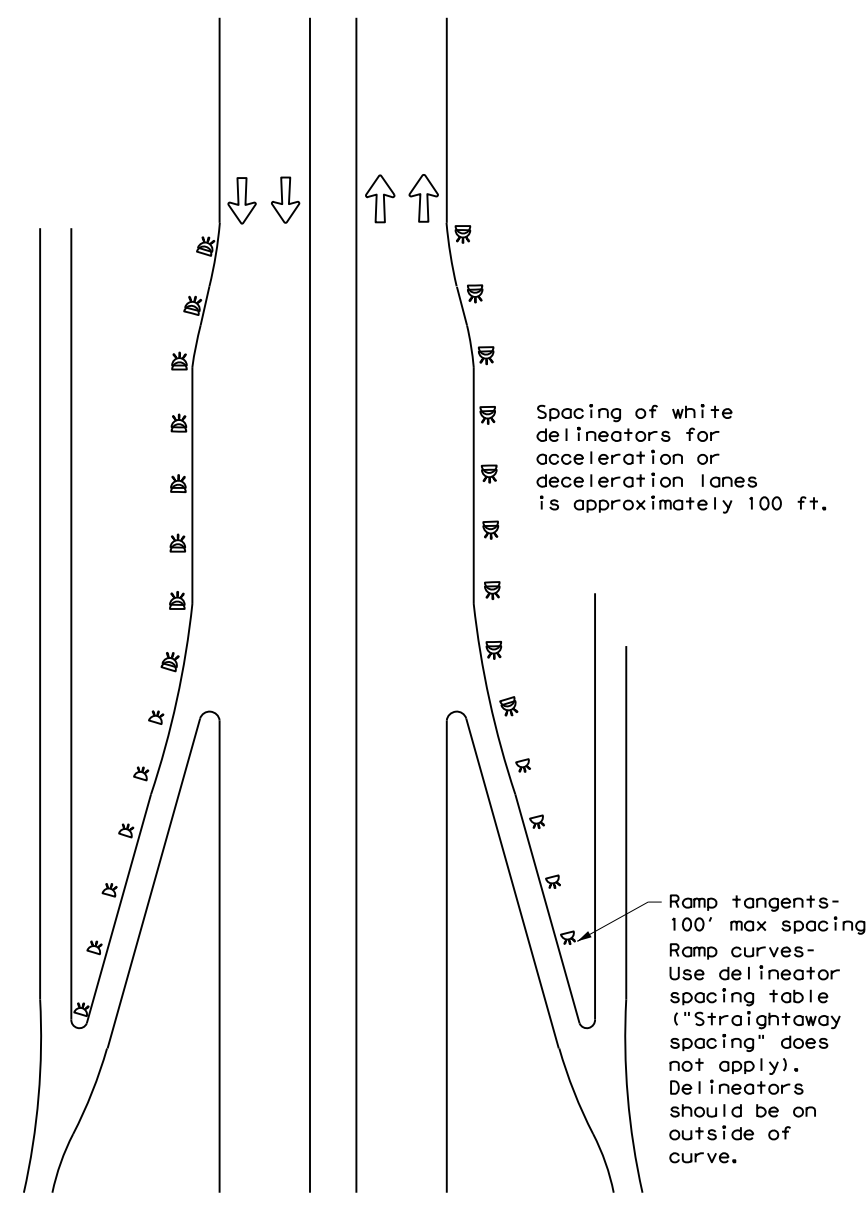
**DETAIL 1**

**FOR CULVERTS WITHOUT MBGF**



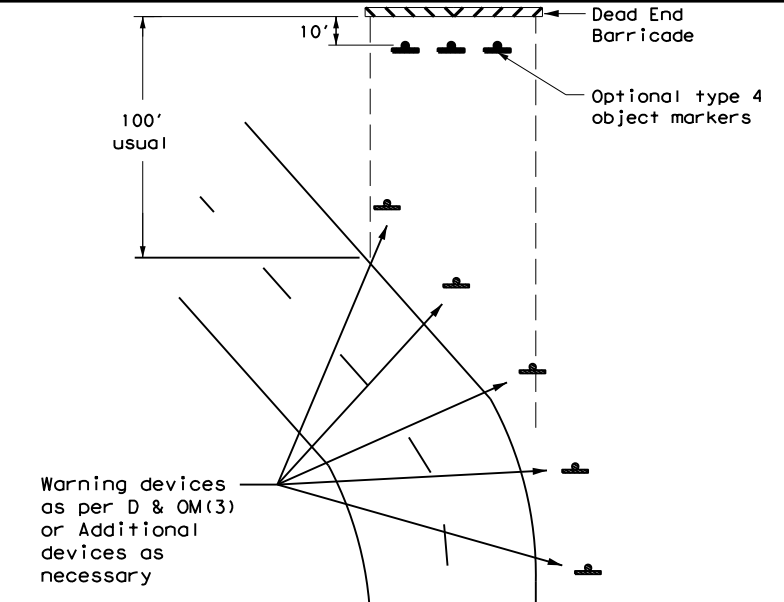
**DETAIL 2**

**FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES**



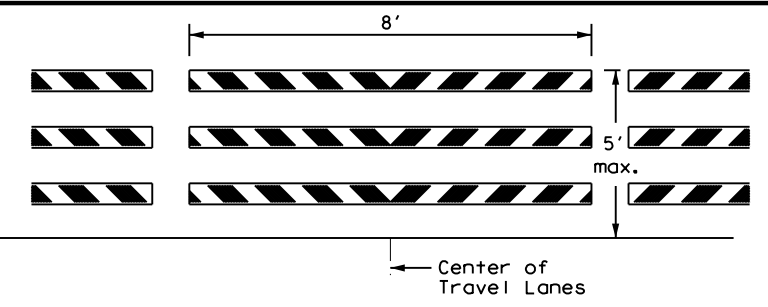
**DETAIL 3**

**TYPICAL APPLICATION OF DEAD END BARRICADE**



**DETAIL 4**

**TYPICAL DEAD END BARRICADE INSTALLATION**



**NOTES**

- Barricade striping shall be red and white reflective sheeting for all permanent road closures.
- Barricade striping is red and white sloping toward the center of the roadway.
- 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

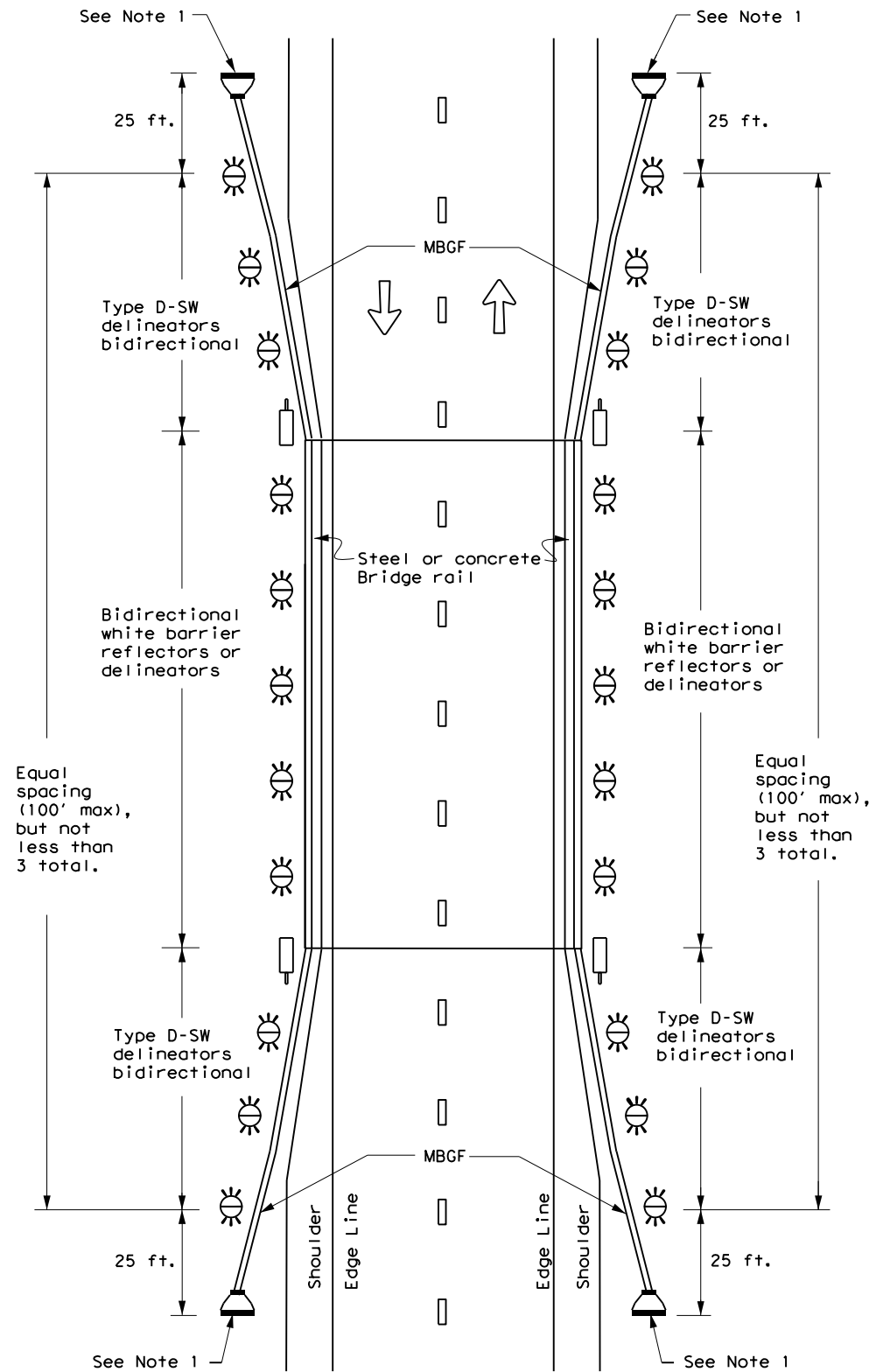


**DELINEATOR & OBJECT MARKER PLACEMENT DETAILS**

**D & OM(4) -20**

FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	OW: TXDOT	CR: TXDOT
© TXDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0275	12	083, ETC	IH-40
3-15	DIST	COUNTY	SHEET NO.	
7-20	CHS	WHEELER	49	

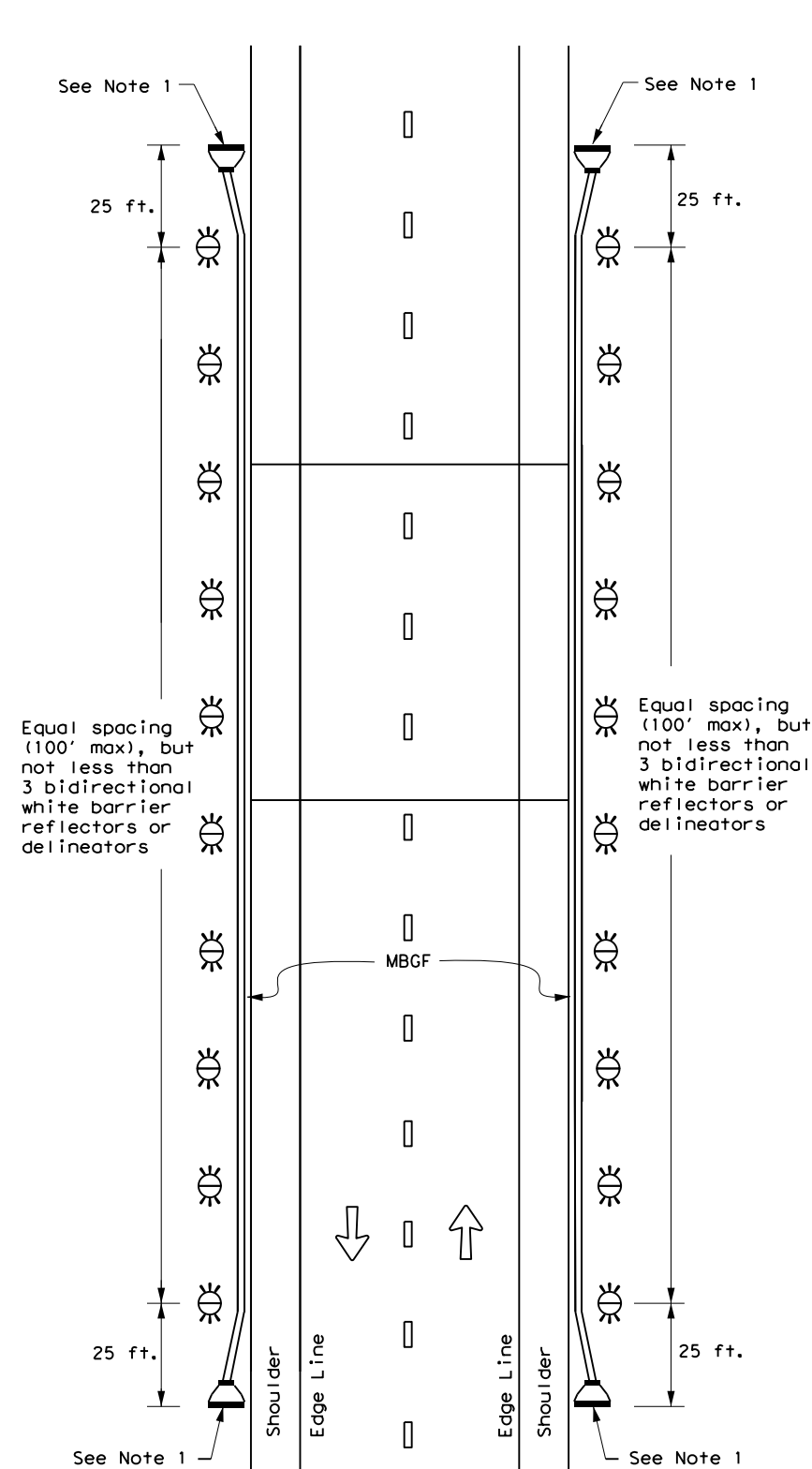
**TWO-WAY, TWO LANE ROADWAY  
WITH REDUCED WIDTH APPROACH RAIL**



**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.

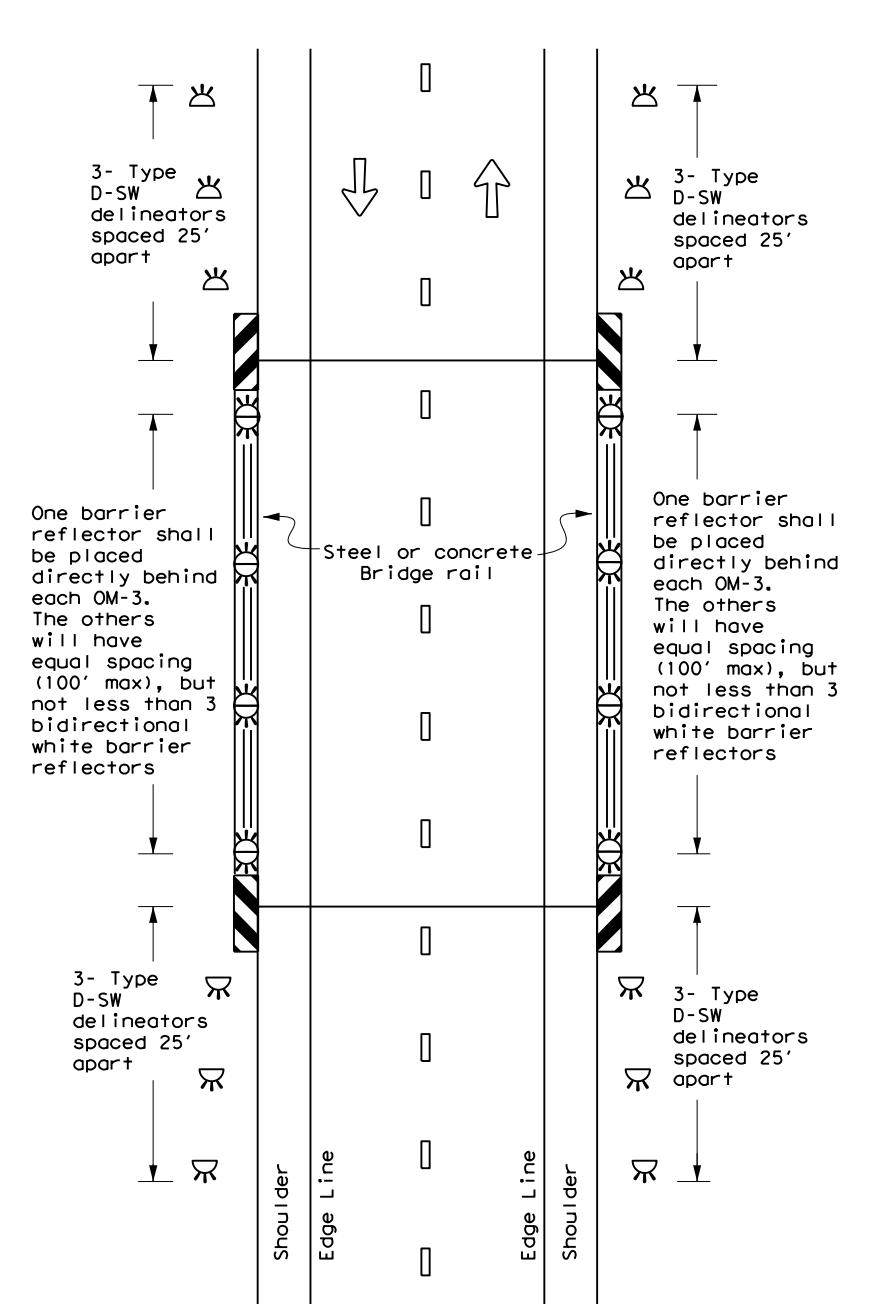
**TWO-WAY, TWO LANE ROADWAY  
WITH METAL BEAM GUARD FENCE (MBGF)**



**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



**DELINEATOR &  
OBJECT MARKER  
PLACEMENT DETAILS**

**D & OM(5) - 20**

FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0275	12	083, ETC	IH-40
7-20	DIST	COUNTY	SHEET NO.	
	CHS	WHEELER	50	

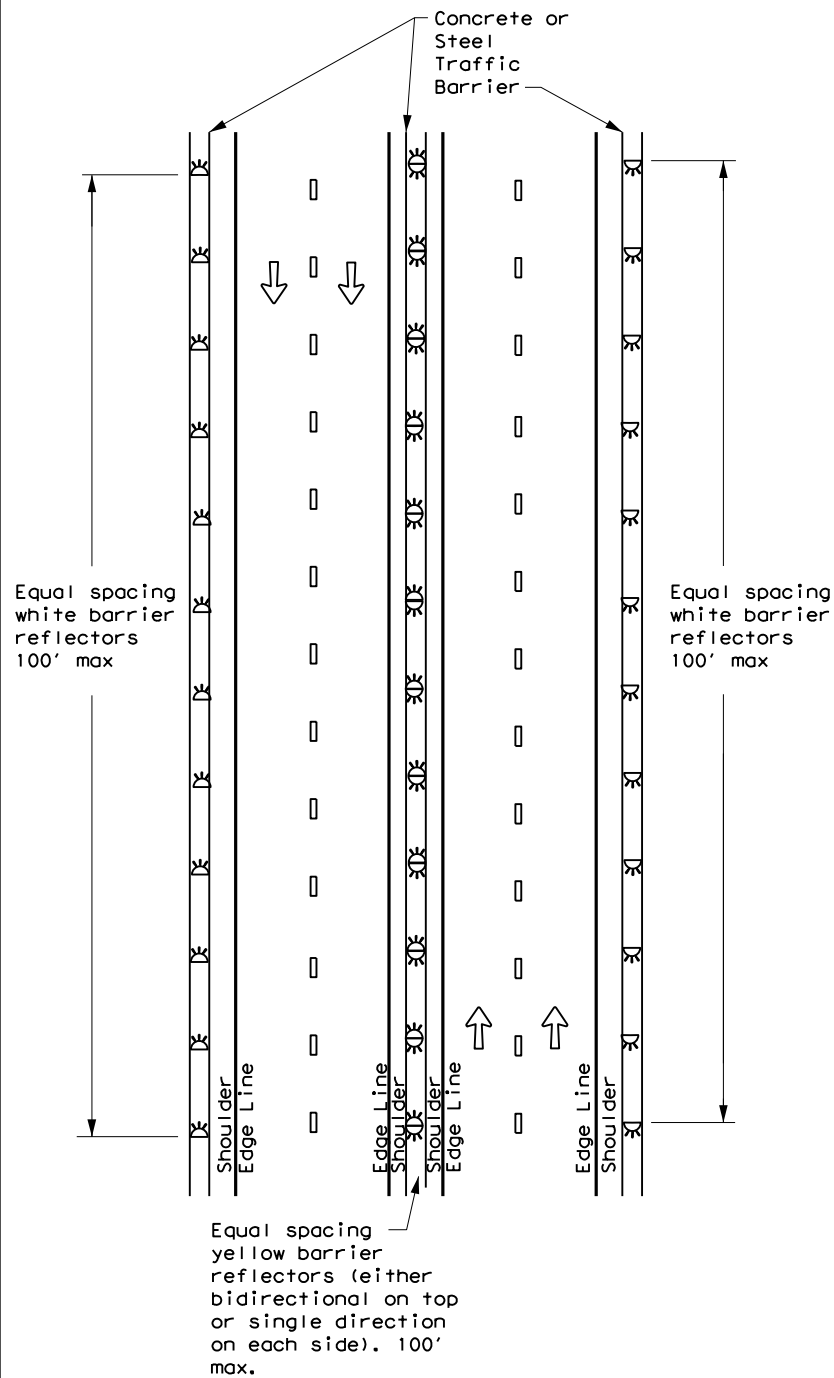
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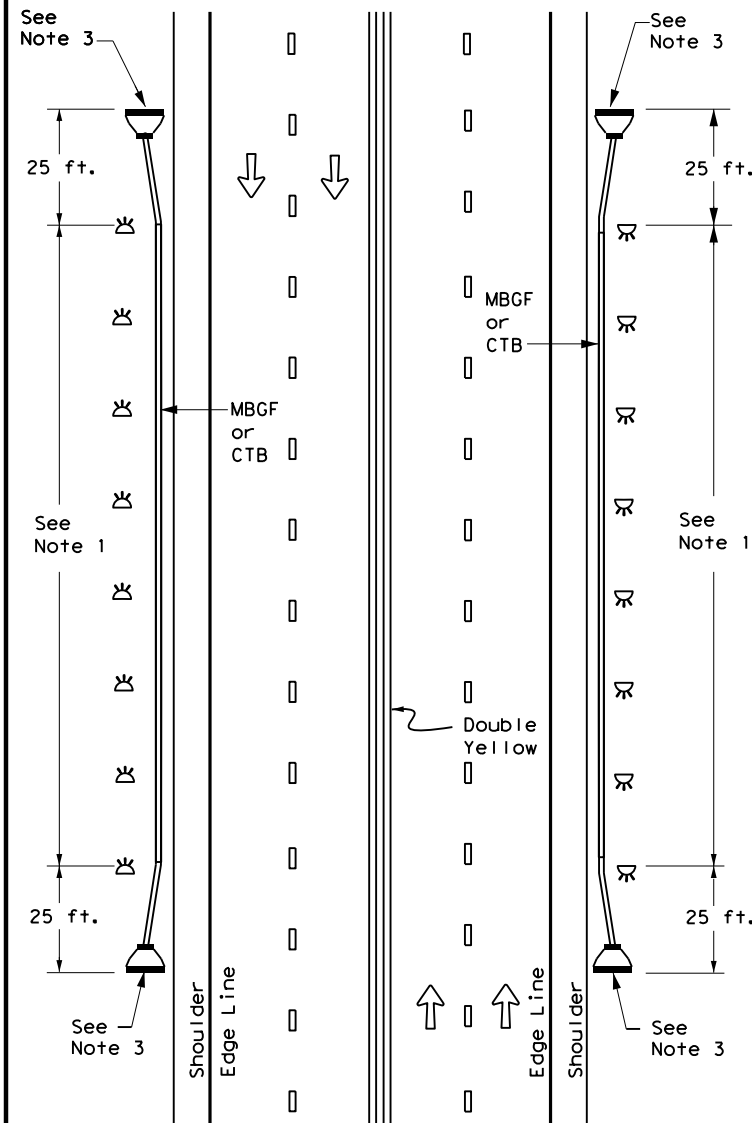
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DATE: 12/29/2022 9:15:38 AM  
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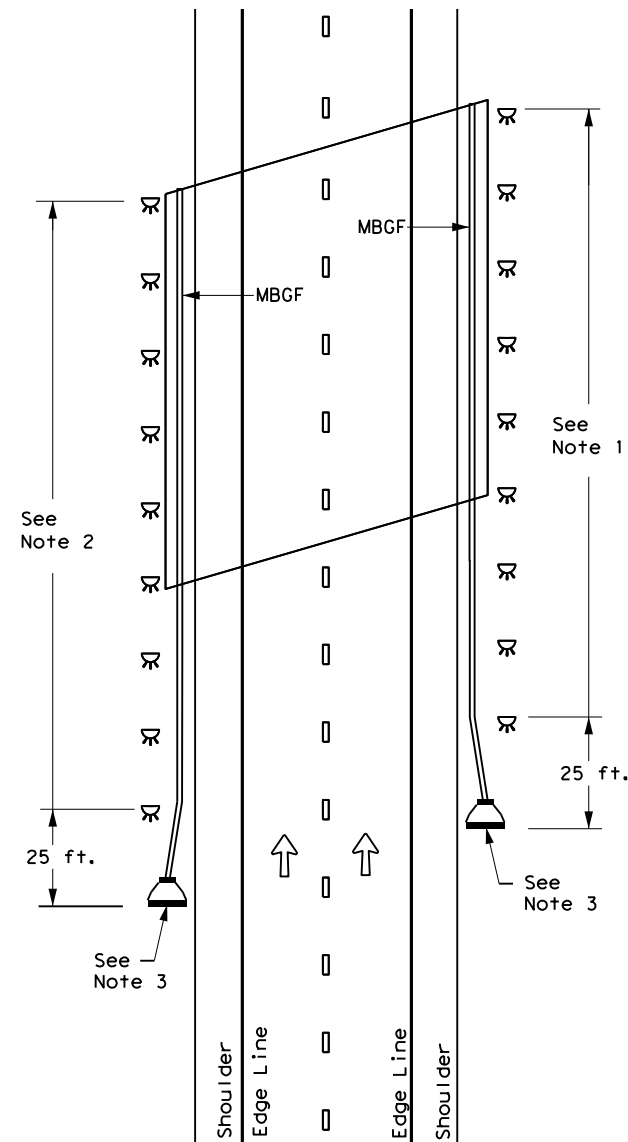
### CONTINUOUS CONCRETE OR STEEL BARRIER



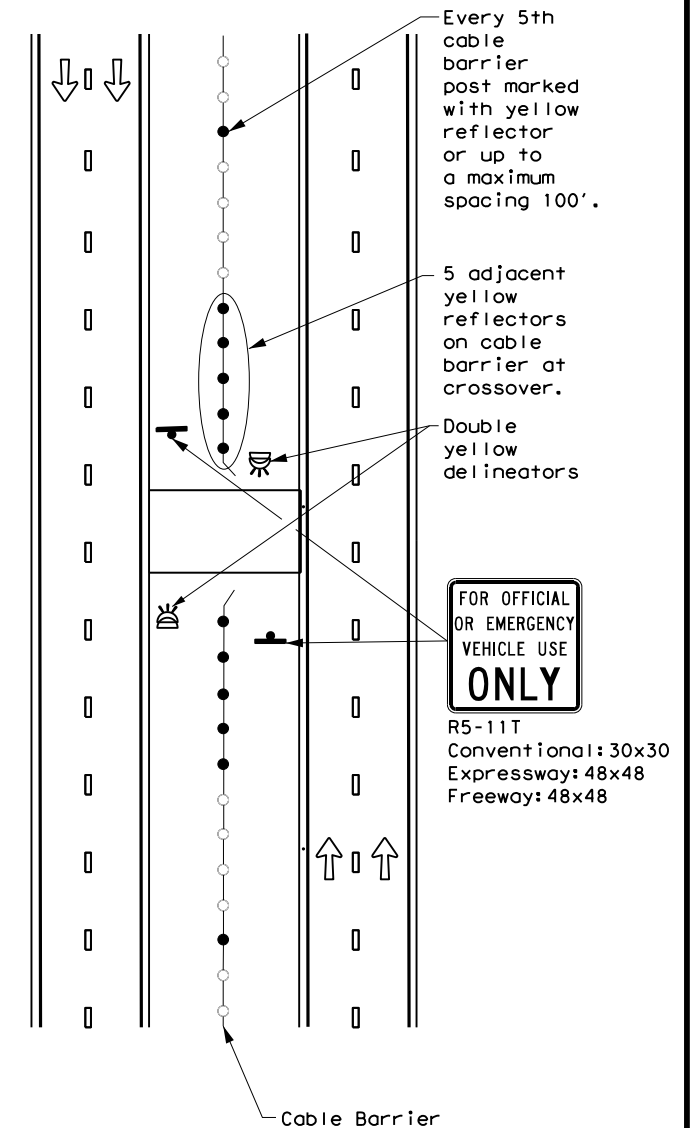
### MULTI-LANE UNDIVIDED, TWO-WAY ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



### 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

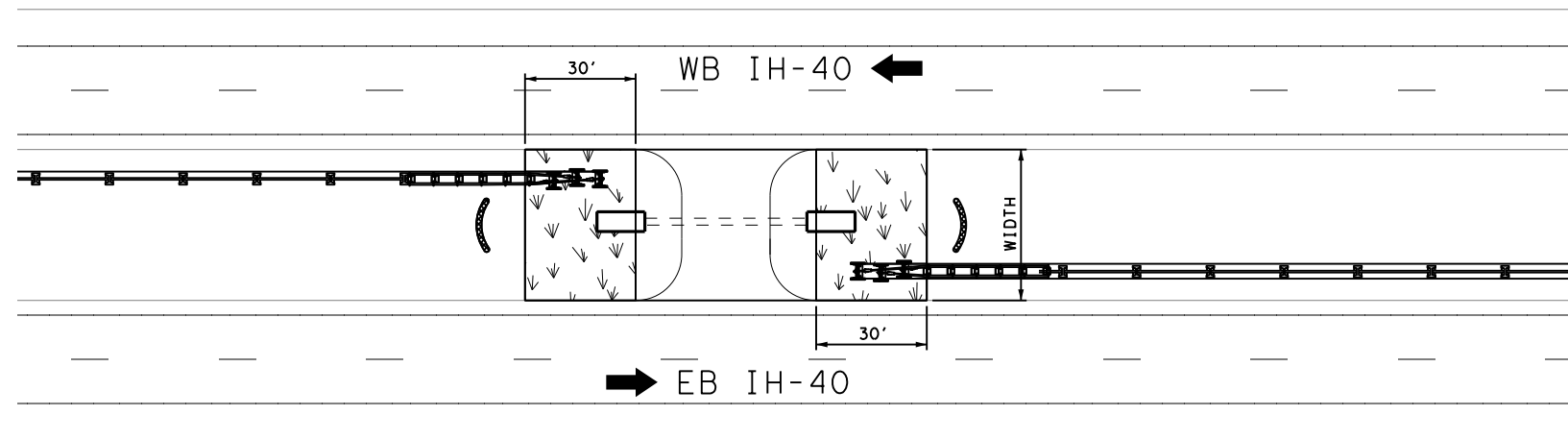


## DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

### D & OM(6)-20

FILE: dom6-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
7-20	0275	12	083, ETC	IH-40
	DIST	COUNTY	SHEET NO.	
	CHS	WHEELER	51	

DATE: 12/21/2022 3:45:36 PM  
 FILE: I:\CHSD\PROJECTS\WHEELER\0275-12-083 (Cable Barrier)\3D Model\new\_master\_layoutcopy.dgn



**TYPICAL PROPOSED CROSSOVER A**

SHEET SUMMARY

LOCATION	WIDTH	LENGTH	164	164	314	506
			6033	6051	6013	6042
STA.	FT	FT	DRILL SEEDING (PERM) (RURAL) (SANDY)	DRILL SEED (TEMP) (WARM OR COOL)	EMUL ASPH (EROSN CONT) (CSS-1H)	BIODEG EROSN CONT LOGS (IN STL) (18")
			SY	SY	GAL	LF
844+50.00	43	60	287	287	57	100
892+15.00	57	60	380	380	76	100
966+00.00	61	60	407	407	81	100
1087+25.00	69	60	460	460	92	100
1233+20.00	68	60	453	453	91	100
1359+50.00	67	60	447	447	89	100
1416+30.00	70	60	467	467	93	100
1500+75.00	69	60	460	460	92	100
PROJECT TOTALS:			3,360	3,360	672	800



*Ryan J. Reid P.E.*  
 12/29/2022

**IH 40  
 SW3P  
 LAYOUT**



SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0275	12	083, ETC	IH-40
DIST	COUNTY		SHEET NO.
CHS	WHEELER		52

**STORMWATER POLLUTION PREVENTION PLAN (SWP3):**

This SWP3 has been developed in accordance with the TPDES Construction General Permit TXR150000 (CGP). The Texas Department of Transportation (TxDOT) ensures that project specifications include adequate best management practices (BMPs) for this project.

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

This SWP3 is consistent with requirements specified in applicable stormwater plans and the projects environmental permits, issues, and commitments (EPICs). A copy of the CGP is included in Attachment 2.12 of the SWP3 binder.

**1.0 SITE/PROJECT DESCRIPTION**

**1.1 PROJECT CONTROL SECTION JOB (CSJ):**  
0275-12-083

**1.2 PROJECT LIMITS:**

From: 2000' W OF FM 2474

To: 7,650' WEST OF THE OKLAHOMA STATE LINE

**1.3 PROJECT COORDINATES:**

BEGIN: (Lat) 35°13'36.84"N, (Long) 100°17'48.12"W

END: (Lat) 35°13'36.34"N, (Long) 100°01'33.00"W

**1.4 TOTAL PROJECT AREA (Acres):** 7.50

**1.5 TOTAL AREA TO BE DISTURBED (Acres):** 7.50

**1.6 NATURE OF CONSTRUCTION ACTIVITY:**

INSTALL MOWSTRIP FOR CABLE BARRIER

INSTALL PIPES AND SET'S UNDER CROSSOVERS

PLACE CONCRETE FOR EMERGENCY CROSSOVERS

**1.7 MAJOR SOIL TYPES:**

Soil Type	Description

**1.8 PROJECT SPECIFIC LOCATIONS (PSLs):**

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

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

Type	Sheet #s

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

**1.9 CONSTRUCTION ACTIVITIES:**

(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.5.)

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

**1.10 POTENTIAL POLLUTANTS AND SOURCES:**

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

**1.11 RECEIVING WATERS:**

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

Tributaries	Classified Waterbody

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

**1.12 ROLES AND RESPONSIBILITIES: TxDOT**

- Development of plans and specifications
- Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
- Post Construction Site Notice
- Submit NOI/CSN to local MS4
- Perform SWP3 inspections
- Maintain SWP3 records and update to reflect daily operations
- Complete and submit Notice of Termination to TCEQ
- Maintain SWP3 records for 3 years
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_

**1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR**

- Day To Day Operational Control
- Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
- Post Construction Site Notice
- Submit NOI/CSN to local MS4
- Maintain schedule of major construction activities
- Install, maintain and modify BMPs
- Complete and submit Notice of Termination to TCEQ
- Maintain SWP3 records for 3 years
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_

**1.14 LOCAL MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) OPERATOR COORDINATION:**

MS4 Entity



Ryan J. Reid P.E.  
12/29/2022

**STORMWATER POLLUTION PREVENTION PLAN (SWP3)**



Sheet 1 of 2

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
	STP 2023(511)HES		53
STATE	STATE DIST.	COUNTY	
TEXAS	CHS	WHEELER	
CONT.	SECT.	JOB	HIGHWAY NO.
0275	12	083,ETC	IH-40

**STORMWATER POLLUTION PREVENTION PLAN (SWP3):**

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

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

**2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:**

**T / P**

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

**2.2 SEDIMENT CONTROL BMPs:**

**T / P**

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

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

Sediment control BMPs requiring design capacity calculations (See SWP3 Attachment 1.3.):

**T / P**

- Sediment Trap
  - Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
  - 3,600 cubic feet of storage per acre drained
- Sedimentation Basin
  - Not required (<10 acres disturbed)
  - Required (>10 acres) and implemented.
    - Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
    - 3,600 cubic feet of storage per acre drained
  - Required (>10 acres), but not feasible due to:
    - Available area/Site geometry
    - Site slope/Drainage patterns
    - Site soils/Geotechnical factors
    - Public safety
    - Other: \_\_\_\_\_

**2.3 PERMANENT CONTROLS:**

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

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To

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

**2.4 OFFSITE VEHICLE TRACKING CONTROLS:**

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

**2.5 POLLUTION PREVENTION MEASURES:**

- Chemical Management
- Concrete and Materials Waste Management
- Debris and Trash Management
- Dust Control
- Sanitary Facilities
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_

**2.6 VEGETATED BUFFER ZONES:**

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

Type	Stationing	
	From	To

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

**2.7 ALLOWABLE NON-STORMWATER DISCHARGES:**

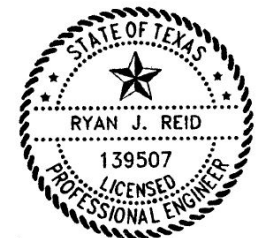
- Fire hydrant flushings
- Irrigation drainage
- Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- Potable water sources
- Springs
- Uncontaminated groundwater
- Water used to wash vehicles or control dust
- Other allowable non-stormwater discharges as allowed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

**2.8 INSPECTIONS:**

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3 .

**2.9 MAINTENANCE:**

Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3.



*Ryan J. Reid P.E.*  
12/29/2022

**STORMWATER POLLUTION PREVENTION PLAN (SWP3)**



Sheet 2 of 2

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
	STP 2023(511)HES		54
STATE	STATE DIST.	COUNTY	
TEXAS	CHS	WHEELER	
CONT.	SECT.	JOB	HIGHWAY NO.
0275	12	083,ETC	IH-40



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DATE: FILE:

**I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402**

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

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

1.  
2.
- No Action Required       Required Action

Action No.

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

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

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

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

- No Permit Required
- Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)
- Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)
- Individual 404 Permit Required
- Other Nationwide Permit Required: NWP# \_\_\_\_\_

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

1.  
2.  
3.  
4.

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

Best Management Practices:

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

**III. CULTURAL RESOURCES**

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

- No Action Required       Required Action

Action No.

1.  
2.  
3.  
4.

**IV. VEGETATION RESOURCES**

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

- No Action Required       Required Action

Action No.

1. Minimize impacts to existing vegetation in the project area; impacted vegetation should be replaced with in-kind native vegetation. Trim trees instead of removal (when possible). Re-vegetation proposed for the project would be in compliance with Executive Order 13112 on Invasive Species and the Executive Memorandum on Beneficial Landscapes.
- 2.
- 3.

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

- No Action Required       Required Action

Action No.

1. MIGRATORY BIRDS-DO NOT DISTURB, DESTROY, OR REMOVE ACTIVE NESTS INCLUDING NESTING BIRDS DURING THE NESTING SEASON. AVOID IMPACTS TO BIRDS, THEIR EGGS, AND THEIR YOUNG. AVOID THE REMOVAL OF UNOCCUPIED, INACTIVE NESTS, AS PRACTICALBE.
2. PLAINS SPOTTED SKUNK - AVOID HARMING SPECIES IF ENCOUNTERED AND AVOID UNNECESSARY IMPACTS TO DENS.
3. TEXAS HORNED LIZARD - POTENTIAL OCCURRENCE IN THE PROJECT AREA. IF THE TEXAS HORNED LIZARD IS FOUND IN THE PROJECT AREA; AVOID HARMING THE SPECIES AND ALLOW SPECIES TO SAFELY LEAVE THE PROJECT AREA. THIS SHOULD INCLUDE AVOIDING HARVESTER ANT MOUNDS IN THE SELECTION OF PROJECT SPECIFIC LOCATIONS (PSLs). AVOID OR MINIMIZE DISTURBING OR REMOVING DOWNED TREES, ROTTING STUMPS, AND LEAF LITTER WHERE FEASIBLE.

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

**LIST OF ABBREVIATIONS**

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

**VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES**

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used. Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act. Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:

- \* Dead or distressed vegetation (not identified as normal)
- \* Trash piles, drums, canister, barrels, etc.
- \* Undesirable smells or odors
- \* Evidence of leaching or seepage of substances

Does the project involve any bridge class structure rehabilitation or replacements (bridge class structures not including box culverts)?

- Yes       No

If "No", then no further action is required.

If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

Are the results of the asbestos inspection positive (is asbestos present)?

- Yes       No

If "Yes", then TxDOT must retain a DSHS licensed asbestos consultant to assist with the notification, develop abatement/mitigation procedures, and perform management activities as necessary. The notification form to DSHS must be postmarked at least 15 working days prior to scheduled demolition.

If "No", then TxDOT is still required to notify DSHS 15 working days prior to any scheduled demolition.

In either case, the Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and asbestos consultant in order to minimize construction delays and subsequent claims.

Any other evidence indicating possible hazardous materials or contamination discovered on site. Hazardous Materials or Contamination Issues Specific to this Project:

- No Action Required       Required Action

Action No.

1.  
2.  
3.

**VII. OTHER ENVIRONMENTAL ISSUES**

(includes regional issues such as Edwards Aquifer District, etc.)

- No Action Required       Required Action

Action No.

1.  
2.  
3.

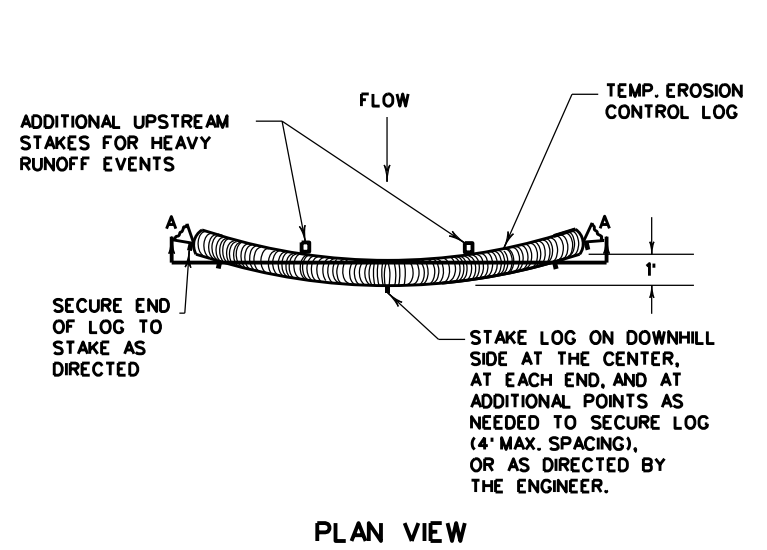


*Ryan J. Reid P.E.*  
12/29/2022

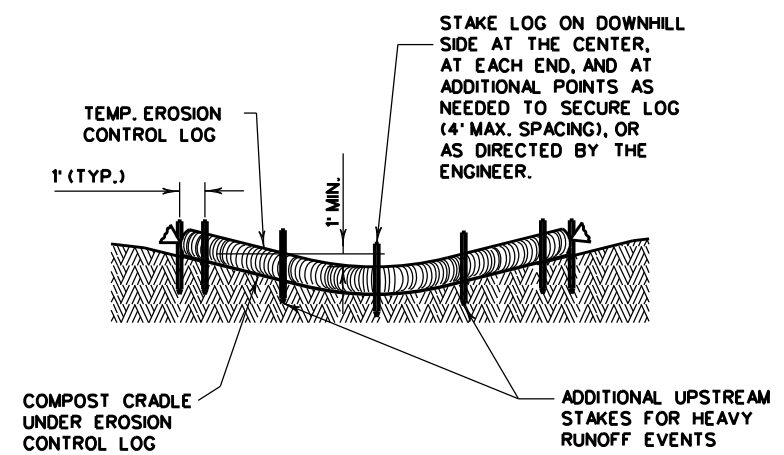
		<i>Design Division Standard</i>	
<b>ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS</b>			
<b>EPIC</b>			
FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP
©TxDOT: February 2015	CONT	SECT	JOB
12-12-2011 1051 REVISIONS	027512		083.ETC IH-40
05-07-14 ADDED NOTE SECTION IV.	DIST	COUNTY	SHEET NO.
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	CHS	WHEELER	55

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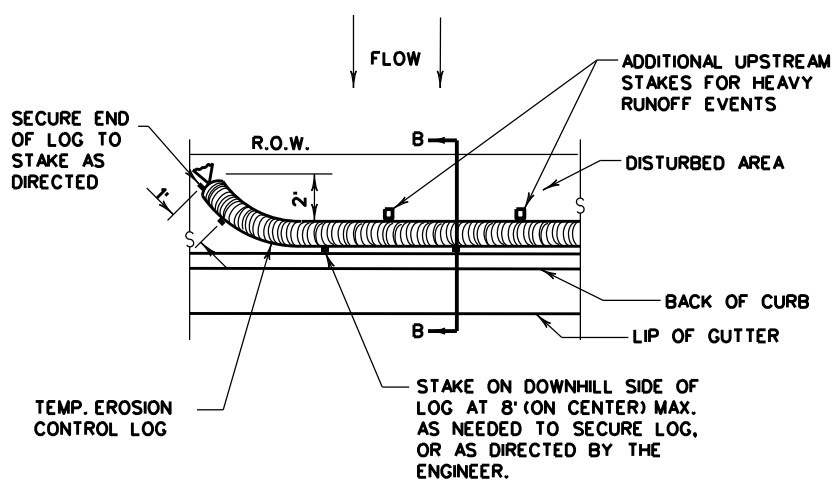


PLAN VIEW

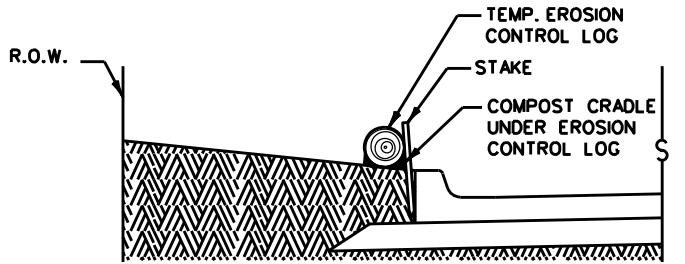


SECTION A-A  
EROSION CONTROL LOG DAM

CL-D



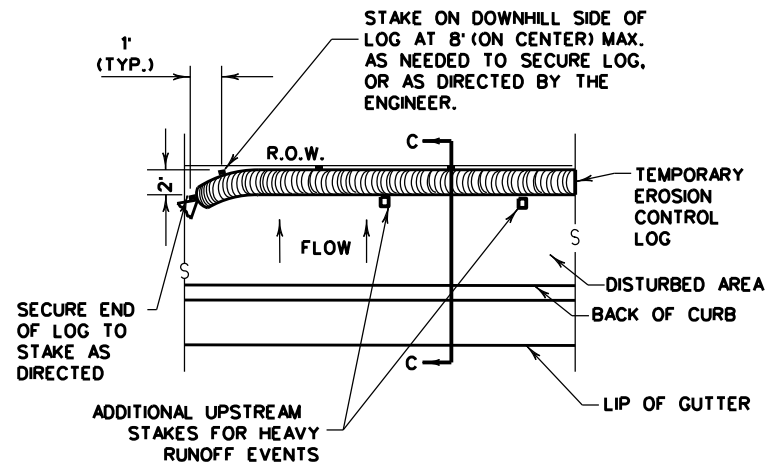
PLAN VIEW



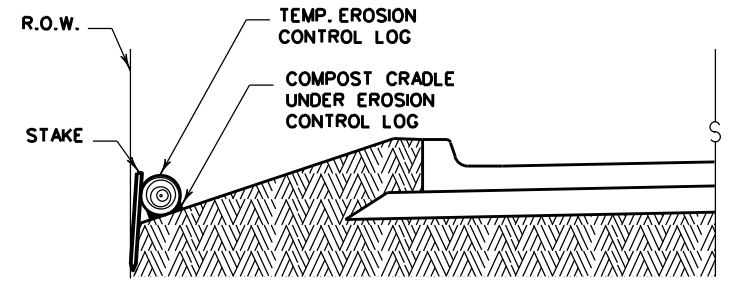
SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

CL-BOC



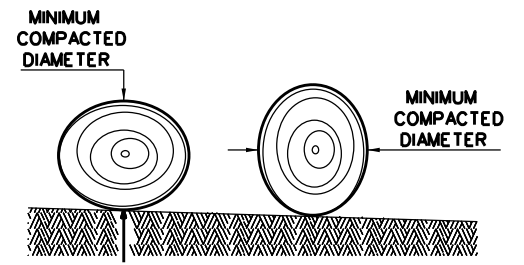
PLAN VIEW



SECTION C-C

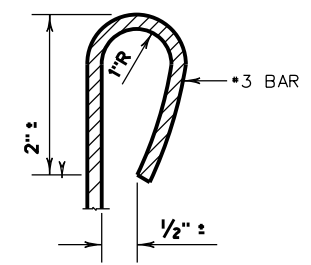
EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

- LEGEND**
- CL-D EROSION CONTROL LOG DAM
  - CL-BOC EROSION CONTROL LOG AT BACK OF CURB
  - CL-ROW EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
  - CL-SST EROSION CONTROL LOGS ON SLOPES STAKE AND TRENCHING ANCHORING
  - CL-SSL EROSION CONTROL LOGS ON SLOPES STAKE AND LASHING ANCHORING
  - CL-DI EROSION CONTROL LOG AT DROP INLET
  - CL-CI EROSION CONTROL LOG AT CURB INLET
  - CL-GI EROSION CONTROL LOG AT CURB & GRATE INLET



REBAR STAKE DETAIL

**SEDIMENT BASIN & TRAP USAGE GUIDELINES**

An erosion control log sediment trap may be used to filter sediment out of runoff draining from an unstabilized area.

**Log Traps:** The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" the drainage area).

Controllogs should be placed in the following locations:

1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets or drain inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way
5. Just before the drainage leaves the construction limits where drainage flows away from the project.

The logs should be cleaned when the sediment has accumulated to a depth of 1/2 the log diameter.

Cleaning and removal of accumulated sediment deposits is incidental and will not be paid for separately.

**GENERAL NOTES:**

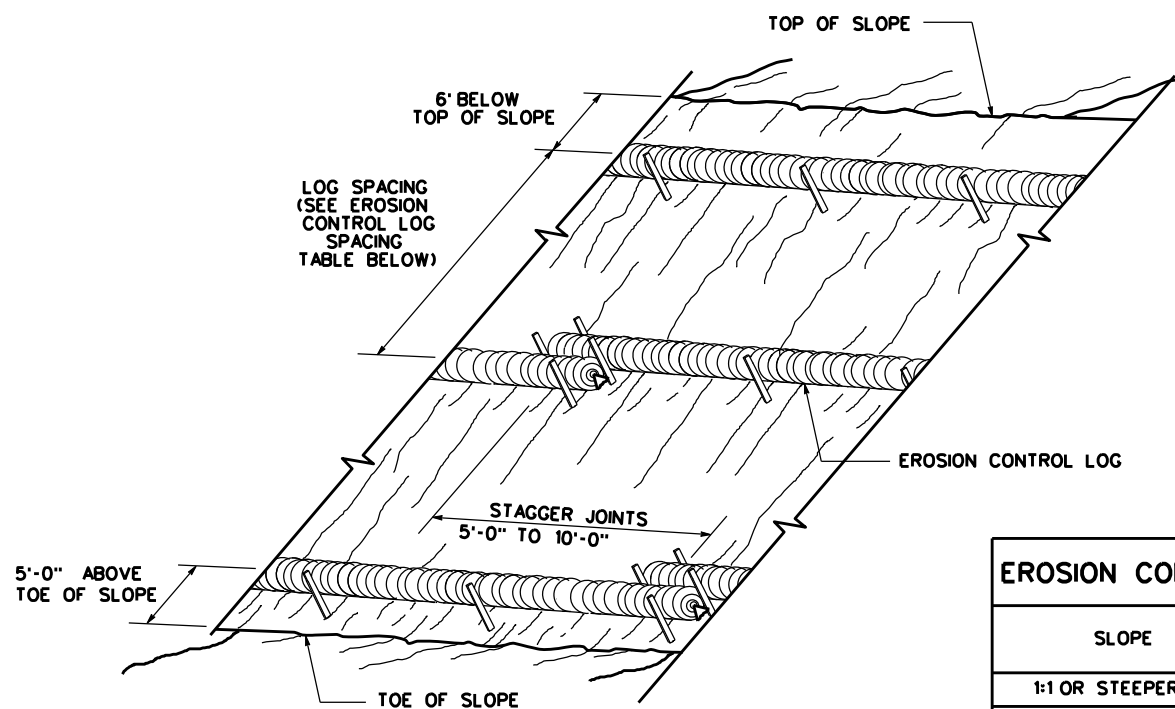
1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE OR PHOTODEGRADABLE CONTAINMENT MESH ONLY WHERE LOG WILL REMAIN IN PLACE AS PART OF A VEGETATIVE SYSTEM. FOR TEMPORARY INSTALLATIONS, USE RECYCLABLE CONTAINMENT MESH.
4. FILL LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE THE MINIMUM COMPACTED DIAMETER SPECIFIED IN THE PLANS WITHOUT EXCESSIVE DEFORMATION.
5. STAKES SHALL BE 2" X 2" WOOD OR #3 REBAR, 2'-4' LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG, OR AS DIRECTED BY THE ENGINEER.
6. DO NOT PLACE STAKES THROUGH CONTAINMENT MESH.
7. COMPOST CRADLE MATERIAL IS INCIDENTAL & WILL NOT BE PAID FOR SEPARATELY.
8. SANDBAGS USED AS ANCHORS SHALL BE PLACED ON TOP OF LOGS & SHALL BE OF SUFFICIENT SIZE TO HOLD LOGS IN PLACE.
9. TURN THE ENDS OF EACH ROW OF LOGS UPSLOPE TO PREVENT RUNOFF FROM FLOWING AROUND THE LOG.
10. FOR HEAVY RUNOFF EVENTS, ADDITIONAL UPSTREAM STAKES MAY BE NECESSARY TO KEEP LOG FROM FOLDING IN ON ITSELF.

SHEET 1 OF 3

		Design Division Standard	
<p><b>TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES EROSION CONTROL LOG EC(9)-16</b></p>			
FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT
© TxDOT: JULY 2016	CONT: 0275	SECT: 12	JOB: 083,ETC
REVISIONS	DIST: CHS	COUNTY: WHEELER	SHEET NO.: 56

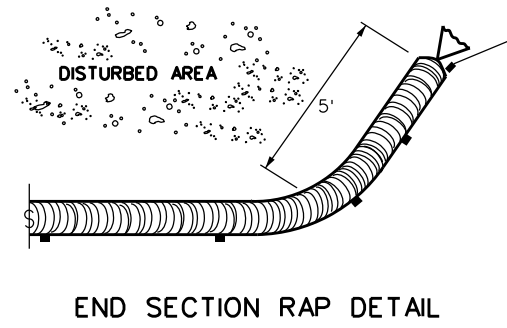
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**EROSION CONTROL LOGS ON SLOPES  
 STAKE AND TRENCHING ANCHORING**

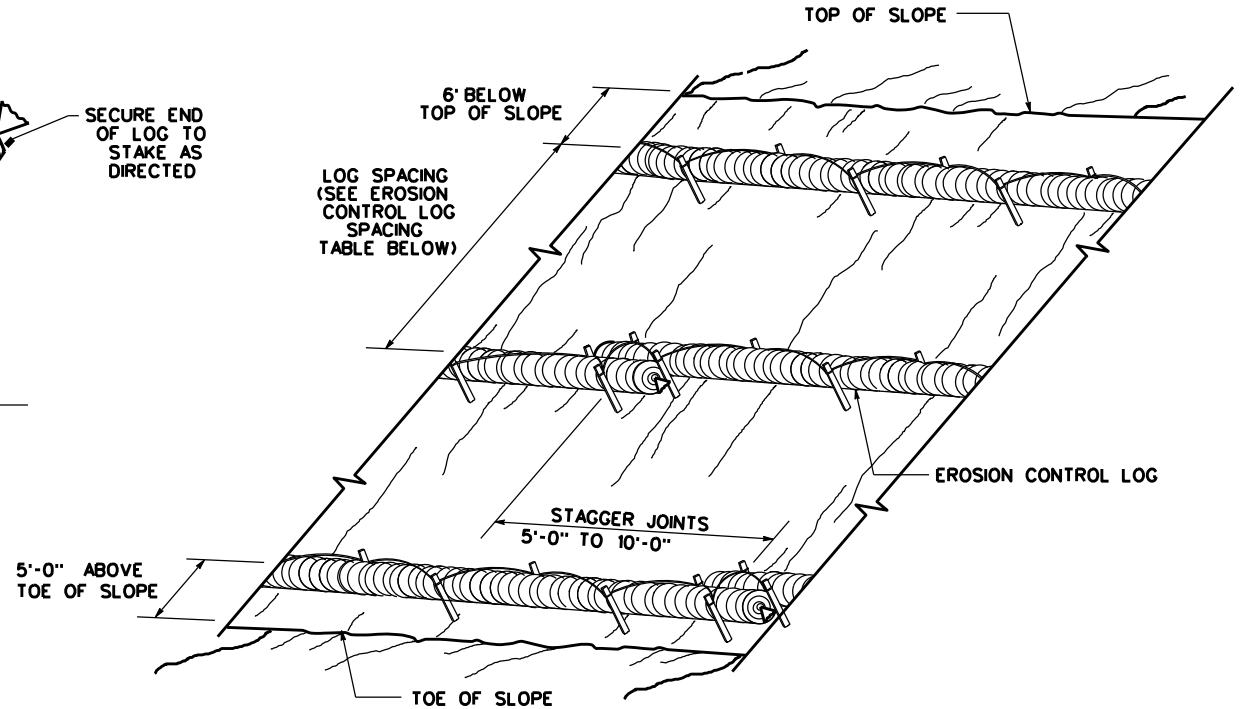
CL-SST



**END SECTION RAP DETAIL**

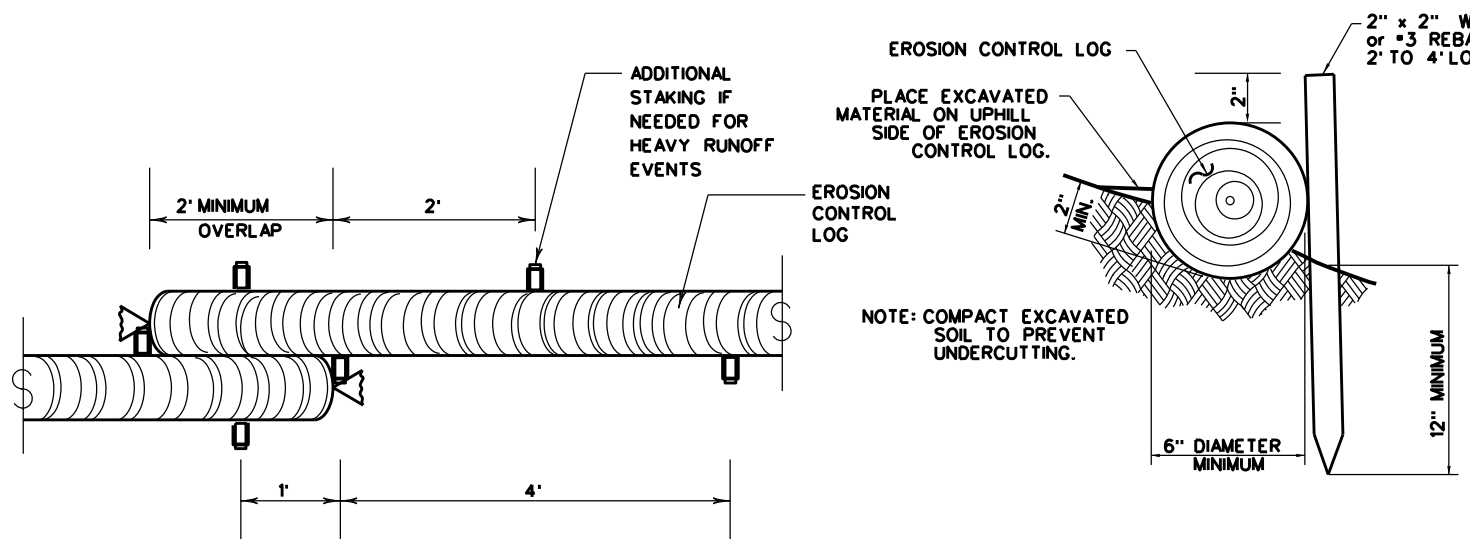
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

• ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:  
 SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;  
 HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



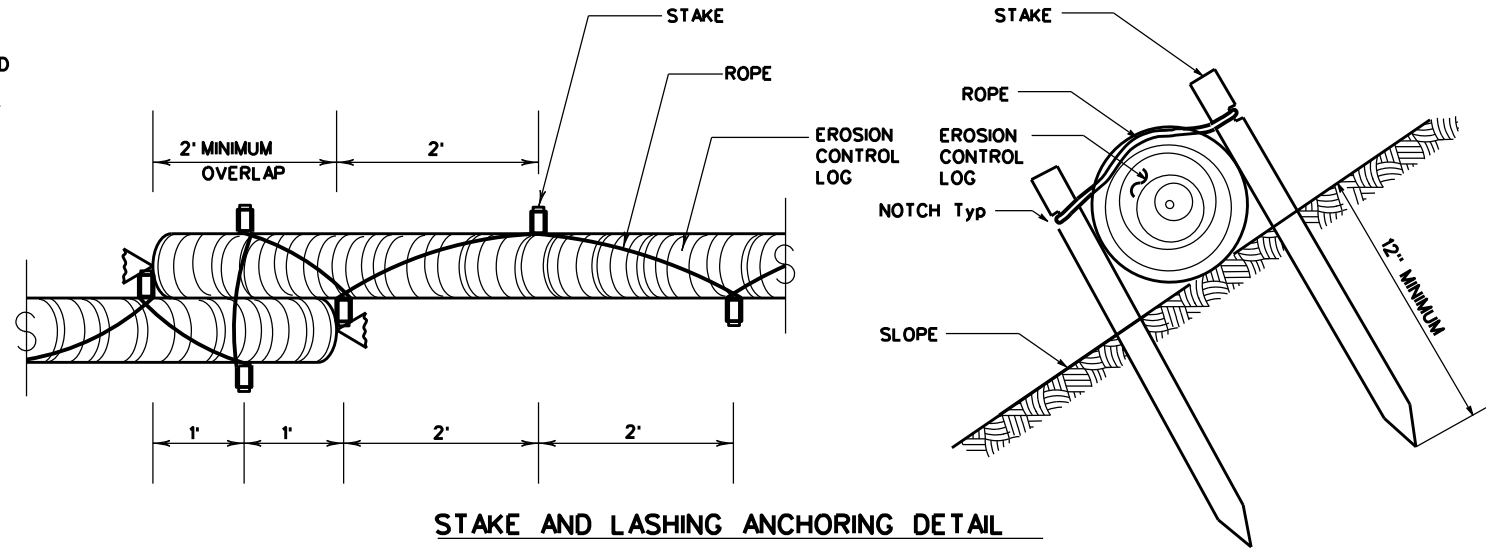
**EROSION CONTROL LOGS ON SLOPES  
 STAKE AND LASHING ANCHORING**

CL-SSL



**STAKE AND TRENCHING ANCHORING DETAIL**

CL-SST

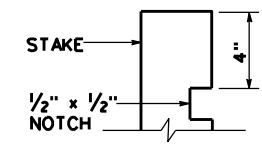


**STAKE AND LASHING ANCHORING DETAIL**

CL-SSL

LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"

**TRENCH DEPTH TABLE**



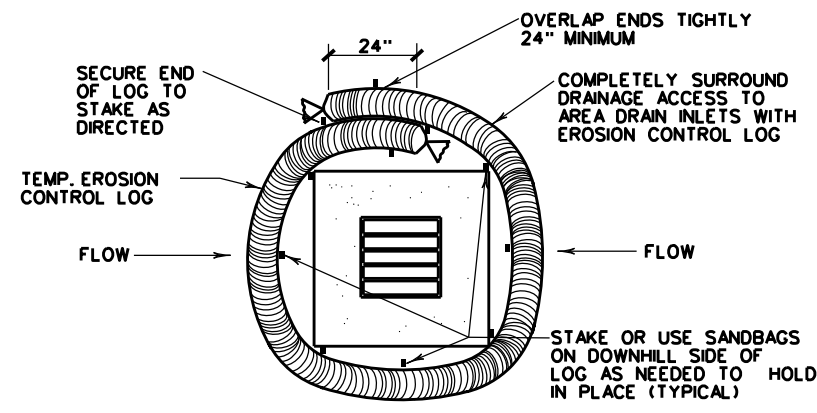
**STAKE NOTCH DETAIL**

SHEET 2 OF 3

		Design Division Standard	
<b>TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES</b> <b>EROSION CONTROL LOG</b> <b>EC(9)-16</b>			
FILE: ec116	DN: TxDOT	CK: KM	DW: LS/PT
© TxDOT: JULY 2016	CONT SECT	JOB	HIGHWAY
REVISIONS	0275 12	083,ETC	IH-40
DIST	COUNTY	SHEET NO.	
CHS	WHEELER	57	

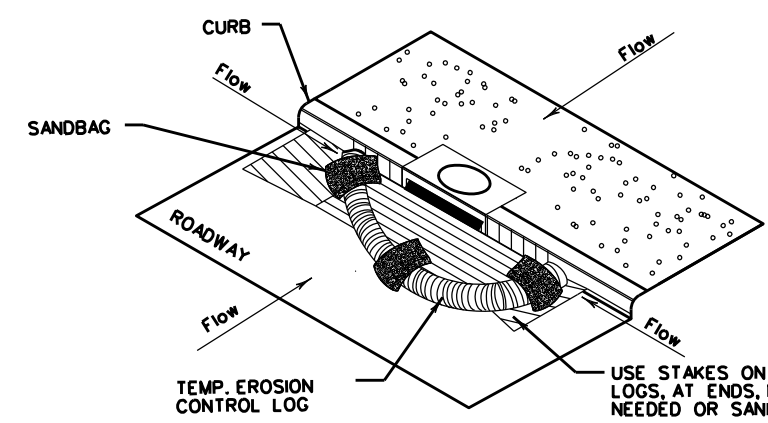
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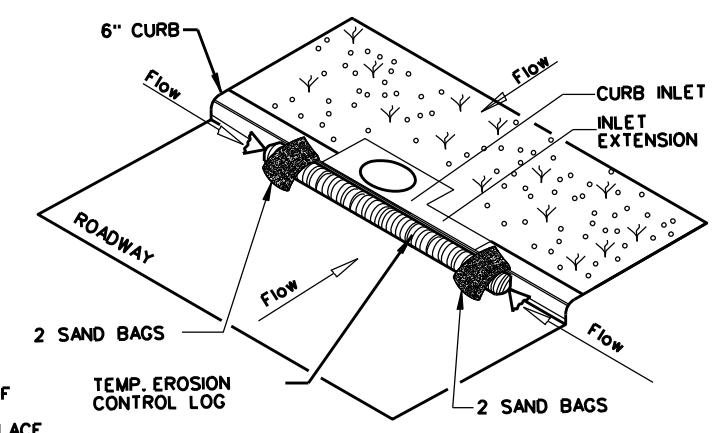
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

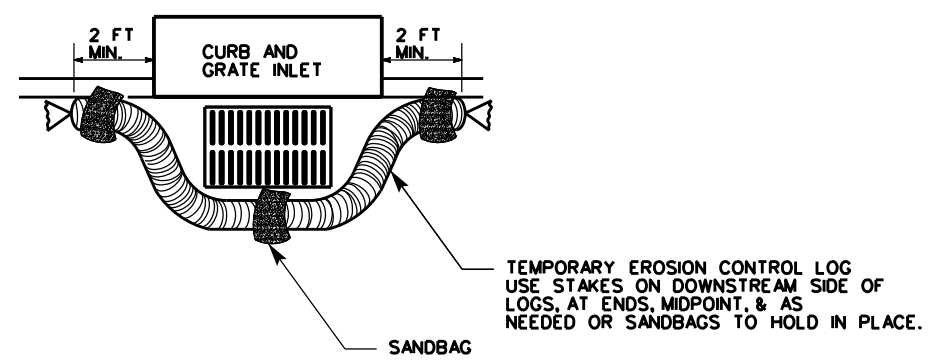
CL-CI



EROSION CONTROL LOG AT CURB INLET

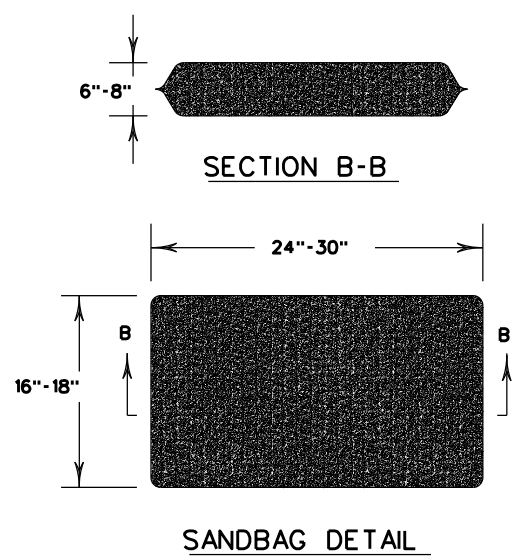
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NOTE:  
 EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI



SHEET 3 OF 3

		Design Division Standard	
<b>TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES</b> <b>EROSION CONTROL LOG</b> <b>EC(9)-16</b>			
FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT
© TxDOT: JULY 2016	CONT: 0275	SECT: 12	JOB: 083,ETC
REVISIONS:			HIGHWAY: IH-40
	DIST: CHS	COUNTY: WHEELER	SHEET NO.: 58