FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	BR 2023(033)		1
STATE	STATE DIST.	COUNTY	
TEXAS	YKM	WHARTON	
CONTROL	SECTION	JOB	HIGHWAY NO.
0913	09	117	CR

INDEX OF SHEETS

SEE SHEET 2

STATE OF TEXAS
TEXAS DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

FEDERAL PROJECT NO. BR 2023(033)

FOR THE CONSTRUCTION OF BRIDGE REPLACEMENT
CONSISTING OF REPLACE BRIDGE AND APPROACHES

① PROJECT NO.: BR 2023(033)
COUNTY: WHARTON
CSJ: 0913-09-117
HIGHWAY: CR 114
LIMITS: AT LCRA CANAL TO STR #AA01-86-001
FUNCTIONAL CLASS: RURAL LOCAL ROAD
DESIGN SPEED: MEETS OR IMPROVES EXISTING
ADT: 38 VPD (2021), 53 VPD (2041)

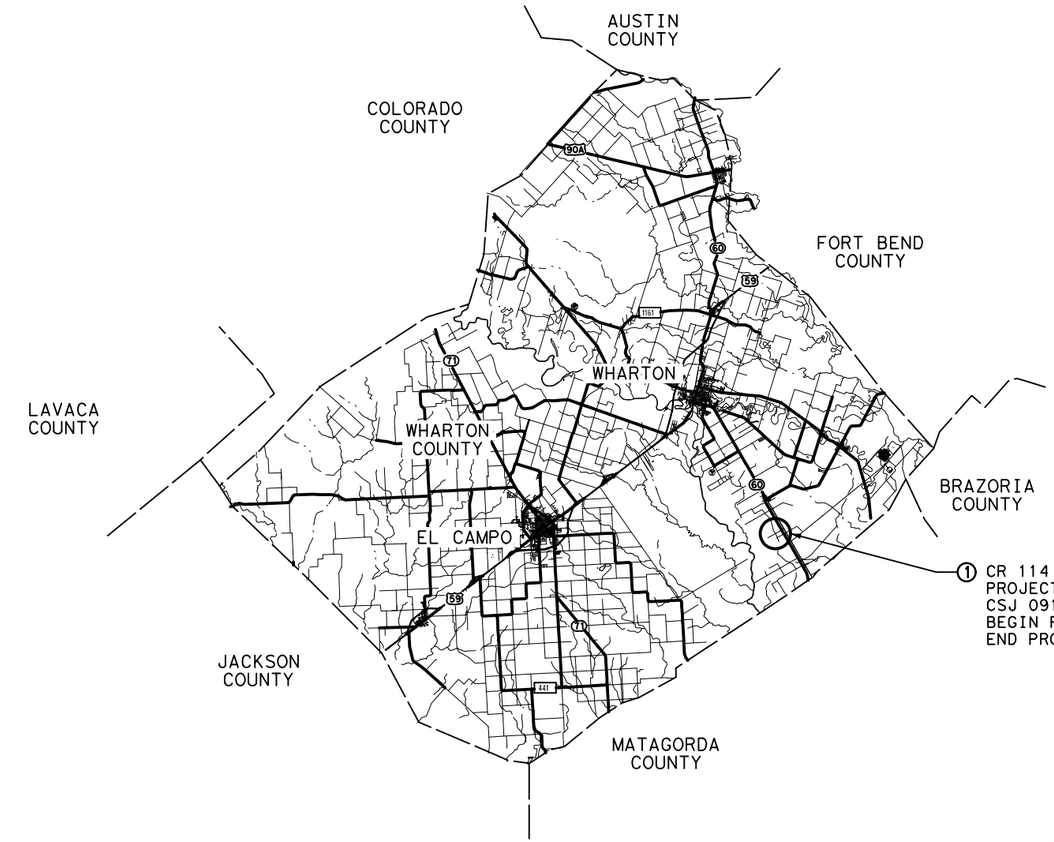
ROADWAY	= 301.00 LF	= 0.057 MI
BRIDGE	= 42.00 LF	= 0.008 MI
TOTAL	= 343.00 LF	= 0.065 MI

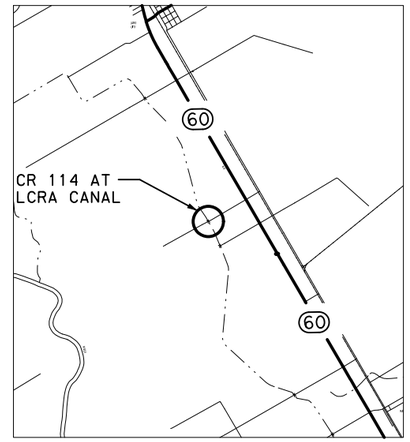
CONTRACTOR: _____
DATE OF LETTING: _____
DATE WORK BEGAN: _____
DATE WORK COMPLETED: _____
DATE WORK ACCEPTED: _____
FINAL CONTRACT COST: $ _____

LIST OF APPROVED FIELD CHANGES:

THIS IS TO CERTIFY THAT THE CONSTRUCTION WORK WAS PERFORMED IN ACCORDANCE WITH THE PLANS, CONTRACT, AND LISTED FIELD CHANGES.

P.E.
AREA ENGINEER DATE





INSERT MAP

① CR 114 AT LCRA CANAL
PROJECT NO. BR 2023(033)
CSJ 0913-09-117
BEGIN PROJECT STA 11+49.00
END PROJECT STA 14+92.00

STATE OF TEXAS
THOMAS G. ASHCRAFT
81411
REGISTERED
PROFESSIONAL ENGINEER

stv
TBPE FIRM # 1741

N

5 2.5 0 5 10
SCALE MILE

WHARTON COUNTY
YOAKUM DISTRICT

EXCEPTIONS: NONE
RAILROAD CROSSINGS: NONE
EQUATIONS: NONE

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

RECOMMENDED FOR LETTING 6/2/2023
DocuSigned by: Jeffery Vinklarek, P.E.
DIRECTOR OF TRANSPORTATION PLANNING & DEVELOPMENT

SUBMITTED FOR LETTING 5/23/2023
Thomas G. Ashcraft
PROJECT MANAGER STV, INC.

CONCURRENCE 5/24/2023
DocuSigned by:
COUNTY JUDGE, WHARTON COUNTY

APPROVED FOR LETTING 6/2/2023
DocuSigned by: Martin C. Horsley PE
DISTRICT ENGINEER

cpybw_ANSIB.tbl
cpypdf_ANSIB.plcfg
pw:/Active Projects/TXYO1700668.00/TXYO1700668.04/Plan Set 24/8.00 Plans and Drawings/8.30 Cut Sheets/8.3.01 General/42409117GNgy.dgn
5/23/2023 4:38:27 PM AshcraTC

SHEET NO.		DESCRIPTION
		GENERAL
1		TITLE SHEET
2		INDEX OF SHEETS
3		TYPICAL SECTIONS
4,4A–4C		GENERAL NOTES
5		ESTIMATE & QUANTITY SHEET
6		SUMMARY OF QUANTITIES
		TRAFFIC CONTROL PLAN
7		TRAFFIC CONTROL PLAN NARRATIVE
8		TRAFFIC CONTROL PLAN PHASE 1
9		TRAFFIC CONTROL PLAN PHASE 2
		STANDARD SHEETS
10 – 21	*	BC(1)–21 TO BC(12)–21
		ROADWAY DETAILS
22		HORIZONTAL AND VERTICAL CONTROL INDEX SHEET
23 – 24		HORIZONTAL AND VERTICAL CONTROL SHEET
25		PLAN AND PROFILE
		STANDARD SHEETS
		DRAINAGE
26		DRAINAGE AREA MAP
27		HYDRAULIC DATA SHEET
28		BRIDGE CLASS CULVERT (LCRA CANAL BRIDGE)
29		TRAFFIC RAIL FOUNDATION DETAILS
30		BCS
		STANDARD SHEETS
31 – 32	#	T221
33	#	PW (MOD)
34	#	SCP–MD
35	#	SCP–9
36 – 37	#	RAC
38 – 39	#	SRR
		TRAFFIC ITEMS
		STANDARD SHEETS
40	*	D & OM(1)–20
41	*	D & OM(2)–20
42	*	D & OM(3)–20
43	*	D & OM(4)–20
44	*	D & OM(5)–20
45	*	D & OM(VIA)–20
		ENVIRONMENTAL ISSUES
46 – 47		TXDOT STORM WATER POLLUTION PREVENTION PLAN (SWP3)
48		SWP3 LAYOUT
49		ENVIRONMENTAL PERMITS, ISSUES & COMMITMENTS
		STANDARD SHEETS
50	*	EC(1)–16

STATE OF TEXAS
SANDRA GAIL MORRIS
113680
LICENSED
PROFESSIONAL ENGINEER

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

Sandra Morris 05/25/2023

SANDRA GAIL MORRIS, P.E.

STATE OF TEXAS
KELLY HO
112947
LICENSED
PROFESSIONAL ENGINEER

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

Kelly Ho 05/25/2023

KELLY HO, P.E.

NO.	REVISION	BY	DATE

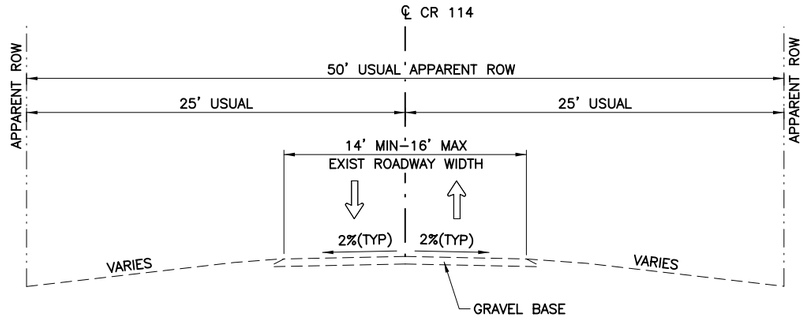
TEXAS REGISTERED ENGINEERING FIRM F-204

CR 114 AT LCRA CANAL

INDEX OF SHEETS

CSJ 0913–09–117 SHEET 1 OF 1

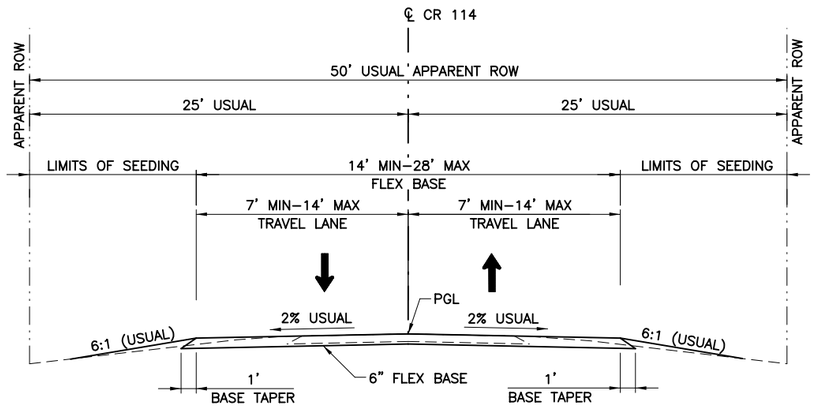
Designed: JLN	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				HIGHWAY NO.
Checked: SGM	6	TEXAS					CR
Drawn: JLN	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
Checked: SGM	YKM	WHARTON	0913	09	117		2



CR 114
EXISTING ROADWAY TYPICAL SECTION

NOT TO SCALE

STA 11+49.00 TO STA 14+92.00
EXIST STRUCTURE: STA 13+07.73 TO STA 13+41.94



CR 114
PROPOSED ROADWAY TYPICAL SECTION

NOT TO SCALE

STA 11+49.00 TO STA 11+99.00 16'-28'
STA 11+99.00 TO STA 12+99.00 28'-28'
STA 12+99.00 TO STA 13+42.50 BRIDGE CLASS CULVERT 28'
STA 13+42.50 TO STA 14+42.00 28'-28'
STA 14+42.00 TO STA 14+92.00 28'-14'

STATE OF TEXAS
SANDRA GAIL MORRIS
113680
LICENSED
PROFESSIONAL ENGINEER

05/25/2023

NO.	REVISION	BY	DATE

TEXAS REGISTERED ENGINEERING FIRM F-204

 Texas Department of Transportation

CR 114 AT LCRA CANAL

TYPICAL SECTIONS

CSJ 0913-09-117 SHEET 1 OF 1

Designed:	JLN	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				HIGHWAY NO.
Checked:	SGM	6	TEXAS					CR
Drawn:	JLN	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
Checked:	SGM	YKM	WHARTON	0913	09	117		3

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cpypdf_ANSIB.pltcfg

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pw:\\stv-sw-pw.bentley.com:stv-sw-pw-01\Documents\Active Projects\TXY01700668.00\TXY01700668.04\Plan Set 24\8.00 Plans and Drawings\8.30 Cut Sheets\8.3.01 General\42409117GNgt.dgn

GENERAL NOTES:

GENERAL:

The LCRA canal is utilized as an irrigation waterway and will be filled to capacity beginning in early spring 2024 (March 1st). All work within the canal will need to be completed prior to this date to allow for construction in a dry channel. Contractor will need to make the necessary accommodations including the fabrication of material in a timely manner to ensure this deadline is achievable.

The contractor shall work continuously as much as possible including night time operations during (Phase 1)(culvert replacement) to reduce impact to traffic.

The Contractor is to take note that this project has Milestones for substantial completion. See Item 8 below for details.

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

Ryan Simper Ryan.Simper@txdot.gov
Paul Rodriguez Jr. Paul.Rodriguez@txdot.gov

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

Questions may be submitted via the Letting Pre-Bid Q&A web page. This webpage can be accessed from the Notice to Contractors dashboard located at the following Address: https://tableau.txdot.gov/views/ProjectInformationDashboard/NoticetoContractors

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

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

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

The Contractor may need to make necessary accommodations to facilitate the delivery of materials and equipment to the project due to tight horizontal curves. This work is subsidiary to the pertinent bid items.

Project Number: **Sheet: 4**

County: Wharton **Control: 0913-09-117**

Highway: CR

Provide a minimum two week advance notice to TxDOT prior to closing County Roads. TxDOT will notify local officials at least one week in advance.

Remove and replace right-of-way fences at particular work sites, where necessary, at contractor's entire expense except as shown on plans. Replace fences in a condition comparable to that at removal.

Do not work on the roadway before sunrise or after sunset unless otherwise noted or approved.

The following standard detail sheets have been modified:
PW-1(MOD)

Furnish a certified copy of the legal gross weight of each vehicle hauling materials by weight and certified measurements for all trucks hauling material by volume.

Unless otherwise approved, maintain a minimum safety clearance from the edge of the travelway for material stockpiled in proximity of traffic lanes based on the current average traffic count of the particular highway as follows:

0 - 1500 = 16 feet
Over 1500 = 30 feet

In the event the above requirements cannot be met, make arrangements to stockpile material off the right of way.

Provide temporary pipe drains or culverts and take such other measures as directed to provide for continued drainage from all abutting property, the right of way and the roadway during construction operations. Labor and materials involved in this work will not be paid for directly, but will be considered subsidiary to the various bid items of the contract.

The Department will provide the cylinder testing machine for this project. Deliver the test specimens to the engineer's curing facilities as directed.

Do not clean out concrete trucks within the right of way.

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 a notarized original of the TxDOT Construction Material Buy America Certification Form for all items classified as construction materials. This form is not required for materials classified as a manufactured product.

Refer to the Buy America Material Classification Sheet for clarification on material categorization.

The Buy America Material Classification Sheet is located at the below link. https://www.txdot.gov/business/resources/materials/buy-america-material-classification-sheet.html for clarification on material categorization.

ITEM 7: LEGAL RELATIONS AND RESPONSIBILITIES

The Department has determined that a USACE Nationwide or Individual Permit is not necessary for the project since all work shall be conducted outside the USACE jurisdictional areas. Any impacts to these jurisdictional areas by the Contractor without a USACE permit will be the responsibility of the Contractor. If the Contractor deems it necessary to impact the USACE jurisdictional areas, then it becomes the Contractor's entire responsibility to consult with the USACE pertaining to the need for a Nationwide or Individual Permit. TXDOT will then hold the Contractor responsible for following all conditions of the approved permit.

If the Contractor elects to work on a structure when the stream is flowing, near normal flow shall be maintained by a method approved by the Engineer. Labor and materials involved in this work will not be paid for directly, but will be considered subsidiary to the various bid items of the contract.

No significant traffic generator events identified.

If the contractor proposes work beyond the TxDOT obtained permit limitations, the contractor is responsible for additional costs, delays, and obtaining new or revised permits prior to construction.

All temporary construction access work and materials will not be measured or paid for directly but will be subsidiary to pertinent items. Prior to the scheduling of a Pre-Construction Meeting, submit a Temporary Construction Access Plan to the Area Engineer and to District Environmental Staff for their approval. The Construction Plan should contain a description of the equipment, such as barges, structures, etc., which may occupy waters of the US including jurisdictional wetlands, and a detailed work schedule. No work of any kind will be allowed until the pre-construction meeting has been held.

Temporary construction waterway crossings have been environmental cleared/permitted within Right of Way. Restrict construction operations in any water body to the necessary areas as shown on the plans or applicable permit, or as directed. Use temporary bridges, timber mats, or other structurally sound and non-eroding material for stream crossings. All temporary construction access materials shall be completely removed as soon as possible once temporary access is no longer required and affected areas shall be returned to preconstruction elevations and contours and revegetated in accordance with the SW3P. All work must comply with the General Conditions of the appropriate USACE permit.

Project Number: **Sheet: 4A**

County: Wharton **Control: 0913-09-117**

Highway: CR

ITEM 8: PROSECUTION AND PROGRESS

Milestone 1 – Phase 1 Construction

Time charges for Milestone 1 begin when CR 114 (CSJ: 0913-09-117) is closed to traffic. The time charges for Milestone 1 shall end when traffic is following the lane arrangement as shown on the plans for the constructed and/or existing roadway as specified in the TCP (Phase) and/or the final lane configuration. All pavement construction, traffic control devices, and safety devices shall be in their final position (or as called for in the plans for the specified phase of work) at this time.

The contractor shall have a time period from Friday 7:00 pm to Sunday midnight to complete Milestone 1.

The daily road user cost for each Milestone shall be five times the project liquidated damage rate based on the contract schedule of liquidated damages.

Failure to complete the above Milestone within the established work period will result in the daily road user cost being assessed for every calendar day in excess of the stated number.

Milestone 2 – Phase 2 Construction

Time charges for Milestone 2 begin when Milestone 1 is completed. The time charges for Milestone 2 shall end when traffic is following the lane arrangement as shown on the plans for the constructed and/or existing roadway as specified in the TCP (Phase) and/or the final lane configuration. All pavement construction, traffic control devices, and safety devices shall be in their final position (or as called for in the plans for the specified phase of work) at this time.

The contractor shall have 47 working days to complete Milestone 2.

The daily road user cost for each Milestone shall be five times the project liquidated damage rate based on the contract schedule of liquidated damages.

Failure to complete the above Milestone within the established number of working days will result in the daily road user cost being assessed for every working day in excess of the stated number.

After the milestone is substantially complete, the liquidated damages become those based on the contract schedule of liquidated damages.

TxDOT will supply bidders, upon written request, one electronic copy of the time determination schedule. The time determination schedule provided is for informational use only and is not intended for bidding or construction purposes.

TxDOT will not adjust the number of days for the project or milestones, if any, due to differences in opinion regarding any assumptions made in the preparation of the schedule or for errors, omissions, or discrepancies found in the time determination schedule.

Provide progress schedule as a Bar Chart.

ITEM 100: PREPARING RIGHT-OF-WAY

Removal and trimming of trees will not be quantified separately, but will be considered subsidiary to Item 100.

Dispose of trees from the right-of-way within 24 hours of removal.

ITEM 110: EXCAVATION

Remove existing vegetation, including roots and topsoil, within the grading limits to a depth of approximately 2 inches immediately before grading operations begin within any section. Place the material in a windrow on each side of the roadbed and replace as directed on the completed slopes as soon as practicable. Measurement and payment will be in accordance with Item "Excavation" for cut sections. All topsoil excavation and the work involved in replacing the topsoil will not be paid for directly but will be subsidiary to the pertinent items for fill sections.

ITEMS 110 & 132: EXCAVATION AND EMBANKMENT

Furnish Type C embankment consisting of suitable earth material such as loam, clay or other such material that will form a stable embankment and has a plasticity index of at least 15 but not more than 40. Requirements may vary for material excavated under Item 110, "Excavation", as directed.

Removal/reworking of existing pavement is included in the excavation and embankment items.

ITEM 150: BLADING

Sprinkling and rolling which may be required during the operation of Item 150 will not be measured or paid for directly, but will be considered subsidiary to this item.

Project Number: **Sheet: 4B**

County: Wharton **Control: 0913-09-117**

Highway: CR

ITEM 247: FLEXIBLE BASE

Unless otherwise approved, the delivered material's moisture content at most will be two percent above optimum moisture content, determined by TEX-113-E.

Compact the Type A flex base by ordinary compaction.

Density requirements for base in side road entrances, intersections, or detours may be waived provided the material is satisfactorily sprinkled and compacted.

ITEM 400: EXCAVATION AND BACKFILL FOR STRUCTURES

Flexible base (Ty D) may be used for cement stabilized backfill aggregate, as approved.

ITEM 427: SURFACE FINISHES FOR CONCRETE

Provide Surface Area II, railing, and culvert headwalls and wingwalls with a Slurry Coat Finish per 427.4.3.2 for cast-in-place concrete surfaces.

ITEM 432: RIPRAP

The dimension as shown in the stone protection bid item description is the stone size as described in the specification. The required thickness will be as shown elsewhere in the plans.

ITEM 462: CONCRETE BOX CULVERTS AND DRAINS

Use precast concrete boxes on this project.

ITEM 496: REMOVING STRUCTURES

The removal of the existing concrete riprap or stone riprap protecting the existing bridge, is subsidiary to Item 496 Removing Structures, except as shown in the plans.

Material removed under this item will not be deemed salvageable.

ITEM 502: BARRICADES, SIGNS, AND TRAFFIC HANDLING

The Contractor Force Account "Safety Contingency" that has been established for this project is intended to be utilized for work zone enhancements, to improve the effectiveness of the Traffic

Control Plan, that could not be foreseen in the project planning and design stage. These enhancements will be mutually agreed upon by the Engineer and the Contractor's Responsible Person based on weekly or more frequent traffic management reviews on the project. The Engineer may choose to use existing bid items if it does not slow the implementation of enhancement.

Provide suitable warning lights mounted high enough to be visible from all directions on all construction equipment, including pilot vehicles, and operate warning lights when the equipment is within the right of way. Equip other equipment such as trucks, trailers, autos, etc., with emergency flashers and use emergency flashers while within the work area.

County Roads will be closed to through traffic until substantial completion as approved by the Area Engineer. Once the roadway is open to traffic, project limit signing as shown on BC(2) will be required. This will be subsidiary to Item 502.

ITEM 506: TEMPORARY EROSION, SEDIMENTATION, AND ENVIRONMENTAL CONTROLS

1. See SWP3 plan sheet for total disturbed acreage.

2. The disturbed area in this project, all project locations in the contract, and contractor project specific locations (PSLs), within one (1) mile of the project limits, for the contract will further establish the authorization requirements for storm water discharges.

3. 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.

4. Obtain any required authorization from the TCEQ for any contractor PSLs for construction activities on or off right-of-way (ROW).

5. When the total disturbed area for all projects in the contract and PSLs within one (1) mile of the project limits exceeds five (5) acres, provide a copy of the contractor NOI.

6. Provide a signed sketch detailing the location of any contractor's PSLs on ROW or within one (1) mile of the project.

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0913-09-117 **DISTRICT** Yoakum **COUNTY** Wharton
HIGHWAY CR 114

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0913-09-117**			
		PROJECT ID		**A00183900**			
		COUNTY		**Wharton**			
		HIGHWAY		**CR 114**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	100-6002	PREPARING ROW	STA	0.500		0.500	
	110-6001	EXCAVATION (ROADWAY)	CY	123.000		123.000	
	110-6002	EXCAVATION (CHANNEL)	CY	206.000		206.000	
	132-6005	EMBANKMENT (FINAL)(ORD COMP)(TY C)	CY	146.000		146.000	
	150-6002	BLADING	HR	8.000		8.000	
	164-6003	BROADCAST SEED (PERM) (RURAL) (CLAY)	SY	660.000		660.000	
	164-6009	BROADCAST SEED (TEMP) (WARM)	SY	165.000		165.000	
	164-6011	BROADCAST SEED (TEMP) (COOL)	SY	165.000		165.000	
	168-6001	VEGETATIVE WATERING	MG	5.800		5.800	
	247-6366	FL BS (CMP IN PLC)(TY A GR 5)(FNAL POS)	CY	180.000		180.000	
	400-6005	CEM STABIL BKFL	CY	124.000		124.000	
	403-6001	TEMPORARY SPL SHORING	SF	1,640.000		1,640.000	
	420-6066	CL C CONC (RAIL FOUNDATION)	CY	12.600		12.600	
	432-6001	RIPRAP (CONC)(4 IN)	CY	3.300		3.300	
	432-6031	RIPRAP (STONE PROTECTION)(12 IN)	CY	101.000		101.000	
	450-6004	RAIL (TY T221)	LF	183.000		183.000	
	462-6026	CONC BOX CULV (9 FT X 7 FT)	LF	120.000		120.000	
	466-6245	WINGWALL (PW) (HW=10FT) (MOD)	EA	2.000		2.000	
	496-6009	REMOV STR (BRIDGE 0 - 99 FT LENGTH)	EA	1.000		1.000	
	496-6042	REMOV STR (SMALL)	EA	1.000		1.000	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	4.000		4.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	620.000		620.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	620.000		620.000	
	658-6014	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)	EA	4.000		4.000	
	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	

SUMMARY OF ROADWAY QUANTITIES

ITEM DISCRIPTION	SURFACE BEGIN WIDTH	SURFACE END WIDTH	LENGTH	FLEX BASE BEGIN WIDTH	FLEX BASE END WIDTH	FLEX BASE AVG. DEPTH	0100 PREPARING ROW	0150 * BLADING	0247 FL BS (CMP IN PLC) (TY A GR 5) (FNAL POS) 6"	0496 REMOV STR (BRIDGE 0 – 99 FT LENGTH)	0496 REMOV STR (SMALL)
	FT	FT	FT	FT	FT	IN	STA	HR	CY	EA	EA
CSJ: 0913–09–117											
STA 11+49.00 TO STA 11+99.00	16.0	24.0	50.0	17.0	25.0	6			21		
STA 11+99.00 TO STA 12+99.00	24.0	24.0	100.0	25.0	25.0	6			61		
BRIDGE CLASS CULVERT	44.0	44.0	43.5	44.0	44.0	6			21		
STA 13+42.50 TO STA 14+42.00	24.0	24.0	100.0	25.0	25.0	6			57		
STA 14+42.00 TO STA 14+92.00	24.0	14.0	50.0	25.0	15.0	6			20		
PROJECT TOTAL							0.50	8	180	1	1

*** ESTIMATED QUANTITY**

SUMMARY OF BRIDGE QUANTITIES

ITEM DISCRIPTION	0400 CEM STABIL BKFL	0403 TEMPORARY SPL SHORING	0420 CL C CONC (RAIL FOUNDATION)	0432 RIPRAP (CONC)(4 IN)	0432 RIPRAP (STONE PROTECTION)(12 IN)	0450 RAIL (TY T221)	0462 CONC BOX CULV (9 FT X 7 FT)	0466 WINGWALL (PW) (HW=10FT) (MOD)
	CY	SF	CY	CY	CY	LF	LF	EA
CSJ: 0913–09–117								
STA 11+49.00 TO STA 12+99.00			5.4		9	42		
BRIDGE CLASS CULVERT	124	1640		3.3	74	87	120	2
STA 13+42.50 TO STA 14+92.00			7.2		17	54		
PROJECT TOTAL	124	1640	12.6	3.3	101	183	120	2

SUMMARY OF SW3P QUANTITIES

ITEM DISCRIPTION	0164 BROADCAST SEED (PERM) (RURAL) (CLAY)	0164 BROADCAST SEED (TEMP) (WARM)	0164 BROADCAST SEED (TEMP) (COOL)	0166 ** FERTILIZER 500 LBS/AC	0168 VEGETATIVE WATERING 13.6 MG/AC/MO X 3MO	0506 TEMP SEDMT CONT FENCE (INSTALL)	0506 TEMP SEDMT CONT FENCE (REMOVE)
	SY	SY	SY	TON	MG	LF	LF
CSJ: 0913–09–117							
STA 11+49.00 TO STA 12+99.00	324	81	81	0.02	2.9		
BRIDGE CLASS CULVERT							
STA 13+42.50 TO STA 14+92.00	336	84	84	0.02	2.9		
BMP #1						99	99
BMP #2						120	120
BMP #3						110	110
BMP #4						85	85
BMP #5						100	100
BMP #6						106	106
PROJECT TOTAL	660	165	165	0.04	5.8	620	620

**** FOR CONTRACTORS INFORMATION ONLY**

SUMMARY OF DELINEATOR AND OBJECT MARKER QUANTITIES

ITEM DISCRIPTION	0658 INSTL DEL ASSM (D–SW)SZ (BRF)CTB (BI)
	EA
CSJ: 0913–09–117	
STA 11+49.00 TO STA 14+92.00	
LEFT	2
RIGHT	2
PROJECT TOTAL	4

SUMMARY OF EARTHWORK QUANTITIES

ITEM DISCRIPTION	0110 EXCAVATION (ROADWAY)	0110 EXCAVATION (CHANNEL)	0132 EMBANKMENT (FINAL) (ORD COMP) (TY C)
	CY	CY	CY
CSJ: 0913–09–117			
11+49.00	0		0
11+50.00	0		1
12+00.00	22		3
12+50.00	12		19
12+99.00	10		24
BRIDGE CLASS CULVERT		206	
13+42.50	2		0
13+50.00	16		10
14+00.00	25		63
14+50.00	18		22
14+92.00	18		4
PROJECT TOTAL	123	206	146

NO.	REVISION	BY	DATE

TEXAS REGISTERED ENGINEERING FIRM F-204

CR 114 AT LCRA CANAL

SUMMARY OF QUANTITIES

CSJ 0913–09–117 SHEET 1 OF 1

Designed:	JLN	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
Checked:	SGM	6	TEXAS				CR
Drawn:	JLN	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
Checked:	SGM	YKM	WHARTON	0913	09	117	6

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TRAFFIC CONTROL PLAN NARRATIVE

THIS NARRATIVE IS A SUPPLEMENT TO THE TRAFFIC CONTROL PLAN (TCP) SHEETS. THE TCP SHEETS DETAIL A GENERAL PLAN FOR CONSTRUCTION PHASING AND TRAFFIC MANAGEMENT.

THE GENERAL CRITERIA FOR TRAFFIC MANAGEMENT FOR CR 114 IS TO CLOSE BRIDGE DURING PHASE 1 CONSTRUCTION. PHASE 2 WILL BE OPEN TO TRAFFIC TO MATCH EXISTING CONDITIONS.

CONTRACTOR SHALL PROVIDE ALL ADVANCE WARNING SIGNS PER TXDOT BC STANDARDS, TXDOT TCP STANDARDS AND AS SHOWN IN TRAFFIC CONTROL PLANS FOR THE PROJECT LIMITS. EXISTING CONFLICTING SIGNS SHALL BE COVERED OR REMOVED, STORED AND REPLACED AS PER THE CONTRACT PLANS.

CONTRACTOR SHALL MAINTAIN POSITIVE DRAINAGE AT ALL TIMES.

CONTRACTOR SHALL FIELD VERIFY EXISTING UTILITIES AND NOTIFY THE ENGINEER OF ANY CONFLICTS DISCOVERED.

CONTRACTOR SHALL MAINTAIN DRIVEWAY ACCESS AT ALL TIMES.

PERFORM TEMPORARY OR PERMANENT SEEDING AS SOON AS GRADING IS COMPLETE FOR THE AREA OR PHASE. MULTIPLE MOVE-INS WILL BE REQUIRED.

CONTRACTOR SHALL COORDINATE WITH TXDOT AREA OFFICE TWO WEEKS IN ADVANCE TO IDENTIFY SPECIFIC DATE/TIMES FOR PHASE 1 CONSTRUCTION CLOSURE.

TRAFFIC CONTROL SEQUENCE OF WORK:

TRAFFIC CONTROL SHALL FOLLOW THIS SEQUENCE UNLESS OTHERWISE APPROVED BY THE ENGINEER.

PHASE 1

TRAFFIC: CR 114 CLOSURE WILL BE ALLOWED FROM FRIDAY 7 P.M. TO MONDAY 5 A.M. DURING PHASE 1 CONSTRUCTION. CONTRACTOR SHALL WORK 24 HOURS PER DAY OF CLOSURE UNTIL PHASE 1 IS COMPLETE.

CONSTRUCTION NOTES:

1. PLACE ADVANCE WARNING SIGNS IN ACCORDANCE WITH TMUTCD, TXDOT STANDARDS, TCP PLANS, AND AS DIRECTED BY ENGINEER.
2. INSTALL BMP'S FOR PHASE 1 SW3P.
3. INSTALL TRAFFIC CHANNELIZATION DEVICES FOR PHASE 1.
4. CONSTRUCT PROPOSED PRECAST BOX CULVERTS.
5. PLACE TEMPORARY SHORING AS NEEDED FOR CONSTRUCTION OF CULVERTS AND WINGWALLS.
6. CONSTRUCT CEMENT STABILIZED BACKFILL, EMBANKMENT AND FLEX BASE.
7. PHASE 1 MILESTONE IS COMPLETE.

PHASE 2

TRAFFIC: CR 114 OPERATES ON ONE-LANE TWO-WAY TRAFFIC ALONG PROPOSED ALIGNMENT. CONTRACTOR WILL COMPLETE ALL IMPROVEMENTS IN EACH WORK AREA AND RETURN SURFACE TO A FLEX BASE COURSE IN ONE WORKING DAY PER EACH WORK AREA. TRAFFIC WILL BE ADJUSTED TO FINAL PROPOSED CR 114 ROADWAY ALIGNMENT WITH TWO-LANE OPERATION FOR NON-WORKING HOURS UPON COMPLETION OF FIRST WORK AREA (TRANSITION) IN PHASE 2.

CONSTRUCTION NOTES:

1. DO NOT BEGIN UNTIL PHASE 1 IS COMPLETE.
2. INSTALL BMP'S FOR PHASE 2 SW3P FOR BOTH TRANSITIONS.
3. ADJUST ADVANCE WARNING SIGNS IN ACCORDANCE WITH TMUTCD, TXDOT STANDARD TCP PLANS, AND AS DIRECTED BY ENGINEER.
4. CONSTRUCT CAST IN PLACE PORTION OF BOX CULVERTS AND WINGWALLS.
5. REMOVE TEMPORARY SHORING AND CONSTRUCT RAC AND TRF.
6. CONSTRUCT T221 BARRIER AND COMPLETE FINAL GRADING.
7. PLACE DELINEATORS AND SIGNAGE UTILIZING TXDOT STANDARD PLANS.
8. PHASE 2 MILESTONE IS COMPLETE.
9. REMOVE ADVANCE WARNING SIGNAGE AND DEVICES.

STATE OF TEXAS
SANDRA GAIL MORRIS
113680
LICENSED
PROFESSIONAL ENGINEER

06/01/2023

NO.	REVISION	BY	DATE

TEXAS REGISTERED ENGINEERING FIRM F-204

CR114 AT LCRA CANAL

TRAFFIC CONTROL NARRATIVE AND SEQUENCE OF WORK

CSJ 0913-09-117 SHEET 1 OF 1

Designed:	JLN	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				HIGHWAY NO.
Checked:	SGM	6	TEXAS					CR
Drawn:	JLN	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
Checked:	SGM	YKM	WHARTON	0913	09	117		7

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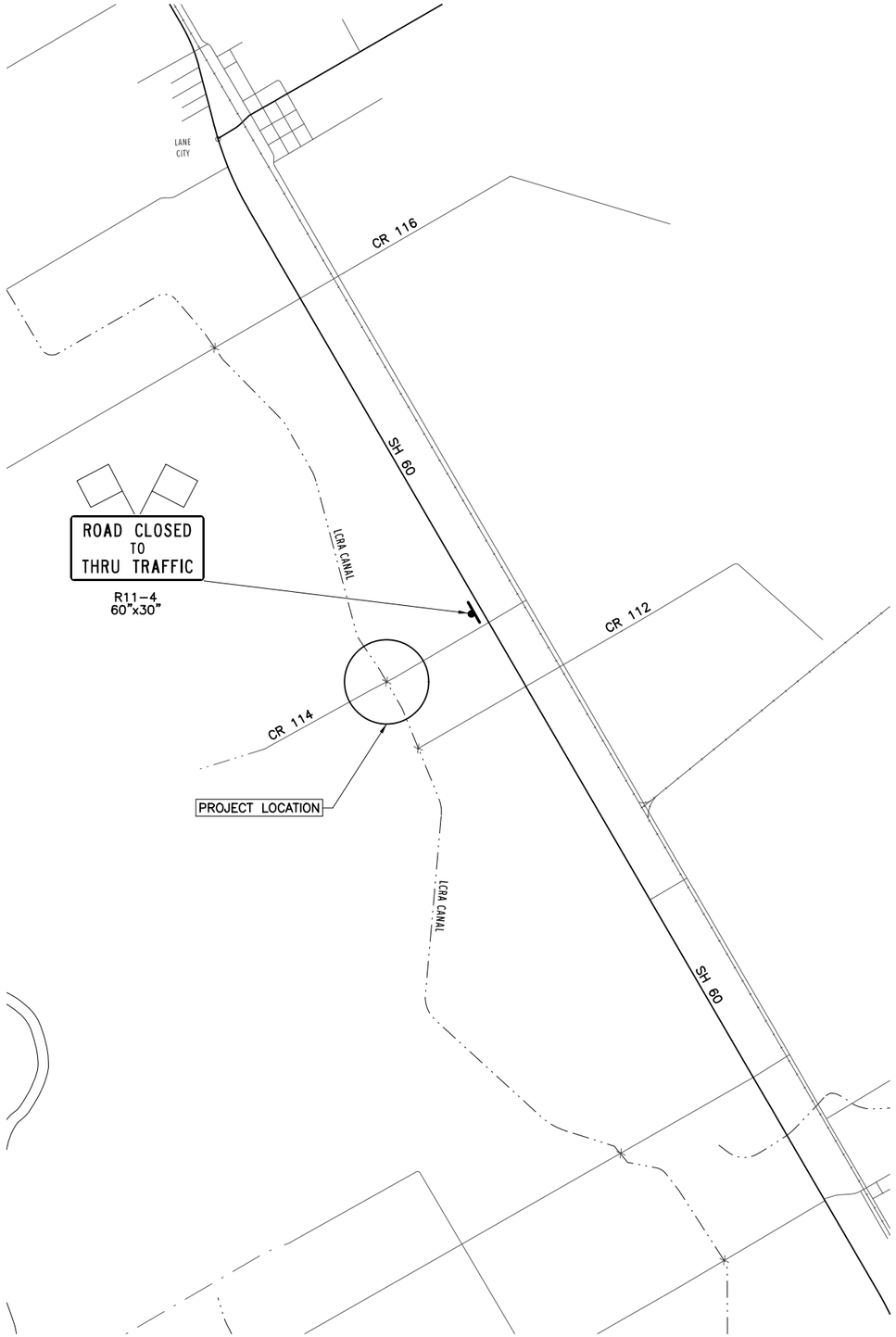

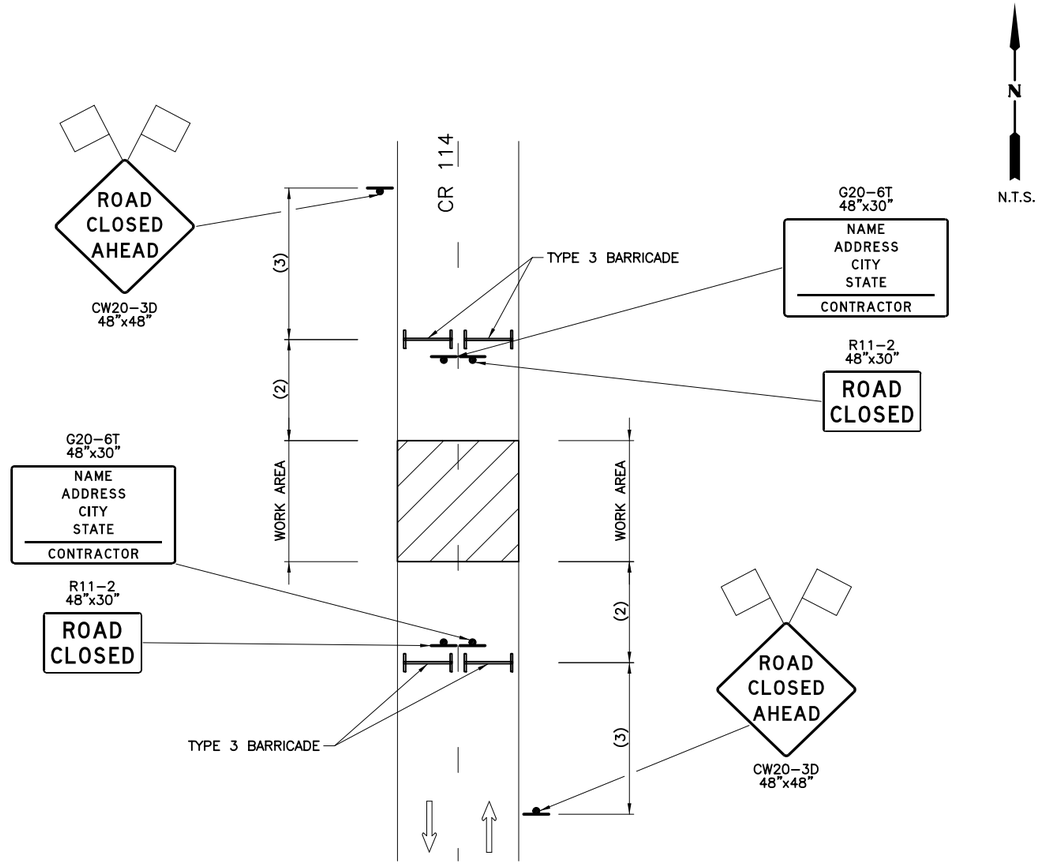

CONSTRUCTION SIGNING AT PROJECT LOCATION

NOTES:

1. CR 114 WILL BE CLOSED DURING PLACEMENT OF PRECAST BOX CULVERTS. OPEN TO TRAFFIC PER TCP LAYOUT DURING CONSTRUCTION OF WINGWALLS (IN PHASE 2).
2. TYPE 3 BARRICADES TO BE PLACED IN A LOCATION THAT IS SATISFACTORY TO THE ENGINEER TO ALLOW EGRESS AND INGRESS FOR LOCAL PROPERTY OWNERS.
3. SEE BC SHEETS FOR SIGN SPACING.
4. SEE ITEM 8 GENERAL NOTES REGARDING CLOSURE.
5. PLACE 24' MINIMUM OF PRE-CAST BOX CULVERT FOR EACH BARREL IN PHASE 1.

STATE OF TEXAS
SANDRA GAIL MORRIS
113680
LICENSED
PROFESSIONAL ENGINEER

05/25/2023

NO.	REVISION	BY	DATE

TEXAS REGISTERED ENGINEERING FIRM F-204

CR114 AT LCRA CANAL

TRAFFIC CONTROL PLAN PHASE 1

CSJ 0913-09-117 SHEET 1 OF 1

Designed:	JLN	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				HIGHWAY NO.
Checked:	SGM	6	TEXAS					CR
Drawn:	JLN	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
Checked:	SGM	YKM	WHARTON	0913	09	117		8

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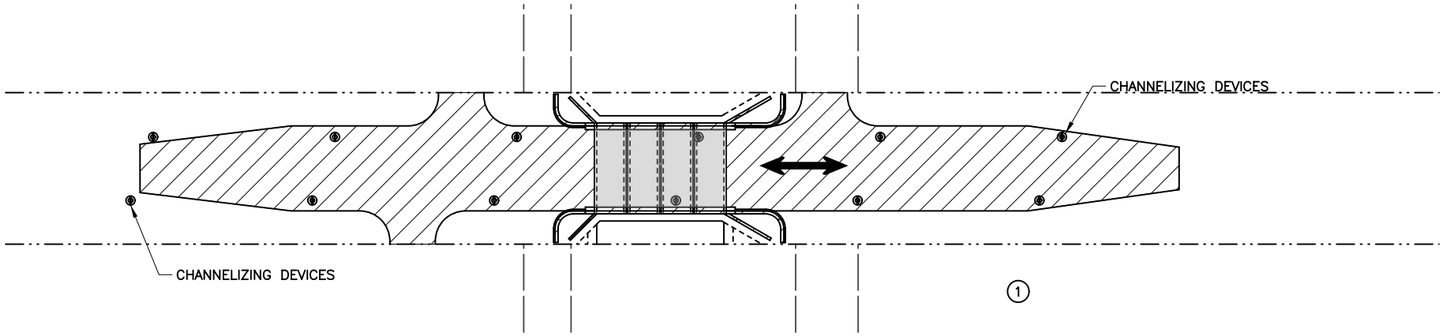
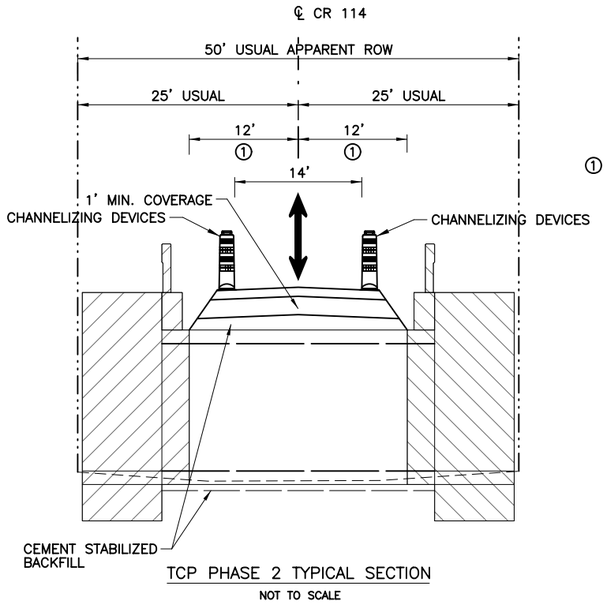
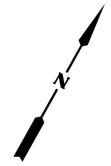




TCP PHASE 2 TYPICAL SECTION

NOT TO SCALE

① MINIMUM LENGTH OF PRE-CAST CULVERT IN PHASE 1



TCP LEGEND

- TYPE 3 BARRICADE
- CHANNELIZING DEVICES
- SIGN
- CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- LANE DIRECTION

NOTES:

1. SEE CURRENT STANDARDS FOR LAYOUT OF WARNING SIGN SPACING & SPACING OF CHANNELIZING DEVICES.
2. ALL WARNING SIGNS AND CHANNELIZING DEVICES SHALL BE PLACED IN ACCORDANCE WITH THE TCP STANDARDS, BC STANDARDS AND TEXAS MUTCD. RELOCATION OF EXISTING SIGNS IS SUBSIDIARY TO ITEM 502.
3. ACCESS TO ALL DRIVEWAYS SHALL BE MAINTAINED AT ALL TIMES.
4. SEE TRAFFIC CONTROL PLAN TYPICAL SECTIONS FOR ADDITIONAL INFORMATION.
5. ADJUST CHANNELIZING DEVICES TO ACCOMMODATE ROADWAY CONSTRUCTION.

05/25/2023

NO.	REVISION	BY	DATE

TEXAS REGISTERED ENGINEERING FIRM F-204

CR114 AT LCRA CANAL

TRAFFIC CONTROL PLAN PHASE 2

CSJ 0913-09-117 SHEET 1 OF 1

Designed:	JLN	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				HIGHWAY NO.
Checked:	SGM	6	TEXAS					CR
Drawn:	JLN	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
Checked:	SGM	YKM	WHARTON	0913	09	117		9

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DATE:
FILE:

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

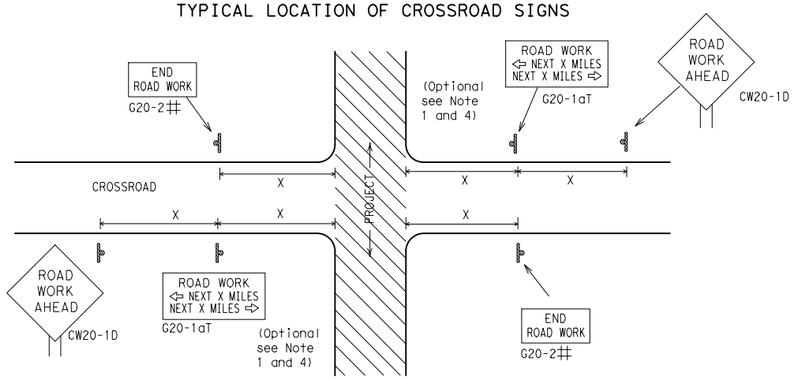
Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-03 7-13 9-07 8-14 5-10 5-21	0913	09	117	CR
	DIST	COUNTY		SHEET NO.
	YKM	WHARTON		10

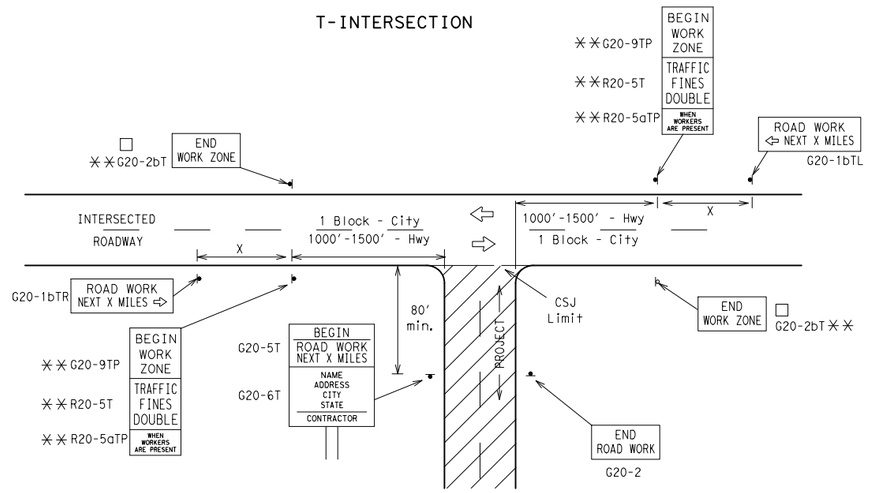
TYPICAL LOCATION OF CROSSROAD SIGNS



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]

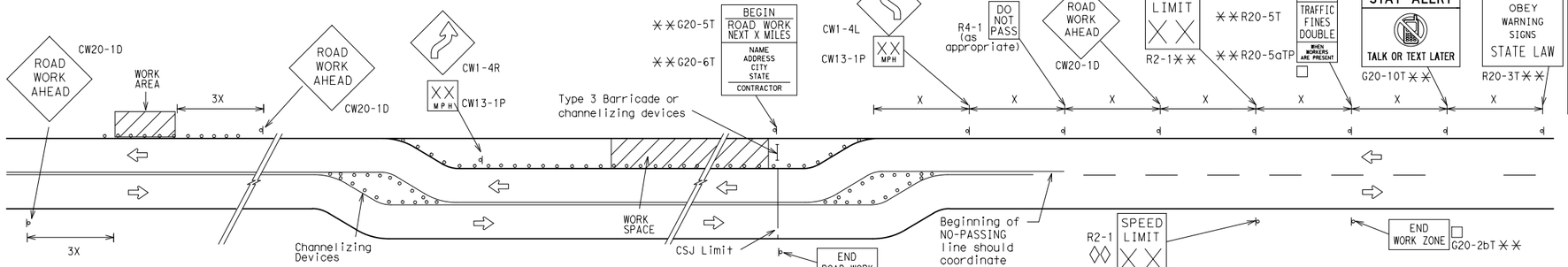
✳ For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

△ 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.

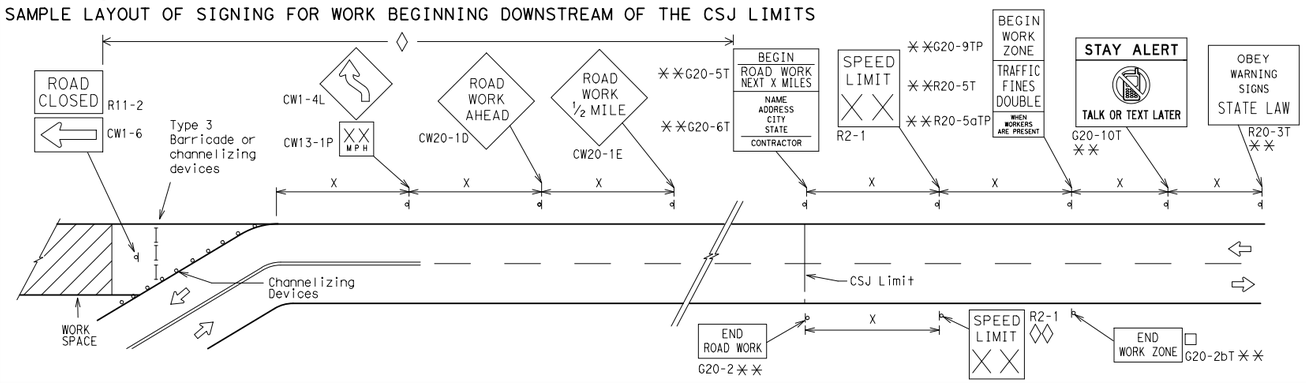
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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 AT THE CSJ LIMITS

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



NOTES

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

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

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

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

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

LEGEND

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	09	117	CR
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	YKM	WHARTON		11

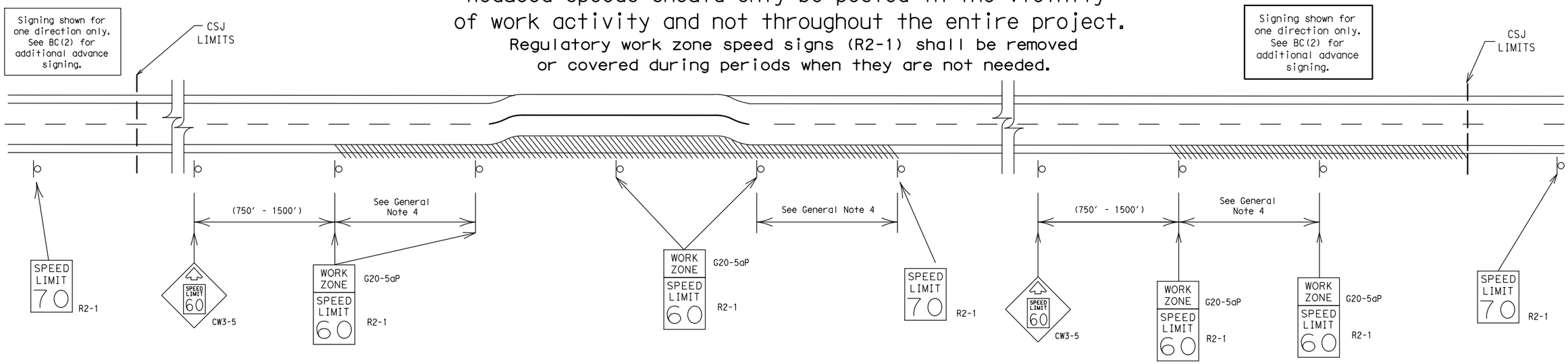
DATE:
FILE:

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

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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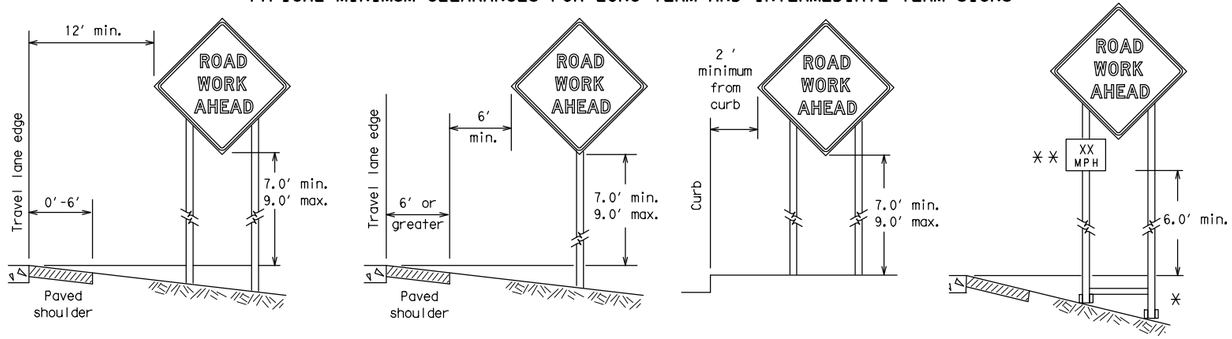
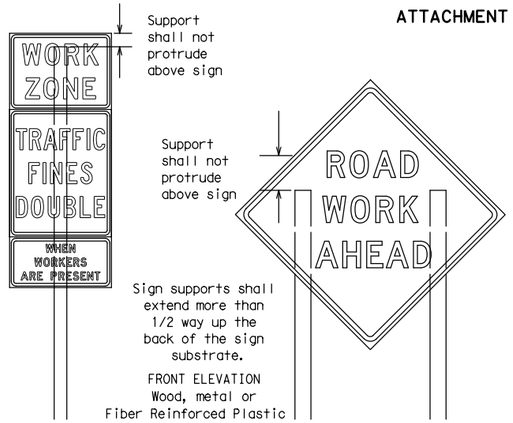
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

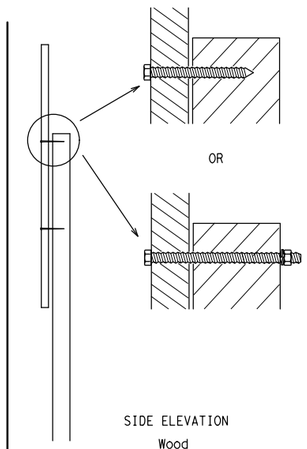


⚹ When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





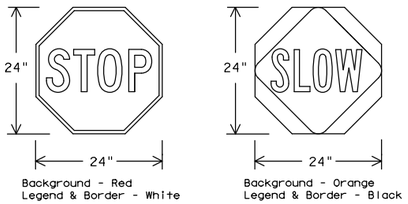
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

Splicing embedded perforated square metal tubing in order to extend post height will only be allowed when the splice is made using four bolts, two above and two below the spice point. Splice must be located entirely behind the sign substrate, not near the base of the support. Splice insert lengths should be at least 5 times nominal post size, centered on the splice and of at least the same gauge material.

STOP/SLOW PADDLES

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



Background - Red
Legend & Border - White

Background - Orange
Legend & Border - Black

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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

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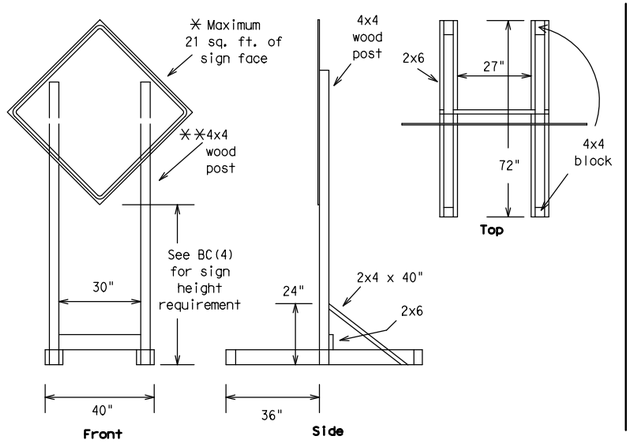
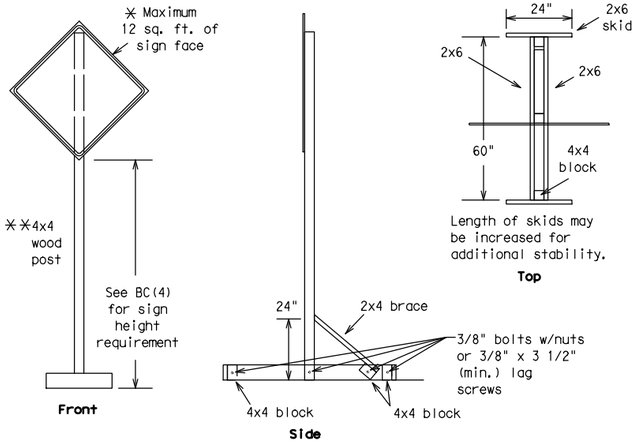
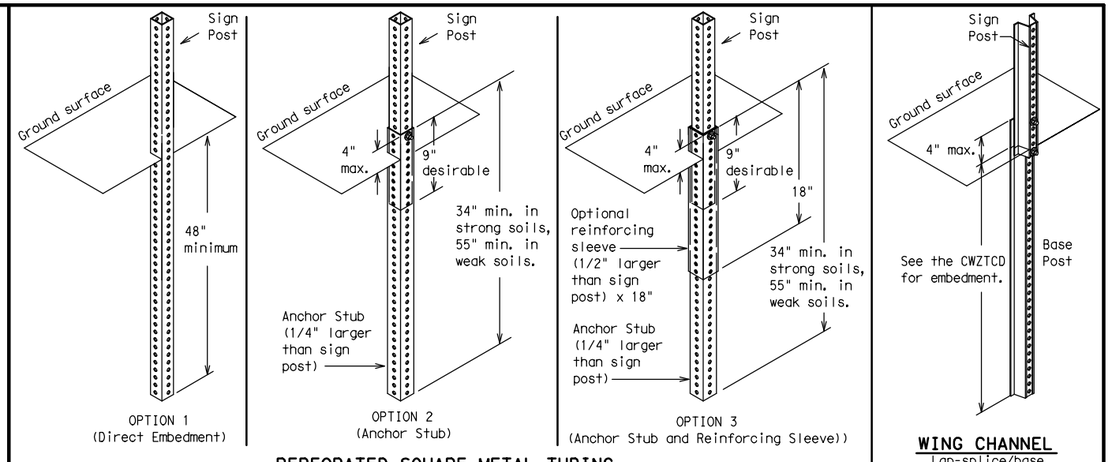




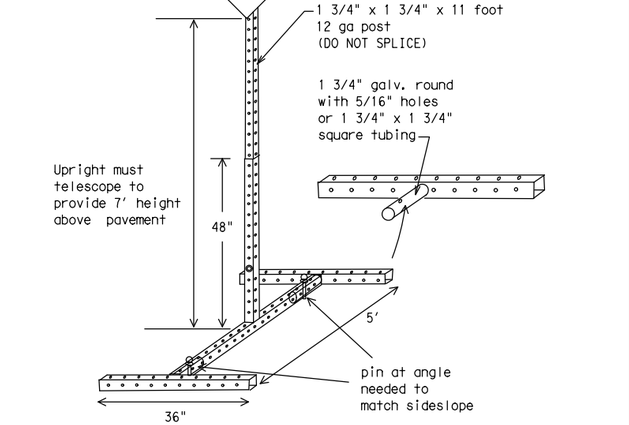
SKID MOUNTED WOOD SIGN SUPPORTS

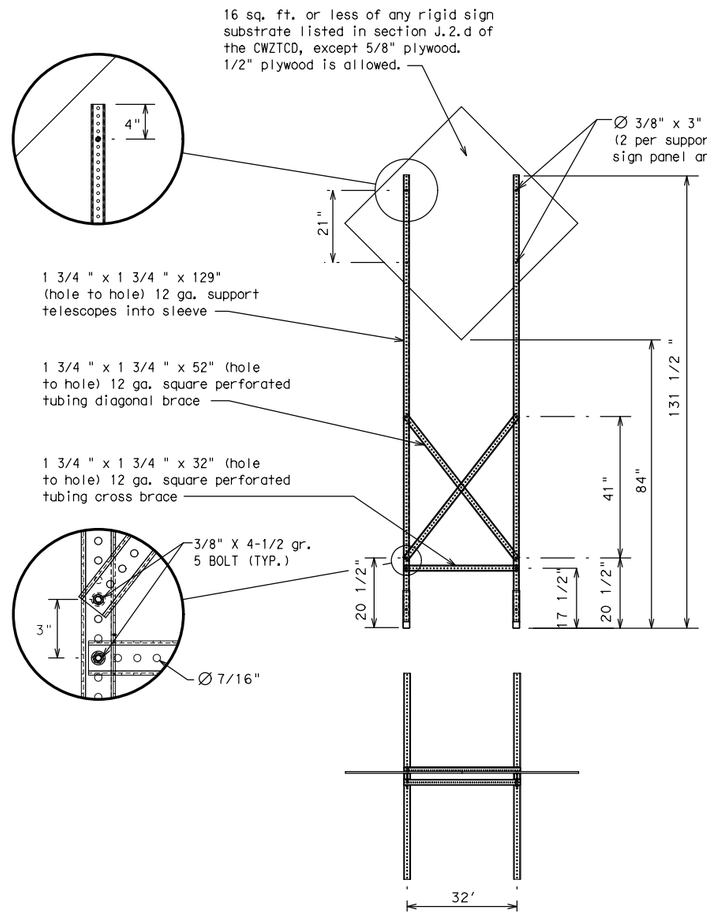
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

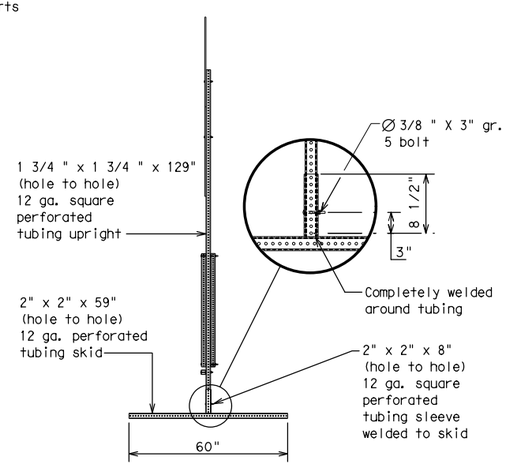


GROUND MOUNTED SIGN SUPPORTS

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







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

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DATE:
FILE:

DATE:
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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		Location List	Warning List	** Advance Notice List
MERGE RIGHT	FORM X LINES RIGHT	AT FM XXXX	SPEED LIMIT XX MPH	TUE-FRI XX AM- X PM
DETOUR NEXT X EXITS	USE XXXXX RD EXIT	BEFORE RAILROAD CROSSING	MAXIMUM SPEED XX MPH	APR XX-XX X PM-X AM
USE EXIT XXX	USE EXIT I-XX NORTH	NEXT X MILES	MINIMUM SPEED XX MPH	BEGINS MONDAY
STAY ON US XXX SOUTH	USE I-XX E TO I-XX N	PAST US XXX EXIT	ADVISORY SPEED XX MPH	BEGINS MAY XX
TRUCKS USE US XXX N	WATCH FOR TRUCKS	XXXXXXX TO XXXXXXX	RIGHT LANE EXIT	MAY X-X XX PM - XX AM
WATCH FOR TRUCKS	EXPECT DELAYS	US XXX TO FM XXXX	USE CAUTION	NEXT FRI-SUN
EXPECT DELAYS	PREPARE TO STOP		DRIVE SAFELY	XX AM TO XX PM
REDUCE SPEED XXX FT	END SHOULDER USE		DRIVE WITH CARE	NEXT TUE AUG XX
USE OTHER ROUTES	WATCH FOR WORKERS			TONIGHT XX PM- XX AM
STAY IN LANE *				

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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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9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	YKM	WHARTON		15

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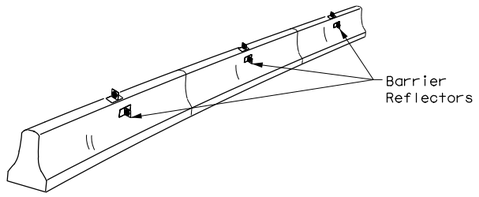
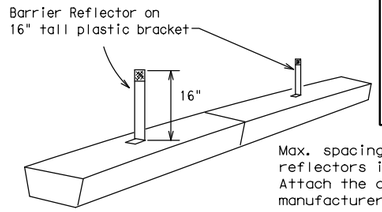
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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

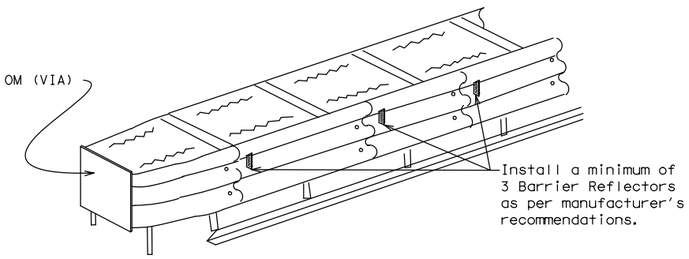


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB)

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.

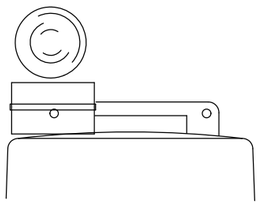


DELINEATION OF END TREATMENTS

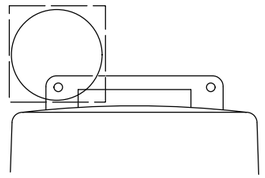
END TREATMENTS FOR CTB'S USED IN WORK ZONES

End treatments used on CTB's in work zones shall meet the apppropriate crashworthy standards as defined in the Manual for Assessing Safety Hardware (MASH). Refer to the CWZTCD List for approved end treatments and manufacturers.

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

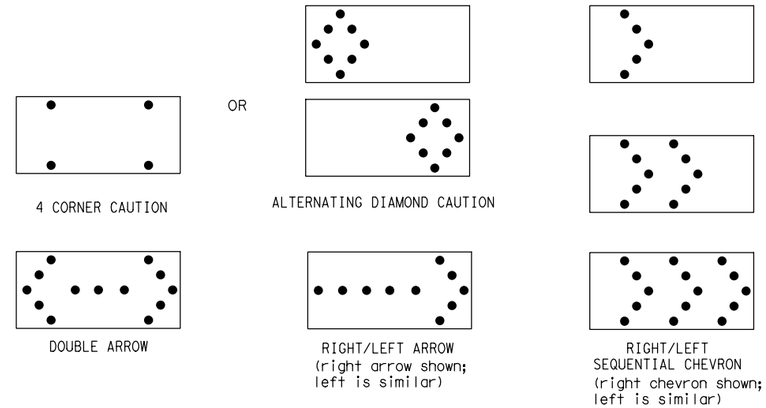
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



4 CORNER CAUTION

ALTERNATING DIAMOND CAUTION

DOUBLE ARROW

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

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

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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

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

Texas Department of Transportation

Traffic Safety Division Standard

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

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	09	117	CR
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	YKM	WHARTON		16

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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:

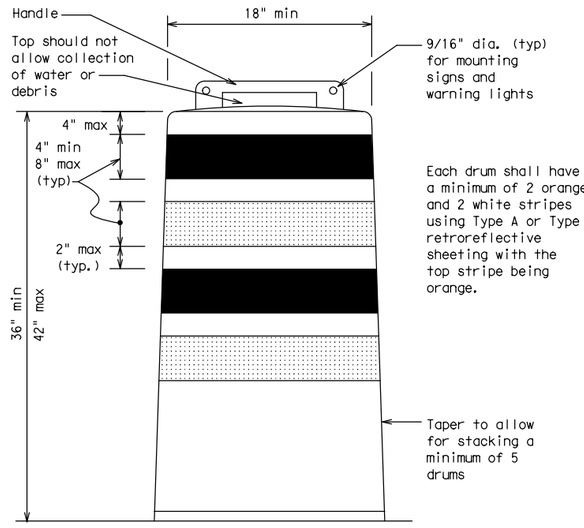
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

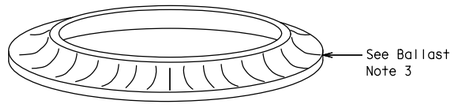
RETROREFLECTIVE SHEETING

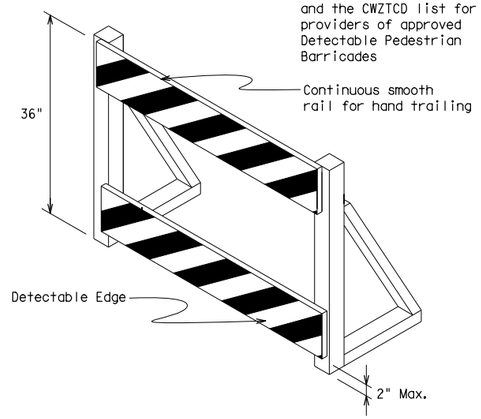
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

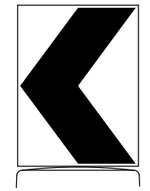




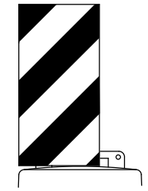


DETECTABLE PEDESTRIAN BARRICADES

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	09	117	CR
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	YKM	WHARTON		17
7-13				

DATE:
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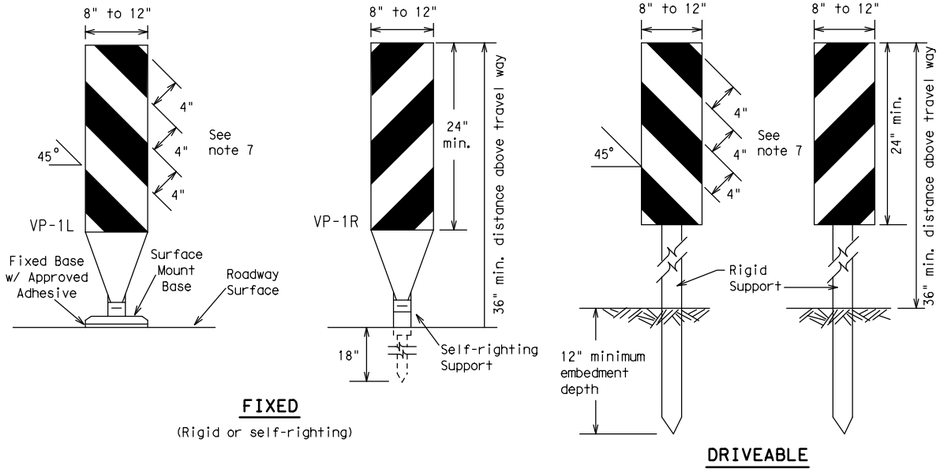
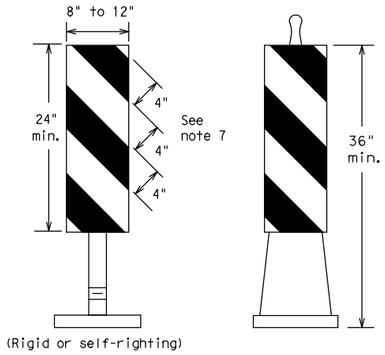


FIXED

(Rigid or self-righting)

DRIVEABLE

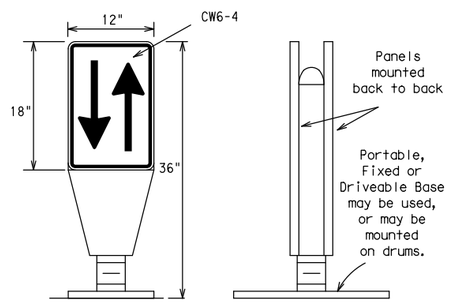


(Rigid or self-righting)

PORTABLE

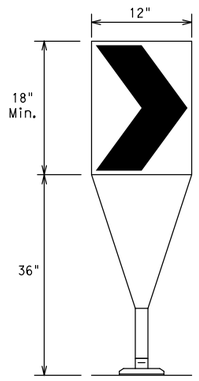
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

VERTICAL PANELS (VPs)



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

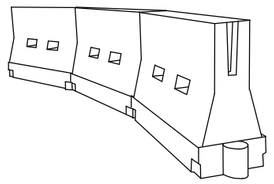
OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



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

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

CHEVRONS



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

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.

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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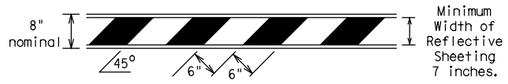
7-13 5-21	YKM	WHARTON		18

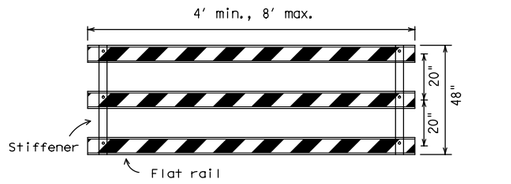
TYPE 3 BARRICADES

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.



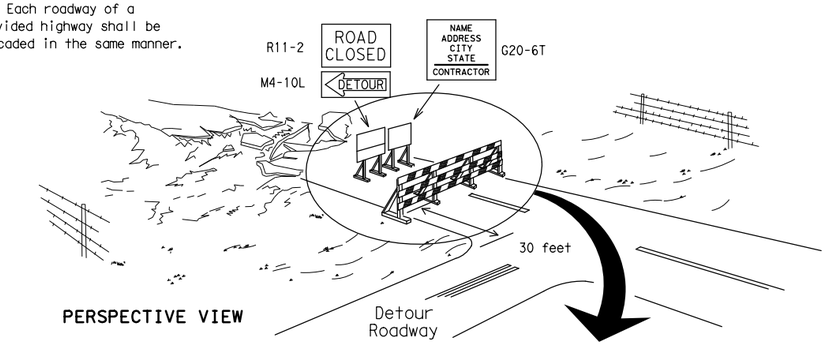
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

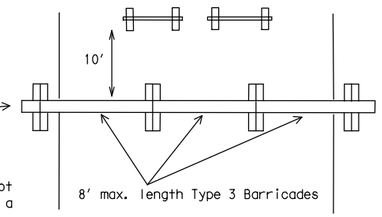
Each roadway of a divided highway shall be barricaded in the same manner.



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.

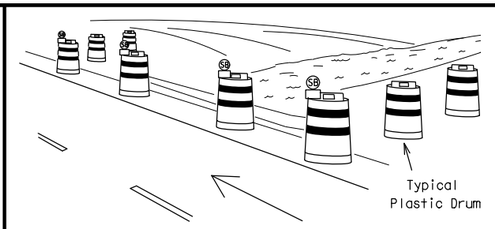
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

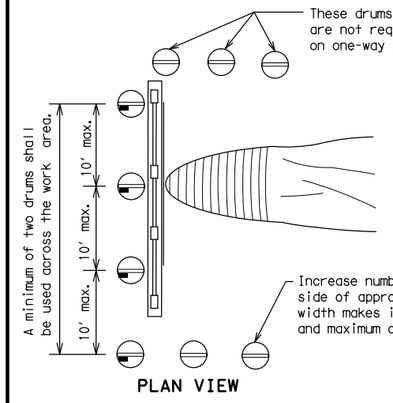
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

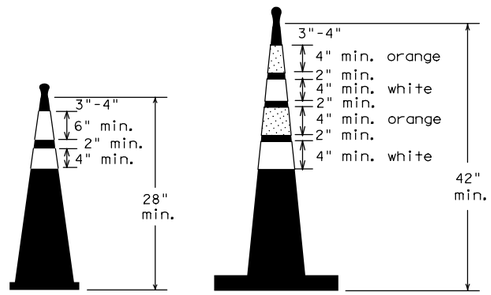
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder 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

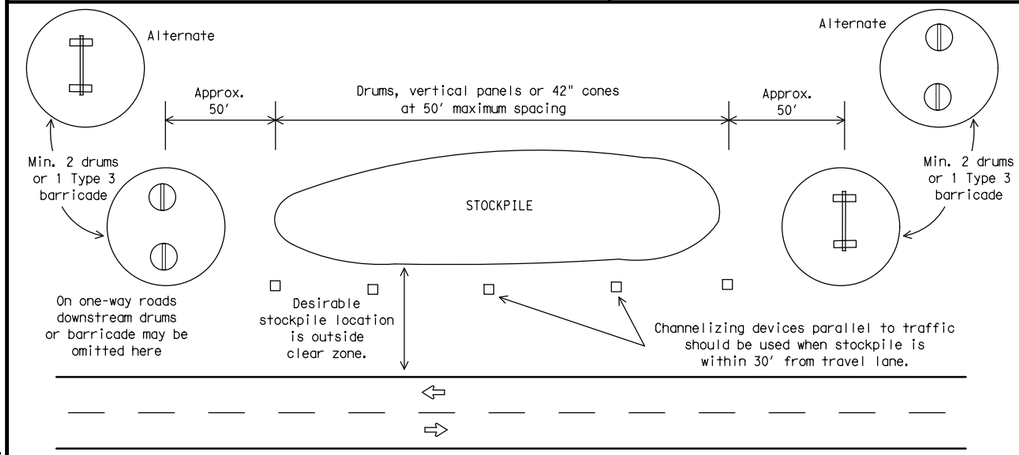
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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

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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

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

DATE:
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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.

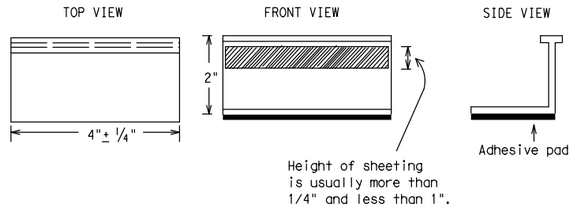
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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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1-02 7-13	YKM	WHARTON		20
11-02 8-14				

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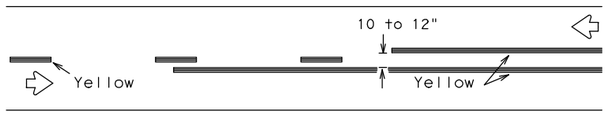
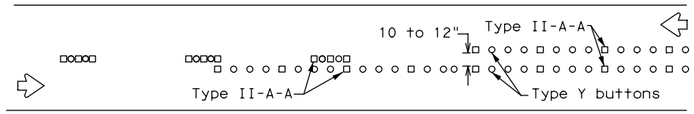
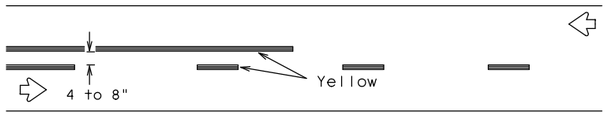
PAVEMENT MARKING PATTERNS



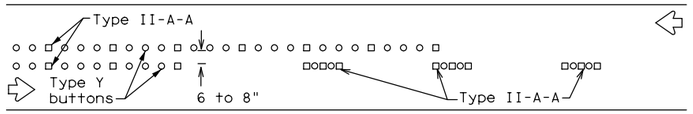
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



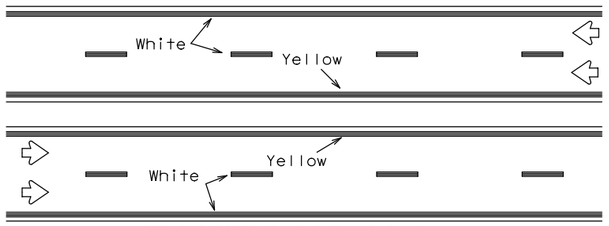
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



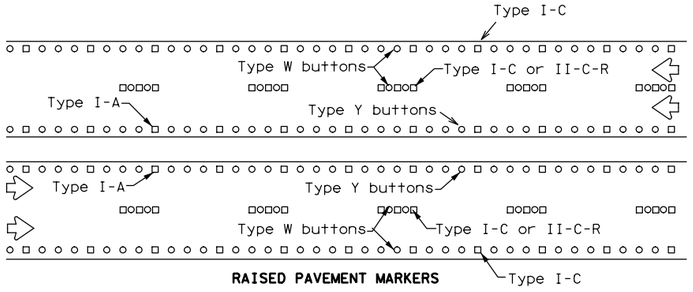
RAISED PAVEMENT MARKERS - PATTERN B

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



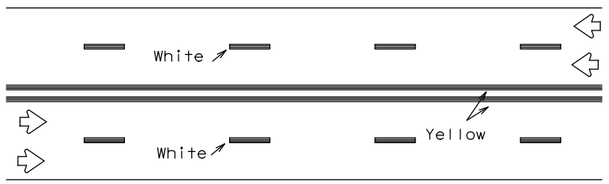
REFLECTORIZED PAVEMENT MARKINGS



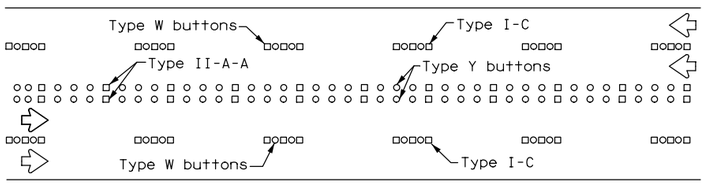
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



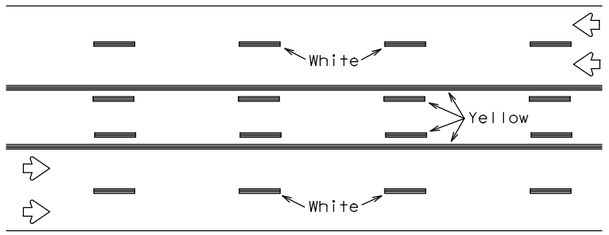
REFLECTORIZED PAVEMENT MARKINGS



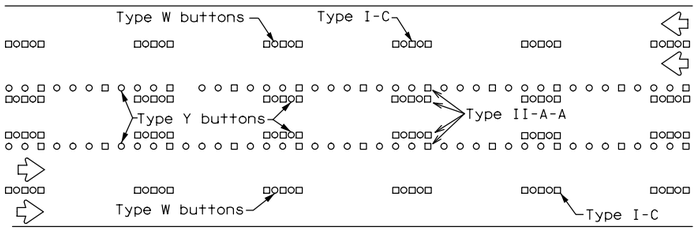
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS

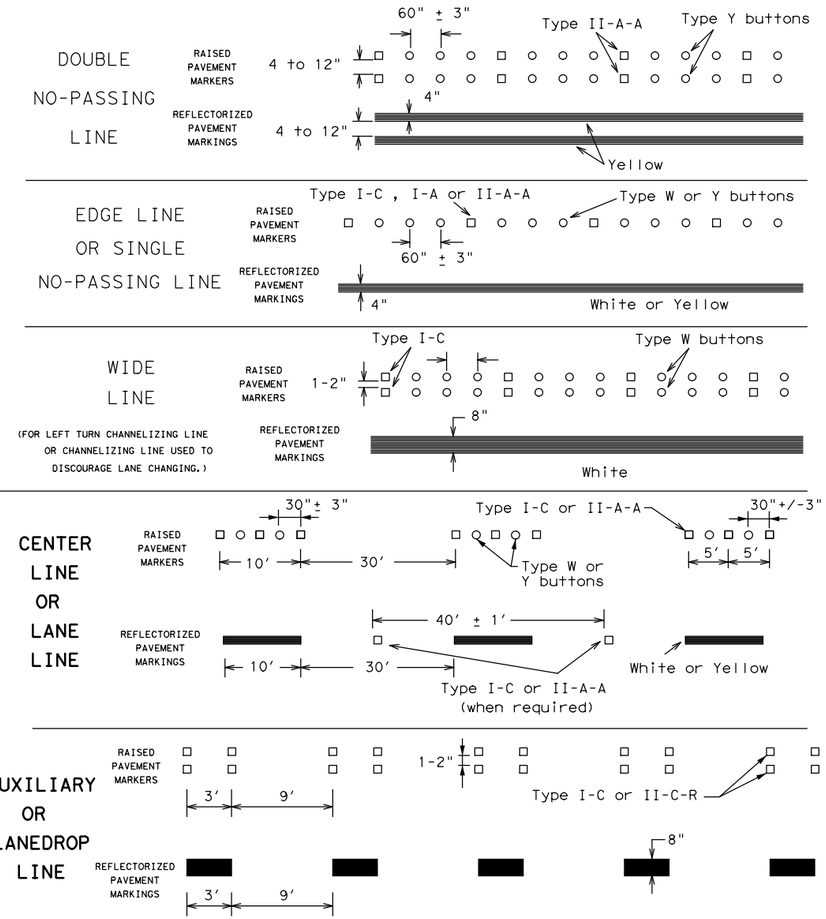


RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

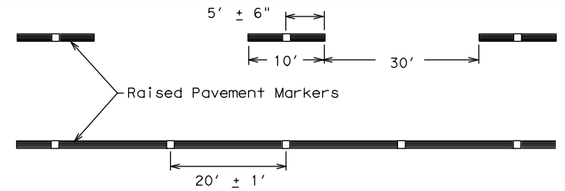
TWO-WAY LEFT TURN LANE

STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS



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

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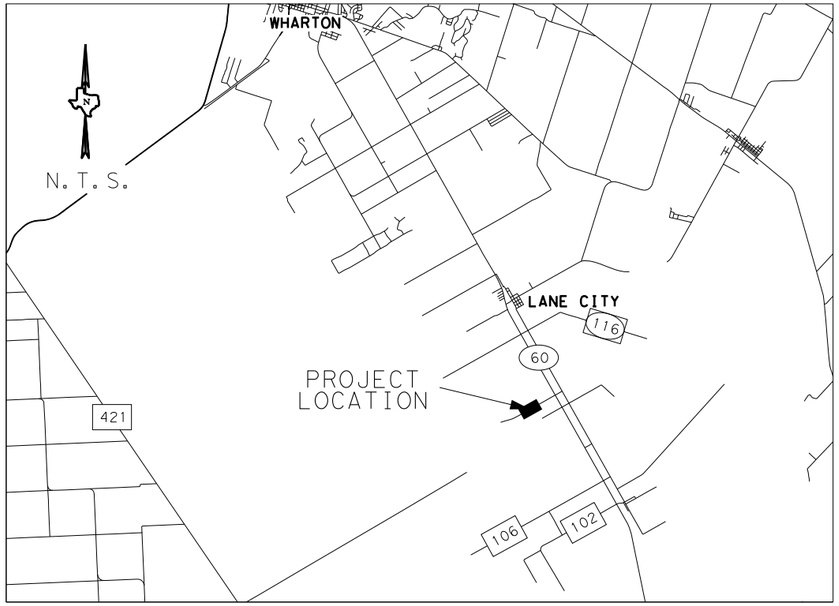
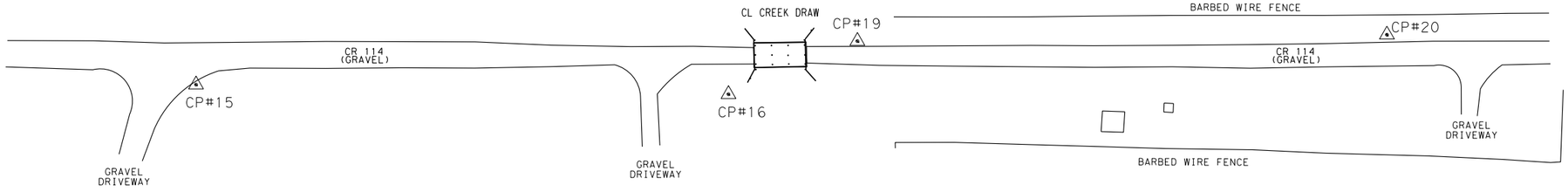
	DIST	COUNTY		SHEET NO.
	YKM	WHARTON		21



LOCATION MAP

N. T. S.



CONTROL POINT	SURFACE COORDINATES		NAVD 88 ELEVATION	GRID COORDINATES		DESCRIPTION
	NORTHING	EASTING		NORTHING	EASTING	
CP#15	13,627,602.448	2,919,811.516	77.953	13,625,831.090	2,919,431.990	5/8-IR W/ RED CAP STAMPED "CP&Y TRAV. POINT"
CP#16	13,627,769.261	2,920,122.149	81.177	13,625,997.881	2,919,742.582	5/8-IR W/ RED CAP STAMPED "CP&Y TRAV. POINT"
CP#19	13,627,841.647	2,920,179.426	81.544	13,626,070.258	2,919,799.852	5/8-IR W/ RED CAP STAMPED "CP&Y TRAV. POINT"
CP#20	13,628,016.723	2,920,483.232	78.993	13,626,245.311	2,920,103.619	5/8-IR W/ RED CAP STAMPED "CP&Y TRAV. POINT"

NOTES:
HORIZONTAL COORDINATES SHOWN ARE IN U.S. SURVEY FEET, AND ARE BASED UPON THE TEXAS COORDINATE SYSTEM OF NAD '83 (HARN '93) TEXAS SOUTH CENTRAL ZONE 4204, WITH A SURFACE ADJUSTMENT FACTOR OF 1.00013. VALUES WERE DERIVED UTILIZING THE TXDOT STATE VIRTUAL REFERENCE STATION NETWORK IN NOVEMBER, 2022.

ELEVATIONS ARE BASED UPON NAVD '88 DATUM (GEOID 18) DERIVED FROM UTILIZING THE TXDOT STATE VIRTUAL REFERENCE STATION NETWORK IN NOVEMBER, 2022.

LEGEND

△ 5/8" IRON ROD W/ RED PLASTIC CAP SET "CP&Y TRAV. POINT"

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.

STATE OF TEXAS
REGISTERED
BRIAN K. KIDD
6494
PROFESSIONAL
LAND SURVEYOR

BRIAN K. KIDD
RPLS NO. 6494

5/24/2023
DATE

NO.	REVISION	BY	DATE

TBPELS FIRM REGISTRATION NUMBER 10194305

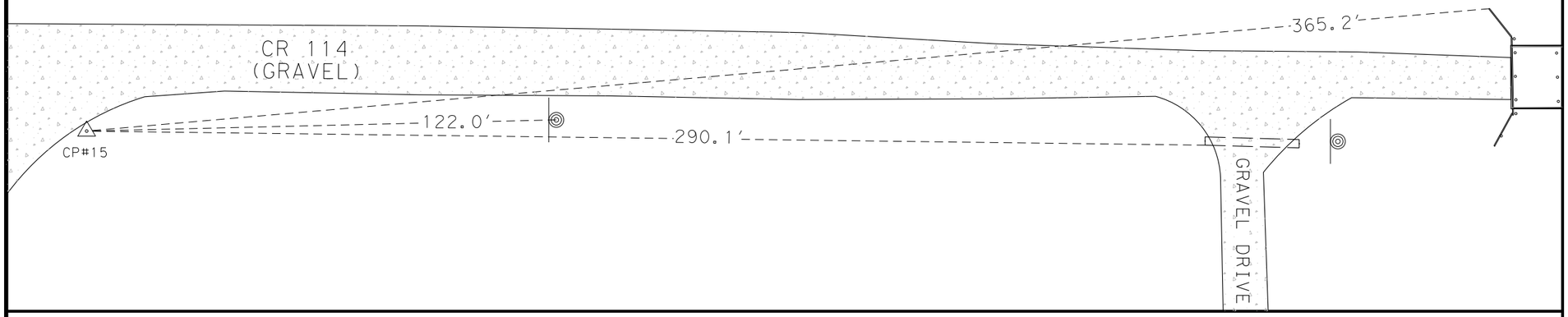
CR 114 AT LCRA CANAL

HORIZONTAL AND VERTICAL CONTROL INDEX SHEET

CSJ 0913-09-117 SHEET 1 OF 1

DESIGNED:	CP&Y	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				HIGHWAY NO.
CHECKED:	CP&Y	13	TEXAS					CR
DRAFTED:	CP&Y	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
CHECKED:	CP&Y	YKM	WHARTON	0913	09	117		22

N. T. S.



CP# 15 IS A 5/8-INCH IRON ROD WITH RED PLASTIC CAP STAMPED "CP&Y TRAV. POINT" LOCATED IN WHARTON COUNTY, TX., LOCATED ON THE SOUTH SIDE OF CR 114, +/- 365.2' SOUTHWEST OF A WINGWALL LOCATED AT THE SOUTHWEST CORNER OF A BRIDGE ON CR 114, +/- 290.1' SOUTHWEST OF A CRUSHED CMP LOACTED ON THE SOUTH SIDE OF CR 114, AND +/- 122.0' SOUTHWEST OF A SPEED LIMIT SIGN LOCATED ON THE SOUTH SIDE OF CR 114.

US SURVEY FEET
DATA SET: NOVEMBER 2022
MONUMENT: 5/8"-IR W/ RED PLASTIC CAP STAMPED "CP&Y TRAV. POINT"
SURFACE ADJUSTMENT FACTOR 1.00013
ELEVATIONS ARE NAVD 88 BASED UPON GEOID 18
TXDOT VRS NETWORK

NOTES:
HORIZONTAL COORDINATES SHOWN ARE IN U.S. SURVEY FEET, AND ARE BASED UPON THE TEXAS COORDINATE SYSTEM OF NAD '83 (HARN '93) TEXAS SOUTH CENTRAL ZONE 4204, WITH A SURFACE ADJUSTMENT FACTOR OF 1.00013. VALUES WERE DERIVED UTILIZING THE TXDOT STATE VIRTUAL REFERENCE STATION NETWORK IN NOVEMBER, 2022.

ELEVATIONS ARE BASED UPON NAVD '88 DATUM (GEOID 18) DERIVED FROM UTILIZING THE TXDOT STATE VIRTUAL REFERENCE STATION NETWORK IN NOVEMBER, 2022.

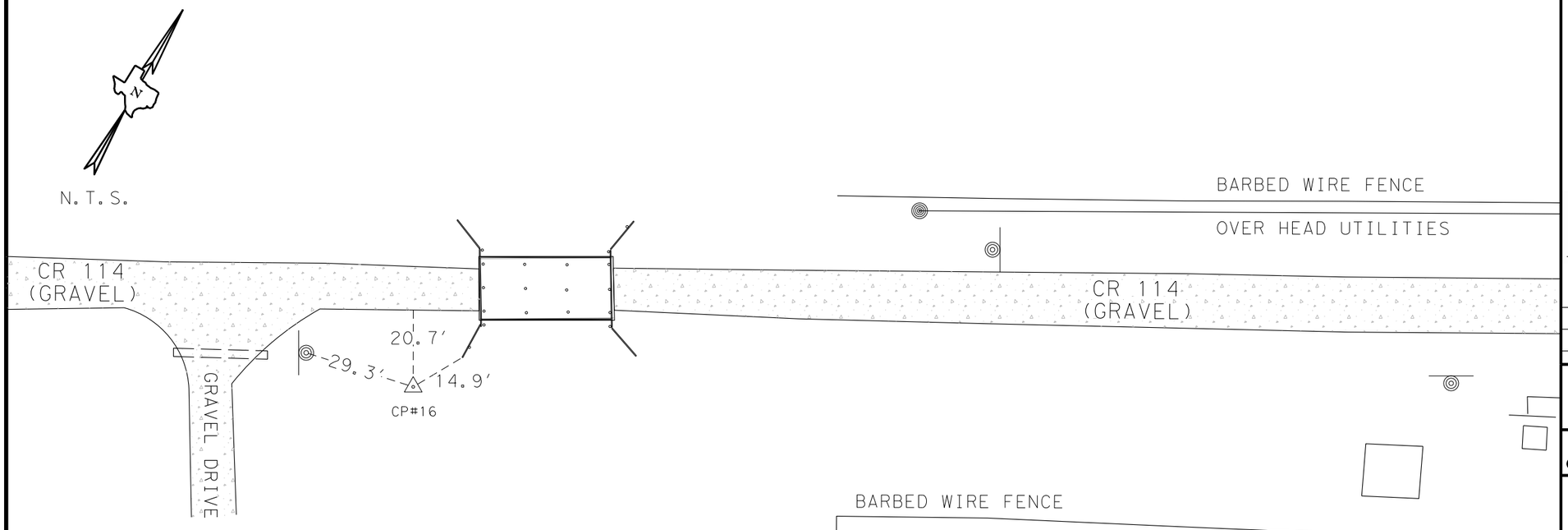
LEGEND

PP

SIGN

5/8" IRON ROD W/ RED PLASTIC CAP SET "CP&Y TRAV. POINT"

N. T. S.



CP# 16 IS A 5/8-INCH IRON ROD WITH RED PLASTIC CAP STAMPED "CP&Y TRAV. POINT" LOCATED IN WHARTON COUNTY, TX., LOCATED ON THE SOUTH SIDE OF CR 114, +/- 14.9'SOUTHWEST OF A WINGWALL LOCATED AT THE SOUTHEAST CORNER OF A BRIDGE LOCATED ON CR 114, +/- 20.7' SOUTH EAST OF THE SOUTH EDGE OF PAVEMENT FOR CR 114, AND +/- 29.3' EAST OF A WEIGHT LIMIT SIGN LOCATED ON THE SOUTH SIDE OF CR 114.

US SURVEY FEET
DATA SET: NOVEMBER 2022
MONUMENT: 5/8"-IR W/ RED PLASTIC CAP STAMPED "CP&Y TRAV. POINT"
SURFACE ADJUSTMENT FACTOR 1.00013
ELEVATIONS ARE NAVD 88 BASED UPON GEOID 18
TXDOT VRS NETWORK

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.

STATE OF TEXAS
REGISTERED
BRIAN K. KIDD
6494
PROFESSIONAL
LAND SURVEYOR

BRIAN K. KIDD
RPLS NO. 6494

5/24/2023
DATE

NO.	REVISION	BY	DATE

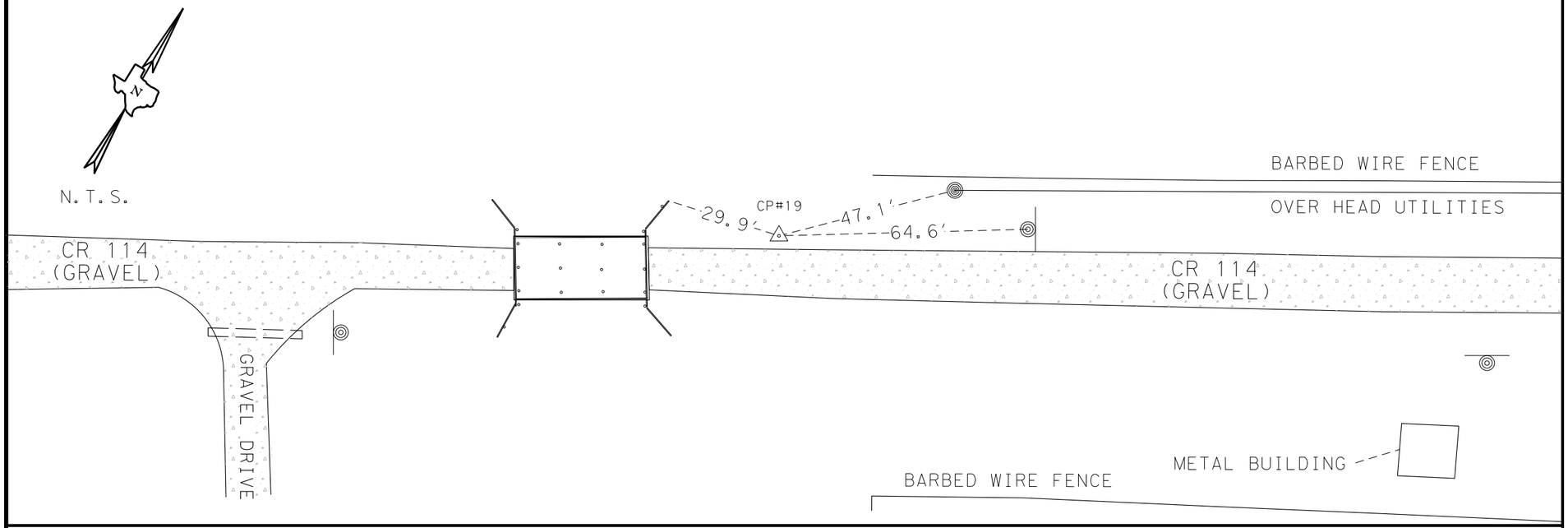
TBPELS FIRM
REGISTRATION NUMBER
10194305

CR 114 AT LCRA CANAL

HORIZONTAL AND VERTICAL CONTROL SHEET

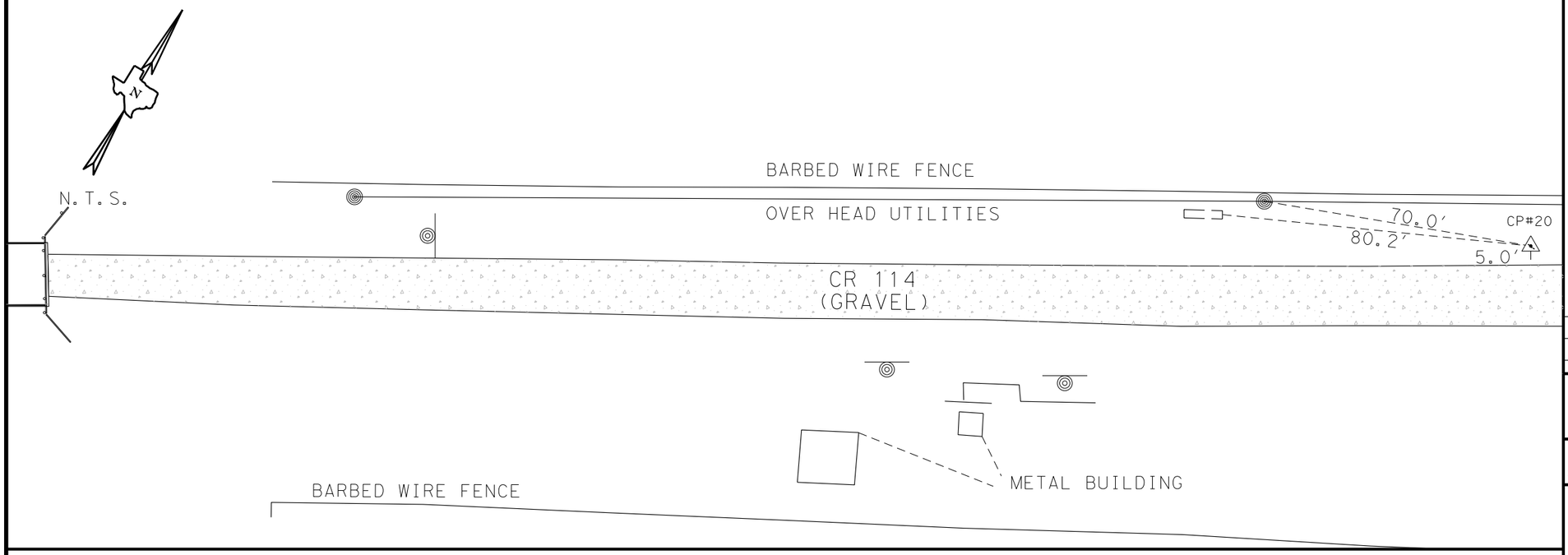
CSJ 0913-09-117 SHEET 1 OF 2

DESIGNED:	CP&Y	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				HIGHWAY NO.
CHECKED:	CP&Y	13	TEXAS					CR
DRAFTED:	CP&Y	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
CHECKED:	CP&Y	YKM	WHARTON	0913	09	117		23



CP# 19 IS A 5/8-INCH IRON ROD WITH RED PLASTIC CAP STAMPED "CP&Y TRAV. POINT"
LOCATED IN WHARTON COUNTY, TX., LOCATED ON THE NORTH SIDE OF CR 114,
+/- 29.9' EAST OF A WINGWALL LOCATED AT THE NORTHWEST CORNER OF A BRIDGE ON CR 114,
+/- 47.1' SOUTHWEST OF A POWERPOLE LOCATED ON THE NORTH SIDE OF CR 114,
AND +/- 64.6' SOUTHWEST OF A WEIGHT LIMIT SIGN LOCATED ON THE NORTH SIDE OF CR 114.

US SURVEY FEET
DATA SET: NOVEMBER 2022
MONUMENT: 5/8"-IR W/ RED PLASTIC CAP STAMPED "CP&Y TRAV. POINT"
SURFACE ADJUSTMENT FACTOR 1.00013
ELEVATIONS ARE NAVD 88 BASED UPON GEOID 18
TXDOT VRS NETWORK



CP# 20 IS A 5/8-INCH IRON ROD WITH RED PLASTIC CAP STAMPED "CP&Y TRAV. POINT"
LOCATED IN WHARTON COUNTY, TX., LOCATED ON THE NORTH SIDE OF CR 114,
+/- 80.2' NORTHEAST OF A 12" CMP LOCATED ON THE NORTH SIDE OF CR 114,
+/- 70.0' NORTHEAST OF A POWERPOLE LOCATED ON THE NORTH SIDE OF CR 114,
AND +/- 5.0' NORTHWEST OF THE NORTH EDGE OF PAVEMENT OF CR 114.

US SURVEY FEET
DATA SET: NOVEMBER 2022
MONUMENT: 5/8"-IR W/ RED PLASTIC CAP STAMPED "CP&Y TRAV. POINT"
SURFACE ADJUSTMENT FACTOR 1.00013
ELEVATIONS ARE NAVD 88 BASED UPON GEOID 18
TXDOT VRS NETWORK

NOTES:
HORIZONTAL COORDINATES SHOWN ARE IN U.S. SURVEY FEET, AND ARE BASED UPON THE TEXAS COORDINATE SYSTEM OF NAD '83 (HARN '93) TEXAS SOUTH CENTRAL ZONE 4204, WITH A SURFACE ADJUSTMENT FACTOR OF 1.00013. VALUES WERE DERIVED UTILIZING THE TXDOT STATE VIRTUAL REFERENCE STATION NETWORK IN NOVEMBER, 2022.

ELEVATIONS ARE BASED UPON NAVD '88 DATUM (GEOID 18) DERIVED FROM UTILIZING THE TXDOT STATE VIRTUAL REFERENCE STATION NETWORK IN NOVEMBER, 2022.

LEGEND

- PP
- SIGN
- 5/8" IRON ROD W/ RED PLASTIC CAP SET "CP&Y TRAV. POINT"

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.

STATE OF TEXAS
REGISTERED
BRIAN K. KIDD
6494
PROFESSIONAL
LAND SURVEYOR

BRIAN K. KIDD
RPLS NO. 6494

5/24/2023
DATE

NO.	REVISION	BY	DATE

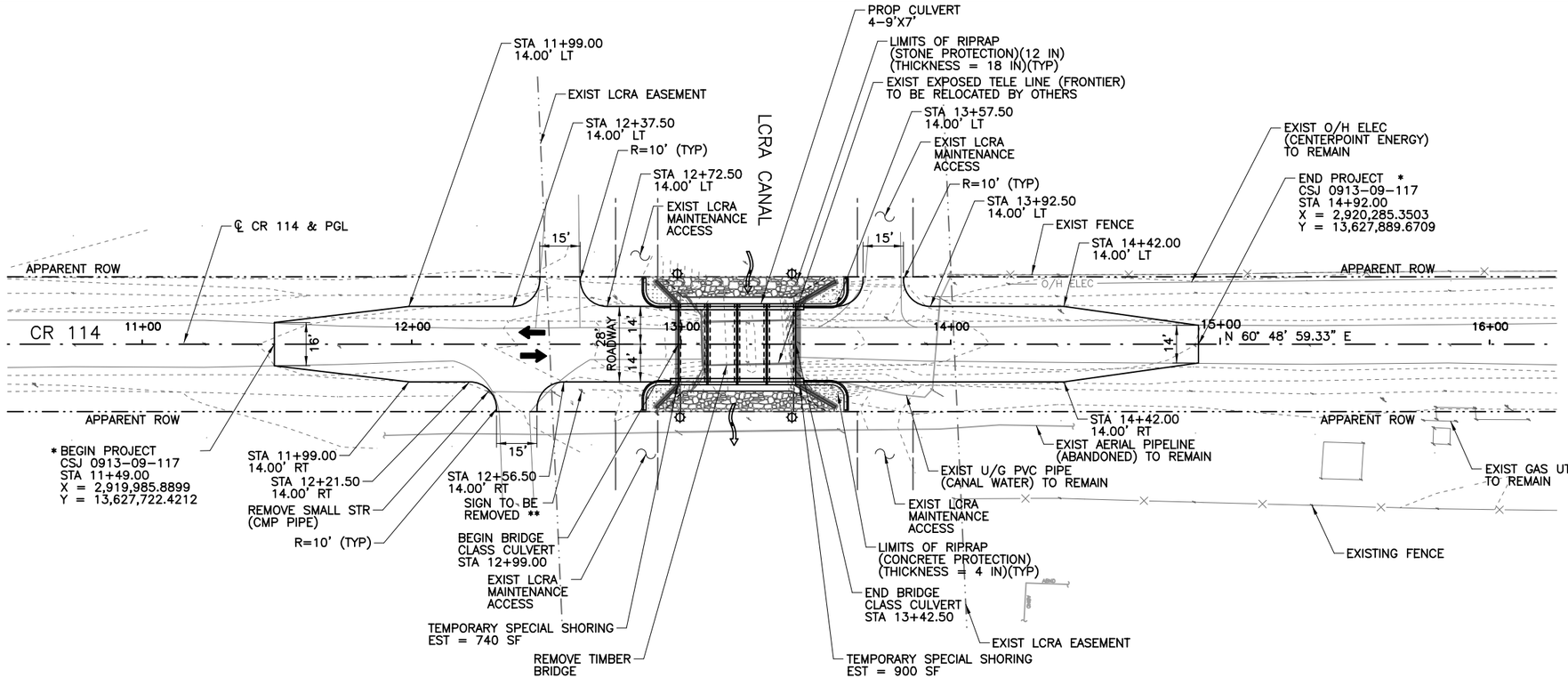
TBPELS FIRM
REGISTRATION NUMBER
10194305

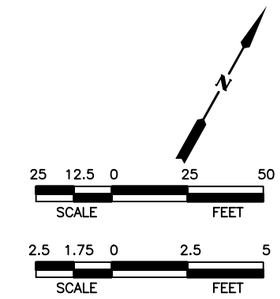
CR 114 AT LCRA CANAL

HORIZONTAL AND VERTICAL CONTROL SHEET

CSJ 0913-09-117 SHEET 2 OF 2

DESIGNED:	CP&Y	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHECKED:	CP&Y	13	TEXAS				CR
DRAFTED:	CP&Y	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CHECKED:	CP&Y	YKM	WHARTON	0913	09	117	24





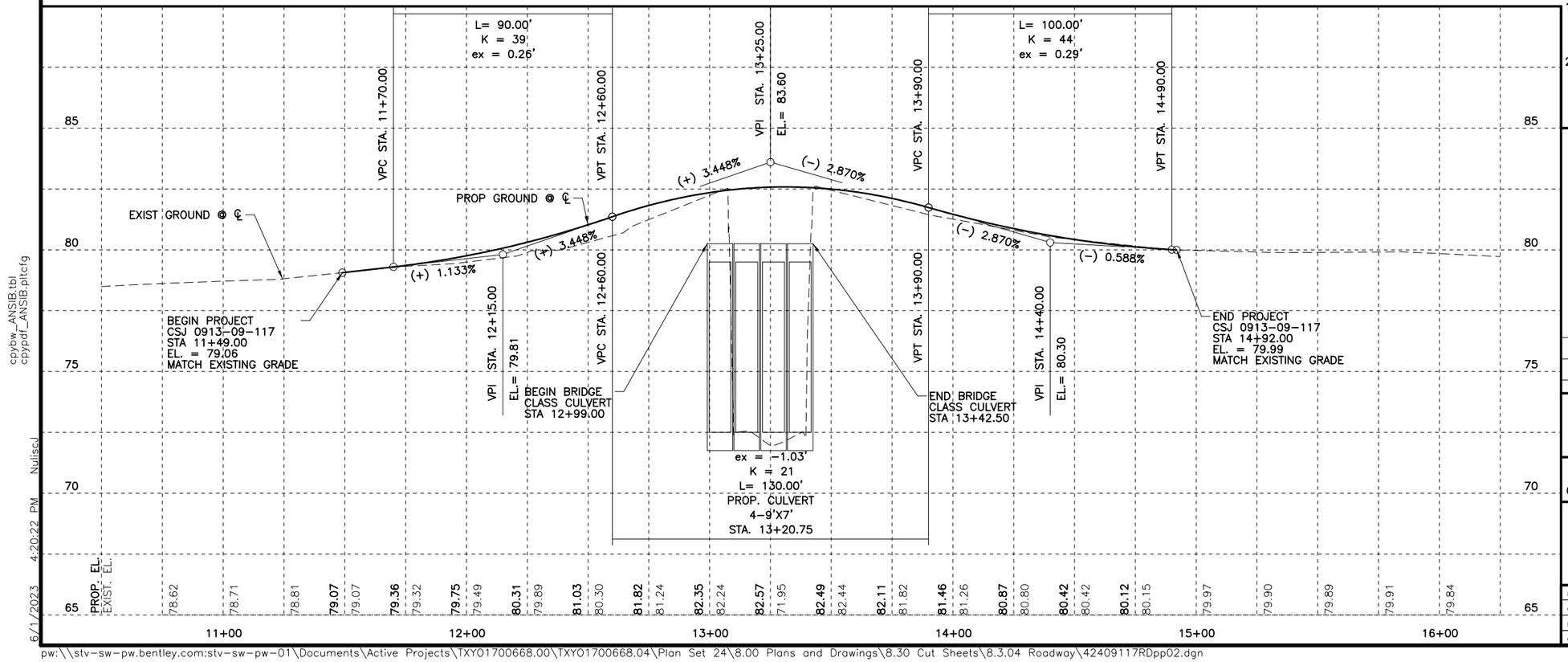
LEGEND

- DIRECTION OF TRAFFIC
- APPARENT ROW
- EXISTING FENCE
- O/H Elec — OVERHEAD ELECTRIC
- G1 — UNDERGROUND GAS UTILITY
- T1 — UNDERGROUND TELE UTILITY
- BI-DIRECTIONAL DELINEATORS
- ROCK RIPRAP
- CONCRETE RIPRAP

* MATCH EXISTING GRADE AND ROADWAY CROSS SLOPE.
** FOR CONTRACTOR'S INFORMATION ONLY.

NOTES

1. THE LOCATION OF ALL UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION BEFORE COMMENCING WORK.
2. LCRA RESPONSIBLE FOR CONNECTION TO MAINTENANCE ACCESS AFTER COMPLETION OF CONSTRUCTION.



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STATE OF TEXAS
SANDRA GAIL MORRIS
113680
LICENSED
PROFESSIONAL ENGINEER

06/01/2023

NO.	REVISION	BY	DATE

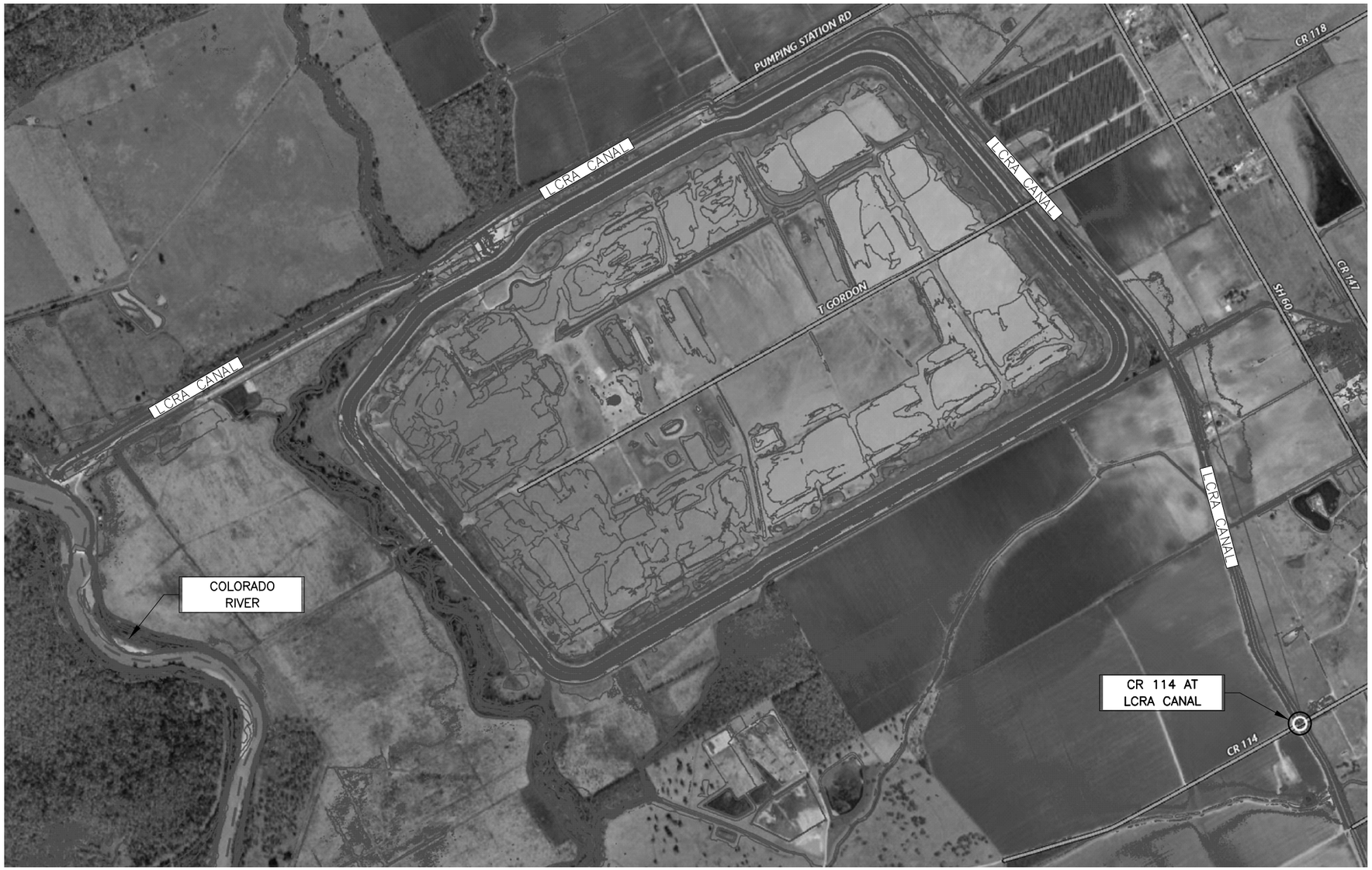
stv
TEXAS REGISTERED
ENGINEERING FIRM
F-204

CR 114 AT LCRA CANAL

PLAN & PROFILE

CSJ 0913-09-117 SHEET 1 OF 1

Designed:	JLN	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
Checked:	SGM	6	TEXAS				CR
Drawn:	JLN	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
Checked:	SGM	YKM	WHARTON	0913	09	117	25



Basin Name	Parameters	Q (cfs) | Normal	Q (cfs) | High
CR 114 at LCRA Canal	A (ac) 42	250	300

N

15000 0 15000 30000

SCALE FEET

LEGEND

DRAINAGE AREA BOUNDARY

NHD FLOWLINE

NOTES:

1. DRAINAGE AREA ENCOMPASSES THE LCRA CANAL FROM ITS HEADWATERS AT THE COLORADO RIVER AND DOWNSTREAM AT THE PROJECT LOCATION.
2. THIS CANAL SERVES AS AN IRRIGATION CANAL REGULATED BY LCRA WITH BERMS THAT ARE HIGH POINTS AROUND THE PERIMETER. THEREFORE, THE FLOW RATES SPECIFIED ARE CONTROLLED FLOW RATES PROVIDED BY LCRA FOR NORMAL FLOW AND HIGH FLOW CONDITIONS.
3. CONTOURS SHOWN WERE OBTAINED BY 2018 LAVACA & WHARTON COUNTY LiDAR DATA SOURCED FROM TEXAS NATURAL RESOURCES INFORMATION SYSTEM (TNRIS). CONTOUR INTERVAL = 5-FT

STATE OF TEXAS
AARON RAY ROBERTS
110497
LICENSED
PROFESSIONAL ENGINEER

05/24/2023

NO.	REVISION	BY	DATE

TEXAS REGISTERED ENGINEERING FIRM F-204

CR 114 AT LCRA CANAL

DRAINAGE AREA MAP

CSJ 0913-09-117 SHEET 1 OF 1

		FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
Designed:	RL						
Checked:	ARR	6	TEXAS				CR
Drawn:	RL	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
Checked:	ARR	YKM	WHARTON	0913	09	115	26

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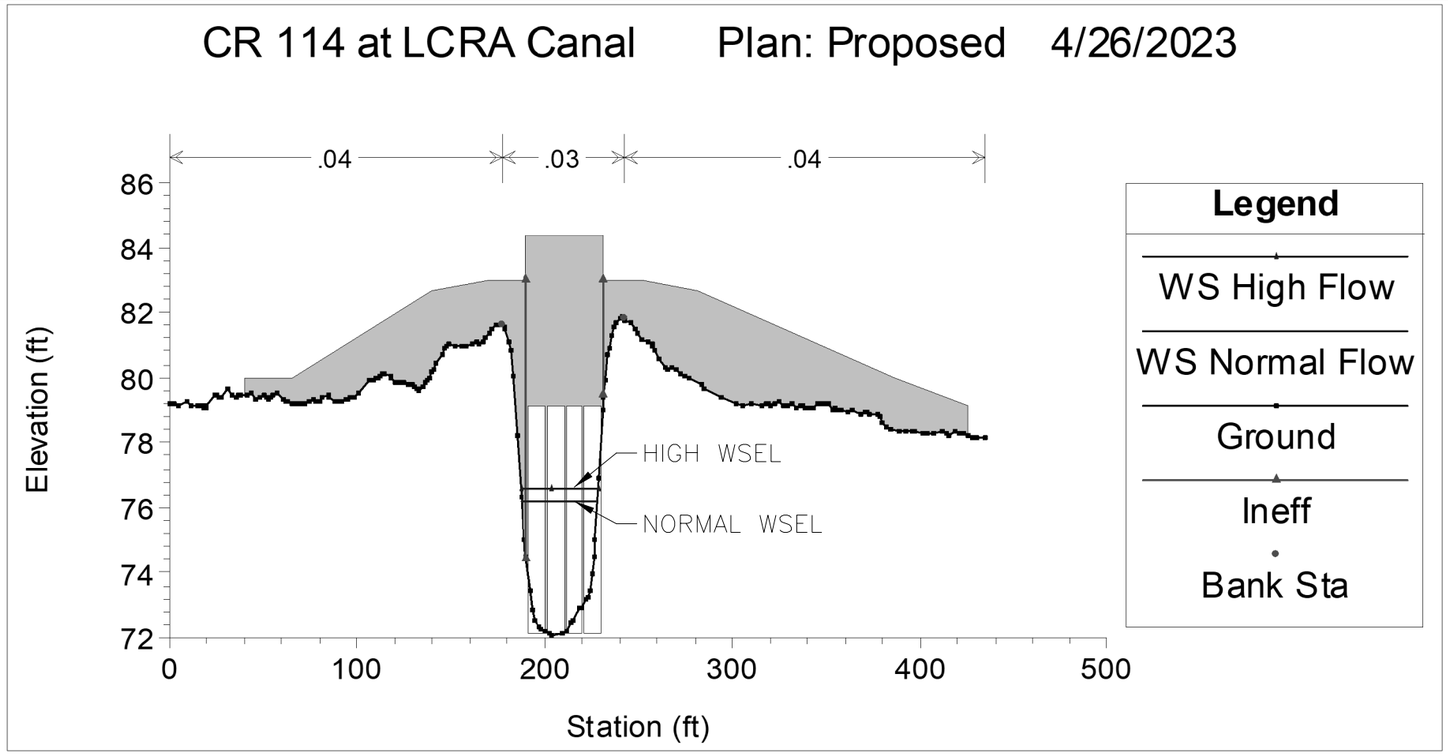
CROSS SECTION LOCATION MAP

STREAM CROSS SECTION AT ROAD PROFILE



NORMAL FLOW HYDRAULIC DATA

RIVER STATION	EXISTING			PROPOSED			PR–EX WSEL (ft)
	Q (cfs)	WSEL (ft)	VEL (fps)	Q (cfs)	WSEL (ft)	VEL (fps)	
5637	250	76.35	1.72	250	76.34	1.72	–0.01
5413	250	76.29	1.76	250	76.28	1.77	–0.01
5173	250	76.20	2.02	250	76.21	1.92	+0.01
5158	Bridge			Culvert			–
5142	250	76.18	1.89	250	76.19	1.81	+0.01
4908	250	76.08	2.18	250	76.08	2.18	0.00
4623	250	75.93	2.29	250	75.93	2.29	0.00

HIGH FLOW HYDRAULIC DATA

RIVER STATION	EXISTING			PROPOSED			PR–EX WSEL (ft)
	Q (cfs)	WSEL (ft)	VEL (fps)	Q (cfs)	WSEL (ft)	VEL (fps)	
5637	300	76.73	1.86	300	76.73	1.86	0.00
5413	300	76.67	1.91	300	76.67	1.91	0.00
5173	300	76.58	2.18	300	76.59	2.07	+0.01
5158	Bridge			Culvert			–
5142	300	76.56	2.06	300	76.57	1.96	+0.01
4908	300	76.45	2.32	300	76.45	2.32	0.00
4623	300	76.30	2.44	300	76.30	2.44	0.00

NOTES:

1. HEC-RAS VERSION 6.3.1 WAS USED FOR THE EXISTING BRIDGE AND PROPOSED CULVERT ANALYSES.
2. THE LCRA CANAL SERVES AS AN IRRIGATION CANAL REGULATED BY LCRA WITH BERMS THAT ARE HIGH POINTS AROUND THE PERIMETER. THEREFORE, THE FLOW RATES USED ARE CONTROLLED FLOW RATES PROVIDED BY LCRA FOR NORMAL FLOW AND HIGH FLOW CONDITIONS.
3. FOR CULVERT DESIGN PURPOSES, THE NORMAL FLOW REPRESENTS THE 10% AEP DESIGN STORM EVENT AND THE HIGH FLOW REPRESENTS THE 1% AEP CHECK STORM EVENT.
4. CROSS SECTIONS WERE CUT USING 2018 LAVACA & WHARTON COUNTY LiDAR DATA.
5. NORMAL DEPTH TAILWATER CONDITION WITH A SLOPE OF 0.00054 FT/FT WAS USED IN THE HYDRAULIC MODEL.
6. THE PROJECT LOCATION IS IN A ZONE X FLOOD HAZARD AREA PER FEMA FIRM PANEL NUMBER: 48481C0575F.
   EFFECTIVE DATE: DECEMBER 21, 2017.
7. COORDINATION WITH THE WHARTON COUNTY FLOODPLAIN ADMINISTRATOR OCCURRED ON MAY 23, 2023.

STATE OF TEXAS
AARON RAY ROBERTS
110497
LICENSED
PROFESSIONAL ENGINEER
05/24/2023

NO.	REVISION	BY	DATE

stv
TEXAS REGISTERED ENGINEERING FIRM F-204

CR 114 AT LCRA CANAL

HYDRAULIC DATA SHEET

CSJ 0913-09-117 SHEET 1 OF 1

Designed:	RL	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
Checked:	ARR	6	TEXAS				CR
Drawn:	RL	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
Checked:	ARR	YKM	WHARTON	0913	09	115	27

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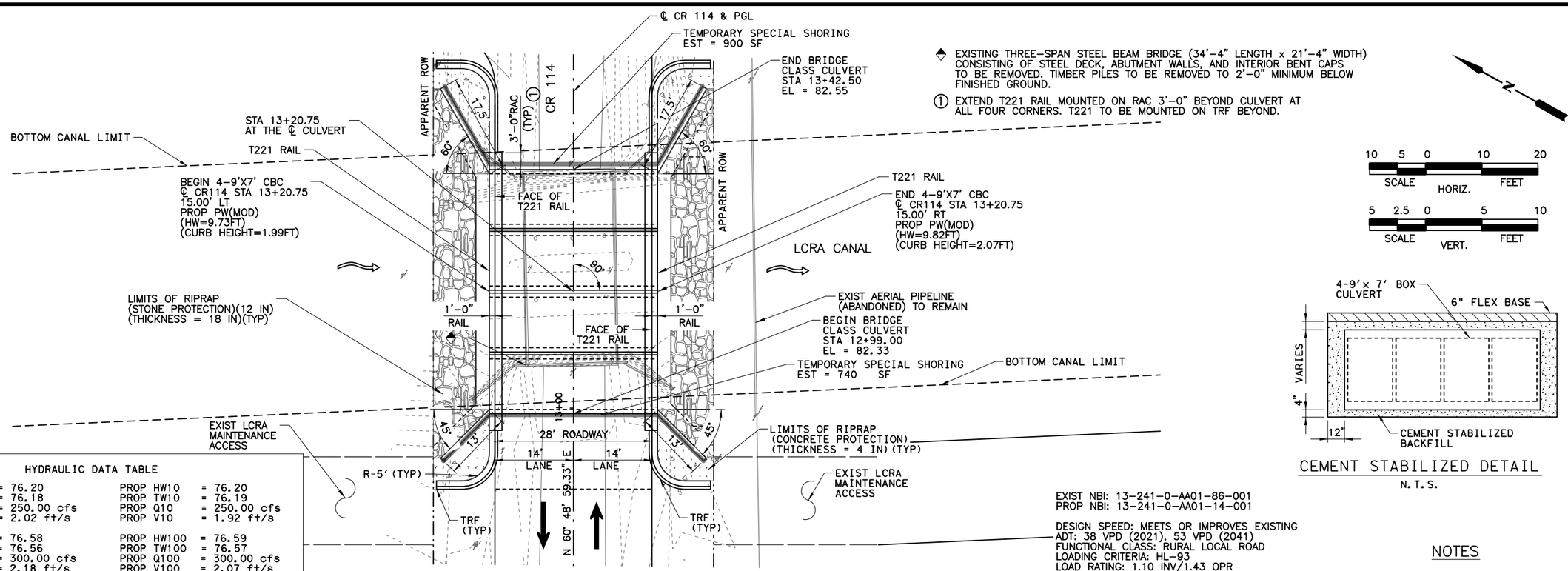


◆ EXISTING THREE-SPAN STEEL BEAM BRIDGE (34'-4" LENGTH x 21'-4" WIDTH) CONSISTING OF STEEL DECK, ABUTMENT WALLS, AND INTERIOR BENT CAPS TO BE REMOVED. TIMBER PILES TO BE REMOVED TO 2'-0" MINIMUM BELOW FINISHED GROUND.

① EXTEND T221 RAIL MOUNTED ON RAC 3'-0" BEYOND CULVERT AT ALL FOUR CORNERS. T221 TO BE MOUNTED ON TRF BEYOND.

10 5 0 10 20
SCALE HORIZ. FEET

5 2.5 0 5 10
SCALE VERT. FEET

CEMENT STABILIZED DETAIL
N.T.S.

HYDRAULIC DATA TABLE

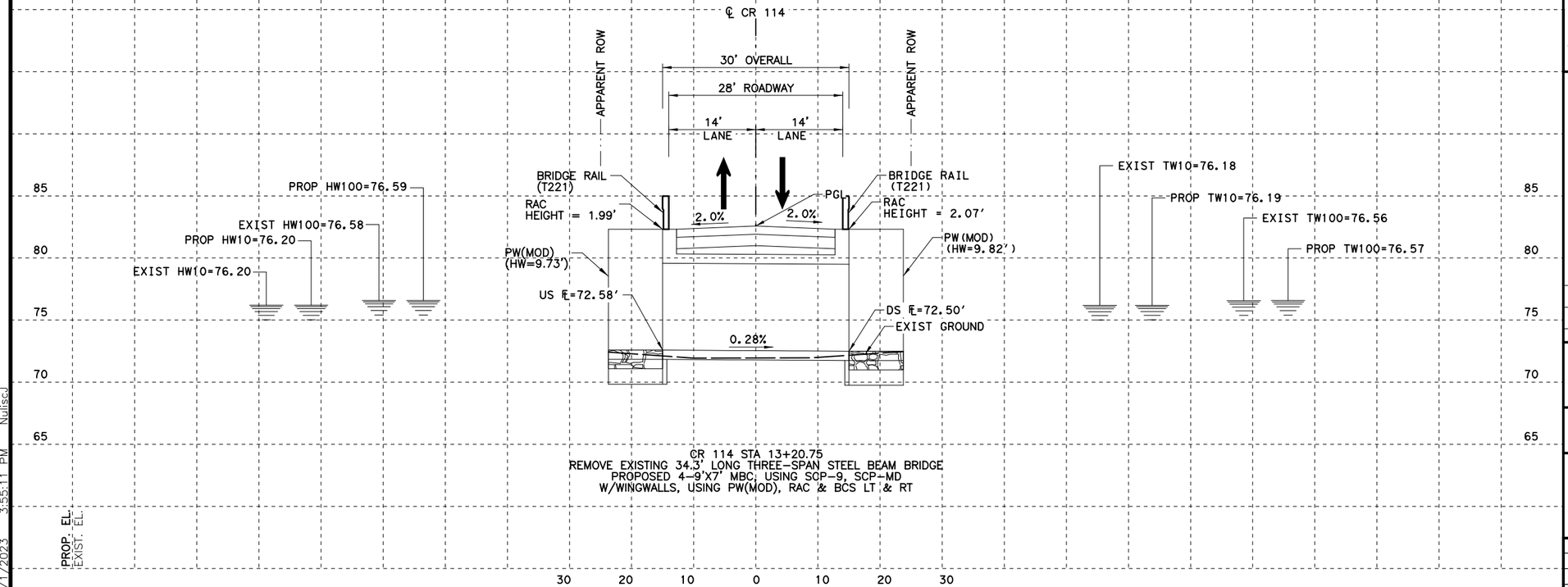
EXIST HW10	= 76.20	PROP HW10	= 76.20
EXIST TW10	= 76.18	PROP TW10	= 76.19
EXIST Q10	= 250.00 cfs	PROP Q10	= 250.00 cfs
EXIST V10	= 2.02 ft/s	PROP V10	= 1.92 ft/s
EXIST HW100	= 76.58	PROP HW100	= 76.59
EXIST TW100	= 76.56	PROP TW100	= 76.57
EXIST Q100	= 300.00 cfs	PROP Q100	= 300.00 cfs
EXIST V100	= 2.18 ft/s	PROP V100	= 2.07 ft/s

EXIST NBI: 13-241-0-AA01-86-001
PROP NBI: 13-241-0-AA01-14-001

DESIGN SPEED: MEETS OR IMPROVES EXISTING
ADT: 38 VPD (2021), 53 VPD (2041)
FUNCTIONAL CLASS: RURAL LOCAL ROAD
LOADING CRITERIA: HL-93
LOAD RATING: 1.10 INV/1.43 OPR

NOTES

1. FOR CULVERT DESIGN PURPOSES, THE NORMAL FLOW REPRESENTS THE 10% AEP DESIGN STORM AND THE HIGH FLOW REPRESENTS THE 1% AEP CHECK STORM EVENTS.
2. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION (2020) AND TXDOT BRIDGE DESIGN MANUAL (NOV 2021).
3. UTILIZE PW-1 PROFILE AS SHOWN ON STANDARD PW(MOD) FOR CULVERT WINGWALLS.



CR 114 STA 13+20.75
REMOVE EXISTING 34.3' LONG THREE-SPAN STEEL BEAM BRIDGE
PROPOSED 4-9'X7' MBC, USING SGP-9, SCP-MD
W/WINGWALLS, USING PW(MOD), RAC & BCS LT & RT

SANDRA GAIL MORRIS
113680
LICENSED
PROFESSIONAL ENGINEER
STATE OF TEXAS
06/01/2023

NO.	REVISION	BY	DATE

stv
TEXAS REGISTERED ENGINEERING FIRM F-204

CR 114 AT LCRA CANAL
BRIDGE CLASS CULVERT LAYOUT
LCRA CANAL BRIDGE
STA 13+20.75
CSJ 0913-09-117 SHEET 1 OF 1

		FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				HIGHWAY NO.
Designed:	JLN	6	TEXAS					CR
Checked:	SGM	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
Drawn:	JLN	YKM	WHARTON	0913	09	117		28
Checked:	SGM							

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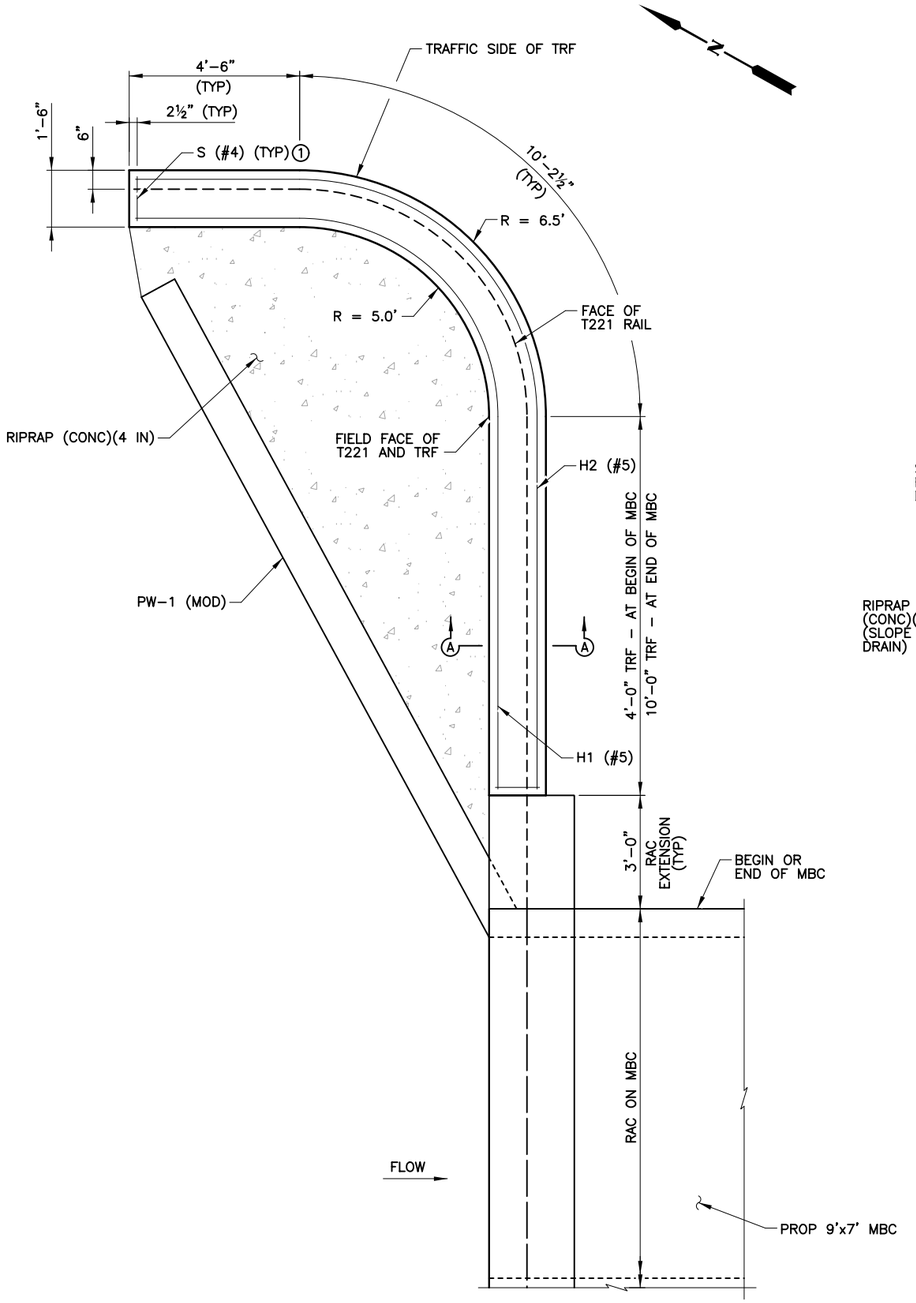


PLAN

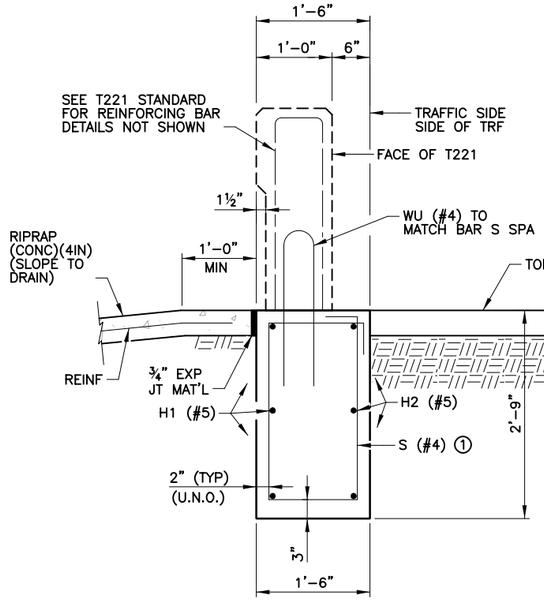
(SHOWING LEFT SIDE TRF AT END OF MBC. TYPICAL AT ALL FOUR CORNERS.)

TRF GENERAL NOTES:

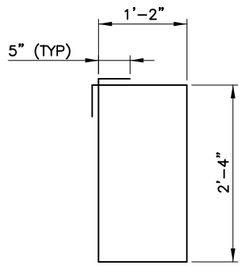
1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION (2020).
2. PROVIDE CLASS "C" CONCRETE (f'c = 3,600 PSI).
3. PROVIDE GRADE 60 REINFORCING STEEL.
4. COVER DIMENSIONS ARE CLEAR DIMENSIONS UNLESS OTHERWISE NOTED.
5. SEE T221 TXDOT RAIL STANDARD FOR DETAILS AND INFORMATION NOT SHOWN.
6. PAYMENT FOR TRF TO BE PAID FOR BY THE BID ITEM 420 6066 CLASS "C" CONC (RAIL FOUNDATION).

CONCRETE RIPRAP GENERAL NOTES:

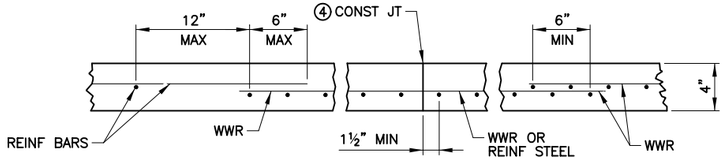
1. PROVIDE CLASS "B" CONCRETE (f'c = 2,000 PSI), CLASS "C" CONCRETE IS ACCEPTABLE.
2. PROVIDE GRADE 60 REINFORCING STEEL.
3. PROVIDE DEFORMED WELDED WIRE REINFORCEMENT (WWR) MEETING ASTM A1064, UNLESS OTHERWISE SHOWN.
4. PROVIDE REINFORCING BARS, DEFORMED WWR, OR ANY SUITABLE COMBINATION OF BOTH TYPES FOR RIPRAP REINFORCING.
5. INSTALL CONSTRUCTION JOINTS OR GROOVED JOINTS EXTENDING THE FULL SLANT SLOPE HEIGHT AT INTERVALS OF APPROXIMATELY 20 FEET UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
6. SEE CULVERT LAYOUT FOR LIMITS OF RIPRAP.
7. PAYMENT FOR CONCRETE RIPRAP TO BE PAID FOR BY THE BID ITEM 432 6001 RIPRAP (CONC)(4 IN).



SECTION A-A



BARS S (#4)



CONCRETE RIPRAP REINFORCEMENT DETAILS ③

FOR CONTRACTOR'S INFORMATION
FOR CONCRETE RIPRAP ONLY:
4" CONC= 0.012 CY/SF
#3 REINF AT 18" C-C = 0.501 LBS/SF
6x6-D3xD3 = 0.408 LBS/SF

TABLE OF ESTIMATED QUANTITIES ② END BRIDGE TRAFFIC RAIL FOUNDATION

BAR	NO.	SIZE	LENGTH	WEIGHT
H1	3	5	24'-0"	75
H2	3	5	22'-5"	70
S	50	4	7'-10"	262
REINFORCING STEEL			LB	337
CLASS "C" CONC (RAIL FOUNDATION)			CY	3.6

TABLE OF ESTIMATED QUANTITIES ② BEGIN BRIDGE TRAFFIC RAIL FOUNDATION

BAR	NO.	SIZE	LENGTH	WEIGHT
H1	3	5	18'-0"	56
H2	3	5	16'-5"	51
S	38	4	7'-10"	199
REINFORCING STEEL			LB	255
CLASS "C" CONC (RAIL FOUNDATION)			CY	2.7

① BAR S TO BE SPACED AT 6" MAX LONGITUDINALLY ALONG TRF FROM TRAFFIC SIDE OF TRF.

② QUANTITIES SHOWN ARE FOR ONE TRAFFIC RAIL FOUNDATION ONLY. TOTAL CLASS C CONCRETE (RAIL FOUNDATION) = 12.6 CY.

③ PROVIDE #3 REINFORCING BARS AT 18" SPA C-C. PROVIDE WELDED WIRE REINFORCEMENT (WWR) AS 6X6-D2.9XD2.9 OR D3XD3. COMBINATIONS OF WWR AND REINFORCING BARS ARE PERMITTED. USE LAP SPLICES OF A MINIMUM 6 INCHES, MEASURED FROM THE TRANSVERSE WIRE OF WWR, AND THE ENDS OF REINFORCING BARS.

④ WWR OR REINFORCING STEEL IS CONTINUOUS THROUGH RIPRAP CONSTRUCTION JOINTS. PROVIDE WWR OR REINFORCING STEEL THAT EXTENDS 1'-1" MINIMUM INTO ADJACENT RIPRAP ON EACH SIDE OF CONSTRUCTION JOINT.

STATE OF TEXAS
KELLY HO
112947
LICENSED PROFESSIONAL ENGINEER
05/31/2023

NO.	REVISION	BY	DATE

stv
TEXAS REGISTERED ENGINEERING FIRM F-204

CR 114 AT LCRA CANAL

TRAFFIC RAIL FOUNDATION DETAILS

CSJ 0913-09-117 SHEET 1 OF 1

Designed:	KAD	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				HIGHWAY NO.
Checked:	KH	6	TEXAS					CR
Drawn:	KAD	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
Checked:	KH	YKM	WHARTON	0913	09	117		29

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pw:\\stv-sw-pw.bentley.com:stv-sw-pw-01\Documents\Active Projects\TXY01700668.00\TXY01700668.04\Plan Set 24\8.00 Plans and Drawings\8.30 Cut Sheets\8.3.08 Bridge\42409115TRF01.dgn

Culvert Station and/or Creek Name followed by applicable end (Lt, Rt or Both)	Description of Box Culvert No. Spans ~ Span X Height	Max Fill Height (Ft)	Applicable Box Culvert Standard (4)	Applicable Wingwall or End Treatment Standard	Skew Angle (0°,15°, 30° or 45°)	Side Slope or Channel Slope Ratio (SL:1)	T Culvert Top Slab Thickness (In)	U Culvert Wall Thickness (In)	C Estimated Curb Height (Ft)	Hw (1) Height of Wingwall (Ft)	A Curb to End of Wingwall (Ft)	B Offset of End of Wingwall (Ft)	Lw Length of Longest Wingwall (Ft)	Ltw Culvert Toewall Length (Ft)	Atw Anchor Toewall Length (Ft)	Riprap Apron (CY)	Class "C" Conc (Curb) (2) (CY)	Class "C" Conc (Wingwall) (3) (CY)	Total Wingwall Area (SF)
CULVERT AT STA 13+20.75 (LT)	4 ~ 9'x 7'	1.82'	SCP-9	PW(MOD)	0°	2:1	9"	9"	1.99'	9.73'	N/A	N/A	17.5'	43.5'	N/A	0.0	8.5	20.2	236.4
CULVERT AT STA 13+20.75 (RT)	4 ~ 9'x 7'	1.82'	SCP-9	PW(MOD)	0°	2:1	9"	9"	2.07'	9.82'	N/A	N/A	17.5'	43.5'	N/A	0.0	8.5	20.2	236.4

NOTES:
Skew = 0° on SW-0, FW-0, SETB-CD, SETB-SW-0, and SETB-FW-0 standard sheets;
30° maximum for safety end treatment

SL:1 = Horizontal : 1 Vertical
- Side slope at culvert for flared or straight wingwalls.
- Channel slope for parallel wingwalls.
- Slope must be 3:1 or flatter for safety end treatments.

T = Box culvert top slab thickness. Dimension can be found on the applicable box culvert standard sheet.

U = Box culvert wall thickness. Dimension can be found on the applicable box culvert standard sheet.

C = Curb height

See applicable wing or end treatment standard sheets for calculations of Hw, A, B, Lw, Ltw, Atw, and Total Wingwall Area.

Hw = Height of wingwall

A = Distance from face of curb to end of wingwall (not applicable to parallel or straight wingwalls)

B = Offset of end of wingwall (not applicable to parallel or straight wingwalls)

Lw = Length of longest wingwall.

Ltw = Length of culvert toewall (not applicable when using riprap apron)

Atw = Length of anchor toewall (applicable to safety end treatment only)
Total Wingwall Area = Wingwall area in sq. ft. for two wingwalls (one structure end) if Lt or Rt.
Area for four wingwalls (two structure ends) if Both.

(1) Round the wall heights shown to the nearest foot for bidding purposes.

(2) Concrete volume shown is for box culvert curb only. For curbs using the Box Culvert Rail Mounting Details (RAC) standard sheet quantities shown must be increased by a factor of 2.25. If Class S concrete is required for the top slab of the culvert, also provide Class S concrete for the curb. Curb concrete is considered part of the Box Culvert for payment.

(3) Concrete volume shown is total of wings, footings, culvert toewall (if any), anchor toewalls (if any) and wingwall toewalls. Riprap aprons, culverts, and curb quantities are not included.

(4) Regardless of the type of culvert shown on this sheet, the Contractor has the option of furnishing cast-in-place or precast culverts unless otherwise shown elsewhere on the plans. If the Contractor elects to provide culverts of a different type than those shown on this sheet, it is the Contractor's responsibility to make the necessary adjustments to the dimensions and quantities shown.

STATE OF TEXAS
SANDRA GAIL MORRIS
113680
LICENSED
PROFESSIONAL ENGINEER

05/25/2023

Texas Department of Transportation

Bridge Division Standard

BOX CULVERT SUPPLEMENT
WINGS AND END TREATMENTS

BCS

FILE:	bcsstde1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS		0913	09	117	CR
		DIST	COUNTY		SHEET NO.
		YKM	WHARTON		30

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

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DATE:
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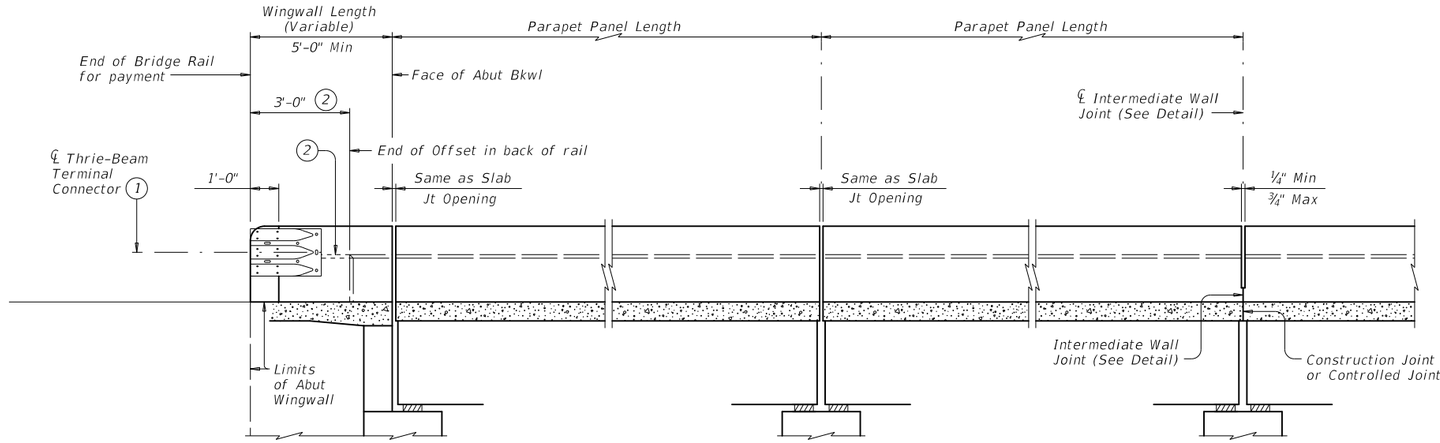
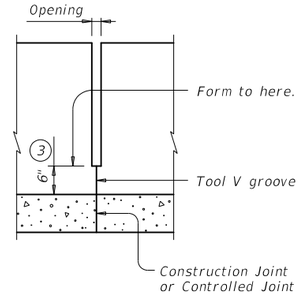
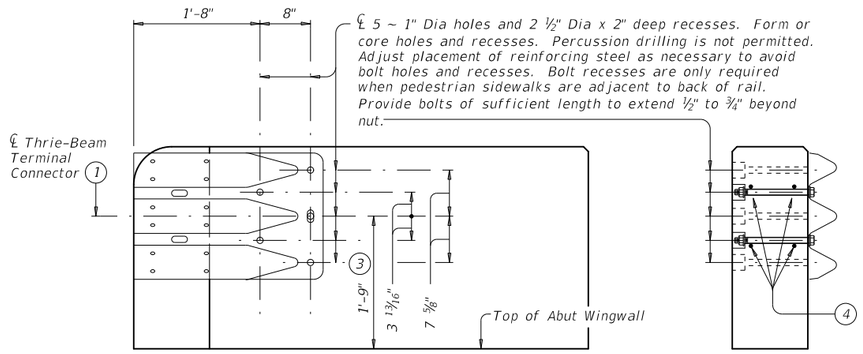


ROADWAY ELEVATION OF RAIL



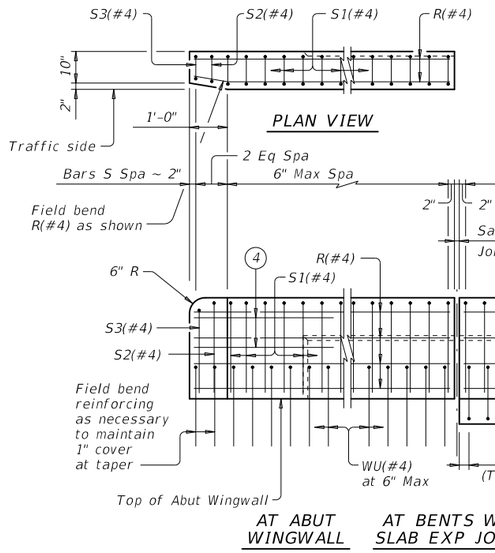
INTERMEDIATE WALL JOINT DETAIL

Provide at all interior bents without slab expansion joints.

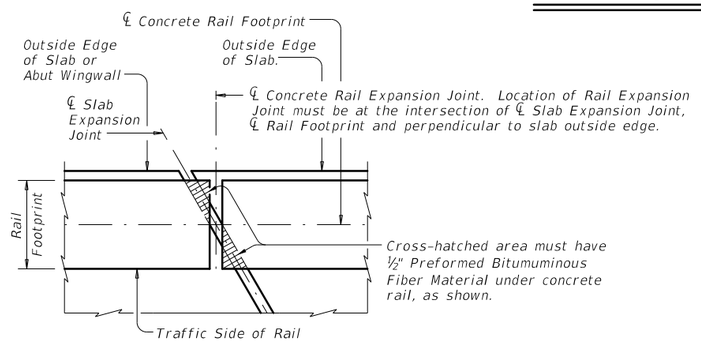


TERMINAL CONNECTION DETAILS

1. Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.
2. Back of rail offset may, with Engineer's approval, be continued to the end of the railing.
3. Increase 2" for structures with overlay.
4. Place 4 additional Bars R(#4) 3'-8" in length inside Bars S(#4) and centered 2'-0" from end of rail when Terminal Connections are required. Field bend as needed.



ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT



PLAN OF RAIL AT EXPANSION JOINTS

Example showing Slab Expansion Joints without breakbacks.

SHEET 1 OF 2

Texas Department of Transportation

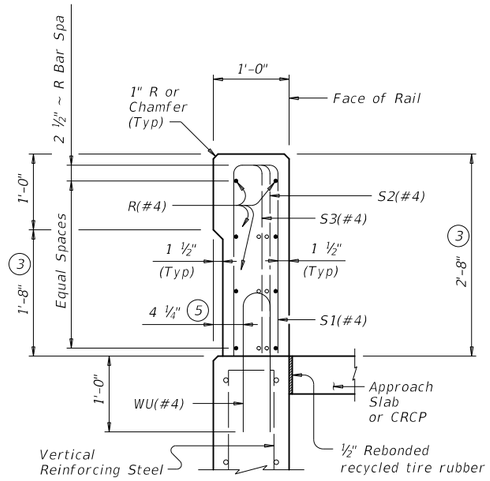
Bridge Division Standard

TRAFFIC RAIL

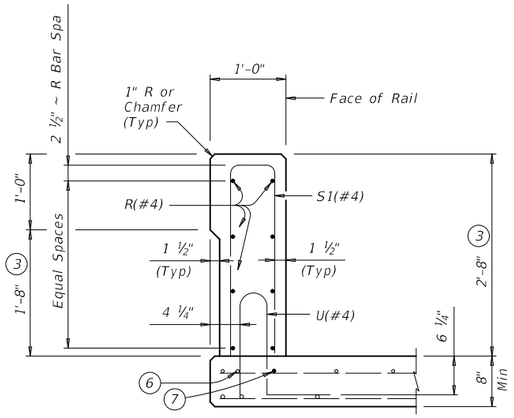
TYPE T221

FILE: rlstd004-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	09	117	CR
	DIST	COUNTY		SHEET NO.
	YKM	WHARTON		31

DATE:
FILE:



ON ABUTMENT WINGWALLS OR CIP RETAINING WALLS



ON BRIDGE SLAB

SECTIONS THRU RAIL

(3) Increase 2" for structures with overlay.

(5) 5 ¼" when vertical reinforcing has closer clear cover over horizontal reinforcing in abutment wingwalls or retaining walls on traffic side of wall.

(6) As an aid in supporting reinforcement, additional longitudinal bars may be used in the slab with the approval of the Engineer. Such bars will be furnished at the Contractors expense.

(7) Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.

(8) Bend or cut as required to clear drain slots.

(9) No longitudinal wires may be in top center of cage.

(10) Space U(#4) bars at 4" Max when end region of panel length is less than 6'-0" to side slot drain. Space U(#4) bars at 6" Max when end region of panel length is 6'-0" and greater to side slot drain.

CONSTRUCTION NOTES:

This railing may be constructed by the slipform process when approved by the Engineer, with equipment approved by the Engineer. Provide sensor control for both line and grade. Tack welding to provide bracing for slipform operations is acceptable. Welding may be performed at a minimum spacing of 3 ft between the cage and the anchorage. It is permissible to weld to bars U, WU and S at any location on the cage. If increased bracing is needed, provide additional anchorage devices and weld in the upper two thirds of the cage. Paint welded areas on epoxy coated and/or galvanized reinforcing with an organic zinc rich paint in accordance with Item 445 "Galvanizing".

If rail is slipformed, apply an heavy epoxy bead 1" behind toe of traffic side of rail to concrete deck just prior to slip forming. Provide a ⅜" width x ¼" tall heavy epoxy bead with Type III, Class C or a Type V epoxy.

Face of rail and parapet must be vertical transversely unless otherwise shown in the plans or approved by the Engineer.

Chamfer all exposed concrete corners.

MATERIAL NOTES:

Provide Class "C" concrete. Provide Class "C" (HPC) if required elsewhere.

Provide Grade 60 reinforcing steel.

Epoxy coat or galvanize all reinforcing steel if slab bars are epoxy coated or galvanized.

Deformed Welded Wire Reinforcement (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars U and WU unless noted otherwise. Deformed WWR (ASTM 1064) may be substituted for Bars R and S, as shown. Combinations of reinforcing steel and WWR or configurations of WWR other that shown are permitted if conditions in the table are satisfied. Provide the same laps as required for reinforcing bars.

Provide bar laps, where required, as follows:

Uncoated or galvanized ~ #4 = 1'-7"
Epoxy coated ~ #4 = 2'-5"

GENERAL NOTES:

This rail has been evaluated and accepted to be of equal strength to railings with like geometry, which have been crash tested to meet MASH TL-3 criteria. This rail can be used for speeds of 50 mph and greater when a TL-3 rated guard fence transition is used. When a TL-2 rated guard fence transition is used, this rail can only be used for speeds of 45 mph and less.

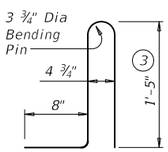
Do not use this railing on bridges with expansion joints providing more than 5" movement.

Rail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.

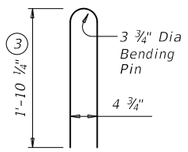
Shop drawings are not required for this rail.

Average weight of railing with no overlay is 370 plf.

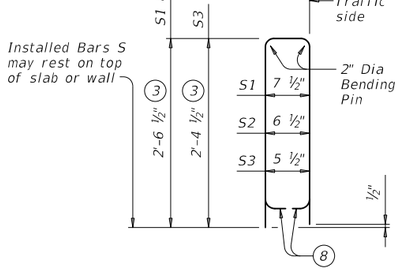
Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing bar dimensions shown are out-to-out of bar.



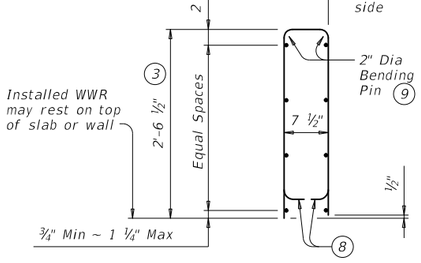
BARS U (#4)



BARS WU (#4)

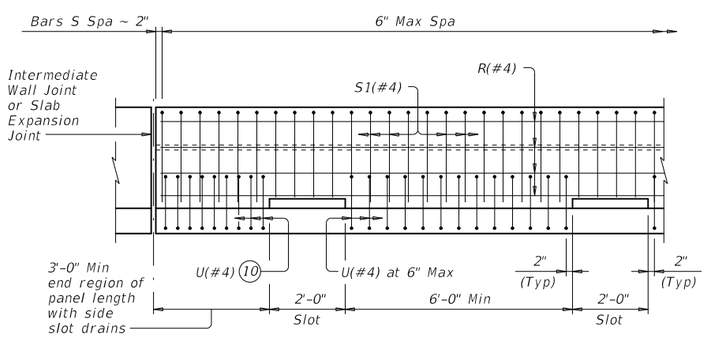


BARS S (#4)



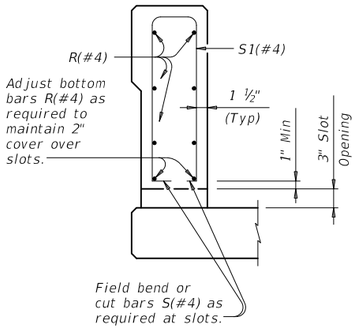
OPTIONAL WELDED WIRE REINFORCEMENT (WWR)

DESCRIPTION	LONGITUDINAL WIRES	VERTICAL WIRES
Minimum (Cumulative Total) Wire Area	1.067 Sq In.	0.267 Sq In. per Ft
	No. of Wires	Spacing
Minimum	8	4"
Maximum	10	8"
Maximum Wire Size Differential	The smaller wire must have an area of 40% or more of the larger wire.	



OPTIONAL SIDE SLOT DRAIN DETAIL

Note: Side Slot Drains may be used where shown elsewhere on the plans or as directed by the Engineer. Drains should not be placed over railroad tracks, lower roadways, or sidewalks. When this rail is used as a separator between a roadway surface and a sidewalk surface, side drain slots will not be permitted.



SECTION THRU OPTIONAL SIDE SLOT DRAIN

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

TYPE T221

FILE:	rlstd004-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT September 2019		CONT	SECT	JOB	HIGHWAY
REVISIONS		0913	09	117	CR
		DIST	COUNTY		SHEET NO.
		YKM	WHARTON		32

DATE:
FILE:

TABLE OF DIMENSIONS AND REINFORCING STEEL
(Wings for one structure end)

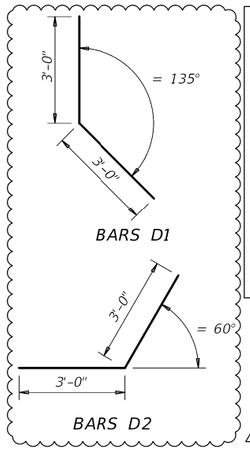
Dimensions					Variable Reinforcing				Estimated Quantities per ft of wing (2~wings) (4)		Estimated Quantities per ft of Toewall (1~toewall)	
Maximum Wingwall Height Hw	W	X	Y	Z	Bars J1		Bars J2					
					Size	Spa	Size	Spa	Reinf (Lb/Ft)	Conc (CY/Ft)	Reinf (Lb/Ft)	Conc (CY/Ft)
9'-6"	6'-0"	2'-10"	2'-2"	9"	#5	6"	#5	6"	156.93	1.136	8.41	0.110
10'-6"	6'-5"	3'-0"	2'-5"	9"	#6	6"	#5	6"	196.27	1.234	8.57	0.117

TABLE OF WINGWALL REINFORCING
(2~wings)

Bar	Size	No.	Spa
D1	#6	~	1'-0"
D2	#6	~	1'-0"
E1	#4	~	1'-0"
F	#4	~	1'-0"
G	#6	~	8"
M1	#4	4	~
P	#4	~	1'-0"
V	#4	~	1'-0"

TABLE OF TOEWALL REINFORCING

Bar	Size	No.	Spa
J3	#4	~	1'-0"
M2	#4	2	~
E2	#4	~	1'-0"



WING DIMENSION FORMULAS:

(All values are in feet.)

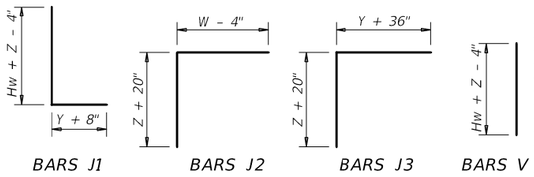
Hw = H + T + C
Lw = (Hw) (SL) ÷ cosine (θ) for Type PW-1
= (Hw – 1') (SL) ÷ cosine (θ) for Type PW-2 and Hw ≥ 4'
= (Hw – 0.5') (SL) ÷ cosine (θ) for Type PW-2 and Hw < 4'

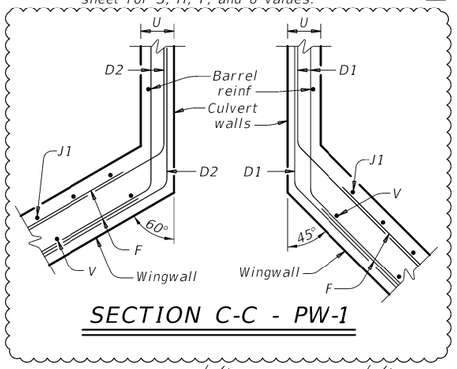
For cast-in-place culverts:
Ltw = [(N) (S) + (N + 1) (U)] ÷ cosine (θ)

For precast culverts:
Ltw = [(N) (2 U + S) + (N – 1) (0.5')] ÷ cosine (θ)
Total Wingwall Area (two wings ~ SF)
= (2)(Hw)(Lw) for Type PW-1
= (2)(Hw)(Lw) – 6 SF for Type PW-2 and Hw ≥ 4'
= (2)(Hw)(Lw) – 1.5 SF for Type PW-2 and Hw < 4'

Hw = Height of wingwall
Lw = Length of wingwall
Ltw = Culvert toewall length
N = Number of culvert spans
SL:1 = Channel slope ratio. (horizontal: 1 vertical, usual value is 2:1)
θ = Culvert skew

See applicable box culvert standard sheet for S, H, T, and U values.





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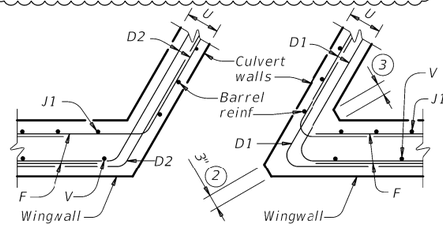
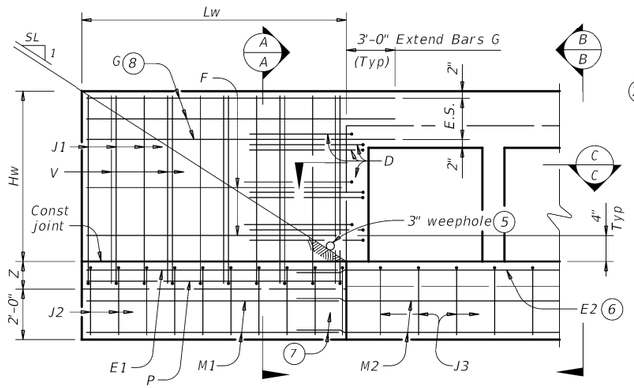
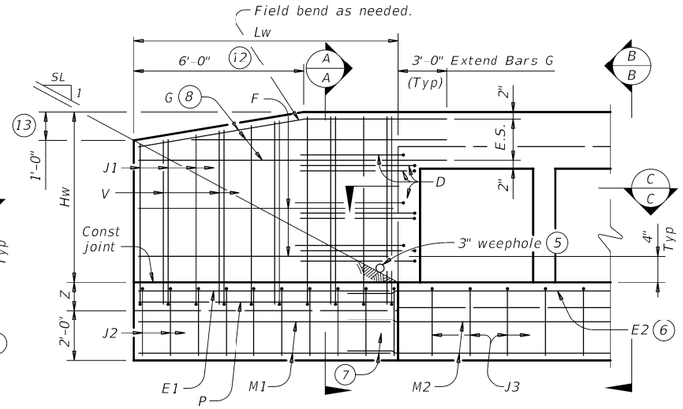


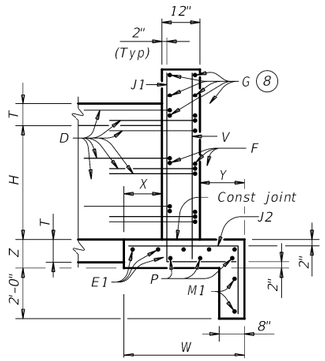
SECTION C-C - PW-2



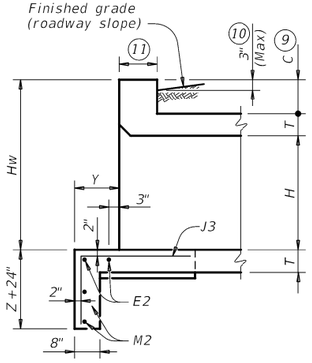
PARTIAL ELEVATION - PW-1



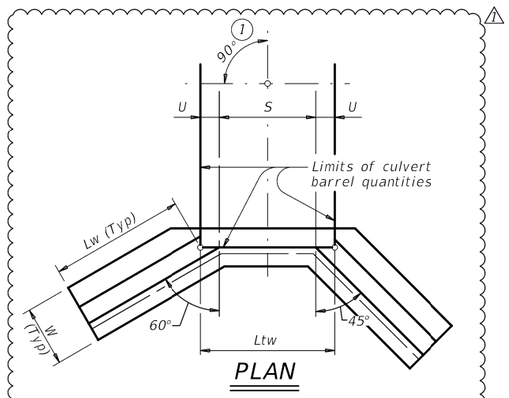
PARTIAL ELEVATION - PW-2



SECTION A-A
(Showing wing reinforcement.)

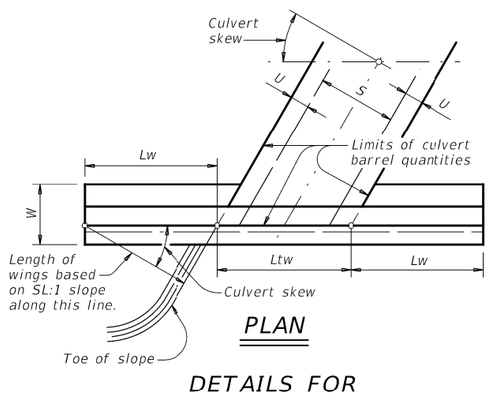


SECTION B-B
(Showing wing reinforcement.)



PLAN

DETAILS FOR NON-SKEWED BOX CULVERTS



PLAN

DETAILS FOR SKEWED BOX CULVERTS
(Showing 30° skew.)

1. Skew = 0°
2. At discharge end, chamfer may be ¾" minimum.
3. For 15° skew ~ 1"
   For 30° skew ~ 2"
   For 45° skew ~ 3"
4. Quantities shown are for two Type PW-1 wings. Adjust concrete volume for Type PW-2 wings. To determine estimated quantities for two wings, multiply the tabulated values by Lw. Quantities shown do not include weight of Bars D.
5. Provide weepholes for Hw = 5'-0" and greater. Fill around weepholes with coarse gravel.
6. Extend Bars E2 1'-6" minimum into the wingwall footing.
7. Lap Bars M1 1'-6" minimum with Bars M2.
8. Place Bars G as shown, equally spaced at 8" maximum. Provide at least two pairs of Bars G per wing.
9. 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.
10. For vehicle safety, the following requirements must be met:
    - For structures without bridge rail, construct curbs no more than 3" above finished grade.
    - For structures with bridge rail, construct curbs flush with finished grade.

    Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
11. 1'-0" typical. 2'-3" when the Box Culvert Rail Mounting Details (RAC) standard sheet is referred to elswhere in the plans.
12. 3'-0" for Hw < 4'.
13. 6" for Hw < 4'.

DESIGNER NOTES:

Type PW-1 can be used for all applications and must be used if railing is to be mounted to the wingwall.
Type PW-2 can only be used for applications without a railing mounted to the wingwall.

MATERIAL NOTES:

Provide Class C concrete (f'c=3,600 psi).
Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.

GENERAL NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specifications.
Depth of toewalls for wingwalls and culverts may be reduced or eliminated when founded on solid rock, when directed by the Engineer.
See Box Culvert Supplement (BCS) standard sheet for wingwall type and additional dimensions and information.
Quantities for concrete and reinforcing steel resulting from the formulas given on this sheet are for the Contractor's information only.

⚠ Modified PW-1 for skewed wings. – KH 05/2023

Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing dimensions are out-to-out of bars.

STATE OF TEXAS
KELLY HO
112947
LICENSED
PROFESSIONAL ENGINEER
05/24/2023

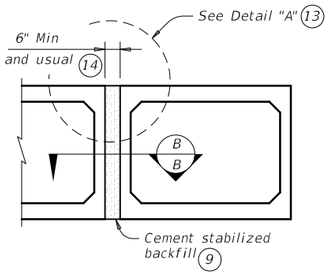
Texas Department of Transportation
Bridge Division Standard

CONCRETE WINGWALLS
WITH PARALLEL WINGS FOR BOX CULVERTS TYPES PW-1 AND PW-2

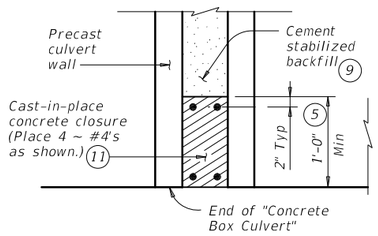
PW (MOD)

FILE: pwstde01-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	09	117	CR
	DIST	COUNTY		SHEET NO.
	YKM	WHARTON		33

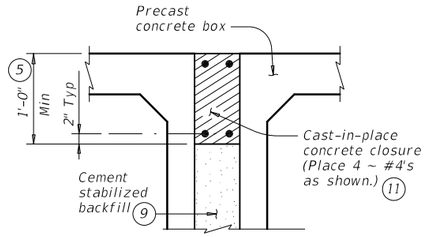
DATE:
FILE:



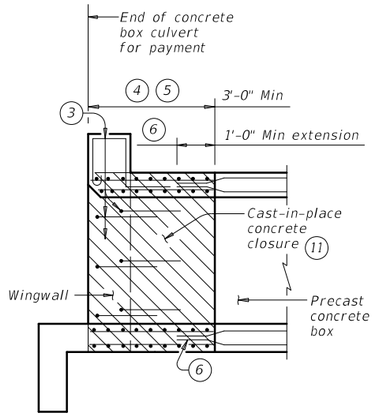
MULTIPLE UNIT PLACEMENT



SECTION B-B

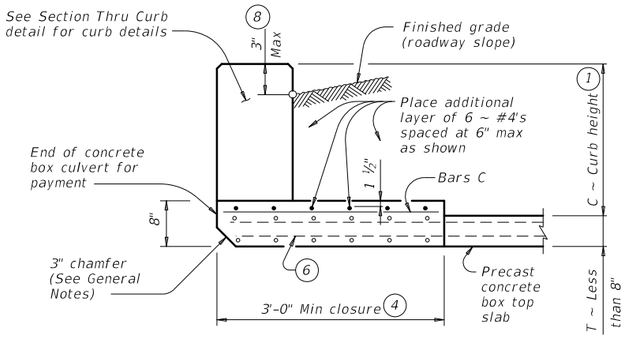


DETAIL "A" (13)

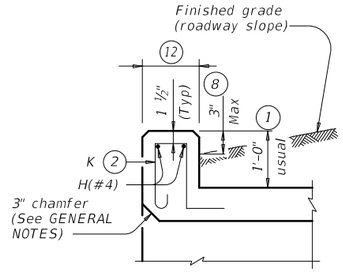


WINGWALL CONNECTION

(Also applies to safety end treatment.)

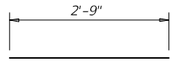


SECTION THRU TOP SLABS LESS THAN 8"



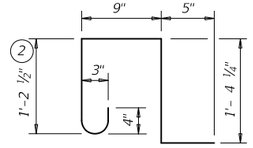
SECTION THRU CURB

QUANTITIES PER FOOT OF CURB (10)	
Reinforcing Steel	4.12 Lb
Concrete	0.037 CY



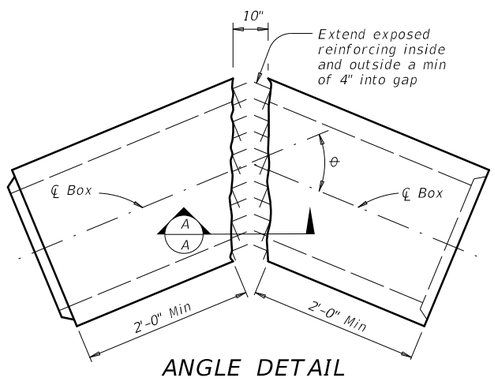
BARS C (#4)

(Spa = 1'–0" Max)

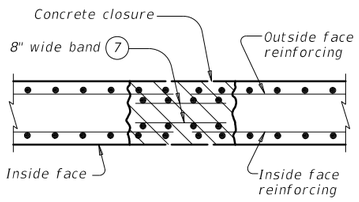


BARS K (#4)

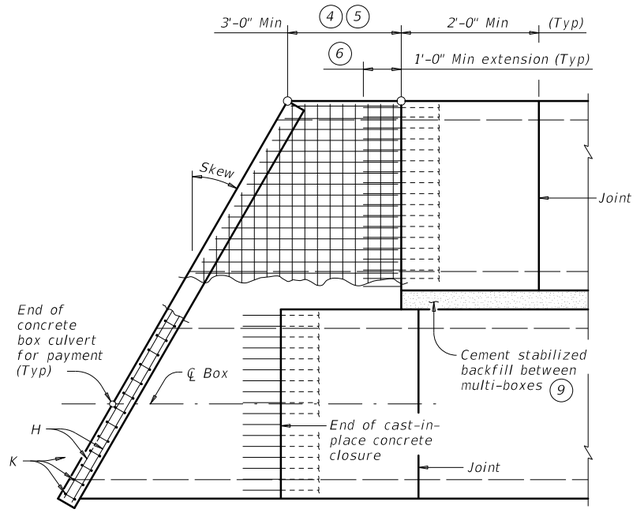
(Spa = 1'–0" Max)
(Length = 4'–2")



ANGLE DETAIL



SECTION A-A



PLAN OF SKEWED ENDS

(Showing multi-box placement.)

1. *0" Min to 5'–0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail, bicycle rail, or curbs taller than 1'–0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631–CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.*
2. *For curbs less than 1'–0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.*
3. *Extend curb, wingwall, or safety end treatment reinforcing into concrete closure. Bend or trim, as necessary, any reinforcing that does not fit into closure area.*
4. *Provide a 3'–0" Min cast–in–place concrete closure. Break back boxes in the field or cast boxes short. Provide bands of reinforcing in the closure that are the same size and spacing as in the precast box section. Provide #4 longitudinal reinforcement spaced at 12 inches Max within the closure. Except where shown otherwise, construct the cast–in–place closure flush with the inside and outside faces of the precast box section.*
5. *For multiple unit placements, adjust the length of the closure for the interior walls as necessary. Provide a 3'–0" Min cast–in–place closure in the top slab, bottom slab, and exterior wall. See Section B–B detail when interior walls are cast full length.*
6. *Extend precast box reinforcing a minimum of 1'–0" into concrete closure (Typ).*
7. *Place bands of reinforcing matching the inside and outside face reinforcing in the gaps of the top and bottom slabs. Place a band matching the outside face reinforcing of the wall in the gaps of the walls (placed in the outside face only). Tack weld the bands to the exposed reinforcing at each point of contact.*
8. *For vehicle safety, the following requirements must be met:*
   - *For structures without bridge rail, construct curbs no more than 3" above finished grade.*
   - *For structures with bridge rail, construct curbs flush with finished grade.*

   Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
9. *Cement stabilized backfill between boxes is considered part of the box culvert for payment.*
10. *All curb concrete and reinforcing is considered part of the box culvert for payment.*
11. *Any additional concrete and reinforcing required for the closures will be considered subsidiary to the box culvert for payment.*
12. *1'–0" typical. 2'–3" when the Box Culvert Rail Mounting Details (RAC) standard sheet is referred to elsewhere in the plans.*
13. *For multiple unit placement with overlay, with 1 to 2 course surface treatment, or with the top slab as the final riding surface, provide wall closure as shown in Detail "A".*
14. *This dimension may be increased with approval of the Engineer to allow the precast boxes to be tunneled or jacked in accordance with Item 476, "Jacking, Boring, or Tunneling Pipe or Box". No payment will be made for any additional material in the gap between adjacent boxes.*

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide ASTM A1064 welded wire reinforcement.
Provide Class C concrete (f'c = 3,600 psi) for the closures.
Provide cement stabilized backfill meeting the requirements of Item 400, "Excavation and Backfill for Structures."
Any additional concrete required for the closures will be considered subsidiary to the box culvert.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Refer to the Single Box Culverts Precast (SCP) standard sheets for details and notes not shown.
Chamfer the bottom edge of the top slab closure 3 inches at culvert closure ends.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bars dimensions are out–to–out of bars.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

BOX CULVERTS PRECAST MISCELLANEOUS DETAILS

SCP-MD

FILE: scpmdsts-20.dgn	DN: GAF	CK: LMW	DW: BWH/TxDOT	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	09	117	CR
	DIST	COUNTY		SHEET NO.
	YKM	WHARTON		34

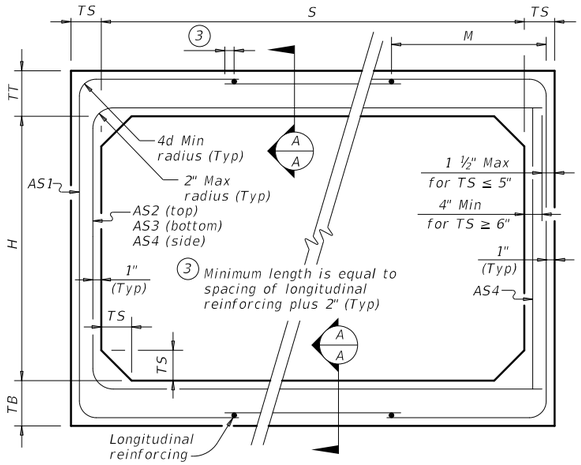
DATE:
FILE:

BOX DATA

SECTION DIMENSIONS					Fill Height	M (Min)	REINFORCING (sq. in. / ft.) (2)							(1) Lift Weight
S (ft.)	H (ft.)	TT (in.)	TB (in.)	TS (in.)	(ft.)	(in.)	AS1	AS2	AS3	AS4	AS5	AS7	AS8	(tons)
9	4	9	9	9	< 2	–	0.30	0.36	0.28	0.22	0.22	0.22	0.22	13.7
9	4	9	9	9	2 < 3	54	0.35	0.34	0.31	0.22	–	–	–	13.7
9	4	9	9	9	3 – 5	50	0.28	0.27	0.27	0.22	–	–	–	13.7
9	4	9	9	9	10	49	0.31	0.30	0.31	0.22	–	–	–	13.7
9	4	9	9	9	15	49	0.40	0.40	0.41	0.22	–	–	–	13.7
9	4	9	9	9	20	44	0.52	0.51	0.52	0.22	–	–	–	13.7
9	4	9	9	9	25	44	0.65	0.64	0.65	0.22	–	–	–	13.7
9	5	9	9	9	< 2	–	0.28	0.38	0.31	0.22	0.22	0.22	0.22	14.6
9	5	9	9	9	2 < 3	54	0.32	0.38	0.34	0.22	–	–	–	14.6
9	5	9	9	9	3 – 5	49	0.25	0.30	0.30	0.22	–	–	–	14.6
9	5	9	9	9	10	49	0.28	0.33	0.34	0.22	–	–	–	14.6
9	5	9	9	9	15	44	0.36	0.43	0.45	0.22	–	–	–	14.6
9	5	9	9	9	20	44	0.47	0.56	0.57	0.22	–	–	–	14.6
9	5	9	9	9	25	44	0.58	0.69	0.71	0.22	–	–	–	14.6
9	6	9	9	9	< 2	–	0.25	0.40	0.34	0.22	0.22	0.22	0.22	15.5
9	6	9	9	9	2 < 3	54	0.29	0.41	0.38	0.22	–	–	–	15.5
9	6	9	9	9	3 – 5	49	0.23	0.33	0.33	0.22	–	–	–	15.5
9	6	9	9	9	10	49	0.26	0.35	0.37	0.22	–	–	–	15.5
9	6	9	9	9	15	44	0.33	0.46	0.48	0.22	–	–	–	15.5
9	6	9	9	9	20	44	0.42	0.60	0.61	0.22	–	–	–	15.5
9	6	9	9	9	25	44	0.52	0.74	0.75	0.22	–	–	–	15.5
9	7	9	9	9	< 2	–	0.23	0.42	0.36	0.22	0.22	0.22	0.22	16.4
9	7	9	9	9	2 < 3	59	0.26	0.44	0.41	0.22	–	–	–	16.4
9	7	9	9	9	3 – 5	54	0.22	0.35	0.35	0.22	–	–	–	16.4
9	7	9	9	9	10	49	0.24	0.37	0.39	0.22	–	–	–	16.4
9	7	9	9	9	15	44	0.31	0.48	0.51	0.22	–	–	–	16.4
9	7	9	9	9	20	44	0.39	0.62	0.65	0.22	–	–	–	16.4
9	8	9	9	9	< 2	–	0.22	0.43	0.39	0.22	0.22	0.22	0.22	17.3
9	8	9	9	9	2 < 3	59	0.24	0.46	0.43	0.22	–	–	–	17.3
9	8	9	9	9	3 – 5	59	0.22	0.37	0.38	0.22	–	–	–	17.3
9	8	9	9	9	10	54	0.22	0.39	0.41	0.22	–	–	–	17.3
9	8	9	9	9	15	44	0.29	0.50	0.53	0.22	–	–	–	17.3
9	8	9	9	9	20	44	0.36	0.64	0.67	0.22	–	–	–	17.3
9	9	9	9	9	< 2	–	0.22	0.44	0.42	0.22	0.22	0.22	0.22	18.2
9	9	9	9	9	2 < 3	72	0.23	0.49	0.46	0.22	–	–	–	18.2
9	9	9	9	9	3 – 5	72	0.22	0.39	0.40	0.22	–	–	–	18.2
9	9	9	9	9	10	59	0.22	0.40	0.43	0.22	–	–	–	18.2
9	9	9	9	9	15	49	0.27	0.51	0.55	0.22	–	–	–	18.2
9	9	9	9	9	20	49	0.34	0.66	0.69	0.22	–	–	–	18.2

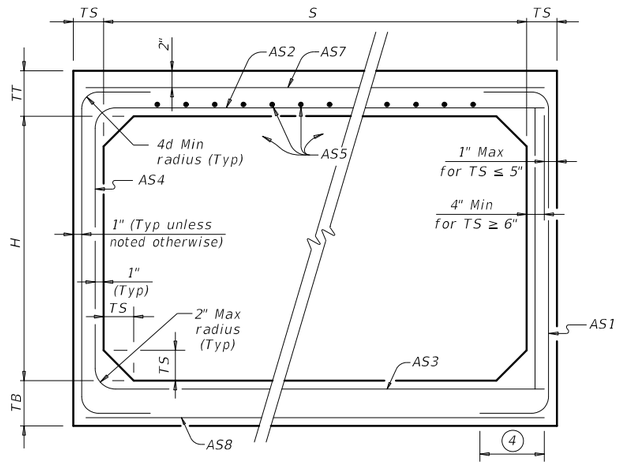
(1) For box length = 8'-0"

(2) AS1 thru AS4, AS7 and AS8 are minimum required areas of reinforcement per linear foot of box length. AS5 is minimum required area of reinforcement per linear foot of box width.



CORNER OPTION "A" CORNER OPTION "B"

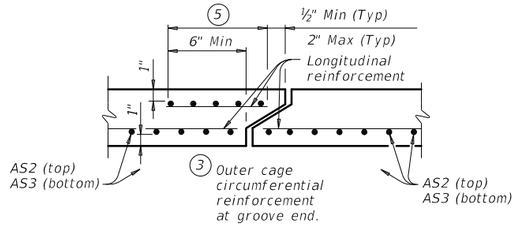
FILL HEIGHT 2 FT AND GREATER



CORNER OPTION "A" CORNER OPTION "B"

FILL HEIGHT LESS THAN 2 FT

(4) Length is equal to spacing of longitudinal reinforcing plus 2". (10" Min) (Typ)



SECTION A-A

(Showing top and bottom slab joint reinforcement.)

MATERIAL NOTES:

Provide 0.03 sq. in./ft. minimum longitudinal reinforcement at each face in slabs and walls. This minimum requirement may be met by the transverse wires when wire mesh reinforcement is used.

Provide Class H concrete (f`c = 5,000 psi).

GENERAL NOTES:

Designs shown conform to ASTM C1577. Refer to ASTM C1577 for information or details not shown.

See Box Culverts Precast Miscellaneous Details (SCP-MD) standard sheet for details and notes not shown.

In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Submit shop plans for alternate designs in accordance with Item "Precast Concrete Structural Members (Fabrication)".

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS PRECAST

9'-0" SPAN

SCP-9

FILE: scp09sts-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	YKM	WHARTON		35

DATE:
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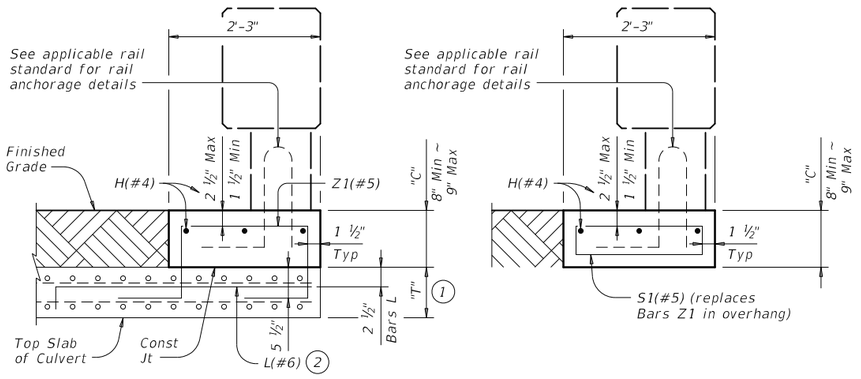
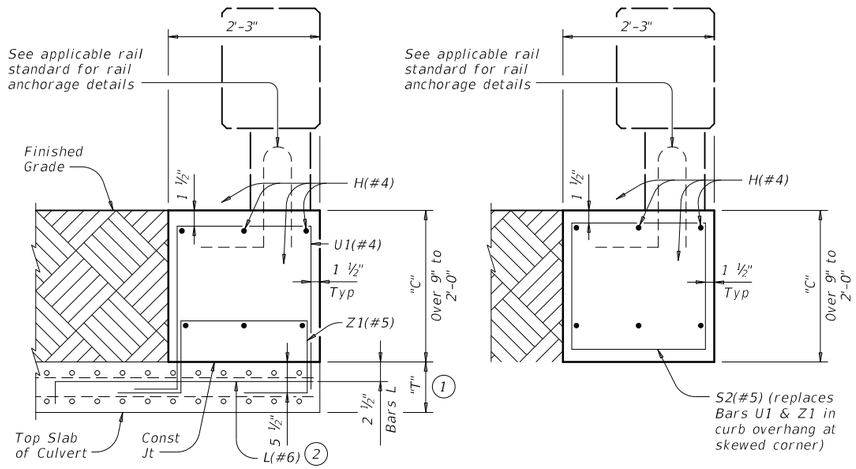


SECTION A-A SECTION B-B

TYPE 1 CURB

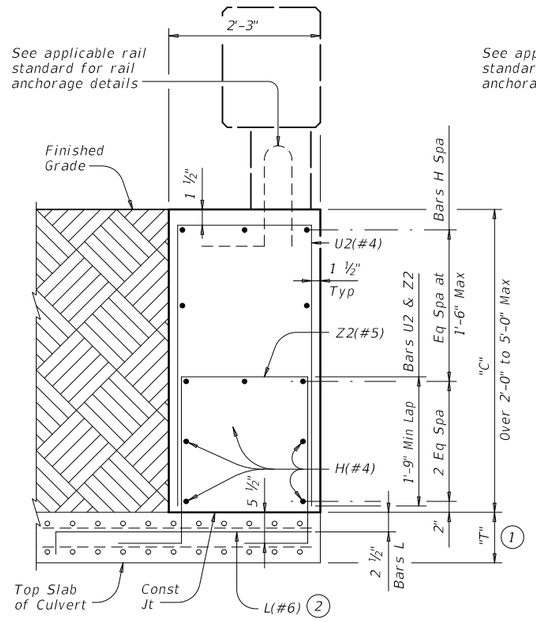
Used for curbs from 8" to 9" (Showing "C" = 9"). Showing T223 Rail, other rails similar. (Bars L(#5) on T223 and C223 Rails are not used for this structure). Bars RH(#5) required on standards T80HT, T80SS and T224 are not required when used with the RAC standard.



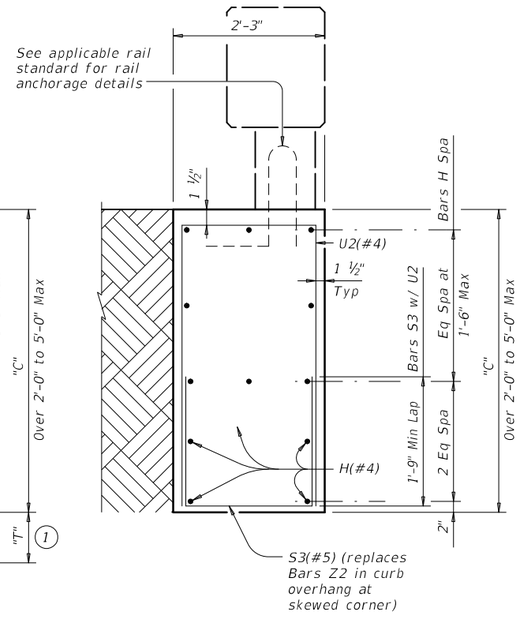
SECTION A-A SECTION B-B

TYPE 2 CURB

Used for curbs over 9" to 2'-0" (Showing "C" = 2'-0"). Showing T223 Rail, other rails similar. (Bars L(#5) on T223 and C223 Rails are not used for this structure). Bars RH(#5) required on standards T80HT, T80SS and T224 are not required when used with the RAC standard.



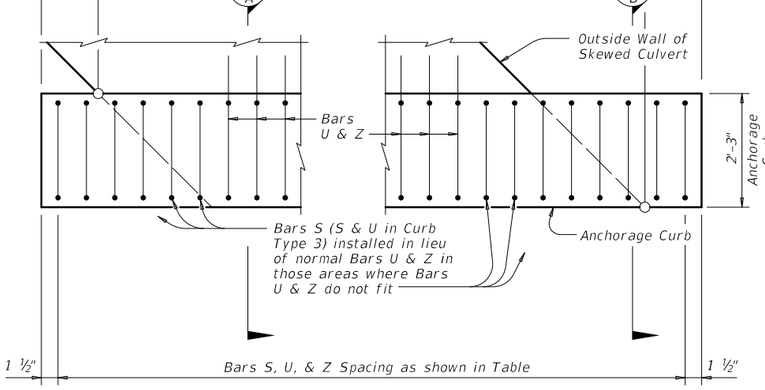
SECTION A-A



SECTION B-B

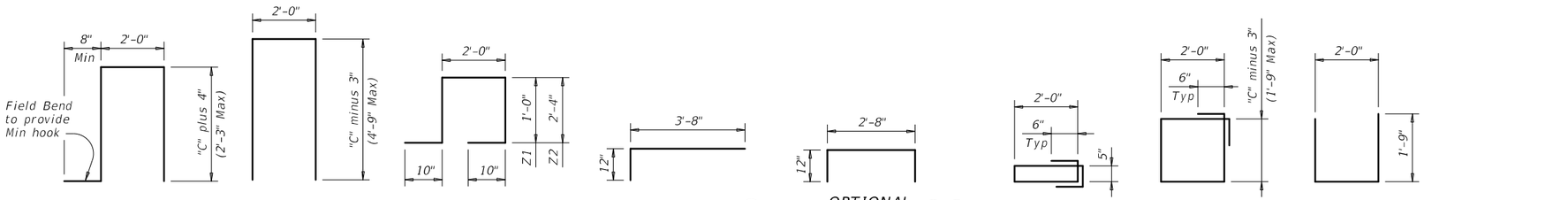
TYPE 3 CURB

Used for curbs over 2'-0" to 5'-0" (Showing "C" = 4'-0"). Showing T223 Rail, other rails similar. (Bars L(#5) on T223 and C223 Rails are not used for this structure). Bars RH(#5) required on standards T80HT, T80SS and T224 are not required when used with the RAC standard.



TYPICAL CURB PLAN

Showing typical installation on skewed culvert. (Bars L(#5) on T223 and C223 Rails are not used for this structure). Bars RH(#5) required on standards T80HT, T80SS and T224 are not required when used with the RAC standard.



BARS U1 (#4) BARS U2 (#4) BARS Z (#5) BARS L (#6) 2 Spaced at 6" Max OPTIONAL BARS L (#6) 3 2 Spaced at 6" Max BARS S1 (#5) BARS S2 (#5) BARS S3 (#5)

TABLE OF REINFORCING SPACING

Curb Height "C"	Section Type	Bars S, U, & Z Spa
8" to 9"	1	12"
Over 9" to 2'-0"	2	9"
Over 2'-0" to 3'-0"	3	7"
Over 3'-0" to 5'-0"	3	5"

TABLE OF ESTIMATED QUANTITIES 4

Curb Height "C"	Section Type	Reinf Steel (Lb/LF)	Class "C" Concrete (CY/LF)
8"	1	21.5	0.056
9"	1	21.5	0.063
1'-0"	2	29.7	0.083
1'-6"	2	30.6	0.125
2'-0"	2	31.5	0.167
3'-0"	3	44.6	0.250
4'-0"	3	56.8	0.333
5'-0"	3	60.0	0.417

1 "T" is equal to the culvert top slab thickness. For Precast Boxes with slabs less than 8" thick, see SCP-MD Standard for additional details.

2 Tilt Bars L hook as necessary to maintain cover.

3 Optional Bars L are to be used only for Precast Box Culverts with 3'-0" closure pours.

4 Quantities shown are for Contractor's information only. Quantities are per Linear Foot of curb length. The values for each section type in table can be interpolated for intermediate values of Curb Height, "C".

CONSTRUCTION NOTES:

When using this anchorage curb, omit normal culvert curb reinforcing bars K and H shown on the culvert standard sheets.

For vehicle safety, the top of the curb must be flush with the finished grade.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.

Galvanize all reinforcing steel if required elsewhere.

Provide bar laps, where required, as follows:
Uncoated or galvanized ~ #4 = 1'-11"

Provide Class "C" concrete (f'c=3,600 psi). Provide Class "C" (HPC) concrete if shown elsewhere in the plans.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

The rail anchorage curb details have sufficient strength for use with all standard rail types.

See appropriate rail standard for approved design speed restrictions, notes and details not shown.

This anchorage curb is considered part of the Box Culvert for payment.

These details are for use with curbs that are 8" to 5'-0" tall only. Curb heights that are less than or greater than those shown will require special design.

Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing bar dimensions shown are out-to-out of bar.

SHEET 1 OF 2

Texas Department of Transportation

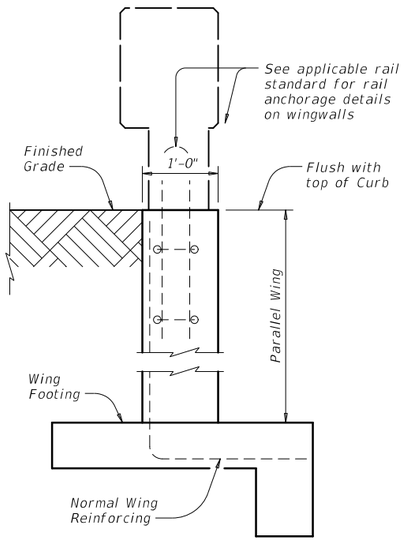
Bridge Division Standard

RAIL ANCHORAGE CURB
BOX CULVERT RAIL MOUNTING DETAILS
(CURBS 8" TO 5'-0" TALL ONLY)

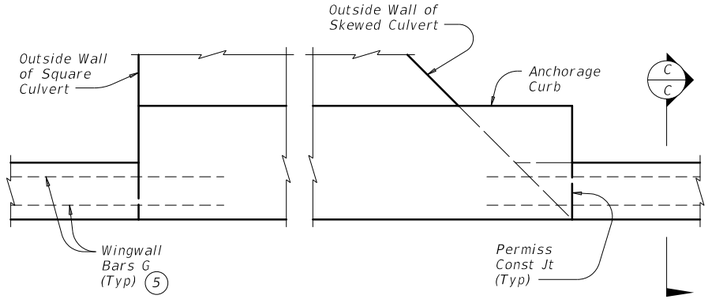
RAC

FILE: racste01-20.dgn	DN: GAF	CK: TxDOT	DW: TxDOT	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	09	117	CR
	DIST	COUNTY		SHEET NO.
	YKM	WHARTON		36

DATE:
FILE:



SECTION C-C



TYPICAL CURB PLAN

Curb reinforcing and footings not shown for clarity

INSTALLATION AT PARALLEL CULVERT WINGWALLS

See culvert wingwall standard for bars and details not shown.

(5) Bars G (#5), as identified on the PARALLEL WINGS PW standard sheet, must extend 1'-6" into the Anchorage Curb similar to that shown for a normal culvert curb.

Texas Department of Transportation

Bridge Division Standard

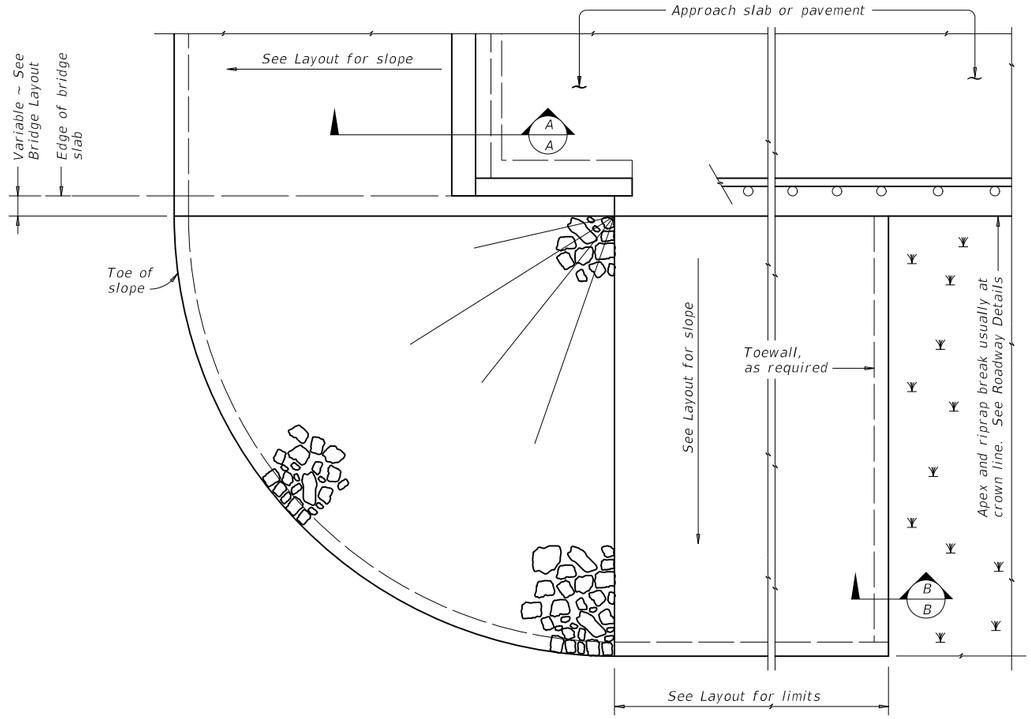
RAIL ANCHORAGE CURB

BOX CULVERT
RAIL MOUNTING DETAILS
(CURBS 8" TO 5'-0" TALL ONLY)

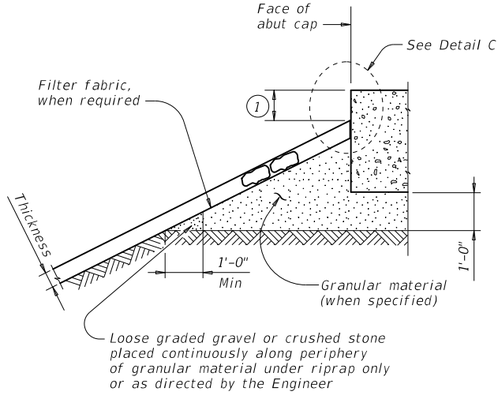
RAC

FILE: racste01-20.dgn	DN: GAF	CK: TxDOT	DW: TxDOT	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	09	117	CR
	DIST	COUNTY		SHEET NO.
	YKM	WHARTON		37

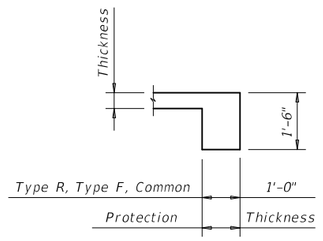
DATE:
FILE:



PLAN

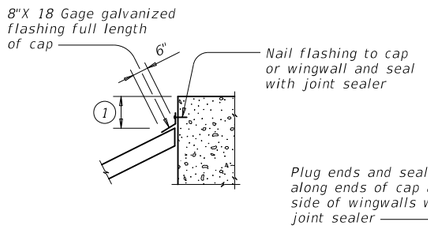


SECTION A-A AT CAP

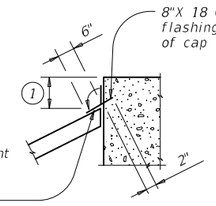


SECTION B-B

Provide toewall when shoulder drain is located adjacent to limits of stone riprap. Omit toewall when thickness of protection riprap is greater than 18".

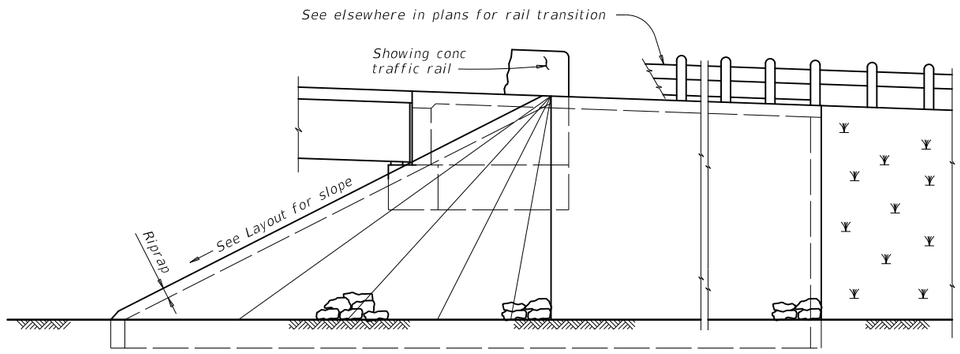


CAP OPTION A



CAP OPTION B

DETAIL C



ELEVATION

(1) Top of cap to top of riprap dimension varies as directed by the Engineer. Provide 9" Min for beam/slab type bridges and 1'-6" for slab span, box beam, or slab beam bridges.

GENERAL NOTES:
Refer to Item 432, "Riprap" for stone size and gradation, and construction details. See Layout for limits and thickness of riprap specified.
See elsewhere in plans for locations and details of shoulder drains.

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

FILE: srrstde1-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	09	117	CR
	DIST	COUNTY		SHEET NO.
	YKM	WHARTON		38

DATE:
FILE:

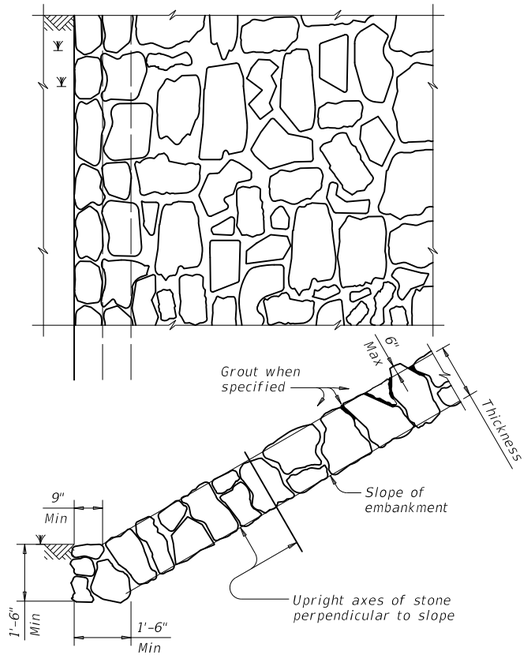


FIGURE 1 ~ TYPE R STONE RIPRAP

dry or grouted

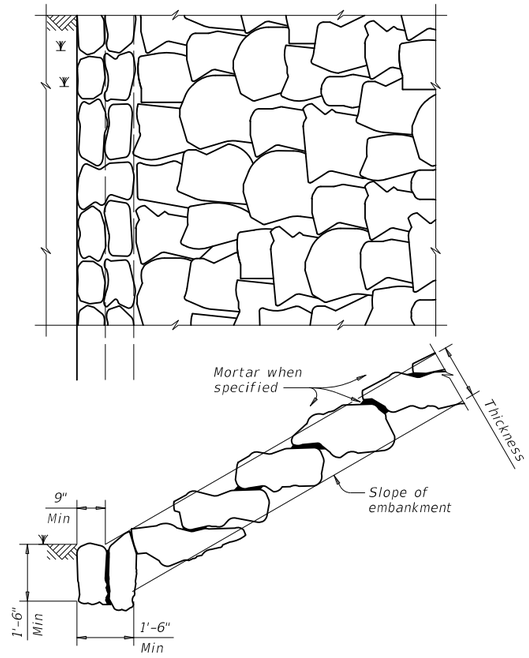


FIGURE 2 ~ TYPE F STONE RIPRAP

dry or mortared

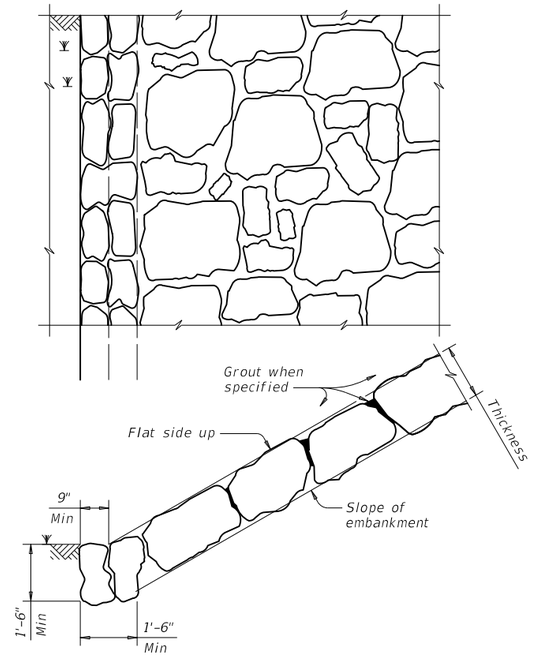


FIGURE 3 ~ TYPE F STONE RIPRAP

grouted

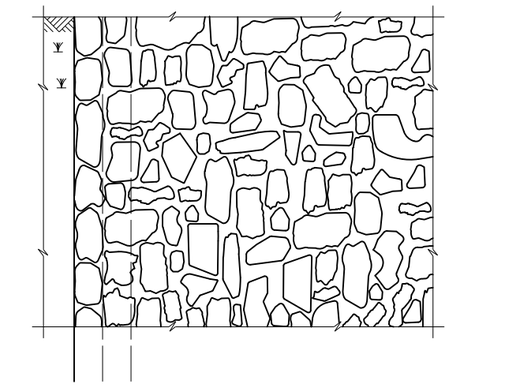


FIGURE 4 ~ COMMON STONE RIPRAP

dry or grouted

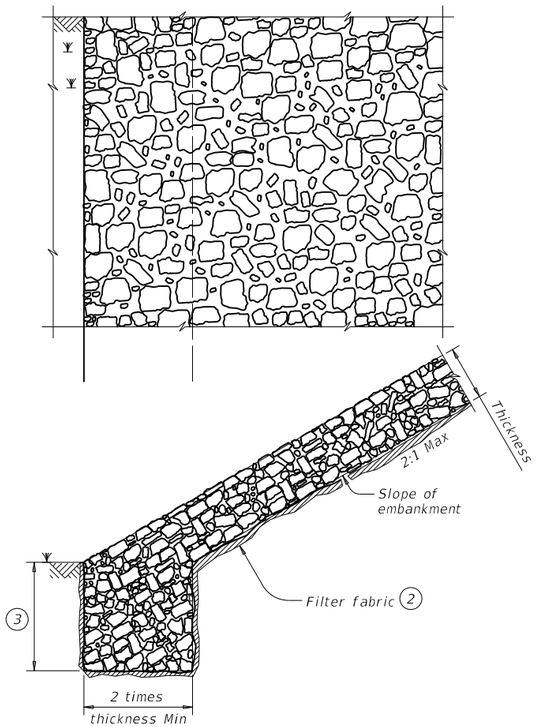


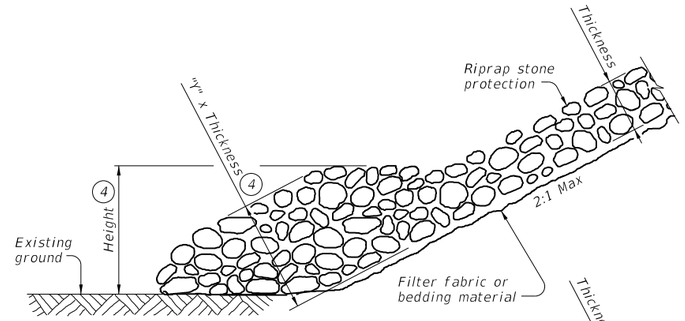
FIGURE 5 ~ PROTECTION STONE RIPRAP (5)

(2) Provide bedding material instead of filter fabric if shown elsewhere in plans. See Layout for thickness of bedding material.

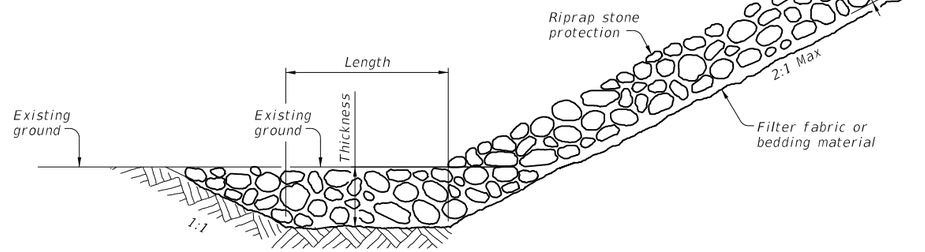
(3) Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.

(4) "Y" and Height need to be defined. See layout or detail sheet for values if this option is used.

(5) List Stone Protection as size (XX inch) and thickness (YY inch) on the layout.
Example: Riprap (Stone Protection) XX inch, Thickness = YY inch.



MOUNDED TOE



EXTENDED ROCK FILLED TRENCH

PROTECTION STONE RIPRAP TOE OPTIONS (5)

Texas Department of Transportation

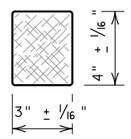
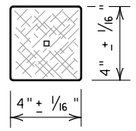
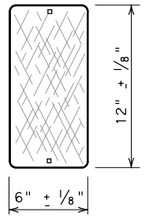
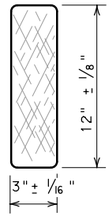
Bridge Division Standard

STONE RIPRAP

SRR

FILE: srrstde1-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	09	117	CR
	DIST	COUNTY		SHEET NO.
	YKM	WHARTON		39

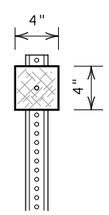
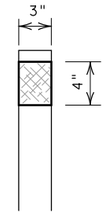
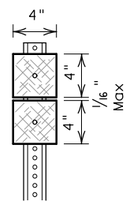
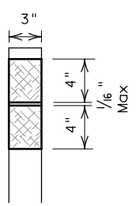
REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	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

DEVICE	SINGLE		DOUBLE	
				
	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

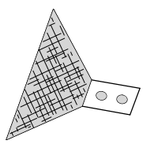
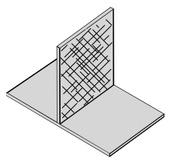
OBJECT MARKERS

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

DEPARTMENTAL MATERIAL SPECIFICATIONS

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

BARRIER REFLECTORS (BRF)

DEVICE	GF1	GF2	CTB
			

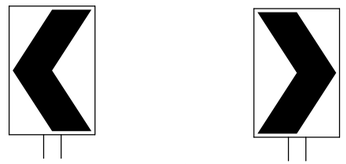
1. Barrier reflectors shall meet the requirements of DMS 8600.
2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.

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	

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

1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies).
2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).

NOTE:

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.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

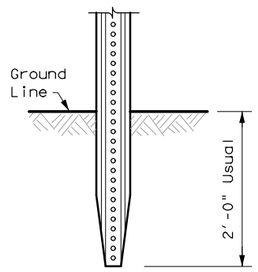
FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	09	117	CR
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	YKM	WHARTON		40

DATE:
FILE:

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

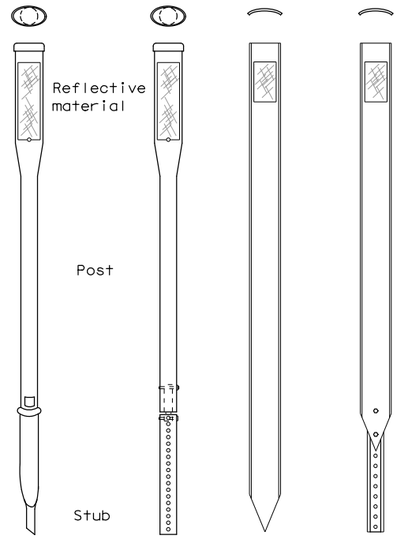


NOTES

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.

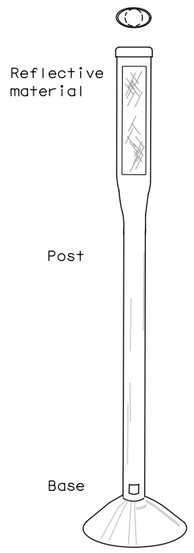
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



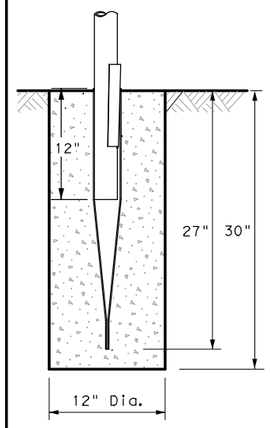
SURFACE MOUNT

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.

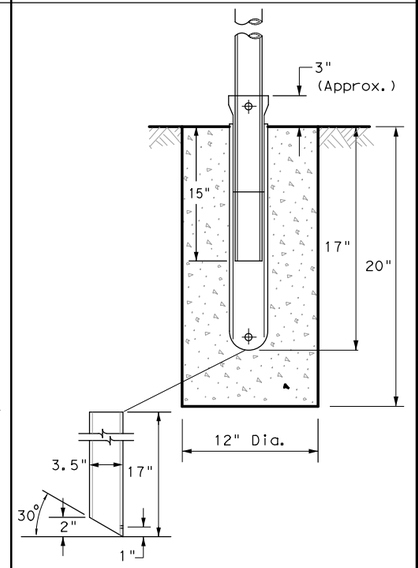
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

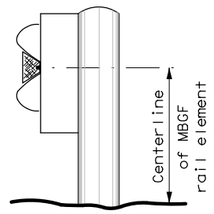
NOTE

1. Install per manufacturer's recommendations.

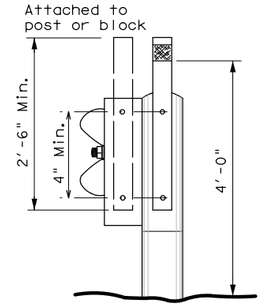
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

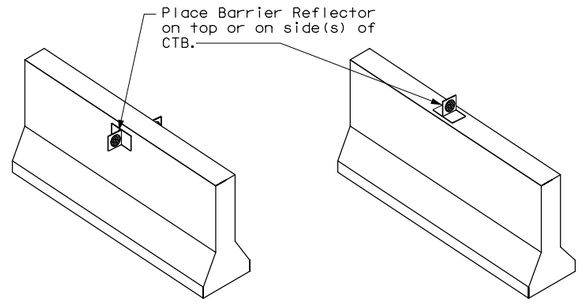
GF1



GF2



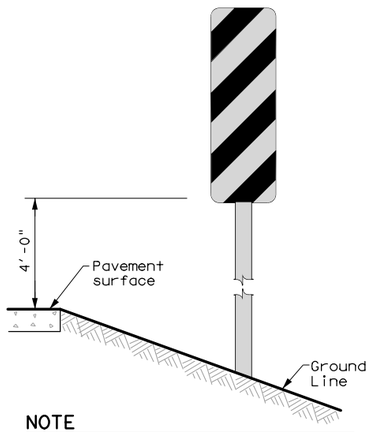
CONCRETE TRAFFIC BARRIER (CTB)



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.

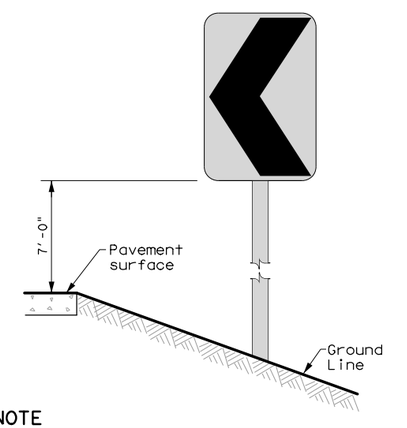
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



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)

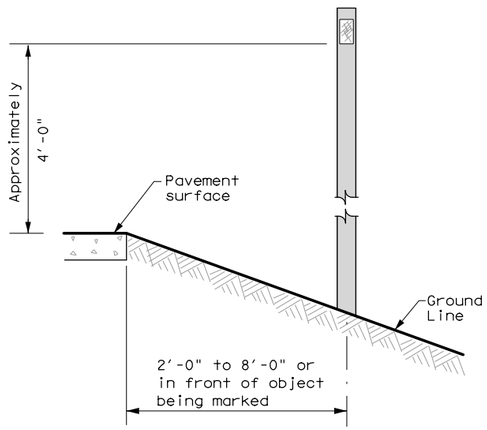
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



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

FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	09	117	CR
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	YKM	WHARTON		41

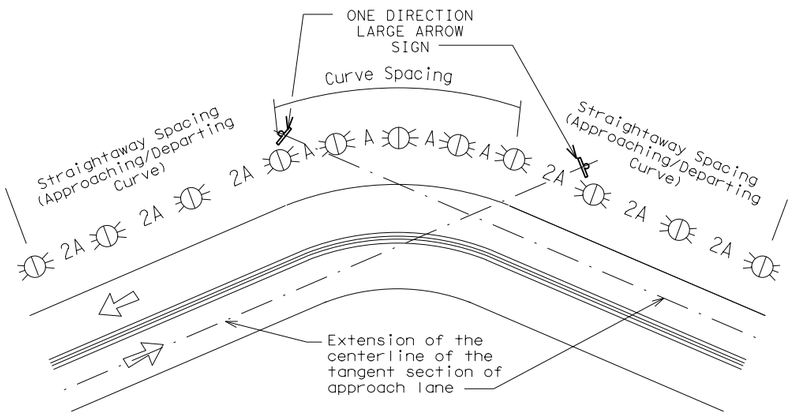
20B

DATE:
FILE:

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

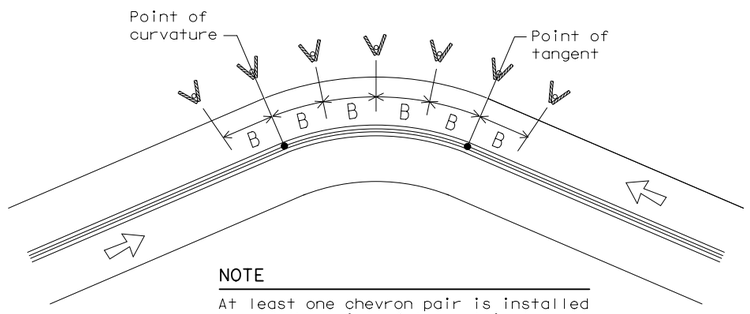
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



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
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	09	117	CR
3-15 8-15	DIST	COUNTY		SHEET NO.
8-15 7-20	YKM	WHARTON		42

DATE:
FILE:

20C

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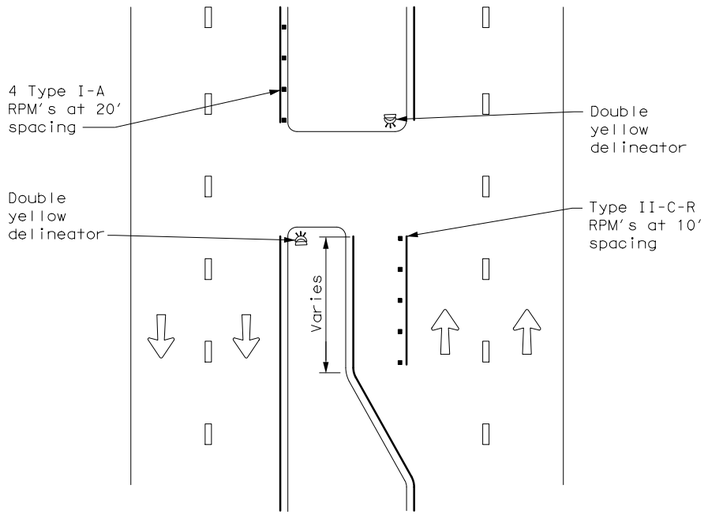
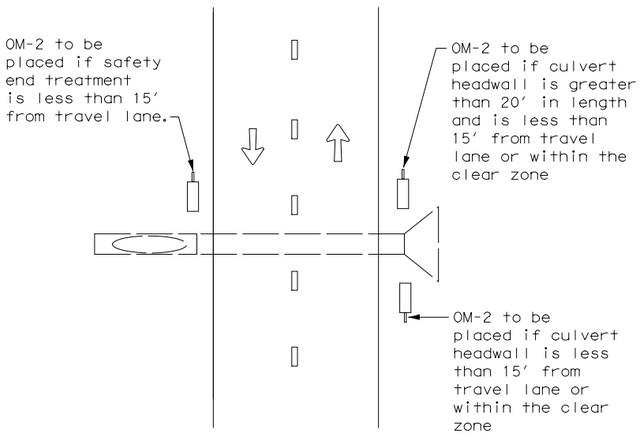
DATE:
FILE:

CROSSOVERS



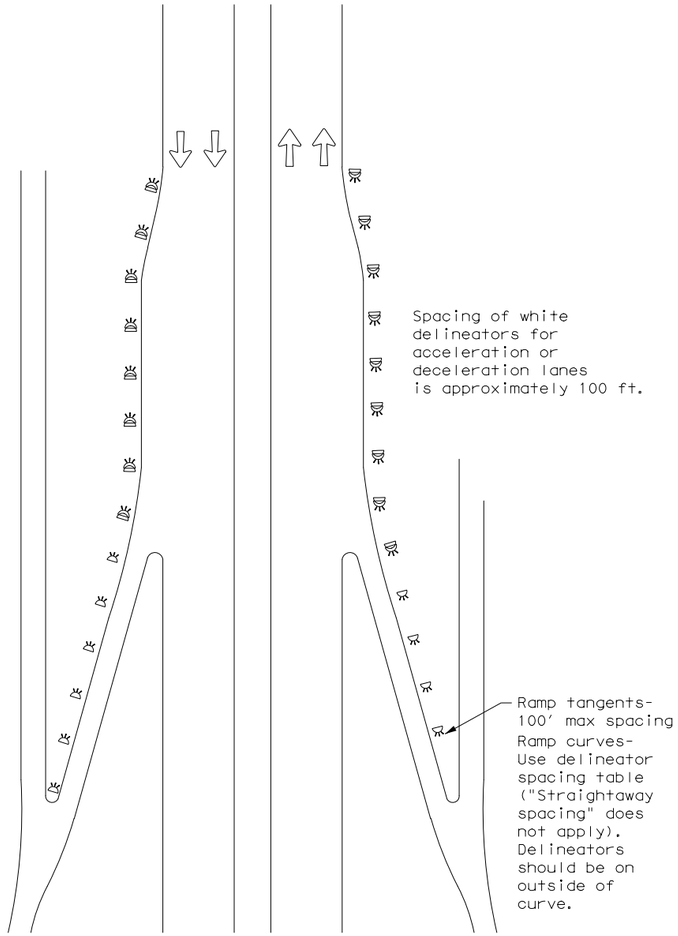
DETAIL 1

FOR CULVERTS WITHOUT MBGF



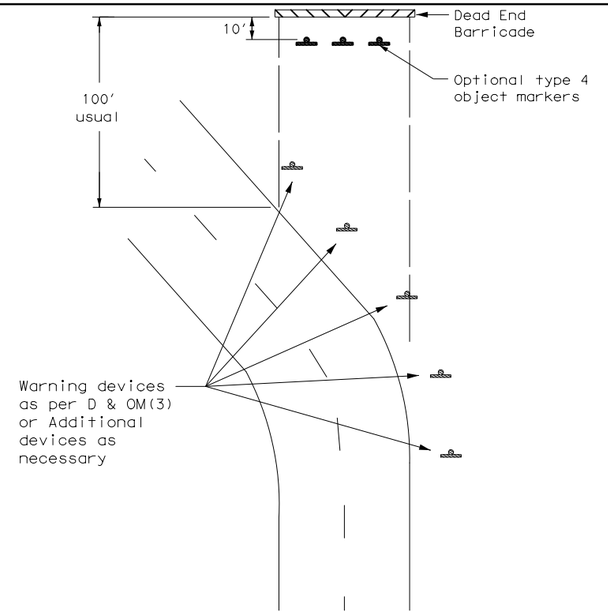
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



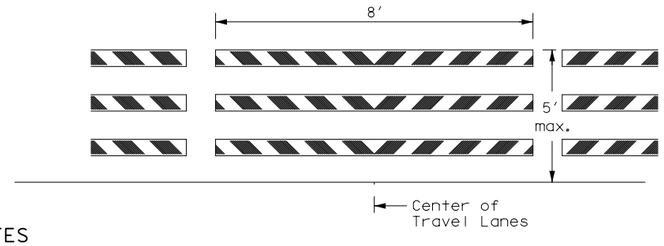
DETAIL 3

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	0913	09	117	CR
3-15	DIST	COUNTY		SHEET NO.
7-20	YKM	WHARTON		43

20D

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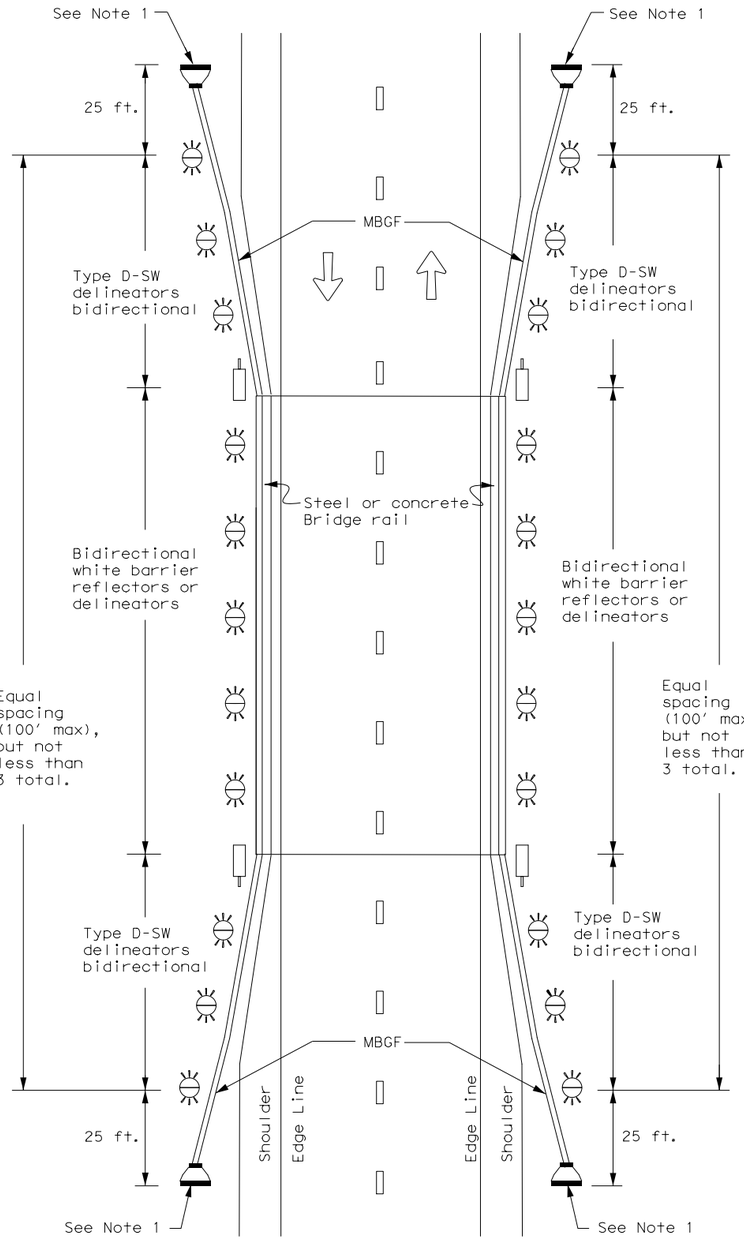
DATE:
FILE:

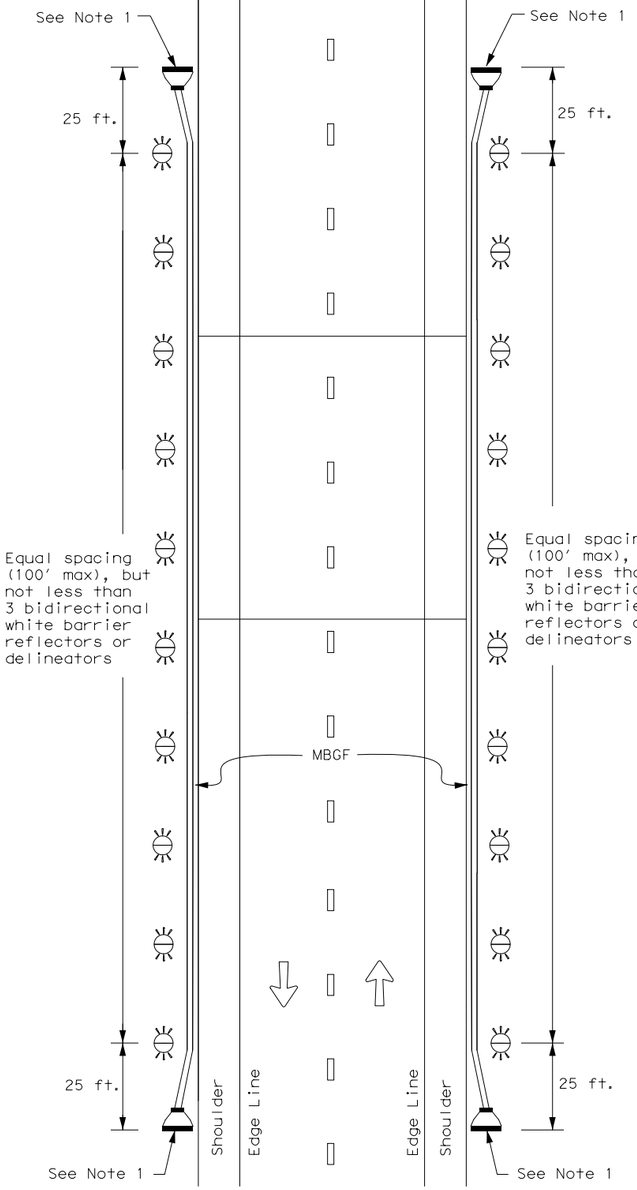
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



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.

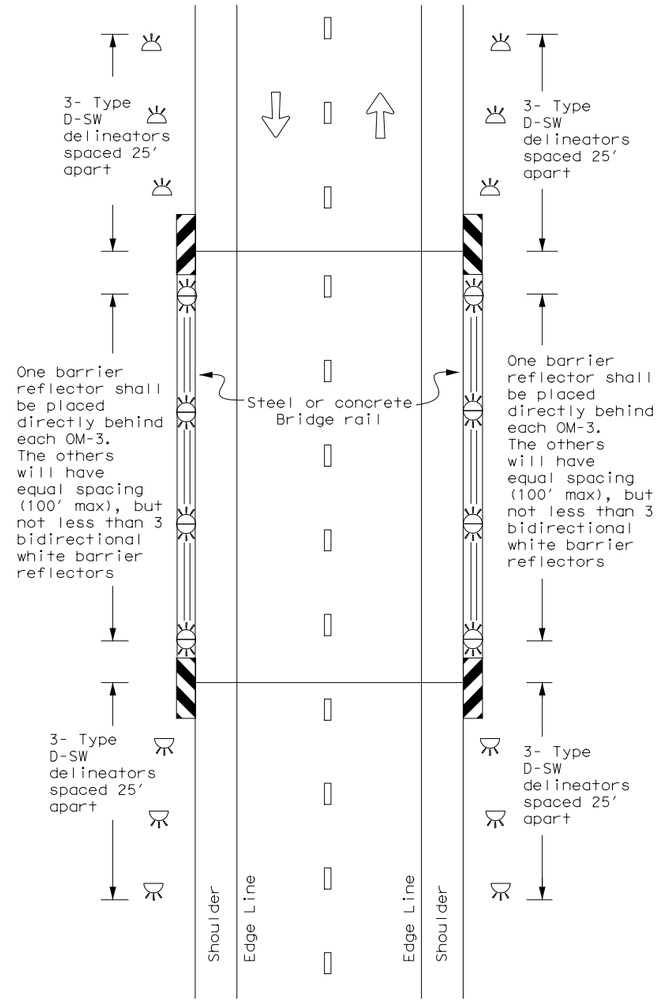
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



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

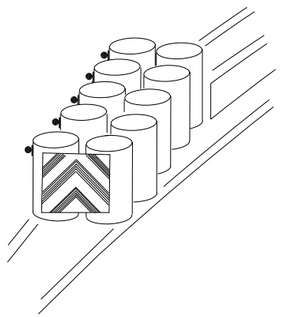
Traffic Safety Division Standard

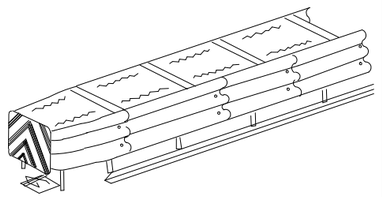
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

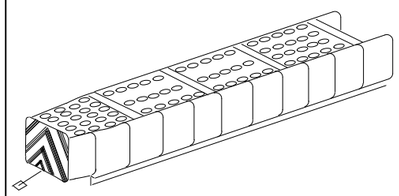
D & OM(5)-20

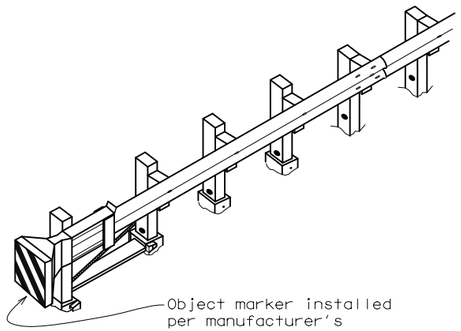
FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	09	117	CR
7-20	DIST	COUNTY		SHEET NO.
	YKM	WHARTON		44

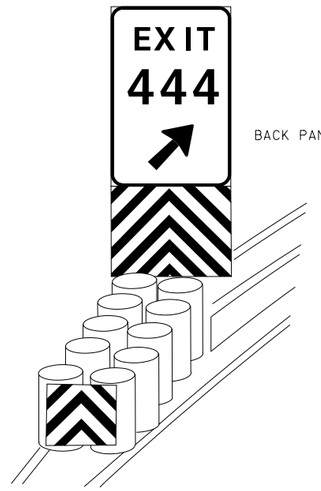
20E

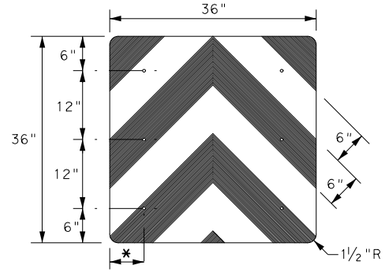


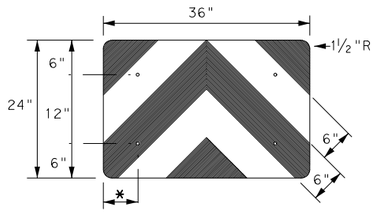




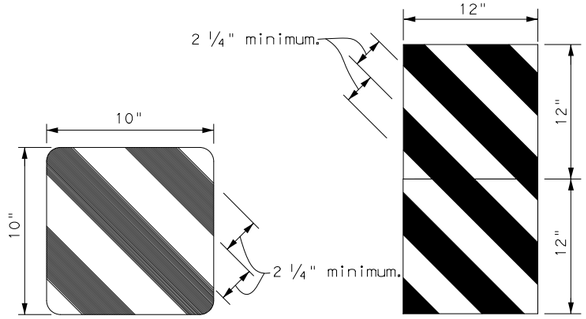




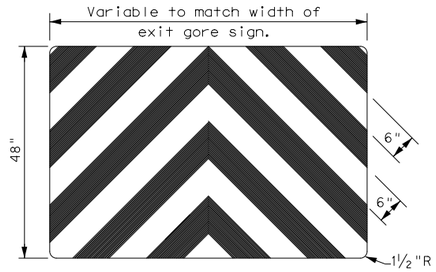


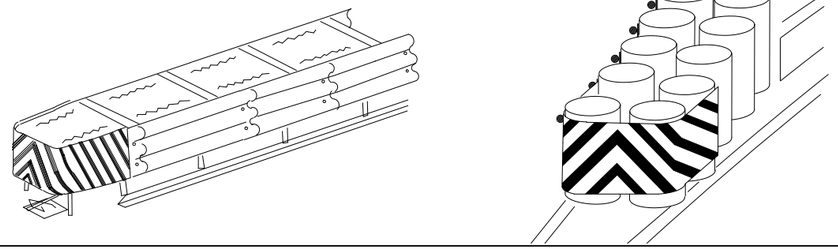


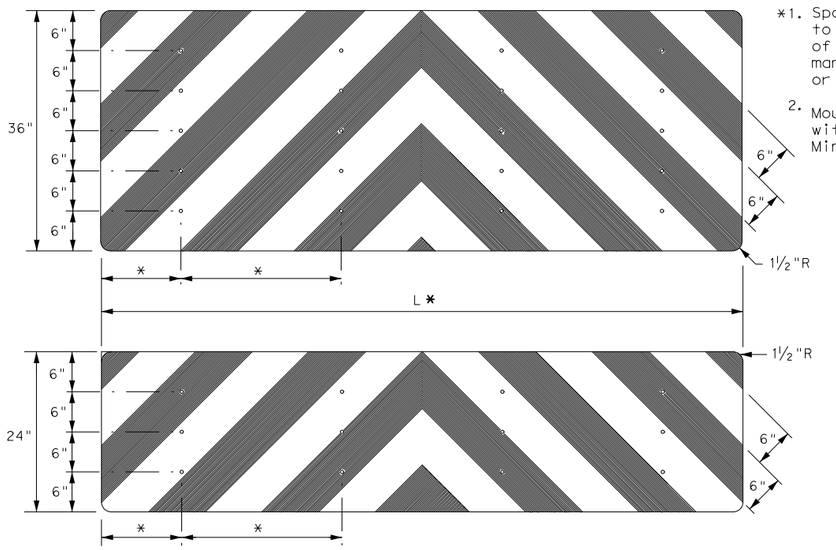
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer



OBJECT MARKERS SMALLER THAN 3 FT^2







NOTES

*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
	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	09	117	CR
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	YKM	WHARTON		45
4-98 7-20				

20G

DATE:
FILE:

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

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):
0913-09-117

1.2 PROJECT LIMITS:
From: CR 114 AT LCRA CANAL

To: STR#

1.3 PROJECT COORDINATES:
BEGIN: (Lat)_____,(Long)_____

END: (Lat)_____,(Long)_____

1.4 TOTAL PROJECT AREA (Acres): 0.41

1.5 TOTAL AREA TO BE DISTURBED (Acres): 0.28

1.6 NATURE OF CONSTRUCTION ACTIVITY:
CONSTRUCTION OF BRIDGE REPLACEMENT CONSISTING OF REPLACING BRIDGE AND APPROACHES

1.7 MAJOR SOIL TYPES:

Soil Type	Description
Lake Charles clay	100% clay, moderately well drained, high rate of runoff.

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

☐ PSLs determined during preconstruction meeting
☒ PSLs determined during construction
☐ No PSLs planned for construction

Type	Sheet #s

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

1.9 CONSTRUCTION ACTIVITIES:
(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.3.)

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

1.10 POTENTIAL POLLUTANTS AND SOURCES:

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

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

Tributaries	Classified Waterbody
Colorado River	Colorado River below La Grange (1402)
NO TMDLs or I-PLANS WERE IDENTIFIED	

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

1.12 ROLES AND RESPONSIBILITIES: TxDOT

☒ Development of plans and specifications
☒ Perform SWP3 inspections
☒ Maintain SWP3 records and update to reflect daily operations
☐ Other: _____
☐ Other: _____

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

☒ Day To Day Operational Control
☒ Maintain schedule of major construction activities
☒ Install, maintain and modify BMPs
☐ Other: _____
☐ Other: _____
☐ Other: _____

STATE OF TEXAS
SANDRA GAIL MORRIS
113680
LICENSED
PROFESSIONAL ENGINEER

05/25/2023

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

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			46
STATE	STATE DIST.	COUNTY	
TEXAS	YKM	WHARTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0913	09	117	CR

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

- [X] [X] Protection of Existing Vegetation
- [ ] [ ] Vegetated Buffer Zones
- [ ] [ ] Soil Retention Blankets
- [ ] [ ] Geotextiles
- [ ] [ ] Mulching/ Hydromulching
- [ ] [ ] Soil Surface Treatments
- [X] [ ] Temporary Seeding
- [ ] [X] Permanent Planting, Sodding or Seeding
- [ ] [ ] Biodegradable Erosion Control Logs
- [ ] [ ] Rock Filter Dams/ Rock Check Dams
- [ ] [ ] Vertical Tracking
- [ ] [ ] Interceptor Swale
- [ ] [X] 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
- [X] [ ] 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:

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

2.5 POLLUTION PREVENTION MEASURES:

- [X] Chemical Management
- [X] Concrete and Materials Waste Management
- [X] Debris and Trash Management
- [X] Dust Control
- [X] 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
No surface waters present, vegetated buffer zones are not planned.		

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

2.8 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3 .

2.9 MAINTENANCE:

Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3.

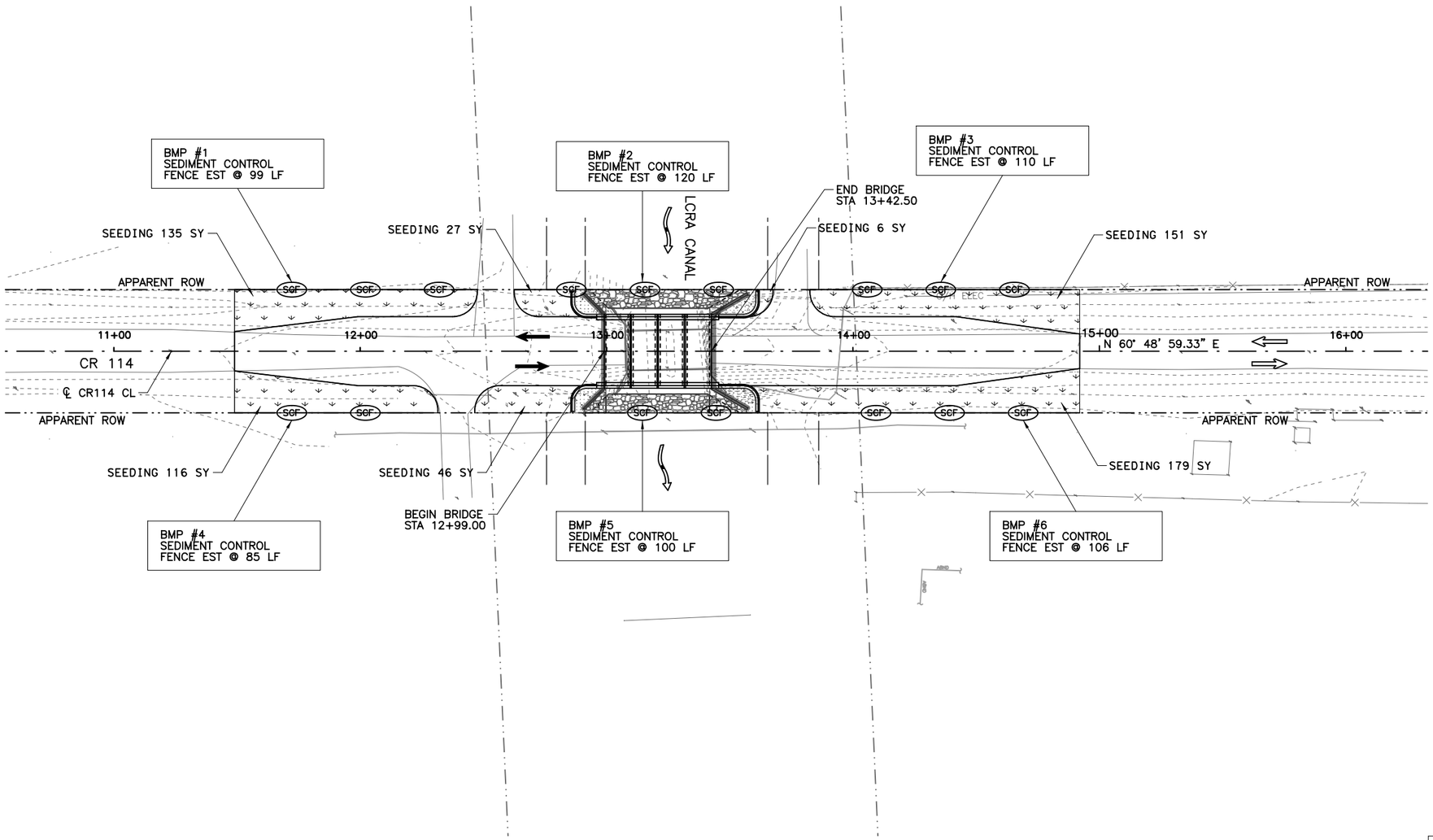
STATE OF TEXAS
SANDRA GAIL MORRIS
113680
LICENSED
PROFESSIONAL ENGINEER

05/25/2023

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

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			47
STATE	STATE DIST.	COUNTY	
TEXAS	YKM	WHARTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0913	09	117	CR



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25 12.5 0 25 50
SCALE HORIZ. FEET

LEGEND

SCF — SEDIMENT CONTROL FENCE

SEEDING AREA

NOTES

1. ACTUAL BMP LOCATIONS AND LENGTHS MAY VARY TO MEET FIELD CONDITIONS, AS APPROVED OR AS DIRECTED BY THE ENGINEER.

STATE OF TEXAS
SANDRA GAIL MORRIS
113680
LICENSED
PROFESSIONAL ENGINEER

06/01/2023

NO.	REVISION	BY	DATE

TEXAS REGISTERED ENGINEERING FIRM F-204

CR 114 AT LCRA CANAL

SWP3 LAYOUT

CSJ 0913-09-117 SHEET 1 OF 1

Designed:	JLN	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				HIGHWAY NO.
Checked:	SGM	6	TEXAS					CR
Drawn:	JLN	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
Checked:	SGM	YKM	WHARTON	0913	09	115		48

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I. STORMWATER POLLUTION PREVENTION

Texas Pollutant Discharge Elimination System (TPDES) TXR 150000: Stormwater Discharge Permit or Construction General Permit is 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. If applicable list MS4 operator that may receive discharges from this project. MS4 operator should be notified prior to construction activities.

- ☒ Prevent stormwater pollution erosion and sedimentation in accordance with TPDES Permit TXR 150000.
- ☒ Comply with the SW3P and revise when necessary to control pollution or as required by the Engineer.
- ☐ Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA, or other inspectors.
- ☐ When Contractor project specific locations (PSL) increase disturbed soil area to 5 acres or more, sumbit Notice of Intent (NOI) to TCEQ and Engineer.
- ☐ MS4 Operator(s):

No Additional Comments

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS

United States Army Corps of Engineers (USACE) Permit is required for filling, dredging, excavating or other work in water bodies, rivers, creeks, streams, wetlands or wet areas. The Contractor must adhere to all of the terms and general conditions associated with the following permit(s). If additional work not represented in the plans is required, contact the Engineer immediately.

- ☒ No USACE Permit Required
- ☐ Work is authorized by the USACE under a Nationwide Permit _____ without a Pre-Construction Notification (PCN). Project specific permit was not issued by USACE, therefore is not in the plan set.
- ☐ Work is authorized by the USACE under a Nationwide Permit _____ with a Pre-Construction Notification (PCN). The project specific permit issued by the USACE is included in the plan set.
- ☐ Work is authorized by the USACE under a Individual Permit (IP). The project specific permit issued by the USACE is included in the plan set.
- ☐ Work would be authorized by the USACE. The project specific permit issued by the USACE or Nationwide Permit will be provided to the contractor.

United States Coast Guard (USCG) Permit is required for projects that involve the construction or modification (including changes to lighting) of a bridge or causeway across a water body determined to be navigable by the United States Coast Guard (USCG) under Section 9 of the Rivers and Harbors Act. If additional work not represented in the plans is required, contact the Engineer immediately.

- ☒ No United States Coast Guard (USCG) Coordination Required
- ☐ United States Coast Guard (USCG) Permit
- ☐ United States Coast Guard (USCG) Exemption

Best Management Practices

Erosion	Sedimentation	Post Construction TSS
☒ Temporary Vegetation	☒ Silt Fence	☒ Vegetative Filter Strips
☐ Vegetation Lined Ditches	☐ Rock Filter Dam	☐ Vegetation Lined Ditches
☐ Sodding	☐ Sand Bag Berm	☐ Grassy Swales

No Additional Comments

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 area and contact the Engineer immediately.

No Additional Comments

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical. Refer to TxDOT Standard Specifications 162, 164, 192, 193, 506, 730, 751, and 752 in order to comply with requirements for invasive species, beneficial landscaping and tree/brush removal.

No Additional Comments

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

If any of the listed species below are observed, cease work in the area, do not disturb species or habitat and contact the Engineer immediately.

The work may not remove active nests (from bridges, structures, or vegetation adjacent to the roadway, etc.) during nesting season (February 15 to October 1). If removal of structures or vegetation is necessary during the nesting season, the Contractor shall conduct a bird survey no more than 3 days in advance of the clearing/demolish start date. All bird surveys shall be conducted by a Field Biologist and adhere to the guidance document “Avoiding Migratory Birds and Handling Potential Violations” found in the TxDOT Environmental Compliance Toolkits at the time of the survey. (See below for Field Biologist and Ornithologist qualifications)

No Additional Comments

Field Biologist, Ornithologist – a field biologist is defined as an individual qualified to perform field investigations, presence/absence surveys and habitat surveys for protected avian species or species of concern. A mandatory bachelor’s degree in biology or a related science is required. At a minimum, the Field Biologist, Ornithologist, shall have completed and reported a minimum of three presence/absence and habitat surveys for protected avian species in the past five years. A minimum of three projects must have been conducted in Texas. Surveys shall have been performed for documentation of species in accordance with a protocol approved by USFWS or TPWD, or following generally accepted methodologies.

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

Refer to TxDOT Standard Specifications in the event potentially contaminated materials are observed, such as dead or distressed vegetation, trash disposal areas, drums, canisters, barrels, leaching or seepage of substances, unusual smells or odors, or stained soil, cease work in the area and contact the Engineer immediately.

Does the project involve any bridge class structure rehabilitation or replacements (bridge class structutres not including box culverts)? Yes ☒ No ☐

Are results of the asbestos inspection positive (is asbestos present)? Yes ☐ No ☒

TxDOT is still required to notify DSHS 14 working days prior to any scheduled demolition.

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.

No Additional Comments

VII. GENERAL NOTES

TxDOT has determined that a USACE Nationwide or Individual Permit is not necessary for the project since all work shall be conducted outside the USACE jurisdictional areas. Any impacts to these jurisdictioanl areas by the contractor without a USACE permit will be the responsibility of the contrator. If the contractor deems it necessary to impact the USACE jurisdcitional areas, then it becomes the contractor's entire responsibility to consult with the USACE pertaining to the need for a Nationwide or Individual Permit. TxDOT will then hold the contractor responsible for following all conditions of the approved Permit.

DATE:
FILE:

Version 13.1

Texas Department of Transportation

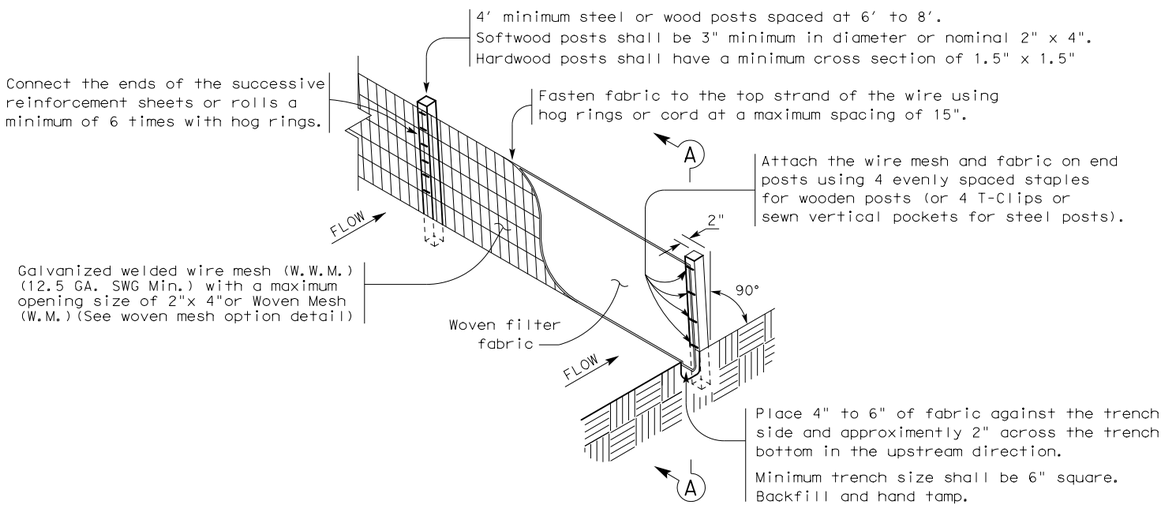
TxDOT Yoakum District

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

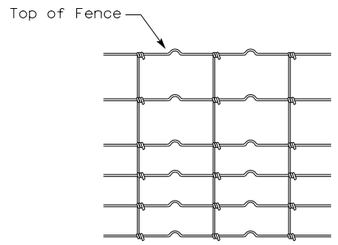
CR 114 at LCRA Canal

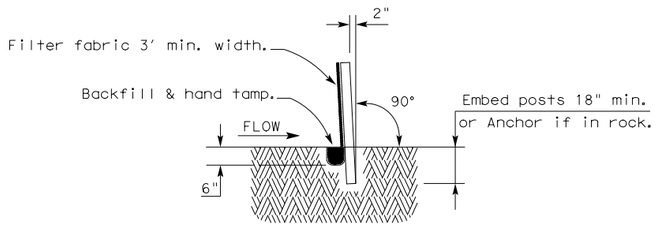
FILE: EPIC Sheet.dgn	DN:	CK:	DW:	CK:
© TxDOT: March 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	09	117	CR 114
	DIST	COUNTY		SHEET NO.
	YKM			49



TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

Galvanized hinge joint knot woven mesh (12.5 GA.SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.

SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT^2. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

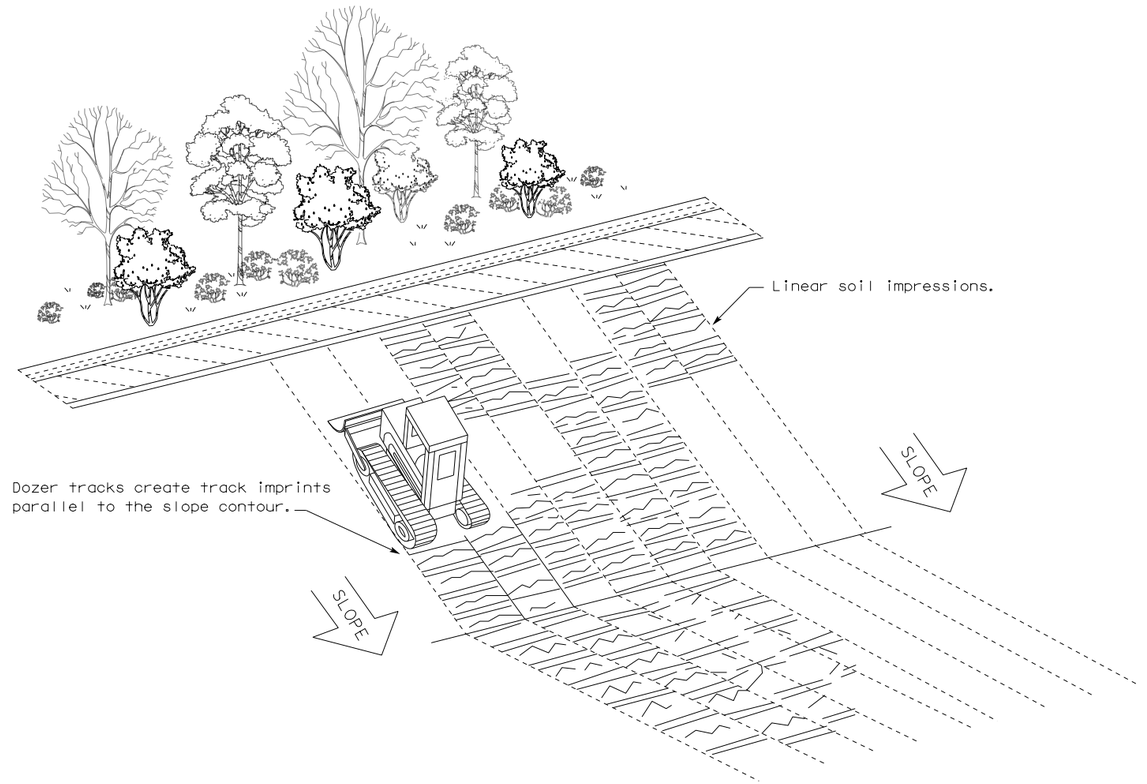
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

EC(1)-16

FILE: ec116	DN: TxDOT		CK: KM		DW: VP		DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY		
REVISIONS	0913	09	117		CR		
	DIST	COUNTY					SHEET NO.
	YKM	WHARTON					50

DATE
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