SHEET 1: TITLE SHEET

SHEET 2: INDEX OF SHEETS

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

FEDERAL AID PROJECT NUMBER: STP 2B24(303)HES

HIGHWAY: SH 144

COUNTY:HOOD

NET LENGTH OF PROJECT= 18,091.65 FT. = 3.426 MI.
LIMITS: FROM CR 310 TO MAMBRINO HWY

FOR THE CONSTRUCTION OF SAFETY IMPROVEMENT WORK
CONSISTING OF CABLE BARRIER FENCE

DESIGN	FED.RD. DIV.NO.	FEDERAL PROJECT NO.		SHEET NO.
GRAPHICS	6	STP 2B24(303)HES		1
	STATE	STATE DIST.NO.	COUNTY	
CHECKED	TEXAS	FTW	HOOD	
CHECKED	CONT.	SECT.	JOB	HIGHWAY NO.
	0385	04	053	SH0144

ROADWAY CLASSIFICATION:
MINOR ARTERIAL

DESIGN SPEED: 65 MPH

CURRENT ADT 2022 = 10,142

LETTING DATE:

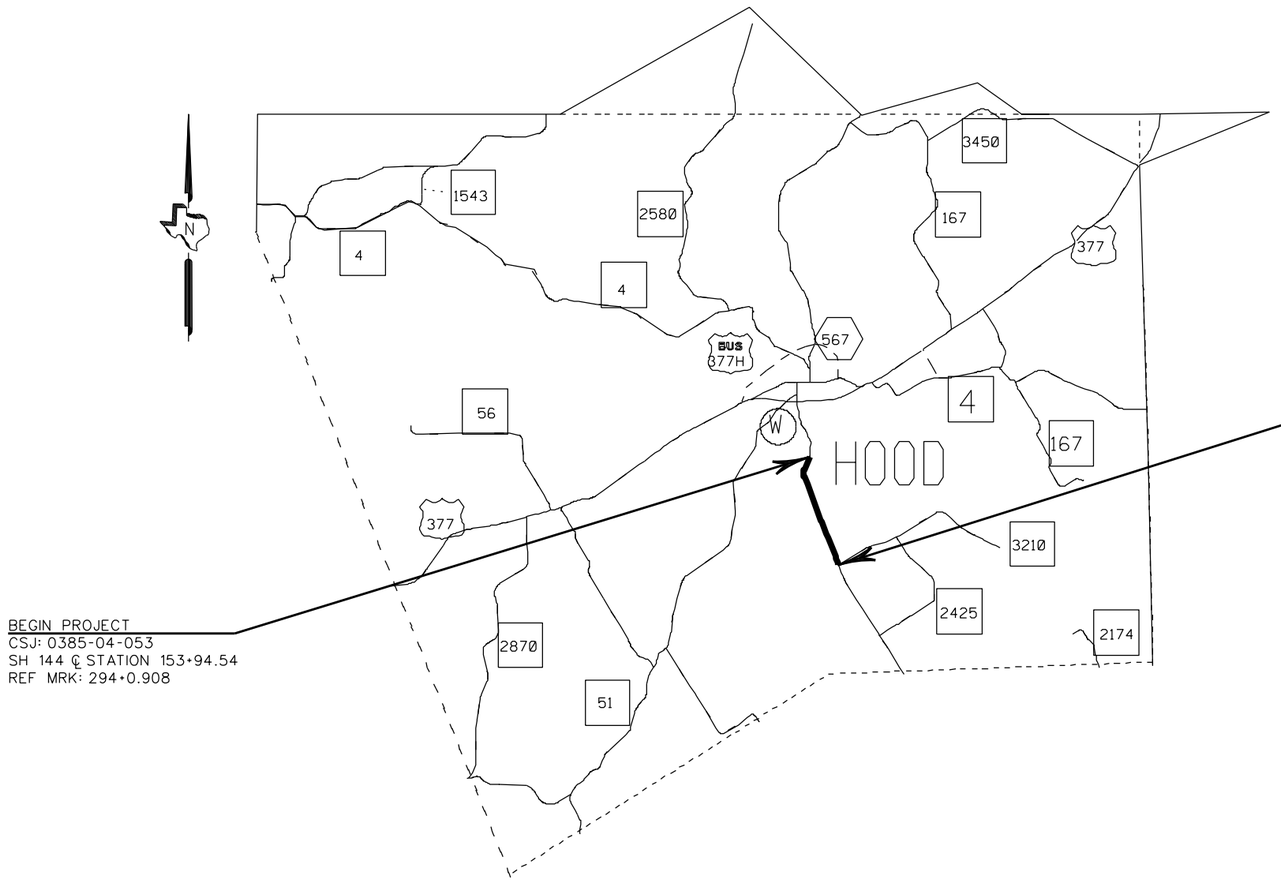
CONTRACTOR:

DATE WORK BEGAN:

DATE WORK COMPLETED:

DATE WORK ACCEPTED:

FINAL CONTRACT COST:



Texas Department of Transportation

SUBMITTED FOR LETTING: 4/25/2024

DocuSigned by: Sarah S. Homer, PE
862BEBCA16FA483... AREA ENGINEER

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

EXCEPTIONS:NONE
EQUATIONS: NONE
RAILROADS: NONE

RECOMMENDED FOR LETTING: 5/20/2024

DocuSigned by:
7879B0B92E5D403... DIRECTOR OF TP&D

APPROVED FOR LETTING: 5/20/2024

DocuSigned by: David M Salazar, P.E.
B741E64FAD82411... DISTRICT ENGINEER

5, 5A – 5C

GENERAL

1	TITLE SHEET
2	INDEX OF SHEETS
3-4	TYPICAL SECTION
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54-56	EC (9) - 16*

STATE OF TEXAS
ELIJAH ZELENOV
142306
LICENSED
PROFESSIONAL ENGINEER

*THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE HAVE BEEN ISSUED BY ME AND ARE APPLICABLE TO THIS PROJECT.

DocuSigned by:
Elijah Zelenov P. E. PE
Signature

5/8/2024
Date

* THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE HAVE BEEN ISSUED BY ME AND ARE APPLICABLE TO THIS PROJECT.

INDEX OF SHEETS

Texas Department of Transportation

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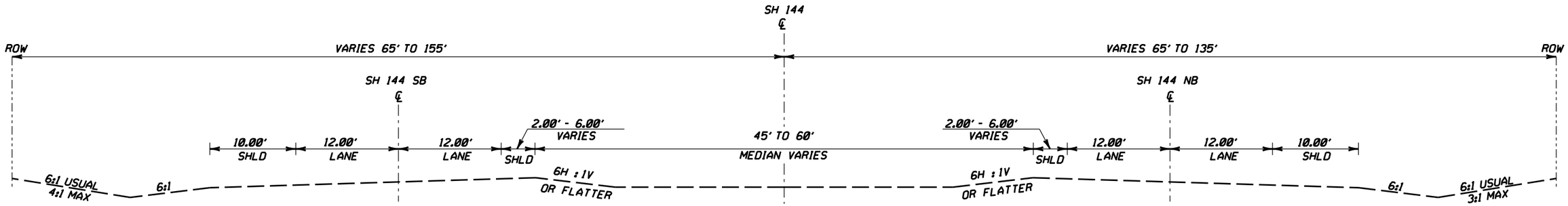
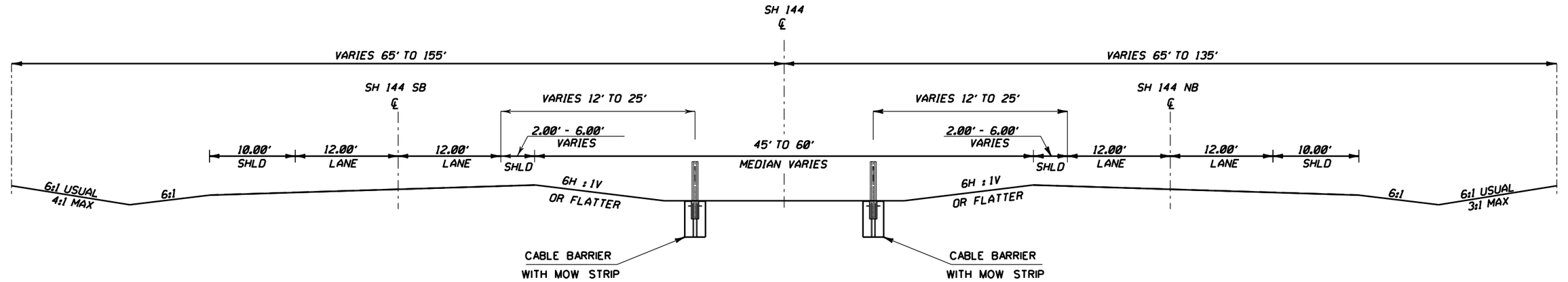
TEXAS	HOOD		
DISTRICT	CONTROL / SECTION / JOB		2
FTW	0385 / 04 / 053		



EXISTING TYPICAL SECTION



PROPOSED TYPICAL SECTION

NOTE: SEE PLAN LAYOUT SHEETS FOR PLACEMENT OF CABLE BARRIER

STATE OF TEXAS
ELIJAH ZELENOV
142306
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
Elijah Zelenov P. E.
4848DA2AA1AB440...
5/11/2024

TYPICAL SECTIONS

Texas Department of Transportation

SHEET 1 OF 2

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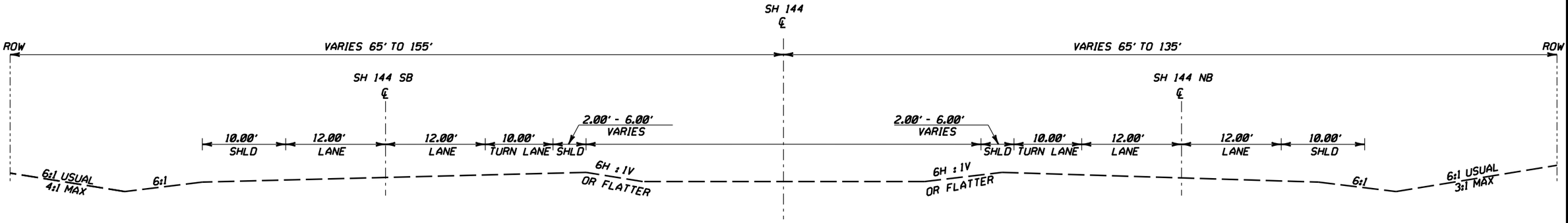
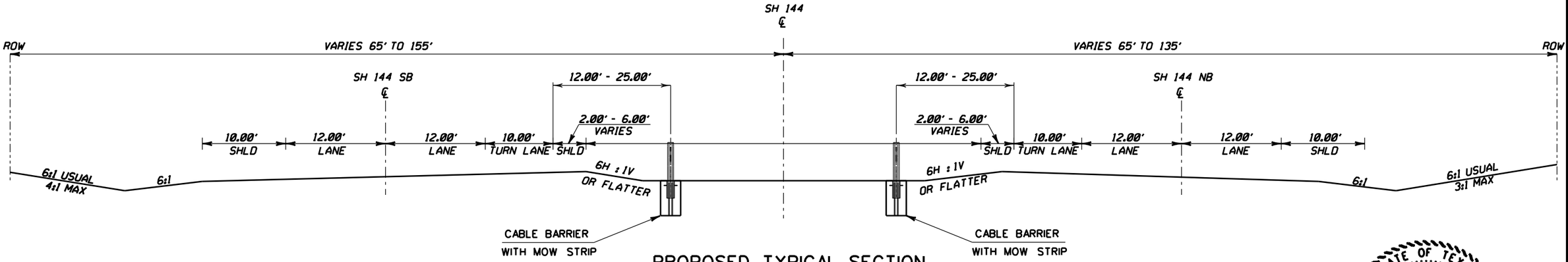
6	SEE TITLE SHEET		SH144
STATE	COUNTY		SHEET NO.
TEXAS	HOOD		3
DISTRICT	CONTROL	SECTION	JOB
FTW	0385	04	053



EXISTING TYPICAL SECTION

TURN LANE



PROPOSED TYPICAL SECTION

TURN LANE

NOTE: SEE PLAN LAYOUT SHEETS FOR PLACEMENT OF CABLE BARRIER

STATE OF TEXAS
ELIJAH ZELENOV
142306
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
Elijah Zelenov P. E. 5/11/2024
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TYPICAL SECTIONS

Texas Department of Transportation

SHEET 2 OF 2

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH144
STATE	COUNTY		SHEET NO.
TEXAS	HOOD		4
DISTRICT	CONTROL	SECTION	JOB
FTW	0385	04	053

Control: 0385-04-053

County: HOOD

Highway: SH 144

GENERAL NOTES

Specification Data:

Basis of Estimate

Item	Description	Rate	Unit
168	Vegetative Watering	169.400 gal/acre	1,000 gal.

** For contractor's information only

Special Notes:

Electronic files containing answered pre-letting questions and other project related design information will be placed in the following FTP site periodically.

Check this site for new information. Notices of new postings will not be sent out by the Engineer.

The data located in these files is for non-construction purposes only and can be found at TxDOT's public FTP site at https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting Responses/.

Access is read-only.

All files in the FTP site are subject to the License Agreement shown on the FTP site.

To obtain a copy of the project plans free of charge, submit a request from the following site: http://www.txdot.gov/business/letting-bids/plans-online.html

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

Area Engineer: Sarah Horner, P.E. Sarah.Horner@txdot.gov

Assistant Area Engineer: Noel Spaar, P.E. Noel.Spaar@txdot.gov

Design manager: Elijah Zelenov, P.E. Elijah.S.Zelenov@txdot.gov

Contractor questions will be accepted through email, phone, and in person by the above individuals.

Control: 0385-04-053

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For Q&A's on Proposals navigate to https://tableau.txdot.gov/views/ProjectInformationDashboard/NoticetoContractors. Use the dashboard to navigate to the project you are interested in by scrolling or filtering the dashboard using the controls on the left. Hover over the blue hyperlink for the project you want to view the Q&A for and click on the link in the window that pops up.

Single lane closures, except as otherwise shown in the plans, will be restricted to off-peak hours as defined in the following table:

Peak Hours		Off-Peak Hours	
6 to 9 AM Monday through Friday	3 to 7 PM Monday through Friday	9 AM to 3 PM and 7 PM to 6 AM Monday through Friday	All day Saturday and Sunday

Work that requires closure of multiple travel lanes in the same direction, except as otherwise shown in the plans, are restricted to night hours between 9 PM and 6 AM.

Existing storm sewers and utilities are shown from the best available information. Verify the location of all underground facilities prior to starting work.

Both unknown Overhead and underground Utilities may exist within the limits and vicinity of the project. The exact location of underground Utilities is not known. Contractor needs to contact the Texas Excavation Safety Systems (TESS) or DIG TESS at 1-800-344-8377 prior to commencing any work. Contractor also shall call TxDOT Utility locates at 817-370-3661 for possible fiber and/or electrical lines before any work takes place. The local Cities within the limits and vicinity of the project will also need to be contacted for their utility locates including their water, electrical/Traffic Department before any construction work.

For dimensions of right-of-way not shown on the plans, see right-of-way map on file at the TxDOT District Office.

Do not discolor or damage existing curb and curb and gutter during construction operations. In the event of discoloration or damage, clean or repair as directed.

Remove any obstructions to existing drainage due to the contractor's operations, as required, at the Contractor's expense.

Item 4 – Scope of Work

Reimbursement for project overhead will not be considered until project completion has extended beyond the original Contract Time.

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Item 6. Control of Materials

To comply with the latest provisions of Build America. Buy America Act (BABA Act) of the Bipartisan Infrastructure Law. the contractor must submit an original of the TxDOT Construction Material Buy America Certification Form for all items classified as construction materials. This form is not required for materials classified as a manufactured product.

Refer to the Buy America Material Classification Sheet 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

Item 7. Legal Relations and Responsibilities

The following Holiday/Event Lane closure restriction requirements apply to this project:
No work that restricts or interferes with traffic shall be allowed from 3:00 pm on the day preceding the Holiday or Event to 9:00 am on the day after the Holiday or Event.

Holiday Lane Closure Restrictions	
New Year's Eve and New Year's Day (December 31 through January 1)	3 PM December 30 through 9 AM January 2
Easter Holiday Weekend (Friday through Sunday)	3PM Thursday through 9 AM Monday
Memorial Day Weekend (Friday through Monday)	3 PM Thursday through 9 AM Tuesday
Independence Day (July 3 through July 5)	3 PM July 2 through 9 AM July 6
Labor Day Weekend (Friday through Monday)	3 PM Thursday through 9 AM Tuesday
Thanksgiving Holiday (Wednesday through Sunday)	3 PM Tuesday through 9 AM Monday
Christmas Holiday (December 23 through December 26)	3 PM December 22 through 9 AM December 27

Plan work schedules around the appropriate dates above to ensure productive work is performed without lane closures.

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Event Lane Closure Restrictions 3 PM the day before Event to 9 AM the day after the Event			
NASCAR Races at Texas Motor Speedway (generally 3 events):	NASCAR Nationwide and Sprint Cup Series (Held in late March/early April)	NASCAR Nationwide and Sprint Cup Series (Held in Late October/early November)	Indy Series Racing and NASCAR Truck Series (Held in June)
Within one mile radius of major retail traffic generators i.e. malls (Thanksgiving Day through January 2)			
Fort Worth Stock Show and Rodeo			

Modifications to Lane Closure / Work Restrictions:

Submit a request in writing for approval by the Engineer a minimum of 10 days in advance of implementing a change to lane closure restrictions.

When deemed necessary. the Engineer will lengthen. shorten. or otherwise modify lane closure restrictions as traffic conditions warrant.

When deemed necessary. the Engineer will modify the list of major events when new events develop. existing events are rescheduled. or when warranted.

The total area disturbed for this project is 0.97 acres. The disturbed area in this project. all project locations in the Contract. and the Contractor project specific locations (PSLs). within 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 right of way. When the total area disturbed in the Contract and PSLs within 1 mile of the project limits exceeds 5 acres. provide a copy of the Contractor NOI for PSLs on the right of way to the Engineer and to the local government that operates a separate storm sewer system.

Item 8. Prosecution and Progress

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

Prepare the progress schedule as a bar chart. include all planned work activities and sequences

and show Contract completion within the number of 85 working days specified. Submit an updated hard copy when changes to the schedule occur or when requested.

Item 100. Preparing Right of Way

Measurement for this item will be by the station. The limits of this item will be in the installed mow strip area only.

Item 164. Seeding for Erosion Control

Apply seeding required between December 1 and January 31 using seed types and mixtures as shown in Item 164.2.1, Table 3. If, in the opinion of the Engineer, this does not provide an effective vegetative cover, apply "straw or hay mulch" as specified in Article 164.3.2, "Straw or Hay Mulch Seeding" as soon as possible. After February 1, apply warm season seeding in order to establish a permanent protective vegetative cover.

Item 168. Vegetative Watering

Furnish and install an approved rain gauge at the project site, as directed. Furnishing and installation of the rain gauge will not be paid for directly but will be subsidiary to Item 168.

Apply vegetative watering for an establishment period of thirteen weeks following application of seed or installation of sod, at a rate of 1/2 inch of water depth per week (approximately 13,030 gallons per acre). During the first four weeks after seeding, apply water twice per week, on nonconsecutive days, each at half the weekly application rate. For the remainder of the establishment period, apply vegetative watering once per week during the months of January through June or September through December, at the weekly application rate; apply watering twice per week, on non-consecutive days during the months of July and August, each at one-half the weekly application rate.

Average weekly rainfall rates for the District are:

January—0.39" April—0.86" July—0.48" October—0.68"
February—0.46" May—1.00" August—0.47" November—0.46"
March—0.48" June—0.63" September—0.74" December—0.37"

Item 432. Riprap

No RAP shall be used as embankment under the mow strip.

Mow strip shall be reinforced with wire mesh or conventional steel.

No fiber reinforced concrete will be allowed in mow strip construction.

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The quantities for riprap at the location indicated may be varied to the extent necessary to ensure proper functioning for the purpose intended.

All concrete ripraps will be 5" (.42') in thickness, unless otherwise shown on the plans, and must be reinforced.

Item 502. Barricades, Signs, and Traffic Handling

Provide signing and traffic control in compliance with the Texas Manual on Uniform Traffic Control Devices (TMUTCD), latest edition, and the appropriate traffic control method as outlined in the TMUTCD, and elsewhere in the plans.

The contractor force account "safety contingency" that has been established for this project is intended to be utilized for work zone enhancements to improve the effectiveness of the traffic control plan that could typically not be foreseen in the project planning and design stage. These enhancements will be mutually agreed upon by the Engineer and the Contractor's responsible person based on weekly or more frequent traffic management reviews on the project. The Engineer may choose to use existing bid items if it does not slow the implementation of enhancement.

Existing signs are to remain as long as they do not interfere with construction and they do not conflict with the traffic control plan.

Any sign not detailed in the plans but called for in the layout will be as shown in the current "Standard Highway Sign Designs for Texas".

When traffic is obstructed, arrange warning devices in accordance with the latest edition of the "Texas Manual on Uniform Traffic Control Devices".

Cover or remove any work zone signs when work or condition referenced is not occurring.

Do not place barricades, signs, or any other traffic control devices where they interfere with sight distance at driveways or side streets. Provide access to all driveways during all phases of construction unless otherwise noted in the plans or as directed.

Item 506. Temporary Erosion, Sedimentation, and Environmental Controls

Remove accumulated sediment or replace SW3P controls when the capacity has been reduced by 50% or when the depth of sediment at the control structure exceeds one foot.

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Item 543. Cable Barrier System
Driven posts will not be permitted.

The following products are approved for use on this project:
Valtir CASS (TL-4) System
Nu-Cable (TL-4) System

Pre-stretch all cable or wire rope.

Site conditions may require grading for proper installation of the cable barrier. This grading will be considered subsidiary to this item.

The contractor shall avoid underground utilities and TXDOT drainage facilities by laying out cable barrier before installation. The engineer shall approve layout and lengths of cable barrier runs.

Item 658. Delineator and Object Marker Assemblies

Contractor to provide delineators that are "SHUR-TITE" or approved equal as by the engineer.

Removal of existing delineators and object marker assemblies shall be considered subsidiary to various bid items

Item 6001. Portable Changeable Message Signs
Provide all portable changeable message signs and arrow panels with a photoelectric device to allow for automatic dimming of operations to approximately 50% of their normal brightness when ambient light drops to approximately five footcandles, and then increase back again for daytime operations.

(Two) electronic portable changeable message sign unit(s) will be required. Individual or collective use of signs will be required by the Engineer when deemed necessary to supplement the traffic control plan.

Each sign must have programmed in its permanent memory the following 15 messages:
1. Exit Closed Ahead
2. Use Other Routes
3. Right Lane
4. Left Lane
5. Closed Ahead
6. Two Lane
7. Detour Ahead
8. Thru Traffic
9. Prepare To Stop

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10. Merging Traffic
11. Expect 15 Minute Delay
12. Max Speed ** MPH
13. Merge Right
14. Merge Left
15. No Exit Next ** Miles

Item 6185. Truck Mounted Attenuator (TMA) and Trailer Attenuator (TA)

In addition to the shadow vehicles with truck mounted attenuator (TMA) that are specified as being required on the traffic control plan for this project, provide 0 additional shadow vehicle(s) with TMA for TCP (5-1)-18 as detailed on General Note of this standard sheet.

Therefore, 1 total shadow vehicles with TMA will be required for this type of work. Determine if one or more of these operations will be ongoing at the same time to determine the total number of TMAs needed for the project.

The seeding and vegetative water operations or any other operations identified by the Engineer, not to include the pavement marking operation, shall use a TMA for the protection of the operations and the traveling public. The used of a TMA on these operations will not be paid for directly but will be considered subsidiary to the pertinent bid items.

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

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

TCP 5 Series	Scenario	Required TMA
(5-1)-18	A	1
	B	2

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

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

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0385-04-053 **DISTRICT** Fort Worth **COUNTY** Hood
HIGHWAY SH 144

				CONTROL SECTION JOB	0385-04-053		TOTAL EST.	TOTAL FINAL
				PROJECT ID	A00201983			
				COUNTY	Hood			
				HIGHWAY	SH 144			
ALT	BID CODE	DESCRIPTION	UNIT		EST.	FINAL		
	100-6002	PREPARING ROW	STA		162.000		162.000	
	164-6021	CELL FBR MLCH SEED(PERM)(RURAL)(SANDY)	SY		9,307.330		9,307.330	
	168-6001	VEGETATIVE WATERING	MG		328.090		328.090	
	432-6046	RIPRAP (MOW STRIP)(5 IN)	CY		646.340		646.340	
	500-6001	MOBILIZATION	LS		1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO		4.000		4.000	
	506-6041	BIODEG EROSN CONT LOGS (INSTL) (12")	LF		5,215.000		5,215.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF		5,215.000		5,215.000	
	543-6002	CABLE BARRIER SYSTEM (TL-4)	LF		13,961.000		13,961.000	
	543-6020	CABLE BARRIER TERMINAL SECTION (TL-4)	EA		24.000		24.000	
	658-6095	INSTL DEL ASSM (D-DY)SZ 1(YFLX)GND	EA		24.000		24.000	
	658-6110	INSTL DEL ASSM (D-SY)SZ 1(BRF)(GF2)(BI)	EA		140.000		140.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA		2.000		2.000	
	6185-6002	TMA (STATIONARY)	DAY		56.000		56.000	
	6185-6005	TMA (MOBILE OPERATION)	DAY		14.000		14.000	
	18	SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS		1.000		1.000	
		EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS		1.000		1.000	
		LAW ENFORCEMENT: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS		1.000		1.000	

	CSJ 0385-04-053 SH 144 ROADWAY LAYOUT QUANTITIES	100 6002	164 6021	168 6001	432 6046	506 6041	506 6043	543 6002	543 6020	658 6095	658 6110	6001 6002	6185 6002	6185 6005
		PREPARING ROW	CELL FBR MLCH SEED(PERM)(RURAL)(SANDY)	VEGETATIVE WATERING	RIPRAP (MOW STRIP)(5 IN)	BIODEG EROSN CONT LOGS (INSTL) (12")	BIODEG EROSN CONT LOGS (REMOVE)	CABLE BARRIER SYSTEM (TL-4)	CABLE BARRIER TERMINAL SECTION (TL-4)	INSTL DEL ASSM (D-DY)SZ 1(YFLX)GND	INSTL DEL ASSM (D-SY)SZ 1(BRF)(GF2)(BI)	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (STATIONARY)	TMA (MOBILE OPERATION)
SHEET	STATION	STA	SY	MG	CY	LF	LF	LF	EA	EA	EA	EA	DAY	DAY
1	153+94.64 - 165+94.64	12.000	266.67	9.33	18.52	40	40	400	2	2	4		3	1
2	165+94.64 - 177+94.64	12.000	693.33	25.43	48.15	880	880	1040	4	4	11		4	1
3	177+94.64 - 189+94.64	12.000	757.33	26.51	52.59	585	585	1136	1	1	12		5	1
4	189+94.64 - 201+94.64	12.000	688.00	24.08	47.78	40	40	1032	2	2	10		4	1
5	201+94.64 - 213+94.64	12.000	746.67	26.13	51.85	120	120	1120	1	1	11		5	1
6	213+94.64 - 225+94.64	12.000	742.00	25.97	51.53	665	665	1113	1	1	11		4	1
7	225+94.64 - 237+94.64	12.000	706.67	24.73	49.07	905	905	1060	1	1	11		4	1
8	237+94.64 - 249+94.64	12.000	780.00	27.30	54.17	80	80	1170	1	1	12		5	1
9	249+94.64 - 261+94.64	12.000	684.67	23.96	47.55	0	0	1027	2	2	10	2	4	1
10	261+94.64 - 273+94.64	12.000	690.00	24.15	47.92	120	120	1035	2	2	10		3	1
11	273+94.64 - 285+94.64	12.000	798.67	27.95	55.46	0	0	1198	0	0	12		5	1
12	285+94.64 - 297+94.64	12.000	656.67	24.15	45.60	570	570	985	4	4	10		3	1
13	297+94.64 - 309+94.64	12.000	690.00	24.15	47.92	680	680	1035	2	2	10		3	1
14	309+94.64 - 321+94.64	6.000	406.67	14.23	28.24	530	530	610	1	1	6		4	1
15	321+94.64 - 333+94.64	0.000	0.00	0.00	0.00	0	0	0	0	0	0		0	0
16	333+94.64 - 334+86.19	0.000	0.00	0.00	0.00	0	0	0	0	0	0		0	0
	PROJECT TOTALS	**162.00**	**9307.33**	**328.09**	**646.34**	**5215**	**5215**	**13961**	**24**	**24**	**140**	**2**	**56**	**14**

PROJECT QUANTITY

Texas Department of Transportation

SHEET 1 OF 1

FHWA DIVISION	PROJECT NO.			HIGHWAY NO.
6	SEE TITLE SHEET			SH144
STATE	COUNTY			SHEET NO.
TEXAS	HOOD			7
DISTRICT	CONTROL	SECTION	JOB	
FTW	0385	04	053	

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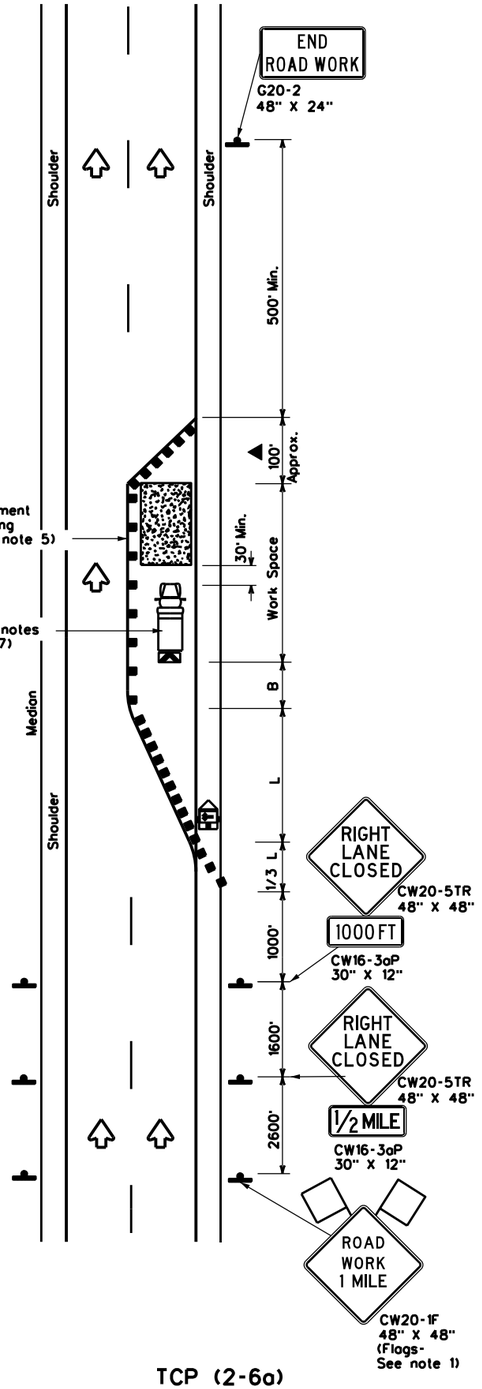
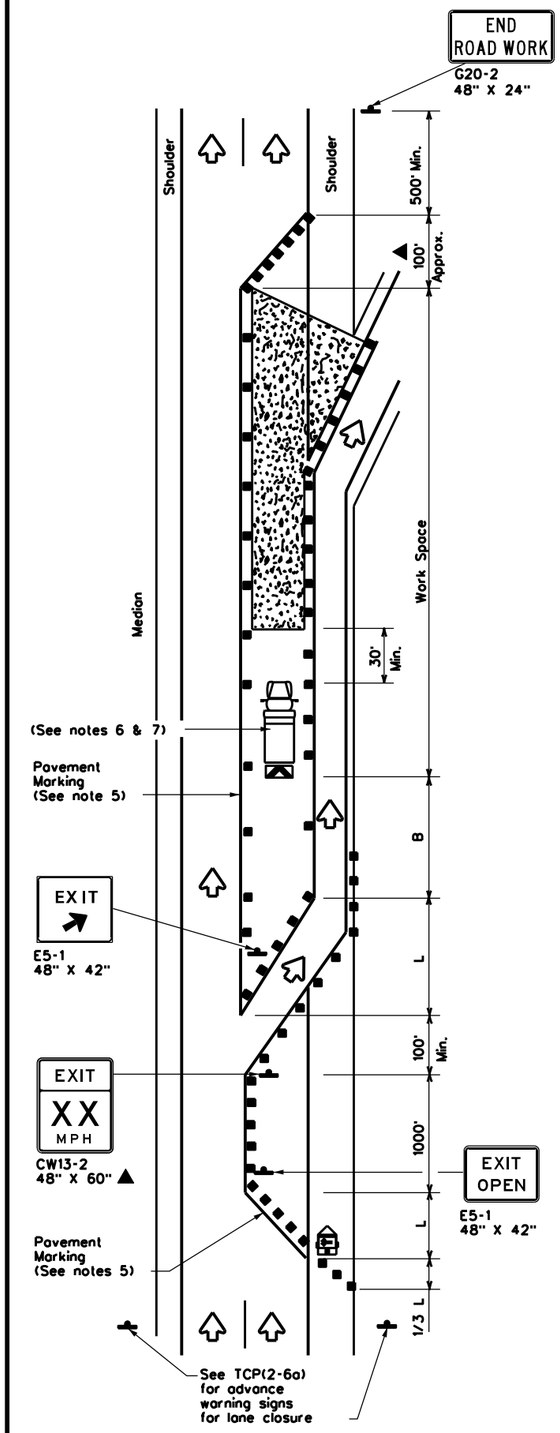


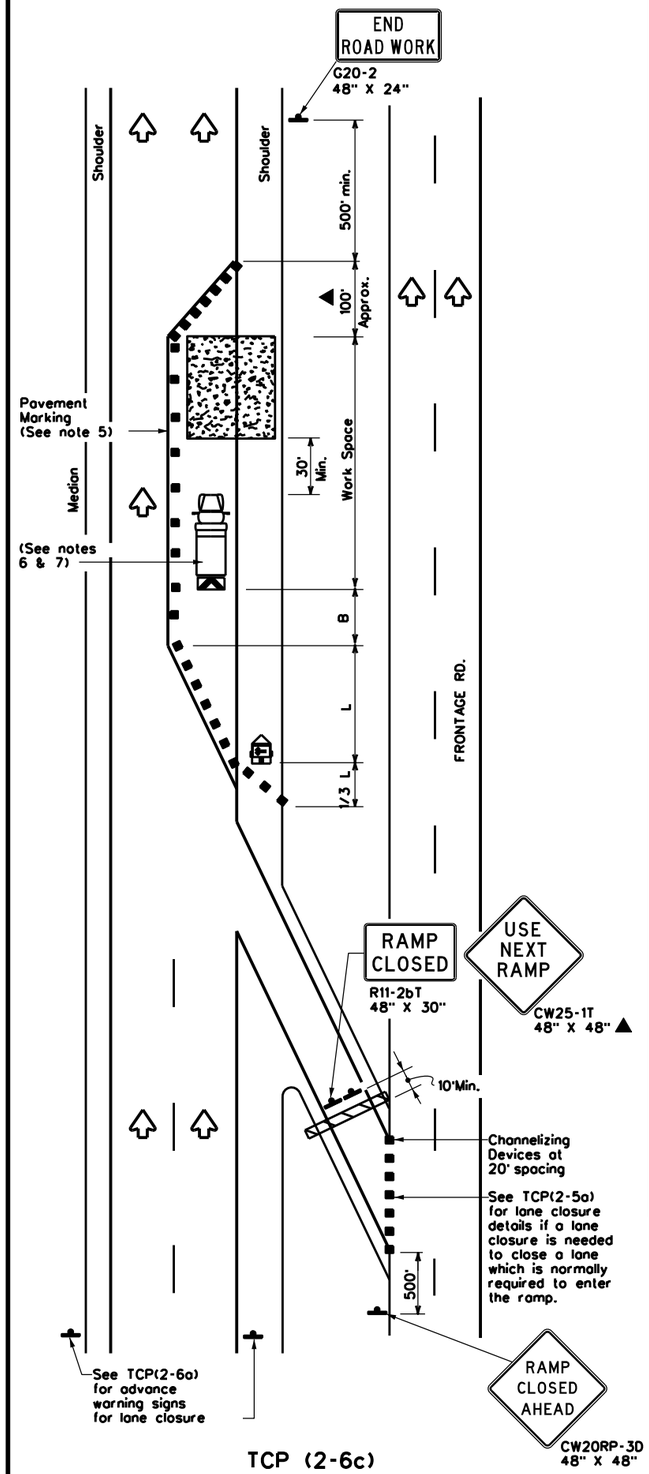
TCP (2-6a)

ONE LANE CLOSURE



TCP (2-6b)

LANE CLOSURE NEAR EXIT RAMPS



TCP (2-6c)

LANE CLOSURE NEAR ENTRANCE RAMPS

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON DIVIDED HIGHWAYS

TCP(2-6)-18

FILE: tcp2-6-18.dgn	DN:	CK:	DW:	CK:
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REVISIONS	0385	04	053	SH144
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12				
1-97 2-18	FTW	HOOD		8

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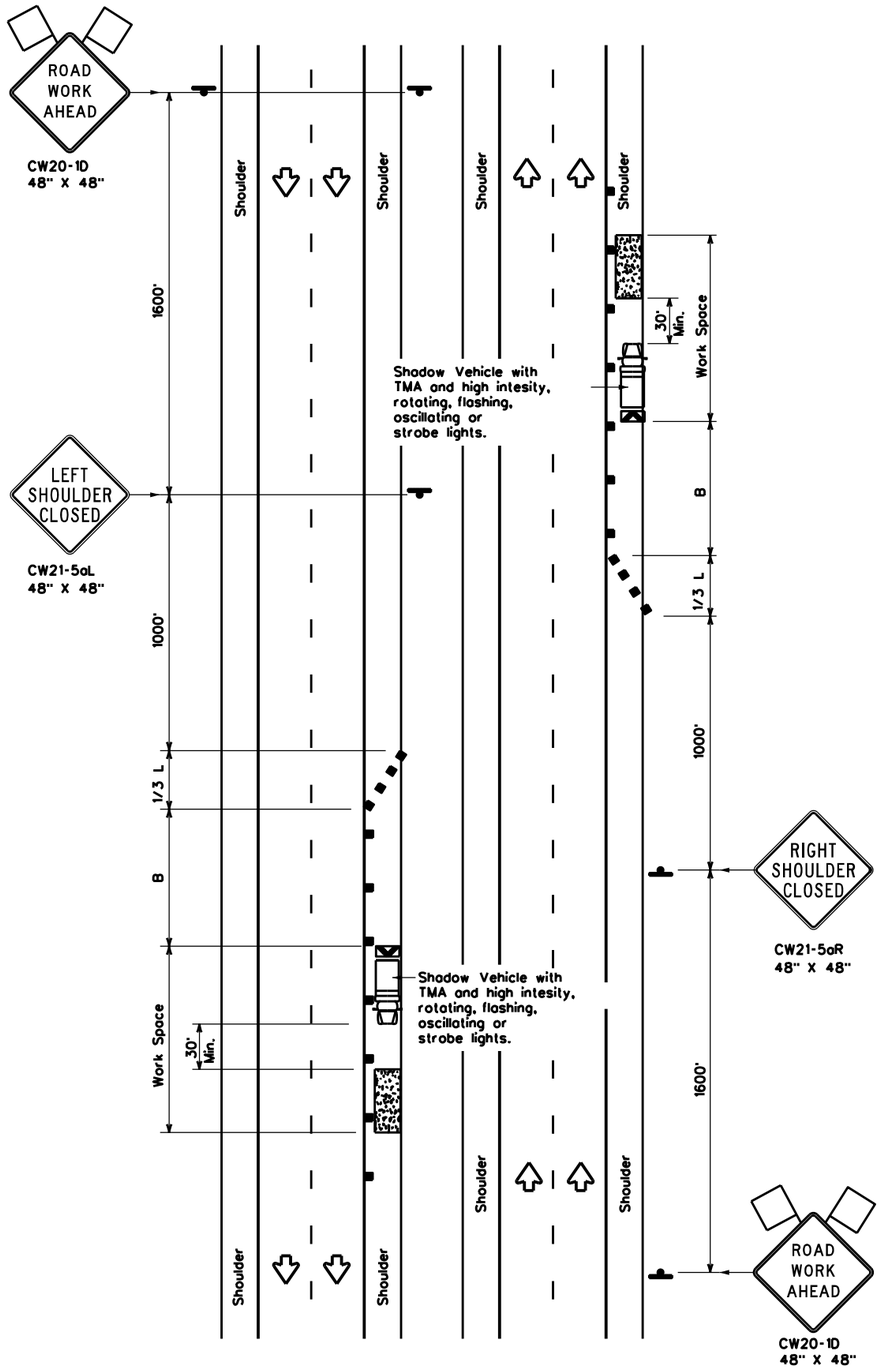
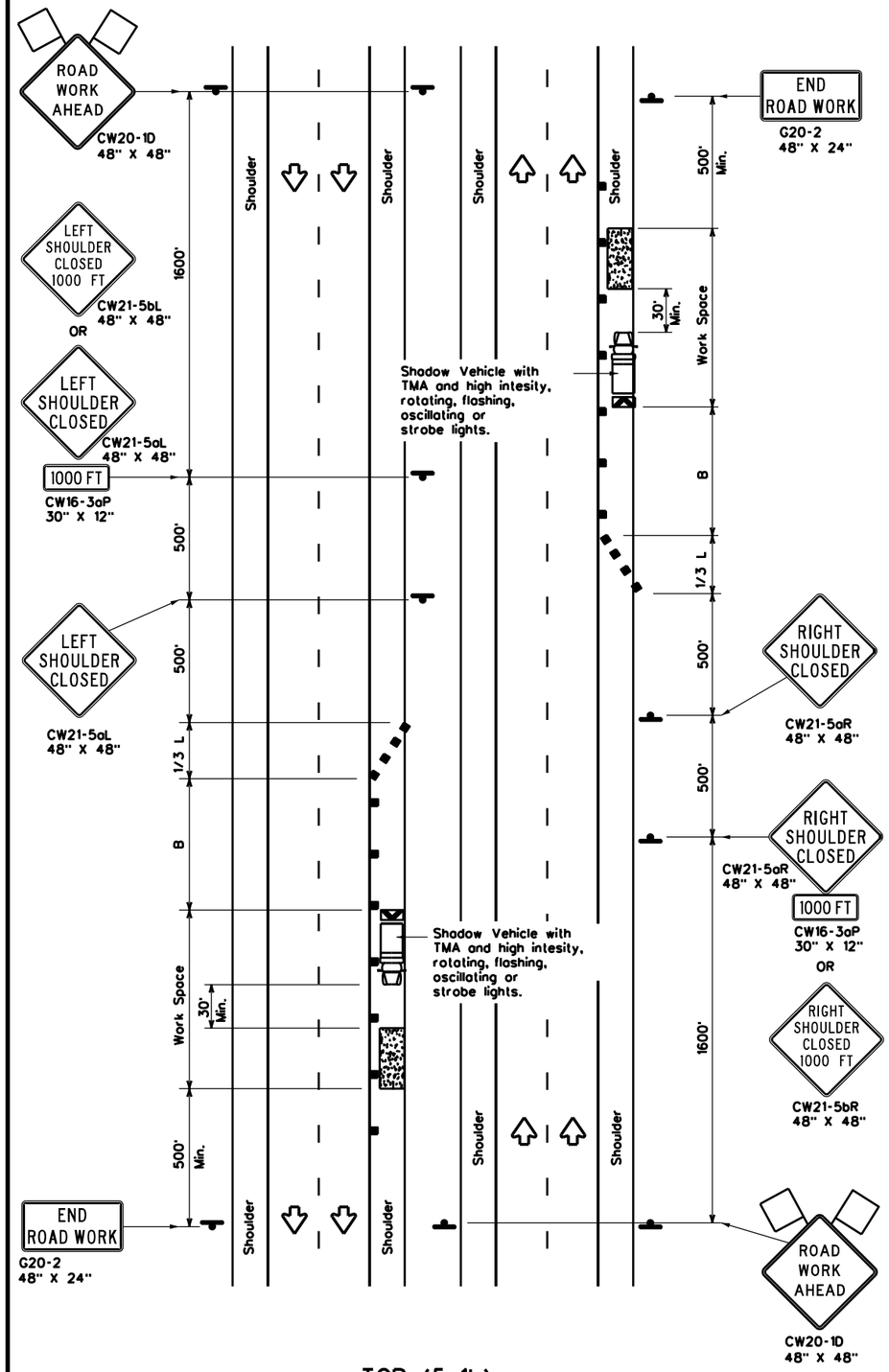


TCP (5-1a)

WORK AREA ON SHOULDER



TCP (5-1b)

WORK AREA ON SHOULDER

LEGEND

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

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

* Conventional Roads Only

** Taper lengths have been rounded off.

L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

TYPICAL USAGE

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN SHOULDER WORK FOR FREEWAYS / EXPRESSWAYS

TCP(5-1)-18

FILE: tcp5-1-18.dgn	DN:	CK:	DW:	CK:
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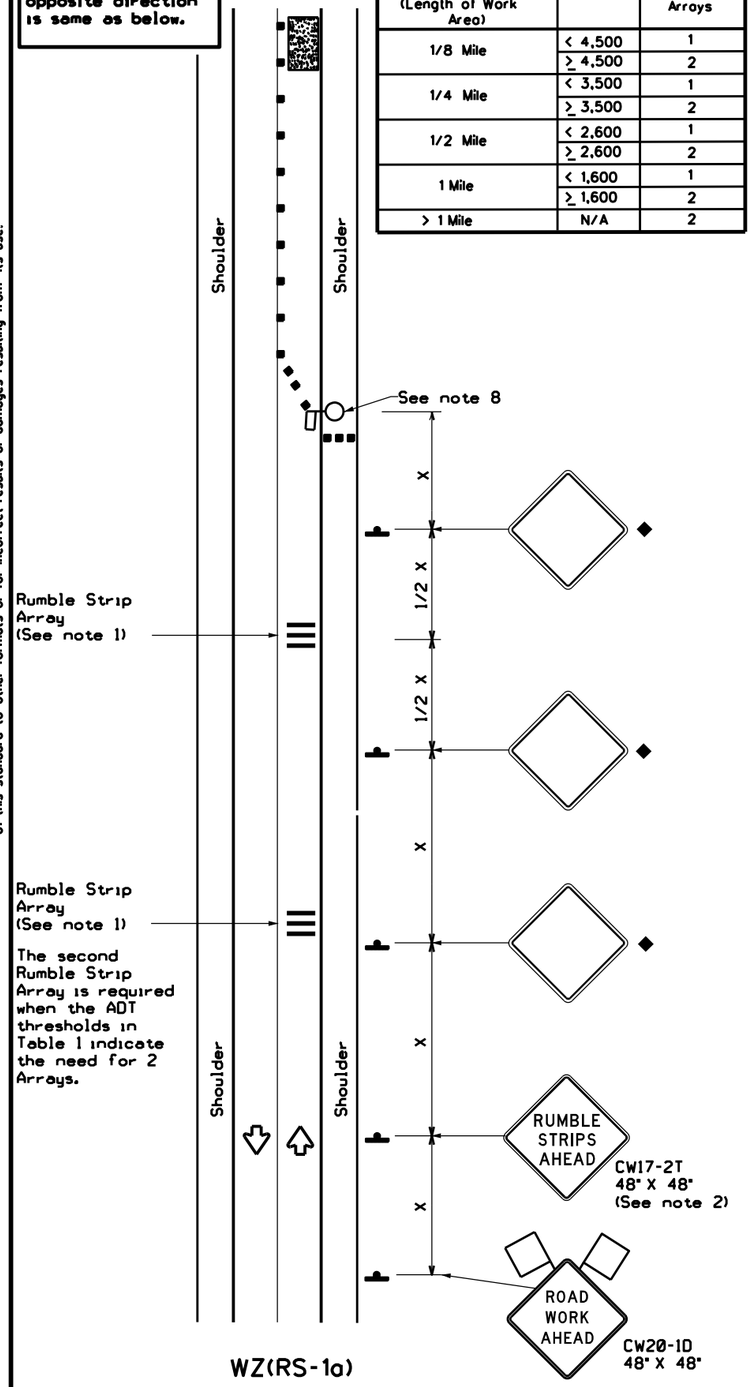
REVISIONS	0385	04	053	SH144
2-18	DIST	COUNTY		SHEET NO.
	FTW	HOOD		9

DATE:
FILE:

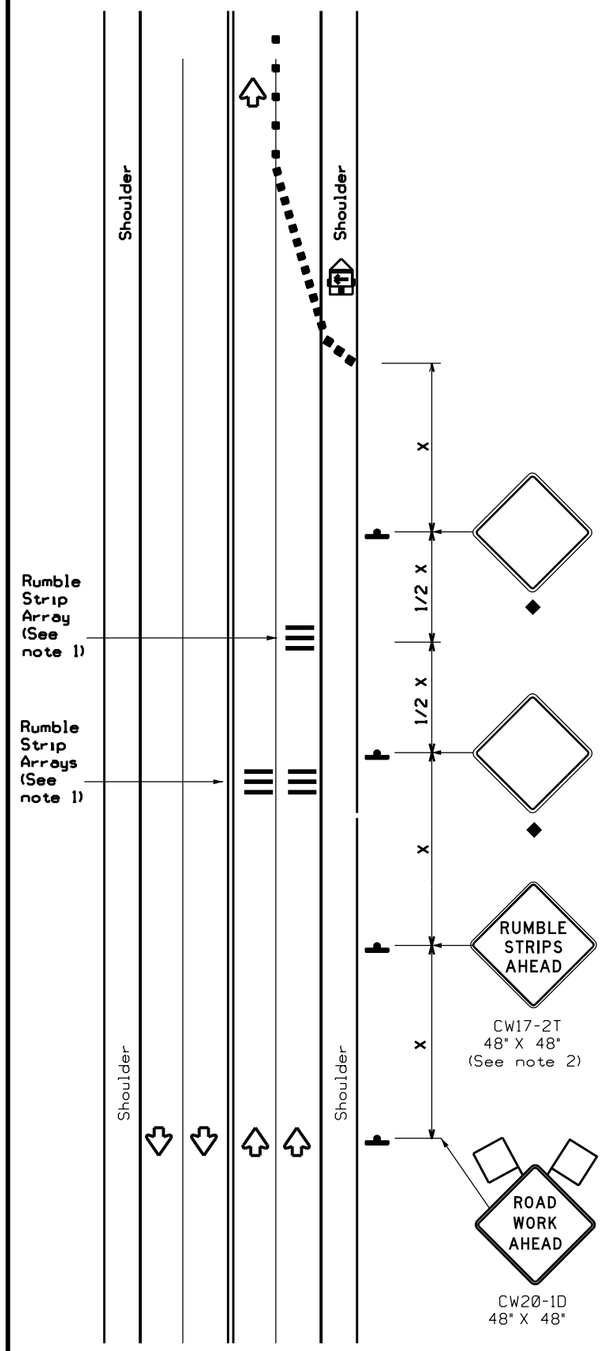
Warning sign and rumble strip sequence in opposite direction is same as below.

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



WZ(RS-1a)

RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION



WZ(RS-1b)

RUMBLE STRIPS FOR LANE CLOSURE ON CONVENTIONAL ROADWAY

GENERAL NOTES

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

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

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

* Conventional Roads Only

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

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

TEMPORARY RUMBLE STRIPS

WZ(RS)-22

FILE: wzrs22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS 2-14 1-22 4-16	0385	04	053	SH144
	DIST	COUNTY		SHEET NO.
	FTW	HOOD		10

DATE:
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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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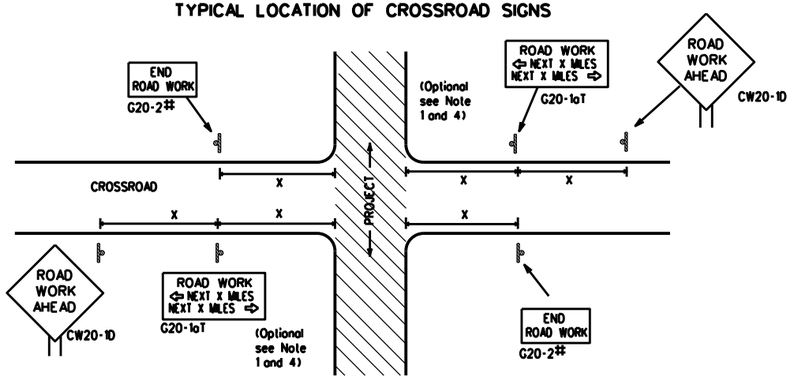
REVISIONS	0385	04	053	SH144
4-03 7-13	DIST	COUNTY		SHEET NO.
9-07 8-14	FTW	HOOD		11
5-10 5-21				

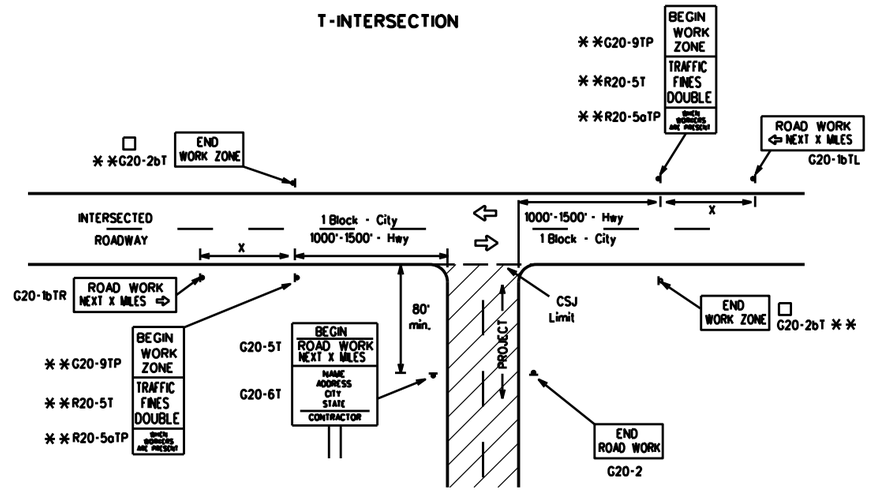
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

TYPICAL CONSTRUCTION WARNING SIGN SIZE AND SPACING

1.5.6

SIZE

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

SPACING

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

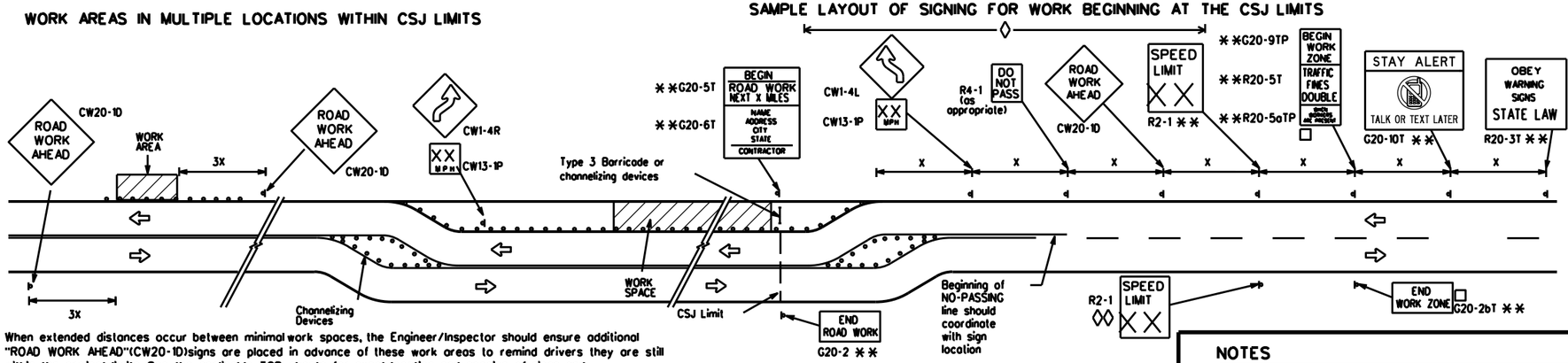
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

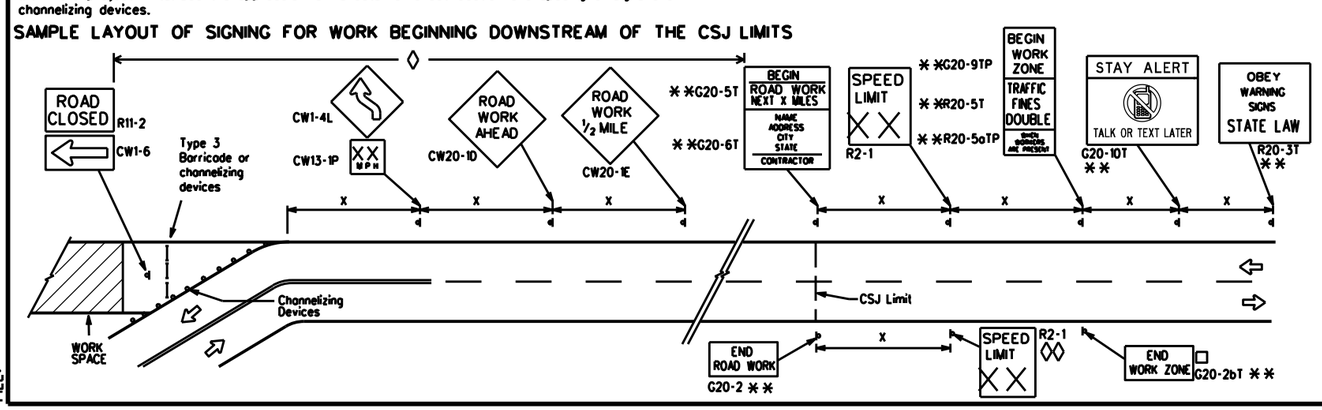
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING 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	CK: TxDOT
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REVISIONS	0385	04	053	SH144
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	FTW	HOOD		12

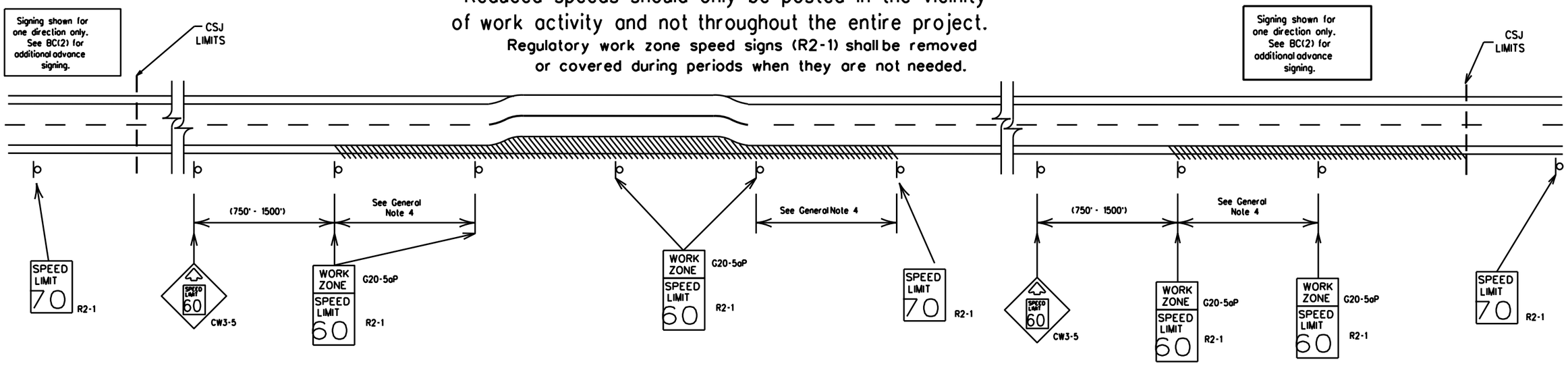
DATE:
FILE:

TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

Work zone speed limits shall be regulatory, established in accordance with the "Procedures for Establishing Speed Zones," and approved by the Texas Transportation Commission, or by City Ordinance when within incorporated City Limits.

Reduced speeds should only be posted in the vicinity of work activity and not throughout the entire project.

Regulatory work zone speed signs (R2-1) shall be removed or covered during periods when they are not needed.



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

This type of work zone speed limit should be included on the design of the traffic control plans when restricted geometrics with a lower design speed are present in the work zone and modification of the geometrics to a higher design speed is not feasible.

Long/Intermediate Term Work Zone Speed Limit signs, when approved as described above, should be posted and visible to the motorist when work activity is present. Work activity may also be defined as a change in the roadway that requires a reduced speed for motorists to safely negotiate the work area, including:

a) rough road or damaged pavement surface
b) substantial alteration of roadway geometrics (diversions)
c) construction detours
d) grade
e) width
f) other conditions readily apparent to the driver

As long as any of these conditions exist, the work zone speed limit signs should remain in place.

SHORT TERM WORK ZONE SPEED LIMITS

This type of work zone speed limit may be included on the design of the traffic control plans when workers or equipment are not behind concrete barrier, when work activity is within 10 feet of the traveled way or actually in the traveled way.

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

GENERAL NOTES

1. Regulatory work zone speed limits should be used only for sections of construction projects where speed control is of major importance.
2. Regulatory work zone speed limit signs shall be placed on supports at a 7 foot minimum mounting height.
3. Speed zone signs are illustrated for one direction of travel and are normally posted for each direction of travel.
4. Frequency of work zone speed limit signs should be:
   40 mph and greater 0.2 to 2 miles
   35 mph and less 0.2 to 1 mile
5. Regulatory speed limit signs shall have black legend and border on a white reflective background (See "Reflective Sheeting" on BC(4)).
6. Fabrication, erection and maintenance of the "ADVANCE SPEED LIMIT" (CW3-5) sign, "WORK ZONE" (G20-5aP) plaque and the "SPEED LIMIT" (R2-1) signs shall not be paid for directly, but shall be considered subsidiary to Item 502.
7. Turning signs from view, laying signs over or down will not be allowed, unless as otherwise noted under "REMOVING OR COVERING" on BC(4).
8. Techniques that may help reduce traffic speeds include but are not limited to:
   A. Law enforcement.
   B. Flagger stationed next to sign.
   C. Portable changeable message sign (PCMS).
   D. Low-power (drone) radar transmitter.
   E. Speed monitor trailers or signs.
9. Speeds shown on details above are for illustration only. Work Zone Speed Limits should only be posted as approved for each project.
10. For more specific guidance concerning the type of work, work zone conditions and factors impacting allowable regulatory construction speed zone reduction see TxDOT form #1204 in the TxDOT e-form system.

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

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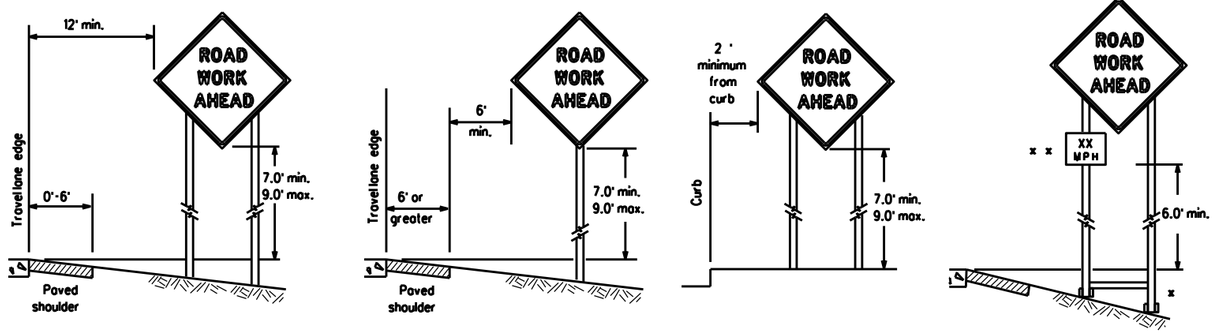
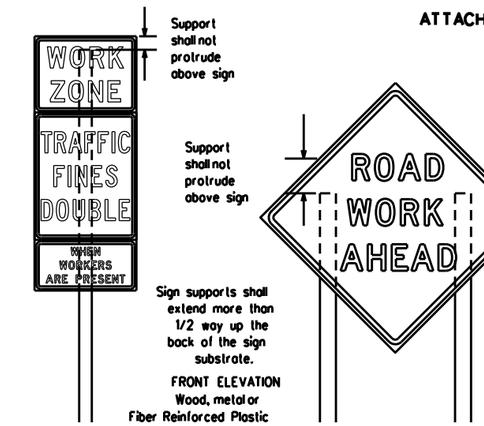
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



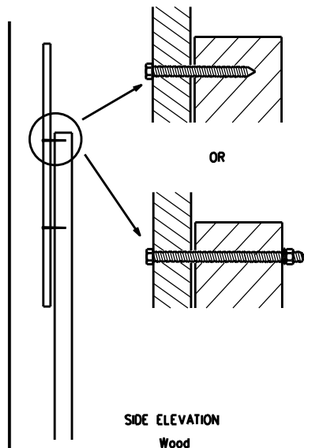
x When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

x x When plaques are placed on dual-leg supports, they should be attached to the upright nearest the travellane. 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 spice point. Splice must be located entirely behind the sign substrate, not near the base of the support. Splice insert lengths should be at least 5 times nominal post size, centered on the splice and of at least the same gauge material.

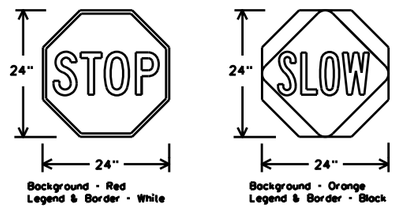


Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

STOP/SLOW PADDLES

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



SHEETING REQUIREMENTS (WHEN USED AT NIGHT)		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	ORANGE	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDER	WHITE	TYPE B OR C SHEETING
LEGEND & BORDER	BLACK	ACRYLIC NON-REFLECTIVE FILM

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

1. Contractor shall install and maintain signs in a straight and plumb condition and/or as directed by the Engineer.
2. Wooden sign posts shall be painted white.
3. Barricades shall NOT be used as sign supports.
4. All signs shall be installed in accordance with the plans or as directed by the Engineer. Signs shall be used to regulate, warn, and guide the traveling public safely through the work zone.
5. The Contractor may furnish either the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SHSD). The Engineer/Inspector may require the Contractor to furnish other work zone signs that are shown in the TMUTCD but may have been omitted from the plans. Any variation in the plans shall be documented by written agreement between the Engineer and the Contractor's Responsible Person. All changes must be documented in writing before being implemented. This can include documenting the changes in the Inspector's TxDOT diary and having both the Inspector and Contractor initial and date the agreed upon changes.
6. The Contractor shall furnish sign supports listed in the "Compliant Work Zone Traffic Control Device List" (CWZTCD) for small roadside signs. Supports for temporary large roadside signs shall meet the requirements detailed on the Temporary Large Roadside Signs (TLRS) standard sheets. The Contractor shall install the sign support in accordance with the manufacturer's recommendations. If there is a question regarding installation procedures, the Contractor shall furnish the Engineer a copy of the manufacturer's installation recommendations so the Engineer can verify the correct procedures are being followed.
7. The Contractor is responsible for installing signs on approved supports and replacing signs with damaged or cracked substrates and/or damaged or marred reflective sheeting as directed by the Engineer/Inspector.
8. Identification markings may be shown only on the back of the sign substrate. The maximum height of letters and/or company logos used for identification shall be 1 inch.
9. The Contractor shall replace damaged wood posts. New or damaged wood sign posts shall not be spliced.

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

1. All signs shall be retroreflective and constructed of sheeting meeting the color and retro-reflectivity requirements of DMS-8300 for rigid signs or DMS-8310 for roll-up signs. The web address for DMS specifications is shown on BC(1).
2. White sheeting, meeting the requirements of DMS-8300 Type A, shall be used for signs with a white background.
3. Orange sheeting, meeting the requirements of DMS-8300 Type B or Type C_{FL}, shall be used for rigid signs with orange backgrounds.

SIGN LETTERS

1. All sign letters and numbers shall be clear, and open rounded type uppercase alphabet letters as approved by the Federal Highway Administration (FHWA) and as published in the "Standard Highway Sign Design for Texas" manual. Signs, letters and numbers shall be of first class workmanship in accordance with Department Standards and Specifications.

REMOVING OR COVERING

1. When sign messages may be confusing or do not apply, the signs shall be removed or completely covered.
2. Long-term stationary or intermediate stationary signs installed on square metal tubing may be turned away from traffic 90 degrees when the sign message is not applicable. This technique may not be used for signs installed in the median of divided highways or near any intersections where the sign may be seen from approaching traffic.
3. Signs installed on wooden skids shall not be turned at 90 degree angles to the roadway. These signs should be removed or completely covered when not required.
4. When signs are covered, the material used shall be opaque, such as heavy mil black plastic, or other materials which will cover the entire sign face and maintain their opaque properties under automobile headlights at night, without damaging the sign sheeting.
5. Burlap shall NOT be used to cover signs.
6. Duct tape or other adhesive material shall NOT be affixed to a sign face.
7. Signs and anchor stubs shall be removed and holes backfilled upon completion of work.

SIGN SUPPORT WEIGHTS

1. Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand should be used.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects shall not be permitted for use as sign support weights.
4. Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs.
5. Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber (such as tire inner tubes) shall NOT be used.
6. Rubber ballasts designed for channelizing devices should not be used for ballast on portable sign supports. Sign supports designed and manufactured with rubber bases may be used when shown on the CWZTCD list.
7. Sandbags shall only be placed along or laid over the base supports of the traffic control device and shall not be suspended above ground level or hung with rope, wire, chains or other fasteners. Sandbags shall be placed along the length of the skids to weigh down the sign support.
8. Sandbags shall NOT be placed under the skid and shall not be used to level sign supports placed on slopes.

FLAGS ON SIGNS

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

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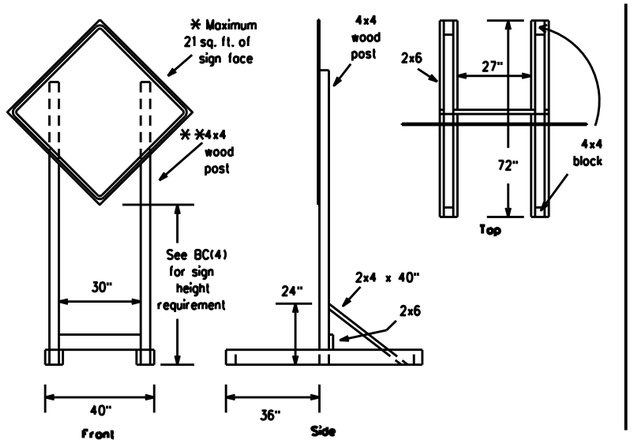
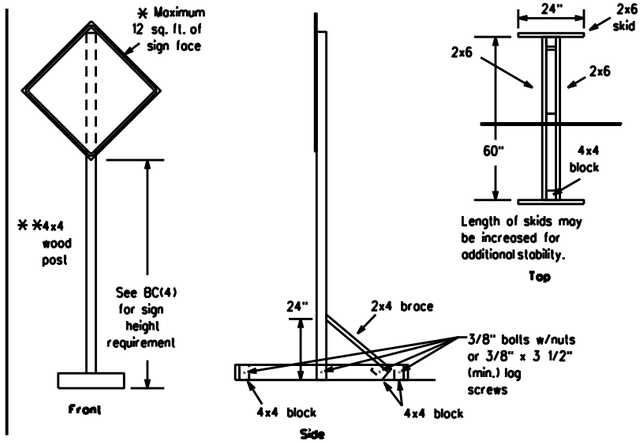
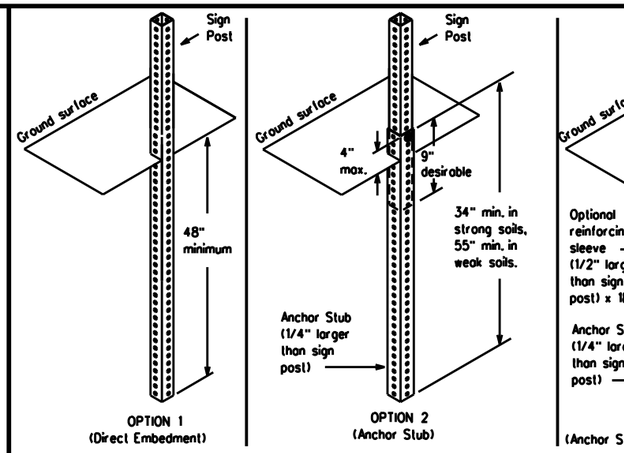


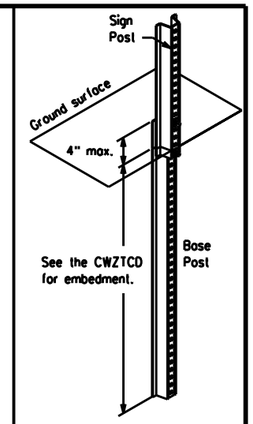


SKID MOUNTED WOOD SIGN SUPPORTS

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



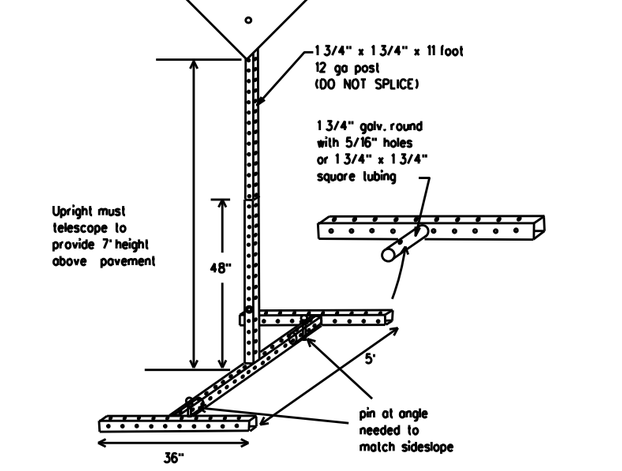
PERFORATED SQUARE METAL TUBING

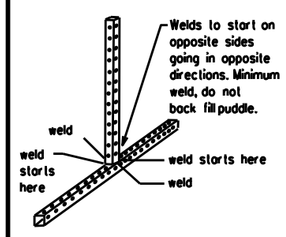


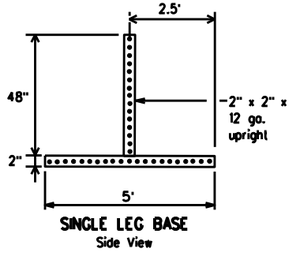
WING CHANNEL
Lap-splice/base bolted anchor

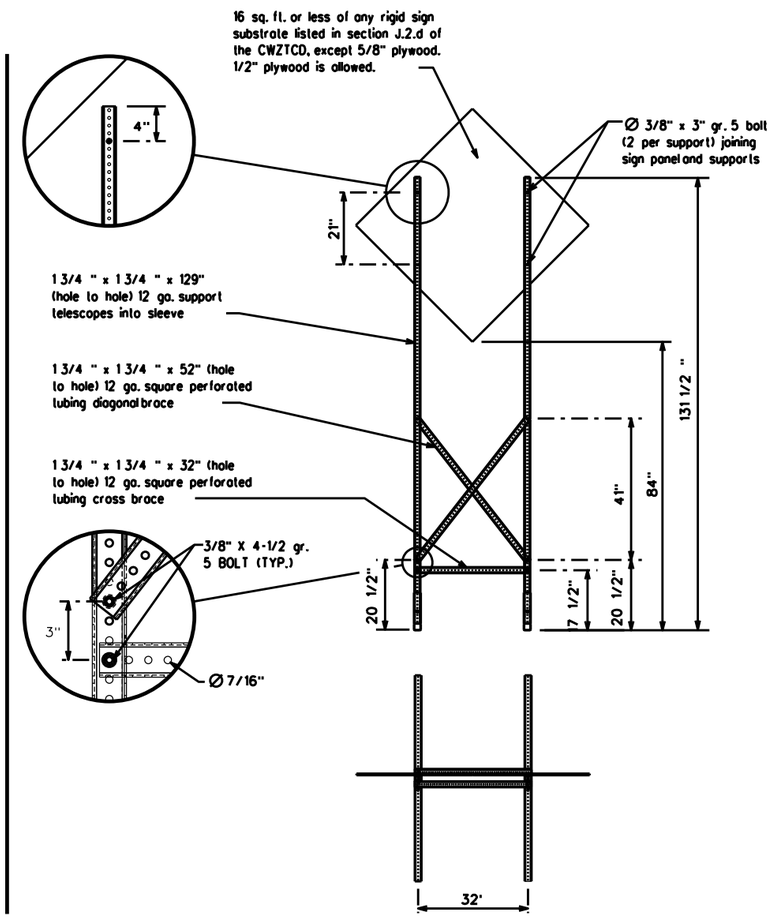
GROUND MOUNTED SIGN SUPPORTS

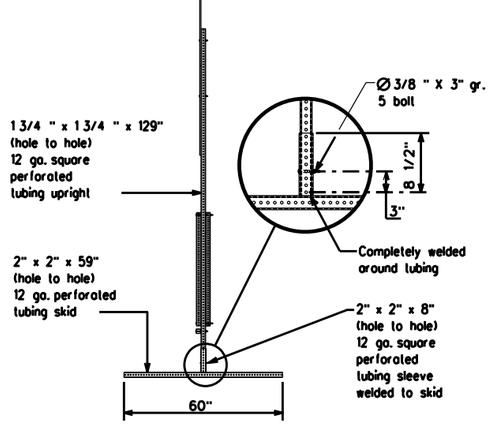
Refer to the CWZTCD and the manufacturer's installation procedure for each type sign support.
The maximum sign square footage shall adhere to the manufacturer's recommendation.
Two post installations can be used for larger signs.











SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

1. Nails may be used in the assembly of wooden sign supports, but 3/8" bolts with nuts or 3/8" x 3 1/2" lag screws must be used on every joint for final connection.
2. No more than 2 sign posts shall be placed within a 7 ft. circle, except for specific materials noted on the CWZTCD List.
3. When project is completed, all sign supports and foundations shall be removed from the project site. This will be considered subsidiary to Item 502.

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

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

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

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Texas Department of Transportation | *Traffic Safety Division Standard*

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

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WHEN NOT IN USE, REMOVE THE PCMS FROM THE RIGHT-OF-WAY OR PLACE THE PCMS BEHIND BARRIER OR GUARDRAIL WITH SIGN PANEL TURNED PARALLEL TO TRAFFIC

PORTABLE CHANGEABLE MESSAGE SIGNS

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

WORD OR PHRASE	ABBREVIATION
Access Road	ACCS RD
Alternate	ALT
Avenue	AVE
Best Route	BEST RTE
Boulevard	BLVD
Bridge	BRDG
Cannot	CANT
Center	CTR
Construction Ahead	CONST AHD
CROSSING	XING
Detour Route	DETOUR RTE
Do Not	DONT
East	E
Eastbound	(route) E
Emergency	EMER
Emergency Vehicle	EMER VEH
Entrance, Enter	ENT
Express Lane	EXP LN
Expressway	EXPWY
XXXX Feet	XXXX FT
Fog Ahead	FOG AHD
Freeway	FRWY, FWY
Freeway Blocked	FWY BLKD
Friday	FRI
Hazardous Driving	HAZ DRIVING
Hazardous Material	HAZMAT
High-Occupancy	HOV
Vehicle Highway	HWY
Hour(s)	HR, HRS
Information	INFO
It Is	ITS
Junction	JCT
Left	LFT
Left Lane	LFT LN
Lane Closed	LN CLOSED
Lower Level	LWR LEVEL
Maintenance	MAINT

WORD OR PHRASE	ABBREVIATION
Major	MAJ
Miles	MI
Miles Per Hour	MPH
Minor	MNR
Monday	MON
Normal	NORM
North	N
Northbound	(route) N
Parking	PKING
Road	RD
Right Lane	RT LN
Saturday	SAT
Service Road	SERV RD
Shoulder	SHLDR
Slippery	SLIP
South	S
Southbound	(route) S
Speed	SPD
Street	ST
Sunday	SUN
Telephone	PHONE
Temporary	TEMP
Thursday	THURS
To Downtown	TO DWNTN
Traffic	TRAF
Travelers	TRVLRS
Tuesday	TUES
Time Minutes	TIME MIN
Upper Level	UPR LEVEL
Vehicles (s)	VEH, VEHS
Warning	WARN
Wednesday	WED
Weight Limit	WT LIMIT
West	W
Westbound	(route) W
Wet Pavement	WET PVMT
Will Not	WONT

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

1. Only 1 or 2 phases are to be used on a PCMS.
2. The 1st phase (or both) should be selected from the "Road/Lane/Ramp Closure List" and the "Other Condition List".
3. A 2nd phase can be selected from the "Action to Take/Effect on Travel, Location, General Warning, or Advance Notice Phase Lists".
4. A Location Phase is necessary only if a distance or location is not included in the first phase selected.
5. If two PCMS are used in sequence, they must be separated by a minimum of 1000 ft. Each PCMS shall be limited to two phases, and should be understandable by themselves.
6. For advance notice, when the current date is within seven days of the actual work date, calendar days should be replaced with days of the week. Advance notification should typically be for no more than one week prior to the work.

WORDING ALTERNATIVES

1. The words RIGHT, LEFT and ALL can be interchanged as appropriate.
2. Roadway designations IH, US, SH, FM and LP can be interchanged as appropriate.
3. EAST, WEST, NORTH and SOUTH (or abbreviations E, W, N and S) can be interchanged as appropriate.
4. Highway names and numbers replaced as appropriate.
5. ROAD, HIGHWAY and FREEWAY can be interchanged as needed.
6. AHEAD may be used instead of distances if necessary.
7. FT and MI, MILE and MILES interchanged as appropriate.
8. AT, BEFORE and PAST interchanged as needed.
9. Distances or AHEAD can be eliminated from the message if a location phase is used.

PCMS SIGNS WITHIN THE R.O.W. SHALL BE BEHIND GUARDRAIL OR CONCRETE BARRIER OR SHALL HAVE A MINIMUM OF FOUR (4) PLASTIC DRUMS PLACED PERPENDICULAR TO TRAFFIC ON THE UPSTREAM SIDE OF THE PCMS, WHEN EXPOSED TO ONE DIRECTION OF TRAFFIC. WHEN EXPOSED TO TWO WAY TRAFFIC, THE FOUR DRUMS SHOULD BE PLACED WITH ONE DRUM AT EACH OF THE FOUR CORNERS OF THE UNIT.

FULL MATRIX PCMS SIGNS

1. When Full Matrix PCMS signs are used, the character height and legibility/visibility requirements shall be maintained as listed in Note 15 under "PORTABLE CHANGEABLE MESSAGE SIGNS" above.
2. When symbol signs, such as the "Flagger Symbol"(CW20-7) are represented graphically on the Full Matrix PCMS sign and, with the approval of the Engineer, it shall maintain the legibility/visibility requirement listed above.
3. When symbol signs are represented graphically on the Full Matrix PCMS, they shall only supplement the use of the static sign represented, and shall not substitute for, or replace that sign.
4. A full matrix PCMS may be used to simulate a flashing arrow board provided it meets the visibility, flash rate and dimming requirements on BC(7), for the same size arrow.

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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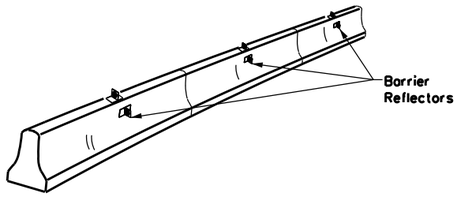
7-13 5-21	FTW	HOOD		16

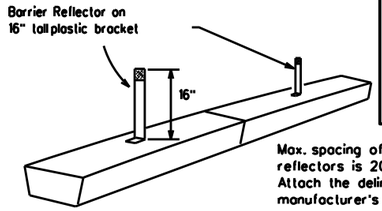
DATE:
FILE:

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



CONCRETE TRAFFIC BARRIER (CTB)

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

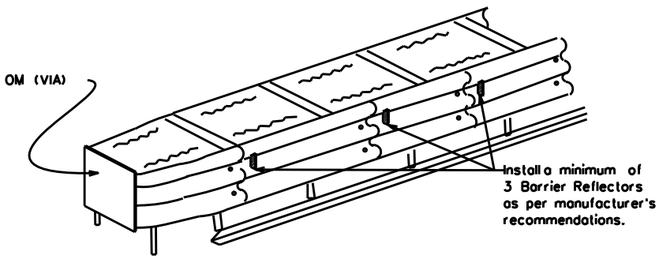


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

LOW PROFILE CONCRETE BARRIER (LPCB)

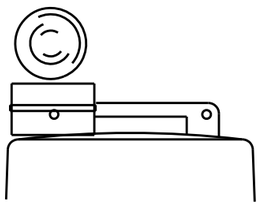


DELINEATION OF END TREATMENTS

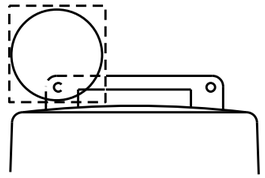
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

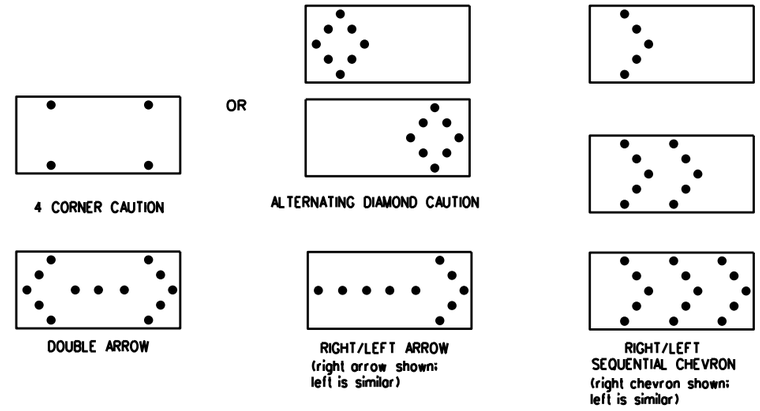
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

1. A warning reflector or approved substitute may be mounted on a plastic drum as a substitute for a Type C, steady burn warning light at the discretion of the Contractor unless otherwise noted in the plans.
2. The warning reflector shall be yellow in color and shall be manufactured using a sign substrate approved for use with plastic drums listed on the CWZTCD.
3. The warning reflector shall have a minimum retroreflective surface area (one-side) of 30 square inches.
4. Round reflectors shall be fully reflectorized, including the area where attached to the drum.
5. Square substrates must have a minimum of 30 square inches of reflectorized sheeting. They do not have to be reflectorized where it attaches to the drum.
6. The side of the warning reflector facing approaching traffic shall have sheeting meeting the color and retroreflectivity requirements for DMS 8300-Type B or Type C.
7. When used near two-way traffic, both sides of the warning reflector shall be reflectorized.
8. The warning reflector should be mounted on the side of the handle nearest approaching traffic.
9. The maximum spacing for warning reflectors should be identical to the channelizing device spacing requirements.

Arrow Boards may be located behind channelizing devices in place for a shoulder taper or merging taper, otherwise they shall be delineated with four (4) channelizing devices placed perpendicular to traffic on the upstream side of traffic.

1. The Flashing Arrow Board should be used for all lane closures on multi-lane roadways, or slow moving maintenance or construction activities on the travel lanes.
2. Flashing Arrow Boards should not be used on two-lane, two-way roadways, detours, diversions or work on shoulders unless the "CAUTION" display (see detail below) is used.
3. The Engineer/Inspector shall choose all appropriate signs, barricades and/or other traffic control devices that should be used in conjunction with the Flashing Arrow Board.
4. The Flashing Arrow Board should be able to display the following symbols:



5. The "CAUTION" display consists of four corner lamps flashing simultaneously, or the Alternating Diamond Caution mode as shown.
6. The straight line caution display is NOT ALLOWED.
7. The Flashing Arrow Board shall be capable of minimum 50 percent dimming from rated lamp voltage. The flashing rate of the lamps shall not be less than 25 nor more than 40 flashes per minute.
8. Minimum lamp "on time" shall be approximately 50 percent for the flashing arrow and equal intervals of 25 percent for each sequential phase of the flashing chevron.
9. The sequential arrow display is NOT ALLOWED.
10. The flashing arrow display is the TxDOT standard; however, the sequential chevron display may be used during daylight operations.
11. The Flashing Arrow Board shall be mounted on a vehicle, trailer or other suitable support.
12. A Flashing Arrow Board SHALL NOT BE USED to laterally shift traffic.
13. A full matrix PCMS may be used to simulate a Flashing Arrow Board provided it meets visibility, flash rate and dimming requirements on this sheet for the same size arrow.
14. Minimum mounting height of trailer mounted Arrow Boards should be 7 feet from roadway to bottom of panel.

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

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

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

1. Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the Manual for Assessing Safety Hardware (MASH).
2. Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
3. Refer to the CWZTCD for a list of approved TMAs.
4. TMAs are required on freeways unless otherwise noted in the plans.
5. A TMA should be used anytime that it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the work performance.
6. The only reason a TMA should not be required is when a work area is spread down the roadway and the work crew is on extended distance from the TMA.

Texas Department of Transportation

Traffic Safety Division Standard

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

BC(7)-21

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GENERAL NOTES

1. For long term stationary work zones on freeways, drums shall be used as the primary channelizing device.
2. For intermediate term stationary work zones on freeways, drums should be used as the primary channelizing device but may be replaced in tangent sections by vertical panels, or 42" two-piece cones. In tangent sections, one-piece cones may be used with the approval of the Engineer but only if personnel are present on the project at all times to maintain the cones in proper position and location.
3. For short term stationary work zones on freeways, drums are the preferred channelizing device but may be replaced in tapers, transitions and tangent sections by vertical panels, two-piece cones or one-piece cones as approved by the Engineer.
4. Drums and all related items shall comply with the requirements of the current version of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) and the "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
5. Drums, bases, and related materials shall exhibit good workmanship and shall be free from objectionable marks or defects that would adversely affect their appearance or serviceability.
6. The Contractor shall have a maximum of 24 hours to replace any plastic drums identified for replacement by the Engineer/Inspector. The replacement device must be an approved device.

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

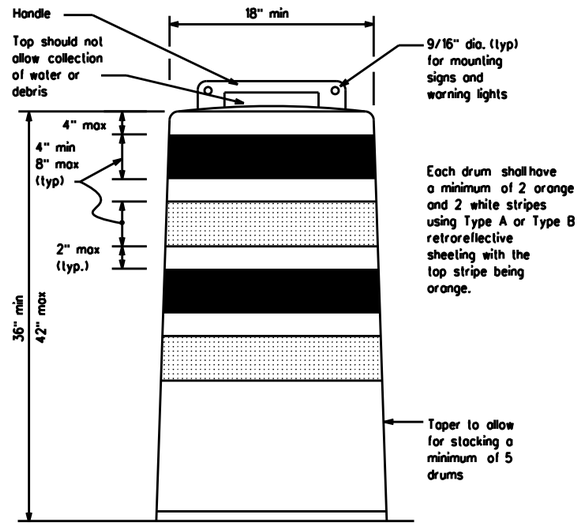
1. Plastic drums shall be a two-piece design: the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents accidental separation due to normal handling and/or air turbulence created by passing vehicles.
3. Plastic drums shall be constructed of lightweight flexible, and deformable materials. The Contractor shall NOT use metal drums or single piece plastic drums as channelization devices or sign supports.
4. Drums shall present a profile that is a minimum of 18 inches in width at the 36 inch height when viewed from any direction. The height of drum unit (body installed on base) shall be a minimum of 36 inches and a maximum of 42 inches.
5. The top of the drum shall have a built-in handle for easy pickup and shall be designed to drain water and not collect debris. The handle shall have a minimum of two widely spaced 9/16 inch diameter holes to allow attachment of a warning light, warning reflector unit or approved compliant sign.
6. The exterior of the drum body shall have a minimum of four alternating orange and white retroreflective circumferential stripes not less than 4 inches nor greater than 8 inches in width. Any non-reflectorized space between any two adjacent stripes shall not exceed 2 inches in width.
7. Bases shall have a maximum width of 36 inches, a maximum height of 4 inches, and a minimum of two footholds of sufficient size to allow base to be held down while separating the drum body from the base.
8. Plastic drums shall be constructed of ultra-violet stabilized, orange, high-density polyethylene (HDPE) or other approved material.
9. Drum body shall have a maximum unballasted weight of 11 lbs.
10. Drum and base shall be marked with manufacturer's name and model number.

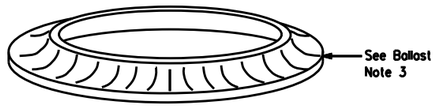
RETROREFLECTIVE SHEETING

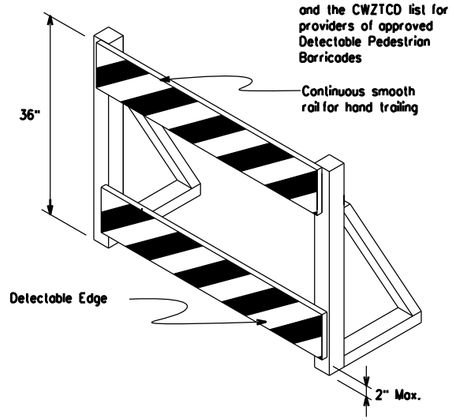
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

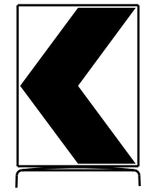




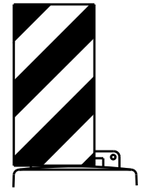


DETECTABLE PEDESTRIAN BARRICADES

1. When existing pedestrian facilities are disrupted, closed, or relocated in a TTC zone, the temporary facilities shall be detectable and include accessibility features consistent with the features present in the existing pedestrian facility. Refer to WZ(BTS-2) for Pedestrian Control requirements for Sidewalk Diversions, Sidewalk Detours and Crosswalk Closures.
2. Where pedestrians with visual disabilities normally use the closed sidewalk, a Detectable Pedestrian Barricade shall be placed across the full width of the closed sidewalk instead of a Type 3 Barricade.
3. Detectable pedestrian barricades similar to the one pictured above, longitudinal channelizing devices, some concrete barriers, and wood or chain link fencing with a continuous detectable edging can satisfactorily delineate a pedestrian path.
4. Tape, rope, or plastic chain strung between devices are not detectable, do not comply with the design standards in the "Americans with Disabilities Act Accessibility Guidelines (ADAAG)" and should not be used as a control for pedestrian movements.
5. Warning lights shall not be attached to detectable pedestrian barricades.
6. Detectable pedestrian barricades should use 8" nominal barricade rails as shown on BC(10) provided that the top rail provides a smooth continuous rail suitable for hand trailing with no splinters, burrs, or sharp edges.



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

1. Signs used on plastic drums shall be manufactured using substrates listed on the CWZTCD.
2. Chevrons and other work zone signs with an orange background shall be manufactured with Type B or Type C Orange_{FL} sheeting meeting the color and retroreflectivity requirements of DMS-8300, "Sign Face Material," unless otherwise specified in the plans.
3. Vertical Panels shall be manufactured with orange and white sheeting meeting the requirements of DMS-8300 Type A or Type B. Diagonal stripes on Vertical Panels shall slope down toward the intended traveled lane.
4. Other sign messages (text or symbolic) may be used as approved by the Engineer. Sign dimensions shall not exceed 18 inches in width or 24 inches in height, except for the R9 series signs discussed in note 8 below.
5. Signs shall be installed using a 1/2 inch bolt (nominal) and nut, two washers, and one locking washer for each connection.
6. Mounting bolts and nuts shall be fully engaged and adequately torqued. Bolts should not extend more than 1/2 inch beyond nuts.
7. Chevrons may be placed on drums on the outside of curves, on merging tapers or on shifting tapers. When used in these locations, they may be placed on every drum or spaced not more than on every third drum. A minimum of three (3) should be used at each location called for in the plans.
8. R9-9, R9-10, R9-11 and R9-11a Sidewalk Closed signs which are 24 inches wide may be mounted on plastic drums, with approval of the Engineer.

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Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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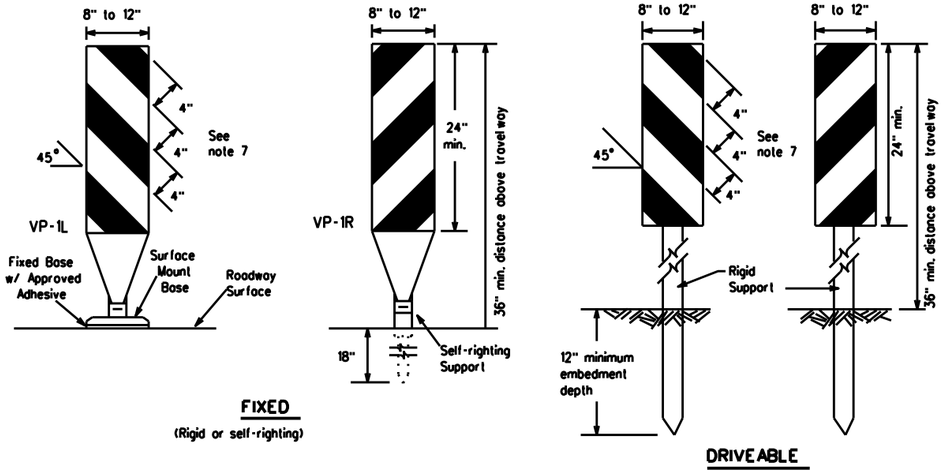
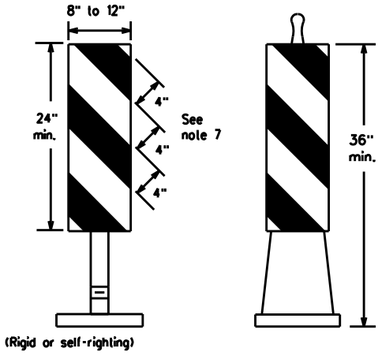


FIXED

(Rigid or self-righting)

DRIVEABLE

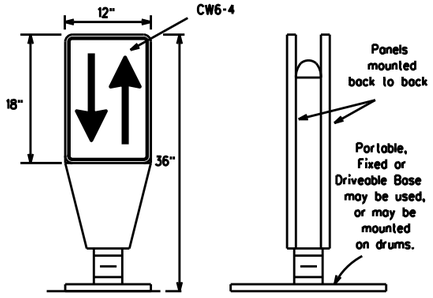


(Rigid or self-righting)

PORTABLE

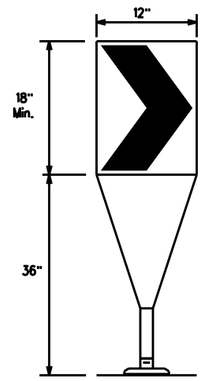
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



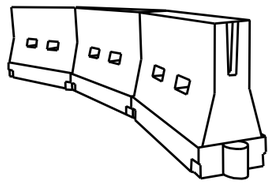
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

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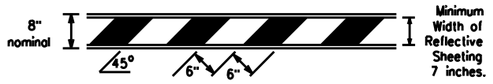
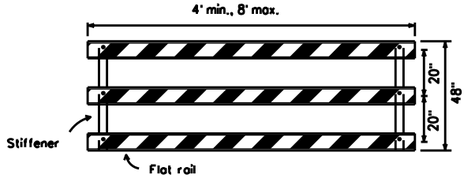
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



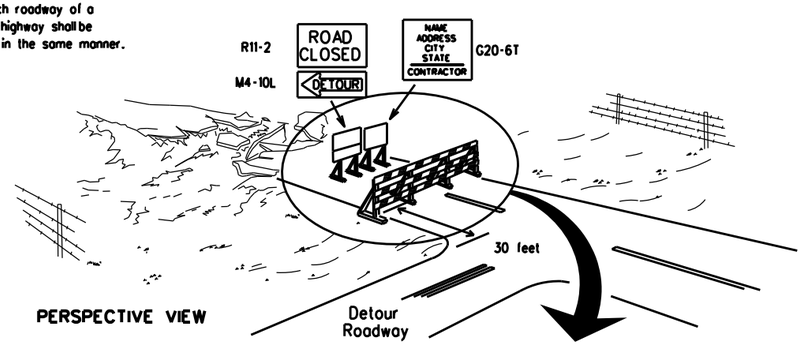
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

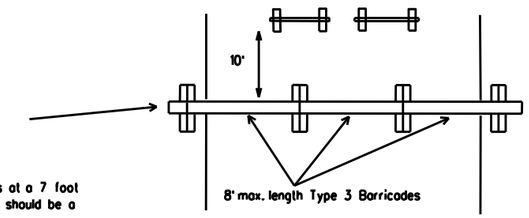
Each roadway of a divided highway shall be barricaded in the same manner.



PERSPECTIVE VIEW

The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.

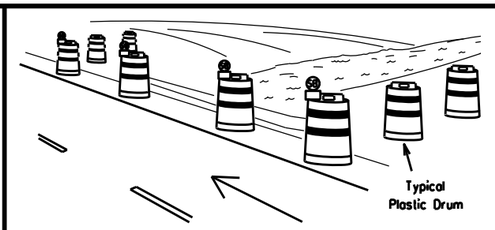
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

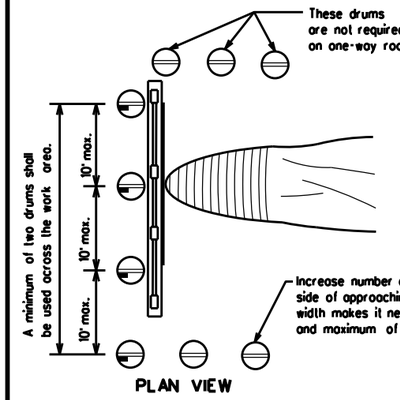
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

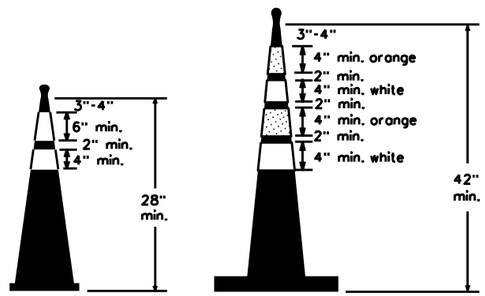
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



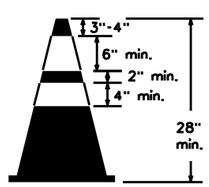
PLAN VIEW

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

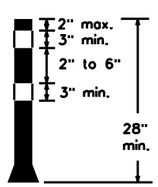
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones



One-Piece cones

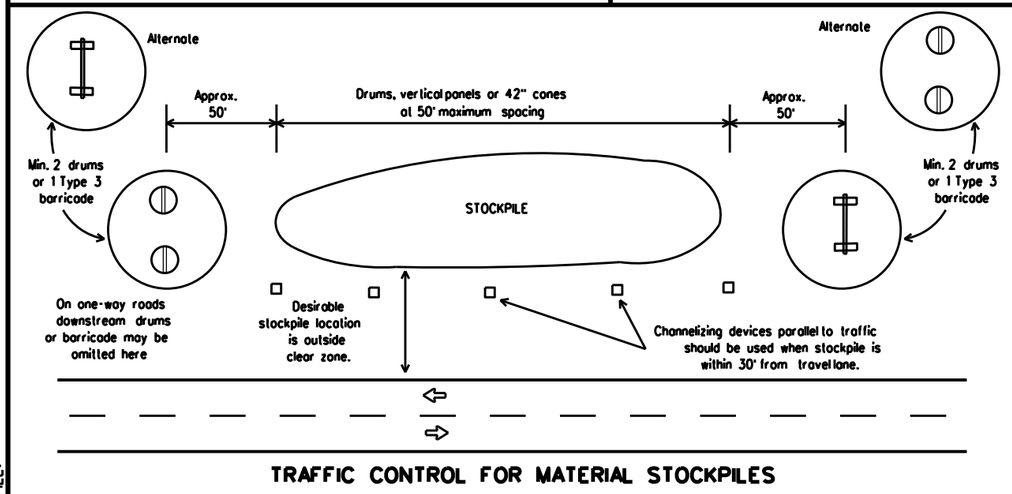


Tubular Marker

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

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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

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Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

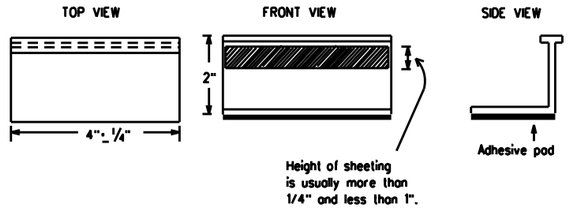
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

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11-02 8-14				

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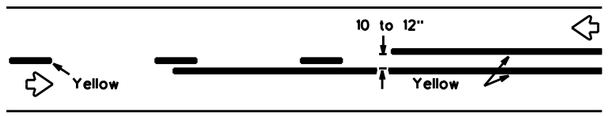
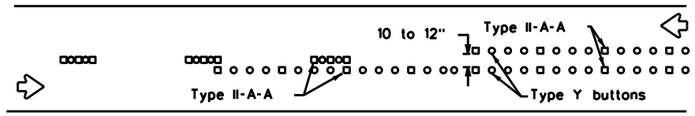
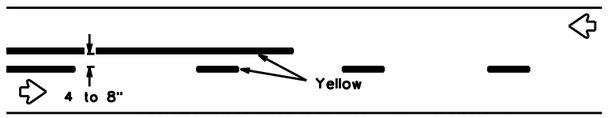
PAVEMENT MARKING PATTERNS



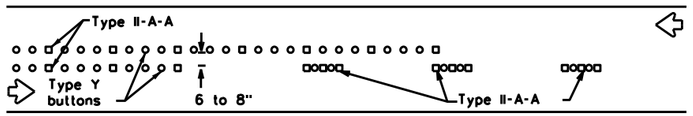
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



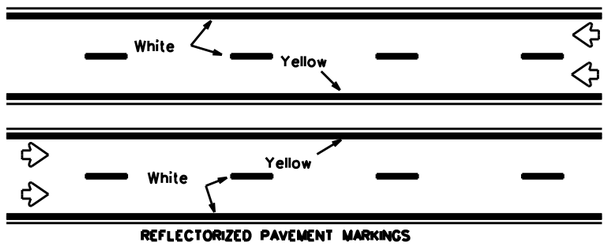
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



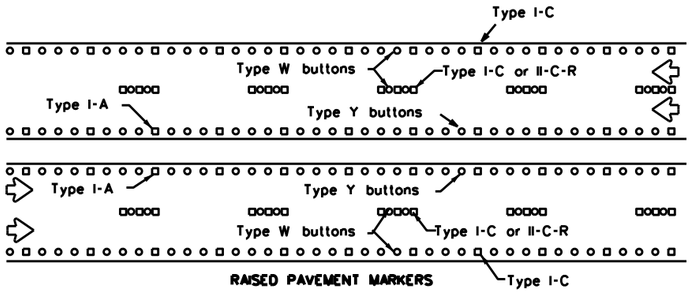
RAISED PAVEMENT MARKERS - PATTERN B

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

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



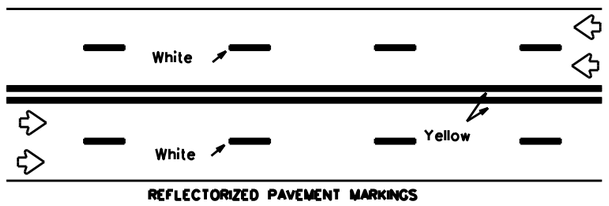
REFLECTORIZED PAVEMENT MARKINGS



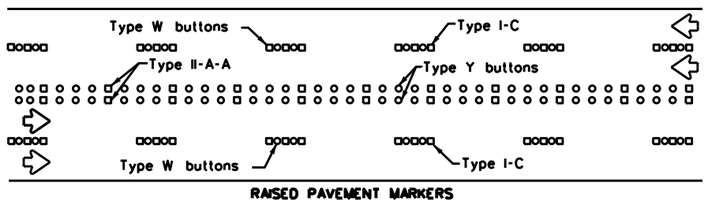
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



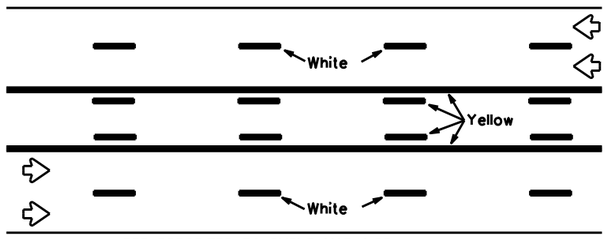
REFLECTORIZED PAVEMENT MARKINGS



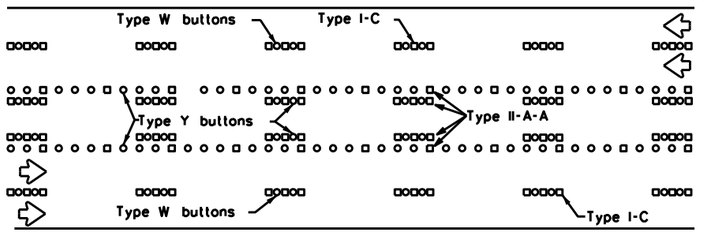
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

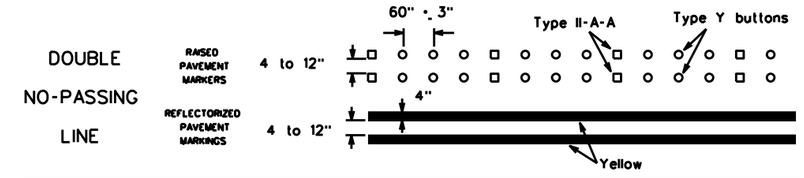
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

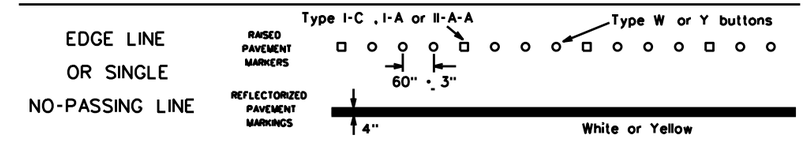
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

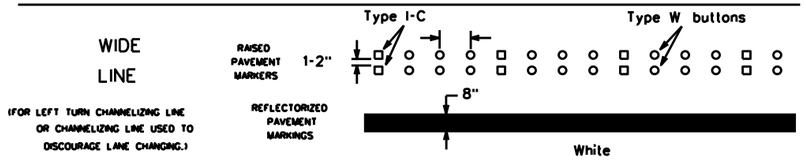


EDGE LINE OR SINGLE NO-PASSING LINE



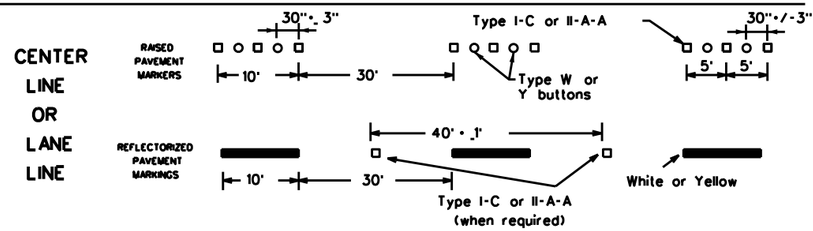
WIDE LINE

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

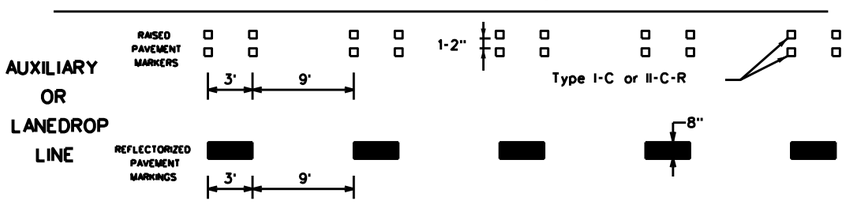


BROKEN LINES

CENTER LINE OR LANE LINE

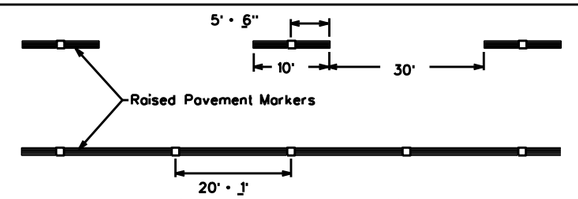


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	0385	04	053	SH144
	DIST	COUNTY		SHEET NO.
	FTW	HOOD		22

Horizontal Alignment Review Report

Report Created: Wednesday, February 21, 2024
Time: 2:22:16 PM

Project: Default
Description:
File Name: C:\Users\RALLEN4\Documents\0385-04-053 HISP CABLE BARRIER\Design\Alignment - Without POT.dgn
Last Revised: 2/16/2024 15:44:08

Note: All units in this report are in feet unless specified otherwise.

Alignment Name: SH144_GEOM
Alignment Description:
Alignment Style: Alignment\Road\Geom_Baseline

		Station	Northing	Easting
Element: Linear				
START	(START)	15394.640	6830691.340	2187491.390
HPI	(HPI)	31096.552	6815982.370	2192986.500
Tangential Direction:		S20.485°E		
Tangential Length:		15701.912		
Element: Linear				
HPI	(HPI)	31096.552	6815982.370	2192986.500
PC	(PC)	31096.634	6815982.293	2192986.529
Tangential Direction:		S20.484°E		
Tangential Length:		0.082		
Element: Circular				
PC	(PC)	31096.634	6815982.293	2192986.529
HPI	(HPI)	31231.657	6815855.620	2193033.850
CC	(CC)		6813991.063	2187656.256
PT	(PT)	31367.030	6815726.842	2193075.100
Radius:		5690.060		
Delta:		2.723° Right		
Degree of Curvature (Arc):		1.007°		
Length:		270.395		
Tangent:		135.223		
Chord:		270.370		
Middle Ordinate:		1.606		
External:		1.607		
Back Tangent Direction:		S20.484°E		
Back Radial Direction:		S69.516°W		
Chord Direction:		S19.123°E		

Ahead Radial Direction:		S72.239°W		
Ahead Tangent Direction:		S17.761°E		
Element: Linear				
PT	(PT)	31367.030	6815726.842	2193075.100
HPI	(HPI)	31367.126	6815726.750	2193075.130
Tangential Direction:		S17.761°E		
Tangential Length:		0.097		
Element: Linear				
HPI (GeomBL2)		31367.126	6815726.750	2193075.130
HPI	(HPI)	32208.967	6814925.030	2193331.920
Tangential Direction:		S17.760°E		
Tangential Length:		841.841		
Element: Linear				
HPI	(HPI)	32208.967	6814925.030	2193331.920
PC	(PC)	32209.090	6814924.913	2193331.957
Tangential Direction:		S17.763°E		
Tangential Length:		0.123		
Element: Circular				
PC	(PC)	32209.090	6814924.913	2193331.957
HPI	(HPI)	32325.755	6814813.810	2193367.550
CC	(CC)		6816423.198	2198008.896
PT	(PT)	32442.376	6814704.522	2193408.378
Radius:		4911.070		
Delta:		2.722° Left		
Degree of Curvature (Arc):		1.167°		
Length:		233.286		
Tangent:		116.665		
Chord:		233.264		
Middle Ordinate:		1.385		
External:		1.386		
Back Tangent Direction:		S17.763°E		
Back Radial Direction:		S72.237°W		
Chord Direction:		S19.124°E		
Ahead Radial Direction:		S69.515°W		
Ahead Tangent Direction:		S20.485°E		
Element: Linear				
PT	(PT)	32442.376	6814704.522	2193408.378
HPI	(HPI)	32442.496	6814704.410	2193408.420
Tangential Direction:		S20.485°E		
Tangential Length:		0.120		
Element: Linear				
HPI (GeomBL5)		32442.496	6814704.410	2193408.420

PC	(PC)	32629.437	6814529.290	2193473.840
Tangential Direction:		S20.484°E		
Tangential Length:		186.941		
Element: Circular				
PC	(PC)	32629.437	6814529.306	2193473.834
HPI	(HPI)	32908.691	6814267.710	2193571.560
CC	(CC)		6815531.923	2196157.671
PT	(PT)	33186.187	6814029.909	2193717.963
Radius:		2865.000		
Delta:		11.134° Left		
Degree of Curvature (Arc):		2.000°		
Length:		556.750		
Tangent:		279.254		
Chord:		555.674		
Middle Ordinate:		13.513		
External:		13.577		
Back Tangent Direction:		S20.484°E		
Back Radial Direction:		S69.516°W		
Chord Direction:		S26.052°E		
Ahead Radial Direction:		S58.381°W		
Ahead Tangent Direction:		S31.619°E		
Element: Linear				
PT	(GeomBL8)	33186.187	6814029.930	2193717.950
END	(END)	33486.190	6813774.460	2193875.230
Tangential Direction:		S31.619°E		
Tangential Length:		300.003		

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ELIJAH ZELENOV
142306
LICENSED PROFESSIONAL ENGINEER

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Elijah Zelenov P. E. 5/11/2024
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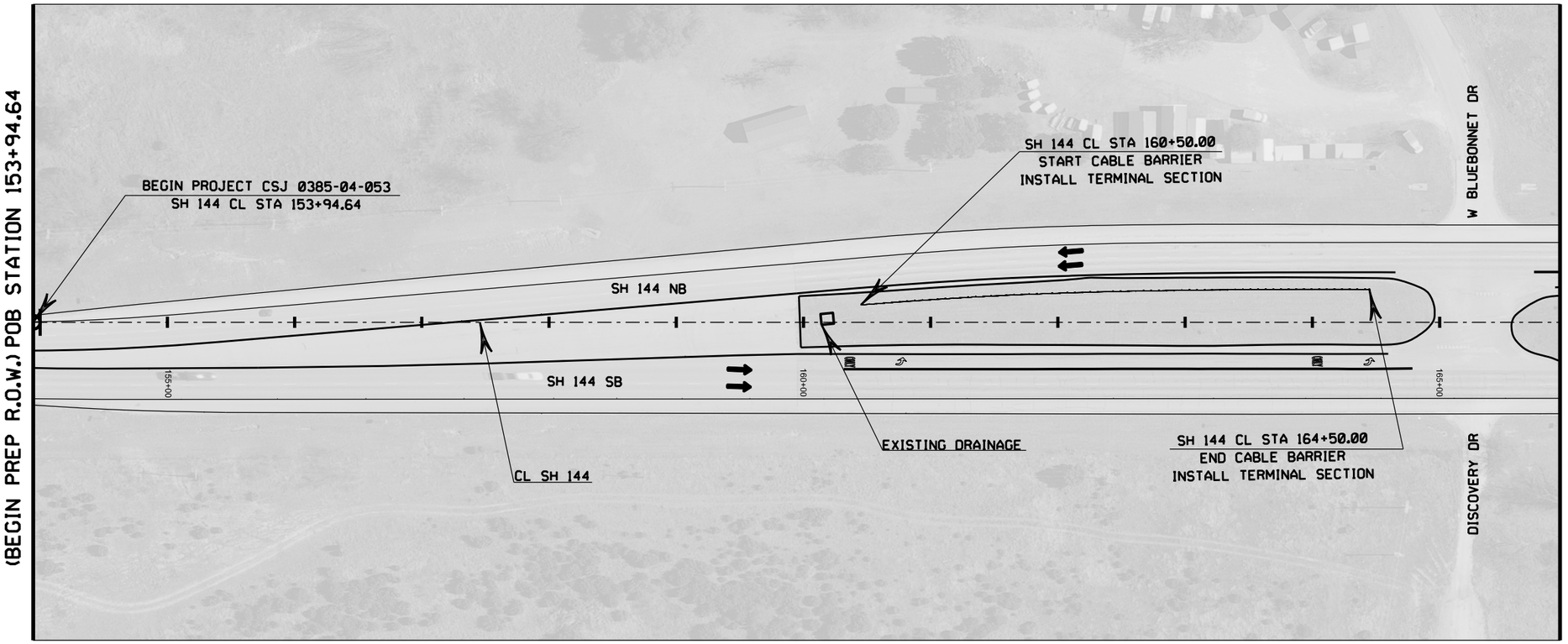
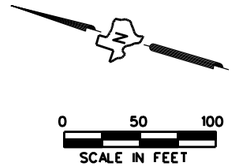
CONTROL DATA

Texas Department of Transportation

SHEET 1 OF 1

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH144
STATE	COUNTY		SHEET NO.
TEXAS	HOOD		
DISTRICT	CONTROL	SECTION	JOB
FTW	0385	04	053





NOTES:
①CABLE BARRIER IS 12 FEET OFFSET FROM NB INSIDE TRAVEL LANE AT SHOULDER / MAINLANE INTERFACE
②IF NEEDED MIN 12 FEET OFFSET CAN BE INCREASED WITH ENGINEER APPROVAL

LEGEND

- TRAFFIC FLOW
- BIO EROSION LOG AT EX INLET /S.E.T
- PROP CABLE BARRIER
- EXISTING CULVERT

CSJ 0385-04-053 SHEET TOTAL	UNIT	QUANTITY
PREP ROW	STA	12.00
CELL FBR MLCH SHEET (PERM)(RURAL)(SANDY)	SY	266.67
VEGETATIVE WATERING	MG	9.33
RIPRAP MOW STRIP 5"	CY	18.52
BIODEG EROSION CONTROL LOGS (INSTALL)	LF	40
BIODEG EROSION CONTROL LOGS (REMOVE)	LF	40
CABLE BARRIER SYSTEM (TL-4)	LF	400
CABLE BARRIER TERMINAL SECTION (TL-4)	EA	2
INSTL DEL ASSM (D-DY)SZ 1(YFLX)GND	EA	2
INSTL DEL ASSM (D-SY)SZ 1(BRF)(GF2)(BI)	EA	4

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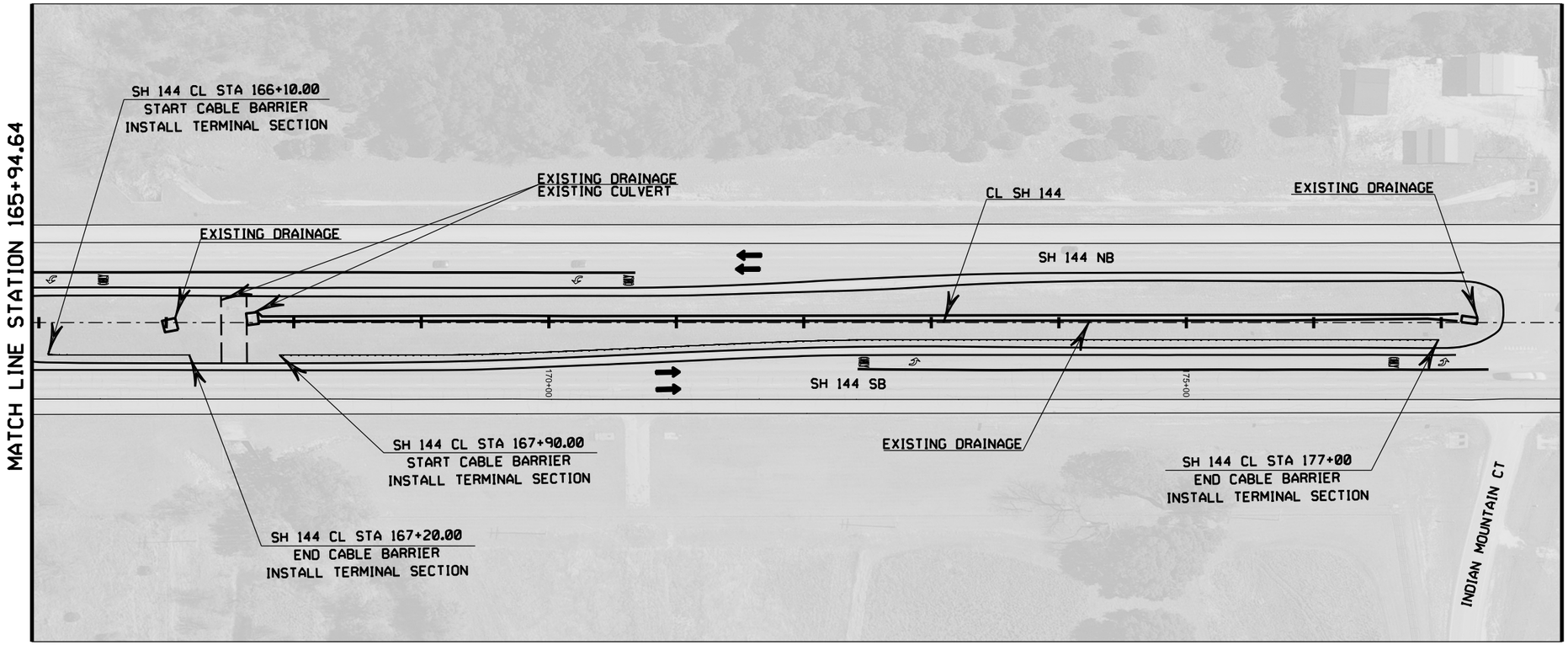
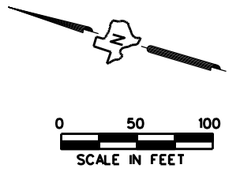
SH 144
ROADWAY LAYOUT

Texas Department of Transportation

SHEET 1 OF 16

FHWA DIVISION	PROJECT NO.			HIGHWAY NO.
6	SEE TITLE SHEET			SH144
STATE	COUNTY			SHEET NO.
TEXAS	HOOD			24
DISTRICT	CONTROL	SECTION	JOB	
FTW	0385	04	053	





NOTES:
① CABLE BARRIER IS TO BE 12 FEET OFFSET FROM SB INSIDE TRAVEL LANE AT SHOULDER / MAINLANE INTERFACE
② IF NEEDED MIN 12 FEET OFFSET CAN BE INCREASED WITH ENGINEER APPROVAL
③ CABLE BARRIER TO STOP 25 FEET PRIOR TO CULVERT
④ CABLE BARRIER TO RESUME 25 FEET AFTER CULVERT

LEGEND

- TRAFFIC FLOW
- BIO EROSION LOG AT EX INLET /S.E.T
- PROP CABLE BARRIER
- EXISTING CULVERT

CSJ 0385-04-053 SHEET TOTAL	UNIT	QUANTITY
PREP ROW	STA	12.00
CELL FBR MLCH SHEET (PERM)(RURAL)(SANDY)	SY	693.33
VEGETATIVE WATERING	MG	25.43
RIPRAP MOW STRIP 5"	CY	48.15
BIODEG EROSION CONTROL LOGS (INSTALL)	LF	880
BIODEG EROSION CONTROL LOGS (REMOVE)	LF	880
CABLE BARRIER SYSTEM (TL-4)	LF	1040
CABLE BARRIER TERMINAL SECTION (TL-4)	EA	4
INSTL DEL ASSM (D-DY)SZ 1(YFLX)GND	EA	4
INSTL DEL ASSM (D-SY)SZ 1(BRF)(GF2)(BI)	EA	11

STATE OF TEXAS
ELIJAH ZELENOV
142306
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Elijah Zelenov P. E. 5/10/2024
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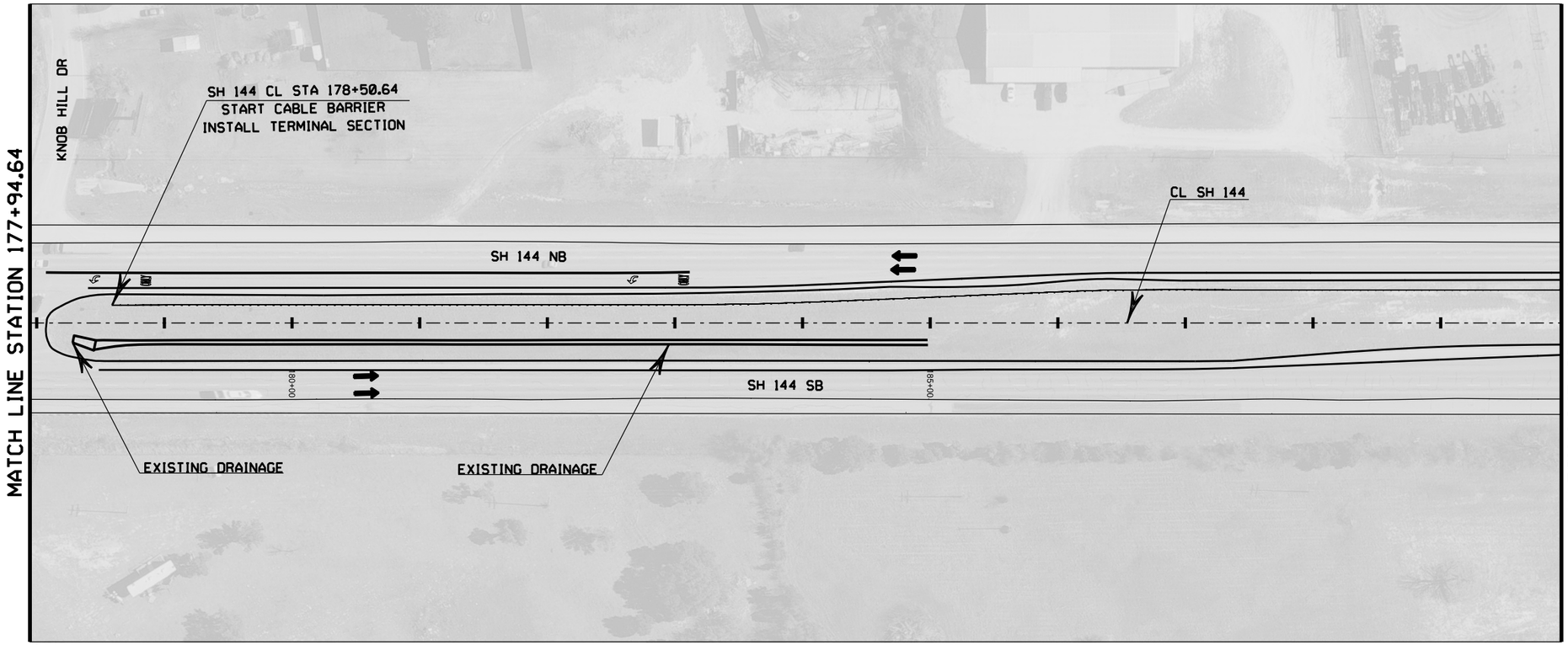
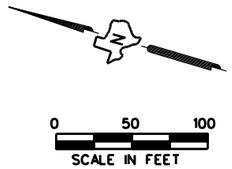
SH 144
ROADWAY LAYOUT

Texas Department of Transportation

SHEET 2 OF 16

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH144
STATE	COUNTY		SHEET NO.
TEXAS	HOOD		
DISTRICT	CONTROL	SECTION	JOB
FTW	0385	04	053





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LEGEND

- TRAFFIC FLOW
- BIO EROSION LOG AT EX INLET /S.E.T
- PROP CABLE BARRIER
- EXISTING CULVERT

CSJ 0385-04-053 SHEET TOTAL	UNIT	QUANTITY
PREP ROW	STA	12.00
CELL FBR MLCH SHEET (PERM)(RURAL)(SANDY)	SY	757.33
VEGETATIVE WATERING	MG	26.51
RIPRAP MOW STRIP 5'	CY	52.59
BIODEG EROSION CONTROL LOGS (INSTALL)	LF	585
BIODEG EROSION CONTROL LOGS (REMOVE)	LF	585
CABLE BARRIER SYSTEM (TL-4)	LF	1136
CABLE BARRIER TERMINAL SECTION (TL-4)	EA	1
INSTL DEL ASSM (D-DY)SZ 1(YFLX)GND	EA	1
INSTL DEL ASSM (D-SY)SZ 1(BRF)(GF2)(BI)	EA	12

STATE OF TEXAS
ELIJAH ZELENOV
142306
LICENSED
PROFESSIONAL ENGINEER

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Elijah Zelenov P. E. 5/10/2024
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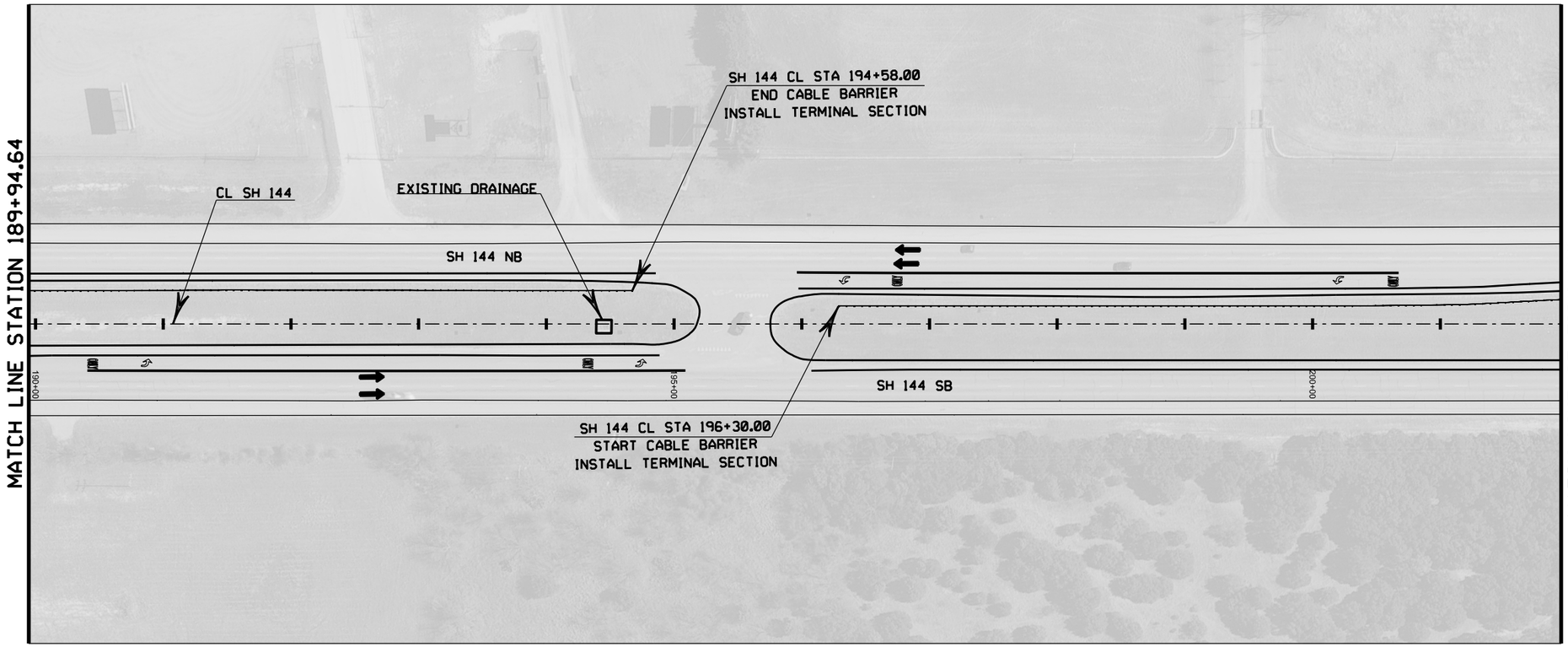
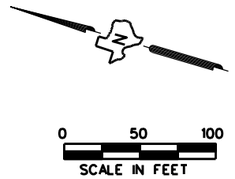
SH 144
ROADWAY LAYOUT

Texas Department of Transportation

SHEET 3 OF 16

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH144
STATE	COUNTY		SHEET NO.
TEXAS	HOOD		
DISTRICT	CONTROL	SECTION	JOB
FTW	0385	04	053





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LEGEND

- TRAFFIC FLOW
- BIO EROSION LOG AT EX INLET /S.E.T
- PROP CABLE BARRIER
- EXISTING CULVERT

CSJ 0385-04-053 SHEET TOTAL	UNIT	QUANTITY
PREP ROW	STA	12.00
CELL FBR MLCH SHEET (PERM)(RURAL)(SANDY)	SY	688
VEGETATIVE WATERING	MG	24.08
RIPRAP MOW STRIP 5"	CY	47.78
BIODEG EROSION CONTROL LOGS (INSTALL)	LF	40
BIODEG EROSION CONTROL LOGS (REMOVE)	LF	40
CABLE BARRIER SYSTEM (TL-4)	LF	1032
CABLE BARRIER TERMINAL SECTION (TL-4)	EA	2
INSTL DEL ASSM (D-DY)SZ 1(YFLX)GND	EA	2
INSTL DEL ASSM (D-SY)SZ 1(BRF)(GF2)(BI)	EA	10

STATE OF TEXAS
ELIJAH ZELENOV
142306
LICENSED
PROFESSIONAL ENGINEER

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Elijah Zelenov P. E.
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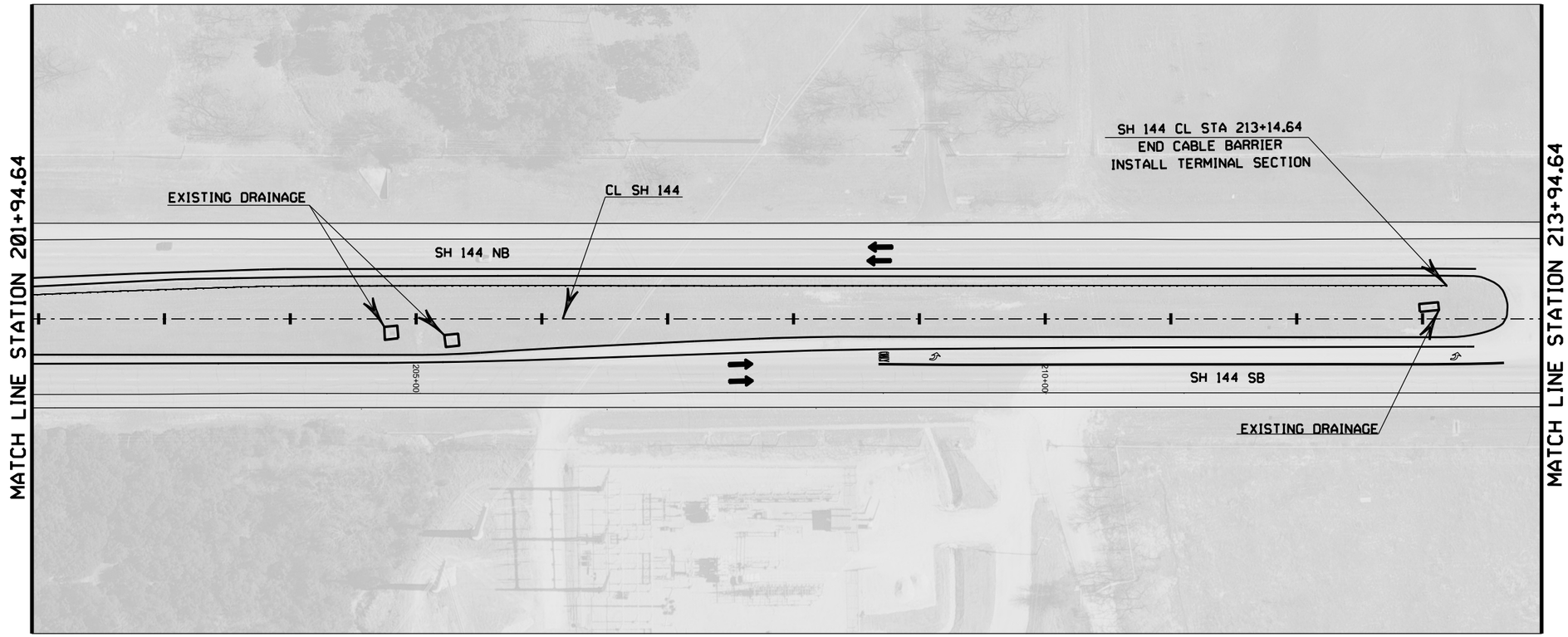
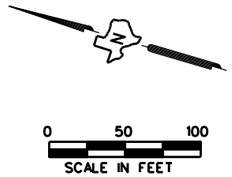
SH 144
ROADWAY LAYOUT

Texas Department of Transportation

SHEET 4 OF 16

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH144
STATE	COUNTY		SHEET NO.
TEXAS	HOOD		
DISTRICT	CONTROL	SECTION	JOB
FTW	0385	04	053





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LEGEND

- TRAFFIC FLOW
- BIO EROSION LOG AT EX INLET /S.E.T
- PROP CABLE BARRIER
- EXISTING CULVERT

CSJ 0385-04-053 SHEET TOTAL	UNIT	QUANTITY
PREP ROW	STA	12.00
CELL FBR MLCH SHEET (PERM)(RURAL)(SANDY)	SY	746.67
VEGETATIVE WATERING	MG	26.13
RIPRAP MOW STRIP 5"	CY	51.85
BIODEG EROSION CONTROL LOGS (INSTALL)	LF	120
BIODEG EROSION CONTROL LOGS (REMOVE)	LF	120
CABLE BARRIER SYSTEM (TL-4)	LF	1120
CABLE BARRIER TERMINAL SECTION (TL-4)	EA	1
INSTL DEL ASSM (D-DY)SZ I(YFLX)GND	EA	1
INSTL DEL ASSM (D-SY)SZ I(BRF)(GF2)(BI)	EA	11

STATE OF TEXAS
ELIJAH ZELENOV
142306
LICENSED
PROFESSIONAL ENGINEER

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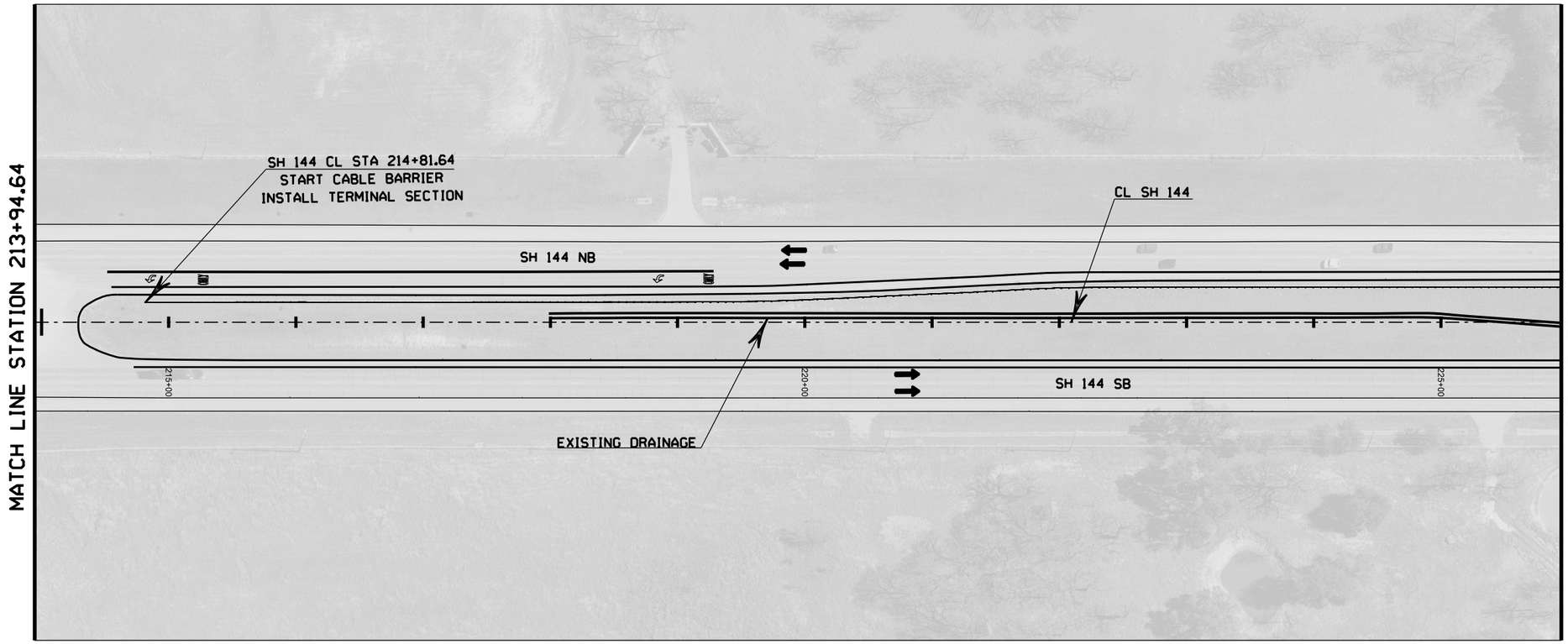
Elijah Zelenov P. E.
4848DA2AA1AB440...
5/10/2024

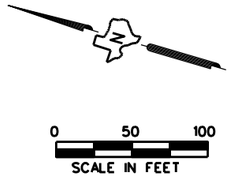
SH 144
ROADWAY LAYOUT

Texas Department of Transportation

SHEET 5 OF 16

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH144
STATE	COUNTY		SHEET NO.
TEXAS	HOOD		
DISTRICT	CONTROL	SECTION	JOB
FTW	0385	04	053





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LEGEND

- TRAFFIC FLOW
- BIO EROSION LOG AT EX INLET /S.E.T
- PROP CABLE BARRIER
- EXISTING CULVERT

CSJ 0385-04-053 SHEET TOTAL	UNIT	QUANTITY
PREP ROW	STA	12.00
CELL FBR MLCH SHEET (PERM)(RURAL)(SANDY)	SY	742
VEGETATIVE WATERING	MG	25.97
RIPRAP MOW STRIP 5'	CY	51.53
BIODEG EROSION CONTROL LOGS (INSTALL)	LF	665
BIODEG EROSION CONTROL LOGS (REMOVE)	LF	665
CABLE BARRIER SYSTEM (TL-4)	LF	1113
CABLE BARRIER TERMINAL SECTION (TL-4)	EA	1
INSTL DEL ASSM (D-DY)SZ 1(YFLX)GND	EA	1
INSTL DEL ASSM (D-SY)SZ 1(BRF)(GF2)(BI)	EA	11

STATE OF TEXAS
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142306
LICENSED
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Elijah Zelenov P. E.
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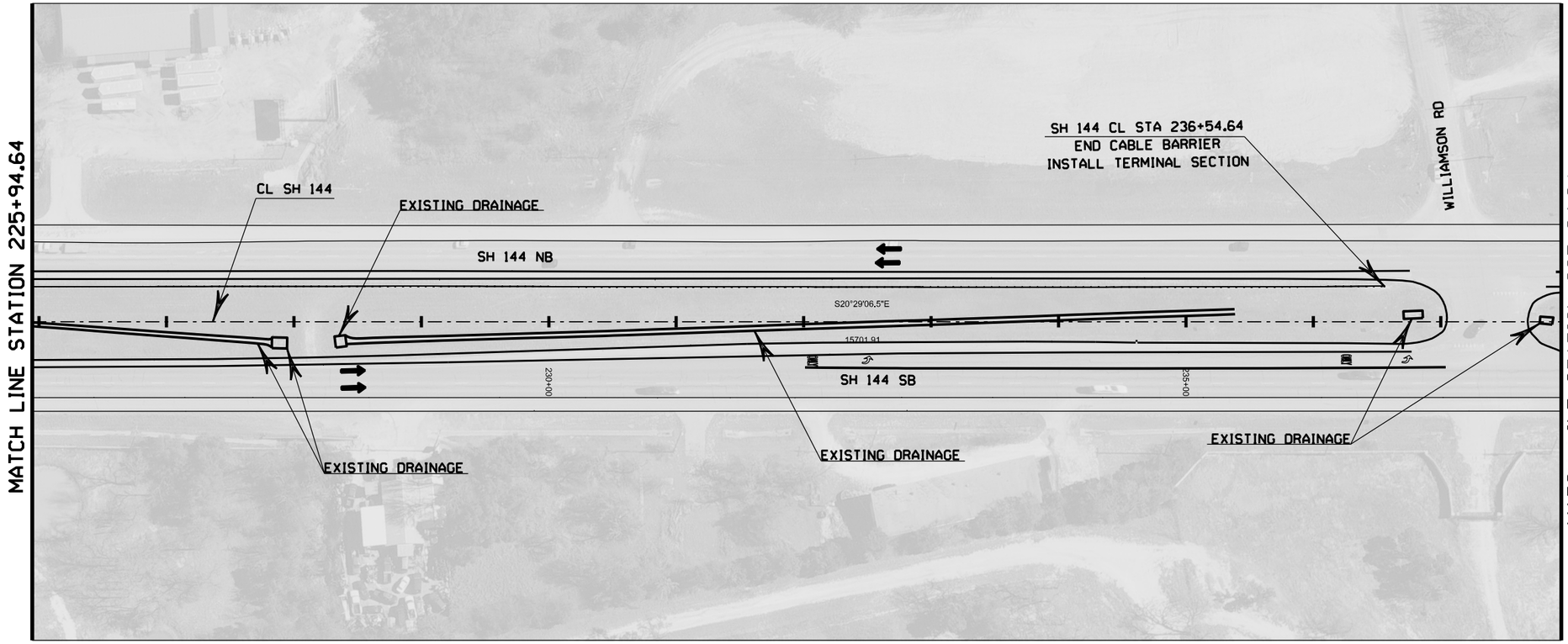
5/10/2024

SH 144
ROADWAY LAYOUT

Texas Department of Transportation

SHEET 6 OF 16

FHWA DIVISION	PROJECT NO.			HIGHWAY NO.
6	SEE TITLE SHEET			SH144
STATE	COUNTY			SHEET NO.
TEXAS	HOOD			
DISTRICT	CONTROL	SECTION	JOB	29
FTW	0385	04	053	



NOTES:
①CABLE BARRIER IS TO BE 12 FEET OFFSET FROM NB INSIDE TRAVEL LANE AT SHOULDER / MAINLANE INTERFACE
②IF NEEDED MIN 12 FEET OFFSET CAN BE INCREASED WITH ENGINEER APPROVAL

LEGEND

- TRAFFIC FLOW
- BIO EROSION LOG AT EX INLET /S.E.T
- PROP CABLE BARRIER
- EXISTING CULVERT

CSJ 0385-04-053 SHEET TOTAL	UNIT	QUANTITY
PREP ROW	STA	12.00
CELL FBR MLCH SHEET (PERM)(RURAL)(SANDY)	SY	706.67
VEGETATIVE WATERING	MG	24.73
RIPRAP MOW STRIP 5"	CY	49.07
BIODEG EROSION CONTROL LOGS (INSTALL)	LF	905
BIODEG EROSION CONTROL LOGS (REMOVE)	LF	905
CABLE BARRIER SYSTEM (TL-4)	LF	1060
CABLE BARRIER TERMINAL SECTION (TL-4)	EA	1
INSTL DEL ASSM (D-DY)SZ 1(YFLX)GND	EA	1
INSTL DEL ASSM (D-SY)SZ 1(BRF)(GF2)(BI)	EA	11

STATE OF TEXAS
ELIJAH ZELENOV
142306
LICENSED
PROFESSIONAL ENGINEER

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Elijah Zelenov P. E.
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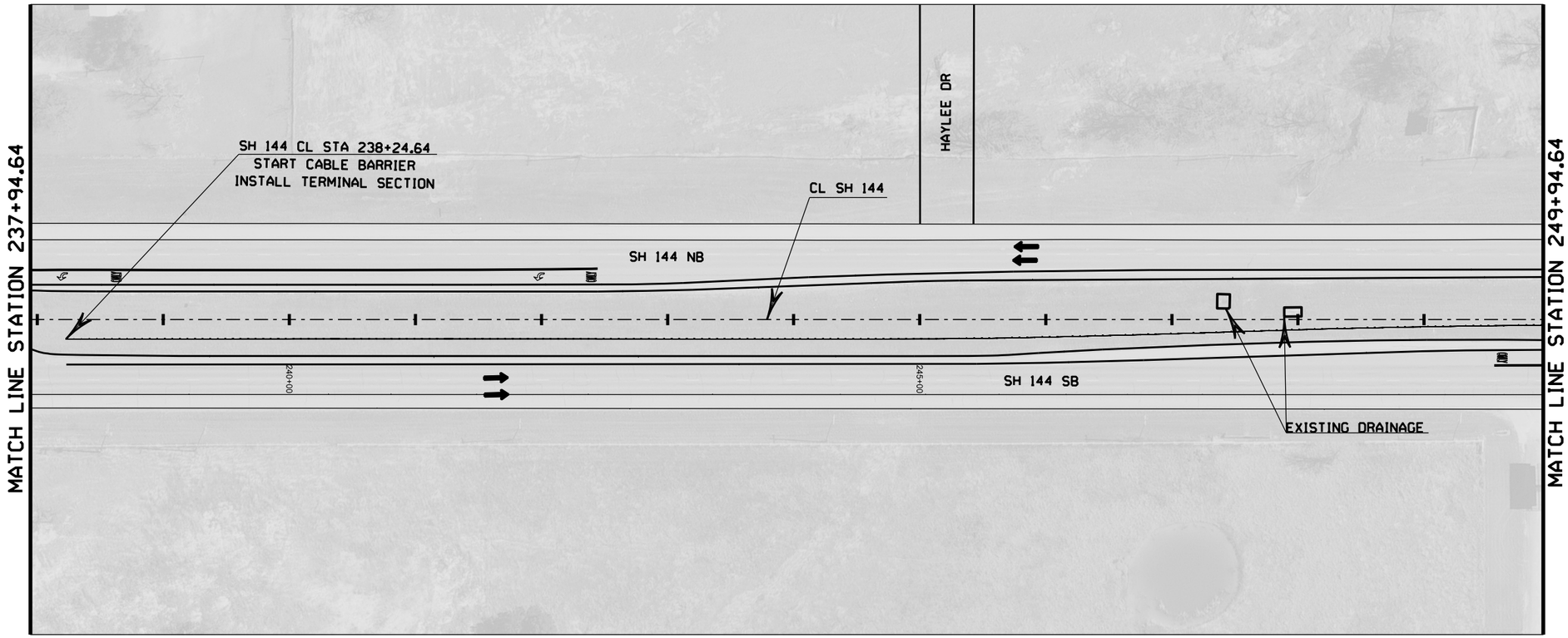
5/10/2024

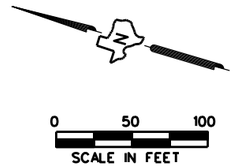
SH 144
ROADWAY LAYOUT

Texas Department of Transportation

SHEET 7 OF 16

FHWA DIVISION	PROJECT NO.			HIGHWAY NO.
6	SEE TITLE SHEET			SH144
STATE	COUNTY			SHEET NO.
TEXAS	HOOD			
DISTRICT	CONTROL	SECTION	JOB	30
FTW	0385	04	053	





NOTES:
①CABLE BARRIER IS TO BE 20 FEET OFFSET FROM SB INSIDE TRAVEL LANE AT SHOULDER / MAINLANE INTERFACE
②IF NEEDED THE 20 FEET OFFSET CAN BE CHANGED WITH ENGINEER APPROVAL

LEGEND

- TRAFFIC FLOW
- BIO EROSION LOG AT EX INLET /S.E.T
- PROP CABLE BARRIER
- EXISTING CULVERT

CSJ 0385-04-053 SHEET TOTAL	UNIT	QUANTITY
PREP ROW	STA	12.00
CELL FBR MLCH SHEET (PERM)(RURAL)(SANDY)	SY	780
VEGETATIVE WATERING	MG	27.30
RIPRAP MOW STRIP 5"	CY	54.17
BIODEG EROSION CONTROL LOGS (INSTALL)	LF	80
BIODEG EROSION CONTROL LOGS (REMOVE)	LF	80
CABLE BARRIER SYSTEM (TL-4)	LF	1170
CABLE BARRIER TERMINAL SECTION (TL-4)	EA	1
INSTL DEL ASSM (D-DY)SZ I(YFLX)GND	EA	1
INSTL DEL ASSM (D-SY)SZ I(BRF)(GF2)(BI)	EA	12

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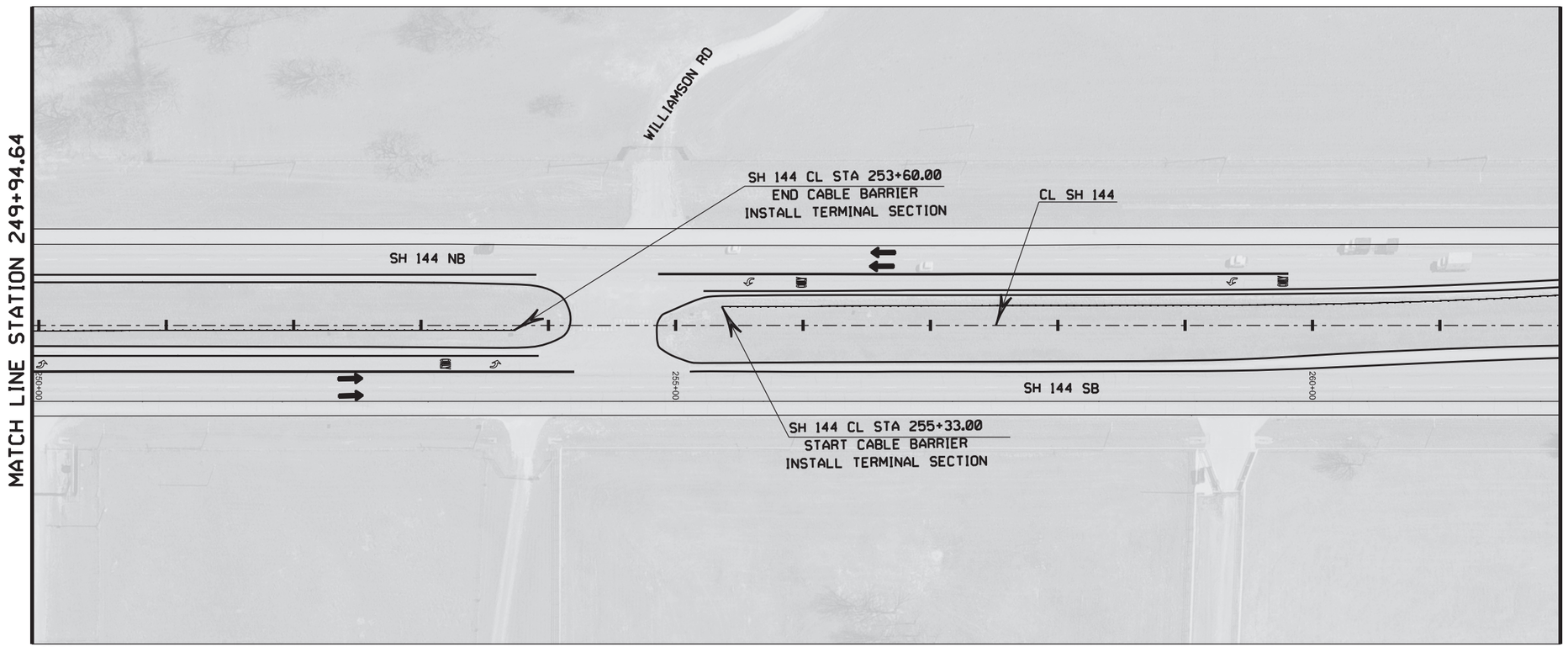
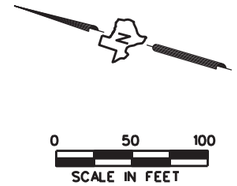
SH 144
ROADWAY LAYOUT

Texas Department of Transportation

SHEET 8 OF 16

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH144
STATE	COUNTY		SHEET NO.
TEXAS	HOOD		
DISTRICT	CONTROL	SECTION	JOB
FTW	0385	04	053





NOTES:
① CABLE BARRIER IS TO BE 20 FEET OFFSET FROM SB INSIDE TRAVEL LANE AT SHOULDER / MAINLANE INTERFACE
② CABLE BARRIER IS TO BE 12 FEET OFFSET FROM NB INSIDE TRAVEL LANE AT SHOULDER / MAINLANE INTERFACE
③ IF NEEDED MIN 12 FEET OFFSET CAN BE INCREASED WITH ENGINEER APPROVAL

LEGEND

- TRAFFIC FLOW
- BIO EROSION LOG AT EX INLET /S.E.T
- PROP CABLE BARRIER
- EXISTING CULVERT

CSJ 0385-04-053 SHEET TOTAL	UNIT	QUANTITY
PREP ROW	STA	12.00
CELL FBR MLCH SHEET (PERM)(RURAL)(SANDY)	SY	684.67
VEGETATIVE WATERING	MG	23.96
RIPRAP MOW STRIP 5"	CY	47.55
BIODEG EROSION CONTROL LOGS (INSTALL)	LF	0
BIODEG EROSION CONTROL LOGS (REMOVE)	LF	0
CABLE BARRIER SYSTEM (TL-4)	LF	1027
CABLE BARRIER TERMINAL SECTION (TL-4)	EA	2
INSTL DEL ASSM (D-DY)SZ 1(YFLX)GND	EA	2
INSTL DEL ASSM (D-SY)SZ 1(BRF)(GF2)(BI)	EA	10

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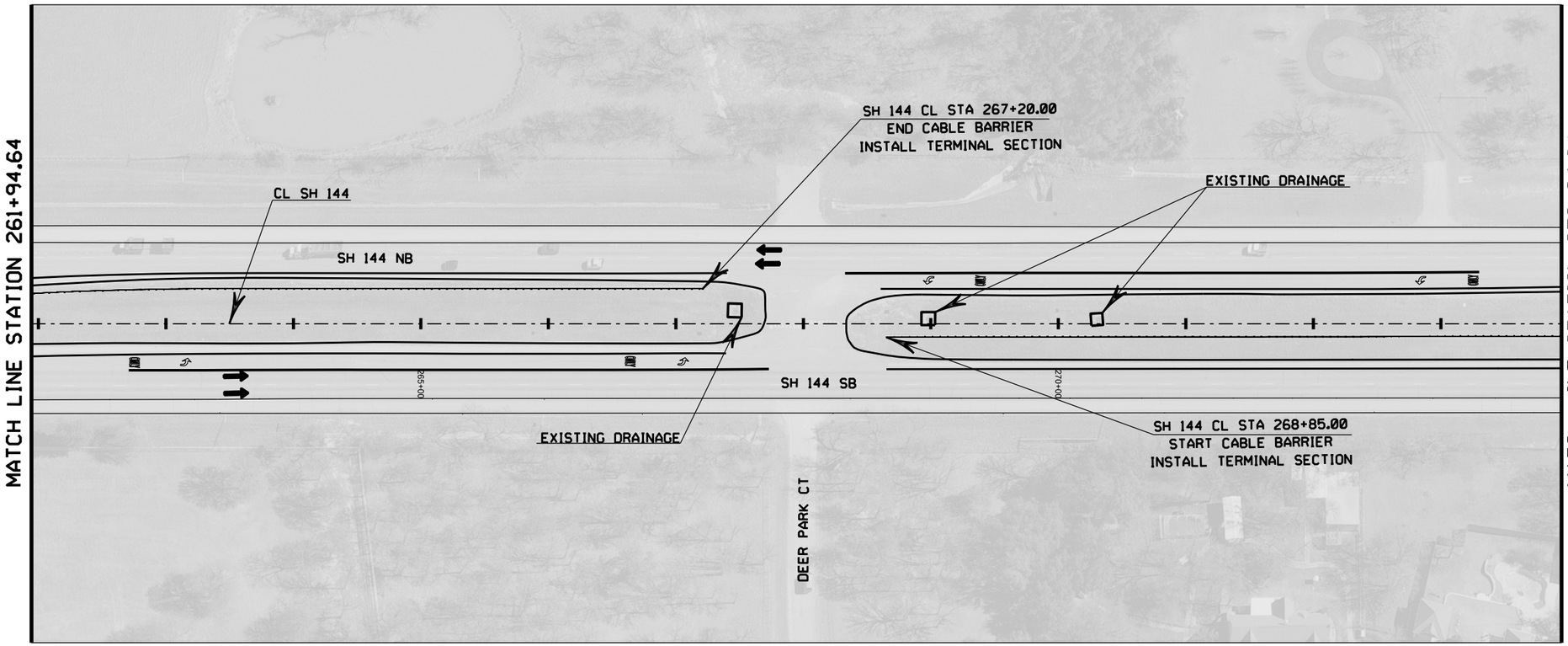
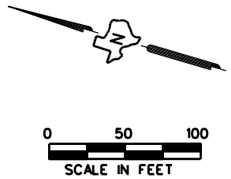
SH 144
ROADWAY LAYOUT

Texas Department of Transportation

SHEET 9 OF 16

FHWA DIVISION	PROJECT NO.			HIGHWAY NO.
6	SEE TITLE SHEET			SH144
STATE	COUNTY			SHEET NO.
TEXAS	HOOD			32
DISTRICT	CONTROL	SECTION	JOB	
FTW	0385	04	053	





NOTES:
①CABLE BARRIER IS TO BE 12 FEET OFFSET FROM NB INSIDE TRAVEL LANE AT SHOULDER / MAINLANE INTERFACE
②CABLE BARRIER IS TO BE 25 FEET OFFSET FROM SB INSIDE TRAVEL LANE AT SHOULDER / MAINLANE INTERFACE
③IF NEEDED MIN 12 FEET OFFSET CAN BE INCREASED WITH ENGINEER APPROVAL
④IF NEEDED 25 FEET OFFSET CAN BE CHANGED WITH ENGINEER APPROVAL

LEGEND

- TRAFFIC FLOW
- BIO EROSION LOG AT EX INLET /S.E.T
- PROP CABLE BARRIER
- EXISTING CULVERT

CSJ 0385-04-053 SHEET TOTAL	UNIT	QUANTITY
PREP ROW	STA	12.00
CELL FBR MLCH SHEET (PERM)(RURAL)(SANDY)	SY	690
VEGETATIVE WATERING	MG	24.15
RIPRAP MOW STRIP 5"	CY	47.92
BIODEG EROSION CONTROL LOGS (INSTALL)	LF	120
BIODEG EROSION CONTROL LOGS (REMOVE)	LF	120
CABLE BARRIER SYSTEM (TL-4)	LF	1035
CABLE BARRIER TERMINAL SECTION (TL-4)	EA	2
INSTL DEL ASSM (D-DY)SZ I(YFLX)GND	EA	2
INSTL DEL ASSM (D-SY)SZ I(BRF)(GF2)(BI)	EA	10

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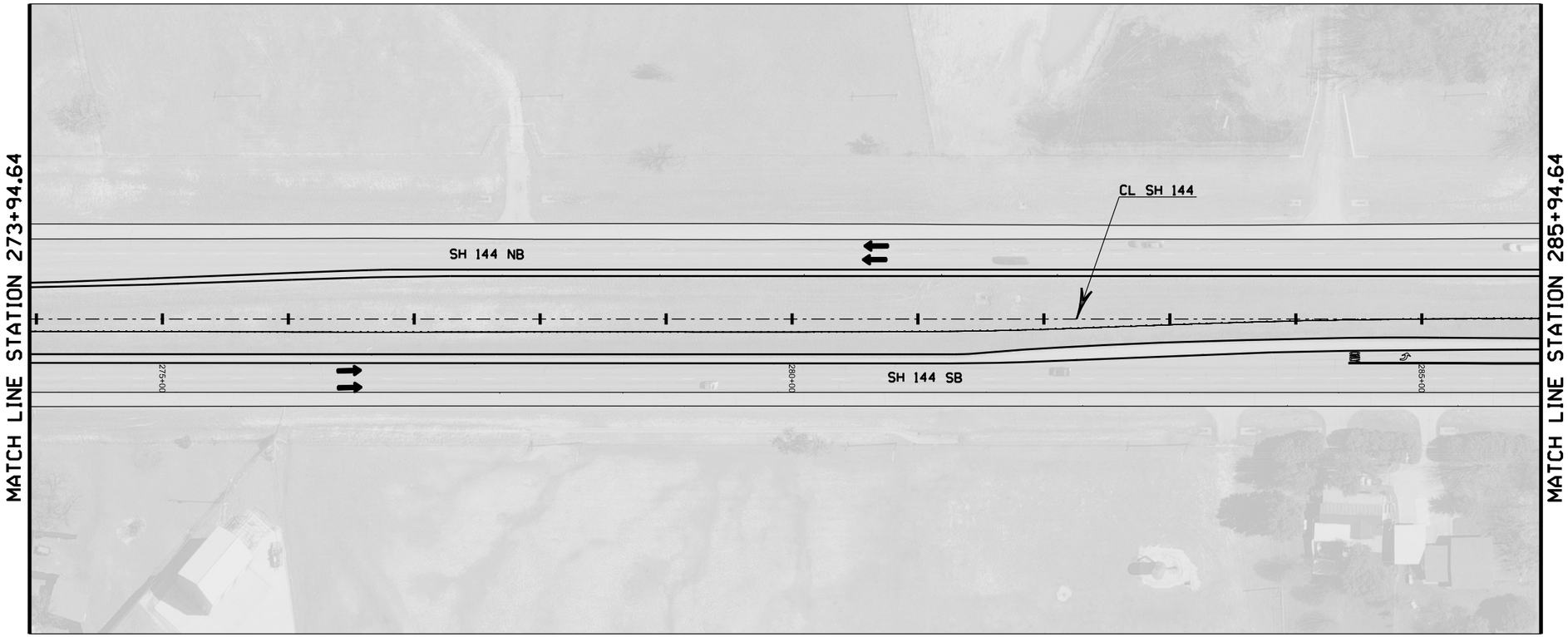
SH 144

ROADWAY LAYOUT

Texas Department of Transportation

SHEET 10 OF 16

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH144
STATE	COUNTY		SHEET NO.
TEXAS	HOOD		
DISTRICT	CONTROL	SECTION	JOB
FTW	0385	04	053



0 50 100
SCALE IN FEET

NOTES:
① CABLE BARRIER IS TO BE 25 FEET OFFSET FROM SB INSIDE TRAVEL LANE AT SHOULDER / MAINLANE INTERFACE
② IF NEEDED 25 FEET OFFSET CAN BE CHANGED WITH ENGINEER APPROVAL

LEGEND

- TRAFFIC FLOW
- BIO EROSION LOG AT EX INLET /S.E.T
- PROP CABLE BARRIER
- EXISTING CULVERT

CSJ 0385-04-053 SHEET TOTAL	UNIT	QUANTITY
PREP ROW	STA	12.00
CELL FBR MLCH SHEET (PERM)(RURAL)(SANDY)	SY	798.67
VEGETATIVE WATERING	MG	27.95
RIPRAP MOW STRIP 5'	CY	55.46
BIODEG EROSION CONTROL LOGS (INSTALL)	LF	0
BIODEG EROSION CONTROL LOGS (REMOVE)	LF	0
CABLE BARRIER SYSTEM (TL-4)	LF	1198
CABLE BARRIER TERMINAL SECTION (TL-4)	EA	0
INSTL DEL ASSM (D-DY)SZ 1(YFLX)GND	EA	0
INSTL DEL ASSM (D-SY)SZ 1(BRF)(GF2)(BI)	EA	12

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4848DA2AA1AB440...

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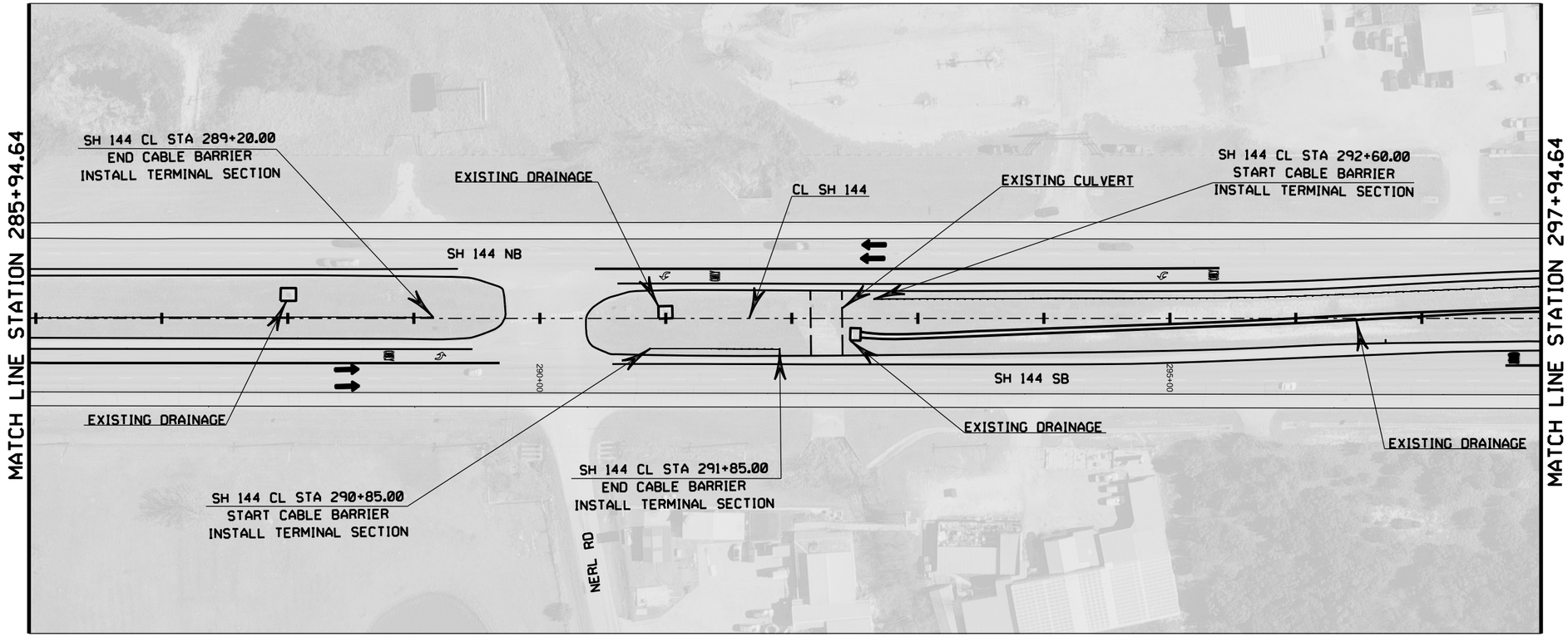
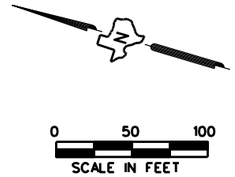
SH 144
ROADWAY LAYOUT

Texas Department of Transportation

SHEET 11 OF 16

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH144
STATE	COUNTY		SHEET NO.
TEXAS	HOOD		
DISTRICT	CONTROL	SECTION	JOB
FTW	0385	04	053





NOTES:
①CABLE BARRIER IS TO BE 25 FEET OFFSET FROM SB INSIDE TRAVEL LANE AT SHOULDER / MAINLANE INTERFACE
②CABLE BARRIER IS TO BE 12 FEET OFFSET FROM SB INSIDE TRAVEL LANE AT SHOULDER / MAINLANE INTERFACE
③CABLE BARRIER IS TO BE 12 FEET OFFSET FROM NB INSIDE TRAVEL LANE AT SHOULDER / MAINLANE INTERFACE
④IF NEEDED 25 FEET OFFSET CAN BE CHANGED WITH ENGINEER APPROVAL
⑤IF NEEDED MIN 12 FEET OFFSET CAN BE INCREASED WITH ENGINEER APPROVAL
⑥CABLE BARRIER TO STOP 25 FT PRIOR TO CULVERT
⑦CABLE BARRIER TO RESUME 25 FT AFTER CULVERT

LEGEND

- TRAFFIC FLOW
- BIO EROSION LOG AT EX INLET /S.E.T
- PROP CABLE BARRIER
- EXISTING CULVERT

CSJ 0385-04-053 SHEET TOTAL	UNIT	QUANTITY
PREP ROW	STA	12.00
CELL FBR MLCH SHEET (PERM)(RURAL)(SANDY)	SY	656.67
VEGETATIVE WATERING	MG	24.15
RIPRAP MOW STRIP 5"	CY	45.60
BIODEG EROSION CONTROL LOGS (INSTALL)	LF	570
BIODEG EROSION CONTROL LOGS (REMOVE)	LF	570
CABLE BARRIER SYSTEM (TL-4)	LF	985
CABLE BARRIER TERMINAL SECTION (TL-4)	EA	4
INSTL DEL ASSM (D-DY)SZ I(YFLX)GND	EA	4
INSTL DEL ASSM (D-SY)SZ I(BRF)(GF2)(BI)	EA	10

STATE OF TEXAS
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4848DA2AA1AB440...

5/10/2024

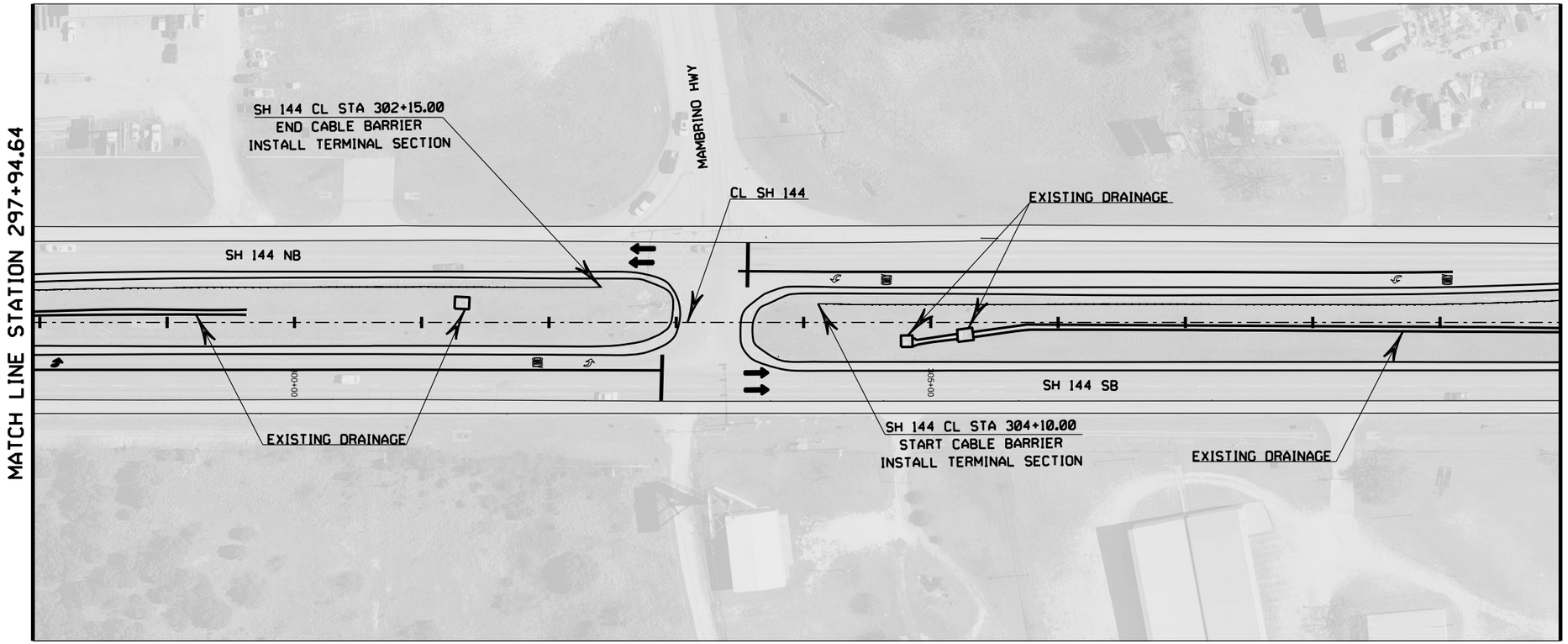
SH 144

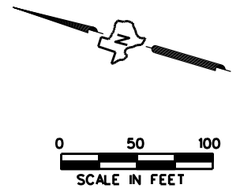
ROADWAY LAYOUT

Texas Department of Transportation

SHEET 12 OF 16

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH144
STATE	COUNTY		SHEET NO.
TEXAS	HOOD		
DISTRICT	CONTROL	SECTION	JOB
FTW	0385	04	053





NOTES:
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② CABLE BARRIER IS TO BE 12 FEET OFFSET FROM NB INSIDE TRAVEL LANE AT SHOULDER / MAINLANE INTERFACE
③ IF NEEDED MIN 12 FEET OFFSET CAN BE INCREASED WITH ENGINEER APPROVAL

LEGEND

- TRAFFIC FLOW
- BIO EROSION LOG AT EX INLET /S.E.T
- PROP CABLE BARRIER
- EXISTING CULVERT

CSJ 0385-04-053 SHEET TOTAL	UNIT	QUANTITY
PREP ROW	STA	12.00
CELL FBR MLCH SHEET (PERM)(RURAL)(SANDY)	SY	690.00
VEGETATIVE WATERING	MG	24.15
RIPRAP MOW STRIP 5'	CY	47.92
BIODEG EROSION CONTROL LOGS (INSTALL)	LF	680
BIODEG EROSION CONTROL LOGS (REMOVE)	LF	680
CABLE BARRIER SYSTEM (TL-4)	LF	1035
CABLE BARRIER TERMINAL SECTION (TL-4)	EA	2
INSTL DEL ASSM (D-DY)SZ 1(YFLX)GND	EA	2
INSTL DEL ASSM (D-SY)SZ 1(BRF)(GF2)(BI)	EA	10

STATE OF TEXAS
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4848DA2AA1AB440...

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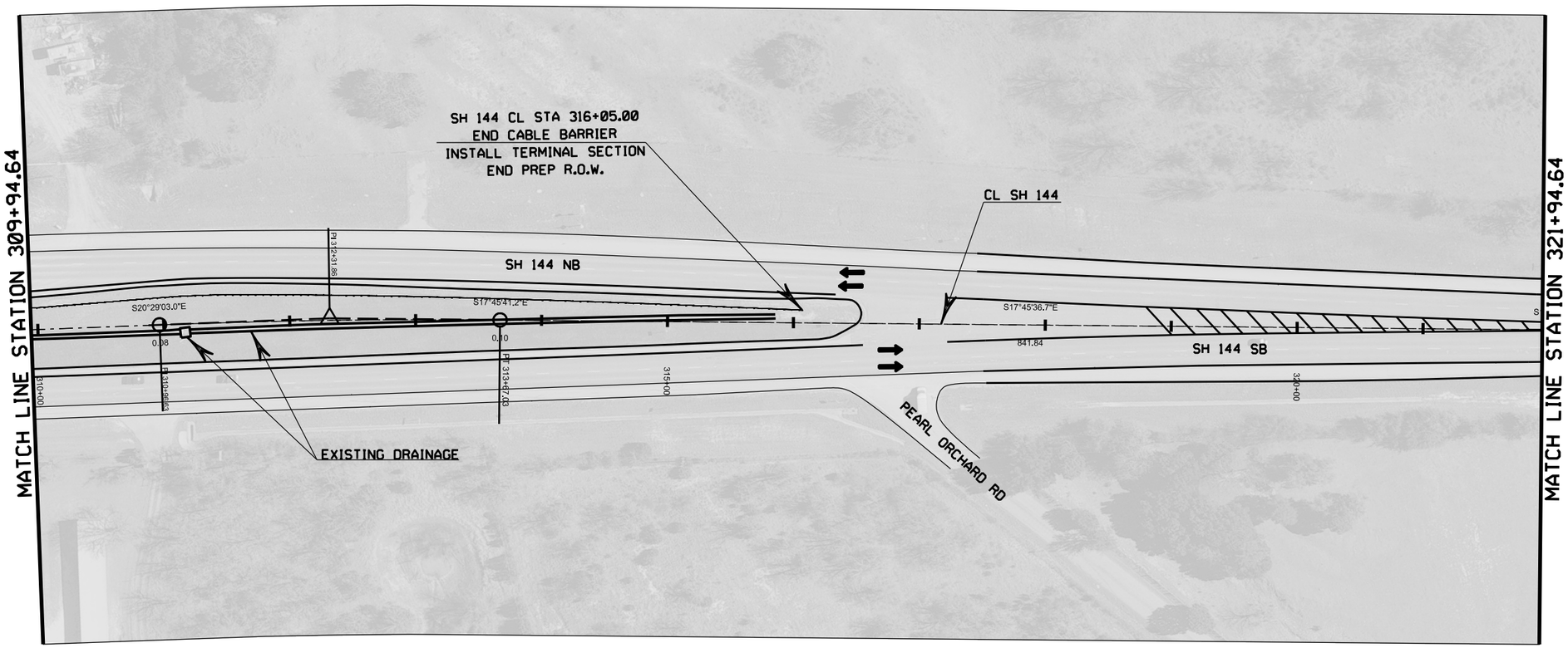
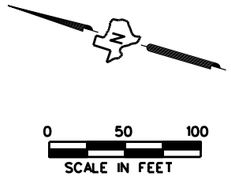
SH 144
ROADWAY LAYOUT

Texas Department of Transportation

SHEET 13 OF 16

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH144
STATE	COUNTY		SHEET NO.
TEXAS	HOOD		36
DISTRICT	CONTROL	SECTION	JOB
FTW	0385	04	053





NOTES:
① CABLE BARRIER IS TO BE 12 FEET OFFSET FROM NB INSIDE TRAVEL LANE AT SHOULDER / MAINLANE INTERFACE
② IF NEEDED MIN 12 FEET OFFSET CAN BE INCREASED WITH ENGINEER APPROVAL

LEGEND

- TRAFFIC FLOW
- BIO EROSION LOG AT EX INLET /S.E.T
- PROP CABLE BARRIER
- EXISTING CULVERT

CSJ 0385-04-053 SHEET TOTAL	UNIT	QUANTITY
PREP ROW	STA	6.00
CELL FBR MLCH SHEET (PERM)(RURAL)(SANDY)	SY	406.67
VEGETATIVE WATERING	MG	14.23
RIPRAP MOW STRIP 5'	CY	28.24
BIODEG EROSION CONTROL LOGS (INSTALL)	LF	530
BIODEG EROSION CONTROL LOGS (REMOVE)	LF	530
CABLE BARRIER SYSTEM (TL-4)	LF	610
CABLE BARRIER TERMINAL SECTION (TL-4)	EA	1
INSTL DEL ASSM (D-DY)SZ 1(YFLX)GND	EA	1
INSTL DEL ASSM (D-SY)SZ 1(BRF)(GF2)(BI)	EA	6

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4848DA2AA1AB440...

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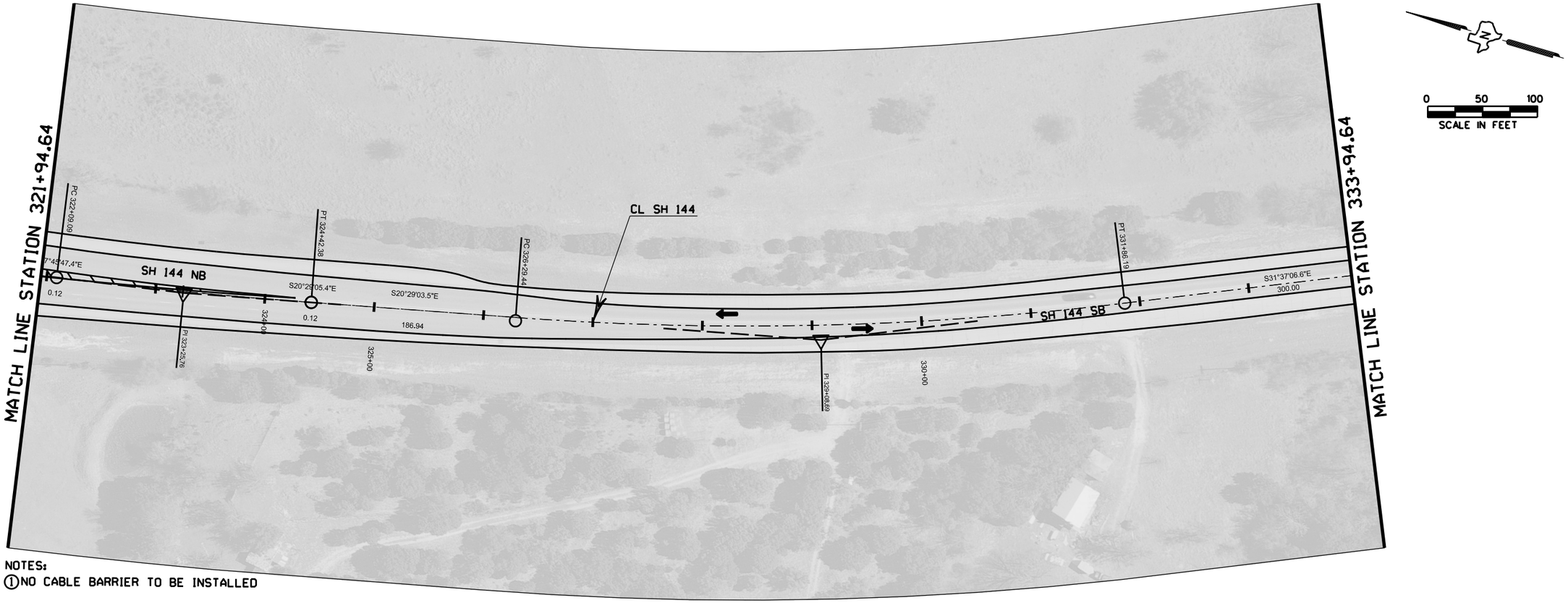
SH 144
ROADWAY LAYOUT

Texas Department of Transportation

SHEET 14 OF 16

FHWA DIVISION	PROJECT NO.			HIGHWAY NO.
6	SEE TITLE SHEET			SH144
STATE	COUNTY			SHEET NO.
TEXAS	HOOD			37
DISTRICT	CONTROL	SECTION	JOB	
FTW	0385	04	053	



NOTES:
① NO CABLE BARRIER TO BE INSTALLED

LEGEND

- TRAFFIC FLOW
- BIO EROSION LOG AT EX INLET /S.E.T
- PROP CABLE BARRIER
- EXISTING CULVERT

CSJ 0385-04-053 SHEET TOTAL	UNIT	QUANTITY
PREP ROW	STA	0.00
CELL FBR MLCH SHEET (PERM)(RURAL)(SANDY)	SY	0.00
VEGETATIVE WATERING	MG	0.00
RIPRAP MOW STRIP 5"	CY	0.00
BIODEG EROSION CONTROL LOGS (INSTALL)	LF	0.00
BIODEG EROSION CONTROL LOGS (REMOVE)	LF	0.00
CABLE BARRIER SYSTEM (TL-4)	LF	0.00
CABLE BARRIER TERMINAL SECTION (TL-4)	EA	0.00
INSTL DEL ASSM (D-DY)SZ 1(YFLX)GND	EA	0.00
INSTL DEL ASSM (D-SY)SZ 1(BRF)(GF2)(BI)	EA	0.00

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SH 144
ROADWAY LAYOUT

Texas Department of Transportation

SHEET 15 OF 16

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH144
STATE	COUNTY		SHEET NO.
TEXAS	HOOD		
DISTRICT	CONTROL	SECTION	JOB
FTW	0385	04	053

0 50 100
SCALE IN FEET

NOTES:
① NO CABLE BARRIER TO BE INSTALLED

LEGEND

- TRAFFIC FLOW
- BIO EROSION LOG AT EX INLET /S.E.T
- PROP CABLE BARRIER
- EXISTING CULVERT

CSJ 0385-04-053 SHEET TOTAL	UNIT	QUANTITY
PREP ROW	STA	0.00
CELL FBR MLCH SHEET (PERM)(RURAL)(SANDY)	SY	0.00
VEGETATIVE WATERING	MG	0.00
RIPRAP MOW STRIP 5'	CY	0.00
BIODEG EROSION CONTROL LOGS (INSTALL)	LF	0.00
BIODEG EROSION CONTROL LOGS (REMOVE)	LF	0.00
CABLE BARRIER SYSTEM (TL-4)	LF	0.00
CABLE BARRIER TERMINAL SECTION (TL-4)	EA	0.00
INSTL DEL ASSM (D-DY)SZ 1(YFLX)GND	EA	0.00
INSTL DEL ASSM (D-SY)SZ 1(BRF)(GF2)(BI)	EA	0.00

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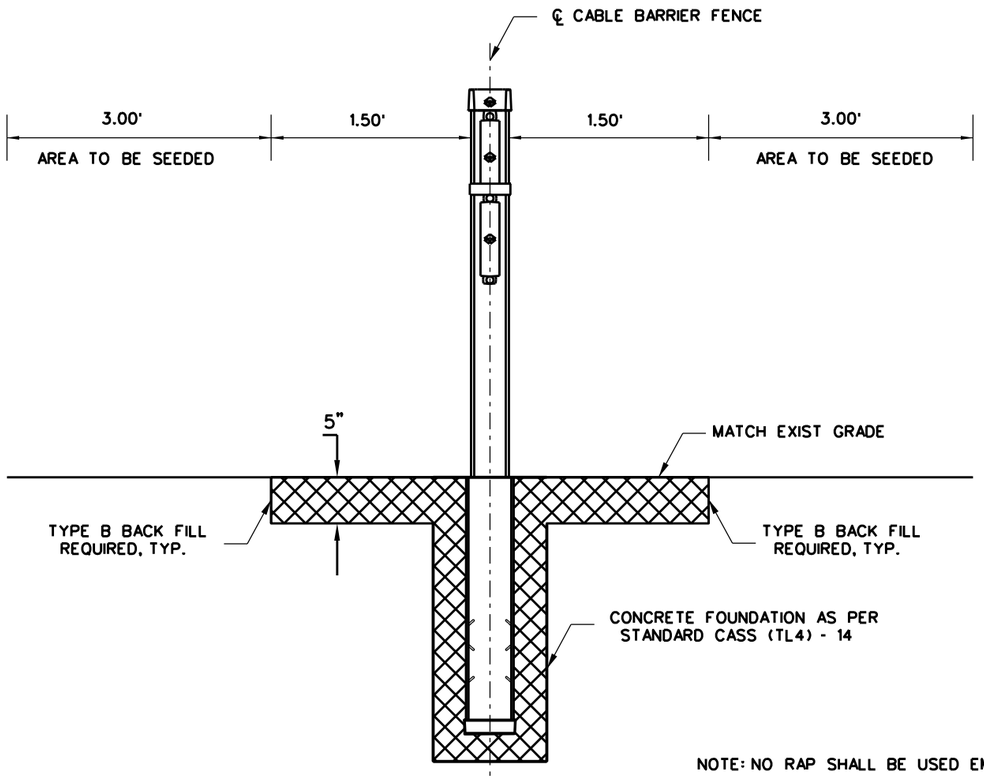
SH 144
ROADWAY LAYOUT

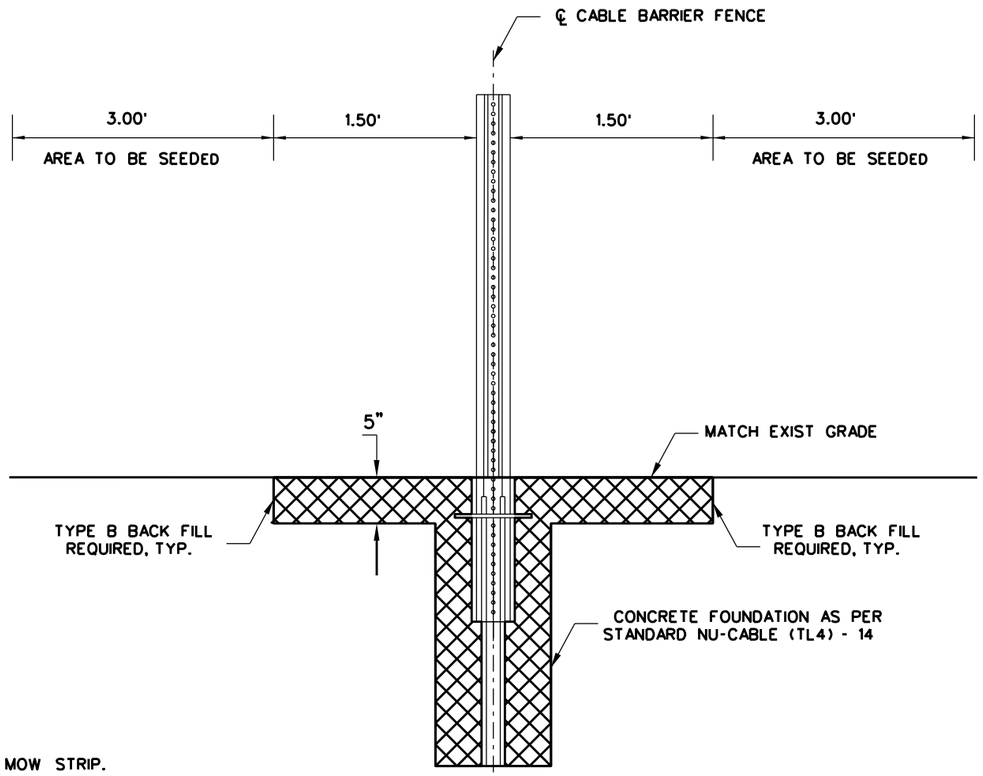
Texas Department of Transportation

SHEET 16 OF 16

FHWA DIVISION	PROJECT NO.			HIGHWAY NO.
6	SEE TITLE SHEET			SH144
STATE	COUNTY			SHEET NO.
TEXAS	HOOD			39
DISTRICT	CONTROL	SECTION	JOB	
FTW	0385	04	053	



MOW STRIP DETAIL
CASS (TL4) - 14



MOW STRIP DETAIL
NU-CABLE (TL4) - 14

NOTE: NO RAP SHALL BE USED EMBANKMENT UNDER THE MOW STRIP.
MOW STRIP WILL BE REINFORCED WITH THE WIRE MESS OR COVENTION STEEL.
NO FIBER REINFORCED CONCRETE WILL BE ALLOWED IN MOW STRIP CONSTRUCTION.

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142306
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4848DA2AA1AB440...

MOW STRIP DETAILS

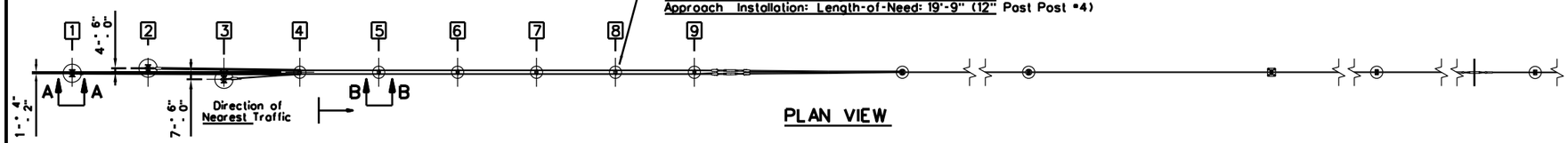
Texas Department of Transportation

SHEET 1 OF 1

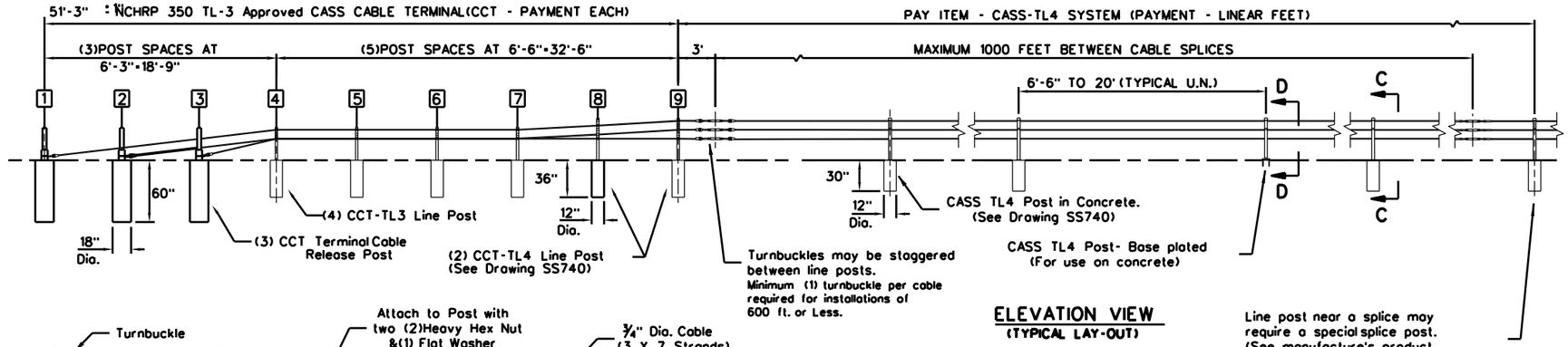
FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH144
STATE	COUNTY		SHEET NO.
TEXAS	HOOD		
DISTRICT	CONTROL	SECTION / JOB	40
FTW	0385	04 / 053	

Preferred Installation: Locate post #2 away from nearest traffic.
System has been succesfully tested with opposite installation.

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

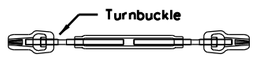


PLAN VIEW



ELEVATION VIEW
(TYPICAL LAY-OUT)

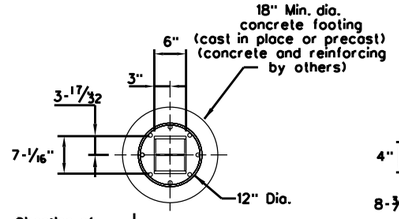
Line post near a splice may require a special splice post. (See manufacture's product manual for details)



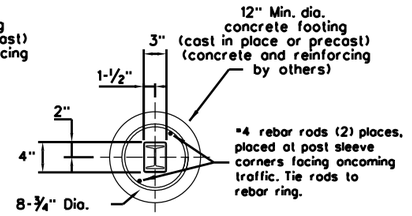
CABLE SPLICE WITH TURNBUCKLE
(OPEN BODY STYLE)

CABLE STUD ASSEMBLY

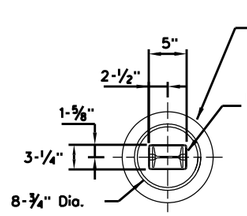
TORPEDO CABLE SPLICE



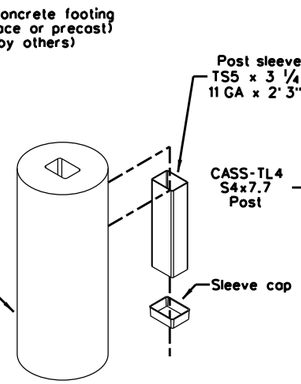
SECTION E-E



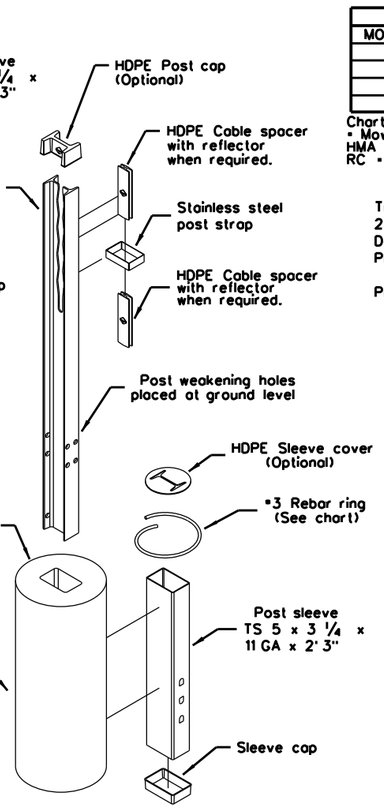
SECTION F-F



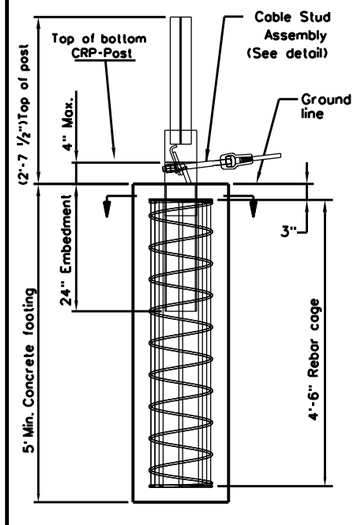
SECTION G-G



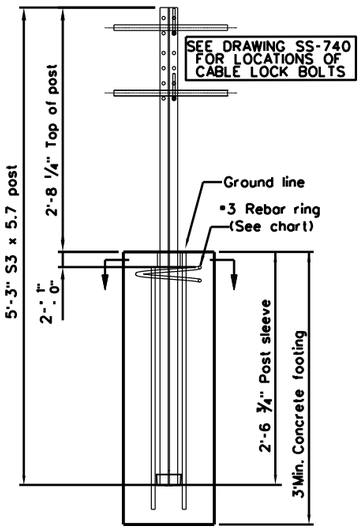
CONCRETE FOOTING
(IN QUALIFYING MOW STRIP SEE CHART)



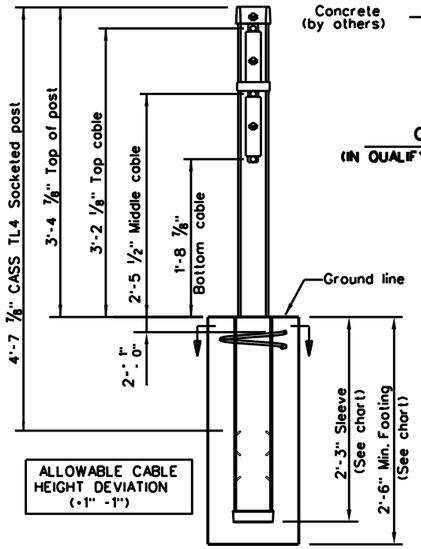
STANDARD POST & CONCRETE FOOTING
(SOCKETED POST)



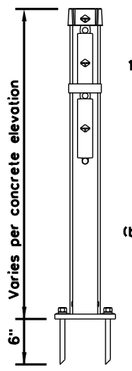
VIEW A-A
(CABLE RELEASE POST 1-3)



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



SECTION C-C
(SOCKETED POST)



SECTION D-D
(BASE PLATED POST)

GENERAL NOTES

1. 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.
2. 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.
3. 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.
4. All posts shall be socketed unless otherwise specified. All cables shall be pre-stretched unless otherwise specified.
5. For payment see Special Specification "Cable Barrier System".
6. 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".
7. 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.
8. Post foundations may be drilled through existing pavement. Please see line post foundation chart for minimum footing requirements in various applications.
9. For aesthetic purposes Trinity recommends all sleeves, driven posts, and lower cable release posts to be installed reasonably plumb (approximately 1/8" per foot).
10. 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 susceptable 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.
11. See the Texas MUTCD for proper "Barrier" Delineation.

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

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

CABLE TENSION CHART	
FAHRENHEIT	PRE-STRETCHED
DEGREES	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.

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

Product.INFO@TRIN.NET

Texas Department of Transportation — Design Division Standard

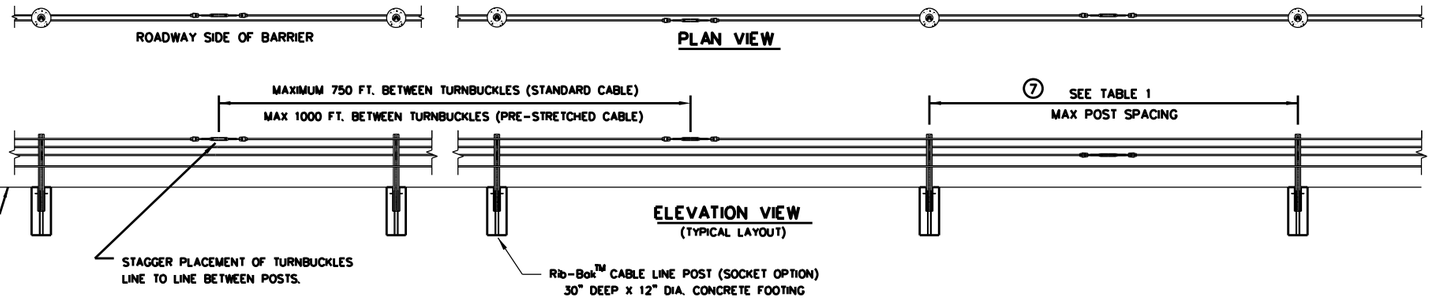
TRINITY CABLE SAFETY SYSTEM (TL-4)

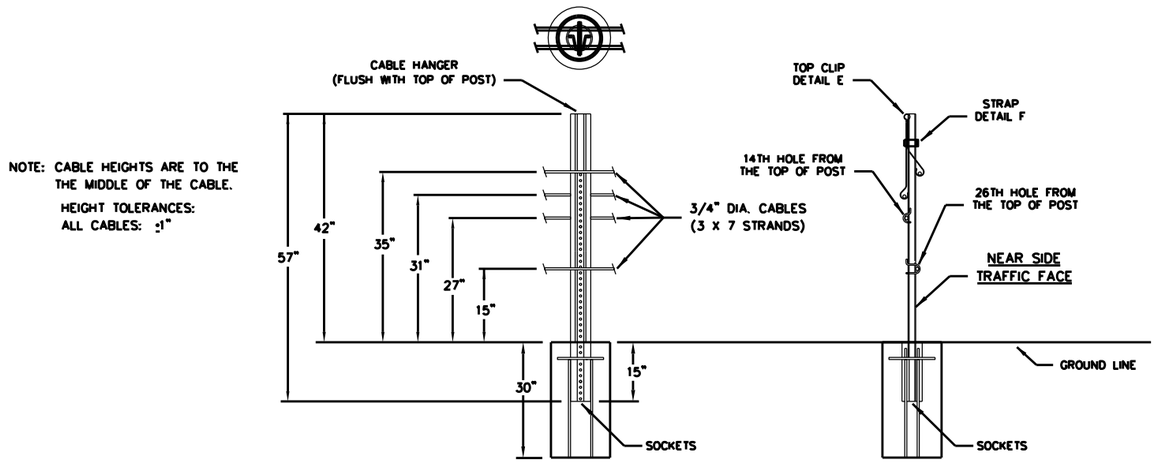
CASS(TL4)-14

FILE: casstl414.dgn	DN: TxDOT	CK: RM	DW: VP	CK:
©TxDOT: March 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0385	04	053	SH144
	DIST	COUNTY		SHEET NO.
	FTW	HOOD		41

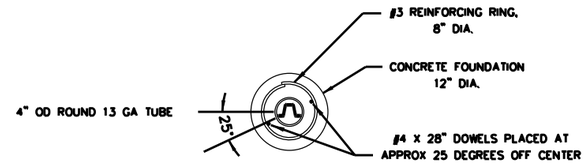
DATE:
FILE:

DATE:
FILE:

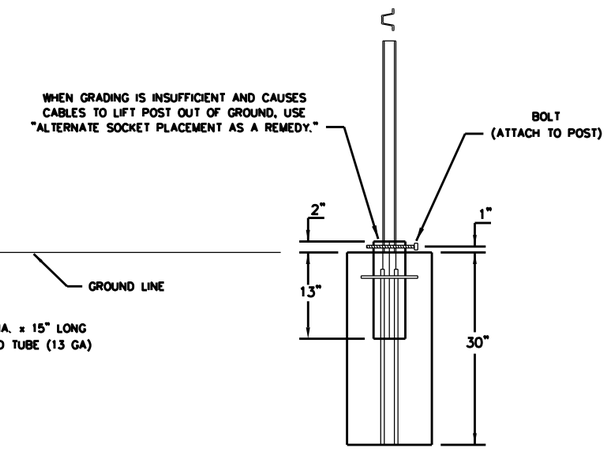




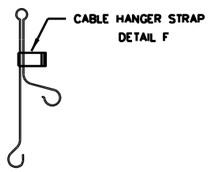
INSTALLATION DETAIL
4 CABLE 6:1



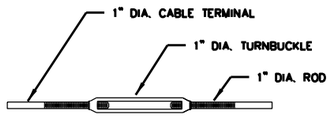
⑪ **SOCKETED POST OPTION**
(TYPE S POST)



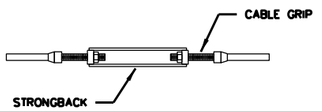
ALTERNATE SOCKET PLACEMENT
(TYPE S POST)



CABLE HANGER BRACKET
DETAIL E
(SUBJECT TO MANUFACTURER'S TOLERANCES)



WEDGED FITTING
TURNBUCKLE DETAIL
(TYPICAL)



STRONGBACK (SELF-SWAGING)
TURNBUCKLE DETAIL
(OPTIONAL)

GENERAL NOTES

1. FOR ADDITIONAL INFORMATION CONTACT YOUR DISTRIBUTOR OR NUCOR STEEL MARION, INC. AT (740) 383-4011.
2. FOR PAYMENT SEE SPECIAL SPECIFICATION "CABLE BARRIER SYSTEM".
3. FOR ADDITIONAL INFORMATION SEE THE MANUFACTURER'S PRODUCT MANUAL.
4. THE NU-CABLE SYSTEM IS DESIGNED FOR BI-DIRECTIONAL TRAFFIC FLOWS. SEE THE MANUFACTURER'S PRODUCT MANUAL FOR PLACEMENT ADJACENT TO GUARDRAIL END TREATMENTS.
5. 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.
6. THE NU-CABLE SYSTEM MAY BE INSTALLED ON EITHER SIDE OF THE ROADWAY. Rib-Bak™ CABLE LINE POSTS MAY BE SOCKETED OR DRIVEN DESIGN.
7. THE TL-4 FOR 6:1 SLOPES CAN USE 4# / LF POST. SEE TABLE #1 FOR POST SIZE PER SPACING.
8. SEE (TABLE 2) FOR TENSION AMOUNT AT SPECIFIC CABLE TEMPERATURE FOR INITIAL INSTALLATION.
9. SEE (TABLE 3) FOR TENSION AMOUNT AT SPECIFIC CABLE TEMPERATURE FOR MAINTENANCE.
10. FOURTH (LOWEST) CABLE IS NOT OPTIONAL ON THE TL-4 SYSTEM.
11. CONSULT YOUR PROJECT PLAN SHEETS AND CABLE BARRIER SPECIFICATIONS FOR DESIRED SOCKET MATERIAL.
12. 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 REQUIRMENTS.
CONSULT PRODUCT MANUAL IF GREATER DEFLECTION IS PERMISSIBLE.

⑧ **TABLE 2**

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

⑨ **TABLE 3**

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

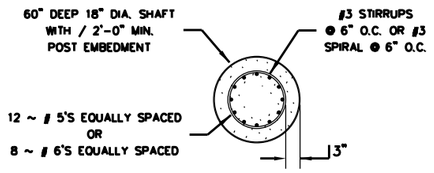
Texas Department of Transportation
Design Division Standard

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

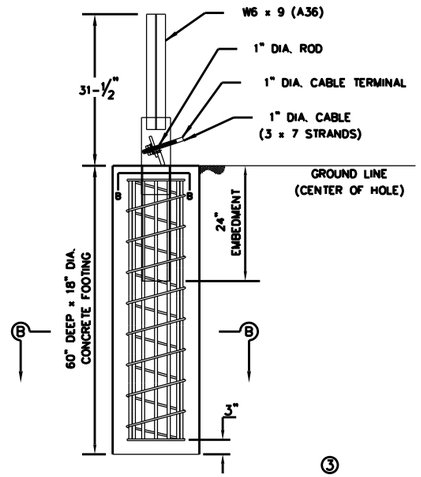
NU-CABLE(TL4)-14

FILE:	DN:	CK:	DW:	CK:
©TxDOT:	CONT	SECT	JOB	HIGHWAY
REVISIONS	0385	04	053	SH144
	DIST	COUNTY		SHEET NO.
	FTW	HOOD		42

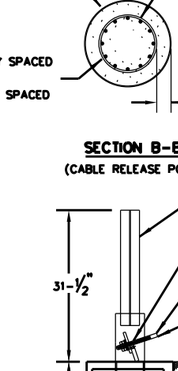
DATE:
FILE:



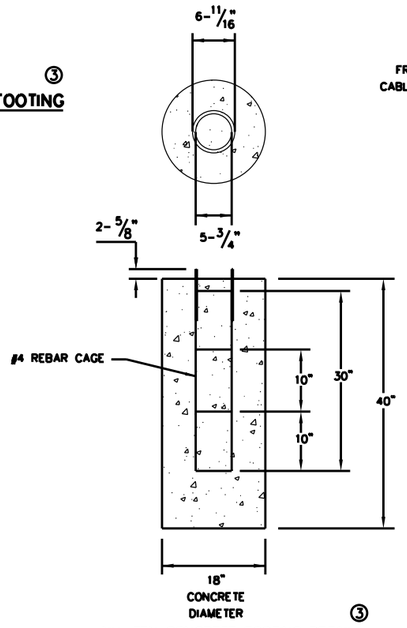
SECTION B-B
(CABLE RELEASE POST)



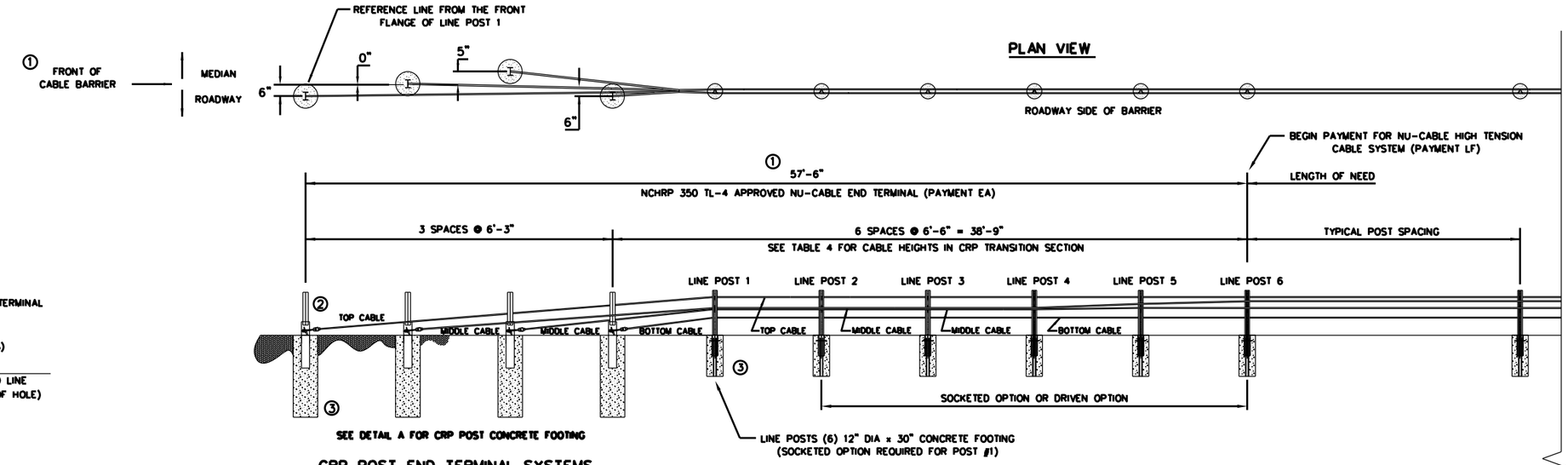
DETAIL A - CRP IN CONCRETE FOOTING
(3000 PSI MIN CONCRETE) ③



DRIVEN SOCKET OPTION



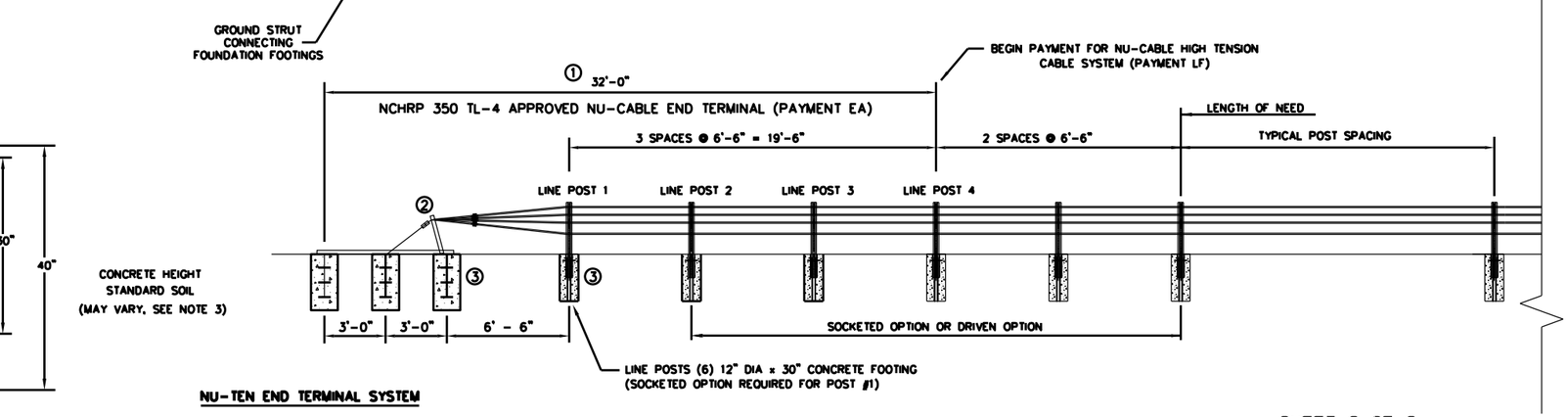
NU-TEN CONCRETE FOOTING DETAIL ③



CRP POST END TERMINAL SYSTEMS

ELEVATION VIEW

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



NU-TEN END TERMINAL SYSTEM

ELEVATION VIEW

④ 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"

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.

Texas Department of Transportation

Design Division Standard

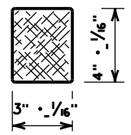
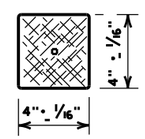
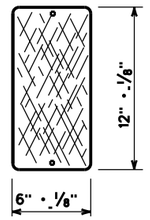
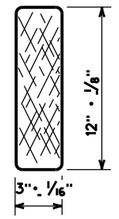
NU-CABLE BARRIER SYSTEM
(TL-4)
(4 CABLE)

NU-CABLE(TL4)-14

FILE:	DN:	CK:	DW:	CK:
© TxDOT:	CONT	SECT	JOB	HIGHWAY
REVISIONS	0385	04	053	SH144
	DIST	COUNTY		SHEET NO.
	FTW	HOOD		43

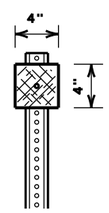
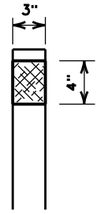
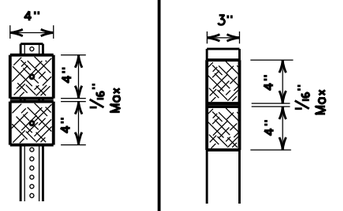
DATE: 3/8/2024 11:30:21 AM
FILE: C:\Users\RALLEN4\Documents\0385-04-053 HISP CABLE BARRIER\DGN\44 D &OM d1-20.dgn/std

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			

NOTE
1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx).
2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.

DELINEATORS

	SINGLE		DOUBLE	
DEVICE				
	1-Size 2 reflector unit	1-Size 1 reflector unit	2-Size 2 reflector units	2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

D & OM DESCRIPTIVE CODES

INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX)

NUMBER OF REFLECTORS
S • Single
D • Double

COLOR OF REFLECTORS
W • White
Y • Yellow
R • Red

REFLECTOR UNIT SIZE
1 or 2

TYPE OF POST OR DELINEATOR
WC • Wing Channel Post
YFLX • Yellow Flexible Post
WFLX • White Flexible Post
BRF • Barrier Reflector

TYPE OF MOUNT
GND • Embedded (drivable or set in concrete)
CTB • Concrete Barrier Mount
GF1 or GF2 • Guard Fence Attachment
SRF • Surface Mount

DIRECTION
If Required
BI • Bi-Directional
BR • Bi-Directional with red on back

INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)

TYPE OF OBJECT MARKER
1, 2, 3, or 4

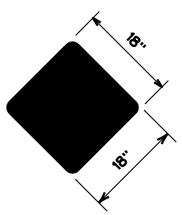
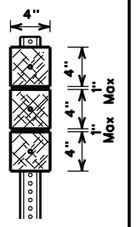
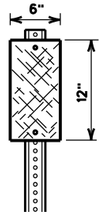
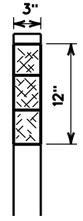
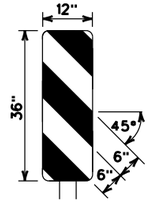
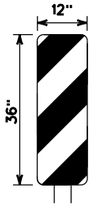
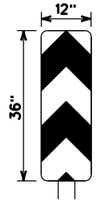
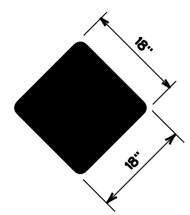
NUMBER OF REFLECTORS OR DIRECTION
X • 3-Size 2 reflector units (Type 2 only)
Y • 1-Size 3 reflector unit (Type 2 only)
Z • 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
L • Left Side (Type 3 Object Marker only)
R • Right Side (Type 3 Object Marker only)
C • Center (Type 3 Object Marker only)

TYPE OF POST
WC • Wing Channel Post
WFLX • White Flexible Post
TWT • Thin Walled Tubing

TYPE OF MOUNT
GND • Embedded (drivable)
SRF • Surface Mount
WAS • Wedge Anchor Steel
WAP • Wedge Anchor Plastic

DIRECTION
If Required
BI • Bi-Directional

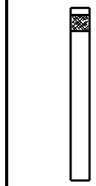
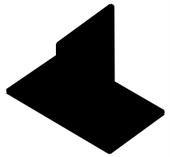
OBJECT MARKERS

	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE		 3-Size 2 reflector units	 1-Size 3 reflector unit	 3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B or C FL Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B or C FL Sheeting			Red -Type B or C FL Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

DEPARTMENTAL MATERIAL SPECIFICATIONS

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

BARRIER REFLECTORS (BRF)

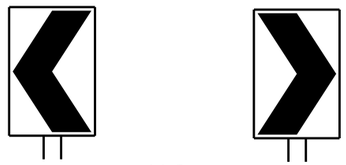
	GF1	GF2	CTB
DEVICE			

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.

SHEETING: Yellow, White, Red

NOTE
1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.

CHEVRONS

DEVICE:  W1-8

SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	

NOTE
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).

ONE DIRECTION LARGE ARROW

DEVICE:  W1-6

SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	

NOTE:
Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.

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DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

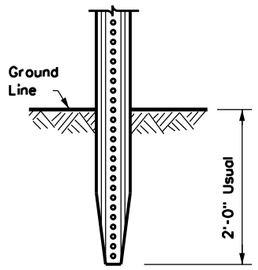
FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0385	04	053	SH144
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	FTW	HOOD		44

20A

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

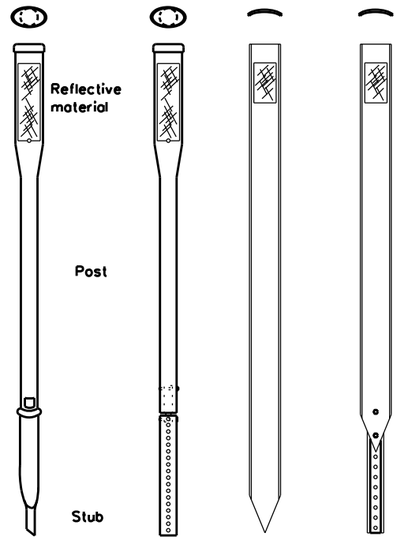


NOTES

1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only.
2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.

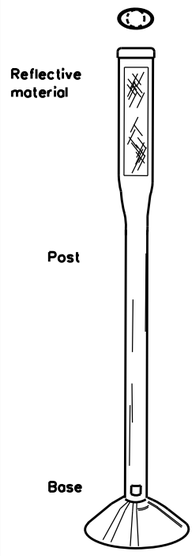
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



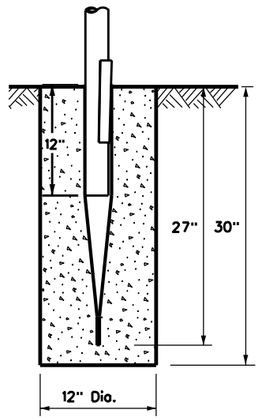
SURFACE MOUNT

NOTES

1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.
4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline or median use, the flexible posts shall be yellow.

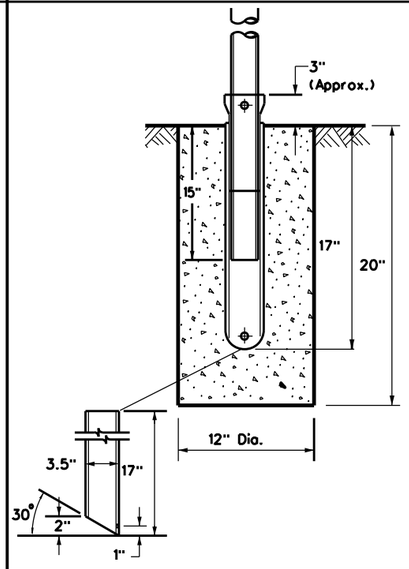
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

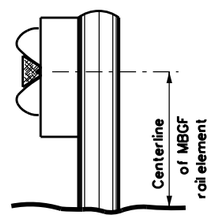
NOTE

1. Install per manufacturer's recommendations.

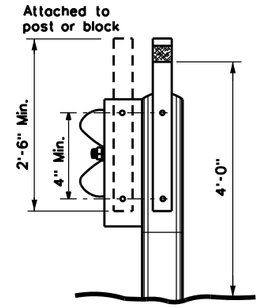
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

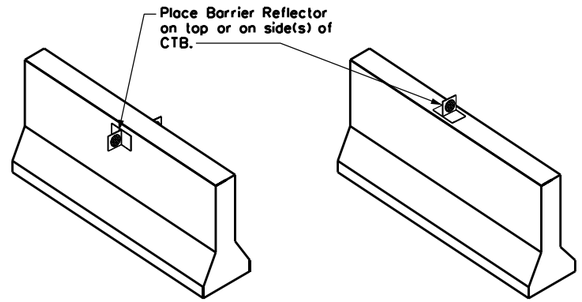
GF1



GF2



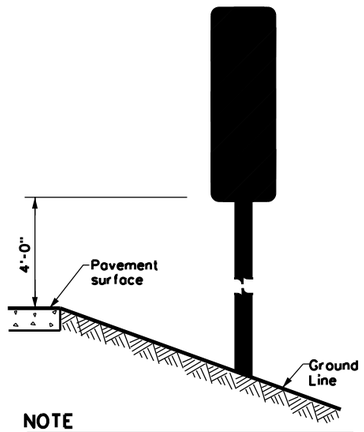
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

1. Place delineators on a section of roadway at a consistent distance from the edge of pavement.
2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction.
3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible.
4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation.
5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface.
6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.

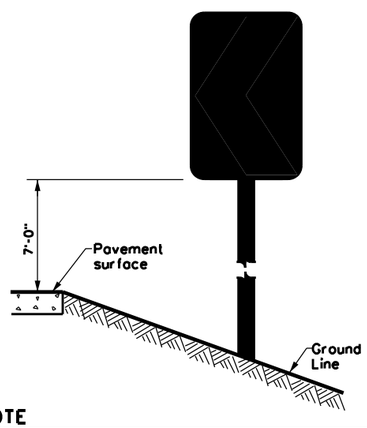
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

Mounting at 4 feet to the bottom of the chevron is permitted for chevrons that will not exceed a height of 6'-6" to the top of the chevron (sizes 24" x 30" and smaller)

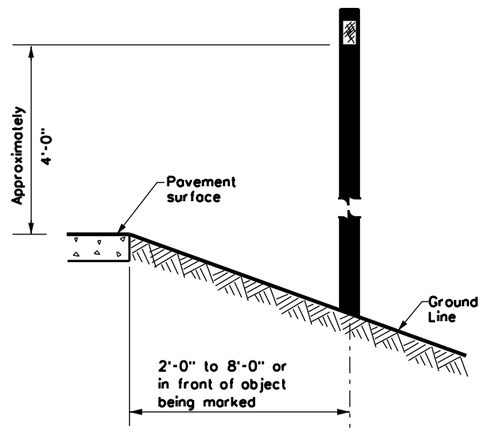
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

Chevrons 30" x 36" and larger shall be mounted at a height of 7' to the bottom of the chevron. Chevron sign and ONE DIRECTION LARGE ARROW sign (W1-9T) shall be installed per SMD standard sheets and paid under item 644.

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

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© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0385	04	053	SH144
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	FTW	HOOD		45

208

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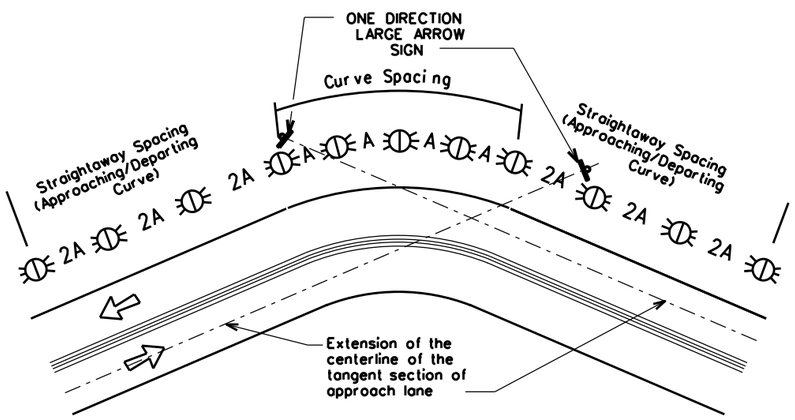
DATE: 3/8/2024 11:34:57 AM
FILE: C:\Users\RALLEN4\Documents\0385-04-053 HISP CABLE BARRIER\DGN\46 D &OM (3)-20.dgn

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

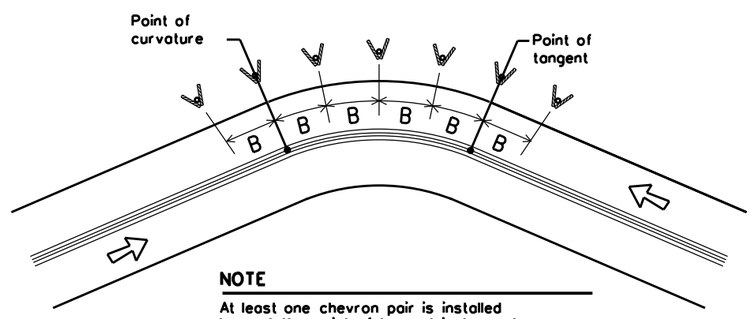
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



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

1. 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.
2. Barrier reflectors may be used to replace required delineators.
3. Single red delineators may be mounted on the back side of delineator posts for wrong way driver applications

LEGEND

	Bi-directional Delineator
	Delineator
	Sign

Texas Department of Transportation — Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-20

FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
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REVISIONS	0385	04	053	SH144
3-15 8-15	DIST	COUNTY		SHEET NO.
8-15 7-20	FTW	HOOD		46

20C

DATE: 3/8/2024 11:36:48 AM
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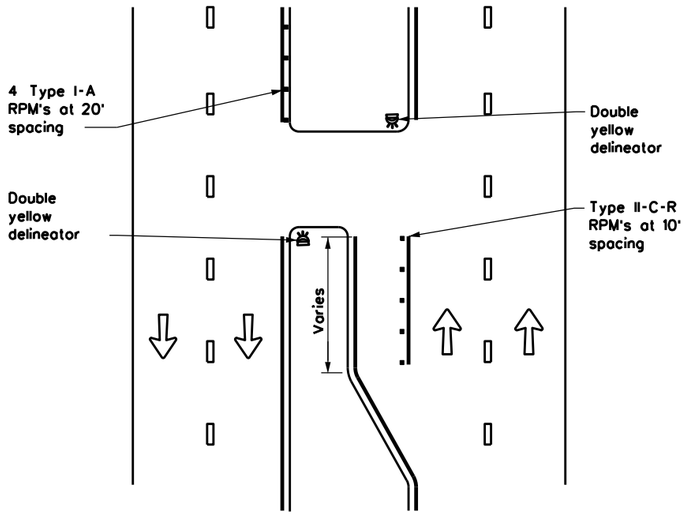
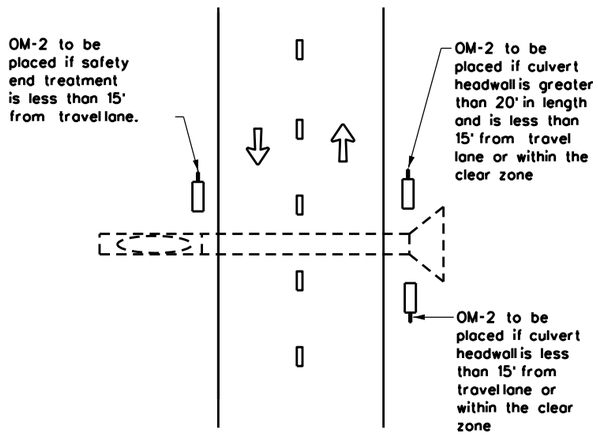
CROSSOVERS



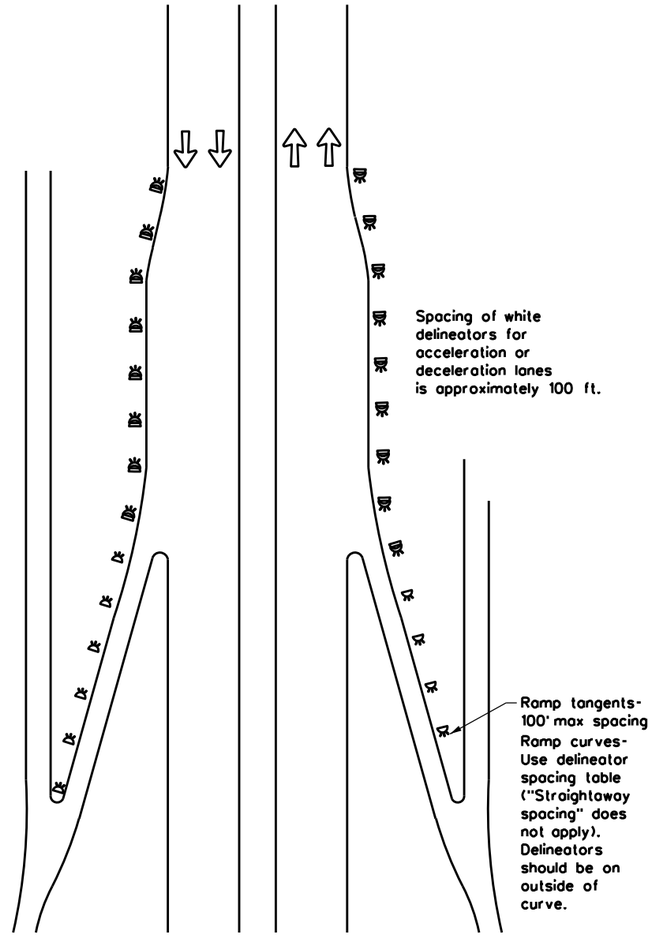
DETAIL 1

FOR CULVERTS WITHOUT MBGF



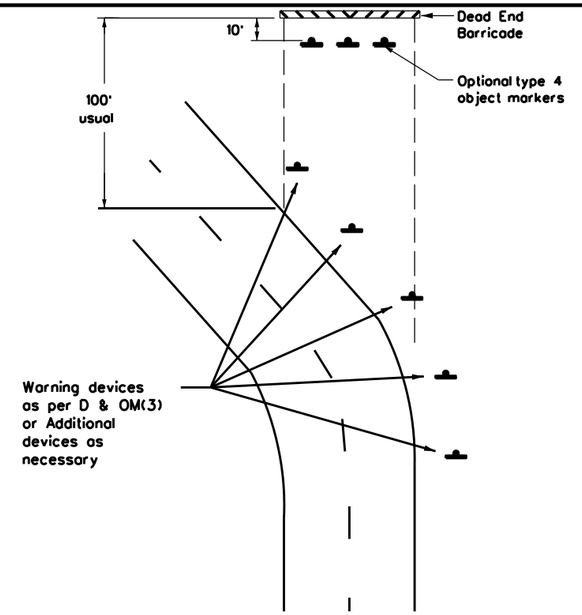
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



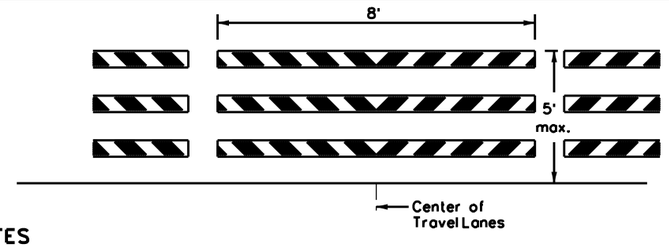
DETAIL 3

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 4

TYPICAL DEAD END BARRICADE INSTALLATION



NOTES

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

DETAIL 5

LEGEND

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

Texas Department of Transportation

Traffic Safety Division Standard

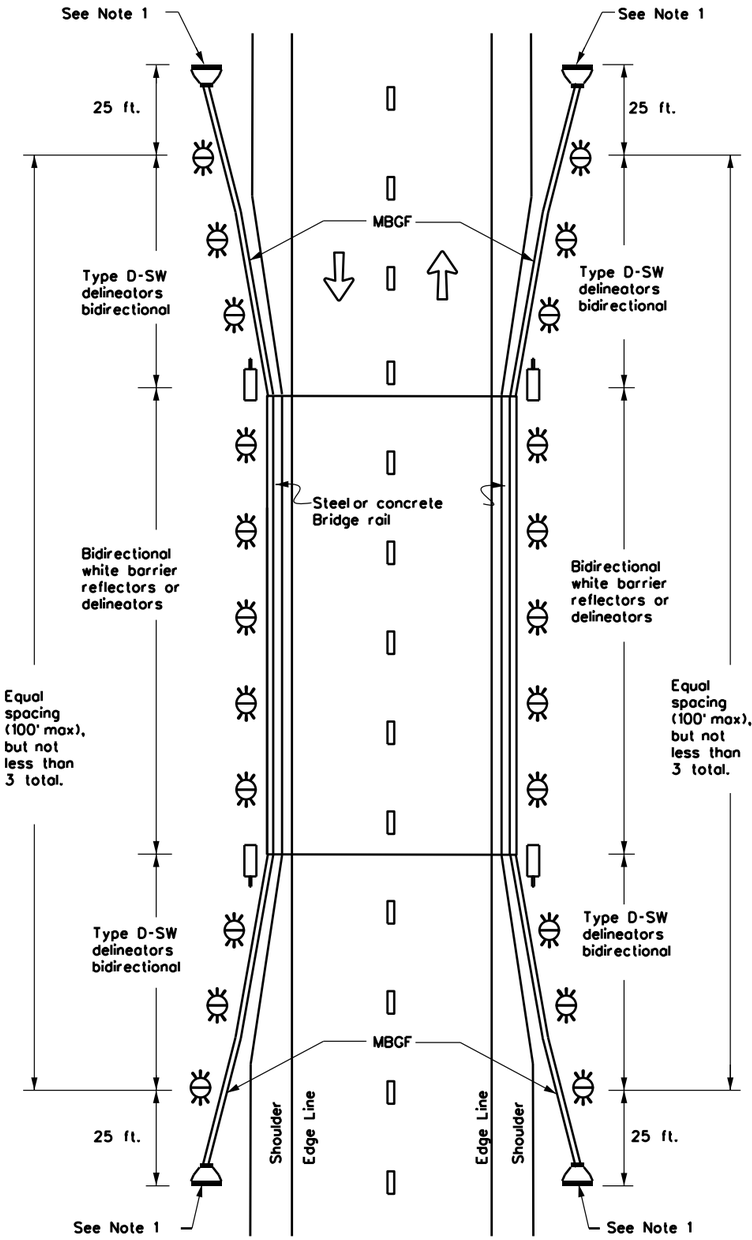
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(4)-20

FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0385	04	053	SH144
3-15 7-20	DIST	COUNTY		SHEET NO.
	FTW	HOOD		47

DATE: 3/8/2024 11:38:24 AM
FILE: C:\Users\RALLEN4\Documents\0385-04-053 HISP CABLE BARRIER\DGN\48 D &OM (5)-20.dgn

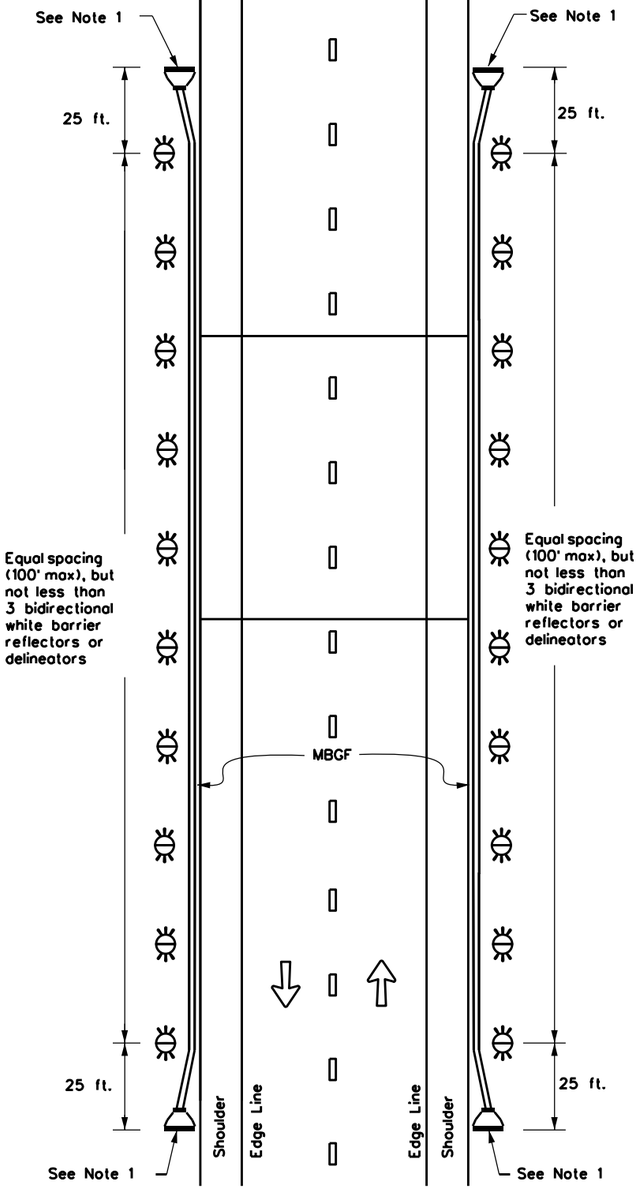
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



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.

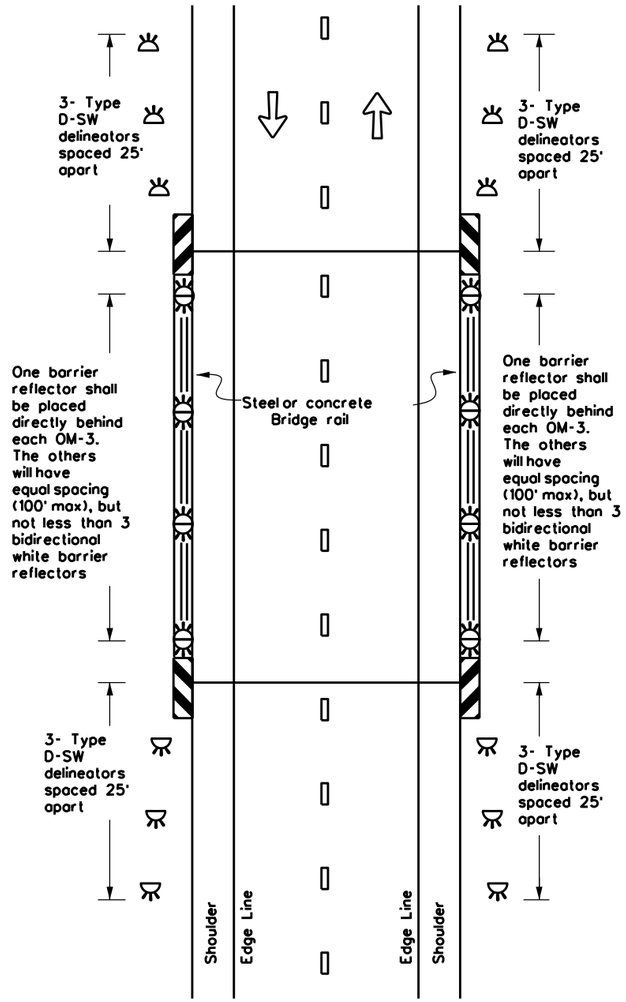
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



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

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(5)-20

FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0385	04	053	SH144
7-20	DIST	COUNTY		SHEET NO.
	FTW	HOOD		48

20E

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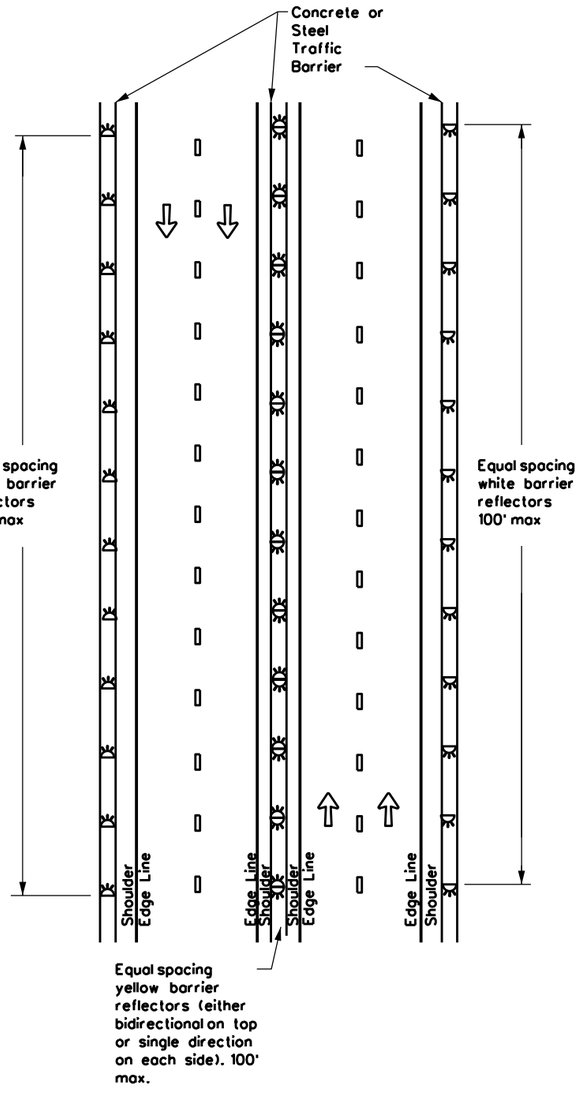
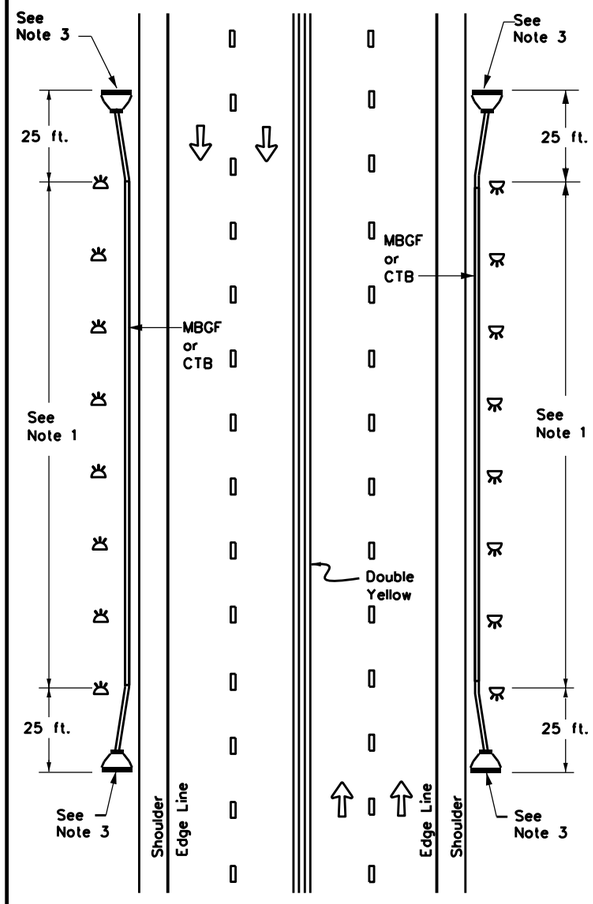
DATE:
FILE:

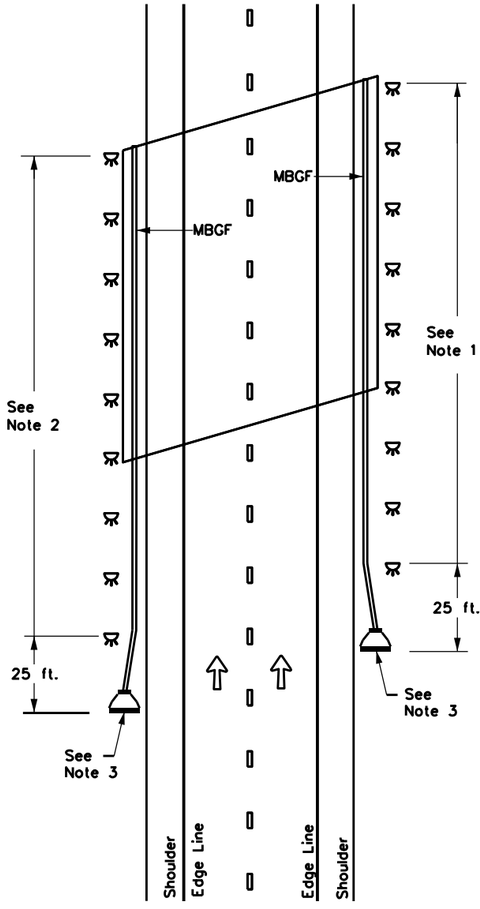
CONTINUOUS CONCRETE OR STEEL BARRIER



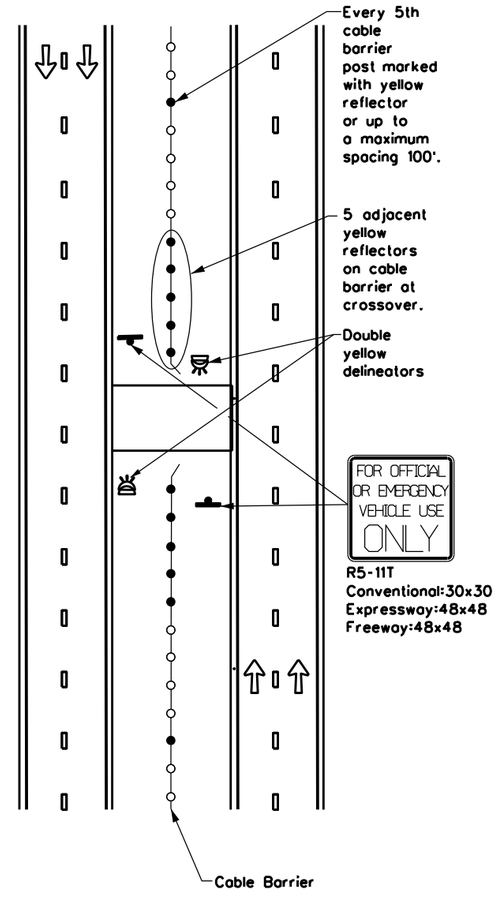
MULTI-LANE UNDIVIDED, TWO-WAY ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



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

LEGEND

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

Texas Department of Transportation

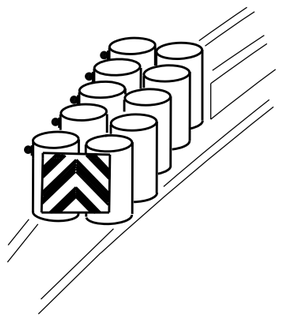
Traffic Safety Division Standard

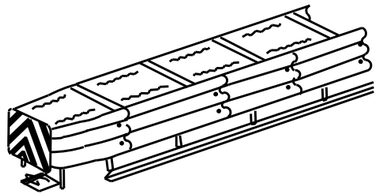
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

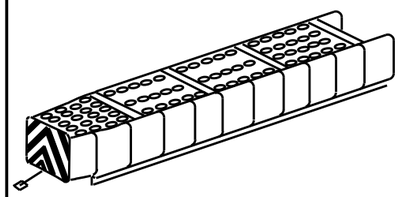
D & OM(6)-20

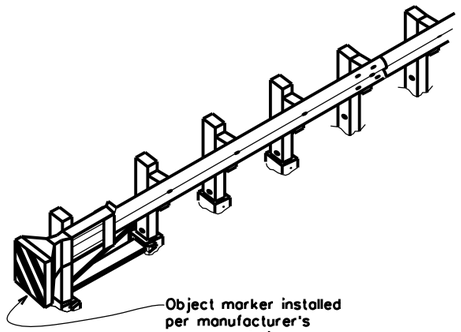
FILE: dom6-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0385	04	053	SH144
7-20	DIST	COUNTY		SHEET NO.
	FTW	HOOD		49

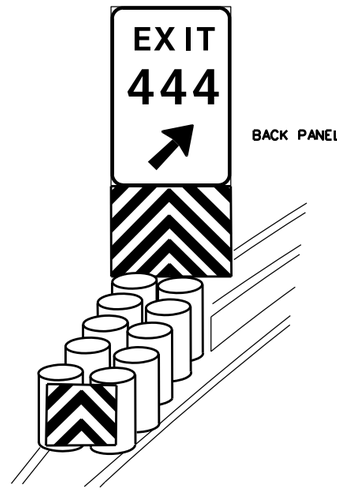
20F

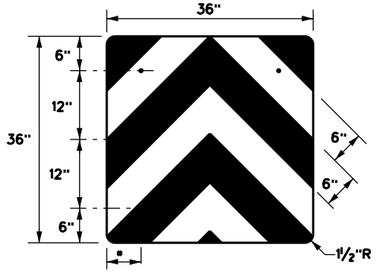


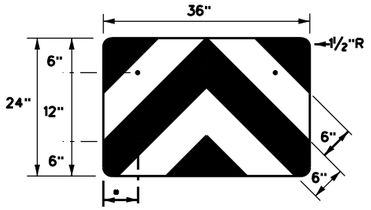




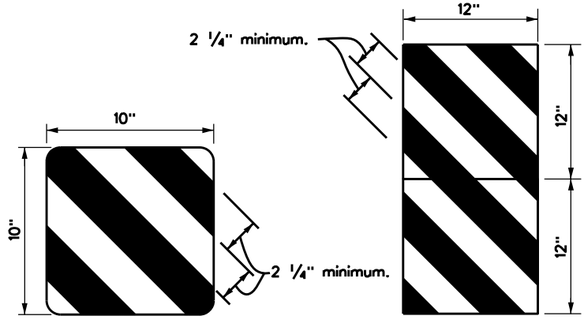




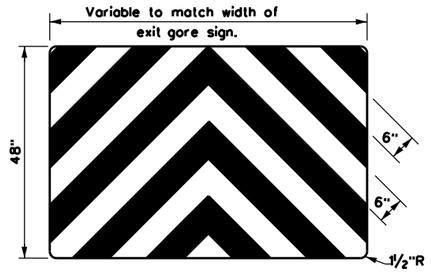


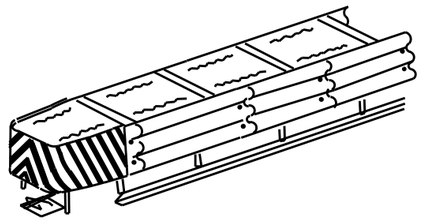


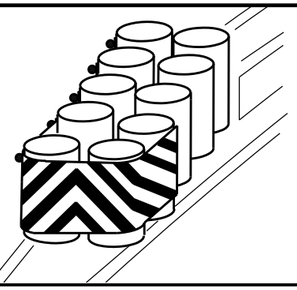
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

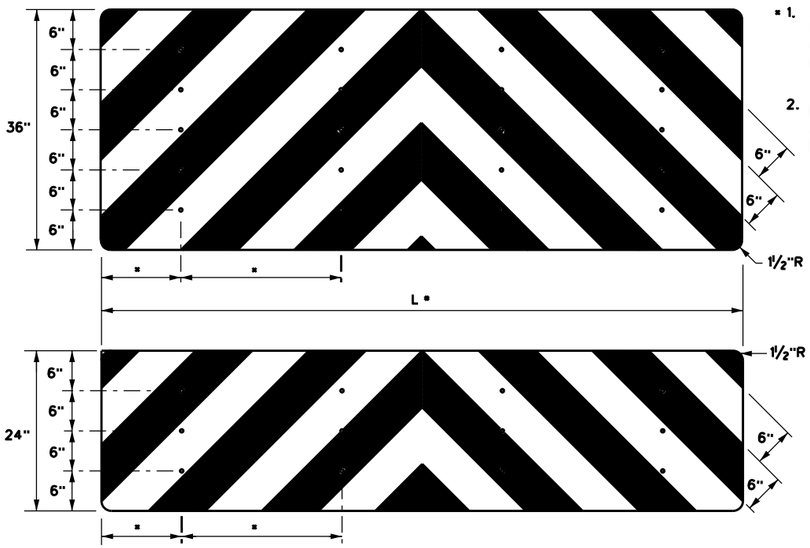


OBJECT MARKERS SMALLER THAN 3 FT^2









* 1. Spacing should be adjusted to attach through centerline of drum, per attenuator manufacturers recommendation, or as directed by the Engineer.

2. Mounting should be flush with top of attenuator. Minimum size 96" x 24".

NOTES

1. Object Markers shall conform to the Texas MUTCD and meet the color and reflectivity requirement of Department Material Specification DMS 8300. Background shall be yellow reflective sheeting (Type B or C) and Chevron shall be black.

2. Object Markers may be fabricated from adhesive backed reflective sheeting applied directly to guardrail end treatment, or applied directly to an "end cap" as per the manufacturer's recommendation. Direct applied sheeting shall provide a smooth surface and have no wrinkles, air bubbles, cuts or tears. A radius at the corners is not required for direct applied sheeting.

3. Object Marker size may be reduced to fit smaller devices. Width of alternating black and yellow stripes are typically 6". Object Markers smaller than 3ft may have reduced width stripes of a minimum of 2 ¼".

4. Pop rivets, screws, or nuts and bolts may be used to attach object markers and reflectors. Holes, slots or other openings may be cut or drilled through object markers to allow cable or other attachments.

5. Object Marker at nose of attenuator is subsidiary to the attenuator.

6. See D & OM (1-4) for required barrier reflectors.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS

D & OM(VIA)-20

FILE: domvia20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT December 1989	CONT	SECT	JOB	HIGHWAY
REVISIONS	0385	04	053	SH144
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	FTW	HOOD		50
4-98 7-20				

20G

DATE: 3/8/2024 11:44:12 AM
FILE: C:\Users\RALLEN4\Documents\0385-04-053 HISP CABLE BARRIER.DGN\50 D &OM (VIA)-20.dgn

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 adjacent MS4 Operator(s) that may receive discharges from this project. They may need to be notified prior to construction activities.
(Note: leave blank only if no adjacent MS4 operator(s) are affected)

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.

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

Best Management Practices:

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

III. CULTURAL RESOURCES

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

☒ No Action Required ☐ Required Action

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

During construction, efforts would be taken to avoid and minimize disturbance of vegetation and soils. Area within existing ROW, but outside the limits of construction, would not be disturbed. Every effort would be made to preserve trees where they would neither compromise safety nor substantially interfere with the proposed projects.

No lanscaping would be apart of the proposed project activities. Re-vegetation of disturbed area would be in compliance with the Executive Memorandum on Beneficial Lanscaping (26 Apr 94) and the Executive Order on Invasive Species (EO 13112). Regionally native and non evasive plants would be used to the extent practicable in lanscaping and re-vegetation.

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

☐ No Action Required ☒ Required Action

No disturbing, destroying, or removing active nests of Bald Eagles, including ground nesting birds, during the nesting season. Avoid the removal of unoccupied, inactive nests as practicable. Prevent the establishment of active nests during the nesting season on TxDOT owned and operated facilities and structures proposed for replacement or repair. No collecting, capturing, relocating or transporting birds, eggs, young or active nests without a permit. The Eagle Protection Act prohibits the taking or possession of and commerce in eagles, parts, feathers, nests, or eggs with limited exceptions. The definition of take includes pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb. Eagles may not be taken for any purpose unless a permit is issued prior to the taking.

Between October 1 and February 15, the contractor would remove all old migratory bird nests from any structure that would be affected by the proposed project, and complete any bridge work/demolition and/or vegetation clearing. In addition, the contractor would be prepared to prevent migratory birds from building nests by utilizing nest prevention methods, such as bird-deterrent netting and bird-repelling sprays and/or gels, between February 15 and October 1. In the event that migratory birds are encountered on-site during project construction, adverse impacts on protected birds, active nests, eggs, and/or young would be avoided.

The contractor and/or TxDOT personnel would be advised of the potential for Whooping Cranes to occur within the project limits. Construction personnel would be advised to avoid adverse impacts to this species and to report any sightings to TxDOT District Environmental staff. Drainage modifications would be limited to the extent practical to accommodate the additional paved surface needed to bring the roadway up to current TxDOT safety standards. The construction personnel would report all sightings to TxDOT Fort Worth District Environmental staff. Reports should include the time, date and location and any available photos

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: Points, 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.

Texas Department of Transportation

Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: epic.dgn	DN: TxDOT		CK: RG	DW: VP		CK: AR
©TxDOT: February 2015	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0385	04	053		SH144	
12-12-2011 (DS)	DIST	COUNTY				SHEET NO.
05-07-14 ADDED NOTE SECTION IV.	FTW	HOOD				51
01-23-2015 SECTION I CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.						

STORMWATER POLLUTION PRVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with TxDOT policy for projects disturbing less than 1 acre of soil, and not part of a larger common plan of development.

For projects with less than one acre of soil disturbing activity and that have Environmental, Permits, Issues, and Commitments (EPICs) dependent on stormwater controls and water quality measures TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office, Area Office, or electronically.

This SWP3 is consistent with requirements specified in applicable stormwater plans, and the project's environmental permits, issues, and commitments (EPICs).

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):
0385-04-053

1.2 PROJECT LIMITS:
From: CR 310

To: MAMBRINO HWY

1.3 PROJECT COORDINATES:
BEGIN: (Lat) 32.401362 ,(Long) -97.791203

END: (Lat) 32.354568 ,(Long) -97.770541

1.4 TOTAL PROJECT AREA (Acres): 47

1.5 TOTAL AREA TO BE DISTURBED (Acres): 0.97

1.6 NATURE OF CONSTRUCTION ACTIVITY:
INSTALLATION OF MEDIAN CABLE BARRIERS

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:

- [x] 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 2.3.)

- [x] Mobilization
- [x] 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
- [x] Install mow strip, MBGF, bridge rail
- [ ] Place flex base
- [ ] Rework slopes, grade ditches
- [ ] Blade windrowed material back across slopes
- [ ] Revegetation of unpaved areas
- [x] 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
- [x] 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
- [x] Trash from various construction activities/receptacles
- [ ] Long-term stockpiles of material and waste
- [ ] Discharges from concrete washout activities, runoff from concrete cutting activities, and other concrete related activities
- [ ] 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

- [x] Development of plans and specifications
- [x] Perform SWP3 inspections
- [x] Maintain SWP3 records and update to reflect daily operations
- [ ] Other: _____
- [ ] Other: _____

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

- [x] Day To Day Operational Control
- [x] Maintain schedule of major construction activities
- [x] Install, maintain and modify BMPs
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____

STATE OF TEXAS
ELIJAH ZELENOV
142306
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Elijah Zelenov P. E. , PE 5/10/2024
4848DA2AA1AB44D... Signature Date

STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)

July 2023 Sheet 1 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		52
STATE	STATE DIST.	COUNTY	
TEXAS	FTW	HOOD	
CONT.	SECT.	JOB	HIGHWAY NO.
0385	04	053	SH144

STORMWATER POLLUTION PRVENTION 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

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
- ☐ Daily street sweeping
- ☐ 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 DEWATERING:

Dewatering discharges of accumulated stormwater, groundwater, and surface water including discharges from dewatering of trenches, excavations, foundations, vaults, and other points of accumulation are prohibited unless managed by appropriate controls to prevent and minimize the offsite discharge of sediment and other pollutants.

2.9 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 2.3 of this SWP3 .

2.10 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 2.3 of this SWP3.

STATE OF TEXAS
ELIJAH ZELENOV
142306
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Elijah Zelenov P.E.
4848DA2AA1AB440...
Signature , PE

5/11/2024
Date

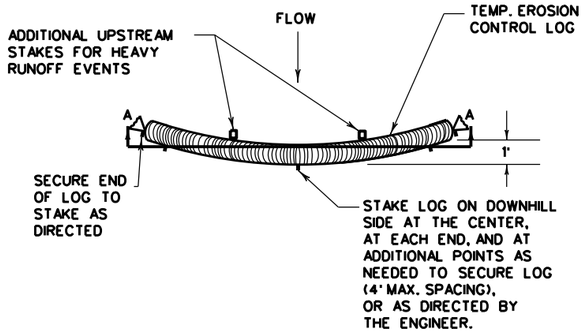
STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)

July 2023 Sheet 2 of 2

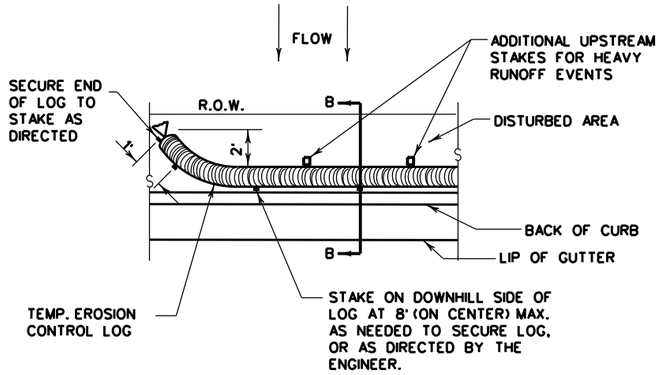
Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		53
STATE	STATE DIST.	COUNTY	
TEXAS	FTW	HOOD	
CONT.	SECT.	JOB	HIGHWAY NO.
0385	04	053	SH144

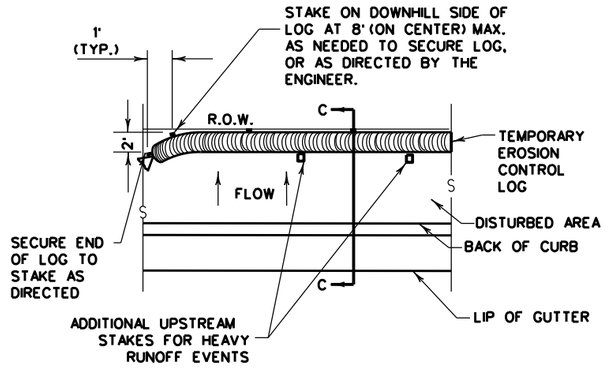
DATE: 3/8/2024
FILE: C:\Users\RALLEN4\Documents\0385-04-053 HISP CABLE BARRIER\DGN\54-55 EC(9)-16.dgn



PLAN VIEW



PLAN VIEW



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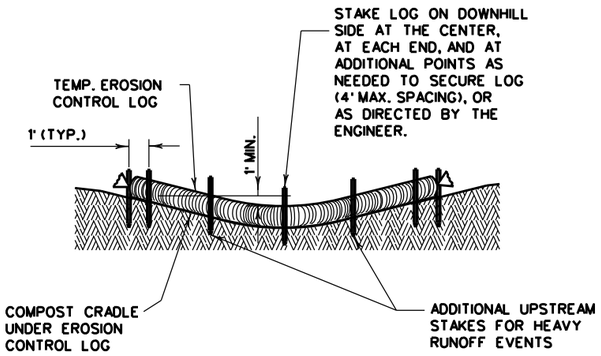
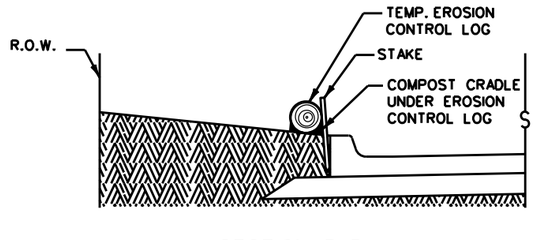


SECTION A-A

EROSION CONTROL LOG DAM

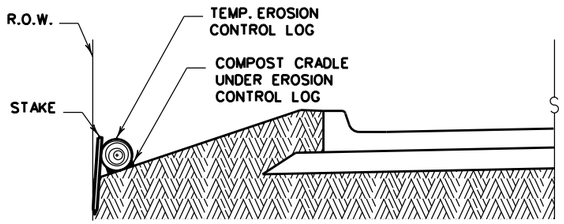
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

CL-BOC



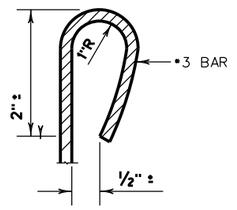
SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW

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

GENERAL NOTES:

1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANFACTURER'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.

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.

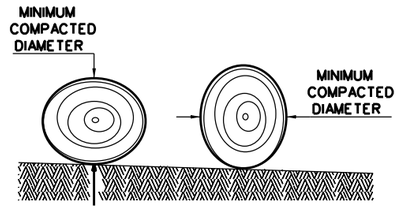
Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Control logs 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.



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT		CK: KM	DW: LS/PT		CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0385	04	053		SH144	
	DIST	COUNTY				SHEET NO.
	FTW	HOOD				54

DATE: 3/8/2024
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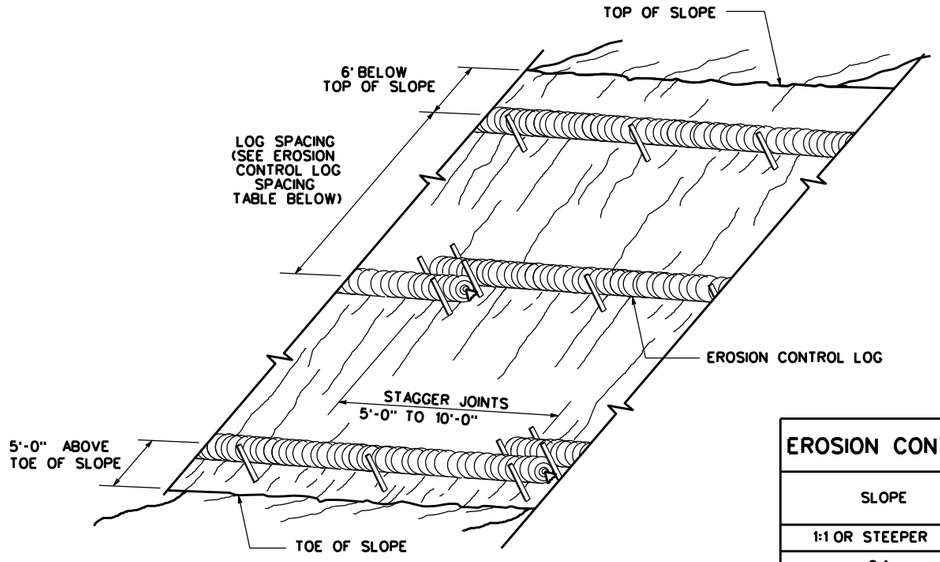
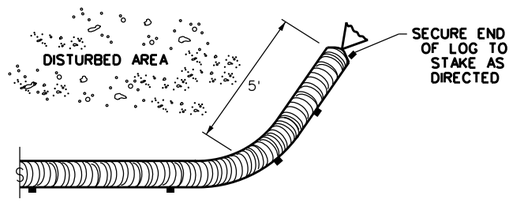


EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

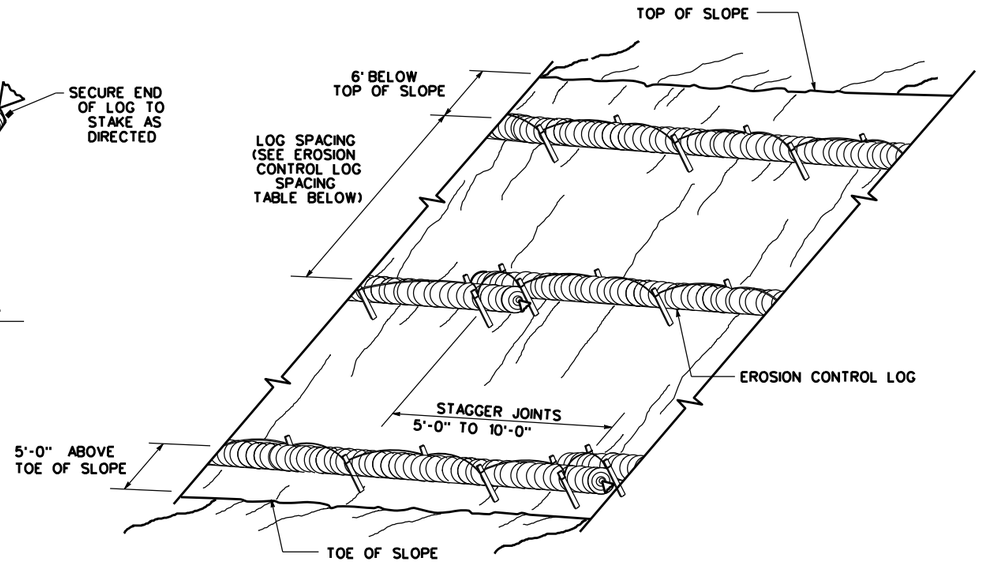
CL-SST



END SECTION RAP DETAIL

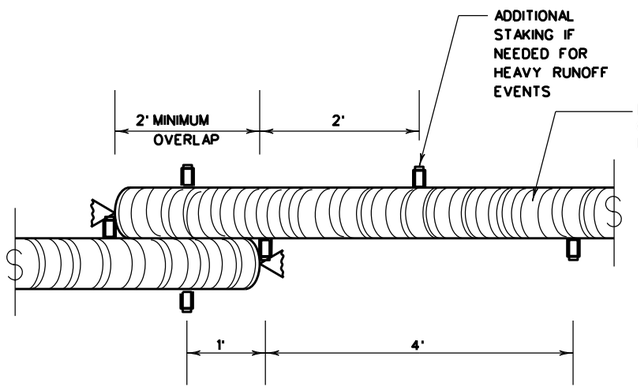
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

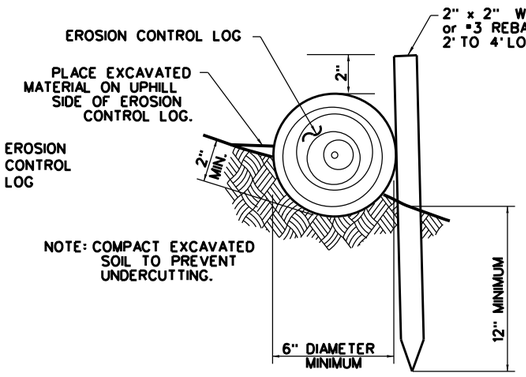
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER:
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

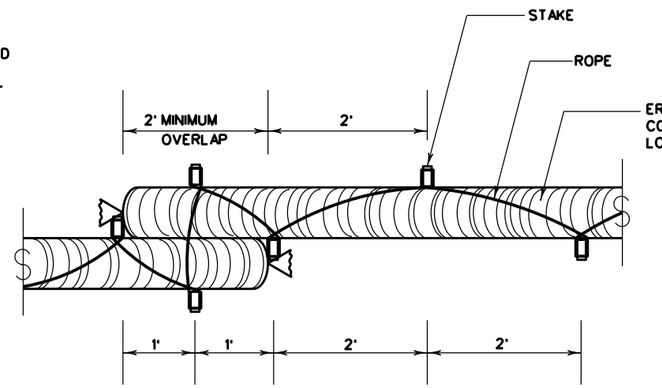


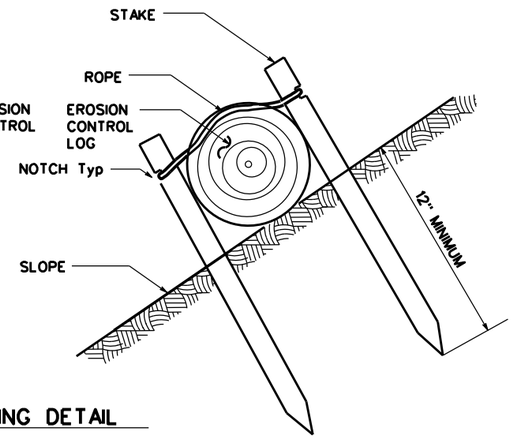


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

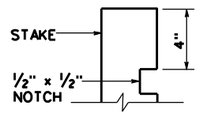
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
EROSION CONTROL LOG
EC(9)-16

FILE: ec116	DN: TxDOT		CK: KM		DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0385	04	053		SH144	
	DIST	COUNTY			SHEET NO.	
	FTW	HOOD			55	

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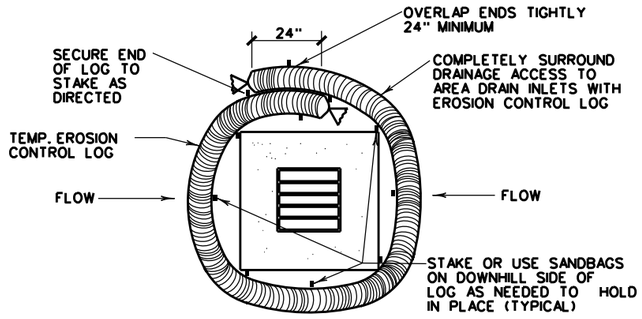
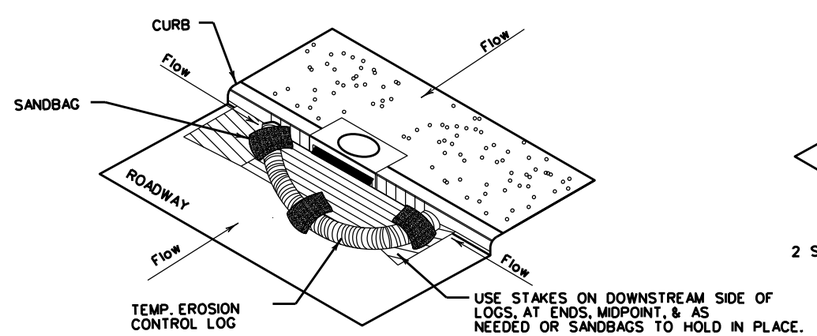


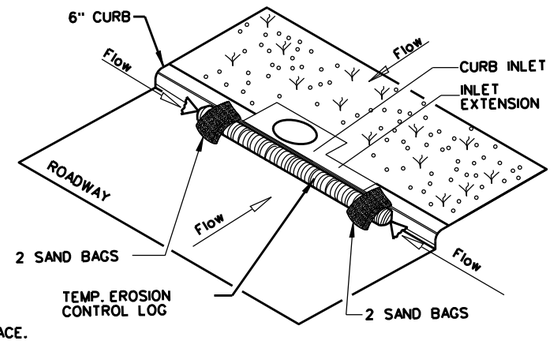
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

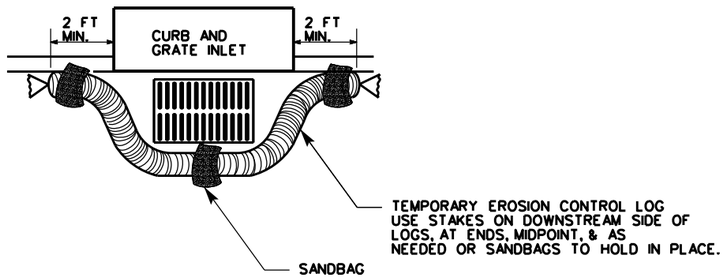
CL-CI



EROSION CONTROL LOG AT CURB INLET

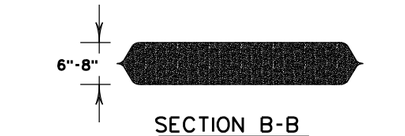
CL-CI

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.

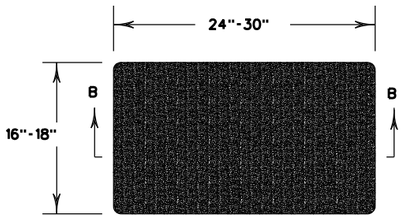


EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI



SECTION B-B



SANDBAG DETAIL

SHEET 3 OF 3

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT		CK: KM		DW: LS/PT		CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY		
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	FTW	HOOD				56	