SEE SHEET 2 FOR INDEX OF SHEETS

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	BR 2020(351), ETC.		1
STATE	DIST.	COUNTY	
TEXAS	WFS	ARCHER	
CONT.	SECT.	JOB	HIGHWAY NO.
0903	29	027,ETC.	CR 232, ETC.

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

FEDERAL AID PROJECT NO. : BR2020(351),ETC.
CONTROL SECTION JOB : 0903-29-027, ETC.

ARCHER COUNTY
CR 232, ETC.

LIMITS: CR 232 (SIGNED WILSON RANCH RD) AT HOLLIDAY CREEK, ETC.

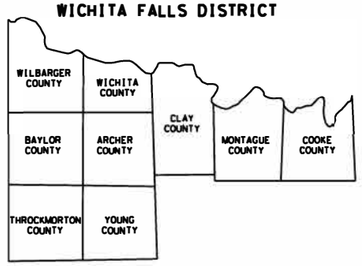
CR 232 (WILSON RANCH RD)
TOTAL LENGTH OF PROJECT =
CSJ 0903-29-027

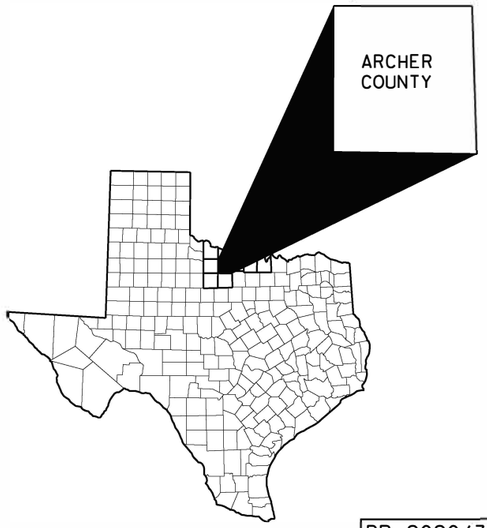
BRIDGE	=	30.00FT.	= 0.006MI.
ROADWAY	=	300.00FT.	= 0.057MI.
TOTAL	=	330.00FT.	= 0.063MI.

CR 261 (RIVER RD)
TOTAL LENGTH OF PROJECT =
CSJ 0903-29-029

BRIDGE	=	40.00FT.	= 0.008MI.
ROADWAY	=	300.00FT.	= 0.057MI.
TOTAL	=	340.00FT.	= 0.064MI.

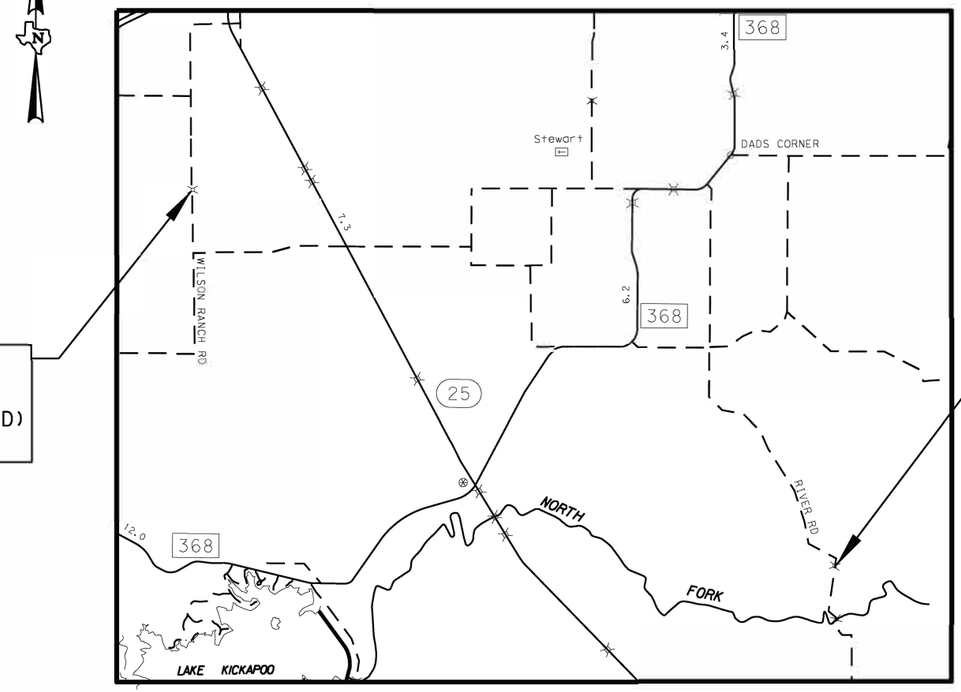
WICHITA FALLS DISTRICT





CSJ	RDWY NAME	COORDINATES LATITUDE	COORDINATES LONGITUDE	DESIGN SPEED (MPH)	AADT (2020)	AADT (2040)	FUNCTIONAL CLASS.
0903-29-027	CR 232	33.740247	-98.805665	25	10	14	LOCAL ROAD
0903-29-029	CR 261	33.671845	-98.671845	25	13	18	LOCAL ROAD

TYPE OF WORK: BRIDGE REPLACEMENT
CONSISTING OF: REPLACE BRIDGE AND APPROACHES



BR 2020(351)
CSJ: 0903-29-027
CR 232 (WILSON RANCH RD)
HOLLIDAY CREEK

BR 2023(780)
CSJ: 0903-29-029
CR 261(RIVER RD)
AT DRAW

0 1 2
SCALE IN MILES

NO EXCEPTIONS
NO EQUATIONS

NO RAILROAD CROSSINGS

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

Texas Department of Transportation ®
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SUBMITTED FOR LETTING 10/26/2022
Bryan Sauer, P.E.
DESIGN ENGINEER

RECOMMENDED FOR LETTING 10/27/2022
James S. Reese P.E.
DISTRICT DIRECTOR OF TRANSPORTATION PLANNING AND DEVELOPMENT

RECOMMENDED FOR LETTING 10/28/2022
Mitchell D. Brown P.E.
DISTRICT ENGINEER

COUNTY _____ PROJ. NO. _____
HWY. NO. _____ LETTING DATE _____
DATE ACCEPTED _____

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 FEDERAL-AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, JULY 2022).

FILE: G:\WFSDESGN\Plans\0903-29\0028V4 - Design\Plan Set\M. General\TITLESHEET.dgn
DATE: 10/24/2022

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	SHEET NO.	DESCRIPTION
		GENERAL
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	2	INDEX OF SHEETS
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	4	CR 261 (RIVER RD) @ DRAW TYPICAL SECTIONS
	5-7	GENERAL NOTES
	8	ESTIMATE & QUANTITIES
	9	QUANTITY SUMMARY
		TRAFFIC CONTROL PLAN
	10	CR 232 (WILSON RANCH RD) @ HOLLIDAY CREEK ROAD CLOSURE LAYOUT
	11	CR 261 (RIVER RD) @ DRAW LOW WATER CROSSING DETOUR
		TRAFFIC CONTROL PLAN STANDARDS
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		ROADWAY STANDARDS
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**	35	D&OM(1)-20
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**	37	D&OM(3)-20
**	38	D&OM(5)-20
**	39	D&OM(VIA)-20
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	43-45	CR 261 (RIVER RD) @ DRAW HYDRAULIC DATA SHEETS
		BRIDGE DETAILS
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	47	CR 232 (WILSON RANCH RD) @ HOLLIDAY CREEK QUANTITIES & BEARING SEAT ELEVATIONS
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**	55	SPSB-24
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**	57	PSBRA
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**	78	EC(2)-16
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STATE OF TEXAS
ZACHARY P. HUSEN
106073
LICENSED PROFESSIONAL ENGINEER

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

Zach P. Husen, P.E. 10/24/2022

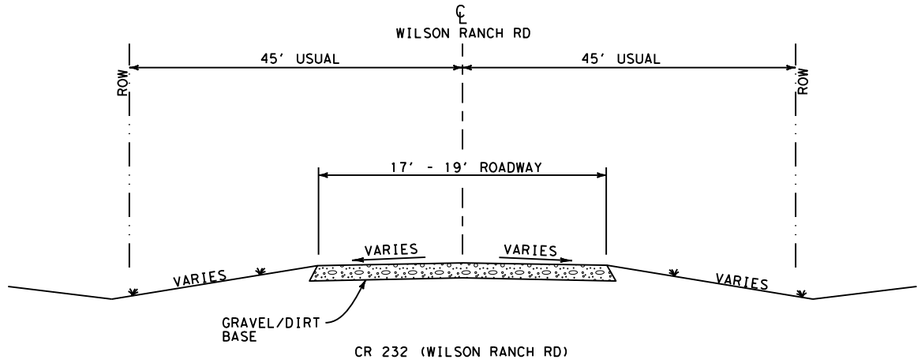
NAME DATE

CR 232, ETC
INDEX OF SHEETS

Texas Department of Transportation

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0903	29	027, ETC	CR 232, ETC
DIST	COUNTY		SHEET NO.
WFS	ARCHER		2



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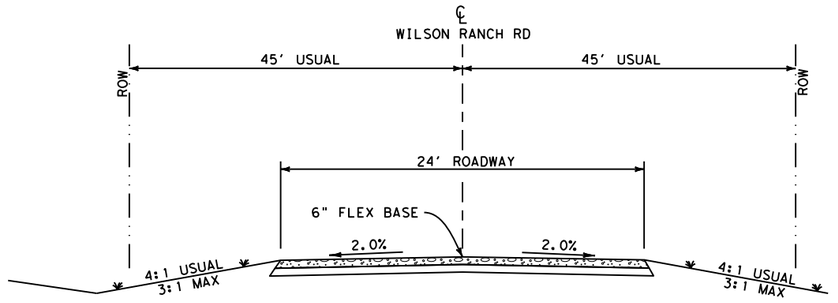

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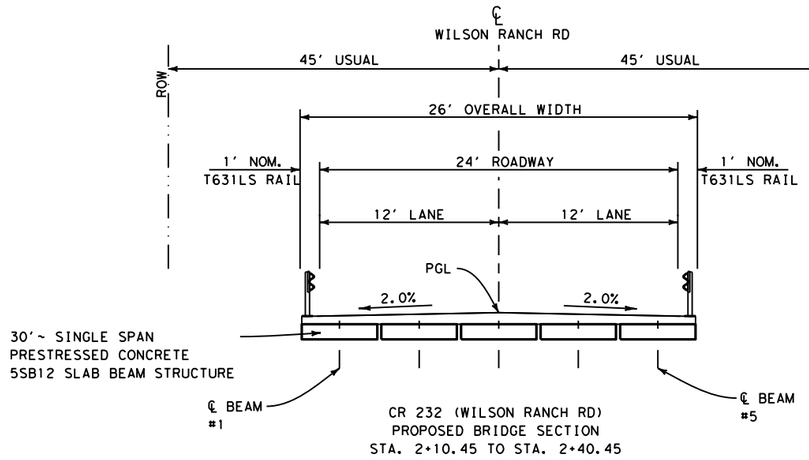
STA. 1+10.45 TO STA. 2+10.45
STA. 2+40.45 TO STA. 3+40.45
STA. 3+40.45 TO STA. 3+90.45 (TRANSITION)



CR 232 (WILSON RANCH RD)
PROPOSED BRIDGE SECTION
STA. 2+10.45 TO STA. 2+40.45

STATE OF TEXAS
ZACHARY P. HUSEN
106073
LICENSED
PROFESSIONAL ENGINEER

Zach P. Husen, P.E.
10/24/2022

CR 232
(WILSON RANCH RD)
@ HOLLIDAY CREEK
TYPICAL SECTIONS

2022 Texas Department of Transportation®

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0903	29	027, ETC	CR 232, ETC
DIST	COUNTY		SHEET NO.
WFS	ARCHER		3

DN: CK: DW: CK:

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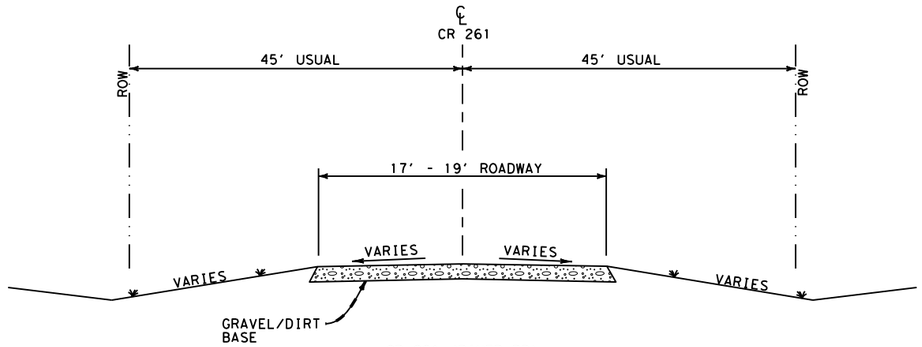

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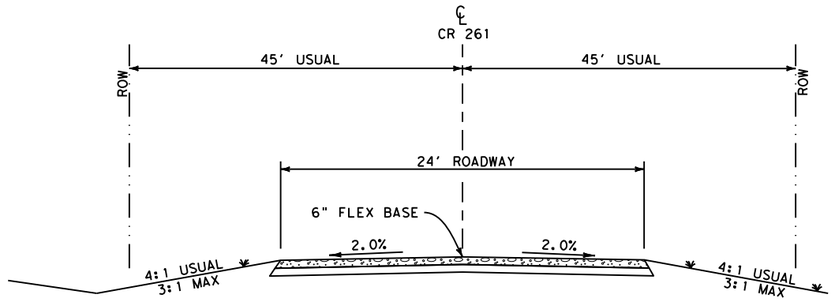

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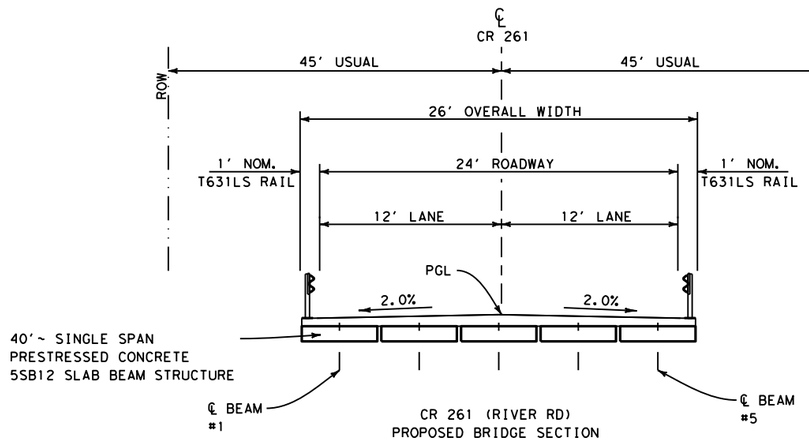
STA. 5+05.80 TO STA. 6+05.80
STA. 6+05.80 TO STA. 6+55.80 (TRANSITION)



CR 261 (RIVER RD)
PROPOSED BRIDGE SECTION
STA. 4+65.80 TO STA. 5+05.80

STATE OF TEXAS
ZACHARY P. HUSEN
106073
LICENSED
PROFESSIONAL ENGINEER

Zach P. Husen, P.E.
10/24/2022

CR 261 (RIVER RD)
@ DRAW
TYPICAL SECTIONS

2022 Texas Department of Transportation®

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0903	29	027, ETC	CR 232, ETC
DIST	COUNTY		SHEET NO.
WFS	ARCHER		4

DATE: 10/24/2022 1:28:52 AM
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DN: | CK: | DW: | CK:

GENERAL NOTES

Basis of Estimate:

Item - Description	Rate*	Unit
168 - Vegetative Watering	1.4 GAL/SY per Application every 2 weeks for 3 months	MG

*For Contractor's information only, actual production rates may vary.

General Requirements

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

Zach Husen, P.E.: Zachary.Husen@txdot.gov
Anthony Boucher, E.I.T.: Anthony.Boucher@txdot.gov

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

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

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

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

Bid Item Specific General Notes

Item 4 - Scope of Work

For the preconstruction conference submit a work schedule; temporary water pollution control plan; material sources; the person responsible for the SW3P; written utility coordination plan; certification statements; request for proposed subcontractors and letters designating the project superintendent, safety officer, and payroll officer at the preconstruction conference.

Item 5 - Control of the Work

Provide the Engineer a minimum 24 hours' notice for work requiring inspection or testing.

When a precast or cast-in-place concrete element is included in the plans, a precast concrete alternate may be submitted in accordance with "Standard Operating Procedure for Alternate

Precast Proposal Submission" found online at https://www.txdot.gov/inside-txdot/forms-publications/consultants-contractors/publications/bridge.html#design. Acceptance or denial of an alternate is at the sole discretion of the Engineer. Impacts to the project schedule and any additional costs resulting from the use of alternates are the sole responsibility of the Contractor.

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

- No significant traffic generator events identified for this project.

Use an all-weather material in conjunction with item 7.2.4. This work will not be paid for directly but will be subsidiary to various bid items.

The Contractor's responsible person as described in item 7.2.6.1 must be able to respond within 45 minutes of being notified.

Item 100 – Preparing Right of Way

Drift, debris, brush removal, and tree trimming will be paid for under Item 100, Preparing Right of Way. Mulch and/or shred brush and trimmed limbs and place material on the backslope in those areas as an erosion deterrent.

Item 132 – Embankment

All borrow/aggregate sites shall meet the requirements of the Texas Aggregate Quarry and Pit Safety Act which can be found at www.txdot.gov/inside-txdot/division/maintenance/quarry.html

This material shall consist of suitable earth material such as loam, clay or other materials that will form a stable embankment and be free from vegetation or other objectionable matter. Any embankment needed from a borrow pit must first be approved by the Engineer.

Windrow approximately 4” of existing grass and topsoil adjacent to the right of way line or vegetative buffer zone prior to beginning earthwork operations. Upon completion of earthwork operations scarify the slopes and ditches longitudinally to a depth of approximately 4 inches and return the windrowed material to the slopes and the ditches as a permanent erosion control measure. This work will not be paid for directly, but is considered subsidiary to the various bid items.

Item 164 - Seeding for Erosion Control

Temporary seeding will be required in several small areas as work progresses to comply with the storm water pollution prevention plan and may require multiple mobilizations of seeding crew. The Engineer may blend temporary and permanent seeding according to the temperatures and time of year in order to achieve maximum coverage in the least amount of time.
The contractor is responsible for the protection and maintenance of all seeded areas until final acceptance of the project. Maintenance includes:

1. Protection of seeded and mulched areas against traffic.

2. Mowing of weeds and tall vegetation, if needed, to prevent loss of soil moisture or choking out of grass seedlings. Mowing will be done as directed by the Engineer and will not be paid for directly.

Item 166 – Fertilizer

Fertilize all areas of the project that are seeded.

Item 168 - Vegetative Watering

Water as directed by the Engineer all areas that receive seed to sustain grass growth to obtain a minimum 70% vegetative cover within the right of way. This may require the contractor to water the newly established grass for a period of up to three months after all other work on the contract is completed and before the project is accepted. Watering shall be done at times determined by the Engineer in order to minimize any loss due to evaporation.

Item 247 - Flexible Base

Flexible base material shall consist of crushed limestone and be placed using ordinary compaction.

When a commercial source is utilized with a known passing triaxial test history, the triaxial requirement may be waived by the Engineer. A copy of the recent passing test results must be obtained from the Wichita Falls District Laboratory and placed in the project records.

Item 496 – Removing Structures

Contractor to provide no less than 7 days' notice to County Commissioner prior to bridge demolition and project completion for coordination of any fence replacement or salvageable material. (Contact information to be provided at the Pre-Construction Meeting).

Any existing substructure remaining after removal of the superstructure shall be demolished to 2 feet below grade in accordance with this bid item. Any existing substructure which conflicts with the proposed bridge foundations shall be completely removed as directed by the Engineer.

The existing bridge elements will become the property of the contractor after removal.

Item 502 - Barricades, Signs, and Traffic Handling

Work vehicles within 30 feet of the traveled way shall have strobe lights or rotating beacons in use.

Work will not be permitted without adequate traffic control in place as determined by the Engineer.

The Traffic Control Plan (TCP) for this project includes the plans, the Texas Manual on Traffic Control Devices, Barricade and Construction Standard Sheets, Standard TCP Sheets, and as otherwise required by the Engineer.

The Contractor's person responsible for TCP compliance is available by local telephone 24 hours a day and must respond to traffic control needs within 45 minutes of being notified.

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.

Always wear appropriate personal protective equipment while outside of vehicles and equipment on the project.

Repair barricades within 48 hours after barricade report has been delivered to the Contractor. Failure to comply will cease all work until barricades are repaired to the satisfaction of the Department. Replace all damaged traffic control devices immediately. Remove any damaged traffic control devices from the project within 24 hours.

Failure to make necessary corrections to Traffic Control items based on barricade inspections will be cause for withholding the monthly estimate until such corrections are made.

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

Item 506 - Temporary Erosion, Sedimentation, and Environmental Controls

The total disturbed area (TDA) will establish the required authorization for storm water discharges. The TDA of the project will be determined as described by the SW3P Narrative sheet.

Contractor shall meet the requirements for the Project SW3P binder as described on the SW3P sheet.

The Contractor shall collect and dispose of all waste material as required by the Storm Water Pollution Prevention Plan (SW3P).

If sediment escapes the construction site, immediately stop all work on the project, remove the sediment, and modify the SW3P site plan to prevent future non-compliance issues.

The Contractor shall construct concrete washouts for all concrete items. This work including materials and labor will not be measured or paid for directly but will be subsidiary to Item 506.

Verify locations and dimensions of BMP’s and obtain the Engineer’s approval prior to placement. BMP locations indicated on the plans are approximate and may be adjusted as necessary by the Engineer.

If it is determined that other erosion control devices are needed, payment for the work will be determined in accordance with Article 4.4, "Changes in the Work".

Anticipate multiple mobilizations for SW3P work.

Item 658 - Delineator and Object Marker Assemblies

The Contractor shall furnish SHUR-TITE Guardrail Post “Flat Mount” from SHUR-TITE Products or equivalent.

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0903-29-027 **DISTRICT** Wichita Falls **COUNTY** Archer
HIGHWAY CR 178, CR 227

				CONTROL SECTION JOB	0903-29-027		0903-29-029		TOTAL EST.	TOTAL FINAL
				PROJECT ID	A00128125		A00128124			
				COUNTY	Archer		Archer			
				HIGHWAY	CR 227		CR 178			
ALT	BID CODE	DESCRIPTION	UNIT		EST.	FINAL	EST.	FINAL		
	100-6002	PREPARING ROW	STA		4.000				4.000	
	110-6004	EXCAVATION (ROADWAY AND CHANNEL)	CY		74.000		51.000		125.000	
	132-6003	EMBANKMENT (FINAL)(ORD COMP)(TY B)	CY		265.000		312.000		577.000	
	164-6009	BROADCAST SEED (TEMP) (WARM)	SY		528.000		515.000		1,043.000	
	164-6011	BROADCAST SEED (TEMP) (COOL)	SY		528.000		515.000		1,043.000	
	164-6021	CELL FBR MLCH SEED(PERM)(RURAL)(SANDY)	SY		528.000		515.000		1,043.000	
	168-6001	VEGETATIVE WATERING	MG		6.000		6.000		12.000	
	216-6001	PROOF ROLLING	HR		4.000		4.000		8.000	
	247-6061	FL BS (CMP IN PLC)(TYA GR1-2) (6")	SY		734.000		734.000		1,468.000	
	416-6002	DRILL SHAFT (24 IN)	LF		297.000		345.000		642.000	
	420-6013	CL C CONC (ABUT)	CY		19.600		19.600		39.200	
	420-6074	CL C CONC (MISC)	CY		3.000		3.000		6.000	
	422-6007	REINF CONC SLAB (SLAB BEAM)	SF		780.000		1,040.000		1,820.000	
	425-6010	PRESTR CONC SLAB BEAM (5SB12)	LF		147.500		197.500		345.000	
	432-6035	RIPRAP (STONE PROTECTION)(24 IN)	CY		292.000		395.000		687.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY		11.800		11.800		23.600	
	450-6019	RAIL (TY T631LS)	LF		84.000		104.000		188.000	
	496-6009	REMOV STR (BRIDGE 0 - 99 FT LENGTH)	EA		1.000		1.000		2.000	
	500-6001	MOBILIZATION	LS		0.500		0.500		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO		3.000		3.000		6.000	
	506-6002	ROCK FILTER DAMS (INSTALL) (TY 2)	LF		100.000		80.000		180.000	
	506-6011	ROCK FILTER DAMS (REMOVE)	LF		100.000		80.000		180.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF		600.000		600.000		1,200.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF		600.000		600.000		1,200.000	
	506-6040	BIODEG EROSN CONT LOGS (INSTL) (8")	LF		100.000		80.000		180.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF		100.000		80.000		180.000	
	508-6001	CONSTRUCTING DETOURS	SY				722.000		722.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF		100.000		100.000		200.000	
	540-6007	MTL BEAM GD FEN TRANS (TL2)	EA		4.000		4.000		8.000	
	540-6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA		2.000		2.000		4.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA		2.000		2.000		4.000	
	658-6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	EA		6.000		6.000		12.000	
	4171-6001	INSTALL BRIDGE IDENTIFICATION NUMBERS	EA		2.000		2.000		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	

CR 232 (WILSON RANCH RD) AT HOLLIDAY CREEK
NBI:03-005-0-AA02-32-002

SUMMARY OF ROADWAY ITEMS

LOCATION	100 6002 PREPARING ROW	110 6004 EXCAVATION (ROADWAY AND CHANNEL)	132 6003 EMBANKMENT (FINAL) (ORD COMP) (TY B)	216 6001 PROOF ROLLING	247 6061 FL BS (CMP IN PLC) (TYA GR1-2) (6")	432 6045 RIPRAP (MOW STRIP) (4 IN)	496 6009 REMOV STR (BRIDGE 0 - 99 FT LENGTH)	540 6001 MTL W-BEAM GD FEN (TIM POST)	540 6007 MTL BEAM GD FEN TRANS (TL2)	540 6016 DOWNSTREAM ANCHOR TERMINAL SECTION	544 6001 GUARDRAIL END TREATMENT (INSTALL)	658 6062 INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)
	STA	CY	CY	HR	SY	CY	EA	LF	EA	EA	EA	EA
CR 232 WILSON RANCH RD @ HOLLIDAY CREEK	4	74	265	4	734	11.8	1	100	4	2	2	6
PROJECT TOTALS	**4**	**74**	**265**	**4**	**734**	**11.8**	**1**	**100**	**4**	**2**	**2**	**6**

SUMMARY OF EROSION CONTROL ITEMS

LOCATION	164 6009 BROADCAST SEED (TEMP) (WARM)	164 6011 BROADCAST SEED (TEMP) (COOL)	164 6021 CELL FBR MLCH SEED (PERM) (RURAL) (SANDY)	168 6001 VEGETATIVE WATERING	506 6002 ROCK FILTER DAMS (INSTALL) (TY 2)	506 6011 ROCK FILTER DAMS (REMOVE)	506 6038 TEMP SEDMT CONT FENCE (INSTALL)	506 6039 TEMP SEDMT CONT FENCE (REMOVE)	506 6040 BIODEG EROSN CONT LOGS (INSTL) (8")	506 6043 BIODEG EROSN CONT LOGS (REMOVE)
	SY	SY	SY	MG	LF	LF	LF	LF	LF	LF
CR 232 WILSON RANCH RD @ HOLLIDAY CREEK	528	528	528	6	100	100	600	600	100	100
PROJECT TOTALS	**528**	**528**	**528**	**6**	**100**	**100**	**600**	**600**	**100**	**100**

CR 261 (RIVER RD) AT DRAW
NBI:03-005-0-AA02-61-003

SUMMARY OF ROADWAY ITEMS

LOCATION	110 6004 EXCAVATION (ROADWAY AND CHANNEL)	132 6003 EMBANKMENT (FINAL) (ORD COMP) (TY B)	216 6001 PROOF ROLLING	247 6061 FL BS (CMP IN PLC) (TYA GR1-2) (6")	432 6045 RIPRAP (MOW STRIP) (4 IN)	496 6009 REMOV STR (BRIDGE 0 - 99 FT LENGTH)	508 6001 CONSTRUCTING DETOURS	540 6001 MTL W-BEAM GD FEN (TIM POST)	540 6007 MTL BEAM GD FEN TRANS (TL2)	540 6016 DOWNSTREAM ANCHOR TERMINAL SECTION	544 6001 GUARDRAIL END TREATMENT (INSTALL)	658 6062 INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)
	CY	CY	HR	SY	CY	EA	SY	LF	EA	EA	EA	EA
CR 261 RIVER RD @ DRAW	51	312	4	734	11.8	1	722	100	4	2	2	6
PROJECT TOTALS	**51**	**312**	**4**	**734**	**11.8**	**1**	**722**	**100**	**4**	**2**	**2**	**6**

SUMMARY OF EROSION CONTROL ITEMS

LOCATION	164 6009 BROADCAST SEED (TEMP) (WARM)	164 6011 BROADCAST SEED (TEMP) (COOL)	164 6021 CELL FBR MLCH SEED (PERM) (RURAL) (SANDY)	168 6001 VEGETATIVE WATERING	506 6002 ROCK FILTER DAMS (INSTALL) (TY 2)	506 6011 ROCK FILTER DAMS (REMOVE)	506 6038 TEMP SEDMT CONT FENCE (INSTALL)	506 6039 TEMP SEDMT CONT FENCE (REMOVE)	506 6040 BIODEG EROSN CONT LOGS (INSTL) (8")	506 6043 BIODEG EROSN CONT LOGS (REMOVE)
	SY	SY	SY	MG	LF	LF	LF	LF	LF	LF
CR 261 RIVER RD @ DRAW	515	515	515	6	80	80	600	600	80	80
PROJECT TOTALS	**515**	**515**	**515**	**6**	**80**	**80**	**600**	**600**	**80**	**80**

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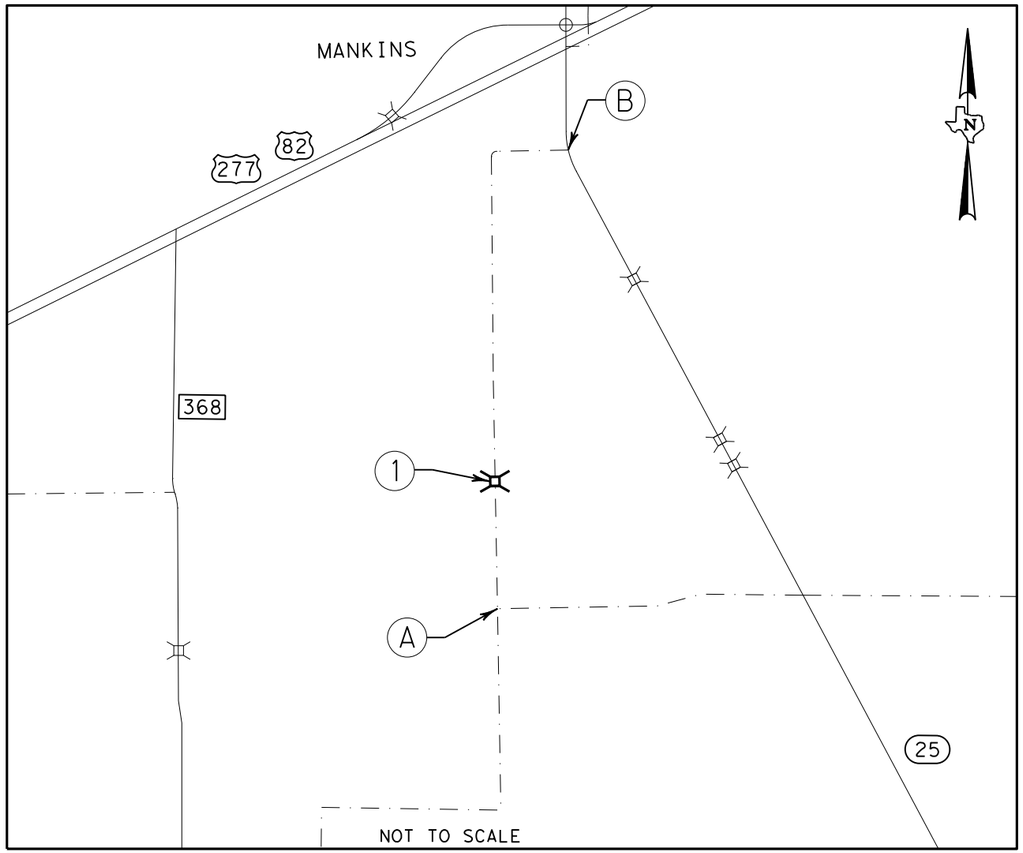
QUANTITY SUMMARY

CONT	SECT	JOB	HIGHWAY
0903	29	027, ETC	CR 232, ETC
DIST	COUNTY		SHEET NO.
WFS	ARCHER		9



LEGEND

SIGN POST

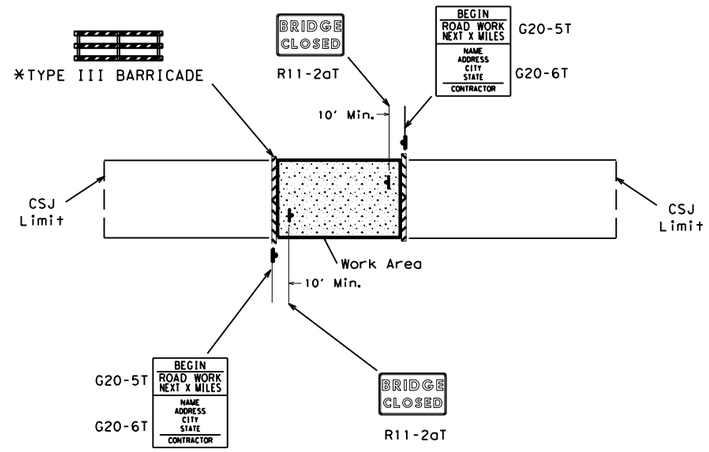
TYPE III BARRICADE

NOTES:

1. THE ONLY BARRICADES REQUIRED FOR THIS LOCATION ARE AS SHOWN ON THIS SHEET. NO ADDITIONAL BARRICADES OR ADVANCED WARNING SIGNS WILL BE REQUIRED AT THIS LOCATION.
2. COVER ALL EXISTING SIGNS IN CONFLICT WITH THE WORK ZONE SIGNS.
3. THE SIGN LOCATIONS SHOWN ON THIS SHEET ARE NOT TO SCALE.

* SHALL NOT BE USED AS A SIGN SUPPORT

(1) PROJECT LOCATION



(A)

ROAD CLOSED
0.6 MILES AHEAD
LOCAL TRAFFIC ONLY

(B)

ROAD CLOSED
2.6 MILES AHEAD
LOCAL TRAFFIC ONLY

STATE OF TEXAS
ZACHARY P. HUSEN
106073
LICENSED PROFESSIONAL ENGINEER

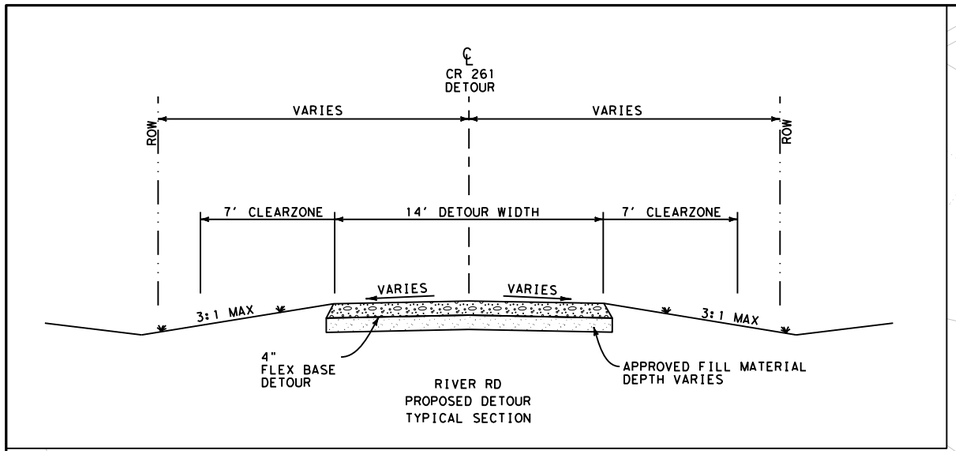
Zach P. Husen, P.E.
10/24/2022

CR 232
(WILSON RANCH RD)
@ HOLLIDAY CREEK

ROAD CLOSURE LAYOUT

2022 Texas Department of Transportation®

FED. RD. DIV. NO.	STATE AID PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		10
STATE	DIST.	COUNTY	
TEXAS	WFS	ARCHER	
CONT.	SECT.	JOB	HIGHWAY NO.
0903	29	027, ETC	CR 232, ETC



RIVER RD
PROPOSED DETOUR
TYPICAL SECTION

NOT TO SCALE

GENERAL NOTES:

1. THE ONLY BARRICADES REQUIRED FOR THIS LOCATION ARE AS SHOWN ON THIS SHEET. NO ADDITIONAL BARRICADES OR ADVANCED WARNING SIGNS WILL BE REQUIRED AT THIS LOCATION.
2. REFER TO BC(2)-21 FOR SIGN SPACING.
3. CONTRACTOR TO PHASE APPROACHES AND GUARDRAIL CONSTRUCTION TO MAINTAIN TRAFFIC FLOW.
4. DETOUR FINAL GRADE MUST BE APPROVED BY THE ENGINEER.
5. MAINTENANCE OF DETOUR DRIVEABILITY WILL BE CONTRACTORS RESPONSIBILITY THROUGHOUT PROJECT.
6. REMOVAL OF DETOUR AT THE END OF THE PROJECT TO BE SUBSIDIARY TO ITEM 508.

STATE OF TEXAS
ZACHARY P. HUSEN
106073
LICENSED
PROFESSIONAL ENGINEER

Zach P. Husen, P.E.
10/24/2022

CR 261 (RIVER RD)
@ DRAW
LOW WATER CROSSING
DETOUR

2022 Texas Department of Transportation®

SHEET 1 OF 1

FED. RD. DIV. NO.	STATE AID PROJECT NO.	SHEET NO.
6	SEE TITLE SHEET	11

STATE	DIST.	COUNTY	
TEXAS	WFS	ARCHER	
CONT.	SECT.	JOB	HIGHWAY NO.
0903	29	027, ETC	CR 232, ETC

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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-03 7-13 9-07 8-14 5-10 5-21	0903	29	027, ETC	CR 232, ETC
	DIST	COUNTY		SHEET NO.
	WFS	ARCHER		12

DATE: 10/24/2022 11:29:11 AM
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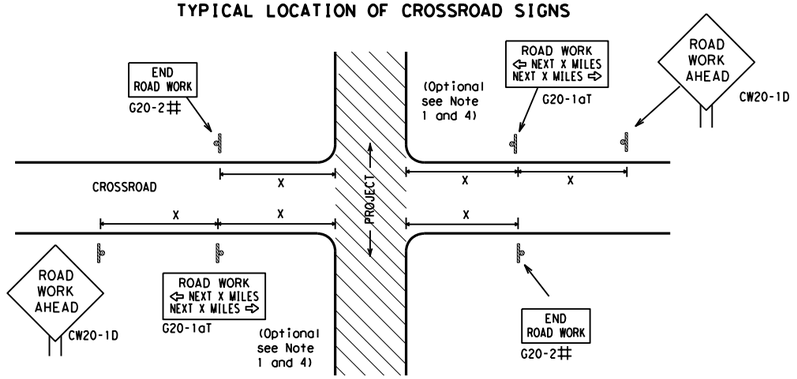
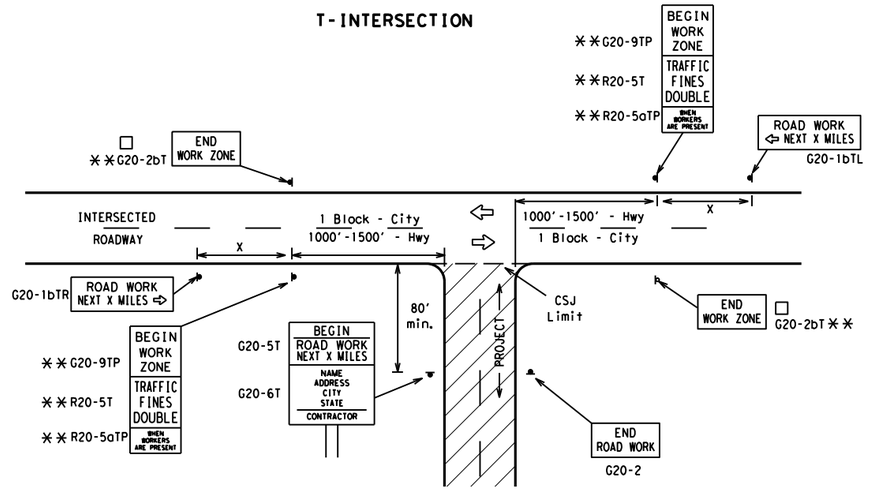
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

TYPICAL CONSTRUCTION WARNING SIGN SIZE AND SPACING[1,5,6]

SIZE

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

SPACING

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

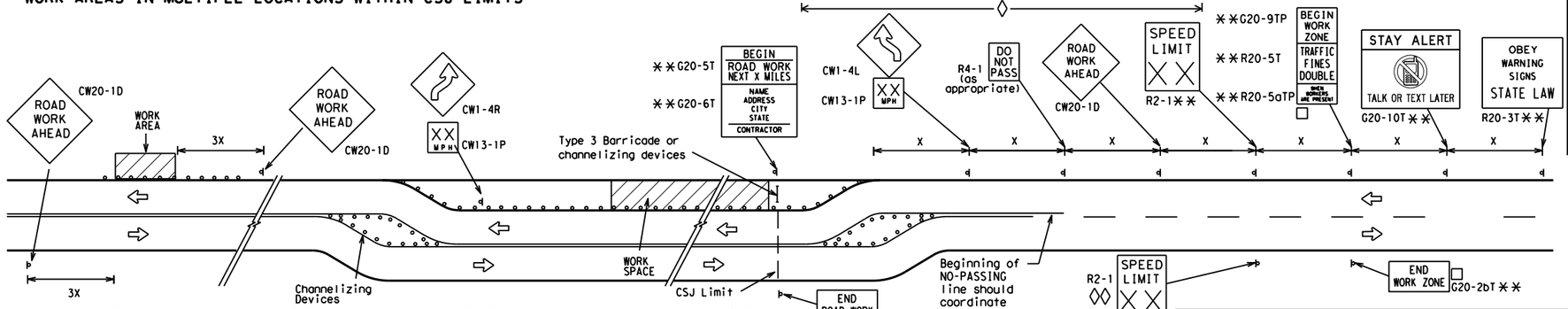
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

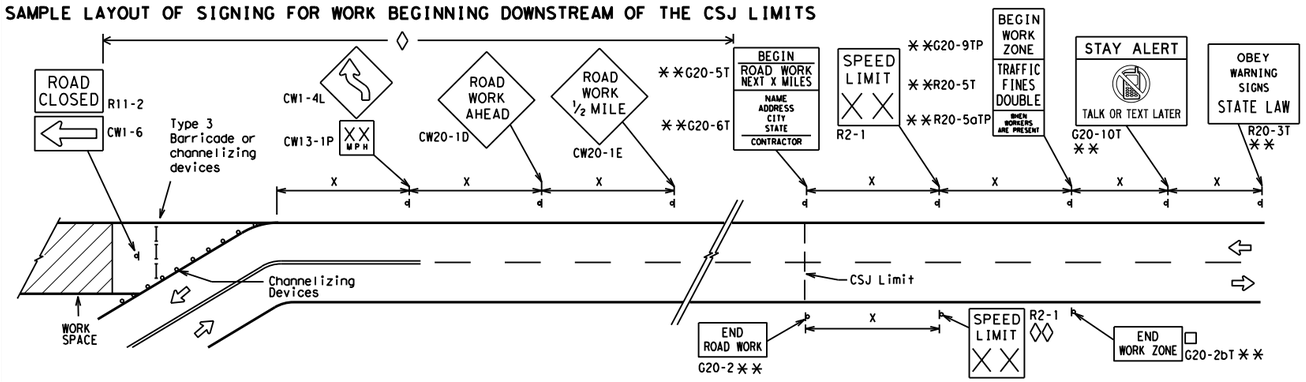
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

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



SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS

NOTES

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

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

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

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

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

LEGEND

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

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	0903	29	027, ETC	CR 232, ETC
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	WFS	ARCHER		13

DATE: 10/24/2022 11:29:13 AM
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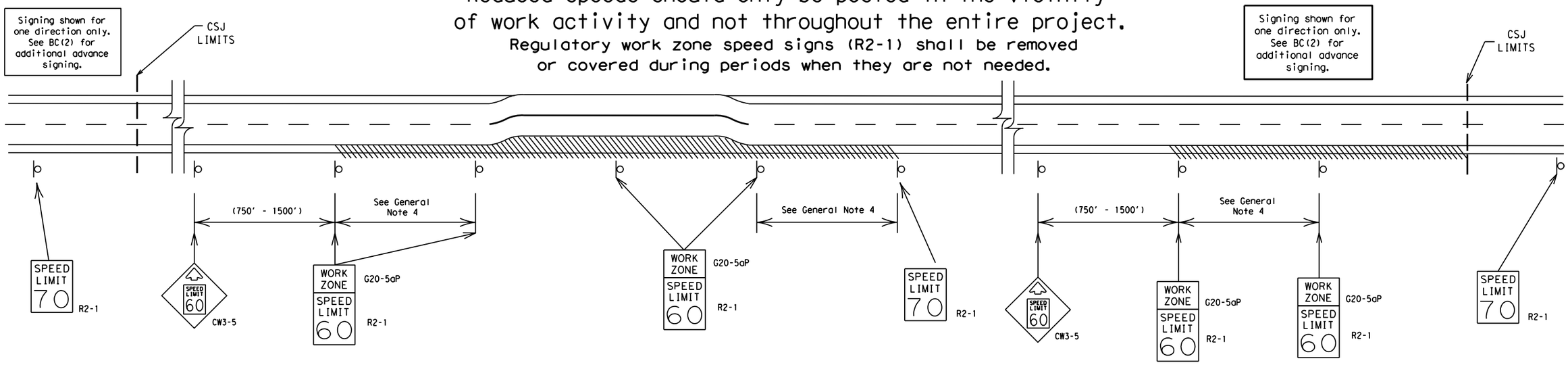
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

1. Regulatory work zone speed limits should be used only for sections of construction projects where speed control is of major importance.
2. Regulatory work zone speed limit signs shall be placed on supports at a 7 foot minimum mounting height.
3. Speed zone signs are illustrated for one direction of travel and are normally posted for each direction of travel.
4. Frequency of work zone speed limit signs should be:
   40 mph and greater 0.2 to 2 miles
   35 mph and less 0.2 to 1 mile
5. Regulatory speed limit signs shall have black legend and border on a white reflective background (See "Reflective Sheeting" on BC(4)).
6. Fabrication, erection and maintenance of the"ADVANCE SPEED LIMIT"(CW3-5)sign, "WORK ZONE"(G20-5aP) 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.

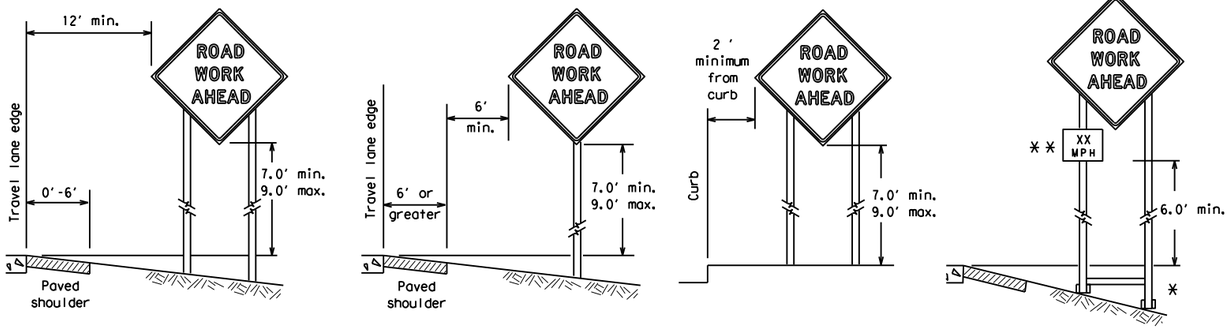
Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0903	29	027, ETC	CR 232, ETC
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	WFS	ARCHER		14

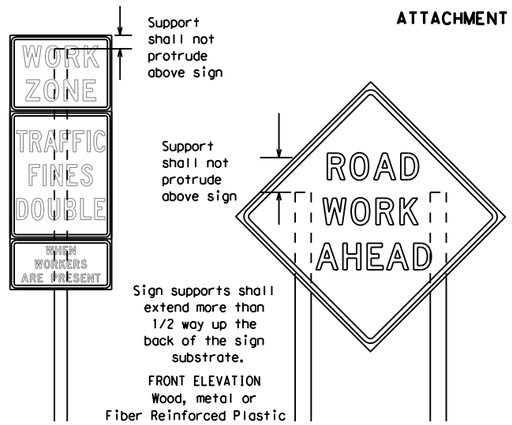
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



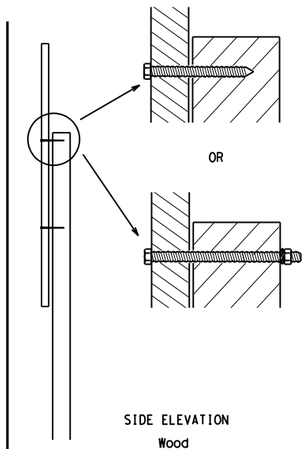
* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS



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

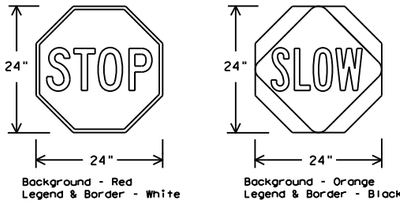


Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

1. The Contractor shall ensure the sign substrate is installed in accordance with the manufacturer's recommendations for the type of sign support that is being used. The CWZTCD lists each substrate that can be used on the different types and models of sign supports.
2. "Mesh" type materials are NOT an approved sign substrate, regardless of the 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

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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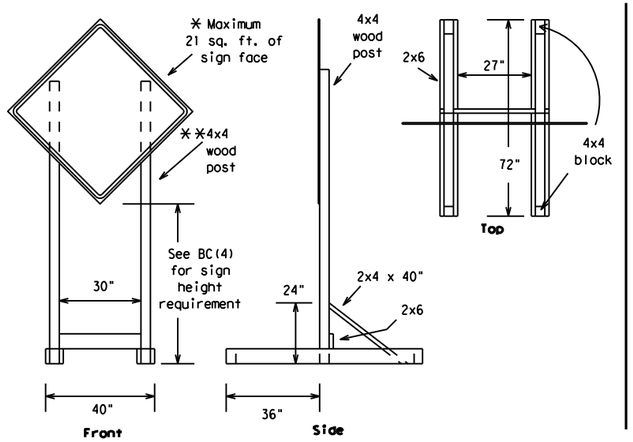
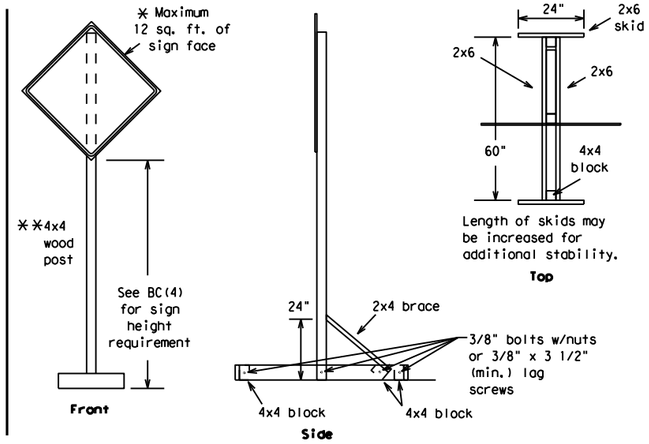
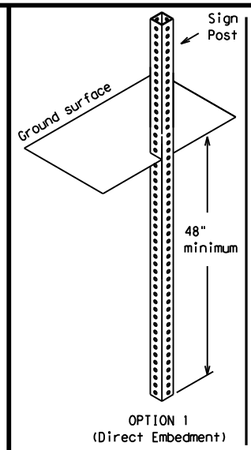
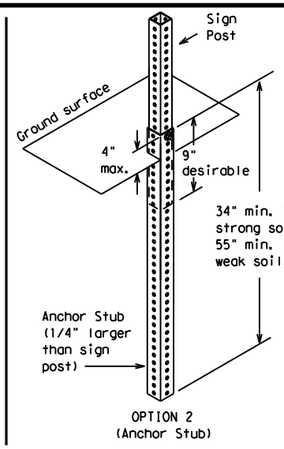


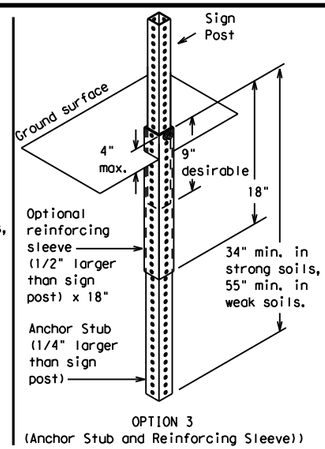


SKID MOUNTED WOOD SIGN SUPPORTS

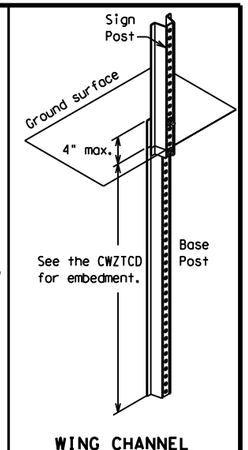
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS







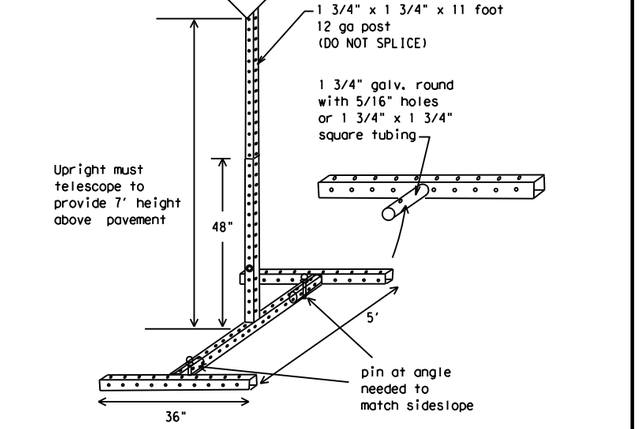
PERFORATED SQUARE METAL TUBING

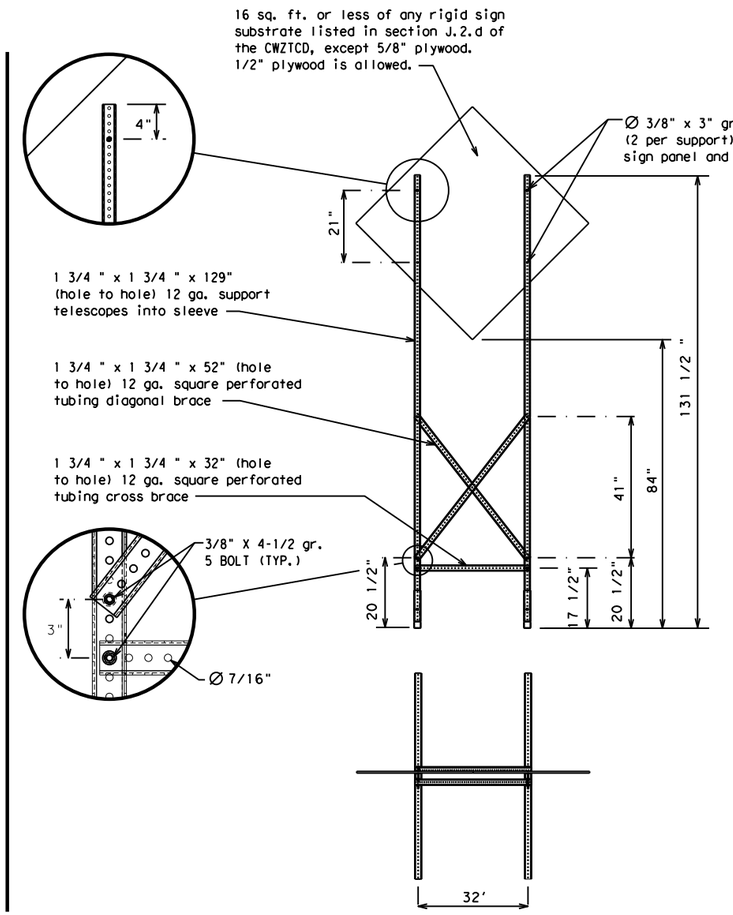


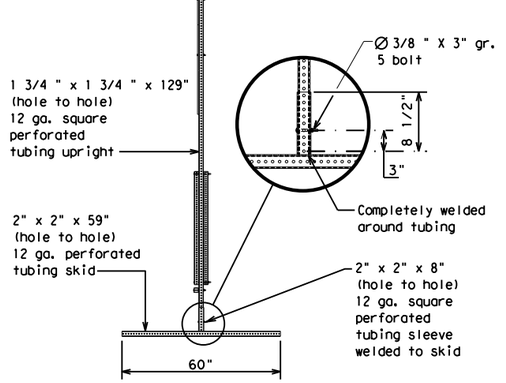
WING CHANNEL
Lap-splice/base bolted anchor

GROUND MOUNTED SIGN SUPPORTS

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







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

** 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

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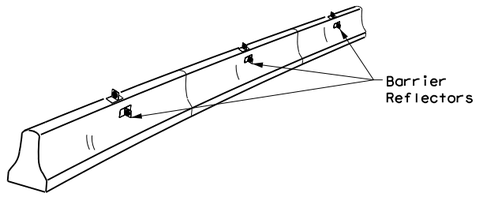
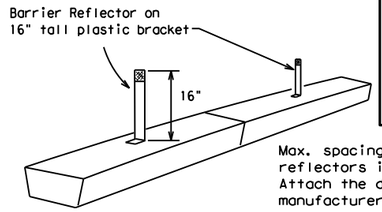
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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

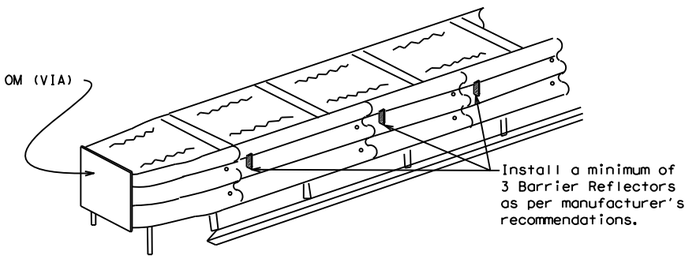


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

LOW PROFILE CONCRETE BARRIER (LPCB)

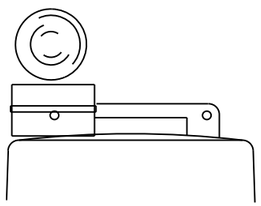


DELINEATION OF END TREATMENTS

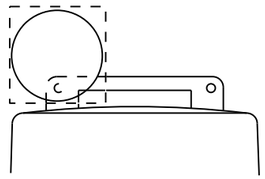
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

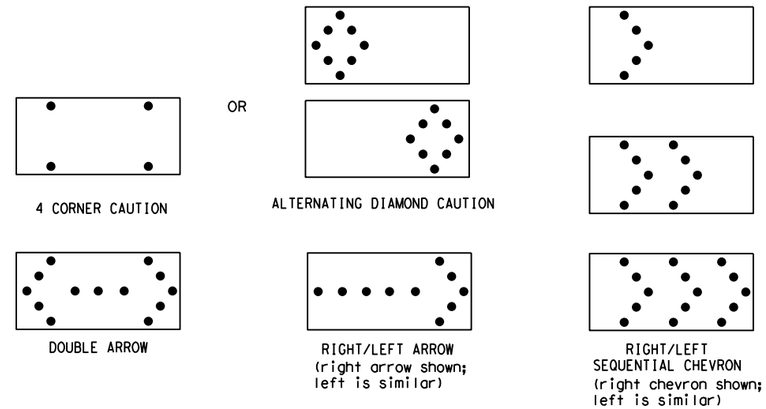
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing 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:



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

SHEET 7 OF 12

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	0903	29	027, ETC	CR 232, ETC
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	WFS	ARCHER		18

101

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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

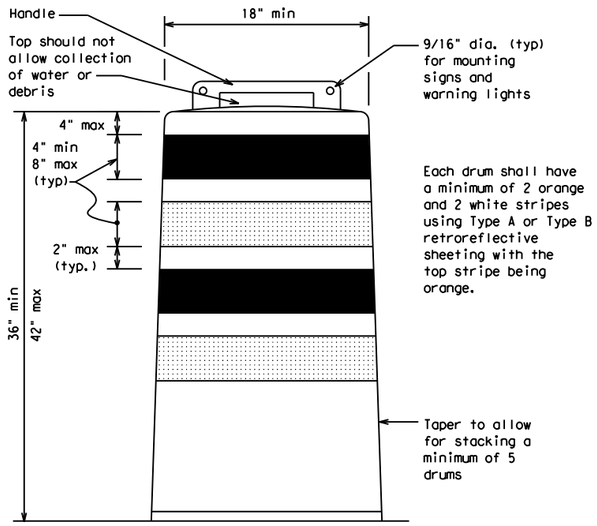
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

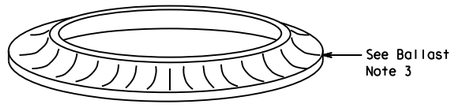
RETROREFLECTIVE SHEETING

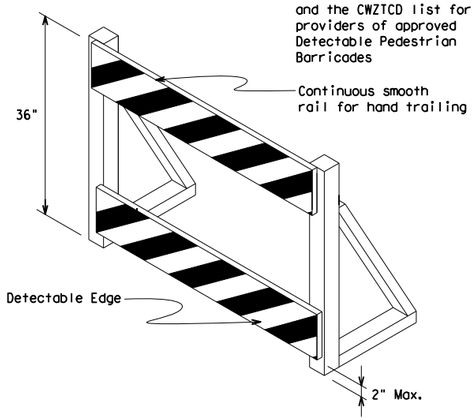
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

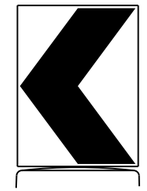




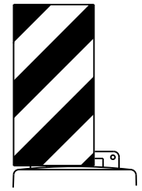


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

1. Signs used on plastic drums shall be manufactured using substrates listed on the CWZTCD.
2. Chevrons and other work zone signs with an orange background shall be manufactured with Type B_{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	0903	29	027, ETC	CR 232, ETC
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9-07 5-21	WFS	ARCHER		19
7-13				

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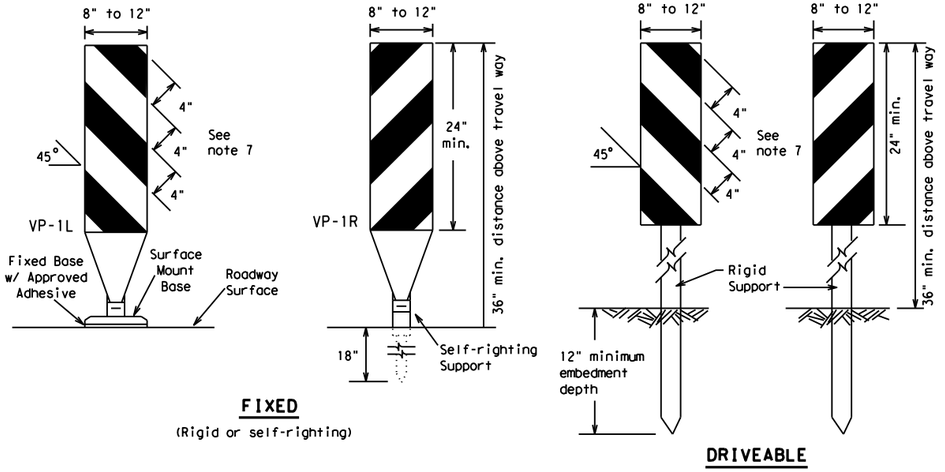
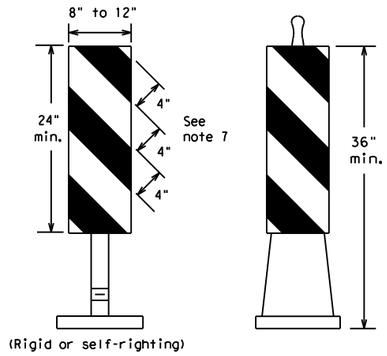


FIXED
(Rigid or self-righting)

DRIVEABLE

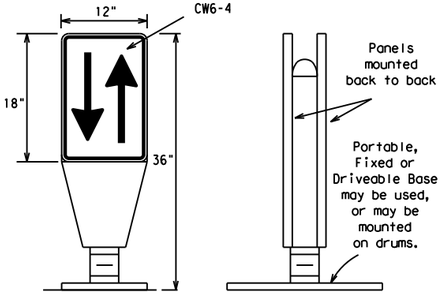


(Rigid or self-righting)

PORTABLE

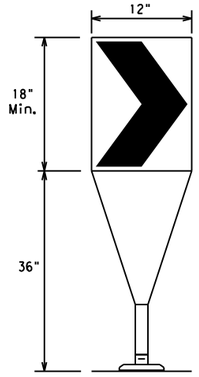
VERTICAL PANELS (VPs)

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.



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)



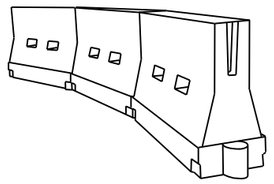
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

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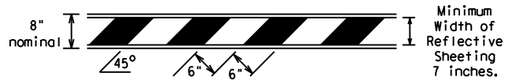
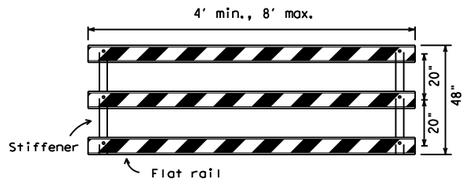
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



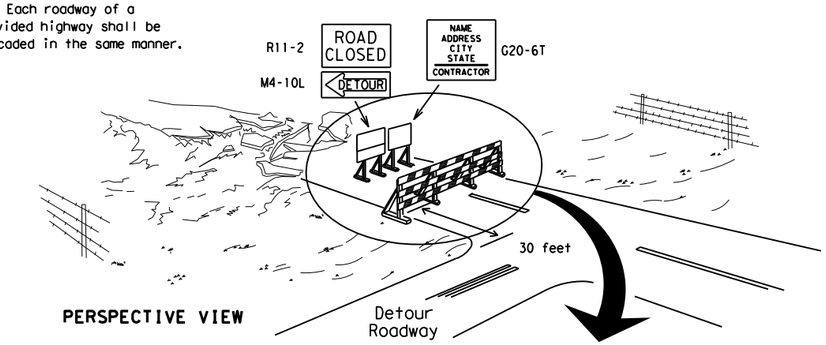
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

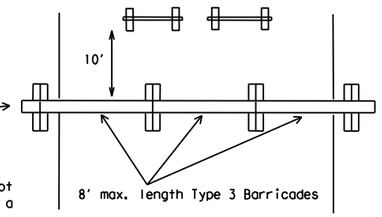
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

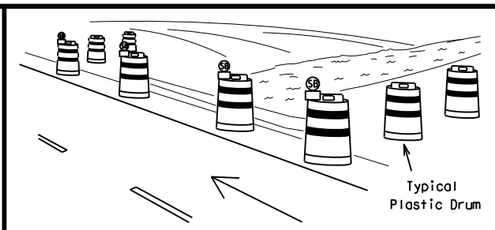
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

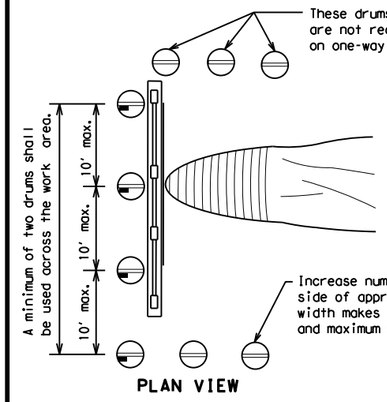
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

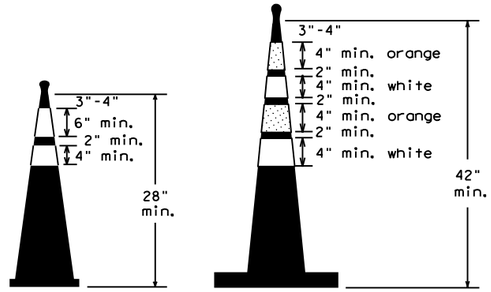
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



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

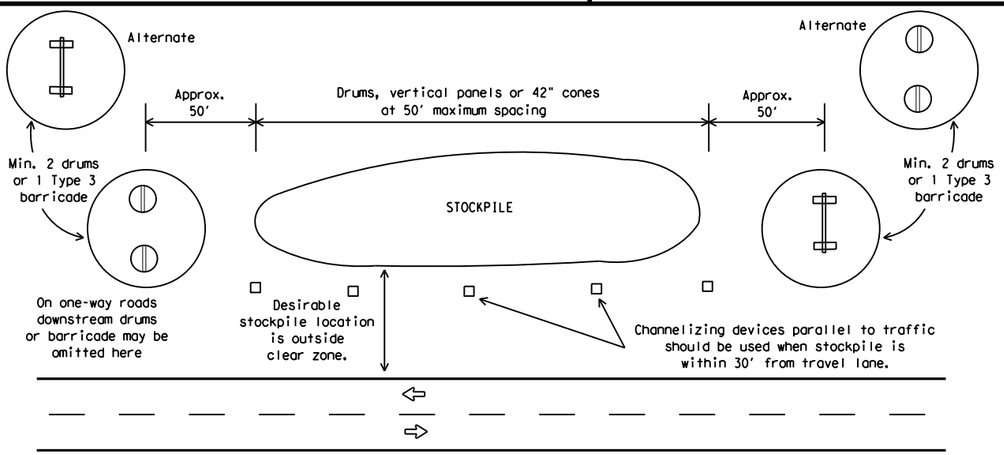
PLAN VIEW

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

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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.

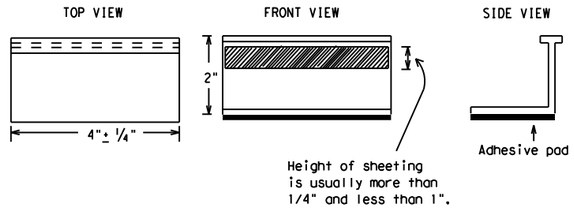
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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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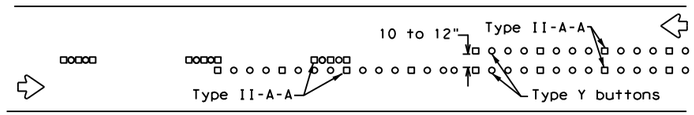
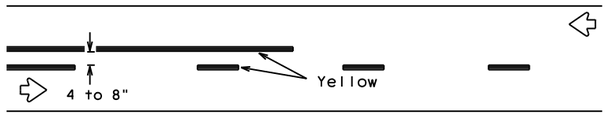
PAVEMENT MARKING PATTERNS

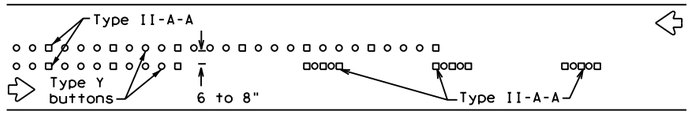
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



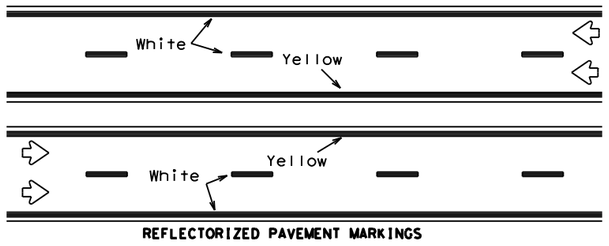
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



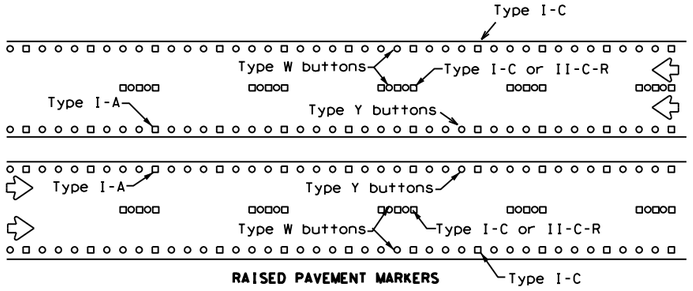
RAISED PAVEMENT MARKERS - PATTERN B

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

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



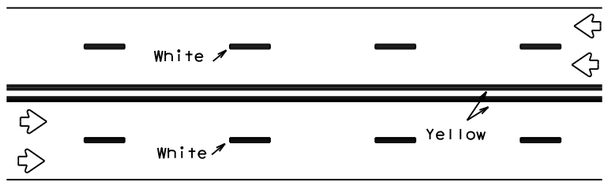
REFLECTORIZED PAVEMENT MARKINGS



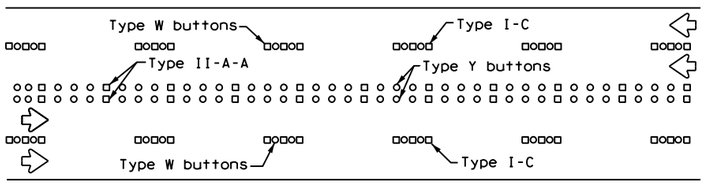
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



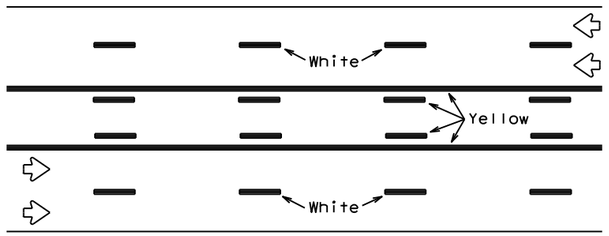
REFLECTORIZED PAVEMENT MARKINGS



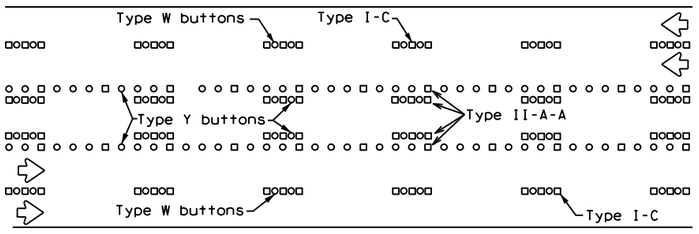
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

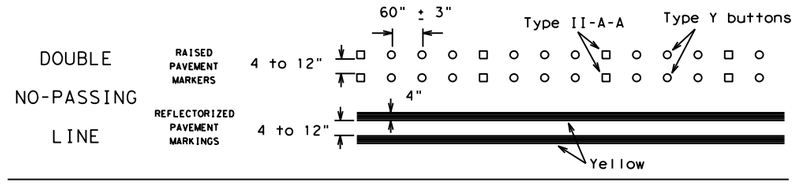
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

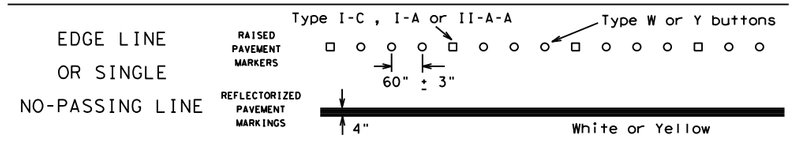
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

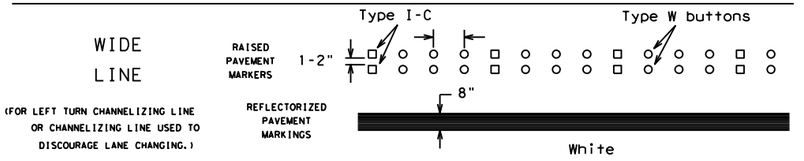


EDGE LINE OR SINGLE NO-PASSING LINE



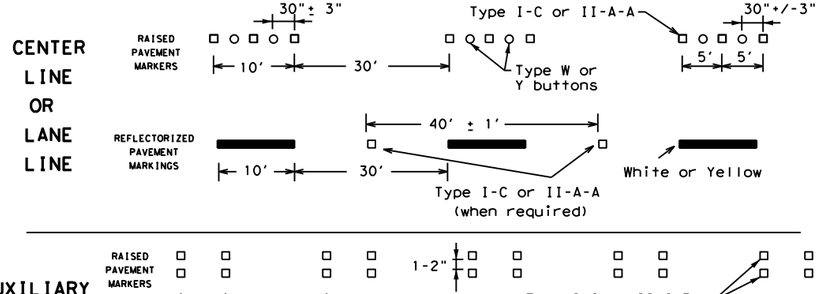
WIDE LINE

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

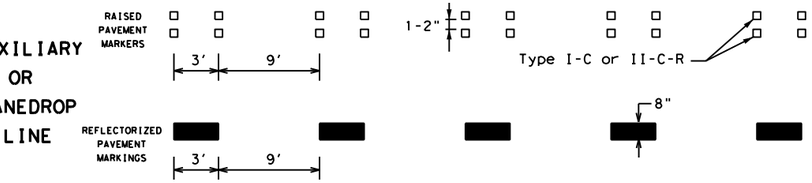


BROKEN LINES

CENTER LINE OR LANE LINE

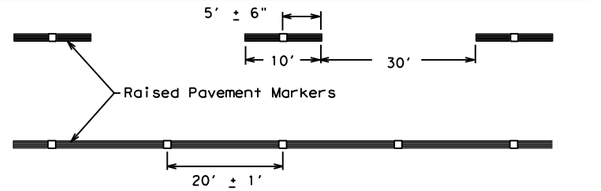


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

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	WFS	ARCHER		23

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<* 1 Describe Chain RDCL99

Chain RDCL99 contains:

RDCL991 CUR RDCL99_3 CUR RDCL99_6 RDCL998

Beginning chain RDCL99 description

Feature: Road_Centerline

==========

Point RDCL991 N 7,316,442.1467 E 1,875,584.0987 Sta 0+00.00

Course from RDCL991 to PC RDCL99_3 S 1° 27′ 54.18" W Dist 148.5279

Curve Data

Curve RDCL99_3

P.I. Station	1+71.46	N	7,316,270.7390	E 1,875,579.7148
Delta =	4° 08′ 43.31" (LT)			
Degree =	9° 02′ 26.90"			
Tangent =	22.9359			
Length =	45.8517			
Radius =	633.7464			
External =	0.4149			
Long Chord =	45.8417			
Mid. Ord. =	0.4146			
P.C. Station	1+48.53	N	7,316,293.6673	E 1,875,580.3012
P.T. Station	1+94.38	N	7,316,247.8282	E 1,875,580.7874
C.C.		N	7,316,277.4642	E 1,876,213.8405
Back = S	1° 27′ 54.18" W			
Ahead = S	2° 40′ 49.13" E			
Chord Bear = S	0° 36′ 27.47" E			

Course from PT RDCL99_3 to PC RDCL99_6 S 2° 40′ 49.13" E Dist 103.8552

Curve Data

Curve RDCL99_6

P.I. Station	3+18.82	N	7,316,123.5282	E 1,875,586.6064
Delta =	7° 09′ 12.37" (RT)			
Degree =	17° 24′ 05.11"			
Tangent =	20.5809			
Length =	41.1084			
Radius =	329.2592			
External =	0.6426			
Long Chord =	41.0817			
Mid. Ord. =	0.6413			
P.C. Station	2+98.23	N	7,316,144.0866	E 1,875,585.6440
P.T. Station	3+39.34	N	7,316,103.0100	E 1,875,585.0013
C.C.		N	7,316,128.6894	E 1,875,256.7450
Back = S	2° 40′ 49.13" E			
Ahead = S	4° 28′ 23.24" W			
Chord Bear = S	0° 53′ 47.06" W			

Course from PT RDCL99_6 to RDCL998 S 4° 28′ 23.24" W Dist 222.9995

Point RDCL998 N 7,315,880.6897 E 1,875,567.6092 Sta 5+62.34

==========

Ending chain RDCL99 description

DATE: 10/24/2022 11:29:40 AM
FILE: G:\WFSDESGN\Plans\0903-29\027\4 - Design\Plan Set\3. Roadway\CR 232 (WILSON RANCH RD) @ HOLLIDAY CREEK ALIGNMENT DATA.dgn

STATE OF TEXAS
ZACHARY P. HUSEN
106073
LICENSED PROFESSIONAL ENGINEER

Zachary P. Husen, P.E.
10/24/2022

CR 232
(WILSON RANCH RD)
@ HOLLIDAY CREEK
ALIGNMENT DATA

2022 Texas Department of Transportation®

CONT	SECT	JOB	HIGHWAY
0903	29	027, ETC	CR 232, ETC
DIST	COUNTY		SHEET NO.
WFS	ARCHER		24

Course from PT RIVER_RD_CL_3 to PC RIVER_RD_CL_6 S 51° 21′ 25.26" E Dist 97.4109

Curve Data

Curve RIVER_RD_CL_6

P.I. Station	3+89.88	N	7,291,325.7361	E	1,917,897.8942
Delta =	47° 37′ 39.35" (RT)				
Degree =	38° 26′ 22.04"				
Tangent =	65.7838				
Length =	123.9029				
Radius =	149.0546				
External =	13.8711				
Long Chord =	120.3663				
Mid. Ord. =	12.6901				
P.C. Station	3+24.10	N	7,291,366.8159	E	1,917,846.5137
P.T. Station	4+48.00	N	7,291,260.0916	E	1,917,902.1731
C.C.		N	7,291,250.3964	E	1,917,753.4342
Back =	S 51° 21′ 25.26" E				
Ahead =	S 3° 43′ 45.91" E				
Chord Bear =	S 27° 32′ 35.58" E				

Course from PT RIVER_RD_CL_6 to PC RIVER_RD_CL_9 S 3° 43′ 45.91" E Dist 129.1411

Curve Data

Curve RIVER_RD_CL_9

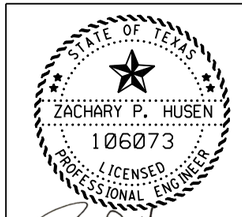
P.I. Station	6+50.69	N	7,291,057.8285	E	1,917,915.3572
Delta =	15° 57′ 27.70" (RT)				
Degree =	10° 55′ 07.21"				
Tangent =	73.5513				
Length =	146.1506				
Radius =	524.7506				
External =	5.1296				
Long Chord =	145.6786				
Mid. Ord. =	5.0799				
P.C. Station	5+77.14	N	7,291,131.2241	E	1,917,910.5731
P.T. Station	7+23.29	N	7,290,985.9459	E	1,917,899.7785
C.C.		N	7,291,097.0918	E	1,917,386.9337
Back =	S 3° 43′ 45.91" E				
Ahead =	S 12° 13′ 41.80" W				
Chord Bear =	S 4° 14′ 57.95" W				

Course from PT RIVER_RD_CL_9 to 2 S 12° 13′ 41.80" W Dist 184.1073

Point 2 N 7,290,806.0157 E 1,917,860.7832 Sta 9+07.40

==========

Ending chain RIVER_RD_CL description



Zachary P. Husen, P.E.
10/24/2022

CR 261
(RIVER RD)
@ DRAW
ALIGNMENT DATA

CONT	SECT	JOB	HIGHWAY
0903	29	027, ETC	CR 232, ETC
DIST	COUNTY		SHEET NO.
WFS	ARCHER		25

DATE: 10/24/2022 11:29:42 AM
FILE: G:\WFSDESGN\Plans\0903-29\027\4 - Design\Plan Set\3. Roadway\CR 261 (RIVER RD) @ DRAW ALIGNMENT DATA.dgn

PI STATION = 1+71.46
DELTA = 4° 08' 43.31" (LT)
DEGREE OF CURVE = 9° 02' 26.90"
TANGENT = 22.94
LENGTH = 45.85
RADIUS = 633.75
PC STATION = 1+48.53
PT STATION = 1+94.38

CSJ 0903-29-027
BEGIN ROAD WORK
STA. 0+60.45
*BEGIN TAPER FROM
EXISTING TO 24'
ROADWAY

INSTALL:
25' MBGF
1 DAT
1.6 CY MOWSTRIP

INSTALL:
42' T631LS

ROW

INSTALL DEL ASSM
FOR MBGF

INSTALL:
25' MBGF
1 SGT
4.3 CY MOWSTRIP

START TAPER
STA. 3+40.45

CSJ 0903-29-027
END ROAD WORK
STA. 3+90.45
END TAPER FROM
24' TO EXISTING ROADWAY

PC 1+48.53
PT 1+94.38

S 1° 27' 54.18" W

S 2° 40' 49.13" E

S 4° 28' 23.24" W

0+00
1+00
2+00
3+00
4+00
5+00

PC 2+98.23
PT 3+39.34

BEGIN BRIDGE
STA. 2+10.45

END TAPER AT
STA. 1+10.45

INSTALL:
25' MBGF
1 SGT
4.3 CY MOWSTRIP

INSTALL:
42' T631LS

INSTALL:
25' MBGF
1 DAT
1.6 CY MOWSTRIP

END BRIDGE
STA. 2+40.45

ROW

PI STATION = 3+18.82
DELTA = 7° 09' 12.37" (RT)
DEGREE OF CURVE = 17° 24' 05.11"
TANGENT = 20.58
LENGTH = 41.11
RADIUS = 329.26
PC STATION = 2+98.23
PT STATION = 3+39.34

*FEATHER APPROACH TAPER TO MATCH
EXISTING GRADE OF DRIVEWAY

LEGEND

- PROP DIRECTION OF TRAVEL
- BI-DIRECTIONAL DELINEATOR
- ×—× EXIST FENCE

STA = 1+76.78
EL = 1,074.50'
SSD = 701'
ex = -0.10'
K = 30
L = 47.81'

STA = 2+81.85
EL = 1,074.50'
SSD = 999'
ex = -0.05'
K = 30
L = 32.94'

CSJ 0903-29-027
BEGIN ROAD WORK
STA. 0+60.45
MATCH EXISTING
ELEVATION

1,072.64

(+)1.5935 %

BEGIN BRIDGE
STA. 2+10.45

(+)0.0000 %

END BRIDGE
STA. 2+40.45

(-)1.0980 %

1,073.31

CSJ 0903-29-027
END ROAD WORK
STA. 3+90.45
MATCH EXISTING
ELEVATION

EXISTING PGL

VPC 1+52.88
EL. = 1,074.12'

VPT 2+00.69
EL. = 1,074.50'

VPC 2+65.38
EL. = 1,074.50'

VPT 2+98.32
EL. = 1,074.32'

	1082	1080	1078	1076	1074	1072	1070	1068	1066
EXISTING	1,072.44	1,072.54	1,072.64	1,072.71	1,072.73	1,072.80	1,072.87	1,073.24	1,073.58
PROPOSED			1,072.64	1,072.96	1,073.28	1,073.60	1,073.91	1,074.22	1,074.43

	1,074.05	1,068.61	1,074.41	1,074.33	1,074.13	1,073.97	1,073.71	1,073.49	1,073.42	1,073.35	1,073.28	1,073.21	1,073.13	1,073.22	1,073.29	1,073.33	1,073.45
EXISTING	1,074.50	1,074.50	1,074.50	1,074.50	1,074.46	1,074.30	1,074.08	1,073.86	1,073.64	1,073.42							
PROPOSED																	

1+00 2+00 3+00 4+00 5+00

STATE OF TEXAS
ZACHARY P. HUSEN
106073
LICENSED PROFESSIONAL ENGINEER
Zach P. Husen, P.E.
10/24/2022

CR 232 (WILSON RANCH RD) @ HOLLIDAY CREEK PLAN & PROFILE

SCALE IN FEET (HORIZONTAL) 0 20 40

SCALE IN FEET (VERTICAL) 0 2 4

2022 Texas Department of Transportation®

CONT	SECT	JOB	HIGHWAY
0903	29	027, ETC	CR 232, ETC
DIST	COUNTY		SHEET NO.
WFS	ARCHER		26

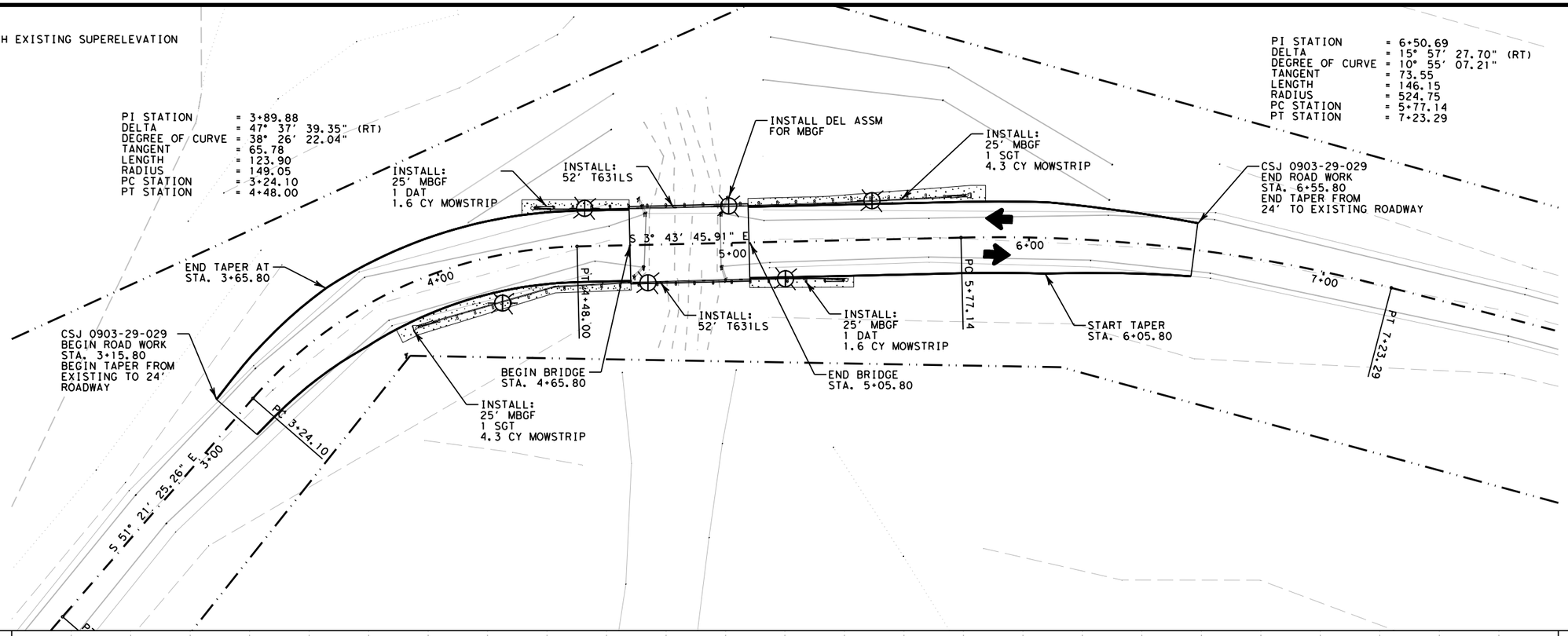
DATE: 10/24/2022 11:29:46 AM
FILE: G:\WFSDESIGN\Plans\0903-29\027\4 - Design\Plan Set\3. Roadway\WILSON RANCH RD PLAN AND PROFILE1.dgn

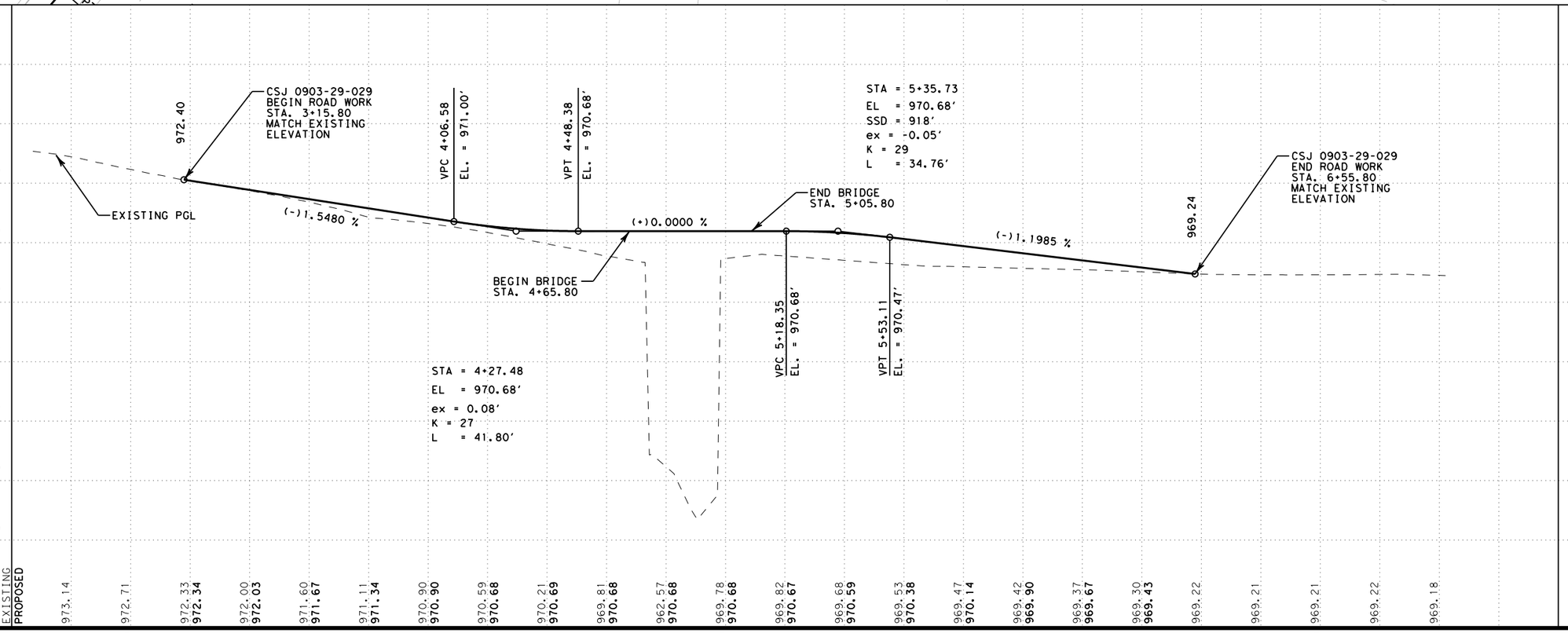
NOTES:

MATCH EXISTING SUPERELEVATION

PI STATION = 3+89.88
DELTA = 47° 37' 39.35" (RT)
DEGREE OF CURVE = 38° 26' 22.04"
TANGENT = 65.78
LENGTH = 123.90
RADIUS = 149.05
PC STATION = 3+24.10
PT STATION = 4+48.00

PI STATION = 6+50.69
DELTA = 15° 57' 27.70" (RT)
DEGREE OF CURVE = 10° 55' 07.21"
TANGENT = 73.55
LENGTH = 146.15
RADIUS = 524.75
PC STATION = 5+77.14
PT STATION = 7+23.29





DATE: 10/24/2022 11:29:52 AM
FILE: G:\WFSDESGN\Plans\0903-29-028\4 - Design\Plan Set\3. Roadway\RIVER RD PLAN & PROFILE.dgn

STATE OF TEXAS
ZACHARY P. HUSEN
106073
LICENSED
PROFESSIONAL ENGINEER
Zach P. Husen, P.E.
10/24/2022

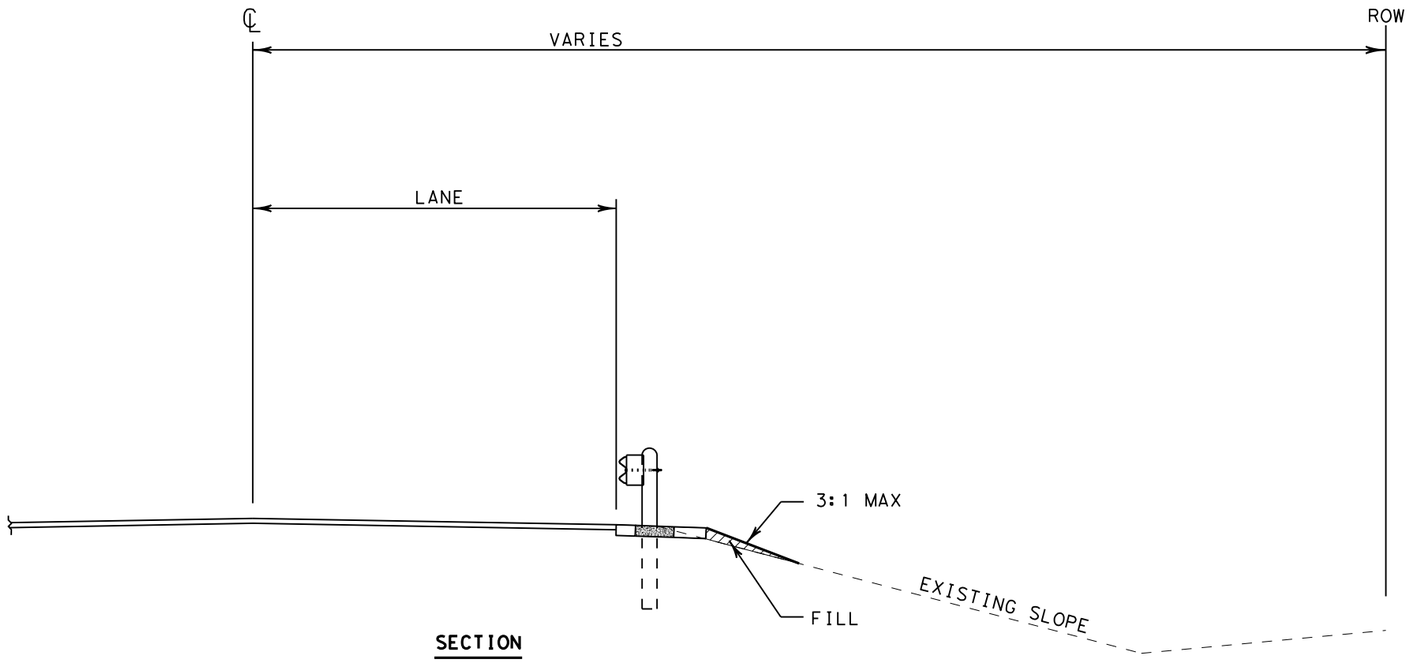
CR 261 (RIVER RD) @ DRAW
PLAN & PROFILE

0 20 40
SCALE IN FEET
(HORIZONTAL)

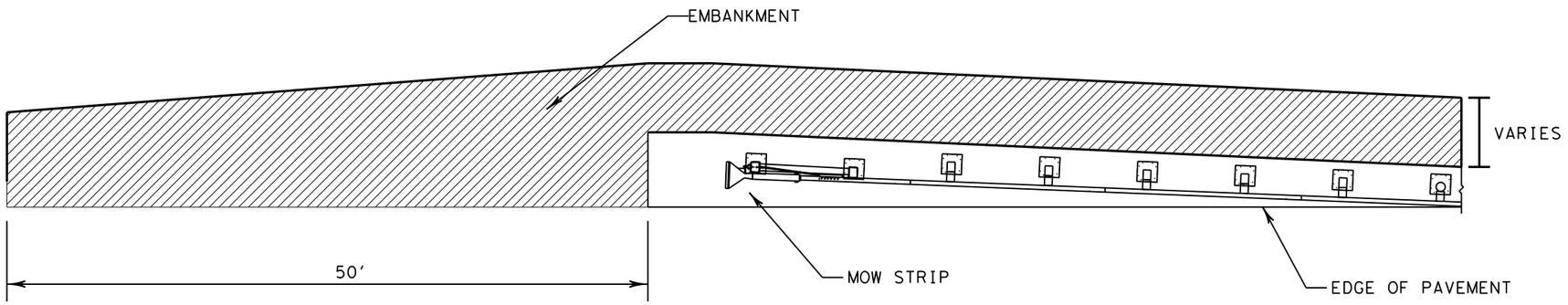
0 2 4
SCALE IN FEET
(VERTICAL)

2022 Texas Department of Transportation®

CONT	SECT	JOB	HIGHWAY
0903	29	027, ETC	CR 232, ETC
DIST	COUNTY		SHEET NO.
WFS	ARCHER		27



SECTION



PLAN

NOTES:

1. THE MATERIAL USED SHALL BE STABLE SOIL CAPABLE OF SUSTAINING VEGETATION.
2. MATERIAL MUST BE APPROVED BY THE ENGINEER BEFORE CONSTRUCTION BEGINS.
3. COMPLETE ALL EMBANKMENT WORK PRIOR TO PLACEMENT OF PROPOSED MBGF AND SGT.
4. AREAS WHERE EMBANKMENT IS ADDED MUST BE SEEDED, FERTILIZED, AND WATERED MEETING THE REQUIREMENTS HEREIN. THIS WORK WILL BE PAID FOR UNDER ITEMS 164 AND 168.

NOT TO SCALE

STATE OF TEXAS
ZACHARY P. HUSEN
106073
LICENSED
PROFESSIONAL ENGINEER

Zach P. Husen, P.E.
10/24/2022

CR 232, ETC
EMBANKMENT DETAIL

Texas Department of Transportation®

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0903	29	027, ETC	CR 232, ETC
DIST	COUNTY		SHEET NO.
WFS	ARCHER		28

DATE: 10/24/2022 11:29:54 AM
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DATE: 10/24/2022
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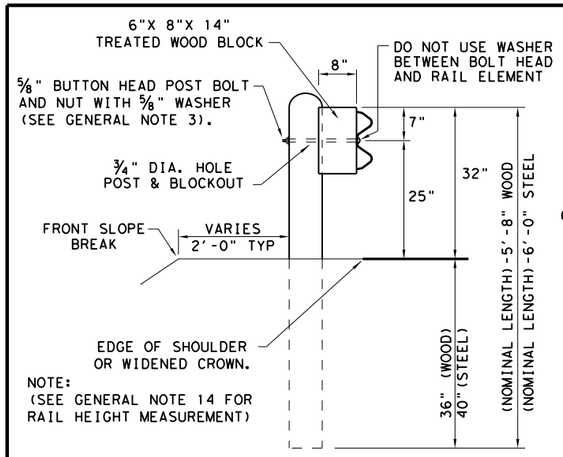
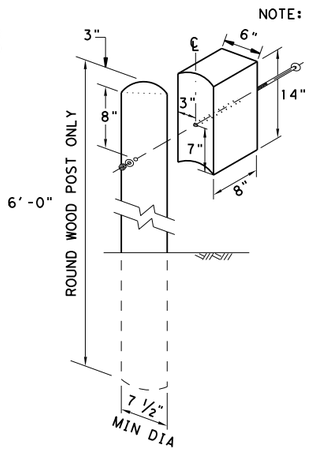
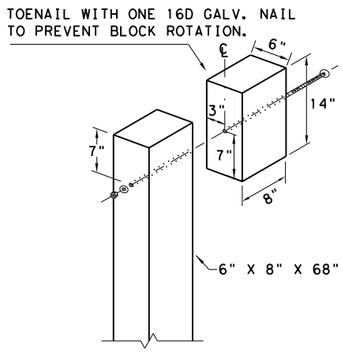


TYPICAL POST PLACEMENT

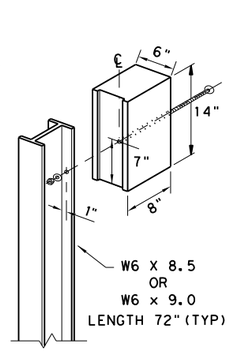


WOOD BLOCK TO ROUND WOOD POST

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

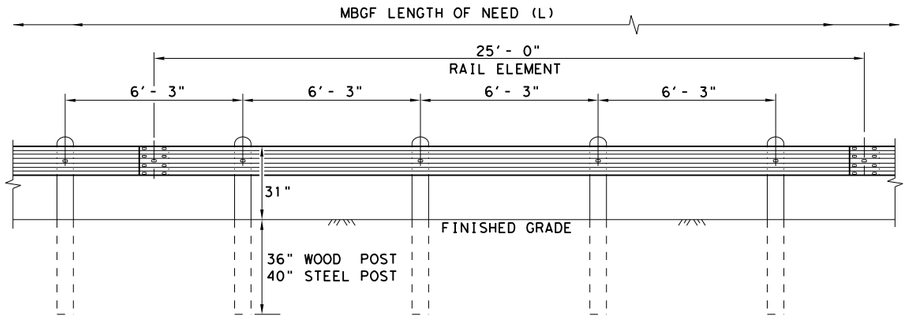


WOOD BLOCK TO RECTANGULAR WOOD POST



ROUTED WOOD BLOCK TO I-BEAM STEEL POST

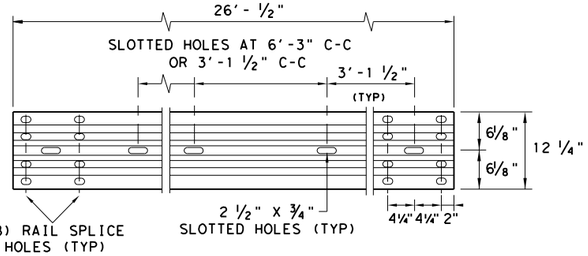
NOTE: ** "WOOD" INDICATES DIMENSIONS FOR BOTH ROUND AND RECTANGULAR WOOD POST SYSTEMS.



DIRECTION OF TRAFFIC

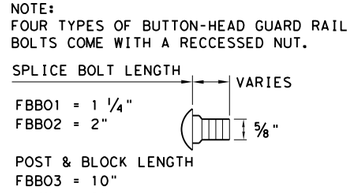
ELEVATION
MID-SPAN RAIL SPLICE

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



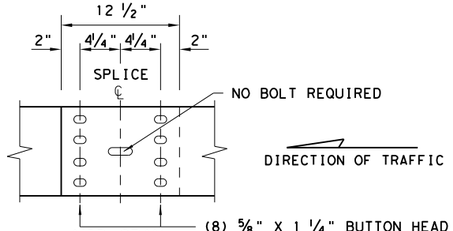
ELEVATION 25'- 0" (NOM.) W-BEAM SECTION

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



BUTTON HEAD BOLT

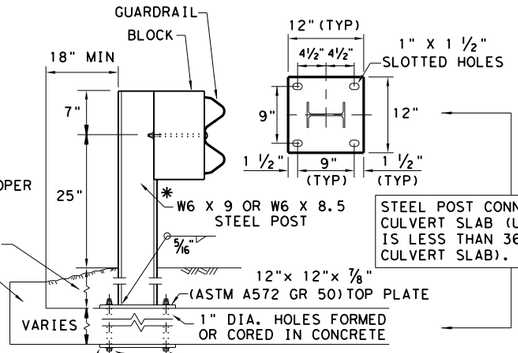
NOTE: SEE GENERAL NOTE 3 FOR SPLICE & POST BOLT DETAILS.



DIRECTION OF TRAFFIC

MID-SPAN RAIL SPLICE DETAIL

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



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

STEEL POST CONNECTION TO CULVERT SLAB (USE WHEN THERE IS LESS THAN 36" COVER OVER CULVERT SLAB).

12" X 12" X ¼" (ASTM A36) STEEL BOTTOM PLATE WITH 1" DIA. HOLES REQUIRED WITH BOLT-THROUGH INSTALLATION.

LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

1. BOLT-THROUGH OPTION: REQUIRES A 6" MIN. SLAB THICKNESS. ⅞" DIA (ASTM A449) HEAVY HEX BOLTS WITH TWO HARDENED WASHER EACH AND HEAVY HEX NUTS.
   NOTE: BOLT LENGTH = SLAB PLUS 2 ¼" MIN.

2. EPOXY ANCHOR OPTION: THIS OPTION MAY ONLY BE USED IF THE CULVERT SLAB IS 9" MIN. THICK. THREADED ANCHOR RODS MUST BE ⅞" DIA. ASTM A449 OR A193 GRADE B7 WITH HEAVY HEX NUT, AND ONE HARDENED WASHER EACH. EMBED ANCHOR RODS 6" WITH HILTI HIT RE 500 EPOXY ADHESIVE. OTHER TYPE III CLASS C EPOXY ADHESIVES MEETING THE REQUIREMENTS OF DMS-6100, "EPOXIES AND ADHESIVES", MAY BE USED IF IT CAN BE DEMONSTRATED THAT THEY MEET OR EXCEED THE STRENGTH OF HILTI HIT RE 500 WITH THE SAME EMBEDMENT DEPTH AND THREADED ROD DIA. FOLLOW THE MANUFACTURER'S REQUIREMENTS FOR INSTALLING EPOXIED THREADED RODS. EXTEND RODS ¼" MIN. BEYOND NUT.

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

NOTE: TRANSISTIONS TO BRIDGE RAILS OR TRAFFIC BARRIERS.
SEE GF(31)TL3 TR STANDARD FOR HIGH-SPEED TL-3 TRANSITIONS.
SEE GF(31)TL2 TR STANDARD FOR LOW-SPEED TL-2 TRANSITIONS.

GENERAL NOTES

1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 25'- 0", OR 12'- 6" (NOM.) LENGTHS. RAIL ELEMENTS MAY HAVE SLOTTED HOLES AT 3'-1 ½" C-C OR 6'-3" C-C. A SPECIAL LENGTH OF RAIL MAY BE MANUFACTURED TO ACCOMMODATE THE DOWNSTREAM ANCHOR TERMINAL (DAT) AND THE TRANSITION SECTIONS OF GUARDRAIL.
3. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND ⅝" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
4. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
5. CROWN SHALL BE WIDENED TO ACCOMMODATE THE METAL BEAM GUARD FENCE.
6. THE LATERAL APPROACH TO THE GUARD FENCE, SHALL HAVE A MAXIMUM SLOPE OF 1V:10H.
7. IF SHOWN ELSEWHERE IN THE PLANS OR AS DIRECTED BY THE ENGINEER, THE GUARD FENCE MAY BE FLARED AT A RATE OF 25:1 OR FLATTER.
8. UNLESS OTHERWISE SHOWN IN THE PLANS, GUARD FENCE PLACED IN THE VICINITY OF CURBS SHALL BE POSITIONED SO THAT THE FACE OF CURB IS LOCATED DIRECTLY BELOW OR BEHIND THE FACE OF THE RAIL. RAIL PLACED OVER CURBS SHALL BE INSTALLED SO THAT THE POST BOLT IS LOCATED APPROXIMATELY 25 INCHES ABOVE THE GUTTER PAN OR EDGE OF SHOULDER.
9. APPLICATIONS IN SOLID ROCK ARE ONLY ALLOWED WITH STEEL POSTS. IF SOLID ROCK IS ENCOUNTERED WITHIN 0 TO 18" OF THE FINISHED GRADE, DRILL A 24" DIA. HOLE, 24" INTO THE ROCK. IF SOLID ROCK IS ENCOUNTERED BELOW 18", DRILL A 12" DIA. HOLE, 12" INTO THE ROCK OR TO THE STANDARD EMBEDMENT DEPTH, WHICHEVER MAYBE LESS. ANY EXCESS POST LENGTH, AFTER MEETING THESE DEPTHS, MAY BE FIELD CUT TO ENSURE PROPER GUARDRAIL MOUNTING HEIGHT. BACKFILL WITH COARSE AGGREGATE MATERIAL.
10. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
11. SPECIAL FABRICATION WILL BE REQUIRED AT INSTALLATION LOCATIONS HAVING A CURVATURE OF LESS THAN 150 FT. RADIUS.
12. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. THE CONSTRUCTION DIVISION, TXDOT MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210 ONLY PRODUCERS ON THE MPL MAY FURNISH COMPOSITE MATERIAL BLOCKS.
13.

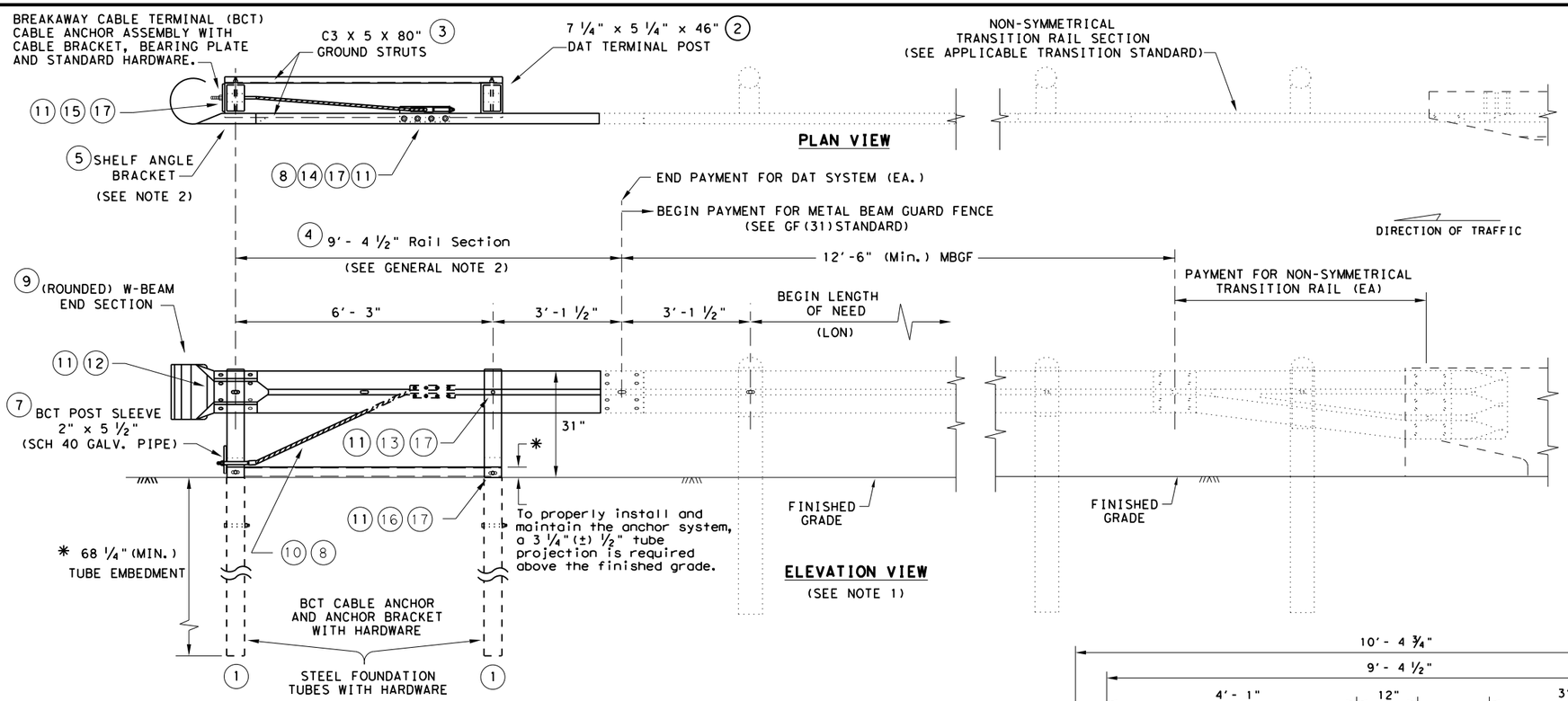
Texas Department of Transportation

Design Division Standard

METAL BEAM GUARD FENCE
TL-3 MASH COMPLIANT
GF(31)-19

FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0903	29	027, ETC	CR 232, ETC
	DIST	COUNTY		SHEET NO.
	WFS	ARCHER		29

DATE: 10/24/2022
FILE: G:\WFSDESGN\Plans\0903-29\028\4 - Design\Plan Set\7. Bridge\GF(31)DAT-19.dgn



DOWNSTREAM ANCHOR TERMINAL (DAT)

NOTE: ONLY FOR DOWNSTREAM USE, WHEN LOCATED OUTSIDE THE HORIZONTAL CLEARANCE AREA OF OPPOSING TRAFFIC.

GENERAL NOTES

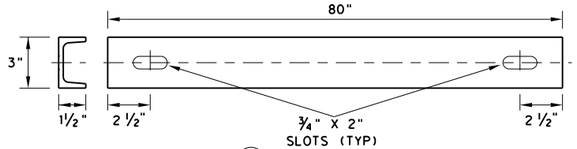
1. THE DETAIL SHOWN IS THE MINIMUM LENGTH OF NEED (LON) FOR A DOWNSTREAM ANCHOR TERMINAL (DAT) CONNECTED TO A CONCRETE RAIL.
2. THE RAIL SECTION AT THE END POST IS SUPPORTED BY THE SHELF ANGLE BRACKET. THE RAIL ELEMENT IS NOT ATTACHED TO THE END POST.
3. THE FOUNDATION TUBES SHALL NOT PROJECT MORE THAN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

MOW STRIP INSTALLATION

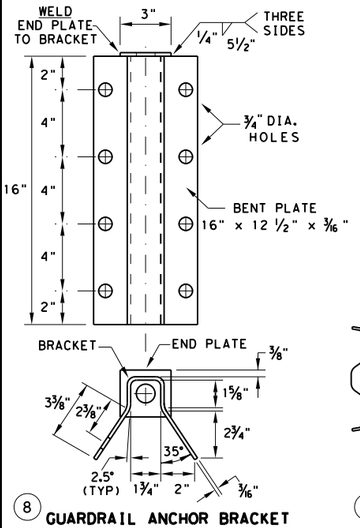
IF A MOW STRIP IS REQUIRED WITH THE DAT INSTALLATION THE LEAVE-OUT AREA AROUND THE STEEL FOUNDATION TUBES AND THE TWO CHANNEL STRUTS MAY BE OMITTED. THIS WILL REQUIRE A FULL POUR AT THE FOUNDATION TUBES.

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

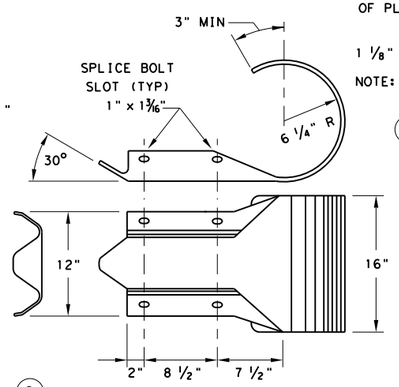
(4) TERMINAL RAIL ELEMENT FOR DAT



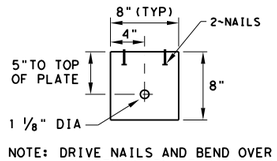
(3) CHANNEL STRUT
C3 X 5 X 80", GRADE A36



(8) GUARDRAIL ANCHOR BRACKET

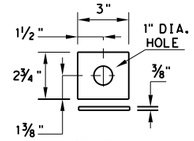


(9) W-BEAM END SECTION (ROUNDED) (12 GA.)

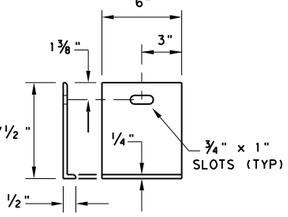


NOTE: DRIVE NAILS AND BEND OVER TO PREVENT PLATE ROTATION

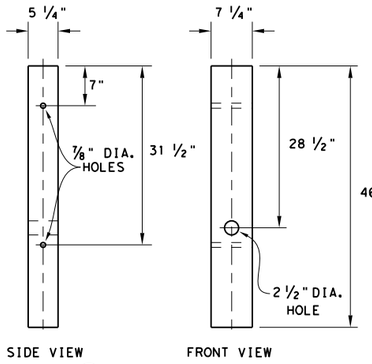
(6) BEARING PLATE
8"x 8"x 5/8" R



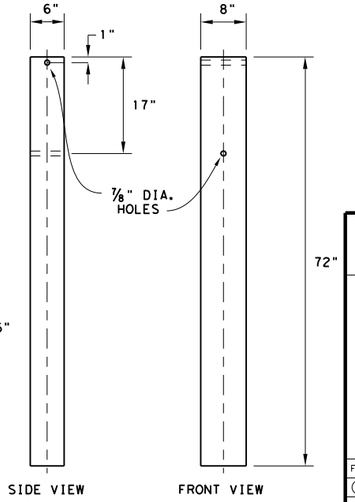
END PLATE



(5) SHELF ANGLE BRACKET



(2) TERMINAL POST
7 1/4"x 5 1/4"x 46" WOOD POST



(1) STEEL FOUNDATION TUBE
6"x 8"x 1/8" x 72" STEEL TUBE

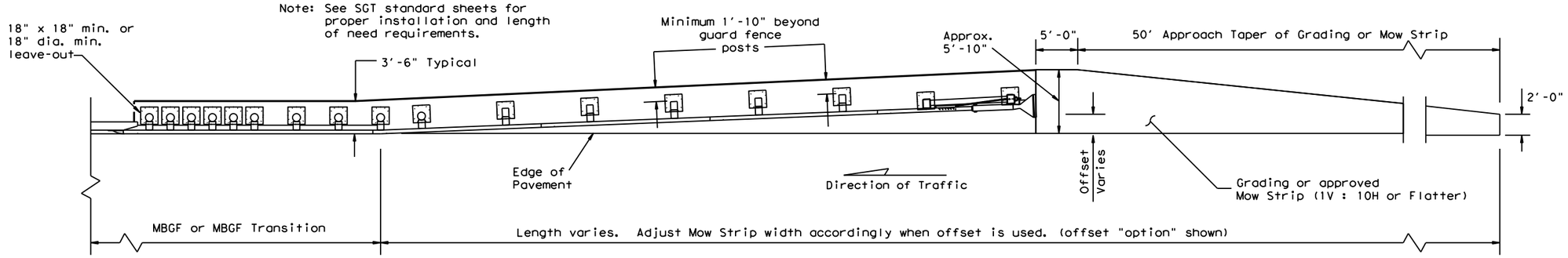
Texas Department of Transportation — Design Division Standard

METAL BEAM GUARD FENCE
(DOWNSTREAM ANCHOR TERMINAL)
TL-3 MASH COMPLIANT

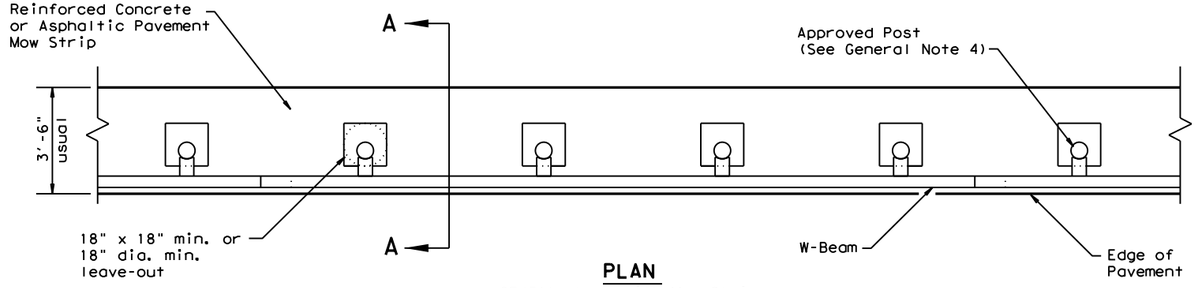
GF(31)DAT-19

FILE: gf31dat19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0903	29	027, ETC	CR 232, ETC
	DIST	COUNTY		SHEET NO.
	WFS	ARCHER		30

DATE: 10/24/2022
FILE: G:\WFSDESGN\Plans\WFS Standards\DGNs\Barrier\MBGF\GF(31)MS-19.dgn

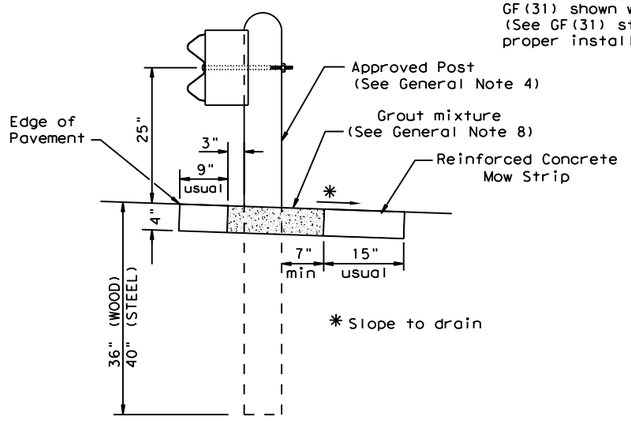


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



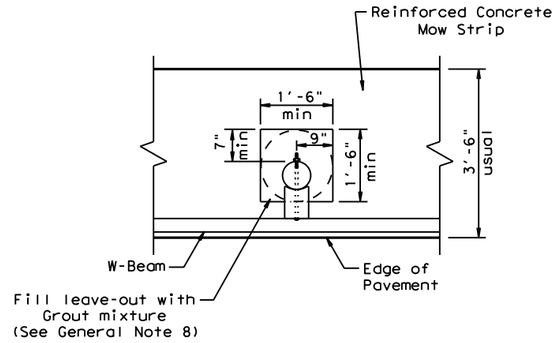
PLAN

GF(31) shown with Mow Strip
(See GF(31) standard sheet for proper installation)



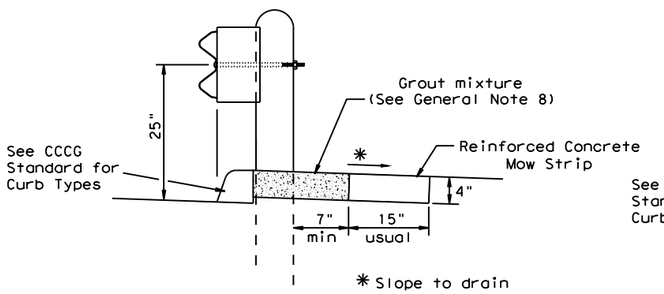
SECTION A-A

Typical



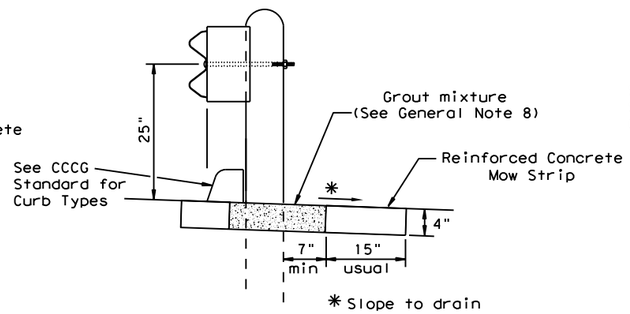
MOW STRIP DETAIL

Reinforced Concrete Mow Strip
with 18" x 18" Square or
18" Dia. minimum leave-out.



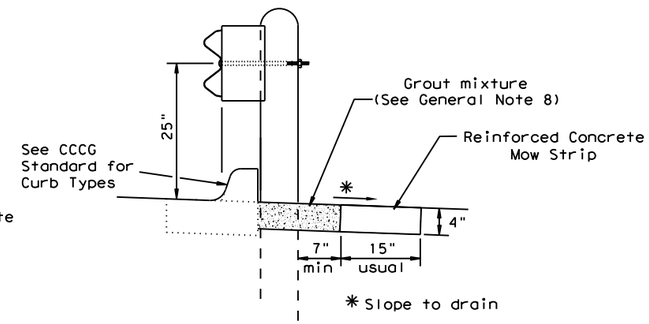
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

Note: Site Condition(s)

Site conditions may exist where grading is required for the proper installation of metal guard fence and end treatments.

Approach grading or mow strip may be decreased or eliminated, as directed by the Engineer.

GENERAL NOTES

1. This mow strip design is for use with metal beam guard fence, guard fence transitions, and guard fence end treatments. See applicable GF(31) MBGF or GF(31) Transition Standard sheet for additional information.
2. Mow strips shall be reinforced concrete with (wire mesh or synthetic fiber), as shown on the plans and will be paid for under the pertinent bid item. Reinforced concrete shall be placed in accordance with Item 432, "Riprap." The use of the synthetic fiber in lieu of steel reinforcing is acceptable, provided the fiber producer is on the Department Material Producer List (MPL), maintained by TxDOT, Construction Division.
3. The leave-out behind the post shall be a minimum of 7".
4. Only steel (W6 x 8.5 or W6 x 9.0), or 7 ½" Dia. round wood posts are acceptable for use in the mow strip. See GF(31) Standard for additional details.
5. Other curb placement options may be used. Curbs are not considered part of the mow strip and will be paid for under other pertinent bid item.
6. Thickness of the mow strip will be 4".
7. The limits of payment for reinforced concrete will include leave-outs for the posts.
8. The leave-outs shall be filled with a Grout mixture consisting of: 2719 pounds sand, 188 pounds Type 1 or II cement, and 550 pounds of water per cubic yard, with a 28-day compressive strength of approximately 230 psi or less. Provide grout with a consistency that will flow into and completely fill all voids. Due to auger size, larger leave-out dimensions are acceptable from both an impact performance and maintenance repair standpoint (Suggested Maximum leave-out of 20"). Payment for furnishing and placing the grout mixture will be subsidiary to the pay item of riprap mow strip.

Texas Department of Transportation

Design Division Standard

METAL BEAM GUARD FENCE (MOW STRIP) TL-3 MASH COMPLIANT

GF(31)MS-19

FILE: gf31ms19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0903	29	027, ETC	CR 232, ETC
	DIST	COUNTY		SHEET NO.
	WFS	ARCHER		31

DATE: 10/24/2022 11:30:00 AM
FILE: G:\WFSDESGN\Plans\WFS Standards\DGNs\Barrier\MBGF\SGT(10S)31-16.dgn

NOTE: STEEL I-BEAM POST W6 X 8.5 (6'-0") PN: 533G
STANDARD WOOD BLOCKOUTS (6"X8"X14") PN: 4076B
AT (POSTS 2 THRU 8)

⅝" X 10" HGR BOLT PN: 3500G
⅝" HGR NUT PN: 3340G

LINE AT THE BACK OF POST #2 THRU #8

FROM THE CENTERLINE OF POST(1) & POST(0)

ANGLE STRUT PN: 15202G

ANCHOR PADDLE PN: 15204A

16"

POST(8) POST(7) POST(6) POST(5) POST(4) POST(3) POST(1) POST(0)

DO NOT BOLT ANCHOR RAIL TO - POST (2)

SEE DETAIL 1

BEGIN LENGTH OF NEED

PLAN VIEW

TRAFFIC FLOW

MASH TEST LEVEL 3 (TL-3) LENGTH OF SoftStop TERMINAL (50'-9 ½")

50'-9 ½" STANDARD INSTALLATION LENGTH (MASH TL-3 SoftStop)

BEGIN STANDARD MBGF

END PAYMENT FOR SGT

6¼" 3'-1 ½" 6'-3" 6'-3"

ANCHOR RAIL WITH SLOTS - (THREADED THRU HEAD)
SEE SoftStop MANUAL FOR COMPLETE DETAILS

MIDDLE SLOT CUTOUT (1) 1 ¾" X 6'-10 ¼"

OUTSIDE SLOTS CUTOUT (2)1½" X 6'-9 ⅝"

MBGF LAPPED IN DIRECTION OF TRAFFIC FLOW

25'-0" DOWNSTREAM W-BEAM GUARDRAIL PN: 61G

SoftStop ANCHOR RAIL (12GA) PN: 15215G

SoftStop FACE SEE GN(3) & NOTE: B

3'-1 ½"(+/-) 6'-3" 6'-3" 6'-3" 6'-3" 6'-3" 6'-3" 5'-8" 4'-7"

ANCHOR PADDLE PN: 15204A

END OF ANCHOR RAIL PN: 15215G

SEE NOTE: A

SEE NOTE: C

POST 32" HEIGHT

31"

RAIL HEIGHT

RAIL 25'-0" PN: 61G

RAIL 25'-0" PN: 15215G

(8) ⅝"x 1- ¼" GR BOLTS PN: 3360G
⅝" HEX NUTS PN: 3340G

(8) ⅝"x 1- ¼" HGR BOLTS PN: 3360G
⅝" HEX NUTS PN: 3340G

POST 40" DEPTH (TYP 1-8)

DO NOT BOLT ANCHOR RAIL TO POST(2)

SEE DETAIL 2

SEE DETAIL 3

13/16" DIA. YIELDING HOLES

13/16" DIA. YIELDING HOLES

POST(8) POST(7) POST(6) POST(5) POST(4) POST(3) POST(2) 6'-0" (SYTP) PN: 15000G POST(1) 4'-9 ½" SYTP PN: 15203G POST(0) 6'-5 ⅜" PN: 15205A

6'-1⅜"

HARDWARE FOR POST(2) THRU POST(8)
(1) ⅝"x 10" HGR BOLT PN: 3500G
(1) ⅝" HGR HEX NUT PN: 3340G

NOTE: DO NOT BOLT ANCHOR RAIL PANEL TO POST(2)

ELEVATION VIEW

B B A A

(1) ⅝" x 1 ¾" HEX HD BOLT PN 3391G

ANGLE STRUT PN: 15202G

(2) ⅝" WASHERS PN 4372G

(1) ⅝" HGR HEX NUT PN 3340G

DETAIL 1
SHOWN AT POST(1) NEAR GROUND

(1) ⅝" HEX NUT

(1) ⅝" x 1- ½" HEX HD BOLT-GR-5 PN: 105286

(2) ⅝" ROUND WASHERS PN: 3240G

DETAIL 2
SHOWN AT POST(1)

ANCHOR KEEPER PLATE (24 GA) PN: 15207G

ANCHOR PLATE WASHER ½" THICK PN: 15206G

1" ROUND WASHER F463 PN: 4902G

(2) ⅝" x 2 ½" HEX HD BOLT GR-5 PN: 105285G

ALTERNATE BLOCKOUT SEE GENERAL NOTE: 6

(2) ⅝" ROUND WASHER (WIDE) PN: 3240G

1" NUT PN: 3908G SHALL BE SECURELY TIGHTENED AFTER FINAL ASSEMBLY, BUT NOT DEFORMING THE KEEPER PLATE.

ANCHOR PADDLE PN: 15204A

(2) ⅝" HEX NUT A563 GR. DH PN: 3245G

W-BEAM FLATTENED (4 PLIES)

ANGLE STRUT PN: 15202G

SEE NOTE: A

(2) ¾" x 2 ½" HEX BOLT (TYP) PN: 3717G

(4) ¾" FLAT WASHER (TYP) PN: 3701G

(2) ¾" HEX NUT (TYP) PN: 3704G

6'-1 ⅜" POST DEPTH

(2) ANCHOR POST ANGLE PN: 15201G

DETAIL 3
AT POST(0)
6'-5 ⅜" (W6 X 15)
I-BEAM POST PN: 15205A

TRAFFIC FLOW

ALTERNATE BLOCKOUT SEE GENERAL NOTE: 6

4" X 7 ½" X 14" BLOCKOUT COMPOSITE PN: 6777B

6" X 8" X 14" BLOCKOUT WOOD PN: 4076B

NOTE: DO NOT BOLT ANCHOR RAIL TO POST(2)

8" 6" 14"

⅝" HGR NUT PN: 3340G

⅝" X 10" HGR POST BOLT PN: 3500G

13/16" DIAMETER YIELDING HOLES LOCATED IN FLANGES

FINISHED GRADE

(HOLES APROXIMATELY CENTERED AT FINISHED GRADE)

ISOMETRIC VIEW POST(1 & 2)

W6 X 8.5 I-BEAM POST SHOWING STANDARD WOOD BLOCKOUT

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

W-BEAM RAIL 25'-0"

6" X 8" X 14" BLOCKOUT WOOD

⅝" X 10" HGR POST BOLT PN: 3500G

⅝" HGR NUT PN: 3340G

POST HEIGHT 32"

31" RAIL HEIGHT

40"

LINE POST (3, 4, 5, 6, 7 & 8)

FINISHED GRADE

SECTION VIEW B-B

6'-0" (W6 X 8.5)
I-BEAM POST PN: 533G

POST(2)

SECTION VIEW A-A

6'-0" (W6 X 8.5)
(SYTP) I-BEAM POST PN: 15000G

NOTE: DO NOT BOLT ANCHOR RAIL PANEL TO POST(2)

POST HEIGHT 17"- ½"

4'- 9 ½"

13/16" DIA. YIELDING HOLES

40"

POST(1)

FRONT VIEW POST(1)

4'-9 ½" (W6 X 8.5)
(SYTP) I-BEAM POST PN: 15203G

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

APPROX 5'-10"

5'-0"

50' APPROACH GRADING

2'-0"

STANDARD MBGF

EDGE OF PAVEMENT

NOTE: ADJUST WIDTH ACCORDINGLY WHEN OFFSET IS USED. (OFFSET "OPTION" SHOWN)

2'-0" MAX. RAIL OFFSET

APPROACH GRADING (1V:10H OR FLATTER) SEE PRODUCT ASSEMBLY MANUAL FOR ADDITIONAL GUIDANCE.

APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: TRINITY HIGHWAY AT 1(888)323-6374. 2525 N. STEMMONS FREEWAY, DALLAS, TX 75207
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE; SoftStop END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL. PN: 620237B
3. APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" ON THE FRONT FACE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
4. FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
5. HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
6. A COMPOSITE MATERIAL BLOCKOUT THAT MEETS THE REQUIREMENTS OF DMS-7210, MAY BE SUBSTITUTED FOR BLOCKOUTS OF SIMILAR DIMENSIONS. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST (MPL) FOR CERTIFIED PRODUCERS.
7. IF SOLID ROCK IS ENCOUNTERED SEE THE MANUFACTURER'S INSTALLATION MANUAL AND REFER TO THE LATEST ROADWAY MBGF STANDARD FOR INSTALLATION GUIDANCE.
8. POSTS SHALL NOT BE SET IN CONCRETE.
9. IT IS ACCEPTABLE TO INSTALL THE SoftStop IMPACT HEAD PARALLEL TO THE GRADE LINE OR WITH AN UPWARD TILT.
10. DO NOT ATTACH THE SoftStop SYSTEM DIRECTLY TO A RIGID BARRIER.
11. UNDER NO CIRCUMSTANCES SHALL THE GUARDRAIL WITHIN THE SoftStop SYSTEM BE CURVED.
12. A FLARE RATE OF UP TO 25:1 MAY BE USED TO PREVENT THE TERMINAL HEAD FROM ENCROACHING ON THE SHOULDER. THE FLARE MAY BE DECREASED OR ELIMINATED FOR SPECIFIC INSTALLATIONS, IF DIRECTED BY THE ENGINEER.

NOTE: A	THE INSTALLATION HEIGHT OF FULLY ASSEMBLED ANCHOR POST WILL VARY FROM 3-¾" MIN. TO 4" MAX. ABOVE FINISHED GRADE.
NOTE: B	PART PN: 5852B RIGHT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING) PART PN: 5851B LEFT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING)
NOTE: C	W-BEAM SPLICE LOCATED BETWEEN LINE POST(4) AND LINE POST(5) GUARDRAIL PANEL 25'-0" PN: 61G ANCHOR RAIL 25'-0" PN: 15215G LAP GUARDRAIL IN DIRECTION OF TRAFFIC FLOW.

PART	QTY	MAIN SYSTEM COMPONENTS
620237B	1	PRODUCT DESCRIPTION ASSEMBLY MANUAL (LATEST REV.)
15208A	1	SoftStop HEAD (SEE MANUAL FOR RIGHT-LEFT APPROACH)
15215G	1	SoftStop ANCHOR RAIL (12GA) WITH CUTOUT SLOTS
61G	1	SoftStop DOWNSTREAM W-BEAM RAIL (12GA) (25'- 0")
15205A	1	POST #0 - ANCHOR POST (6'- 5 ⅞")
15203G	1	POST #1 - (SYTP) (4'- 9 ½")
15000G	1	POST #2 - (SYTP) (6'- 0")
533G	6	POST #3 THRU #8 - I-BEAM (W6 x 8.5) (6'- 0")
4076B	7	BLOCKOUT - WOOD (ROUTED) (6" x 8" x 14")
6777B	7	BLOCKOUT - COMPOSITE (4" x 7 ½" x 14")
15204A	1	ANCHOR PADDLE
15207G	1	ANCHOR KEEPER PLATE (24 GA)
15206G	1	ANCHOR PLATE WASHER (½" THICK)
15201G	2	ANCHOR POST ANGLE (10" LONG)
15202G	1	ANGLE STRUT
		HARDWARE
4902G	1	1" ROUND WASHER F436
3908G	1	1" HEAVY HEX NUT A563 GR. DH
3717G	2	¾" x 2 ½" HEX BOLT A325
3701G	4	¾" ROUND WASHER F436
3704G	2	¾" HEAVY HEX NUT A563 GR. DH
3360G	16	⅝" x 1 ¼" W-BEAM RAIL SPLICE BOLTS HGR
3340G	25	⅝" W-BEAM RAIL SPLICE NUTS HGR
3500G	7	⅝" x 10" HGR POST BOLT A307
3391G	1	⅝" x 1 ¾" HEX HD BOLT A325
4489G	1	⅝" x 9" HEX HD BOLT A325
4372G	4	⅝" WASHER F436
105285G	2	⅝" x 2 ½" HEX HD BOLT GR-5
105286G	1	⅝" x 1 ½" HEX HD BOLT GR-5
3240G	6	⅝" ROUND WASHER (WIDE)
3245G	3	⅝" HEX NUT A563 GR. DH
5852B	1	HIGH INTENSITY REFLECTIVE SHEETING - SEE NOTE: B

Texas Department of Transportation

Design Division Standard

TRINITY HIGHWAY
SOFTSTOP END TERMINAL
MASH - TL-3
SGT(10S)31-16

FILE: sgt10s3116	DN: TxDOT	CK: KM	DW: VP	CK: MB/VP
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0903	29	027, ETC	CR 232, ETC
	DIST	COUNTY		SHEET NO.
	WFS	ARCHER		32

DATE: 10/24/2022
FILE: G:\WFSDESGN\Plans\WFS Standards\DGNs\Barrier\MBGF\SGT(11S)31-18.dgn

(SEE GN NOTE 15)
STANDARD 31" MBGF

ITEM (6)
INNER SIDE SLIDER
(ISS) PANEL FOR RAIL 3

FIELD-SIDE
(RAIL 3)

NOTE:
RECESSED HEX NUTS FACING
TRAFFIC-SIDE **SEE DETAIL (C)**

REFERENCE LINE USED TO INSTALL
LINE POST(9) THRU POST(2)

POST 1 OFFSET DISTANCE MEASURED
7-⅝" FROM REFERENCE LINE

ITEM (10)
CABLE ASSEMBLY

ITEM (2)
GROUNDSTRUT

NO BLOCKOUT
AT (POST 1)

POST 9 | POST 8 | POST 7 | POST 6 | POST 5 | POST 4 | POST 3 | POST 2

RAIL 4 | RAIL 3 | RAIL 2 | RAIL 1

CABLES

NOTES:
1. ITEM (12) COMPOSITE BLOCKOUTS INSTALLED AT LINE POST(9) THRU LINE POST(2).
2. DO NOT INSTALL A BLOCKOUT AT LINE POST(1).

ITEM (5)
TRAFFIC SIDE SLIDER
(TSS) PANEL FOR RAIL 2

NOTE: SECURE THE (TSS) PANEL TO OUTSIDE OF RAIL 2 WITH THE PANEL ARROWS POINTING TOWARDS THE HEAD.

PLAN VIEW

MBGF RAIL 2 | MBGF RAIL 1

INSTALL GUARD FENCE RECESSED HEX NUTS ON TRAFFIC-SIDE

DETAIL (C)

TRAFFIC FLOW

END PAYMENT (SGT) BY EACH

DO NOT BOLT
RAIL TO POST 6

BEGIN LENGTH OF NEED

INSTALLATION LENGTH 55'- ½"

49'-8 ⅝"

6'-3" | 6'-3" | 6'-3" | 6'- ¾" | 6'-3" | 6'-3" | 6'-3" | 37 ½" | 5'-3 ⅛"

ITEM (25)
MAX-TENSION HEAD
SEE DETAIL (A)

RAIL HEIGHT 31"

ARROWS

DETAIL (D)

HEAD HEIGHT

DETAIL (B)

32-¼"

ITEM (13) RAIL 4 | ITEM (13) RAIL 3 | ITEM (13) RAIL 2 | ITEM (13) RAIL 1

CABLES

FINISHED GRADE

ITEM (10)
CABLE ASSEMBLY

ITEM (2)
GROUNDSTRUT

68-⅛"

POST 9 | POST 8 | POST 7 | POST 6 | POST 5 | POST 4 | POST 3 | POST 2 | POST 1

ITEM (4)
I-BEAM
W6 X 9

NO BLOCKOUT
AT (POST 1)

(8) X-LITE LINE POST - ITEM (11)

ELEVATION VIEW

SOIL ANCHOR POST
ITEM (1)

A — A

TSS PANEL
GALVANIZED
ITEM (5)

RSS PLATE
GALVANIZED
ITEM (8)

INSTALL THE TSS AND RSS
WITH THE ARROWS POINTING
TOWARDS THE MAX-HEAD

TSS PANEL AND RSS PLATE

DETAIL (D)

NOTE:
USE THE MASH APPROVED
X-TENSION CABLE ASSEMBLY.

7 ⅝"
2 ⅛"

UPPER CABLE
(BACK SIDE)

LOWER CABLE
(TRAFFIC SIDE)

DETAIL (B)

HEAD HEIGHT
32-¼"

TOP OF POST

31-⅞"

FINISHED GRADE

40-⅛"

68-⅛"
ANCHOR POST
DEPTH

ITEM (1)
ANCHOR

ITEM (11)
LINE POSTS
2 THRU 9
(NOTE: ITEM (4) POST 1 (NOT SHOWN), TO BE INSTALLED AT SAME DEPTH AS LINE POSTS.)

SOIL ANCHOR, POST 1 & LINE POST 2 THRU 9

SECTION VIEW A-A

CABLE
FRICTION PLATE
HEAD UNIT
ITEM (9)

NOTE:
INSTALL ⅝" RECESSED HEX
NUTS ON TRAFFIC SIDE.

ITEM (24)
ITEM (21)

ITEM (20)
8X

ITEM (17)
8X

ITEM (23)
6X
3 SCREWS
EACH SIDE

(RAIL 1)

ITEM (22)
BRACKET
SHIPPED FLAT

ITEM (3)

ITEM (16)
4X

* ITEM (25)
HIGH INTENSITY
REFLECTIVE SHEETING

NOTE: DELINEATION MARKER IN ACCORDANCE WITH TEXAS MUTCD.

SPLICE FOR IMPACT-HEAD
TO GUARD FENCE (RAIL1)

DETAIL (A)

* TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.

** ALTERNATIVE ITEMS NOT SHOWN.
ITEM(26) 8" WOOD-BLOCKOUTS
ITEM(27) 25'GUARD FENCE PANELS

APPROX 5'-10" | 5'-0" | 50' APPROACH GRADING

STANDARD
MBGF

EDGE OF PAVEMENT

2'-0"

NOTE: ADJUST WIDTH ACCORDINGLY WHEN OFFSET IS USED. (OFFSET "OPTION" SHOWN)

2'-0" MAX.
RAIL OFFSET

APPROACH GRADING
(1V:10H OR FLATTER)
SEE PRODUCT ASSEMBLY MANUAL
FOR ADDITIONAL GUIDANCE.

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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

TRAFFIC FLOW

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

GENERAL NOTES

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

ITEM #	PART NUMBER	DESCRIPTION	QTY
1	BSI-1610060-00	SOIL ANCHOR - GALVANIZED	1
2	BSI-1610061-00	GROUND STRUT - GALVANIZED	1
3	BSI-1610062-00	MAX-TENSION IMPACT HEAD	1
4	BSI-1610063-00	W6x9 I-BEAM POST 6FT.-GALVANIZED	1
5	BSI-1610064-00	TSS PANEL - TRAFFIC SIDE SLIDER	1
6	BSI-1610065-00	ISS PANEL - INNER SIDE SLIDER	1
7	BSI-1610066-00	TOOTH - GEOMET	1
8	BSI-1610067-00	RSS PLATE - REAR SIDE SLIDER	1
9	B061058	CABLE FRICTION PLATE - HEAD UNIT	1
10	BSI-1610069-00	CABLE ASSEMBLY - MASH X-TENSION	2
11	BSI-1012078-00	X-LITE LINE POST-GALVANIZED	8
12	B090534	8" W-BEAM COMPOSITE-BLOCKOUT XT110	8
13	BSI-4004386	12'-6" W-BEAM GUARD FENCE PANELS 12GA.	4
14	BSI-1102027-00	X-LITE SQUARE WASHER	1
15	BSI-2001886	⅝" X 7" THREAD BOLT HH (GR.5)GEOMET	1
16	BSI-2001885	¾" X 3" ALL-THREAD BOLT HH (GR.5)GEOMET	4
17	4001115	⅝" X 1 ¼" GUARD FENCE BOLTS (GR.2)MGAL	48
18	2001840	⅝" X 10" GUARD FENCE BOLTS MGAL	8
19	2001636	⅝" WASHER F436 STRUCTURAL MGAL	2
20	4001116	⅝" RECESSED GUARD FENCE NUT (GR.2)MGAL	59
21	BSI-2001888	⅝" X 2" ALL THREAD BOLT (GR.5)GEOMET	1
22	BSI-1701063-00	DELINEATION MOUNTING (BRACKET)	1
23	BSI-2001887	¼" X ¾" SCREW SD HH 410SS	7
24	4002051	GUARDRAIL WASHER RECT AASHTO FWR03	1
* 25	SEE NOTE BELOW	HIGH INTENSITY REFLECTIVE SHEETING	1
** 26	4002337	8" W-BEAM TIMBER-BLOCKOUT, PDB01B	8
** 27	BSI-4004431	25' W-BEAM GUARDRAIL PANEL,8-SPACE,12GA.	2
28	MANMAX Rev-(D)	MAX-TENSION INSTALLATION INSTRUCTIONS	1

Texas Department of Transportation

Design Division Standard

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

FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	0903	29	027, ETC	CR 232, ETC
	DIST	COUNTY		SHEET NO.
	WFS	ARCHER		33

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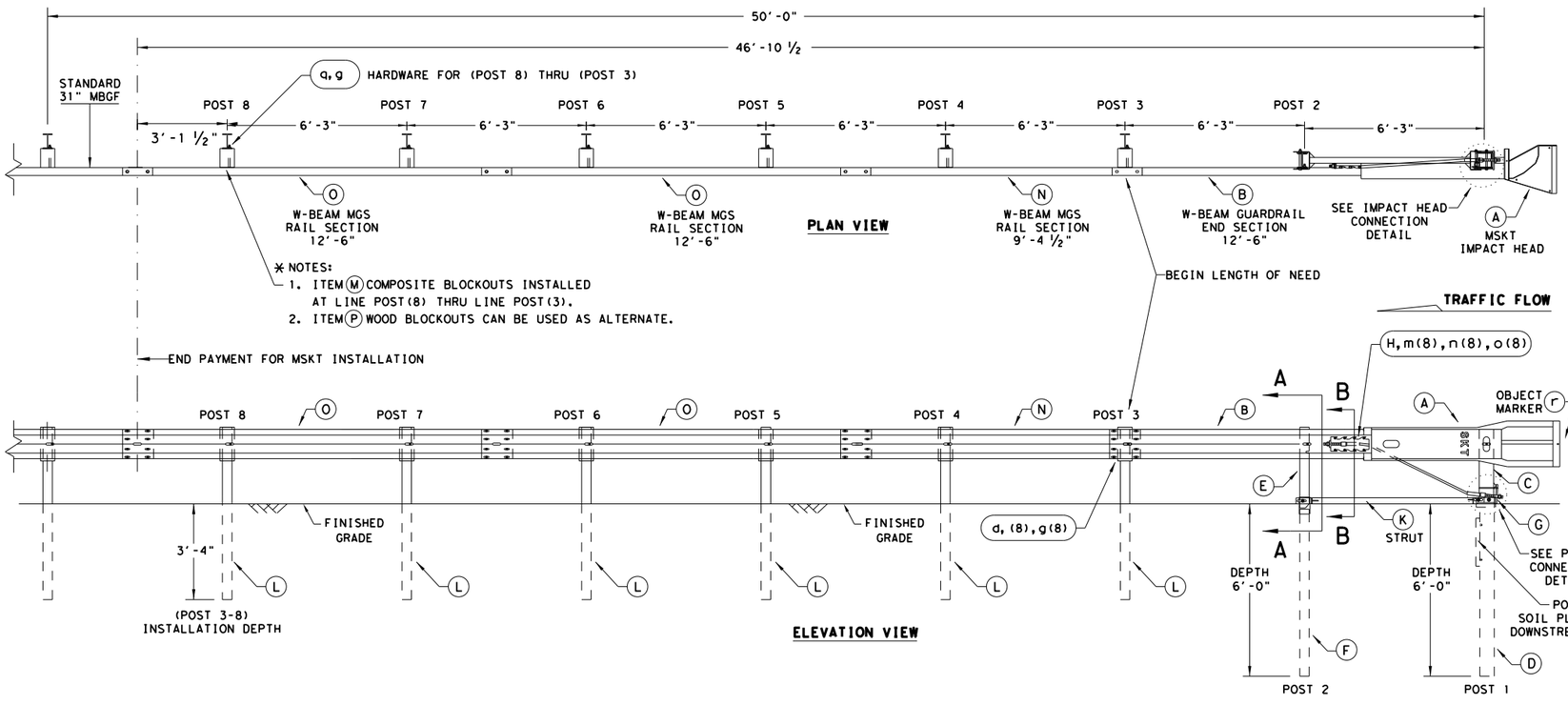
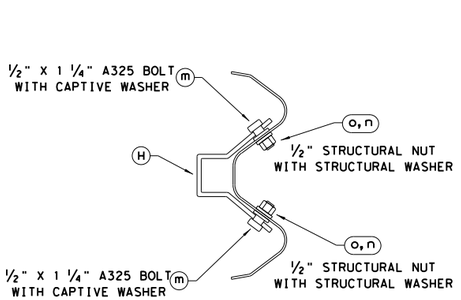
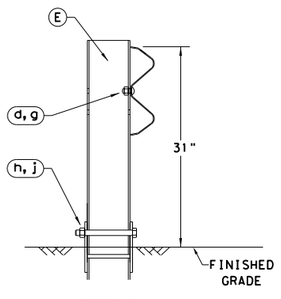


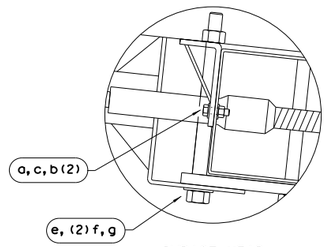
NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.



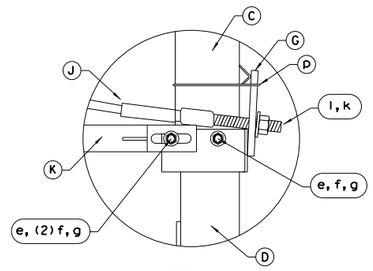
SECTION B-B
ANCHOR BRACKET



POST 2
SECTION A-A



IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL

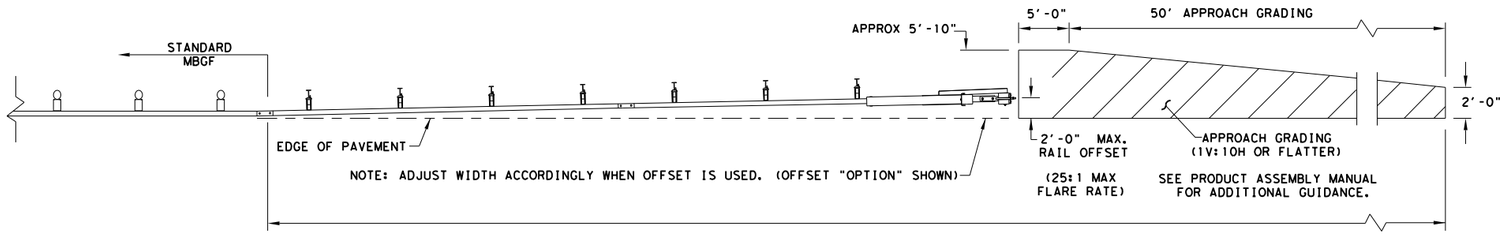
GENERAL NOTES

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

SEE NOTES: *

ALTERNATIVE ITEMS NOT SHOWN. **
* ITEM(P) 8" WOOD-BLOCKOUT
** ITEM(Q) 25'GUARD FENCE PANEL

ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM NUMBERS
A	1	MSKT IMPACT HEAD	MS3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	SF1303
C	1	POST 1 - TOP (6" X 6" X ⅛" TUBE)	MTPHP1A
D	1	POST 1 - BOTTOM (6' W6X15)	MTPHP1B
E	1	POST 2 - ASSEMBLY TOP	UHP2A
F	1	POST 2 - ASSEMBLY BOTTOM (6' W6X9)	HP2B
G	1	BEARING PLATE	E750
H	1	CABLE ANCHOR BOX	S760
J	1	BCT CABLE ANCHOR ASSEMBLY	E770
K	1	GROUND STRUT	MS785
L	6	W6x9 OR W6x8.5 STEEL POST	P621
M	6	COMPOSITE BLOCKOUTS	CBSP-14
N	1	W-BEAM MGS RAIL SECTION (9'-4 ½")	G12025
O	2	W-BEAM MGS RAIL SECTION (12'-6")	G1203A
P	6	WOOD BLOCKOUT 6" X 8" X 14"	P675
Q	1	W-BEAM MGS RAIL SECTION (25'-0")	G1209
		SMALL HARDWARE	
a	2	⅝" x 1" HEX BOLT (GRD 5)	B5160104A
b	4	⅝" WASHER	W0516
c	2	⅝" HEX NUT	N0516
d	25	⅝" Dia. x 1 ¼" SPLICE BOLT (POST 2)	B580122
e	2	⅝" Dia. x 9" HEX BOLT (GRD A449)	B580904A
f	3	⅝" WASHER	W050
g	33	⅝" Dia. H.G.R NUT	N050
h	1	¾" Dia. x 8 ½" HEX BOLT (GRD A449)	B340854A
j	1	¾" Dia. HEX NUT	N030
k	2	1 ANCHOR CABLE HEX NUT	N100
l	2	1 ANCHOR CABLE WASHER	W100
m	8	½" x 1 ¼" A325 BOLT WITH CAPTIVE WASHER	SB12A
n	8	½" STRUCTURAL NUTS	N012A
o	8	1 1/16" O.D. x ⅜" I.D. STRUCTURAL WASHERS	W012A
p	1	BEARING PLATE RETAINER TIE	CT-100ST
q	6	⅝" x 10" H.G.R. BOLT	B581002
r	1	OBJECT MARKER 18" X 18"	E3151



TRAFFIC FLOW

APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

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

Texas Department of Transportation

Design Division Standard

SINGLE GUARDRAIL TERMINAL
MSKT-MASH-TL-3
SGT(12S)31-18

FILE: sgt12s3118.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CL		
© TxDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY		
REVISIONS	0903	29	027, ETC	CR 232, ETC		
	DIST	COUNTY		SHEET NO.		
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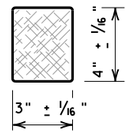
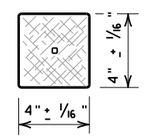
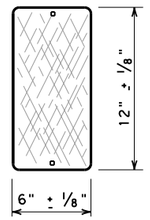
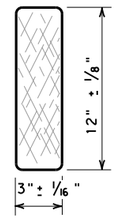
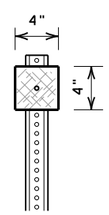
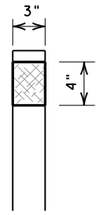
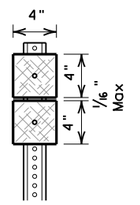
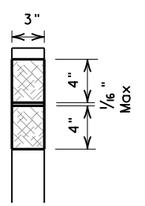
REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

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

DELINEATORS

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

OBJECT MARKERS

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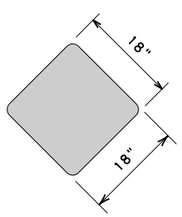
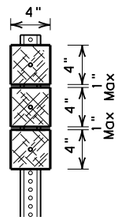
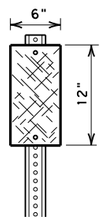
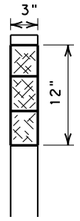
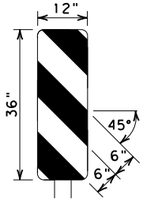
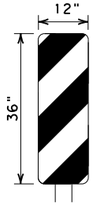
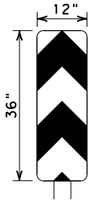
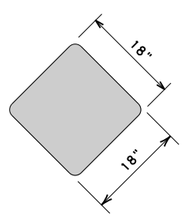
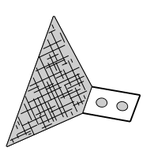
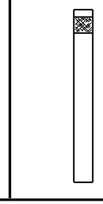
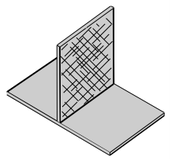
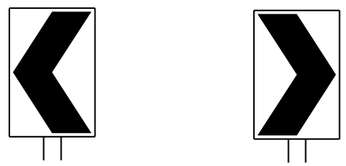
DEVICE								
		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B_{FL} or C_{FL} Sheeting			Red -Type B_{FL}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

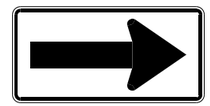
BARRIER REFLECTORS (BRF)

	GF1	GF2	CTB
DEVICE			
	1. Barrier reflectors shall meet the requirements of DMS 8600. 2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.		
SHEETING	Yellow, White, Red		
NOTE	1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.		

CHEVRONS

DEVICE	 W1-8			
SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	
NOTE	1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies). 2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).			

ONE DIRECTION LARGE ARROW

DEVICE	 W1-6	
SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	

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

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

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

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

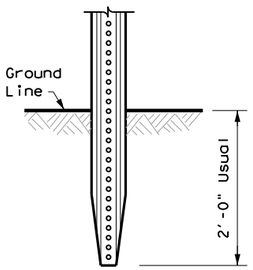
FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0903	29	027, ETC	CR 232, ETC
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	WFS	ARCHER		35

20A

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

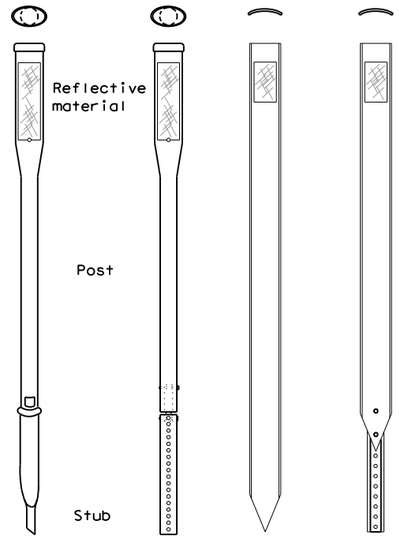


NOTES

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

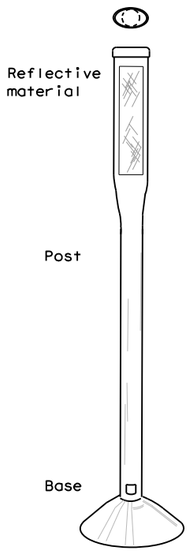
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



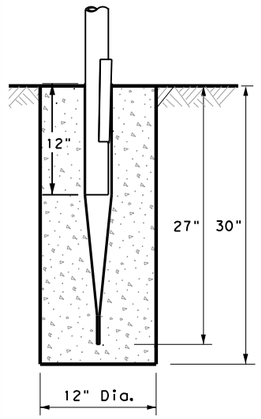
SURFACE MOUNT

NOTES

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

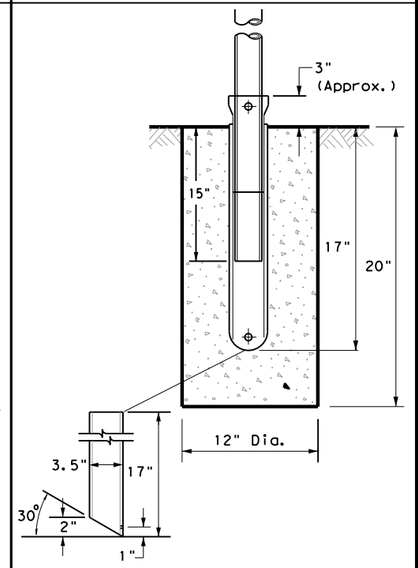
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

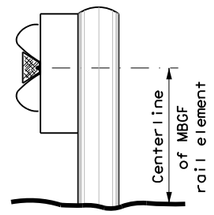
NOTE

1. Install per manufacturer's recommendations.

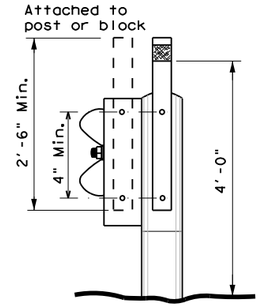
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

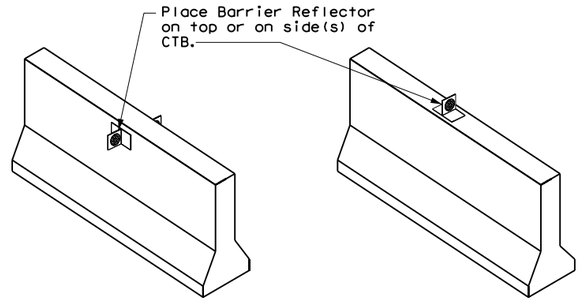
GF1



GF2



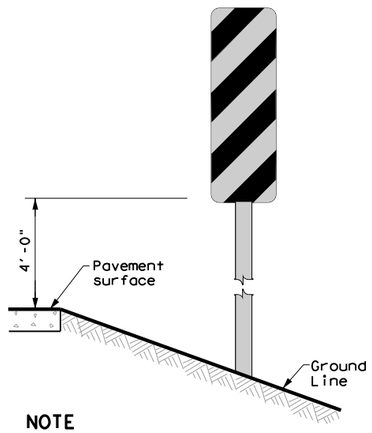
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

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

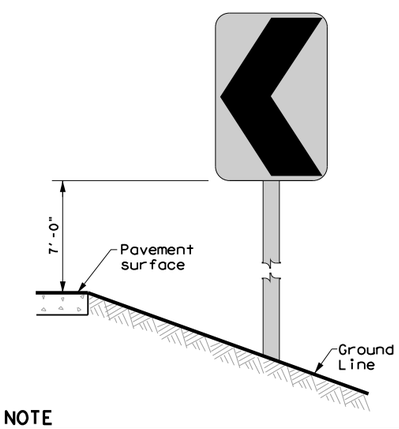
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

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

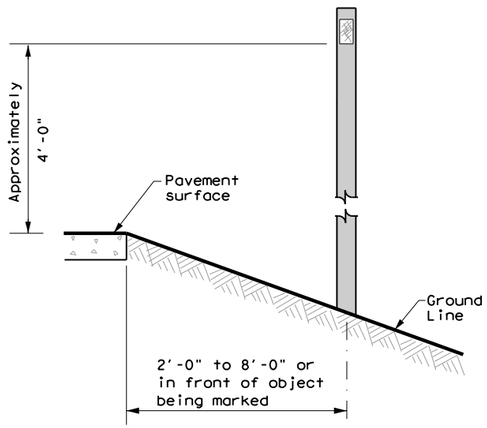
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

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

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation — Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0903	29	027, ETC	CR 232, ETC
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	WFS	ARCHER		36

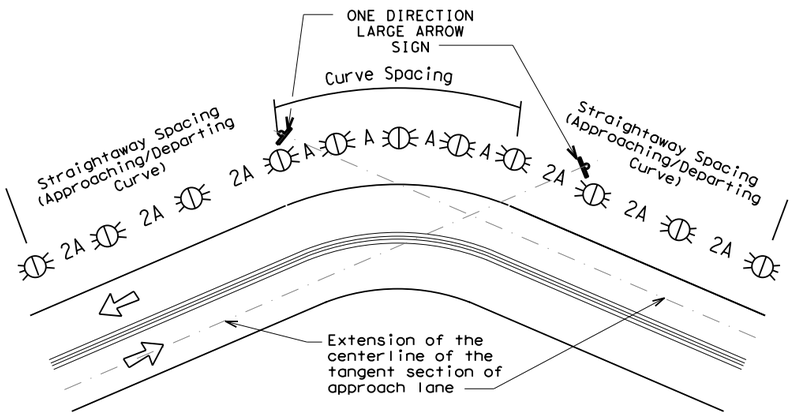
20B

DATE: 10/24/2022 11:30:07 AM
FILE: G:\WFSDESIGN\Plans\WFS Standards\DGNs\Pavement Markings\D&OM(2)-20.dgn

MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

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

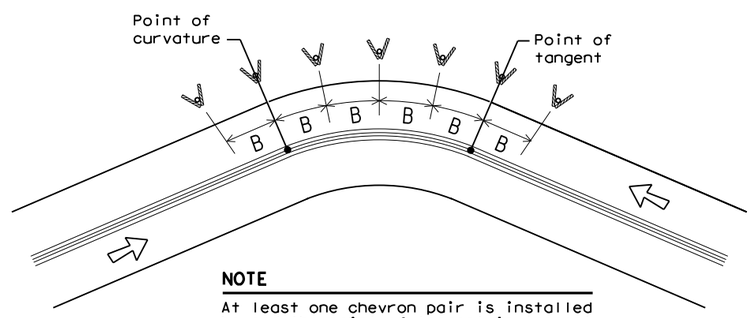
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

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

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

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

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

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

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

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

Advisory Speed (MPH)	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
	A	2xA	B
65	130	260	200
60	110	220	160
55	100	200	160
50	85	170	160
45	75	150	120
40	70	140	120
35	60	120	120
30	55	110	80
25	50	100	80
20	40	80	80
15	35	70	40

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

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

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

NOTES

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

LEGEND

	Bi-directional Delineator
	Delineator
	Sign

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-20

FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0903	29	027, ETC	CR 232, ETC
3-15 8-15	DIST	COUNTY		SHEET NO.
8-15 7-20	WFS	ARCHER		37

20C

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DATE: 10/24/2022 11:30:11 AM
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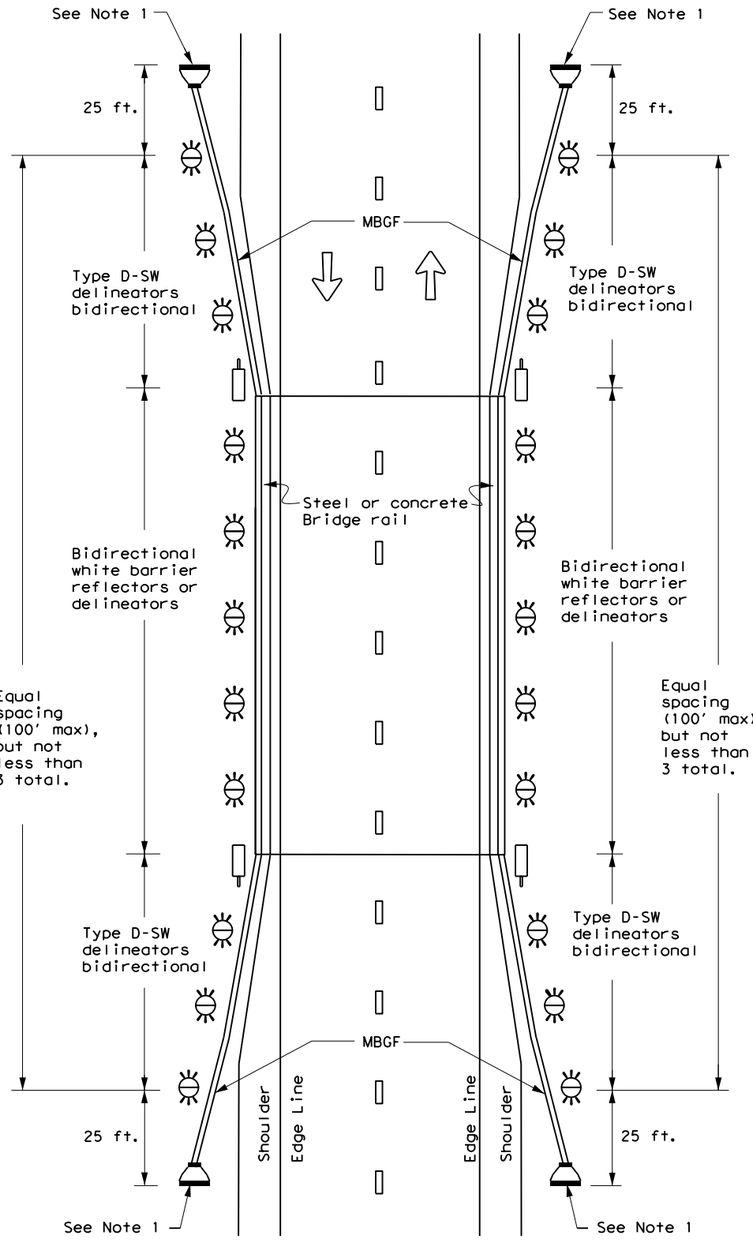
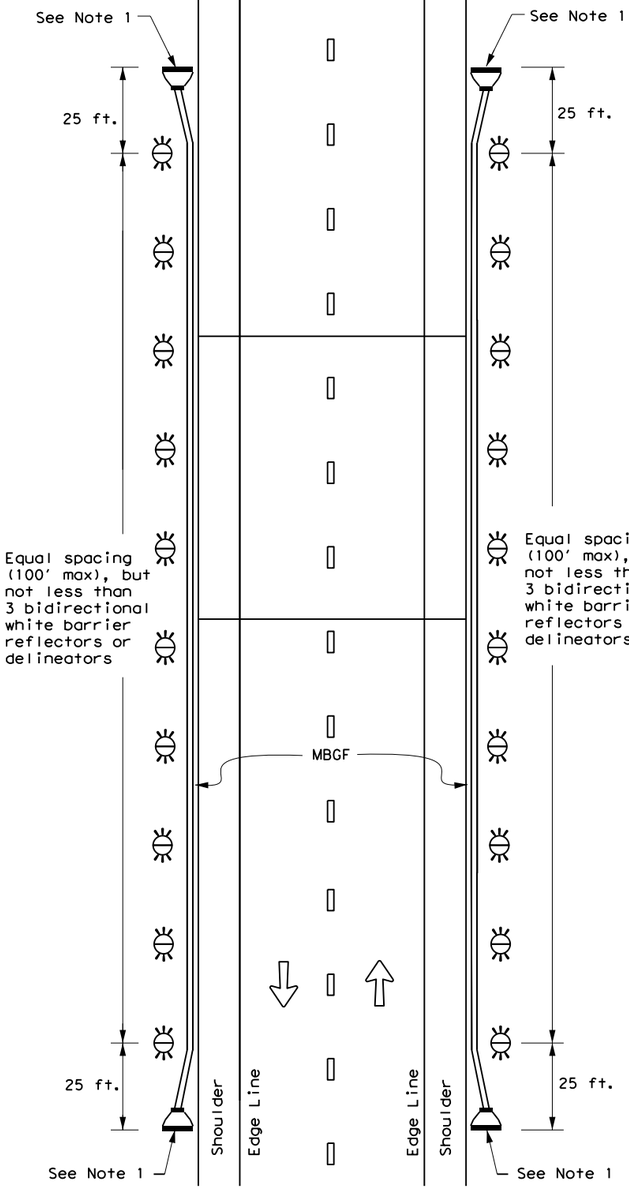
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



NOTE:

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

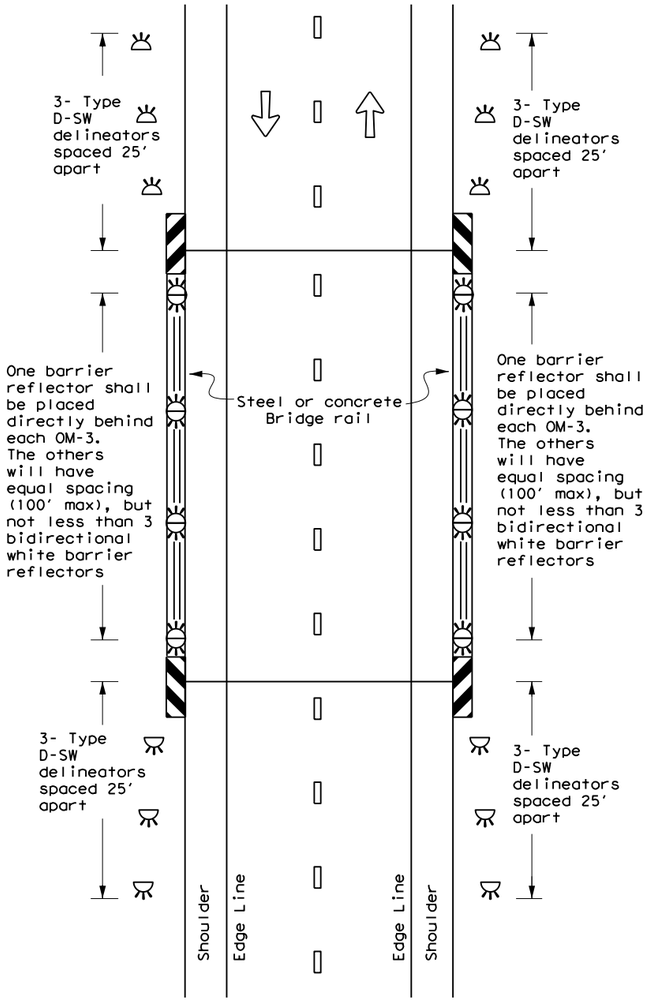
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



NOTE:

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

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



LEGEND

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

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
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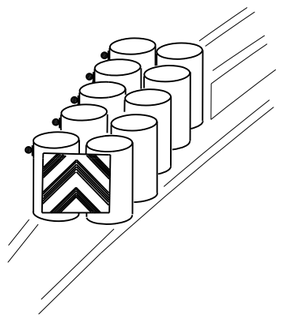
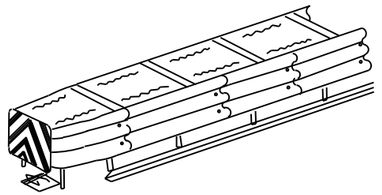
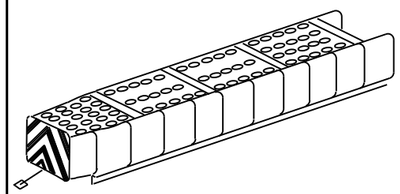
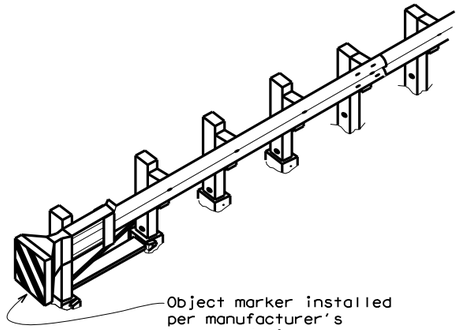
7-20	DIST	COUNTY		SHEET NO.
	WFS	ARCHER		38

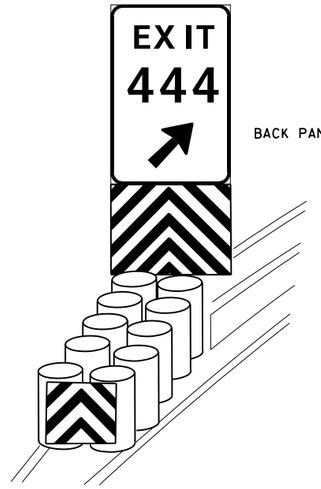
20E

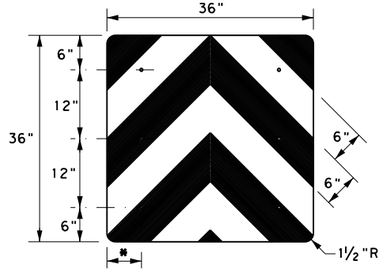


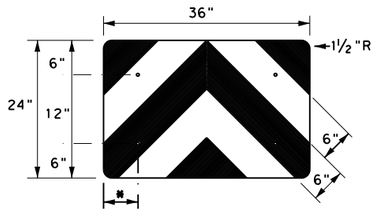




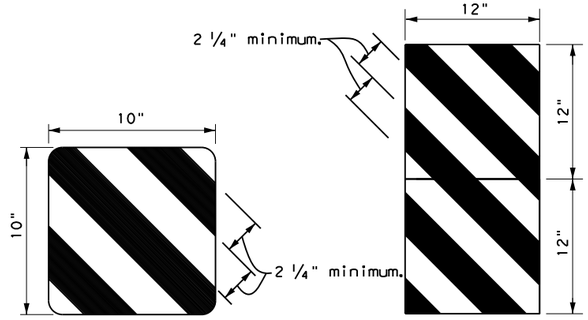




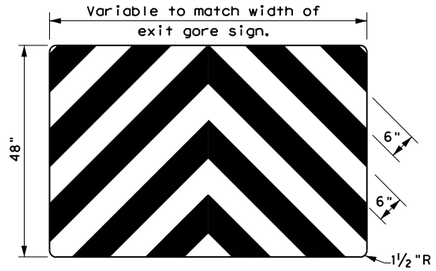


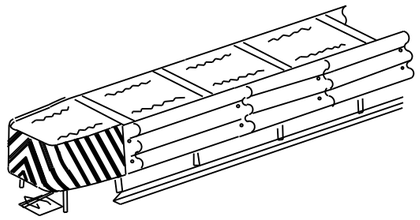


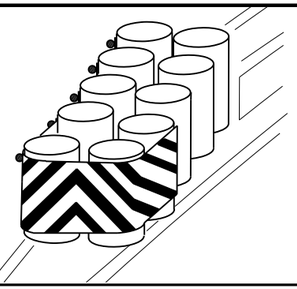
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

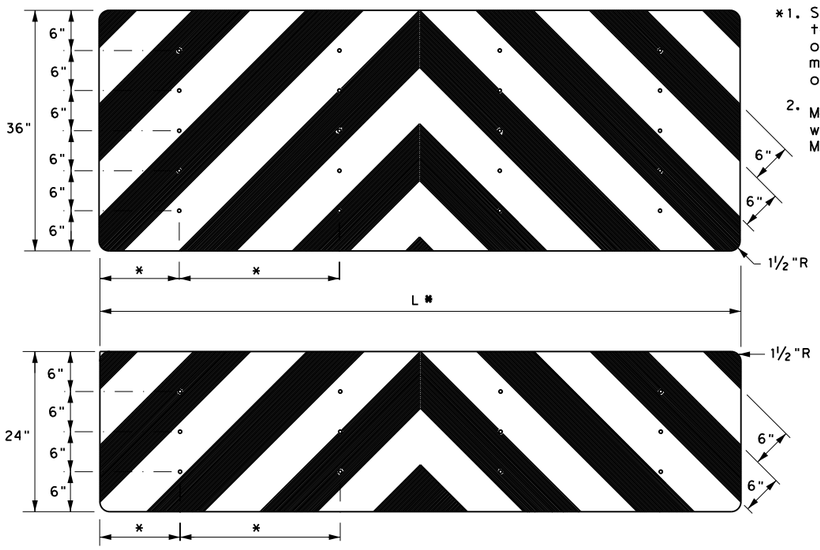


OBJECT MARKERS SMALLER THAN 3 FT^2









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
© TxDOT December 1989	CONT	SECT	JOB	HIGHWAY
REVISIONS	0903	29	027, ETC	CR 232, ETC
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	WFS	ARCHER		39
4-98 7-20				

20G

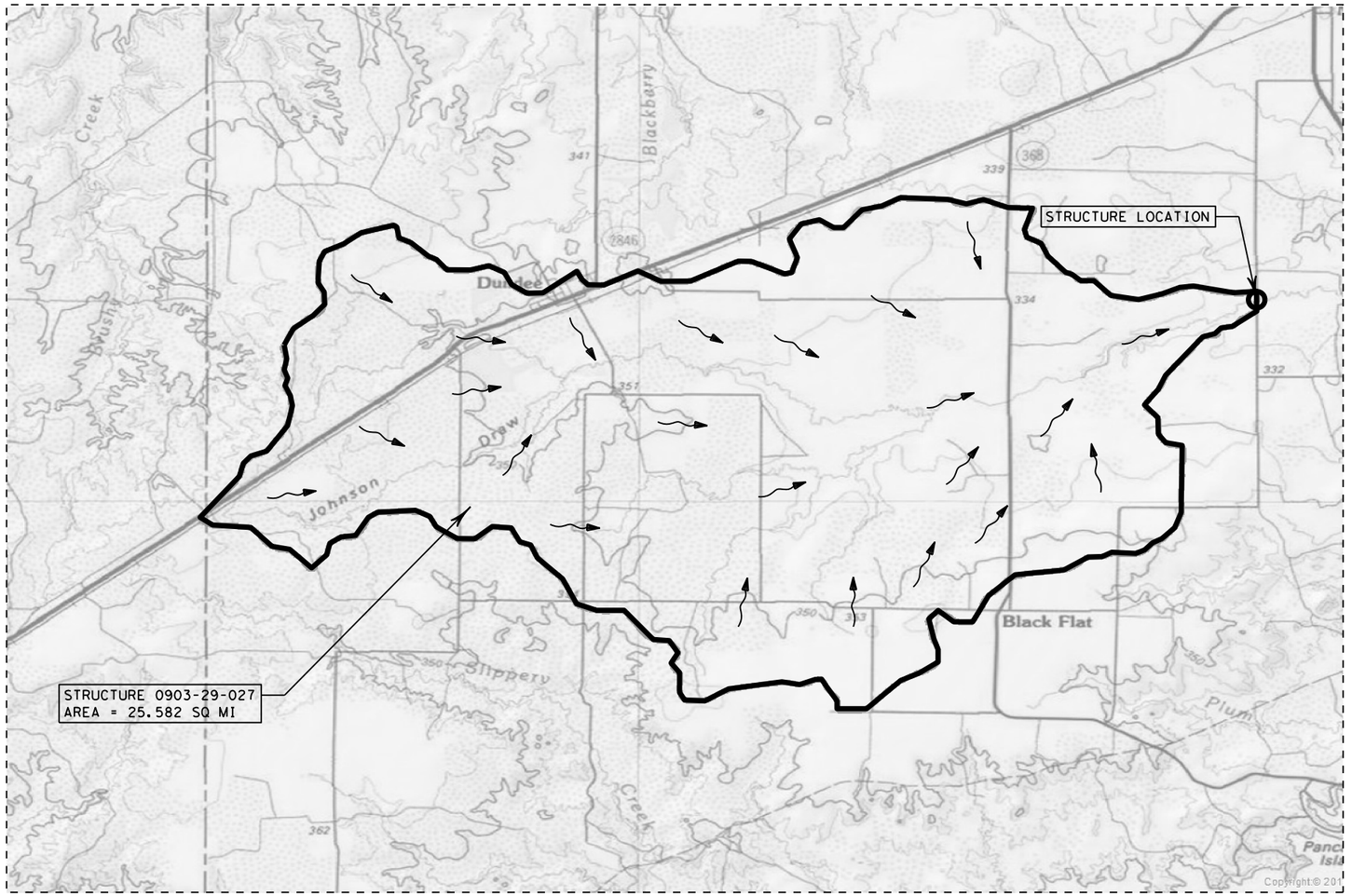
DATE: 10/24/2022 11:30:12 AM
FILE: G:\WFSDESGN\Plans\WFS Standards\DGNs\Pavement Markings\D&OM(VIA)-20.dgn

GENERAL NOTES:

1. OMEGA EM REGRESSION EQUATIONS USED FOR PROJECT HYDROLOGY ANALYSIS.

LEGEND

- # SQ MI — DRAINAGE AREA (SQUARE MILES)
- FLOW DIRECTION
- STRUCTURE LOCATION



OMEGA EM REGRESSION EQUATION PARAMETERS	
DRAINAGE AREA (A)	25.582 SQ MI
ANNUAL PRECIPITATION (P)	27.9 INCHES
CHANNEL SLOPE (S)	0.002005 FT/FT
OMEGA EM (*)	0.015
PEAK DISCHARGE (CFS)	
$Q_{2\text{-YR}}$ (cfs)	834
$Q_{5\text{-YR}}$ (cfs)	1707
$Q_{10\text{-YR}}$ (cfs)	2434
$Q_{25\text{-YR}}$ (cfs)	3559
$Q_{50\text{-YR}}$ (cfs)	4532
$Q_{100\text{-YR}}$ (cfs)	5676

STATE OF TEXAS
ZACHARY P. HUSEN
106073
LICENSED PROFESSIONAL ENGINEER
Zach P. Husen, P.E.
10/24/2022

CR 232 (WILSON RANCH RD) @ HOLLIDAY CREEK HYDRAULIC DATA SHEETS

DRAINAGE AREA MAP

0 0.75 1.5
SCALE IN MILES

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SHEET 1 OF 3

CONT	SECT	JOB	HIGHWAY
0903	29	027, ETC	CR 232, ETC
DIST	COUNTY		SHEET NO.
WFS	ARCHER		40

DATE: 10/24/2022 11:15:25 AM
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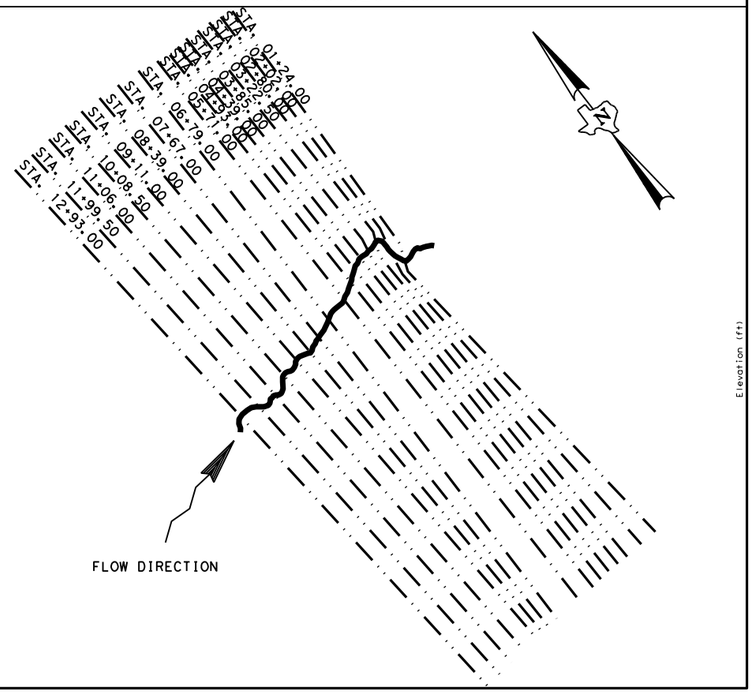
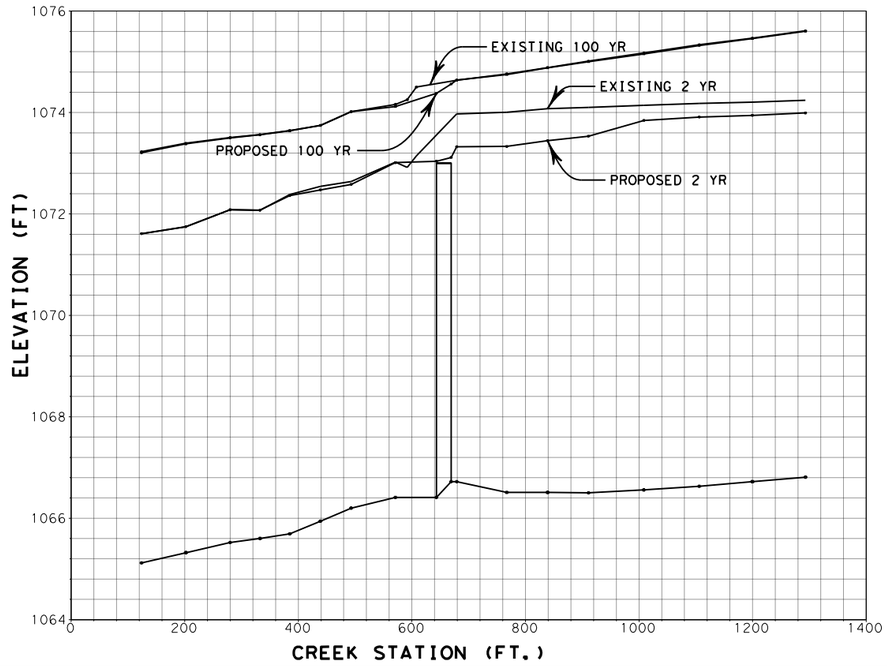
HEC-RAS CROSS SECTION MAP



WATER SURFACE PROFILES



NOTES:

1. OMEGA REGRESSION EQUATION USED FOR PROJECT HYDROLOGY ANALYSIS.
2. HEC-RAS USED FOR HYDRAULIC ANALYSIS AND DESIGN. (VERSION 5.0.7)
3. NORMAL DEPTH COMPUTATION USED FOR DOWNSTREAM BOUNDARY CONDITION, SLOPE = 0.002005 FOR BOTH EXISTING AND PROPOSED CONDITIONS.
4. ABUTMENTS WILL BE PROTECTED AGAINST SCOUR WITH RIPRAP. ABUTMENT SCOUR IS NOT REQUIRED PER TXDOT GEOTECHNICAL MANUAL, MARCH 2018.
5. SCOUR COMPUTATIONS PERFORMED ACCORDING FHWA HEC-18, 5th EDITION, MARCH 23, 2022.
6. ARCHER COUNTY MAINTENANCE SHOULD REGULARLY INSPECT THE STONE RIPRAP PROTECTION TO ENSURE SLOPE STABILIY.
7. THE PROJECT IS LOCATED IN A DESIGNATED SPECIAL FLOOD HAZARD AREA (SFHA) ZONE A FLOODPLAIN WITH NO BASE FLOOD ELEVATIONS (BFE'S) DETERMINED. THE APPROXIMATE LOCATION OF THE BRIDGE CROSSING IN RELATION TO THE MAPPED FLOODPLAIN IS SHOWN ON A PORTION OF FIRM MAP#: 48097C0525C, REVISED DATE: JANUARY 16, 2008.
8. THIS PROJECT HAS BEEN COORDINATED WITH TONY ROBINSON, ARCHER COUNTY FLOOD PLAIN ADMINISTRATOR ON APRIL XX, 2022.

CREEK STA.		EXISTING CONDITIONS				PROPOSED CONDITIONS			
		2 YR FREQUENCY		100 YR FREQUENCY		2 YR FREQUENCY		100 YR FREQUENCY	
		WSEL (FT)	VEL (FT/S)	WSEL (FT)	VEL (FT/S)	WSEL (FT)	VEL (FT/S)	WSEL (FT)	VEL (FT/S)
12+93.00	(US)	1074.24'	1.33'	1075.61'	2.78'	1074.16'	1.43'	1075.58'	2.84'
11+99.50	(US)	1074.21'	1.45'	1075.47'	3.46'	1074.11'	1.78'	1075.45'	3.40'
11+06.00	(US)	1074.18'	1.10'	1075.34'	3.16'	1074.08'	1.18'	1075.30'	3.25'
10+08.50	(US)	1074.14'	1.33'	1075.17'	3.30'	1074.04'	1.39'	1075.16'	3.65'
09+11.00	(US)	1074.10'	1.35'	1075.01'	3.24'	1074.00'	1.64'	1075.01'	3.59'
08+39.00	(US)	1074.08'	1.26'	1074.89'	3.32'	1073.99'	1.23'	1074.93'	3.17'
07+67.00	(US)	1074.01'	1.80'	1074.76'	3.15'	1073.94'	1.64'	1074.82'	3.29'
06+79.00	(US)	1073.97'	1.57'	1074.63'	3.27'	1073.88'	1.80'	1074.72'	3.05'
05+71.00	(DS)	1073.02'	4.95'	1074.16'	4.89'	1072.82'	5.33'	1074.24'	4.51'
04+93.00	(DS)	1072.64'	4.76'	1074.02'	3.37'	1072.33'	5.30'	1074.00'	4.60'
04+39.00	(DS)	1072.55'	2.91'	1073.75'	3.00'	1072.37'	3.41'	1073.72'	4.43'
03+85.00	(DS)	1072.38'	2.93'	1073.64'	3.38'	1072.21'	3.99'	1073.62'	3.57'
03+22.50	(DS)	1072.07'	4.19'	1073.56'	3.00'	1071.84'	5.01'	1073.53'	3.69'
02+80.00	(DS)	1072.08'	2.27'	1073.50'	2.81'	1071.83'	2.81'	1073.46'	2.92'
02+02.00	(DS)	1071.75'	4.29'	1073.38'	3.27'	1071.75'	2.05'	1073.33'	3.04'
01+24.00	(DS)	1071.61'	3.24'	1073.21'	3.97'	1071.61'	3.24'	1073.22'	3.41'

STATE OF TEXAS
ZACHARY P. HUSEN
106073
LICENSED PROFESSIONAL ENGINEER
Zach P. Husen, P.E.
10/24/2022

CR 232 (WILSON RANCH RD) @ HOLLIDAY CREEK HYDRAULIC DATA SHEETS

HYDRAULIC DATA

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SHEET 2 OF 3

CONT	SECT	JOB	HIGHWAY
0903	29	027, ETC	CR 232, ETC
DIST	COUNTY		SHEET NO.
WFS	ARCHER		41

DATE: 10/24/2022 11:30:17 AM
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SCOUR ANALYSIS - 10-YR (INCIPIENT)

SCOUR ANALYSIS DETERMINED BY UTILIZING
EQUATIONS FROM HEC-18 MANUAL, 5TH EDITION

PRESSURE SCOUR:

LIVE-BED CONTRACTION SCOUR EQUATIONS
(EQNS. 6.1 & 6.2)
D50 = 1.8 MM
K1 = 0.69

SCOUR DEPTH YS (CHANNEL) = 0.00 FT.

SCOUR ANALYSIS - 25-YR (DESIGN)

SCOUR ANALYSIS DETERMINED BY UTILIZING
EQUATIONS FROM HEC-18 MANUAL, 5TH EDITION

PRESSURE SCOUR:

LIVE-BED CONTRACTION SCOUR EQUATIONS
(EQNS. 6.1 & 6.2)
D50 = 1.8 MM
K1 = 0.69

SCOUR DEPTH YS (CHANNEL) = 0.00 FT.

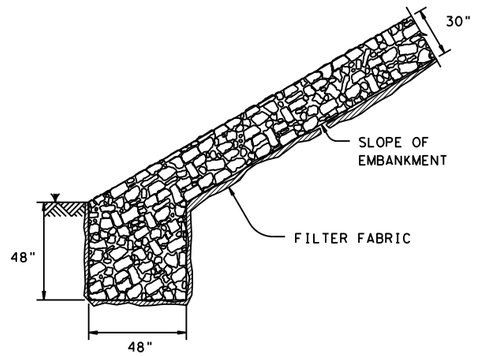
SCOUR ANALYSIS - 50-YR (CHECK)

SCOUR ANALYSIS DETERMINED BY UTILIZING
EQUATIONS FROM HEC-18 MANUAL, 5TH EDITION

PRESSURE SCOUR:

LIVE-BED CONTRACTION SCOUR EQUATIONS
(EQNS. 6.1 & 6.2)
D50 = 1.8 MM
K1 = 0.69

SCOUR DEPTH YS (CHANNEL) = 0.00 FT.

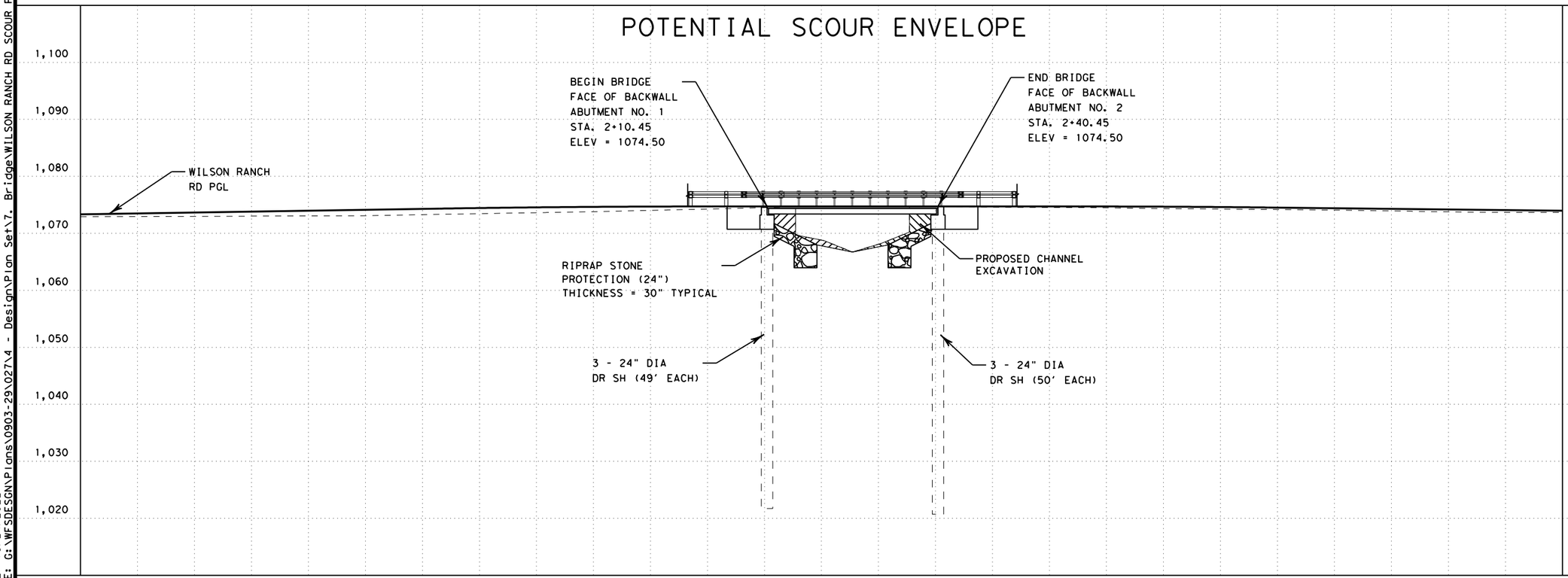


RIP RAP TOE WALL DETAIL

GENERAL NOTES:

1. THERE IS NO EVIDENCE OF SCOUR FOR THE EXIST BRIDGE.
2. ABUTMENTS ARE TO BE PROTECTED WITH ROCK RIPRAP. ABUTMENT SCOUR ANALYSIS IS NOT REQUIRED PER TXDOT GEOTECHNICAL MANUAL.
3. ARCHER COUNTY MAINTENANCE SHOULD REGULARLY INSPECT THE STONE RIPRAP PROTECTION TO ENSURE SLOPE STABILITY.

POTENTIAL SCOUR ENVELOPE



STATE OF TEXAS
ZACHARY P. HUSEN
106073
LICENSED
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Zach P. Husen, P.E.
10/24/2022

CR 232
(WILSON RANCH RD)
@ HOLLIDAY CREEK
HYDRAULIC DATA
SHEETS

Texas Department of Transportation

SHEET 3 OF 3

CONT	SECT	JOB	HIGHWAY
0903	29	027, ETC	CR 232, ETC
DIST	COUNTY		SHEET NO.
WFS	ARCHER		42

DATE: 10/24/2022 11:30:19 AM
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GENERAL NOTES:

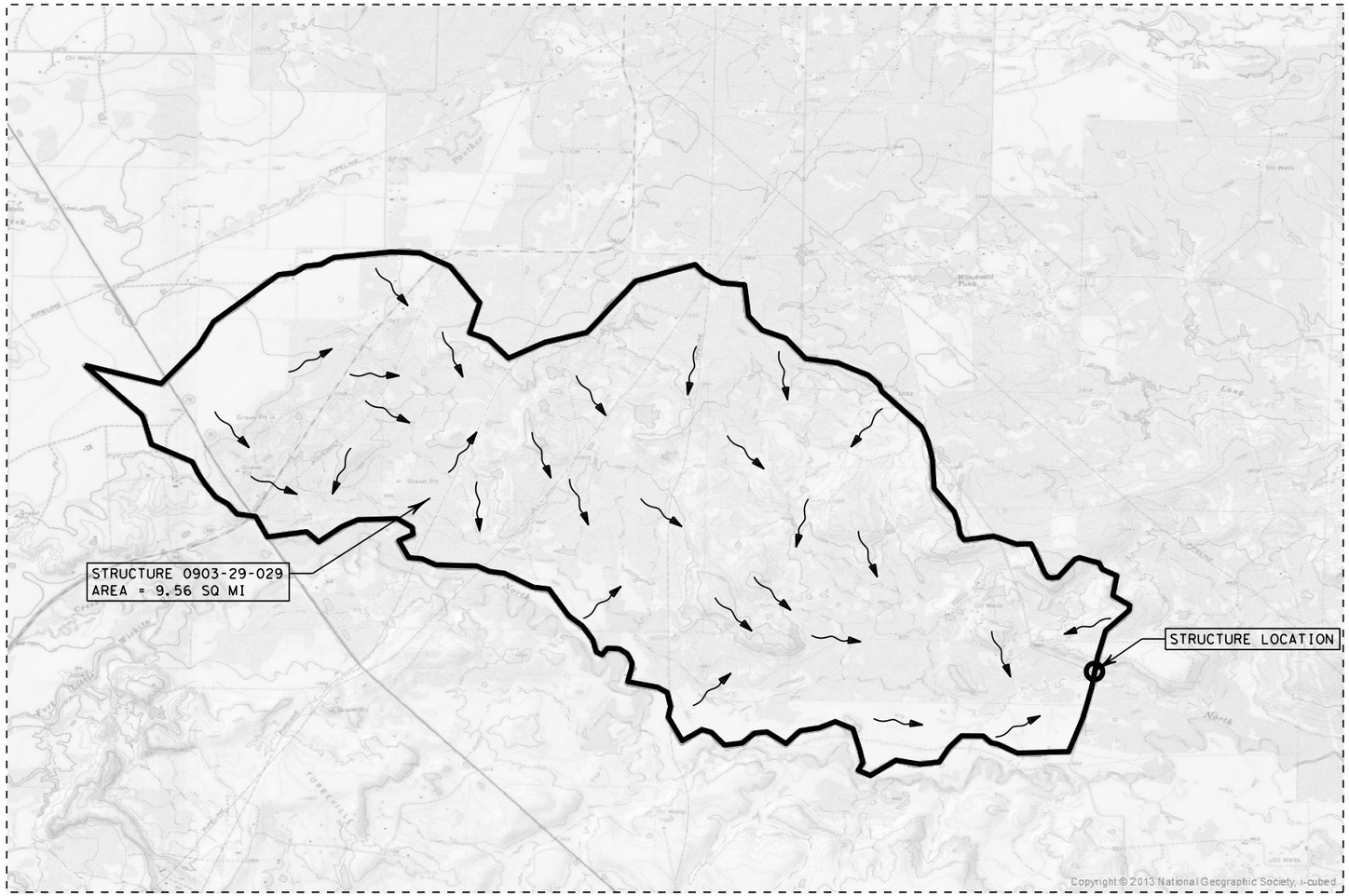
1. OMEGA EM REGRESSION EQUATIONS USED FOR PROJECT HYDROLOGY ANALYSIS IN COMPARISON WITH NRCS METHOD.

LEGEND

SQ MI — DRAINAGE AREA (SQUARE MILES)

FLOW DIRECTION

STRUCTURE LOCATION



OMEGA EM REGRESSION EQUATION PARAMETERS	
DRAINAGE AREA (A)	9.56 SQ MI
ANNUAL PRECIPITATION (P)	29.7 INCHES
CHANNEL SLOPE (S)	0.002729 FT/FT
OMEGA EM (*)	0.015
PEAK DISCHARGE (CFS)	
$Q_{2\text{-YR}}$ (cfs)	513
$Q_{5\text{-YR}}$ (cfs)	1020
$Q_{10\text{-YR}}$ (cfs)	1429
$Q_{25\text{-YR}}$ (cfs)	2053
$Q_{50\text{-YR}}$ (cfs)	2584
$Q_{100\text{-YR}}$ (cfs)	3205

STATE OF TEXAS
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Zach P. Husen, P.E.
10/24/2022

CR 261
(RIVER RD)
@ DRAW
HYDRAULIC DATA SHEETS
DRAINAGE AREA MAP

0 0.75 1.5
SCALE IN MILES

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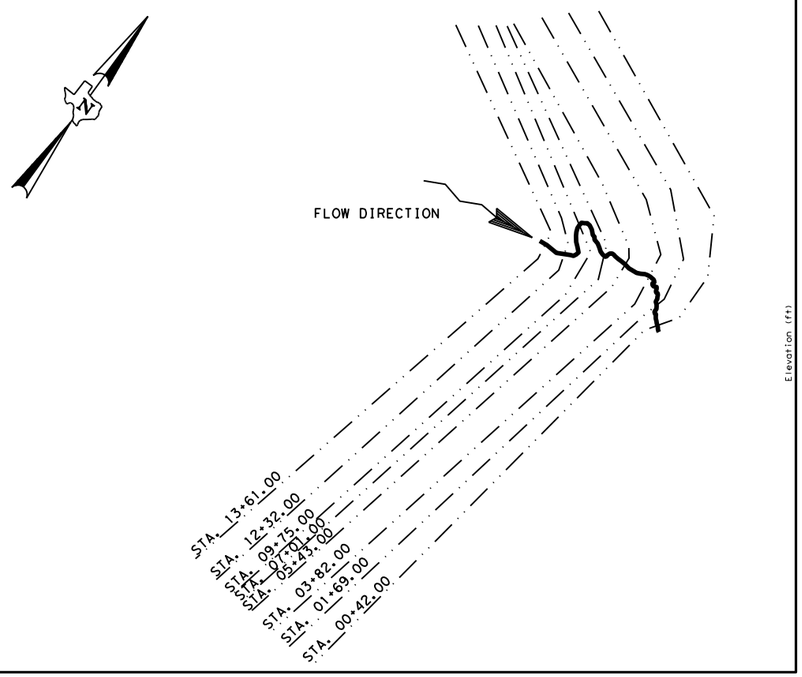
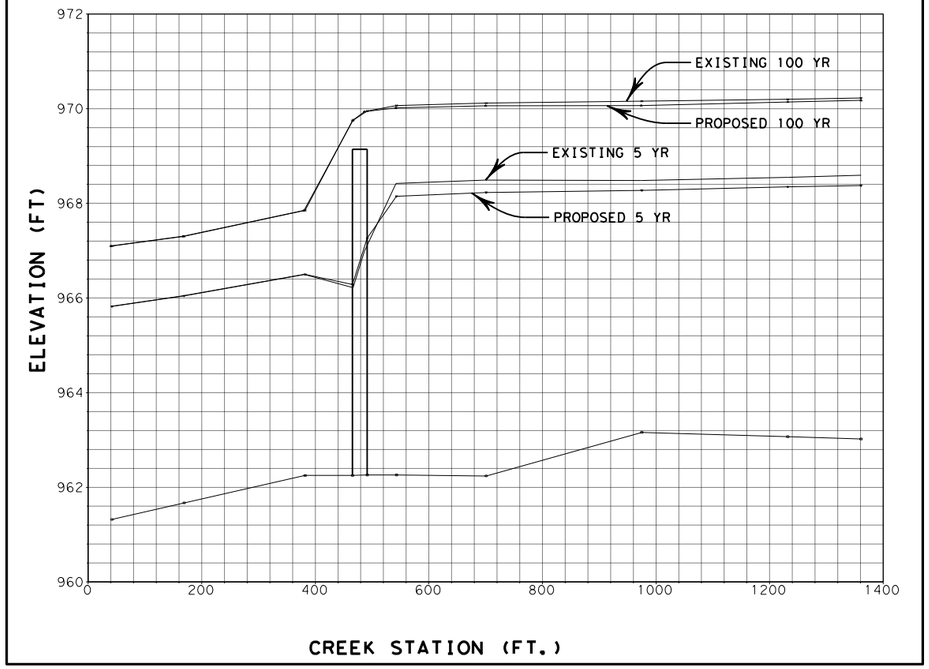
SHEET 1 OF 3

CONT	SECT	JOB	HIGHWAY
0903	29	027, ETC	CR 232, ETC
DIST	COUNTY		SHEET NO.
WFS	ARCHER		43

HEC-RAS CROSS SECTION MAP



WATER SURFACE PROFILES



NOTES:

1. OMEGA REGRESSION EQUATION USED FOR PROJECT HYDROLOGY ANALYSIS.
2. HEC-RAS USED FOR HYDRAULIC ANALYSIS AND DESIGN. (VERSION 5.0.7)
3. NORMAL DEPTH COMPUTATION USED FOR DOWNSTREAM BOUNDARY CONDITION, SLOPE = 0.002729 FOR BOTH EXISTING AND PROPOSED CONDITIONS.
4. ABUTMENTS WILL BE PROTECTED AGAINST SCOUR WITH RIPRAP. ABUTMENT SCOUR IS NOT REQUIRED PER TXDOT GEOTECHNICAL MANUAL, MARCH 2018.
5. SCOUR COMPUTATIONS PERFORMED ACCORDING FHWA HEC-18, 5th EDITION, FEBRUARY XX, 2022.
6. ARCHER COUNTY MAINTENANCE SHOULD REGULARLY INSPECT THE STONE RIPRAP PROTECTION TO ENSURE SLOPE STABILIY.
7. THE PROJECT IS LOCATED IN A DESIGNATED SPECIAL FLOOD HAZARD AREA (SFHA) ZONE A FLOODPLAIN WITH NO BASE FLOOD ELEVATIONS (BFE'S) DETERMINED. THE APPROXIMATE LOCATION OF THE BRIDGE CROSSING IN RELATION TO THE MAPPED FLOODPLAIN IS SHOWN ON A PORTION OF FIRM MAP#: 48097C0525C, REVISED DATE: JANUARY 16, 2008.
8. THIS PROJECT HAS BEEN COORDINATED WITH TONY ROBINSON, ARCHER COUNTY FLOOD PLAIN ADMINISTRATOR ON FEBRUARY XX, 2022.

CREEK STA.		EXISTING CONDITIONS				PROPOSED CONDITIONS			
		5 YR FREQUENCY		100 YR FREQUENCY		5 YR FREQUENCY		100 YR FREQUENCY	
		WSEL (FT)	VEL (FT/S)	WSEL (FT)	VEL (FT/S)	WSEL (FT)	VEL (FT/S)	WSEL (FT)	VEL (FT/S)
13+61.00	(US)	968.59′	2.69	970.18′	2.39	968.38′	2.98	970.22′	2.3
12+32.00	(US)	968.55′	2.66	970.14′	2.87	968.35′	1.89	970.20′	1.9
09+75.00	(US)	968.27′	1.58	970.16′	1.8	968.48′	1.66	970.07′	2.41
07+01.00	(US)	968.23′	1.24	970.12′	1.15	968.49′	1.61	970.06′	1.67
05+43.00	(US)	968.15′	2.05	970.07′	2.09	968.42′	2.24	970.02′	2.36
04+87.00		BRIDGE							
03+82.00	(DS)	966.50′	3.61	966.50′	7.12	967.85′	3.61	967.85′	7.14
01+69.00	(DS)	966.04′	4.42	966.04′	7.03	967.30′	4.42	967.30′	7.03
00+42.00	(DS)	965.82′	3.7	965.82′	5.34	967.10′	3.7	967.10′	5.34

STATE OF TEXAS
ZACHARY P. HUSEN
106073
LICENSED
PROFESSIONAL ENGINEER

Zachary P. Husen, P.E.
10/24/2022

CR 261 (RIVER RD) @ DRAW
HYDRAULIC DATA SHEETS

HYDRAULIC DATA

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SHEET 2 OF 3

CONT	SECT	JOB	HIGHWAY
0903	29	027, ETC	CR 232, ETC
DIST	COUNTY		SHEET NO.
WFS	ARCHER		44

DATE: 10/24/2022 11:30:26 AM
FILE: G:\WFSDESGN\Plans\0903-29\028\4 - Design\Plan Set\7. Bridge\RIVER RD H&H.dgn

SCOUR ANALYSIS - 10-YR (INCIPIENT)

SCOUR ANALYSIS DETERMINED BY UTILIZING
EQUATIONS FROM HEC-18 MANUAL, 5TH EDITION

PRESSURE SCOUR:

LIVE-BED CONTRACTION SCOUR EQUATIONS
(EQNS. 6.1 & 6.2)
D50 = 0.20 MM
K1 = 0.69

SCOUR DEPTH YS (CHANNEL) = 0.00 FT.

SCOUR ANALYSIS - 25-YR (DESIGN)

SCOUR ANALYSIS DETERMINED BY UTILIZING
EQUATIONS FROM HEC-18 MANUAL, 5TH EDITION

PRESSURE SCOUR:

LIVE-BED CONTRACTION SCOUR EQUATIONS
(EQNS. 6.1 & 6.2)
D50 = 0.20 MM
K1 = 0.69

SCOUR DEPTH YS (CHANNEL) = 0.00 FT.

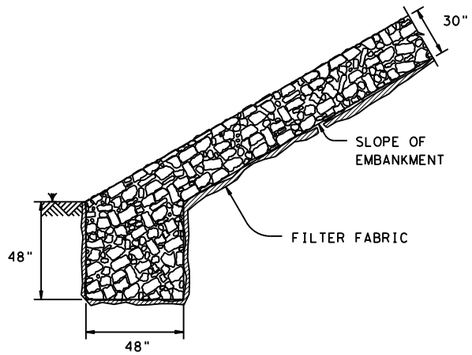
SCOUR ANALYSIS - 50-YR (CHECK)

SCOUR ANALYSIS DETERMINED BY UTILIZING
EQUATIONS FROM HEC-18 MANUAL, 5TH EDITION

PRESSURE SCOUR:

LIVE-BED CONTRACTION SCOUR EQUATIONS
(EQNS. 6.1 & 6.2)
D50 = 0.20 MM
K1 = 0.69

SCOUR DEPTH YS (CHANNEL) = 0.00 FT.

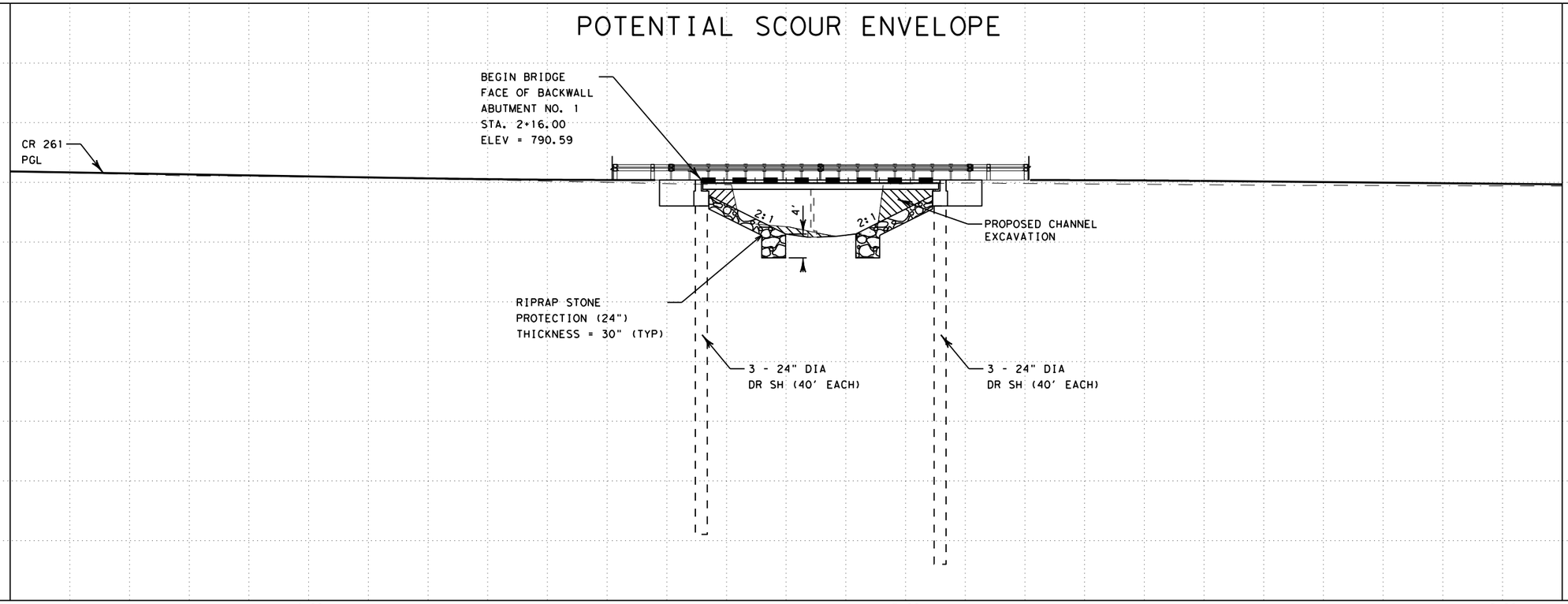


RIPRAP TOE WALL DETAIL

GENERAL NOTES:

1. THERE IS NO EVIDENCE OF SCOUR FOR THE EXIST BRIDGE.
2. ABUTMENTS ARE TO BE PROTECTED WITH ROCK RIPRAP. ABUTMENT SCOUR ANALYSIS IS NOT REQUIRED PER TXDOT GEOTECHNICAL MANUAL.
3. COOKE COUNTY MAINTENANCE SHOULD REGULARLY INSPECT THE STONE RIPRAP PROTECTION TO ENSURE SLOPE STABILITY.

POTENTIAL SCOUR ENVELOPE



STATE OF TEXAS
ZACHARY P. HUSEN
106073
LICENSED
PROFESSIONAL ENGINEER
Zach P. Husen, P.E.
10/24/2022

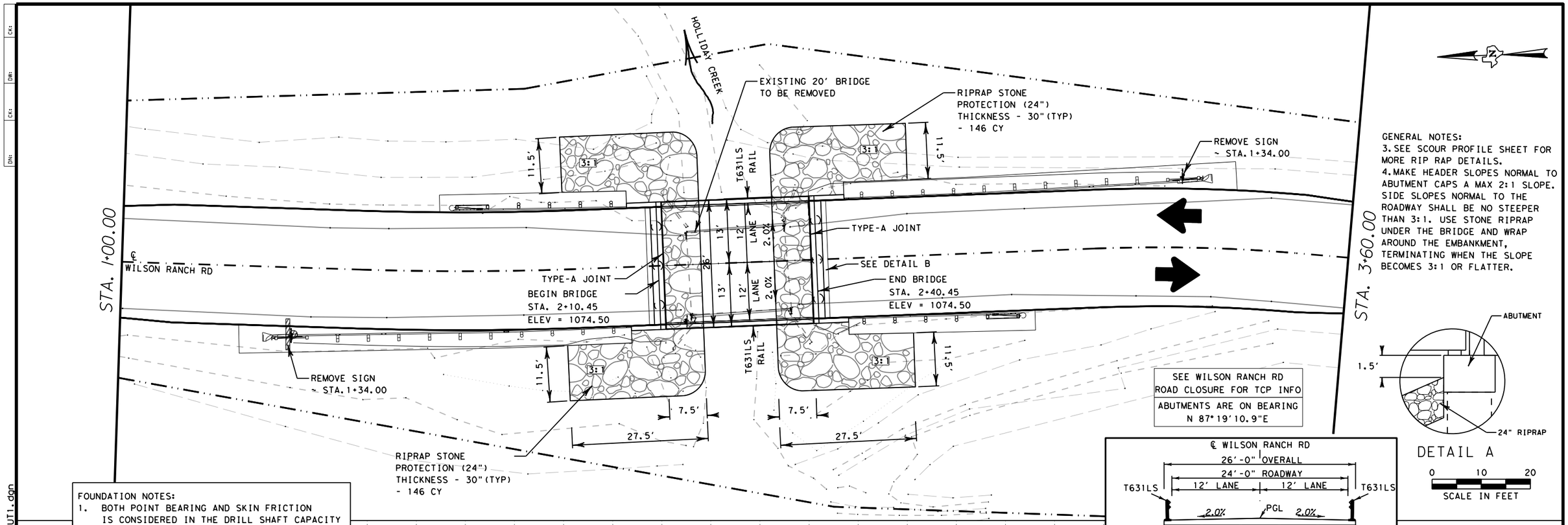
CR 261
(RIVER RD)
@ DRAW
HYDRAULIC DATA
SHEETS

Texas Department of Transportation

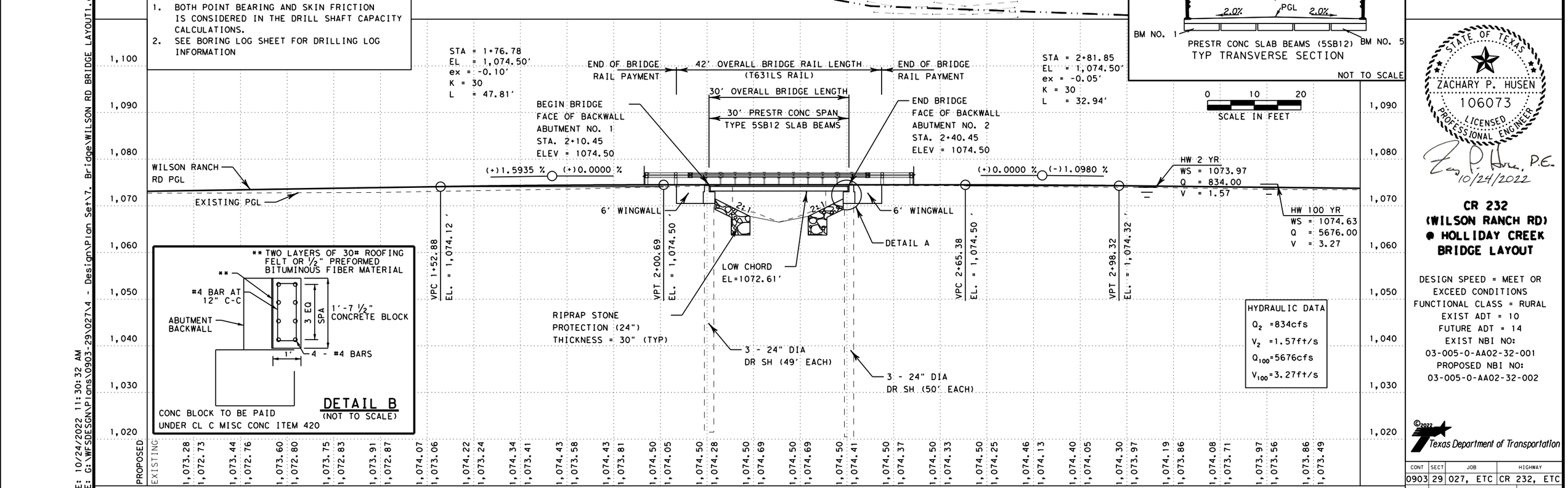
SHEET 3 OF 3

CONT	SECT	JOB	HIGHWAY
0903	29	027, ETC	CR 232, ETC
DIST	COUNTY		SHEET NO.
WFS	ARCHER		45

DATE: 10/24/2022 11:30:28 AM
FILE: G:\WFSDESIGN\Plans\0903-29\028\4 - Design\Plan Set\7. Bridge\RIVER RD SCOUR PROFILE.dgn



FOUNDATION NOTES:
1. BOTH POINT BEARING AND SKIN FRICTION IS CONSIDERED IN THE DRILL SHAFT CAPACITY CALCULATIONS.
2. SEE BORING LOG SHEET FOR DRILLING LOG INFORMATION



STATE OF TEXAS
ZACHARY P. HUSEN
106073
LICENSED PROFESSIONAL ENGINEER
Zach P. Husen, P.E.
10/24/2022

CR 232 (WILSON RANCH RD) @ HOLLIDAY CREEK BRIDGE LAYOUT

DESIGN SPEED = MEET OR EXCEED CONDITIONS
FUNCTIONAL CLASS = RURAL
EXIST ADT = 10
FUTURE ADT = 14
EXIST NBI NO:
03-005-0-AA02-32-001
PROPOSED NBI NO:
03-005-0-AA02-32-002

CONT	SECT	JOB	HIGHWAY
0903	29	027, ETC	CR 232, ETC
DIST	COUNTY		SHEET NO.
WFS	ARCHER		46

DATE: 10/24/2022 11:30:32 AM
FILE: G:\WFSDESGN\Plans\0903-29\027\4 - Design\Plan Set\7. Bridge\WILSON RD BRIDGE LAYOUT1.dgn

SUMMARY OF BRIDGE = 1 ITEMS								
LOCATION	416 6002	420 6013	420 6074	422 6007	425 6010	432 6035	450 6019	4171 6001
	DRILL SHAFT (24 IN)	CL C CONC (ABUT)	CL C CONC (MISC)	REINF CONC SLAB (SLAB BEAM)	PRESTR CONC SLAB BEAM (5SB12)	RIPRAP (STONE PROTECTION) (24 IN)	RAIL (TY T631LS)	INSTALL BRIDGE IDENTIFICATION NUMBERS
	LF	CY	CY	SF	LF	CY	LF	EA
CR 232 WILSON RANCH RD @ HOLLIDAY CREEK	297	19.6	3	780	147.5	292	84	2
PROJECT TOTALS	**297**	**19.6**	**3**	**780**	**147.5**	**292**	**84**	**2**

CAP ELEVATIONS (FT)

	STEP 1	STEP 3		STEP 4		STEP 6
	(RIGHT)	(LT. SIDE)	(RT. SIDE)	(LT. SIDE)	(RT. SIDE)	(LEFT)
ABUT 1 (FWD)	1072.615	1072.822	1072.822	1072.822	1072.822	1072.615
	STEP 1	STEP 3		STEP 4		STEP 6
	(RIGHT)	(LT. SIDE)	(RT. SIDE)	(LT. SIDE)	(RT. SIDE)	(LEFT)
ABUT 2 (BK)	1072.615	1072.822	1072.822	1072.822	1072.822	1072.615

ELEVATION LOCATIONS

DISTANCE FROM PGL TO STEP 1 ALONG CENTERLINE OF BEARING = 13.000 FT LT

	STEP SPACING (ALONG C.L. OF BEARING)
STEP 1	
	10.372 FT
STEP 3	
	5.255 FT
STEP 4	
	10.372 FT
STEP 6	

STEP POSITIONS

STEP 1 is located to the left of BEAM 1.
STEP 3 is located to the between BEAM 2 and BEAM 3.
STEP 4 is located to the between BEAM 3 and BEAM 4.
STEP 6 is located to the right of BEAM 5.

BEAM SLOPES (FT/FT)

	BEAM 1	BEAM 2	BEAM 3	BEAM 4	BEAM 5
SPAN 1	0.0000	0.0000	0.0000	0.0000	0.0000

STATE OF TEXAS
ZACHARY P. HUSEN
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10/24/2022

CR 232 (WILSON RANCH RD) @ HOLLIDAY CREEK BRIDGE QUANTITIES & BEARING SEAT ELEVATIONS

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CONT	SECT	JOB	HIGHWAY
0903	29	027, ETC	CR 232, ETC
DIST	COUNTY		SHEET NO.
WFS	ARCHER		47

DATE: 10/24/2022 11:30:34 AM
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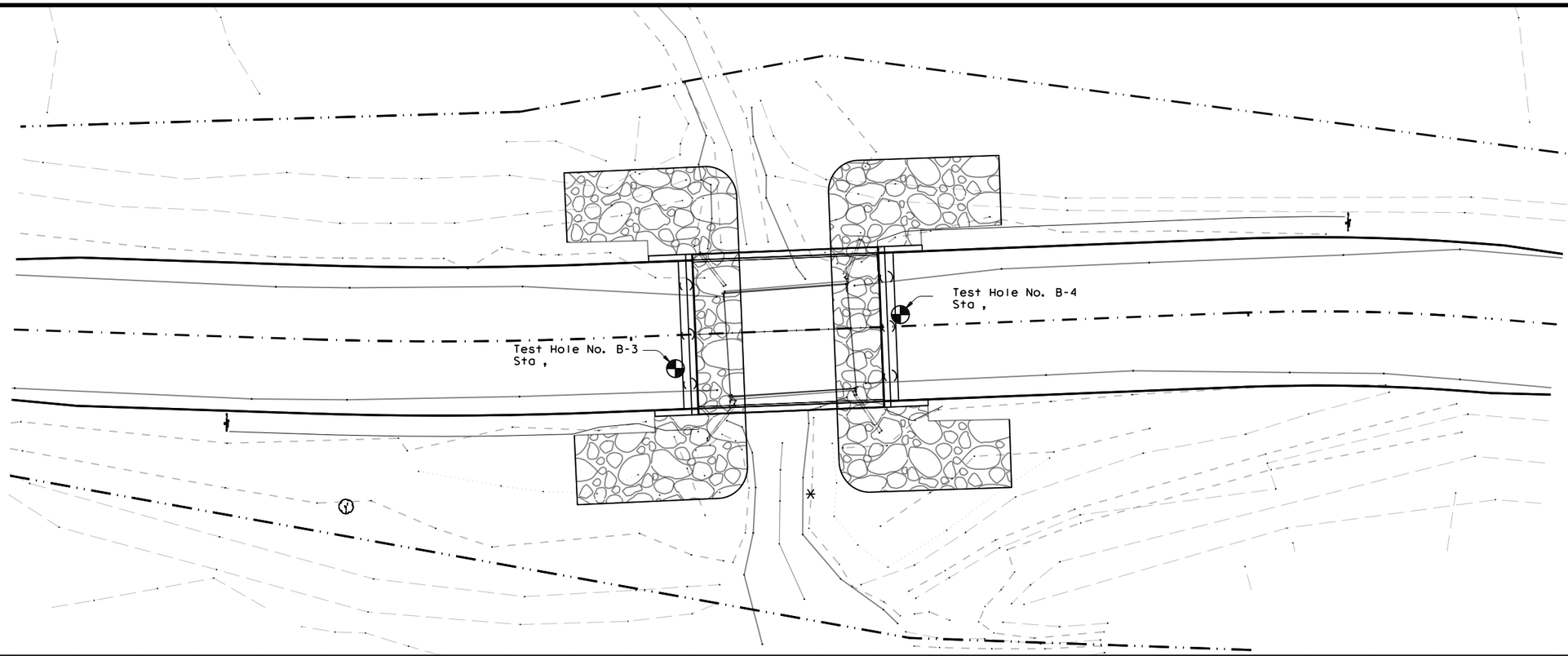

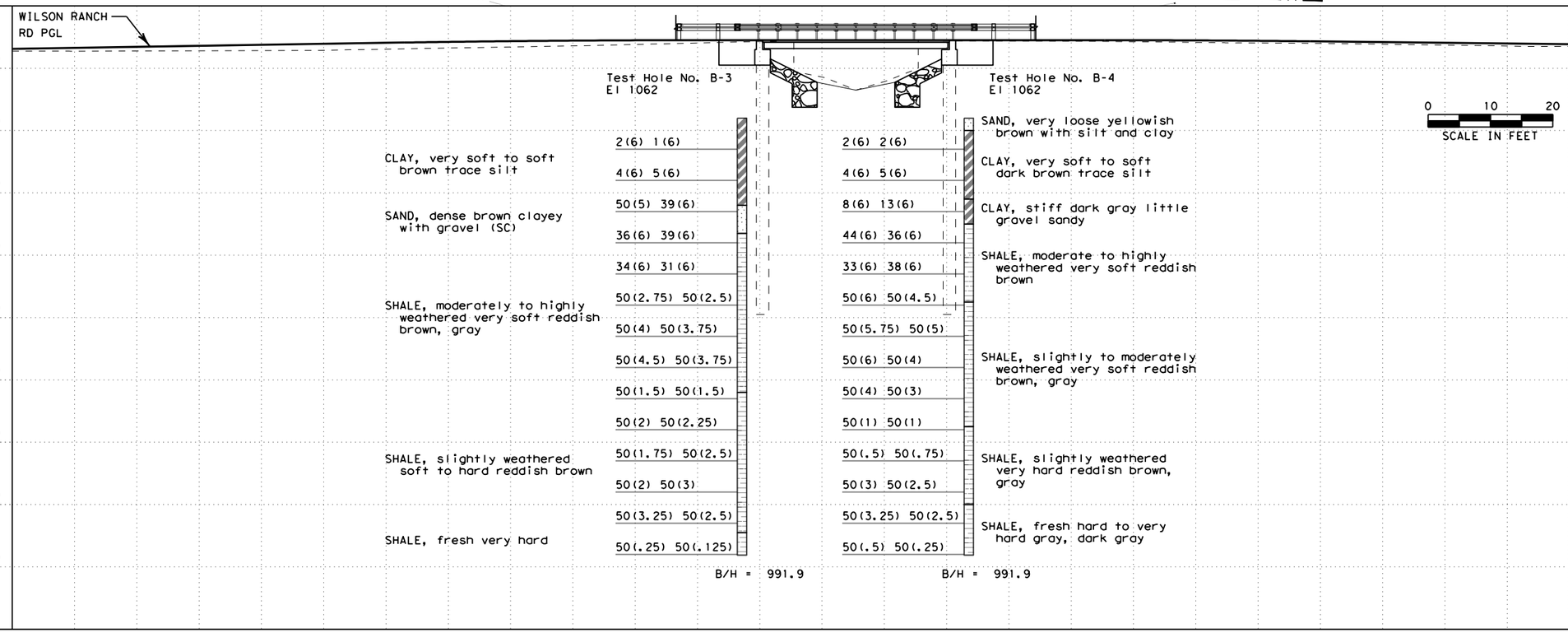

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STATE OF TEXAS
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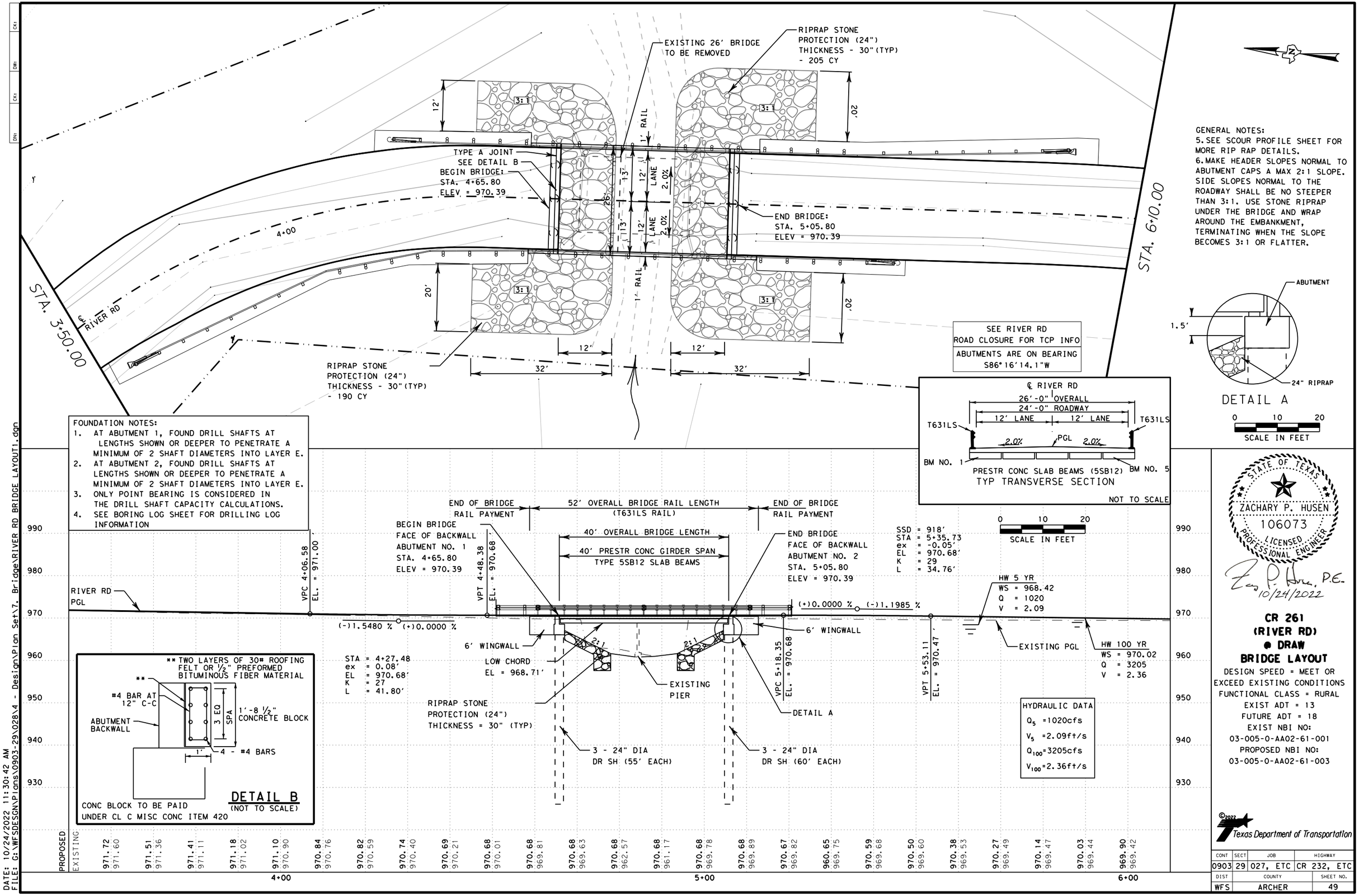
10/24/2022

CR 232
(WILSON RANCH RD)
@ HOLLIDAY CREEK
BORING LOGS

DESIGN SPEED = MEET OR EXCEED EXISTING CONDITIONS
FUNCTIONAL CLASS = RURAL
EXIST ADT = 10
FUTURE ADT = 14
EXIST NBI NO:
03-005-0-AA02-32-001
PROPOSED NBI NO:
03-005-0-AA02-32-002

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0903	29	027, ETC	CR 232, ETC
DIST	COUNTY		SHEET NO.
WFS	ARCHER		48



STATE OF TEXAS
ZACHARY P. HUSEN
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Zach P. Husen, P.E.
10/24/2022

CR 261 (RIVER RD) ● DRAW
BRIDGE LAYOUT

DESIGN SPEED = MEET OR EXCEED EXISTING CONDITIONS
FUNCTIONAL CLASS = RURAL
EXIST ADT = 13
FUTURE ADT = 18
EXIST NBI NO:
03-005-0-AA02-61-001
PROPOSED NBI NO:
03-005-0-AA02-61-003

CONT	SECT	JOB	HIGHWAY
0903	29	027, ETC	CR 232, ETC
DIST	COUNTY		SHEET NO.
WFS	ARCHER		49

DATE: 10/24/2022 11:30:42 AM
FILE: G:\WFSDESGN\Plans\0903-29\028V4 - Design\Plan Set\7. Bridge\RIVER RD BRIDGE LAYOUT1.dgn

SUMMARY OF BRIDGE = 1 ITEMS								
LOCATION	416 6002	420 6013	420 6074	422 6007	425 6010	432 6035	450 6019	4171 6001
	DRILL SHAFT (24 IN)	CL C CONC (ABUT)	CL C CONC (MISC)	REINF CONC SLAB (SLAB BEAM)	PRESTR CONC SLAB BEAM (5SB12)	RIPRAP (STONE PROTECTION) (24 IN)	RAIL (TY T631LS)	INSTALL BRIDGE IDENTIFICATION NUMBERS
	LF	CY	CY	SF	LF	CY	LF	EA
CR 261 RIVER RD @ DRAW	345	19.6	3	1040	197.5	395	104	2
PROJECT TOTALS	**345**	**19.6**	**3**	**1040**	**197.5**	**395**	**104**	**2**

CAP ELEVATIONS (FT)

	STEP 1 (RIGHT)	STEP 3 (LT. SIDE)	STEP 3 (RT. SIDE)	STEP 4 (LT. SIDE)	STEP 4 (RT. SIDE)	STEP 6 (LEFT)
ABUT 1 (FWD)	968.712	968.919	968.919	968.919	968.919	968.712

	STEP 1 (RIGHT)	STEP 3 (LT. SIDE)	STEP 3 (RT. SIDE)	STEP 4 (LT. SIDE)	STEP 4 (RT. SIDE)	STEP 6 (LEFT)
ABUT 2 (BK)	968.712	968.919	968.919	968.919	968.919	968.712

ELEVATION LOCATIONS

DISTANCE FROM PGL TO STEP 1 ALONG CENTERLINE OF BEARING = 13.000 FT LT

	STEP SPACING (ALONG C.L. OF BEARING)
STEP 1	
STEP 3	10.372 FT
STEP 4	5.255 FT
STEP 6	10.372 FT

STEP POSITIONS

STEP 1 is located to the left of BEAM 1.
STEP 3 is located to the between BEAM 2 and BEAM 3.
STEP 4 is located to the between BEAM 3 and BEAM 4.
STEP 6 is located to the right of BEAM 5.

BEAM SLOPES (FT/FT)

	BEAM 1	BEAM 2	BEAM 3	BEAM 4	BEAM 5
SPAN 1	0.0000	0.0000	0.0000	0.0000	0.0000

* INCLUDES SHEAR KEY QUANTITY

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10/24/2022

CR 261
(RIVER RD)
@ DRAW
BRIDGE QUANTITIES
& BEARING SEAT
ELEVATIONS

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CONT	SECT	JOB	HIGHWAY
0903	29	027, ETC	CR 232, ETC
DIST	COUNTY		SHEET NO.
WFS	ARCHER		50

DATE: 10/24/2022 11:30:44 AM
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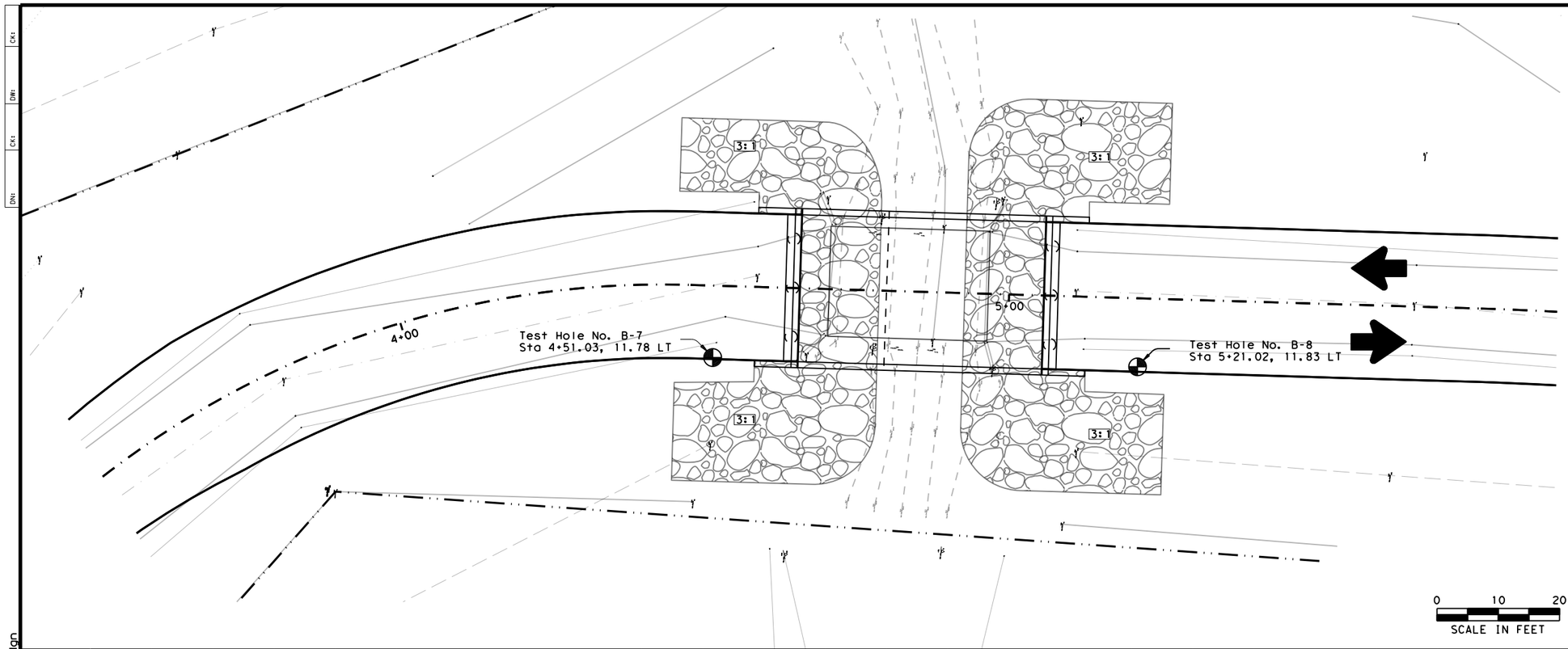
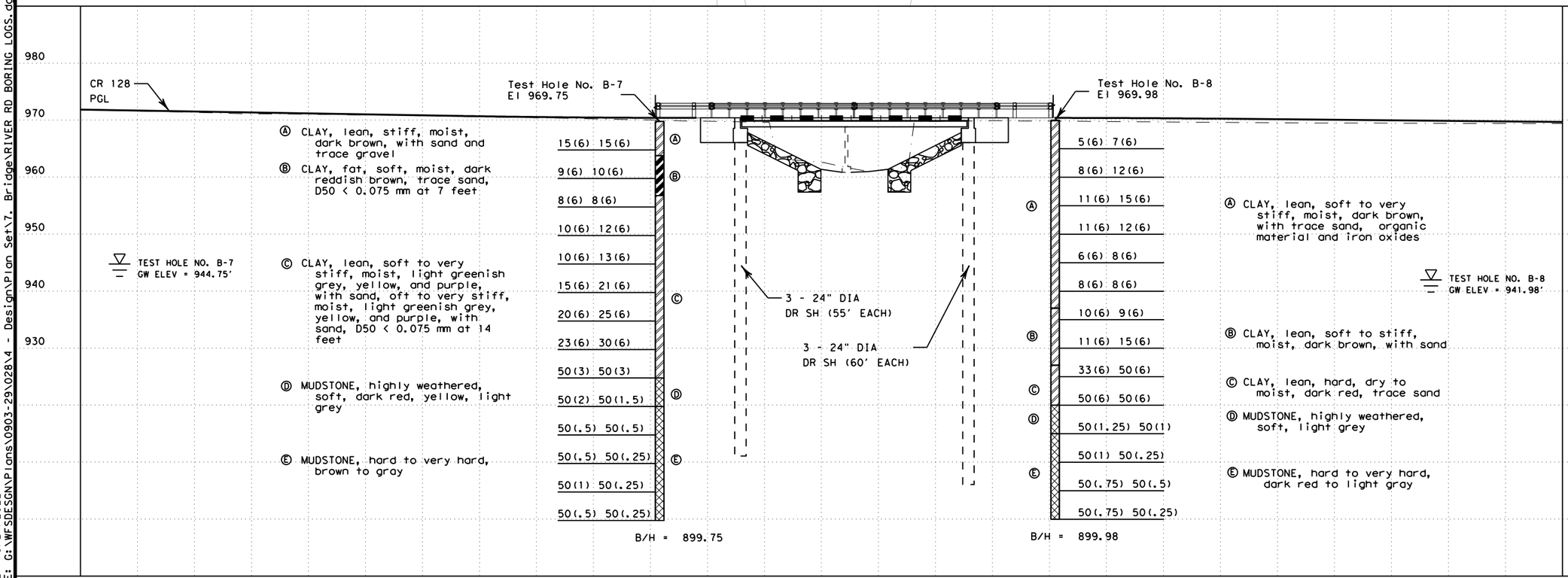


GENERAL NOTES:

1. ALL DRILLED SHAFTS AT ABUTMENTS ARE DESIGNED FOR POINT BEARING.
2. THE CONTRACTOR SHALL TAKE APPROPRIATE MEASURES TO STABILIZE THE DRILLED SHAFT HOLES IF GROUND WATER OR CAVING OF THE SOILS IS ENCOUNTERED.
3. TEST HOLE DATA PROVIDED BY HVJ, ASSOCIATES, PROJECT NO. 28465, APRIL 26TH 2022.
4. CONTRACTORS ATTENTION IS DRAWN TO THE SHALLOW SAND & CLAY INTERVALS OF THE SOIL PROFILE. INTERVALS ARE EXPECTED TO BE WATER BEARING AND WILL REQUIRE CARE IN ADVANCING DRILLED SHAFT FOUNDATIONS. THE CONTRACTOR IS SOLEY RESPONSIBLE FOR HOLE STABILITY.
5. AT ABUTMENT 1, FOUND DRILL SHAFTS A MINIMUM OF 2 SHAFT DIAMETERS INTO LAYER E.
6. AT ABUTMENT 2, FOUND DRILL SHAFTS A MINIMUM OF 2 SHAFT DIAMETERS INTO LAYER E.

⊕ DENOTES CORE BORING LOCATION



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10/24/2022

CR 261
(RIVER RD)
● DRAW
BORING LOGS

DESIGN SPEED = 25 MPH
FUNCTIONAL CLASS = RURAL
EXIST ADT = 3
FUTURE ADT = 4
EXIST NBI NO:
03-169-0-AA01-28-001
PROPOSED NBI NO:
03-169-0-AA01-28-005

CONT	SECT	JOB	HIGHWAY
0903	29	027, ETC	CR 232, ETC
DIST	COUNTY		SHEET NO.
WFS	ARCHER		51

DATE: 10/24/2022 11:30:46 AM
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DATE: 10/24/2022 11:30:48 AM
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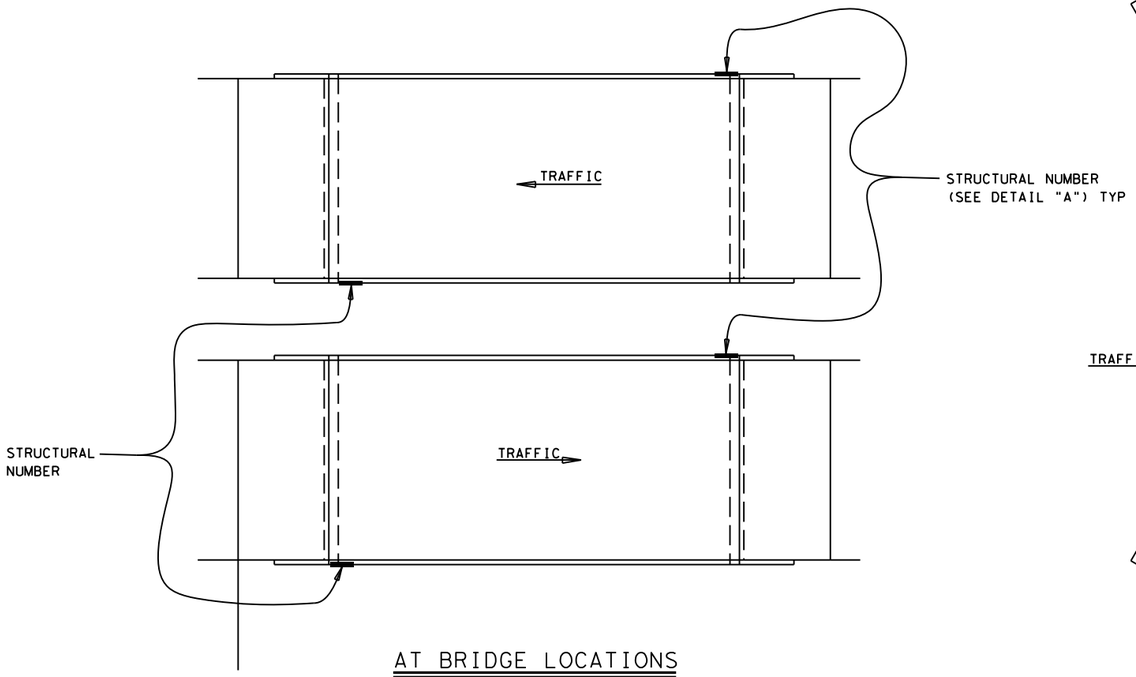
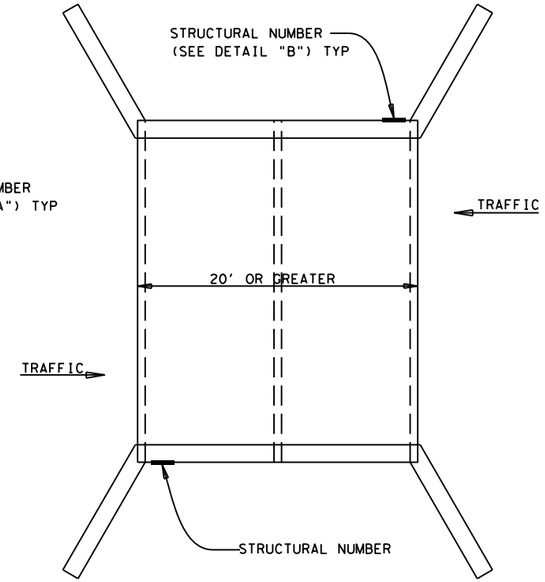


AT BRIDGE LOCATIONS



AT CULVERT LOCATIONS

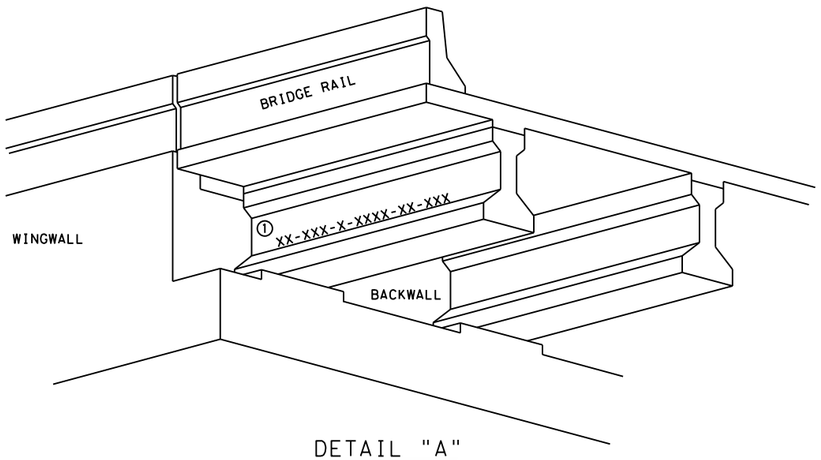
STRUCTURE NAME	NBI NUMBER TO APPLY
CR 261 (RIVER RD) @ DRAW	03-005-0-AA02-61-003
CR 232 (WILSON RANCH RD) @ HOLLIDAY CREEK	03-005-0-AA02-32-002

DETAIL FOR NBI NUMBERS

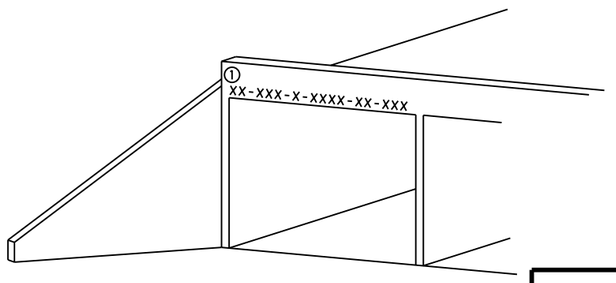
GENERAL NOTES:

COST OF FURNISHING AND PAINTING NBI NUMBERS, INCLUDING PAINT AND STENCIL PLATES SHALL BE PAID AT THE UNIT BID PRICE FOR "INSTALL BRIDGE IDENTIFICATION NUMBERS" UNDER ITEM 4171.

EACH STRUCTURE SHALL HAVE 2 (TWO) NBI NUMBERS PAINTED PER STRUCTURE.



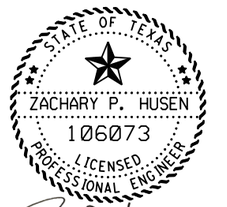
DETAIL "A"



DETAIL "B"

① APPLY NBI NUMBER ON BOTH SIDES OF STRUCTURE (ONCE EACH SIDE). APPLY TO OUTSIDE BEAM CLOSE TO ABUTMENT ON THE UPSTREAM TRAFFIC SIDE AT BRIDGE LOCATIONS. APPLY TO HEADWALL ADJACENT TO WINGWALL AT CULVERT LOCATIONS.

② USE BRASS STENCIL, 3 INCH, NUMBERS AND LETTERS, ADJUSTABLE INTERLOCKING STENCIL SET OR EQUAL OF LEGEND HEIGHT 3 INCHES, SYMBOL HEIGHT 3 INCHES.



Texas Department of Transportation

BRIDGE IDENTIFICATION NUMBERS

REVISIONS

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

CONT	SECT	JOB	HIGHWAY
0903	29	027, ETC	CR 232, ETC

DIST	COUNTY	SHEET NO.
WFS	ARCHER	52

SHEET 1 OF 1

1 OF

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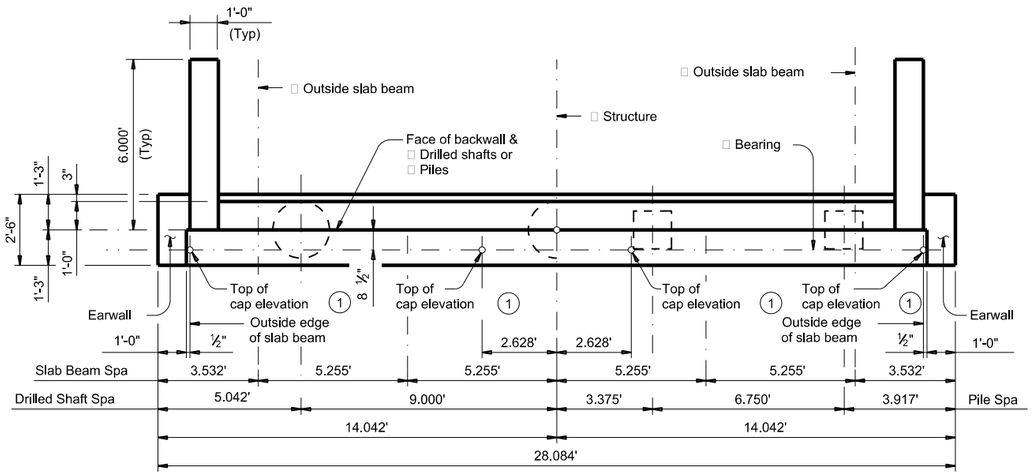
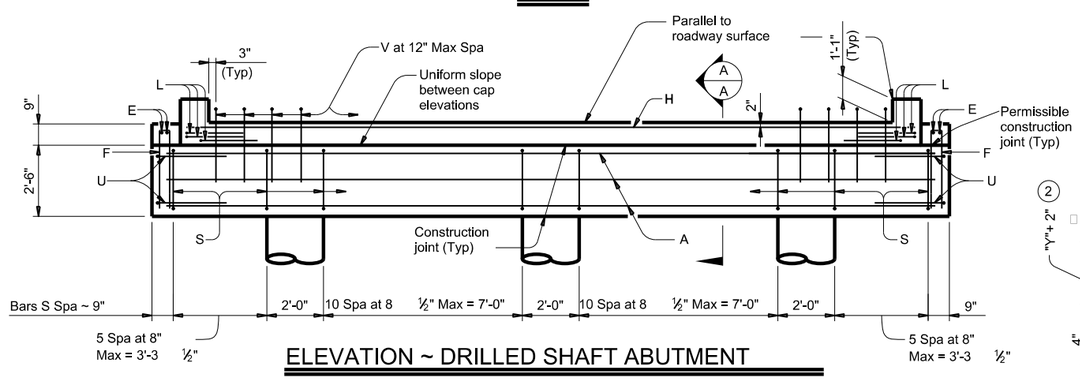


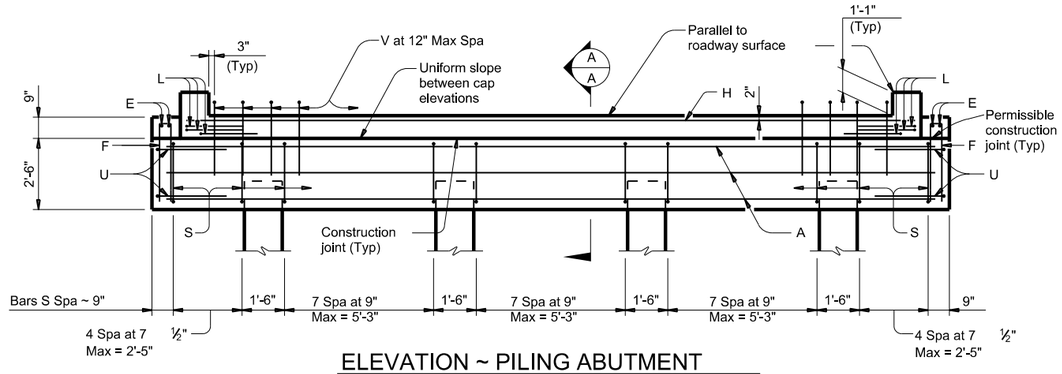
SHOWING DRILLED SHAFTS

PLAN

SHOWING PILES

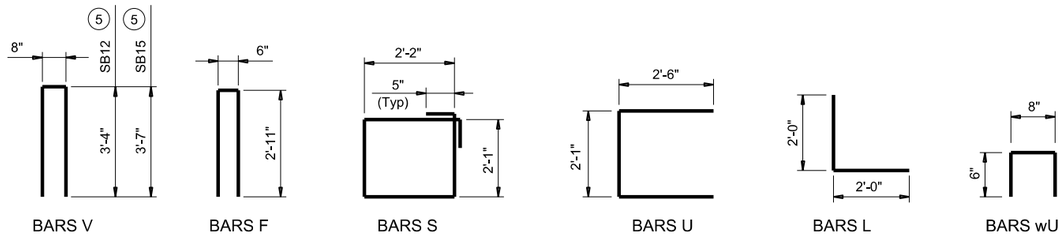


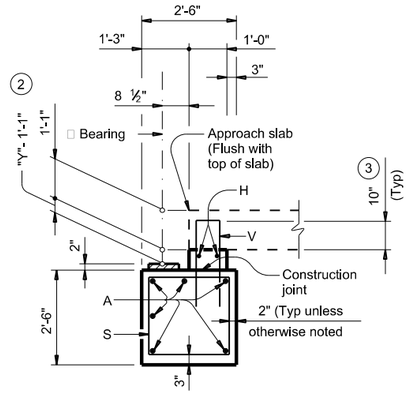
ELEVATION ~ DRILLED SHAFT ABUTMENT



ELEVATION ~ PILING ABUTMENT

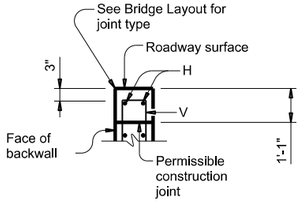
Note: For piles larger than 16", adjust Bars S spacing as required to avoid piles.





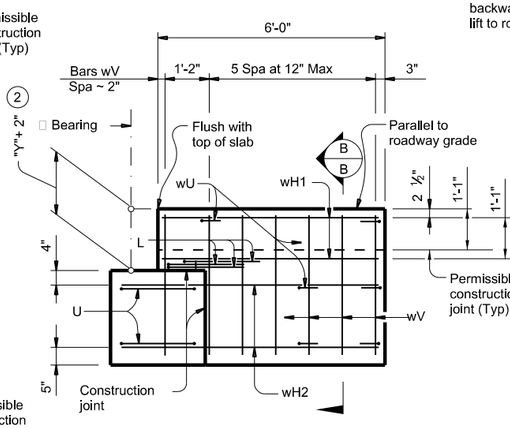
SECTION A-A 4

(With approach slab)
Note: At Contractor's option, backwall may be cast with approach slab.



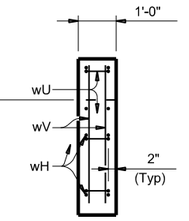
BACKWALL DETAIL 4

(Without approach slab)
Note: At Contractor's option, backwall may be cast in one lift to roadway surface.

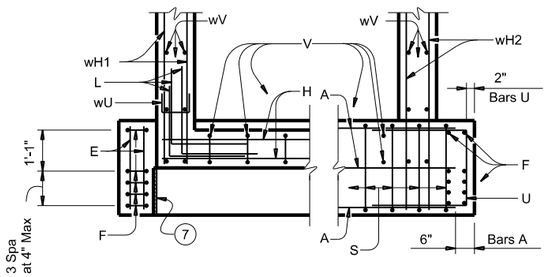


WINGWALL ELEVATION

(Earwall not shown for clarity.)



SECTION B-B



BACKWALL CAP

CORNER DETAILS

FOUNDATION LOADS

Span Length	Drilled Shaft Loads		Vertical Pile Loads	
Ft	Tons/DS		Tons/Pile	
	5SB12	5SB15	5SB12	5SB15
25	39	41	29	31
30	43	46	33	34
35	48	51	36	38
40	52	55	39	41
45		59		44
50		63		47

TABLE OF ESTIMATED QUANTITIES 6

Bar	No.	Size	Length 5		Weight 5	
			5SB12	5SB15	5SB12	5SB15
A	6	#11	27'-1"	27'-1"	863	863
E	4	#4	2'-2"	2'-2"	6	6
F	10	#4	6'-4"	6'-4"	43	43
H	2	#5	25'-8"	25'-8"	54	54
L	6	#6	4'-0"	4'-0"	36	36
S	34	#4	9'-4"	9'-4"	212	212
U	4	#6	7'-1"	7'-1"	43	43
V	25	#5	7'-4"	7'-10"	191	204
wH1	8	#6	5'-8"	5'-8"	68	68
wH2	8	#6	6'-11"	6'-11"	83	83
wU	12	#4	1'-8"	1'-8"	14	14
wV	28	#5	3'-10"	4'-1"	112	119
Reinforcing Steel				Lb	1,725	1,745
Cl "C" Conc (Abut)				CY	8.8	9.2

1. Top of cap elevations are based on section depths shown on Span Details.
2. See Span Details for "Y".
3. Increase as required to maintain 3" from finished grade.
4. See Bridge Layout to determine if approach slab is present.
5. See Bridge Layout for beam type used in the superstructure.
6. Quantities shown are for one abutment only (with approach slab). Without approach slab, add 1.0 CY Class "C" concrete and 54 Lb reinforcing steel for 2 additional Bars H.
7. ½" preformed bituminous fiber material between slab beam and earwall. Bond to earwall with an approved adhesive. Cast inside face of earwall perpendicular to cap. (Typ)

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Designed for a normal embankment header slope of 3:1 and a maximum span length of 50 feet.

See Bridge Layout for header slope and foundation type, size, and length.

See Common Foundation Details (FD) standard sheet for all foundation details and notes.

See Concrete Riprap (CRR) standard sheet or Stone Riprap (SRR) standard sheet for riprap attachment details, if applicable.

See applicable rail details for rail anchorage in wingwalls.

These abutment details may be used with standard SPSB-24 only.

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

MATERIAL NOTES:

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

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

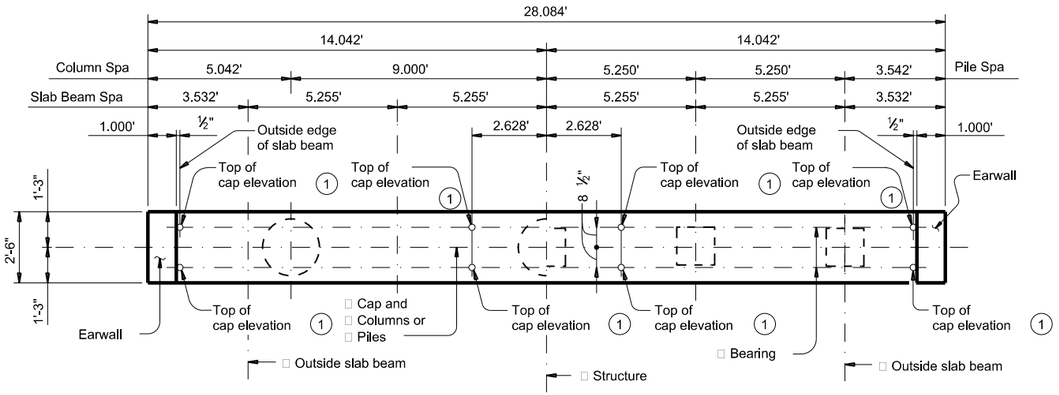
ABUTMENTS

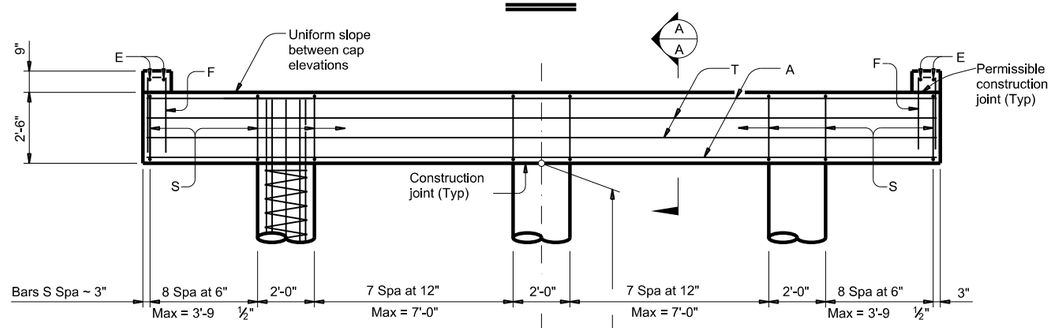
PRESTR CONCRETE SLAB BEAM

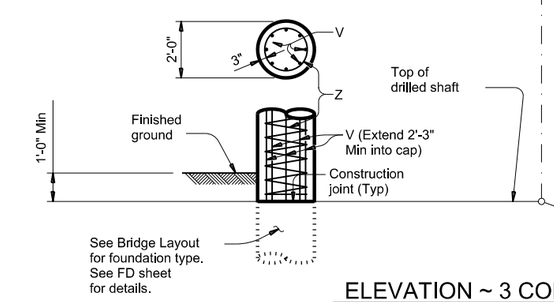
24' ROADWAY

APSB-24

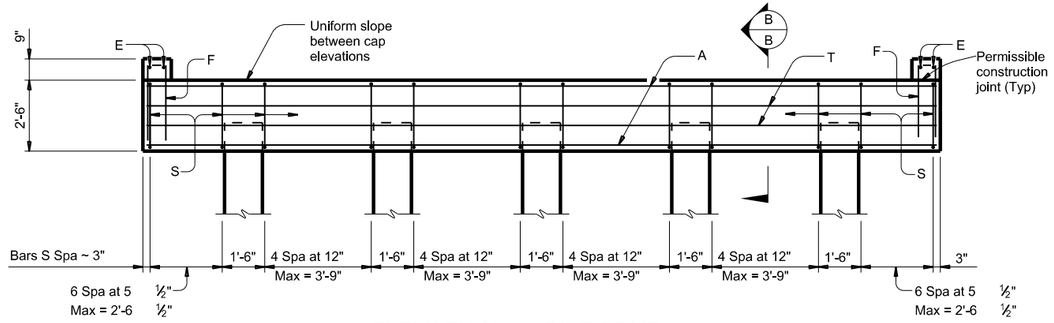
FILE: psbste09-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0903	29	027, ETC	CR 232, ETC
	DIST	COUNTY		SHEET NO.
	WFS	ARCHER		53





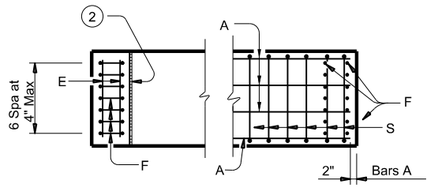


ELEVATION ~ 3 COLUMN BENT



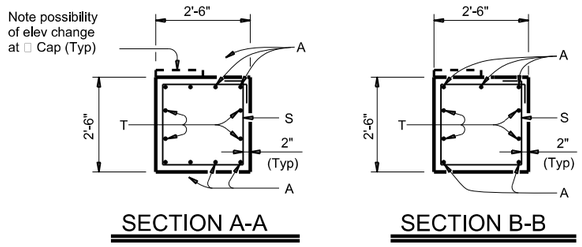
ELEVATION ~ 5 PILE BENT

Note: For piles larger than 16", adjust Bars S spacing as required to avoid piles.

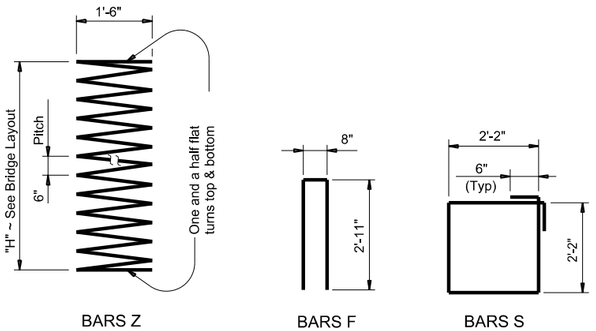


EARWALL CAP

CAP END DETAIL



SECTION A-A SECTION B-B



BARS Z BARS F BARS S

FOUNDATION LOADS

Average Span Length	Drilled Shaft Loads (5)		Vertical Pile Loads	
Ft	Tons/DS		Tons/Pile	
	5SB12	5SB15	5SB12	5SB15
25	57	61	34	37
30	66	71	40	42
35	73	79	44	47
40	80	87	48	52
45		94		57
50		102		61

TABLE OF ESTIMATED QUANTITIES (3)

3 COLUMN BENT

Bar	No.	Size	Length	Weight
A	8	#11	27'-9"	1,180
E	4	#4	2'-2"	6
F	14	#4	6'-6"	61
S	34	#5	9'-8"	343
T	4	#5	27'-9"	116
V	24	#7	26'-3"	1,288
Z	3	#3	242'-2"	273
Reinforcing Steel			Lb	3,267
Cl "C" Conc (Cap)			CY	6.6
Cl "C" Conc (Column)			CY	8.4

TABLE OF ESTIMATED QUANTITIES

5 PILE BENT

Bar	No.	Size	Length	Weight
A	5	#11	27'-9"	737
E	4	#4	2'-2"	6
F	14	#4	6'-6"	61
S	34	#5	9'-8"	343
T	4	#5	27'-9"	116
Reinforcing Steel			Lb	1,263
Cl "C" Conc (Cap)			CY	6.6

TABLE OF MAXIMUM ALLOWABLE EXPOSED PILE HEIGHTS AND PILE LOADS (4)

Pile Type		Max Ht	Max Load
Concrete	Steel	Ft	Tons/Pile
16" Sq	HP14x73	16	75
18" Sq	HP14x117 (6)	20	90

(1) Top of cap elevations are based on section depths shown on Span Details.

(2) ½" preformed bituminous fiber material between slab beam and earwall. Bond to earwall with an approved adhesive. Cast inside face of earwall perpendicular to cap. (Typ)

(3) Quantities shown are based on an "H" value of 24 feet. For each linear foot variation in "H" value, make the following adjustments:
Bars V length, 1'-0"
Bars Z length, 9'-6"
Reinforcing Steel, 60 Lb
Class "C" conc (column), 0.35 CY

(4) This standard may not be used for "H" heights exceeding 24 feet or exposed pile heights exceeding the values shown in the table. In areas of very soft soil or where scour is anticipated, allowable "H" heights or exposed pile heights must be evaluated by the Engineer prior to the use of this standard.

(5) Foundation Loads based on "H" = 24 feet.

(6) When HP14x117 steel piling is specified in the plans, the Contractor has the option of furnishing either HP14x117 or HP16x101 steel piling.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Bent selected must be based on the average span length rounded up to the next 5-foot increment.

For pile bents supporting unequal spans, the shorter span cannot be less than 80 percent of the longer span.

See Bridge Layout for foundation type, size, and length.

See Common Foundation Details (FD) standard sheet for all foundation details and notes.

These bent details do not support the use of multi-pile footings shown on the FD standard.

These bent details may be used with standard SPSB-24 only.

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

MATERIAL NOTES:

Provide Class C concrete (f'c = 3,600 psi).

Provide Class C (HPC) concrete if shown elsewhere in the plans.

Provide Grade 60 reinforcing steel.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

INTERIOR BENTS

PRESTR CONCRETE SLAB BEAM

24' ROADWAY

BPSB-24

FILE: psbste21-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0903	29	027, ETC	CR 232, ETC
	DIST	COUNTY		SHEET NO.
	WFS	ARCHER		54

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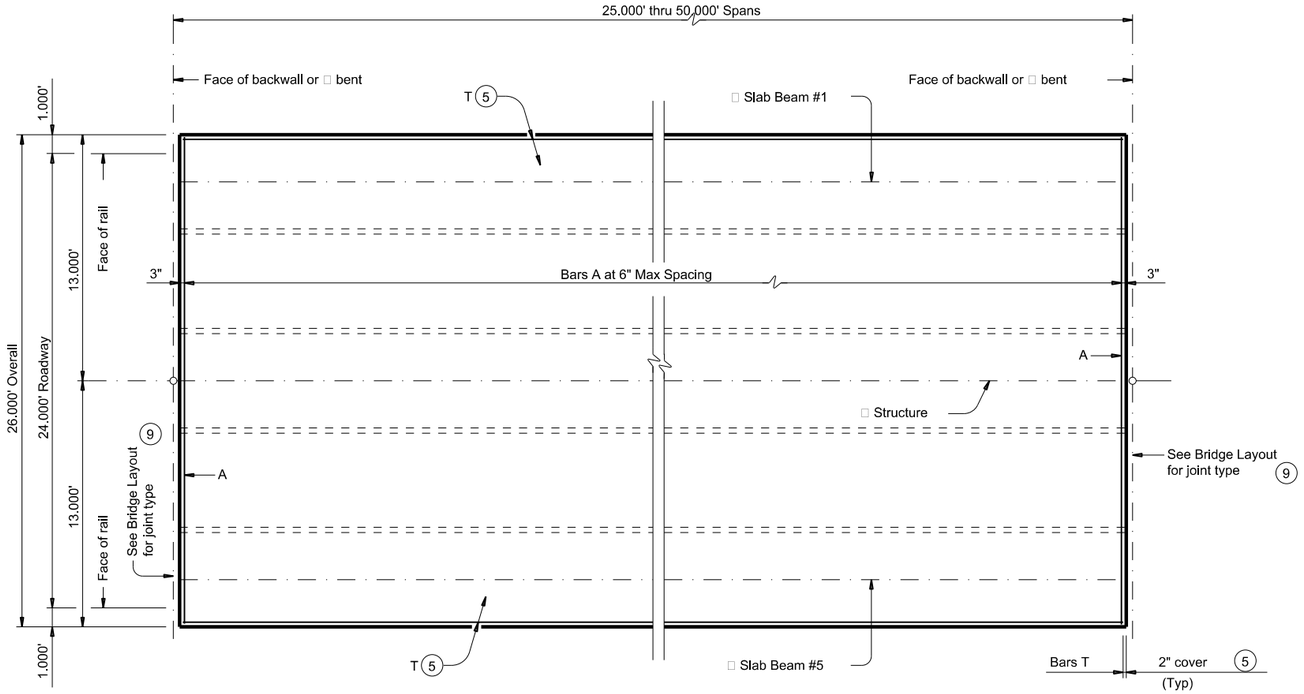
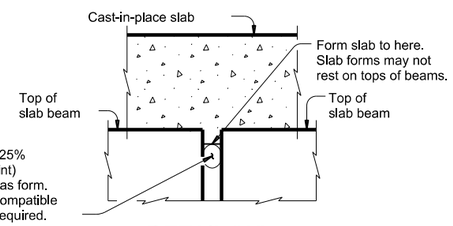
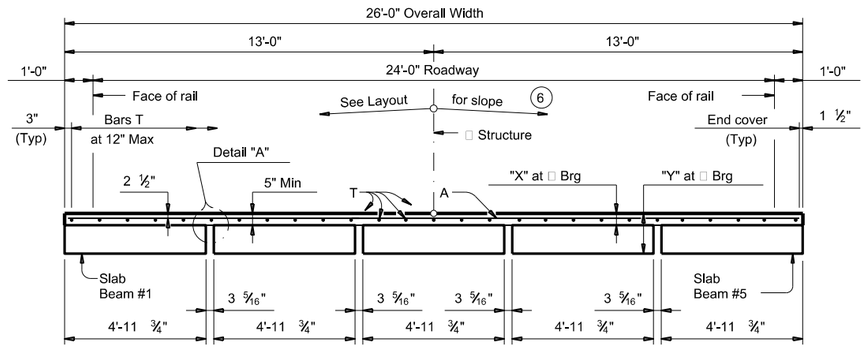


PLAN



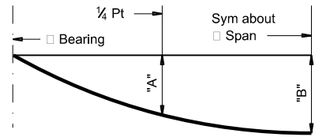
DETAIL "A"



TYPICAL TRANSVERSE SECTION

TABLE OF VARIABLE VALUES

Span Length	Beam Type	Dead Load Deflection		Section Depths (3)	
		"A"	"B"	"X"	"Y"
Ft	(1)	Ft	Ft	In	Ft/In
25	5SB12	0.004	0.005	5 ¼"	1'-5 ¼"
30	5SB12	0.008	0.011	5 ½"	1'-5 ½"
35	5SB12	0.015	0.021	6"	1'-6"
40	5SB12	0.026	0.036	6 ½"	1'-6 ½"
25	5SB15	0.002	0.003	5 ¼"	1'-8 ¼"
30	5SB15	0.004	0.006	5 ½"	1'-8 ½"
35	5SB15	0.008	0.011	5 ½"	1'-8 ½"
40	5SB15	0.013	0.019	5 ¾"	1'-8 ¾"
45	5SB15	0.022	0.030	6 ½"	1'-9 ½"
50	5SB15	0.034	0.047	7"	1'-10"

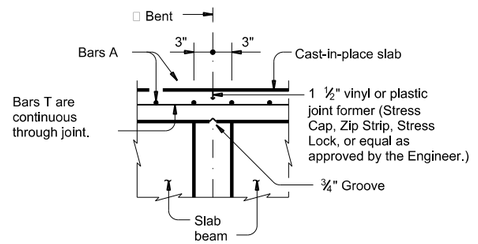


DEAD LOAD DEFLECTION DIAGRAM

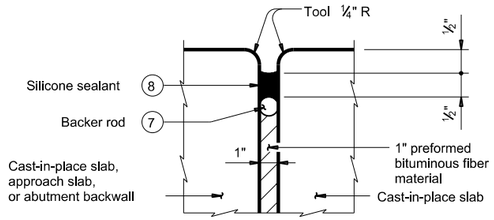
NOTE: Deflections shown are due to concrete slab only (E = 5,000 ksi). Calculated deflections shown are theoretical and actual dimensions may vary. Adjust based on field verification.

BAR TABLE

BAR	SIZE
A	#5
T	#4



CONTINUOUS SLAB DETAIL



TYPE A JOINT DETAIL (9)

TABLE OF ESTIMATED QUANTITIES

SPAN LENGTH	REINF CONCRETE SLAB (SLAB BEAM)	PRESTR CONC SLAB BEAM (5SB12 OR 5SB15) (1)			TOTAL REINF STEEL (2)
		ABUT TO INT BT	INT BT TO INT BT	ABUT TO ABUT	
Ft	SF	LF (4)	LF (4)	LF (4)	Lb
25	650	122.50	122.50	122.50	1,820
30	780	147.50	147.50	147.50	2,180
35	910	172.50	172.50	172.50	2,550
40	1,040	197.50	197.50	197.50	2,910
45	1,170	222.50	222.50	222.50	3,280
50	1,300	247.50	247.50	247.50	3,640

(1) See Bridge Layout for beam type used in the superstructure. These standards do not provide for the use of both SB12 and SB15 beams within the same structure.

(2) Reinforcing steel weight is calculated using an approximate factor of 2.8 Lbs/SF.

(3) Based on theoretical beam camber, dead load deflections of 5" cast-in-place concrete slab and a constant grade. The Contractor will adjust these values for any vertical curve.

(4) Fabricator will adjust beam lengths for beam slopes as required.

(5) Where slab is continuous over Interior Bents, Bars T are continuous through Joint. See "Continuous Slab Detail".

(6) This standard does not provide for changes in roadway cross-slopes within the structure.

(7) 1 ¼" backer rod must be compatible with joint sealant. Use of multiple pieces to create a backer rod cross section is not permitted. Top of backer rod must be convex as shown.

(8) Class 7 silicone sealant that conforms to DMS-6310. Install when ambient temperature is between 55°F and 85°F and rising. Engineer to determine allowable hours for sealant application.

(9) See Bridge Layout for expansion joint locations. If using Type A expansion joints, the maximum distance between joints is 100 feet. Type A joints are subsidiary to Item 422, "Concrete Superstructures".

GENERAL NOTES:
Designed according to AASHTO LRFD Bridge Design Specifications.
Two- or three-span units, with slab continuous over interior bents, may be formed with the details shown on this sheet.
See applicable rail details for rail anchorage in slab.
This standard does not support the use of transition bents.

Cover dimensions are clear dimensions, unless noted otherwise.

MATERIAL NOTES:
Provide Class S concrete (f'c = 4,000 psi).
Provide Class S (HPC) concrete if shown elsewhere in the plans.
Provide Grade 60 reinforcing steel.
Provide bar laps, where required, as follows:

Uncoated	~ #4 = 1'-7"
	~ #5 = 2'-0"
Epoxy coated	~ #4 = 2'-5"
	~ #5 = 3'-0"

Deformed welded wire reinforcement (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars A or T unless noted otherwise.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE SLAB BEAM SPANS (TY SB12 OR SB15)

24' ROADWAY

SPSB-24

FILE: psbste30-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK:TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0903	29	027, ETC	CR 232, ETC
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	WFS	ARCHER		55

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DESIGNED BEAMS (STRAIGHT STRANDS)

STRUCTURE	SPAN LENGTH (ft)	BEAM NO.	BEAM TYPE	PRESTRESSING STRANDS: NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" ℄ (in)	"e" END (in)	TOT NO. DEB	DEBONDED STRANDS PER ROW: DIST FROM BOTTOM (in)	NO. OF STRANDS: TOTAL	NO. OF STRANDS: DE-BONDED	NUMBER OF STRANDS DEBONDED TO (ft from end): 3	6	9	12	15	CONCRETE: RELEASE STRGTH ① f'ci (ksi)	MINIMUM 28 DAY COMP STRGTH f'c (ksi)
24' ROADWAY SB12 BEAM	25	ALL	5SB12		8	0.6	270	3.50	3.50	0	2.5	8	0	0	0	0	0	0	4.000	5.000
	30	ALL	5SB12		10	0.6	270	3.50	3.50	0	2.5	10	0	0	0	0	0	0	4.000	5.000
	35	ALL	5SB12		14	0.6	270	3.50	3.50	0	2.5	14	0	0	0	0	0	0	4.000	5.000
	40	ALL	5SB12		18	0.6	270	3.50	3.50	0	2.5	18	0	0	0	0	0	0	4.000	5.000
24' ROADWAY SB15 BEAM	25	ALL	5SB15		8	0.6	270	5.00	5.00	0	2.5	8	0	0	0	0	0	0	4.000	5.000
	30	ALL	5SB15		8	0.6	270	5.00	5.00	0	2.5	8	0	0	0	0	0	0	4.000	5.000
	35	ALL	5SB15		10	0.6	270	5.00	5.00	0	2.5	10	0	0	0	0	0	0	4.000	5.000
	40	ALL	5SB15		14	0.6	270	5.00	5.00	0	2.5	14	0	0	0	0	0	0	4.000	5.000
	45	ALL	5SB15		18	0.6	270	5.00	5.00	2	2.5	18	2	2	0	0	0	0	4.000	5.000
	50	ALL	5SB15		24	0.6	270	5.00	5.00	8	2.5	24	8	4	4	0	0	0	4.000	5.000
28' ROADWAY SB12 BEAM	25	ALL	5SB12		8	0.6	270	3.50	3.50	0	2.5	8	0	0	0	0	0	0	4.000	5.000
	30	ALL	5SB12		10	0.6	270	3.50	3.50	0	2.5	10	0	0	0	0	0	0	4.000	5.000
	35	ALL	5SB12		12	0.6	270	3.50	3.50	0	2.5	12	0	0	0	0	0	0	4.000	5.000
	40	ALL	5SB12		18	0.6	270	3.50	3.50	0	2.5	18	0	0	0	0	0	0	4.000	5.000
28' ROADWAY SB15 BEAM	25	ALL	5SB15		8	0.6	270	5.00	5.00	0	2.5	8	0	0	0	0	0	0	4.000	5.000
	30	ALL	5SB15		8	0.6	270	5.00	5.00	0	2.5	8	0	0	0	0	0	0	4.000	5.000
	35	ALL	5SB15		10	0.6	270	5.00	5.00	0	2.5	10	0	0	0	0	0	0	4.000	5.000
	40	ALL	5SB15		14	0.6	270	5.00	5.00	0	2.5	14	0	0	0	0	0	0	4.000	5.000
	45	ALL	5SB15		18	0.6	270	5.00	5.00	2	2.5	18	2	2	0	0	0	0	4.000	5.000
	50	ALL	5SB15		22	0.6	270	5.00	5.00	6	2.5	22	6	4	2	0	0	0	4.000	5.000
30' ROADWAY SB12 BEAM	25	ALL	4SB12		6	0.6	270	3.50	3.50	0	2.5	6	0	0	0	0	0	0	4.000	5.000
	30	ALL	4SB12		8	0.6	270	3.50	3.50	0	2.5	8	0	0	0	0	0	0	4.000	5.000
	35	ALL	4SB12		10	0.6	270	3.50	3.50	0	2.5	10	0	0	0	0	0	0	4.000	5.000
	40	ALL	4SB12		14	0.6	270	3.50	3.50	0	2.5	14	0	0	0	0	0	0	4.000	5.000
30' ROADWAY SB15 BEAM	25	ALL	4SB15		6	0.6	270	5.00	5.00	0	2.5	6	0	0	0	0	0	0	4.000	5.000
	30	ALL	4SB15		6	0.6	270	5.00	5.00	0	2.5	6	0	0	0	0	0	0	4.000	5.000
	35	ALL	4SB15		8	0.6	270	5.00	5.00	0	2.5	8	0	0	0	0	0	0	4.000	5.000
	40	ALL	4SB15		12	0.6	270	5.00	5.00	0	2.5	12	0	0	0	0	0	0	4.000	5.000
	45	ALL	4SB15		14	0.6	270	5.00	5.00	2	2.5	14	2	2	0	0	0	0	4.000	5.000
	50	ALL	4SB15		18	0.6	270	5.00	5.00	4	2.5	18	4	2	2	0	0	0	4.000	5.000

OPTIONAL DESIGN

STRUCTURE	DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I) fct (ksi)	DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III) fcb (ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (kip-ft)	LIVE LOAD DISTRIBUTION FACTOR ② Moment	LIVE LOAD DISTRIBUTION FACTOR ② Shear
24' ROADWAY SB12 BEAM	0.914	-1.217	448	0.450	0.450
	1.292	-1.685	530	0.450	0.450
	1.730	-2.219	675	0.450	0.450
	2.218	-2.796	820	0.440	0.440
24' ROADWAY SB15 BEAM	0.725	-0.897	551	0.450	0.450
	1.020	-1.244	574	0.450	0.450
	1.361	-1.640	708	0.450	0.450
	1.739	-2.068	864	0.440	0.440
	2.179	-2.574	1054	0.440	0.440
	2.680	-3.153	1276	0.440	0.440
28' ROADWAY SB12 BEAM	0.903	-1.184	444	0.430	0.430
	1.276	-1.639	508	0.430	0.430
	1.708	-2.159	647	0.430	0.430
	2.200	-2.744	799	0.430	0.430
28' ROADWAY SB15 BEAM	0.716	-0.874	529	0.430	0.430
	1.007	-1.212	570	0.430	0.430
	1.343	-1.598	680	0.430	0.430
	1.725	-2.032	842	0.430	0.430
	2.149	-2.508	1013	0.420	0.420
	2.643	-3.073	1227	0.420	0.420
30' ROADWAY SB12 BEAM	0.904	-1.187	341	0.340	0.340
	1.277	-1.646	407	0.340	0.340
	1.711	-2.169	518	0.340	0.340
	2.205	-2.758	640	0.340	0.340
30' ROADWAY SB15 BEAM	0.723	-0.888	431	0.350	0.350
	1.017	-1.231	438	0.350	0.350
	1.346	-1.605	545	0.340	0.340
	1.729	-2.043	675	0.340	0.340
	2.166	-2.542	823	0.340	0.340
	2.665	-3.115	998	0.340	0.340

LOAD RATING FACTORS

STRUCTURE	STRENGTH I Inv	STRENGTH I Opr	SERVICE III Inv
24' ROADWAY SB12 BEAM	1.40	1.82	1.71
	1.25	1.62	1.29
	1.33	1.73	1.23
	1.34	1.74	1.12
24' ROADWAY SB15 BEAM	1.77	2.29	2.41
	1.23	1.59	1.45
	1.15	1.49	1.14
	1.32	1.71	1.19
	1.34	1.73	1.08
	1.33	1.72	1.11
28' ROADWAY SB12 BEAM	1.47	1.91	1.80
	1.32	1.71	1.37
	1.18	1.53	1.02
	1.37	1.78	1.17
28' ROADWAY SB15 BEAM	1.85	2.40	2.53
	1.29	1.67	1.53
	1.21	1.57	1.22
	1.36	1.76	1.24
	1.41	1.82	1.16
	1.33	1.72	1.01
30' ROADWAY SB12 BEAM	1.38	1.79	1.67
	1.32	1.71	1.37
	1.24	1.60	1.08
	1.34	1.73	1.11
30' ROADWAY SB15 BEAM	1.69	2.19	2.32
	1.16	1.50	1.37
	1.21	1.57	1.21
	1.47	1.91	1.38
	1.33	1.73	1.06
	1.32	1.71	1.02

① Based on the following allowable stresses (ksi):

Compression = 0.65 f'ci

Tension = 0.24 $\sqrt{f'ci}$

Optional designs must likewise conform.

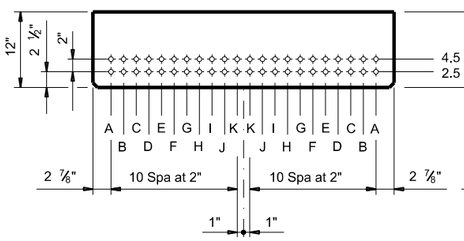
② Portion of full HL93.

DESIGN NOTES:

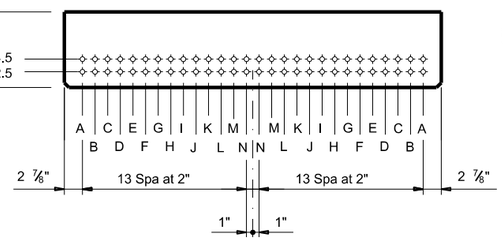
Designed according to AASHTO LRFD Bridge Design Specifications.
Load rated using Load and Resistance Factor Rating according to AASHTO Manual for Bridge Evaluation.
Prestress losses for the designed beams have been calculated for a relative humidity of 60 percent. Optional designs must likewise conform.

FABRICATION NOTES:

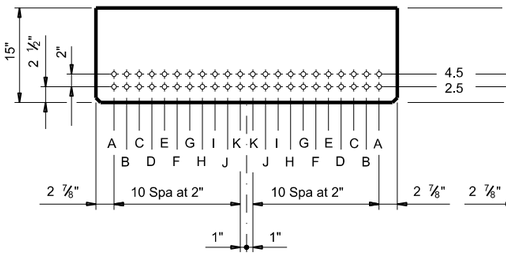
Provide Class H concrete.
Provide Grade 60 reinforcing steel.
Use low relaxation strands, each pretensioned to 75 percent of fpu.
Full-length debonded strands are not permitted in positions "A" and "B".
Strand debonding must comply with Item 424.4.2.2.2.4.
When shown on this sheet, the Fabricator has the option of furnishing either the designed beam or an approved optional beam design. All optional design submittals and shop drawings must be signed, sealed and dated by a Professional Engineer registered in the State of Texas.
Locate strands for the designed beam as low as possible on the 2" grid system unless a non-standard strand pattern is indicated. Fill row "2.5", then row "4.5". Place strands within a row as follows:
1) Locate a strand in each "A" position.
2) Place strand symmetrically about vertical centerline of beam.
3) Space strands as equally as possible across the entire width.
Do not debond strands in position "A". Distribute debonded strands symmetrically about the vertical centerline. Increase debonded lengths working outward, with debonding staggered in each row.



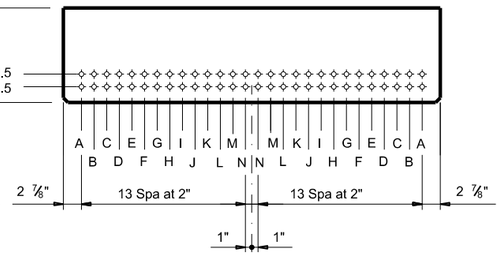
TxDOT 4SB12 SLAB BEAM



TxDOT 5SB12 SLAB BEAM



TxDOT 4SB15 SLAB BEAM



TxDOT 5SB15 SLAB BEAM

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

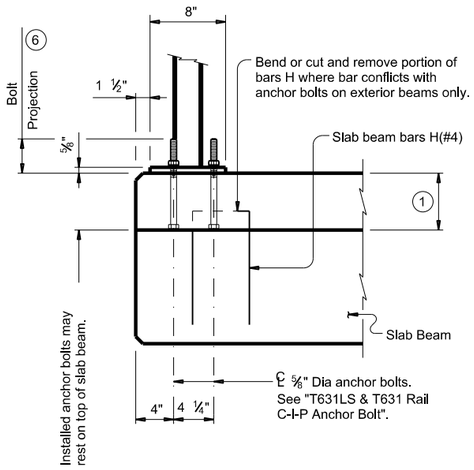
PRESTRESSED CONCRETE SLAB BEAM STD DESIGNS

(TY SB12 OR SB15)

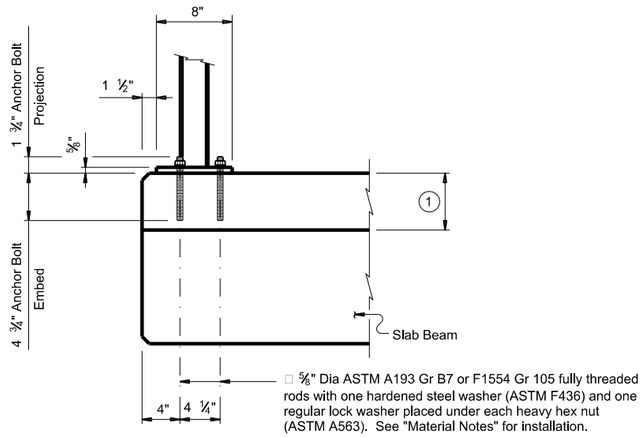
24', 28' & 30' ROADWAY

PSBSD

FILE: psbsts08-21.dgn	DN: SRW	CK: BMP	DW: SFS	CK: SDB
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-21: Added load rating.	0903	29	027, ETC	CR 232, ETC
	DIST	COUNTY		SHEET NO.
	WFS	ARCHER		56



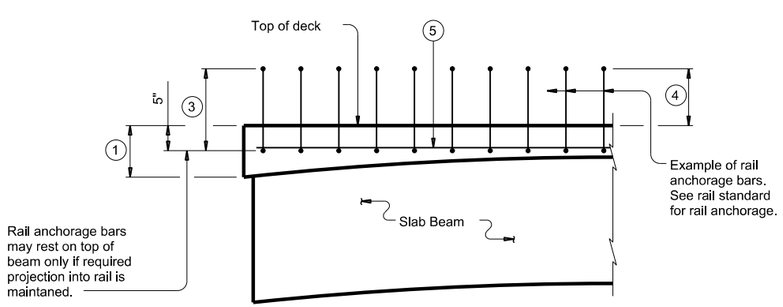
CAST-IN-PLACE ANCHORAGE OPTION



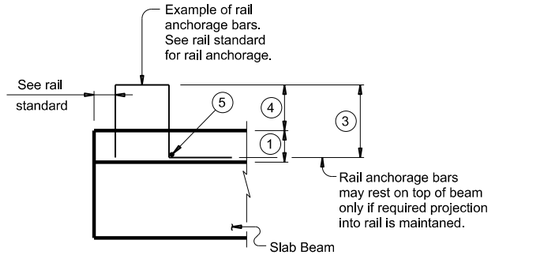
ADHESIVE ANCHORAGE OPTION

T631LS & T631 RAIL ANCHORAGE PLACEMENT (2)(7)

1. Cast-in-place slab thickness varies due to beam camber (5" minimum).
2. Replace cast-in-place anchor bolts shown on T631LS and T631 Rail standard with an adhesive anchor system or cast-in-place anchor bolts shown on this sheet.
3. Bar length shown on rail standard, minus 1 ¼". Adjust bar length for a raised sidewalk.
4. See rail standard for projection from finished grade or top of sidewalk.
5. Place additional (#5) longitudinal bar.
6. Excess bolt length has been provided to accommodate a variable slab thickness due to beam camber. If slab thickness on span details exceed 7", bolt length must be increased accordingly. After posts have been set and bolts tightened, bolt projection above nuts of more than ½" must be cut off and painted with two coats of zinc-rich paint conforming to the Item 445 "Galvanizing".
7. Distance from end of top outside edge of slab to center of first bolt group can not be less than 9", except: 15° Skew: 1'-0" (acute corner only)
   30° Skew: 1'-3" (acute corner only)
8. Location of rail expansion joint must be at the intersection of □ slab expansion joint, □ rail footprint and perpendicular to slab outside edge.
9. Cross-hatched area must have ½" preformed bituminous fiber material under concrete rail, as shown.



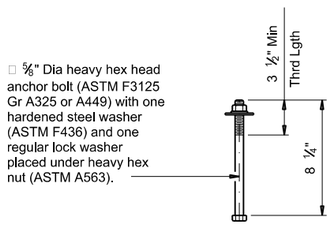
PART SPAN ELEVATION



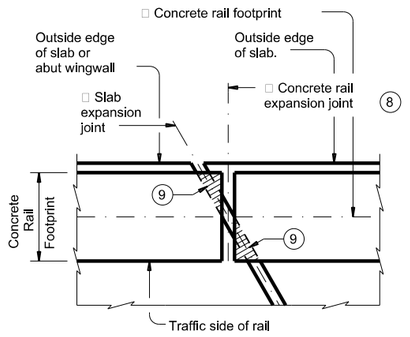
SECTION

TYPICAL CONCRETE RAIL ANCHORAGE

(Showing typical concrete rail anchorage)



T631LS & T631 RAIL C-I-P ANCHOR BOLT



PLAN OF CONCRETE RAILS AT EXPANSION JOINTS

CONSTRUCTION NOTES:

Rail anchorage bars may be field bent as required to clear rail reinforcing or provide minimum cover shown on standard rail detail sheets.

Test adhesive anchors in accordance with Item 450.3.3, "Tests". Test 3 anchors per 100 anchors installed. Perform corrective measures to provide adequate capacity if any of the tests do not meet the required test load. Repair damage from testing as directed.

MATERIAL NOTES:

Galvanize all steel components of steel rail system.

Provide Grade 60 reinforcing steel.

Cast-in-place anchorage system for T631LS and T631 Rail must be ⅝" Dia heavy hex head anchor bolts (ASTM F3125 Gr 325 or A449) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut. Nuts must conform to ASTM A563 requirements. Embed anchor bolts 4 ½" minimum.

Adhesive anchors for T631LS and T631 Rail must be ⅝" Dia ASTM A193 Gr B7 or F1554 Gr 105 fully threaded rods with one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements. Embed fully threaded rod into slab and/or abutment wingwall using a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 4 ¾". Anchor adhesive chosen must be able to achieve a nominal bond strength in tension of a single anchor, Na, of 8 kips (edge distance must be accounted for). Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing."

Epoxy coat or galvanize reinforcing steel shown on this standard if rail reinforcement is epoxy coated or galvanized.

GENERAL NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specifications.

This standard is for use with structures with a 5" minimum cast-in-place concrete slab.

This standard may require modification for interior rails. This standard does not apply to median barriers.

This standard does not provide details for Type T221P, T224, T80HT, T80SS, C412, PR11, PR22 and PR3 rails on slab beam bridges.

See rail standards for approved speed restrictions, notes and details not shown.

Cover dimensions are clear dimensions, unless noted otherwise.

Texas Department of Transportation

Bridge Division Standard

RAIL ANCHORAGE DETAILS

PRESTR CONCRETE SLAB BEAMS

PSBRA

FILE: psbste07-18.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0903	29	027, ETC	CR 232, ETC
03-18: Updated adhesive anchor notes.	DIST	COUNTY		SHEET NO.
	WFS	ARCHER		57

DATE: 10/24/2022 11:30:57 AM
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DATE: 10/24/2022 11:30:59 AM
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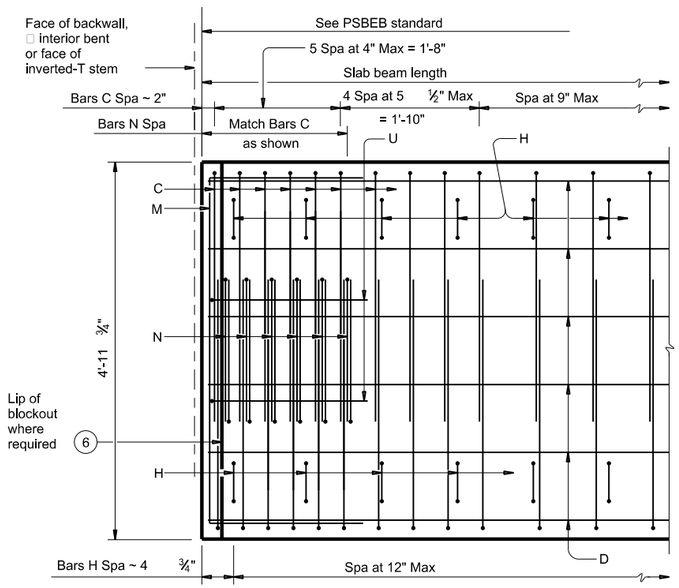
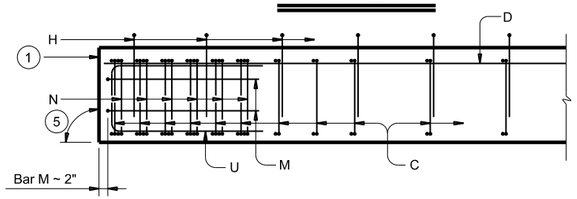
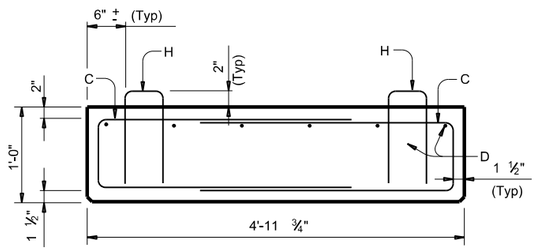


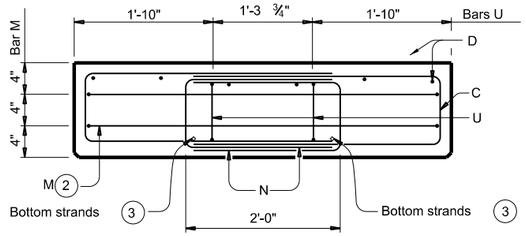
PART PLAN



ELEVATION

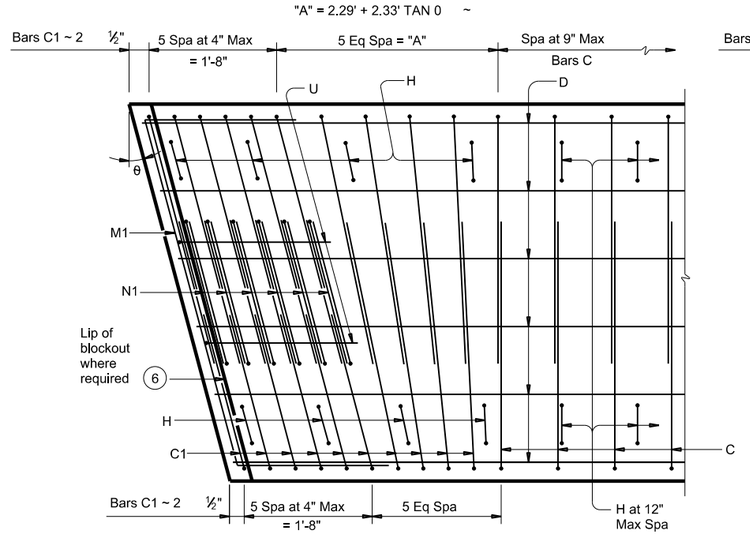


SECTION



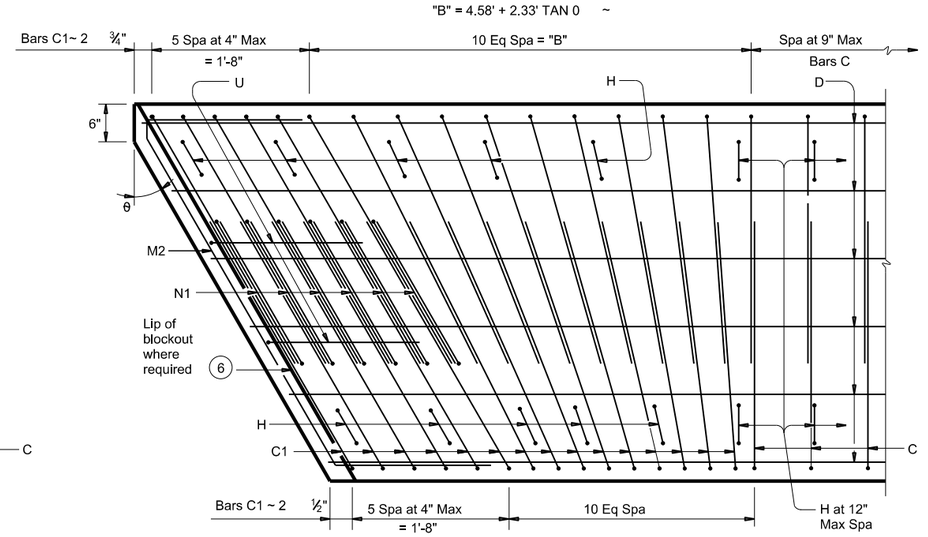
END MAT REINFORCING

Bars H not shown for clarity.



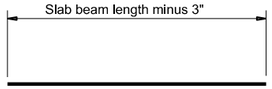
PART SKEW PLAN

(Showing 0 over 0° to 15° Skew)

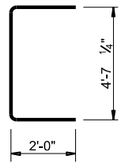


PART SKEW PLAN

(Showing 0 over 15° to 30° Skew)



BARS D(#6)



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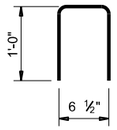

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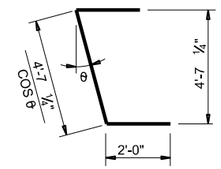

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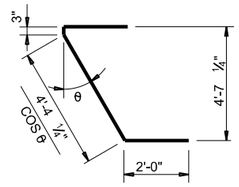
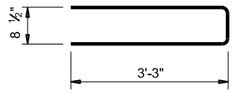
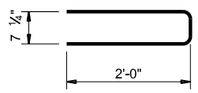


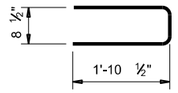
BARS M2(#4)



BARS C(#4)



BARS U(#5)



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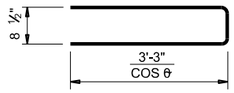

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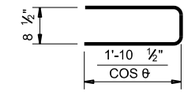

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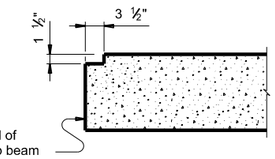


ELEVATION OF BLOCKOUT (6)

BEAM PROPERTIES			
Area	in	2	717.0
Y top	in		6.00
Y bott	in		6.00
I	in	4	8,604
Weight (4)	lb/ft		747

(1) See End Mat Reinforcing detail.

(2) Adjust bars M vertically to avoid strands.

(3) See sheet PSBND or PSBSD for strand locations.

(4) Assumes 150 pcf weight density of concrete.

(5) 90° at conventional interior bents. End of beam must be vertical at abutment backwall and inverted-T stem.

(6) Blockout required at armor joint (AJ) and sealed expansion joint (SEJ) locations to accommodate joint anchorage.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Provide Class H concrete. Provide Class H (HPC) if shown elsewhere in the plans.

Provide Grade 60 reinforcing steel.

An equal area of welded wire reinforcement (WWR) (ASTM 1064) may be substituted for bars C and D if approved by the Engineer.

These details can be used for any skew angle up to a maximum of 30 degrees.

Chamfer all exposed corners ¾" or round to a ¾" radius.

Details are drawn showing right forward skew. See Bridge Layout for actual direction.

Cover dimensions are clear dimensions, unless noted otherwise.

Reinforcing bar dimensions shown are out-to-out of bar.

HL93 LOADING

Texas Department of Transportation

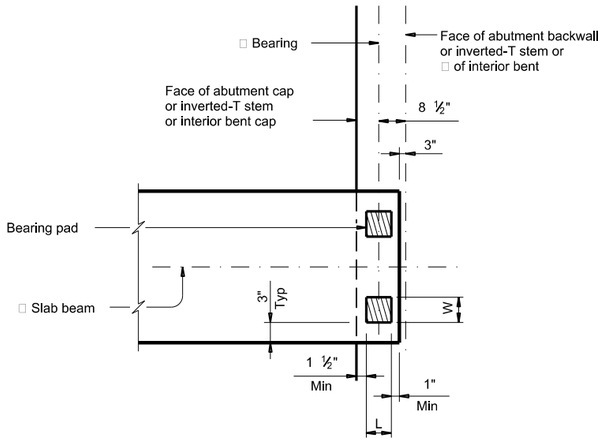
Bridge Division Standard

PRESTRESSED CONCRETE SLAB BEAM DETAILS

(TYPE 5SB12)

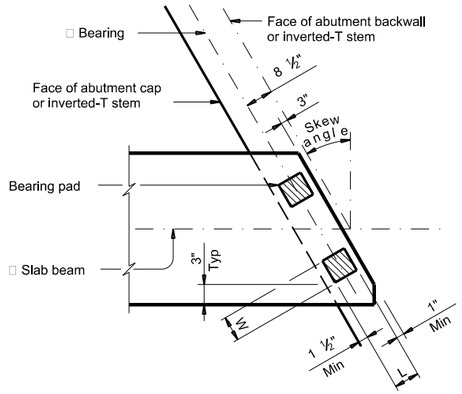
PSB-5SB12

FILE: psbsts03-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0903	29	027, ETC	CR 232, ETC
	DIST	COUNTY		SHEET NO.
	WFS	ARCHER		58



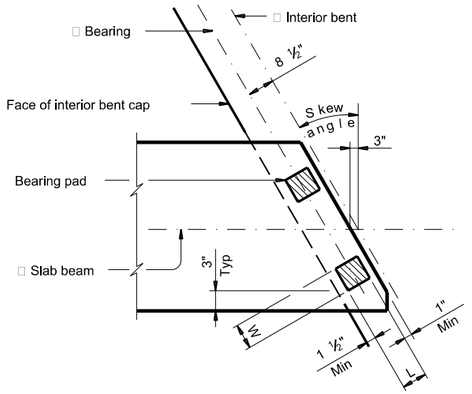
TWO-PAD DETAIL PLAN

(At abutment or inverted-T cap or at interior bent)



TWO-PAD DETAIL SKEW PLAN

(At abutment or inverted-T cap)



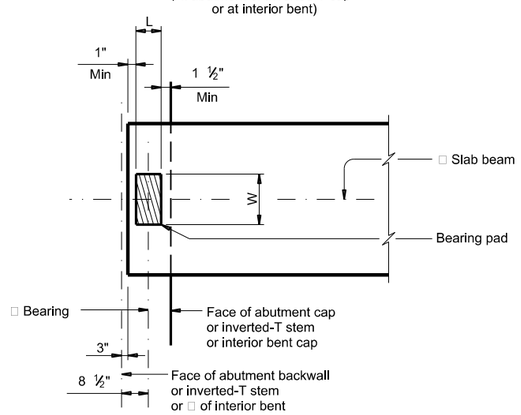
TWO-PAD DETAIL SKEW PLAN

(At interior bent)

TABLE OF BEARING PAD DIMENSIONS (ALL PRESTR CONC SLAB BM TYPES)					
One-Pad (Ty SB1-"N") (2)			Two-Pad (Ty SB2-"N") (2)		
W	L	T	W	L	T
14"	7"	2"	7"	7"	2"

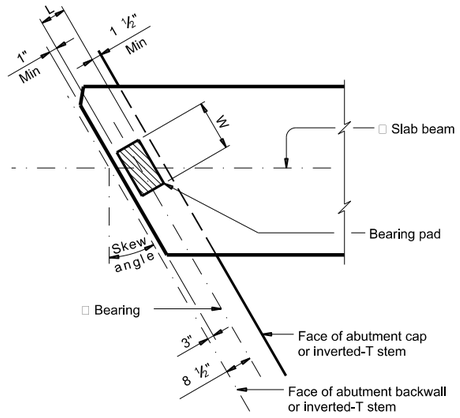
Pad sizes shown are applicable for the following conditions:

(1) All one, two and three span units where the minimum span length is not less than 25' and the maximum span is not more than 50'.
(2) Skews less than or equal to 30°.



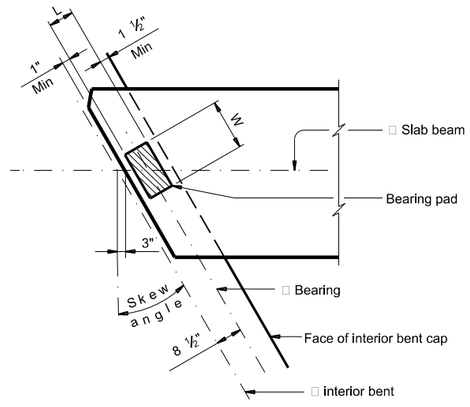
ONE-PAD DETAIL PLAN

(At abutment or inverted-T cap or at interior bent)



ONE-PAD DETAIL SKEW PLAN

(At abutment or inverted-T cap)



ONE-PAD DETAIL SKEW PLAN

(At interior bent)

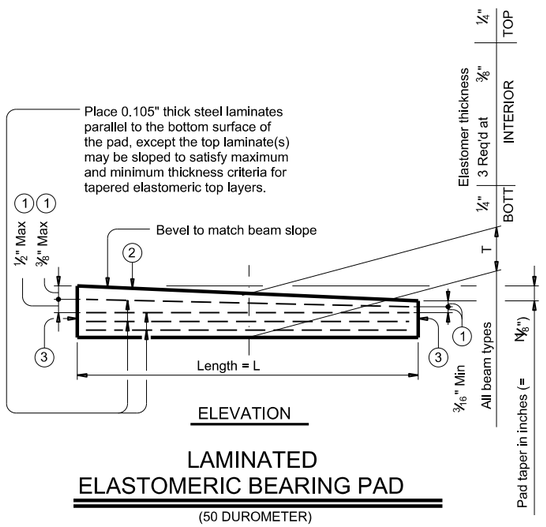
GENERAL NOTES:

These details accommodate skew angles up to 30°.

Shop drawings for approval are required.

A bearing layout which identifies location and orientation of all bearings must be developed by the bearing fabricator. Permanently mark each bearing in accordance with the bearing layout. A copy of the bearing layout is to be provided to the Engineer.

Cost of furnishing and installing elastomeric bearings must be included in unit price bid for "Prestressed Concrete Slab Beams".



ELEVATION

LAMINATED
ELASTOMERIC BEARING PAD

(50 DUROMETER)

ELASTOMERIC BEARING PAD
PLACEMENT AND BEAM END DIAGRAMS

Place one bearing pad at forward station beam end.
Place two bearing pads at back station beam end.

(1) Maximum and minimum layer thicknesses shown are for elastomer only, on tapered layers.

(2) Indicate BEARING TYPE on all pads. For tapered pads, locate BEARING TYPE on the high side. The Fabricator must include the value of "N" (amount of taper in ⅛" increments) in this mark.
Examples: N=0, (for 0" taper)
N=1, (for ⅛" taper)
N=2, (for ¼" taper)
(etc.)
Fabricated pad top surface slope must not vary from plan beam slope by more than $\left(\frac{0.0625 \text{ IN/IN}}{\text{Length}}\right)$

(3) Locate permanent mark here.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

ELASTOMERIC BEARING AND BEAM END DETAILS

PRESTR CONCRETE SLAB BEAM

PSBEB

FILE: psbste06-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0903	29	027, ETC	CR 232, ETC
	DIST	COUNTY		SHEET NO.
	WFS	ARCHER		59

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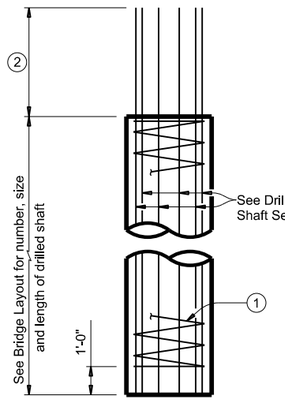
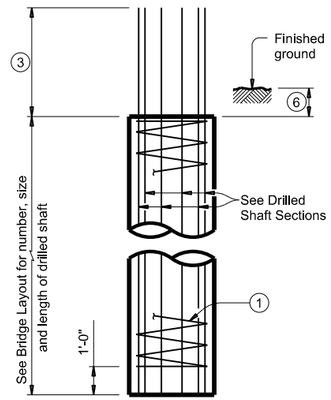
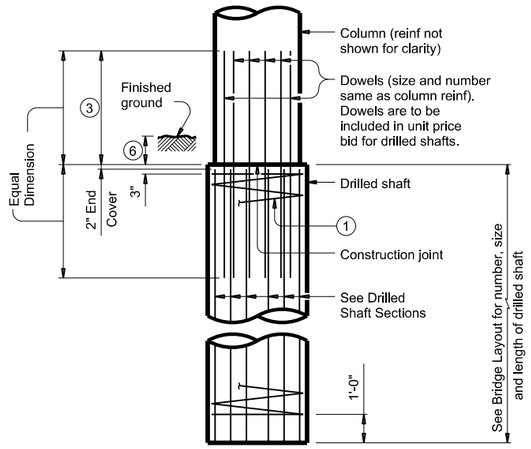


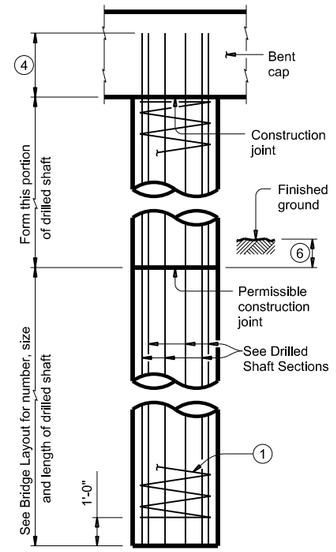
ABUTMENTS, WINGWALLS AND MULTI-DRILLED SHAFT FOOTINGS



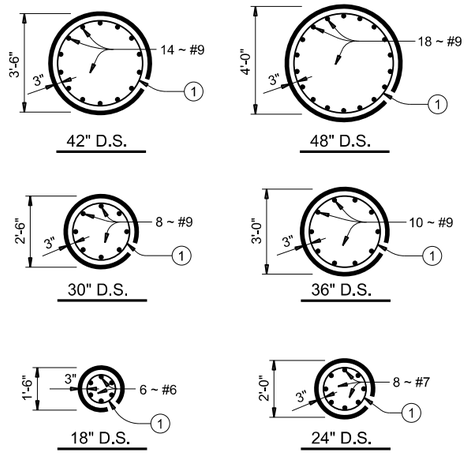
INTERIOR BENTS DRILLED SHAFT DIA EQUAL TO COLUMN DIA



INTERIOR BENTS DRILLED SHAFT DIA GREATER THAN COLUMN DIA



OPTIONAL INTERIOR BENT DRILLED SHAFT DETAIL (5)

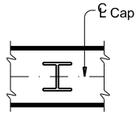


DRILLED SHAFT SECTIONS

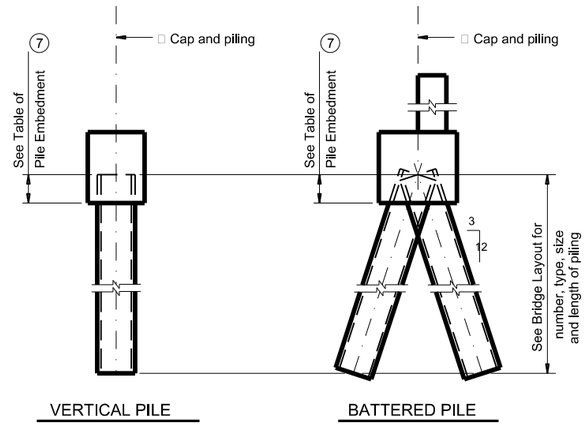
DRILLED SHAFT DETAILS

TABLE OF PILE EMBEDMENT	
Pile Type	Embedment Depth (Ft)
16" Sq Concrete 18" Sq Concrete HP14 Steel HP16 Steel	1'-0"
20" Sq Concrete 24" Sq Concrete HP18 Steel	1'-6"

See Prestressed Concrete Piling (CP) standard for additional details on concrete pile embedment.

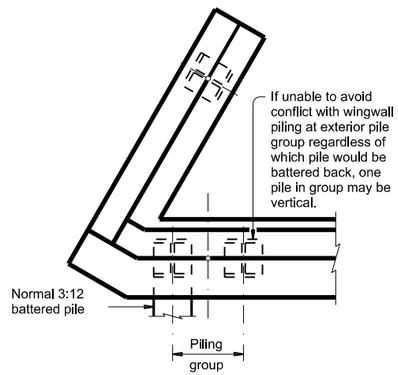


ORIENTATION OF STEEL H-PILING

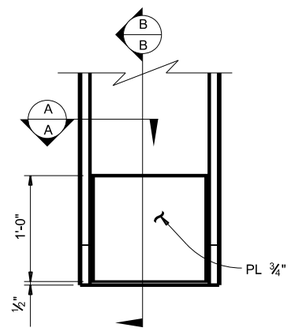


VERTICAL PILE BATTERED PILE

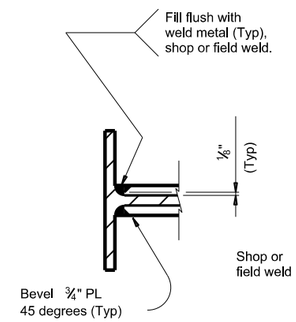
PILING DETAILS
(Concrete or steel H)



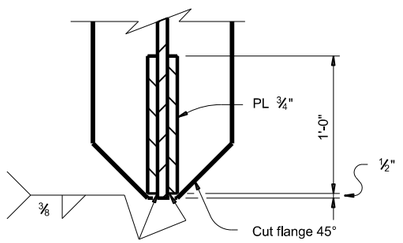
DETAIL "A"
(Showing plan view of a 30° skewed abutment)



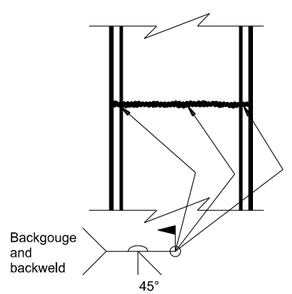
ELEVATION

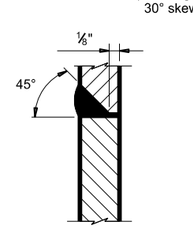


SECTION A-A



SECTION B-B





SECTION THRU FLANGE OR WEB

STEEL H-PILE TIP REINFORCEMENT

See Item 407 "Steel Piling" to determine when tip reinforcement is required and for options to the details shown.

STEEL H-PILE SPLICE DETAIL

Use when required.

(1) #3 spiral at 6" pitch (one and a half flat turns top and bottom).

(2) Min extension into supported element:
#6 Bars = 1'-11"
#7 Bars = 2'-0"
#9 Bars = 2'-3"

(3) Min lap with column reinf:
#7 Bars = 2'-11"
#9 Bars = 3'-9"
#11 Bars = 4'-8"

(4) Min extension into supported element:
#6 Bars = 1'-11"
#7 Bars = 2'-3"
#9 Bars = 2'-9"

(5) Drilled shafts may extend to the bottom of bent caps for "H" heights of 6 ft and less (as shown on the Bridge Layout), if approved. This option can only be used when the drilled shaft diameter equals the column diameter. Obtain approval of the forming method above the ground line prior to construction. No adjustments in payment will be made if this option is used.

(6) 1'-0" Min, unless shown otherwise on plans.

(7) Or as shown on plans.

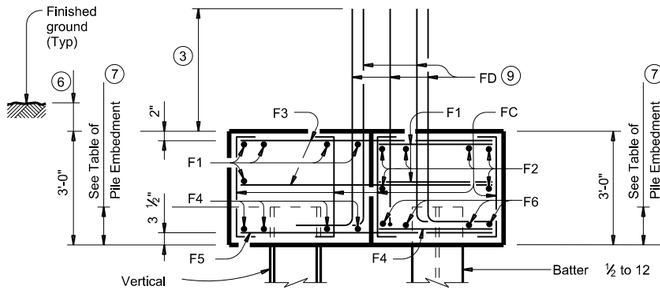
Texas Department of Transportation

Bridge Division Standard

COMMON FOUNDATION DETAILS

FD

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS 01-20: Added #11 bars to the FD bars.	0903	29	027, ETC	CR 232, ETC
	DIST	COUNTY		SHEET NO.
	WFS	ARCHER		60



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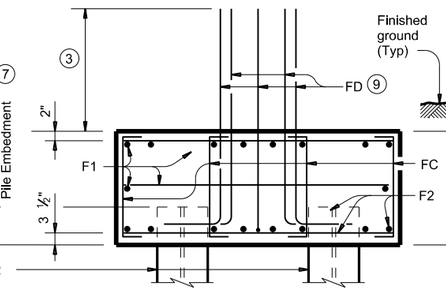

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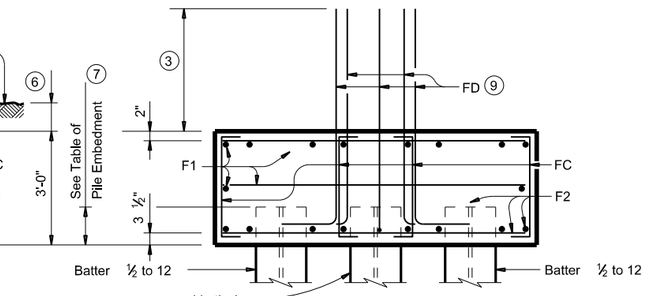

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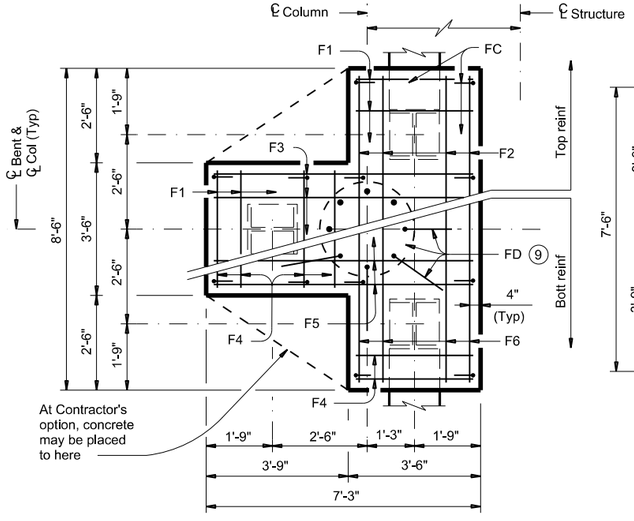
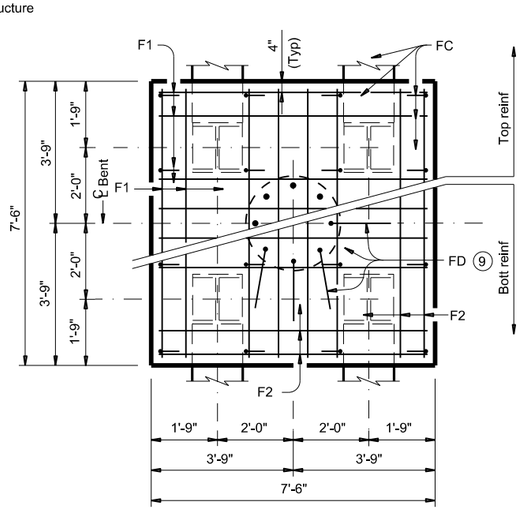


PLAN

THREE PILE FOOTING (8)

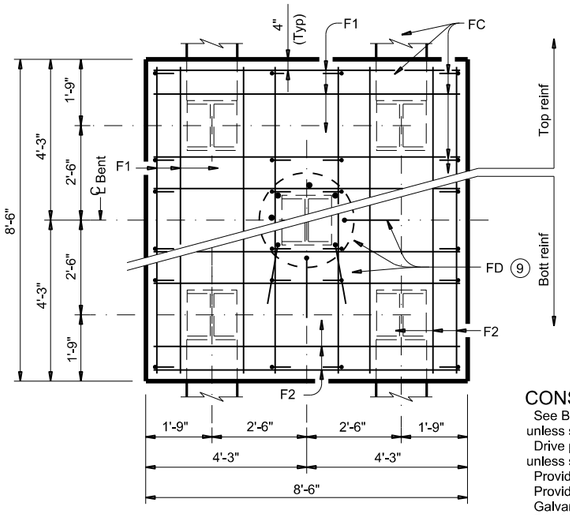
For 36" Dia and smaller columns.



PLAN

FOUR PILE FOOTING (8)

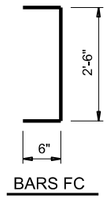
For 42" Dia and smaller columns.



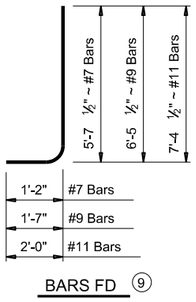
PLAN

FIVE PILE FOOTING (8)

For 42" Dia and smaller columns.



BARS FC



BARS FD (9)

(3) Min lap with column reinforcing:
#7 Bars = 2'-11"
#9 Bars = 3'-9"
#11 Bars = 4'-8"

(6) 1'-0" Min, unless shown otherwise on plans.

(7) Or as shown on plans.

(8) See Bridge Layout for type, size and length of piling.

(9) Number and size of FD bars must match column reinforcing. Tie FD bars to the top of the bottom reinforcing mat.

(10) Adjust FD quantity, size and weight as needed to match column reinforcing.

TABLE OF FOOTING QUANTITIES FOR 30" COLUMNS

ONE 3 PILE FOOTING				
Bar	No.	Size	Length	Weight
F1	11	#4	3'- 2"	23
F2	6	#4	8'- 2"	33
F3	6	#4	6'- 11"	28
F4	8	#9	3'- 2"	86
F5	4	#9	6'- 11"	94
F6	4	#9	8'- 2"	111
FC	12	#4	3'- 6"	28
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	623
Class "C" Concrete			CY	4.8

ONE 4 PILE FOOTING				
Bar	No.	Size	Length	Weight
F1	20	#4	7'- 2"	96
F2	16	#8	7'- 2"	306
FC	16	#4	3'- 6"	37
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	659
Class "C" Concrete			CY	6.3

ONE 5 PILE FOOTING				
Bar	No.	Size	Length	Weight
F1	20	#4	8'- 2"	109
F2	16	#9	8'- 2"	444
FC	24	#4	3'- 6"	56
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	829
Class "C" Concrete			CY	8.0

CONSTRUCTION NOTES:

See Bridge Layout for foundation type required. Use these foundation details unless shown otherwise.

Drive piling under abutment wingwalls to a minimum resistance of 10 Tons/Pile unless shown otherwise.

Provide Class C Concrete (f'c = 3,600 psi), unless shown otherwise.

Provide Grade 60 reinforcing steel.

Galvanize reinforcing if shown elsewhere in the plans.

Provide bar laps for drilled shaft reinforcing, where required, as follows:

Uncoated or galvanized (#6) ~ 2'-6"
Uncoated or galvanized (#7) ~ 2'-11"
Uncoated or galvanized (#9) ~ 3'-9"

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

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

DESIGNER NOTES:

Do not use the drilled shaft details shown on this standard for retaining wall, noise wall, barrier, or sign foundations without structural evaluation.

Do not use the footings shown on this standard in direct contact with salt water or exposed to salt water spray.

Maximum allowable pile loads for the footings shown are:

72 Tons/Pile with 24" Dia Columns
80 Tons/Pile with 30" Dia Columns
100 Tons/Pile with 36" Dia Columns
120 Tons/Pile with 42" Dia Columns

Texas Department of Transportation

Bridge Division Standard

COMMON FOUNDATION DETAILS

FD

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0903	29	027, ETC	CR 232, ETC
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	WFS	ARCHER		61

DATE: 10/24/2022 11:31:04 AM
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DATE: 10/24/2022 11:31:06 AM
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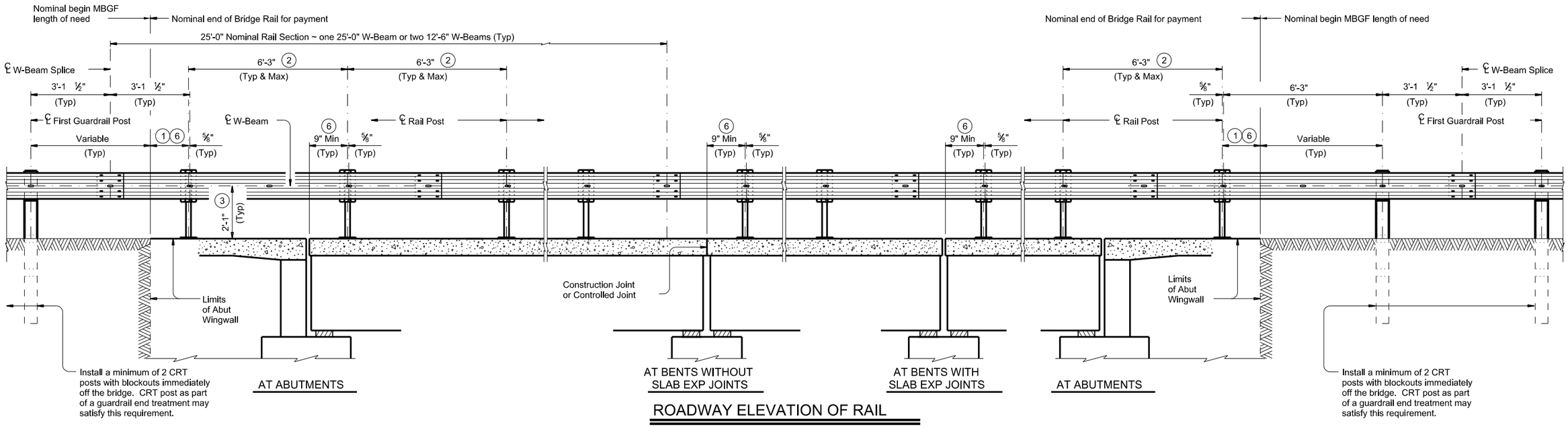
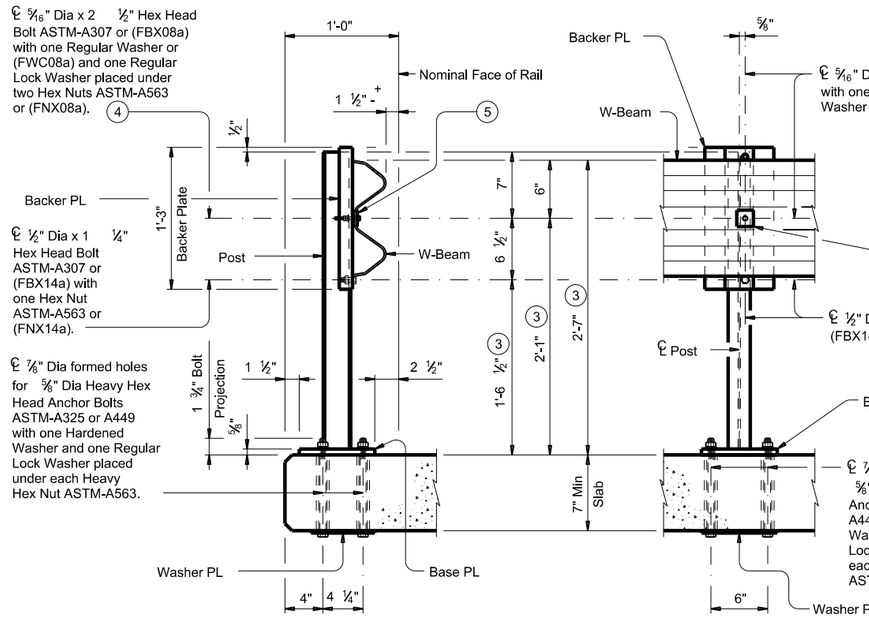


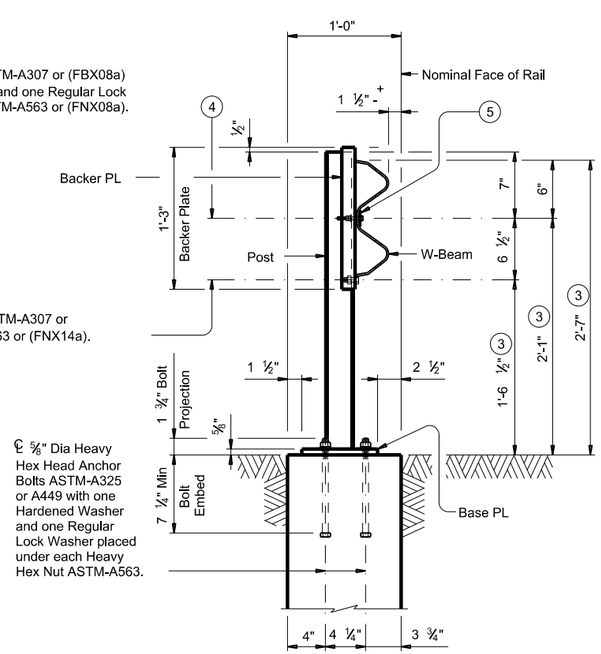
ROADWAY ELEVATION OF RAIL



RAIL SECTION

TRAFFIC SIDE RAIL VIEW

RAIL DETAILS ON BRIDGE SLAB



RAIL SECTION ON ABUTMENT WINGWALL

(1) 9" Min, 5'-9" Max

(2) Maintain 6'-3" Rail Post spacing wherever possible for use with nominal 25'-0" or 12'-6" W-Beam sections. Symmetry of post spacing on both sides and along the structure is not necessary.

(3) Increase 2" for structures with overlay.

(4) Tighten the first hex nut by hand until the top and bottom edges of the W-Beam engage the Backer Plate (Backer Plate should be snug against the post). Then tighten hex nut one revolution with wrench and secure with the second hex nut.

(5) PL ⅛ x 1 ¾ x 1 ¾ with ⅜ Dia Hole centered in PL, ASTM-A36. Square Guardrail Washer (FWR01).

(6) The post nearest to a slab joint or end of structure may be shifted up to 9" in order to satisfy the minimum offset dimension. Drill a new ¾" Dia hole on the centerline of W-beam for shifted post. Paint hole with two coats of zinc-rich paint conforming to the Item "Galvanizing". All other posts must remain on the typical spacing.

The use of this railing is restricted to speeds of 45 mph or less.

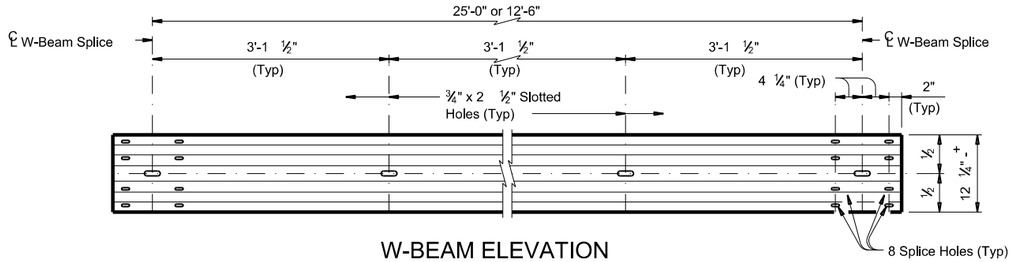
Texas Department of Transportation

Bridge Division Standard

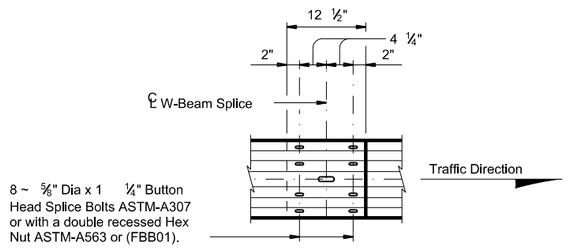
TRAFFIC RAIL

TYPE T631LS

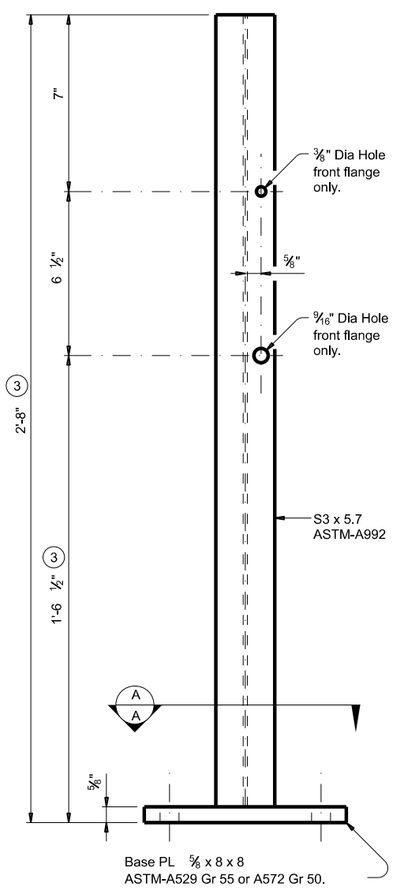
FILE: t631s037.dgn	DN: TxDOT	CK: AES	DW: JTR	CK: AES
©TxDOT July 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0903	29	027, ETC	CR 232, ETC
03-16: Added note for post near joint, additional baker PL material and MBGF end treatment notes.	DIST	COUNTY		SHEET NO.
	WFS	ARCHER		62



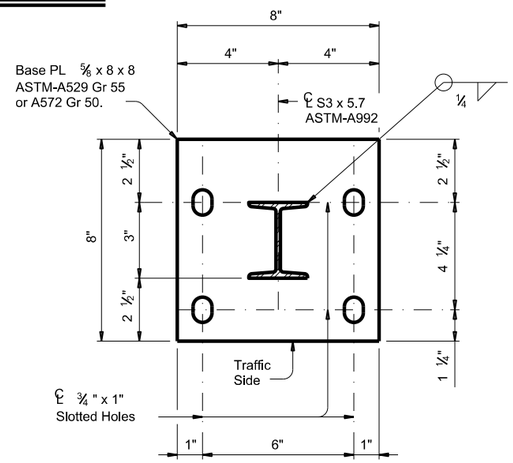
W-BEAM ELEVATION



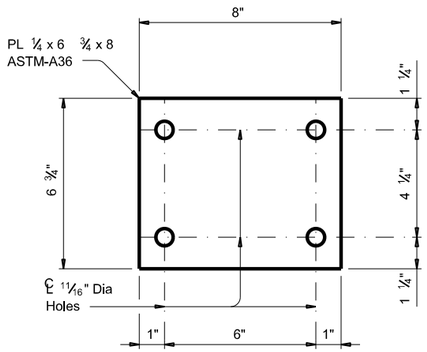
W-BEAM SPLICE ELEVATION



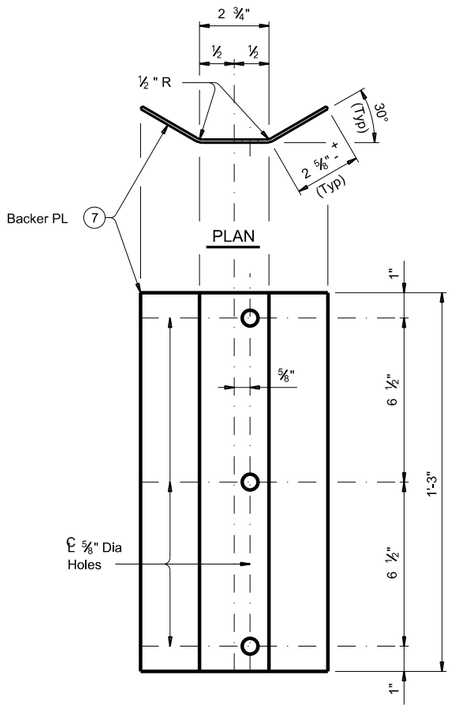
POST ELEVATION



SECTION A-A



WASHER PLATE DETAIL



BACKER PLATE

3 Increase 2" for structures with overlay.

7 Backer PL ⅛ x 8 x 1'-3" ASTM-A1011 CS or SS Gr 33, or A1008 CS or SS Gr 33 (11 Gage acceptable).

MBGF AND END TREATMENT NOTES:

This traffic railing must be anchored by metal beam guard fence (MBGF) and/or guard fence end treatments. Determine MBGF length of need in accordance with the Roadway Design Manual, unless otherwise specified. The minimum MBGF length of need required for anchoring the railing is: SGT; or DAT plus 12.5' of MBGF, as applicable. Provide CRT posts as shown in "Roadway Elevation of Rail."

CONSTRUCTION NOTES:

Face of rail post must be plumb unless otherwise approved by the Engineer. Post must be perpendicular to adjacent roadway grade. Use epoxy mortar under post base plates if gaps larger than $\frac{1}{16}$" exist.

Fully anchored guardrail must be attached to each end of rail. A metal beam guard fence transition is not used with this rail.

It is recommended to show a Rail Layout with rail posts and W-beam splices. Fabricator must submit erection drawings to the Engineer for approval.

Round or chamfer exposed edges of rail post and backer plate to approximately $\frac{1}{16}$" by grinding.

Shop drawings are not required for this rail.

MATERIAL NOTES:

Galvanize all steel components.

Anchor bolts for base plate must be ⅝" Dia ASTM-A325 or A449 bolts with one hardened washer and one regular lock washer placed under each heavy hex nut. Nuts must conform to A563 requirements.

W-beam must meet the requirements of Item 540, "Metal Beam Guard Fence" except as modified in the plans. The Contractor may furnish rail elements of 25'-0", or 12'-6" (Nominal) lengths. W-Beam must have slotted holes at 3'-1 ½".

Some part numbers from the "Task Force 13" Guide to Standardized Highway Barrier Hardware have been furnished for quick reference.

GENERAL NOTES:

This railing has been successfully evaluated by full-scale crash test to meet MASH TL-2 criteria. This railing can be used for speeds of 45 mph and less.

This rail is designed to deflect approximately 2' to 2'-6" as it contains and redirects the errant vehicle. This rail may not be installed on top of or behind curbs that project above finished grade, on bridges with expansion joints providing more than 5" movement, on retaining walls, or on grade separations and interchanges.

Repairs to impact-damaged post and base plate unit are not permitted. Replace all impact-damaged posts with a new post and base plate unit.

Average weight of railing with no overlay: 13 plf total.

SHEET 2 OF 2

Texas Department of Transportation — Bridge Division Standard

TRAFFIC RAIL

TYPE T631LS

FILE:	dfstd037.dgn	DN: TxDOT	CK: AES	DW: JTR	CK: AES
©TxDOT	July 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS		0903	29	027, ETC	CR 232, ETC
03-16: Added note for post near joint, additional baker PL material and MBGF end treatment notes.		DIST	COUNTY		SHEET NO.
		WFS	ARCHER		63

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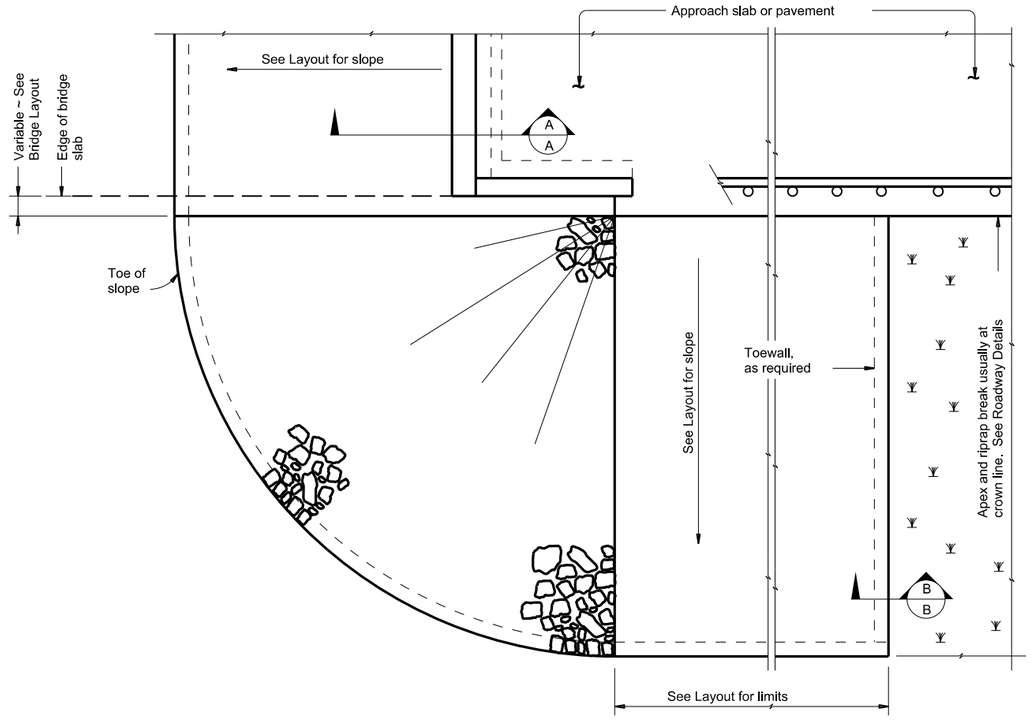
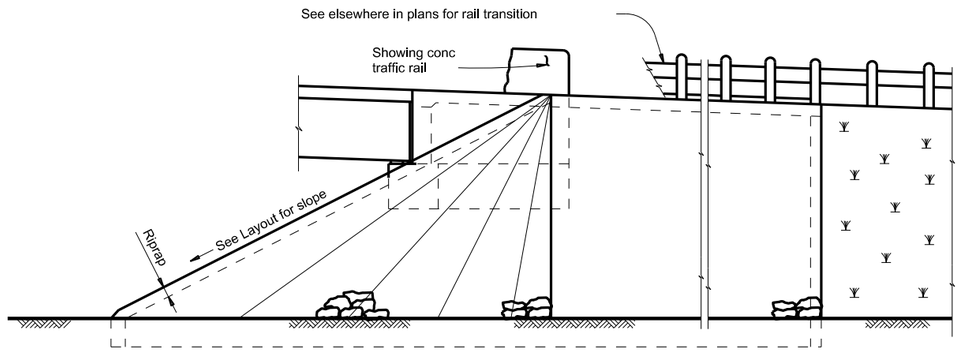


PLAN



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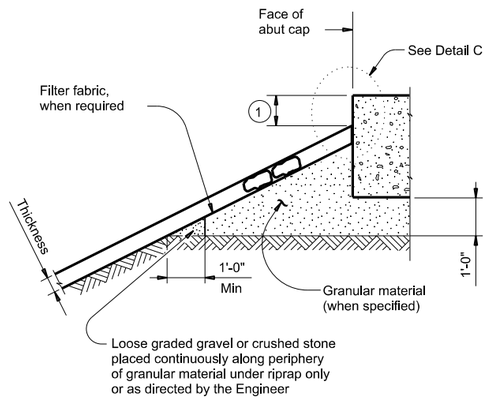
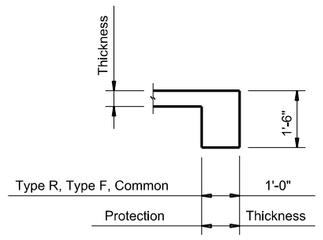
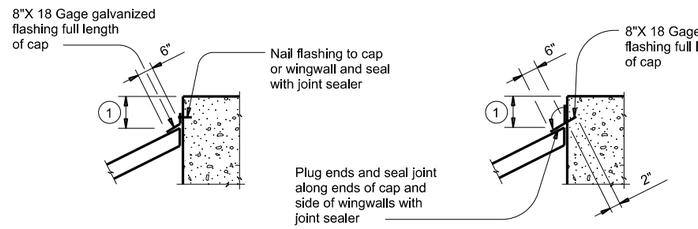


SECTION A-A AT CAP



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

(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	0903	29	027, ETC	CR 232, ETC
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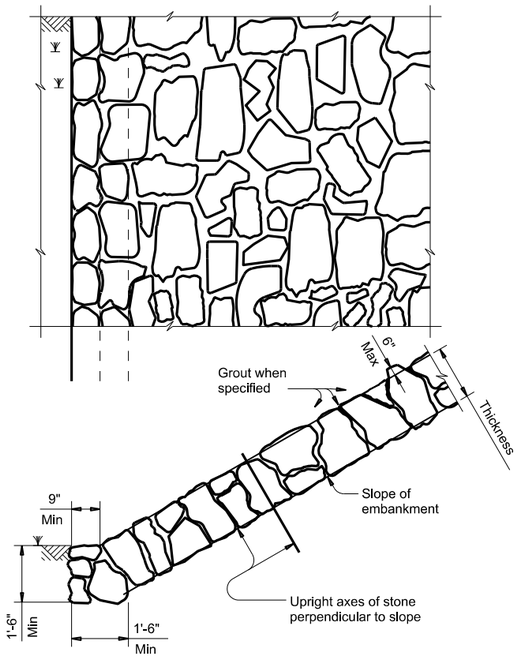


FIGURE 1 ~ TYPE R STONE RIPRAP

dry or grouted

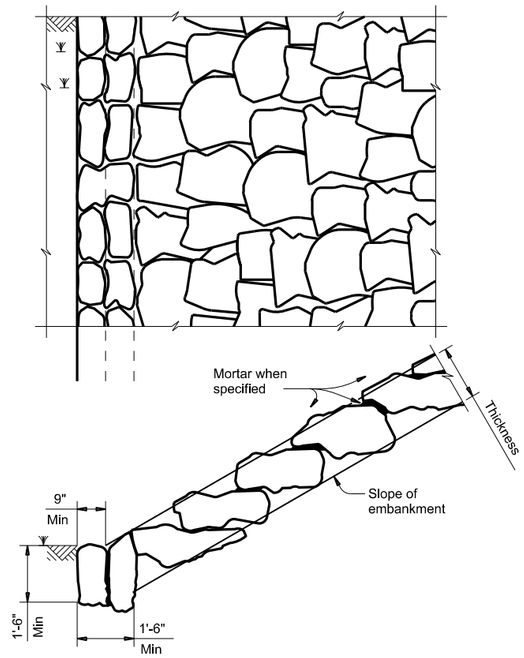


FIGURE 2 ~ TYPE F STONE RIPRAP

dry or mortared

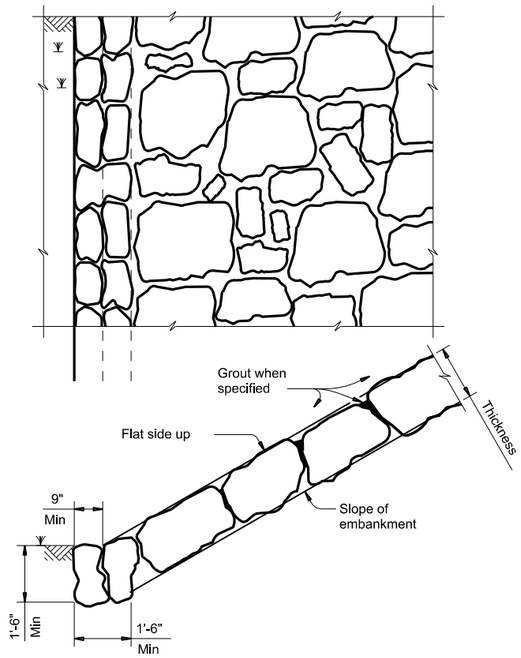


FIGURE 3 ~ TYPE F STONE RIPRAP

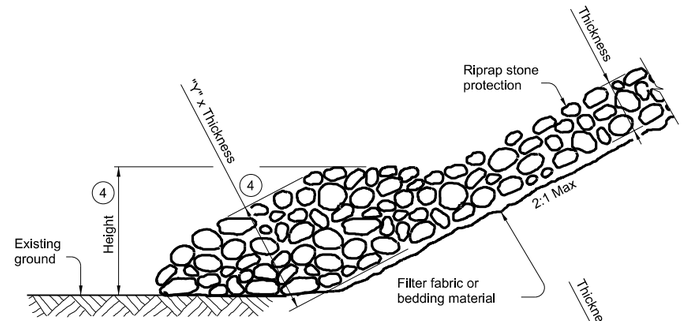
grouted

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

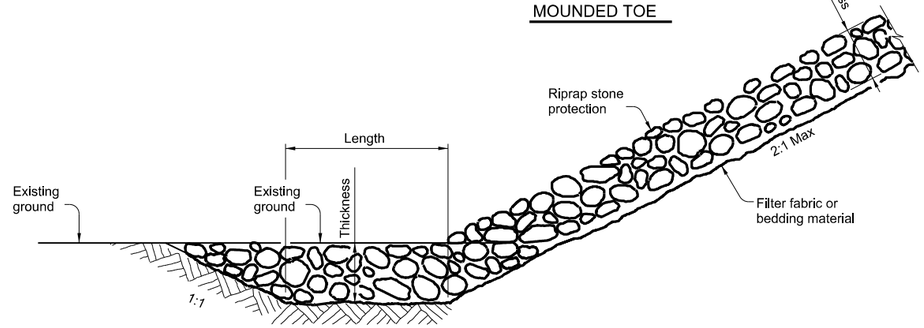
3 Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.

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)

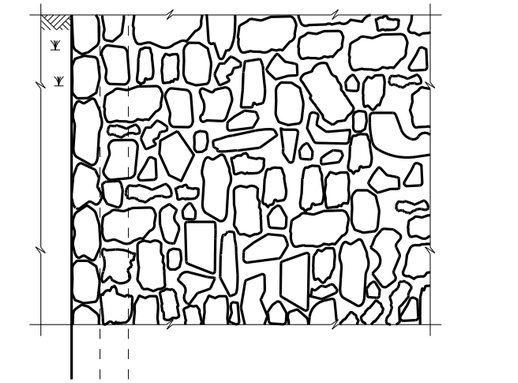


FIGURE 4 ~ COMMON STONE RIPRAP

dry or grouted

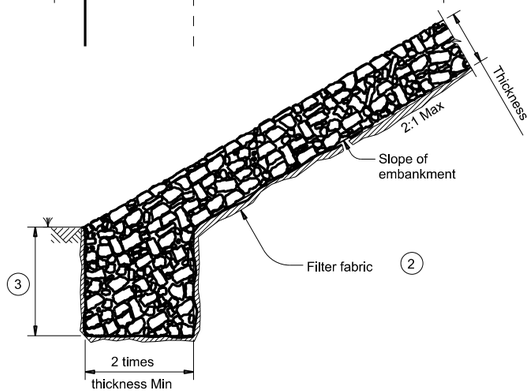


FIGURE 5 ~ PROTECTION STONE RIPRAP (5)

SHEET 2 OF 2

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	0903	29	027, ETC	CR 232, ETC
	DIST	COUNTY		SHEET NO.
	WFS	ARCHER		65

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I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

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

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

1. N/A

☐ No Action Required ☑ Required Action

Action No.

1. The project disturbs less than one acre of surface area. The contractor is responsible for the PSL as defined in the Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges. The total disturbed acreage is the combined acreage to be disturbed on the project and the contractors PSL.
2. Prevent stormwater pollution by controlling erosion and sedimentation to the maximum extent practical. Comply with the SW3P and revise as necessary or as required by the Engineer.
3. This EPIC must be updated if the disturbed area increases to one or more acres during the course of construction.
4. It may become necessary to post a site notice and/or NOI for the project and/or PSL in a location accessible to the public and TCEQ, EPA, or other inspector if the disturbed area increases to more than 1 acre.

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

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

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

☐ No Permit Required

☑ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)

☐ Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)

☐ Individual 404 Permit Required

☐ Other Nationwide Permit Required: NWP# _____

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

1. Holliday Creek: Flows into Holliday Creek.

2. If dewatering activities are necessary, contact TcDOT Environmental Specialist at 940 720 7733.

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

Best Management Practices:

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

III. CULTURAL RESOURCES

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

☑ No Action Required ☐ Required Action

IV. VEGETATION RESOURCES

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

☐ No Action Required ☑ Required Action

Action No.

1. Vegetation disturbances should be kept to the minimum necessary to complete the project.
2. Trim rather than remove trees when possible.

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

☐ No Action Required ☑ Required Action

Action No.

Migratory Bird Treaty Act (MBTA): Migratory birds may arrive in the project area to breed during construction of the proposed project. Measures will be taken to avoid the take of migratory birds, their occupied nests, eggs, or young, in accordance with the Migratory Bird Treaty Act, through phasing of work or preventative measures. Between October 1 and February 15, the contractor would remove all old migratory bird nests from any structures that would be affected by the proposed project, and complete any bridge work/demolition and/or vegetation clearing. In addition, the contractor would be prepared to prevent migratory birds from building nests by utilizing nest prevention methods, such as bird-deterrent netting and bird-repelling sprays and/or gels, between February 15 and October 1. In the event that migratory birds are encountered on-site during project construction, adverse impacts on protect birds, active nests, eggs, and/or young would be avoided.

Amphibian and Aquatic Reptile BMPs: Contractors will be advised of potential occurrence of the Woodhouse's Toad and Strecker's chorus frog in the project area, and to avoid harming them if encountered. Project specific locations (PSLs) within state-owned ROW should be located in uplands away from aquatic features. Where work is directly adjacent to the water, minimize impacts to shoreline basking sites (e.g., downed trees, sand bars, exposed bedrock) and overwinter sites (e.g., brush and debris piles, crayfish burrows) where feasible.

Bat BMPs: If bats are present or recent signs of occupation (i.e.,piles of guano, distinct musky odor, or staining and rub marks at potential entry points) are observed contact TxDOT Environmental Coordinator (Nellie Bennett) at 940 720 7733 or nellie.bennett@txdot.gov. In all instances, avoid harm or death to bats. Bats should only be handled as a last resort and after communication with TPWD.

Mammal BMPs: Contractor will be advised of the potential occurrence of the swamp rabbit to avoid harming the species if encountered, and to avoid unnecessary impacts to dens.

Terrestrial Reptile BMPs: If erosion control blankets or mats are utilized, use products that contain no netting or contain loosely woven, natural fiber netting is preferred. Plastic netting should be avoided to the extent practicable. Visually inspect excavation areas for trapped wildlife prior to backfilling. Inform contractors that if reptiles are found on project site allow species to safely leave the project area.

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

LIST OF ABBREVIATIONS

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

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used.

Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act.

Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:

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

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

☑ Yes ☐ No

If "No", then no further action is required.
If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

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

☐ Yes ☑ No

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

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

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

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

☐ No Action Required ☑ Required Action

Action No.

1. NBI: 03-169-0-AA01-28-001:

VII. OTHER ENVIRONMENTAL ISSUES

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

☐ No Action Required ☑ Required Action

Action No.

1. Reduce idling of vehicles and equipment.
2. Maintain project site. Minimize dust and airborne particles to the maximum extent practical.
3. Collect sanitary waste in accordance with local regulations by a sanitary waste collector. Portable units shall not be placed in or near a waterway or drainage area
4. TxDOT EMS Policy Statement (English & Spanish) should be displayed at the construction site.
5. Collect all waste materials , trash, and debris from the construction site daily and deposite into a metal dumpter having a secure cover

Texas Department of Transportation — Design Division Standard

CR 232 (WILSON RANCH ROAD) @ HOLLIDAY CREEK EPIC

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR	
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY	
REVISIONS 12-12-2011 (DS) 05-07-14 ADDED NOTE SECTION IV. 01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	0903	29	027, ETC	CR 232, ETC	
	DIST	COUNTY		SHEET NO.	
	WFS	ARCHER		66	

A. GENERAL SITE DATA

1. PROJECT LIMITS: *CR 232 (WILSON RANCH RD) AT HOLLIDAY CREEK*

Begin Project Coordinates : Latitude (N) : 33.739744 Longitude (W) : -98.805664
End Project Coordinates : Latitude (N) : 33.740651 Longitude (W) : -98.805662

2. PROJECT SITE MAPS:

- *Project Location Map: The Title Sheet*
- *Drainage Patterns: SW3P Layout*
- *Slopes Anticipated After Major Gradings or Areas of Soil Disturbance: Typical Sections*
- *Location of Erosion and Sediment Controls: SW3P Layout*
- *Surface Waters and Discharge Locations: SW3P Layout*
- *Project Specific Location(s) (PSL): To be determined by the project Construction Personnel. Location(s) shall be shown on SW3P Site Map (If PSL location(s) is within one mile of project) and information located in project SW3P Binder (Reference Item #10 below).*

3. PROJECT DESCRIPTION:

For the replacement of bridge and approaches.

4. MAJOR SOIL DISTURBING ACTIVITIES:

Removal of existing structure and wing walls and installation for the new abutments.

5. EXISTING CONDITION OF SOIL & VEGETATIVE COVER AND % OF EXISTING VEGETATIVE COVER:

This soil consists 4.5% Aspermont Clay Loam, 0-7 inches thick, Sandy Clay Loam to about about 70 inches. Gently sloping (2-5%) except at creek where slope steepens. The channel section of the project consist of 28.5% Pulexas, Fine Sandy Loam to very fine sandy loam, 0-60 inches thick. The North-East and South-West section of the project consists of 16.6% Teller Loam, 0-15 inches over fine sandy loam 15-20 inches, above Sandy Clay Loam at a depth of 20-60 inches. Gently sloping (0-1% slopes).

6. TOTAL PROJECT AREA:

0.34 Acres

7. TOTAL AREA TO BE DISTURBED:

0.16 Acres (47.06%)

8. WEIGHTED RUNOFF COEFFICIENT

BEFORE CONSTRUCTION: *0.4*
AFTER CONSTRUCTION: *0.4*

9. NAME OF RECEIVING WATERS:

Storm water runoff in the project area flows to the northeast and into Holliday Creek.

10. PROJECT SW3P Binder:

A. For projects disturbing one to five acres, TxDOT and the Contractor will maintain SW3P Binders at the project field office (If there is not a project field office, TxDOT's binder should be kept at the Area Office) which contains the following: Index Sheet, TCEQ Signature Authority, TCEQ Small Construction Site Notice, Contractor Certification of Compliance, SW3P Inspector Qualification Statements, Inspection and Maintenance Reports (Form 2118), EPIC Sheet, SW3P Sheet, Site Location Maps, Stored Material Lists specifying associated control measures and the Appendix which contains the TPDES Construction General Permit, MS4 Operator Notification(s) and the Construction PSL Permits per all applicable requirements.

B. For projects disturbing 5 acres or more, TxDOT and the Contractor will follow the actions listed in (10.A.) above with the addition of the following: Notice Of Intent (N.O.I.) and Fee Payment Form, TCEQ Large Construction Site Notice (to be used instead of Small Site Notice), and TPDES Permit Coverage Notice.

C. For projects disturbing less than one acre, actions described in (10.A.) and (10.B.) above are not required. Acreage is calculated by adding Total Disturbed Area within project limits (See #7 above) and the PSL(s) acreage located on or within one mile of project.

B. EROSION AND SEDIMENT CONTROLS

1. SOIL STABILIZATION PRACTICES: (Select T = Temporary or P = Permanent, as applicable)

T	TEMPORARY SEEDING	T	PRESERVATION OF NATURAL RESOURCES
___	MULCHING (Hay or Straw)	___	FLEXIBLE CHANNEL LINER
P	BUFFER ZONES	___	RIGID CHANNEL LINER
___	PLANTING	___	SOIL RETENTION BLANKET
P	SEEDING	___	COMPOST MANUFACTURED TOPSOIL
___	SODDING	T	VERTICAL TRACKING
		___	OTHER:

2. STRUCTURAL PRACTICES: (Select T = Temporary or P = Permanent, as applicable)

- T SILT FENCES
- T EROSION CONTROL LOGS
- ___ EROSION CONTROL COMPOST BERMS (Low Velocity)
- T ROCK FILTER DAMS
- ___ DIVERSION, INTERCEPTOR, OR PERIMETER DIKES
- ___ DIVERSION, INTERCEPTOR, OR PERIMETER SWALES
- ___ DIVERSION DIKE AND SWALE COMBINATIONS
- ___ PIPE SLOPE DRAINS
- ___ PAVED FLUMES
- ___ ROCK BEDDING AT CONSTRUCTION EXIT
- ___ TIMBER MATTING AT CONSTRUCTION EXIT
- ___ CHANNEL LINERS
- ___ SEDIMENT TRAPS
- ___ SEDIMENT BASINS
- ___ STORM INLET SEDIMENT TRAP
- ___ STONE OUTLET STRUCTURES
- ___ CURBS AND GUTTERS
- ___ STORM SEWERS
- T VELOCITY CONTROL DEVICES
- ___ OTHER:

NOTE: TOP OF BMP'S SHOULD NOT BE HIGHER THAN ROADWAY ELEVATION AS NOT TO FLOOD ROADWAY UNLESS PRIOR APPROVAL FROM ENGINEER IS OBTAINED.

3. STORM WATER MANAGEMENT:

A. Storm water drainage will be provided by ditches which carry drainage within the R.O.W. to the lows within the roadway and project site which drains to natural facility, Salt Creek.

B. Other permanent erosion controls include hydraulic design to limit structure outlet velocities and grading design generally consisting of 6 :1 or flatter slopes with permanent vegetative cover.

4. STORM WATER MANAGEMENT ACTIVITIES: (Sequence of Construction)

1. *Remove existing topsoil and windrow to edge of work area. Impacts to topsoil should be kept to the minimum necessary to complete work.*
2. *Place BMPs.*
3. *Prepare area for construction of abutments by excavation and embankment.*
4. *Form up and pour concrete to create abutments.*
5. *Grade sideslopes and build v-ditch by returning topsoil to the prepared slopes.*
6. *Place permanent seeding, fertilizer, and water until vegetation is re-established.*

5. NON-STORM WATER DISCHARGES:

Filter non-storm water discharges, or hold in retention basins, before being allowed to mix with storm water. These discharges consist of, but not limited to, non-polluted ground water, spring water, foundation or footing drain water, water used for dust control or pavement washing and vehicle washwater containing no detergents.

C. OTHER REQUIREMENTS & PRACTICES

1. MAINTENANCE:

Maintain all erosion and sediment controls in good working order. Perform any necessary cleaning/repairs/replacements at the earliest possible date prior to next rain event, but no later than 7 calendar days. Ensure the surrounding ground has dried sufficiently to prevent damage from equipment. "Too Wet" is the only reason for not adhering to timeframes described. When construction activities permanently or temporarily cease and are not expected to resume for 14 or more days on a disturbed portion of the site, stabilization measures must be initiated immediately.

2. INSPECTION:

A TxDOT Inspector will perform a regularly scheduled SW3P Inspection every 14 calendar days. An Inspection and Maintenance Report, signed by the TxDOT Inspector and the Contractor, will be filed for each Inspection within 24-hours following the Inspection. Revise/clean/repair/replace each BMP control device in accordance with the Construction General Permit and the current Field Inspection and Maintenance Report (Form 2118) and Item 1 (Maintenance) above. On project that disturb less than one acre and do not meet the definition of a construction project, Inspections are not required.

C. OTHER REQUIREMENTS & PRACTICES (CONTINUED)

3. WASTE MATERIALS:

Minimize the exposure of contruction wastes and trash on the site to precipitation and to stormwater. On a daily basis, or as may be directed, collect all waste materials, trash and debris from the construction site and deposit into a metal dumpster having a secure cover and which meets all state and local city solid waste management requirements. Minimize the exposure of waste materials by keeping waste container lids closed when not in use. For waste containers that do not have lids and could leak the permittee must provide either a cover (e.g., a tarp, plastic sheeting, temporary roof) to minimize exposure of wastes to precipitation, or a similarly effective means designed to minimize the discharge of pollutants. Empty the dumpster as required by regulation, or as may be directed, at a local approved landfill site. Do not bury construction waste on the construction project site.

4. HAZARDOUS WASTE & SPILL REPORTING:

As a minimum, any products in the following categories are considered to be hazardous: Paints, Acids, Solvents, Fuels, Asphalt Products, Chemical Additives for Soil Stabilization, and Concrete Curing Compounds or Additives. Minimize the exposure of building materials, building products, landscape materials, fertilizers, pesticides, herbicides, detergents, and other materials present on the site to precipitation and to stormwater. When storing hazardous material on the project site, or at a Project Specific Location, take all practicable precaution to prevent and/or contain any spillage of these materials. In the event of a spill, contact the spill coordinator immediately.

5. SANITARY WASTE:

Use a licensed sanitary waste management contractor to collect all sanitary waste from portable units as may be required by local regulation, or as directed. Minimize the exposure of sanitary waste present on the site to precipitation and to stormwater.

6. CONSTRUCTION VEHICLE TRACKING:

On a regular basis, or as may be directed, dampen haul roads for dust control and stabilize construction entrances/exits. Provide for a motorized broom or vacuum type sweeper to be available on a daily basis, or as may be directed, to remove sediment from paved roadways abutting or traversing the project site.

7. MANAGEMENT PRACTICES:

A. Construct disposal areas, stockpiles, haul roads and PSL's in a manner that will minimize and control the amount of sediment that may enter receiving waters. Do not locate disposal areas in any wetland, waterbody or streambed.
B. Locate construction staging areas, vehicle maintenance and PSL's areas in a manner to minimize the runoff of pollutants.
C. When working in or near a wetland, install and maintain operating soil erosion and sediment controls at all times during construction and isolate the work from the wetland.
D. Clear all waterways as soon as practicable of temporary embankment, temporary bridges, matting, falsework, piling, debris or other obstructions placed during construction operations that are not a part of the finished work.
E. Procedures and/or practices should be taken to control dust.
F. Sediment to be removed from roadways daily or when work begins after weather events if construction activities have ceased due to weather event.
G. Operators must prevent or minimize the discharge of spilled cement, aggregate (including sand or gravel), settled dust, or other significant materials from paved portions of the site that are exposed to stormwater.

STATE OF TEXAS
ZACHARY P. HUSEN
106073
LICENSED
PROFESSIONAL ENGINEER
Zachary P. Husen, P.E.
10/24/2022

Texas Department of Transportation
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WICHITA FALLS DISTRICT ENVIRONMENTAL

CR 232 (WILSON RANCH RD)
@ HOLLIDAY CREEK
SW3P NARRATIVE

TEMPLATE REVISION DATE: 04/26/2016

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		CR 232, ETC
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	WFS	ARCHER	67
CHECK	CONTROL	SECTION	JOB	
	0903	29	027, ETC	

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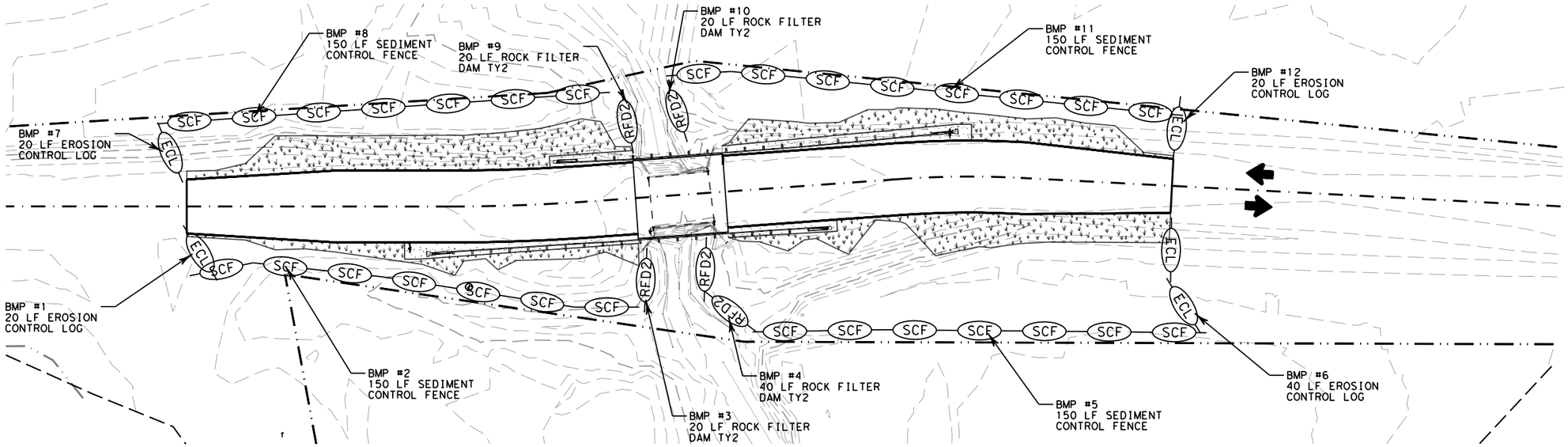
LEGEND

SYMBOL	DESCRIPTION
SCF	SEDIMENT CONTROL FENCE
ECL	EROSION CONTROL LOGS (8")
RFD2	ROCK FILTER DAM (TY 2)
	LIMITS OF SEEDING
	TRAFFIC DIRECTION
	LIMITS OF SOIL DISTURBANCE
	FLOW DIRECTION

NOTES:

1. PLACE SANDBAGS AROUND ANY MATERIAL STOCKPILE THAT ARE LEFT ON SITE OVERNIGHT. THIS WORK WILL NOT BE PAID FOR DIRECTLY BUT WILL BE SUBSIDIARY TO THE VARIOUS BID ITEMS.
2. THE LOCATIONS OF DEVICES ARE FOR GRAPHIC REPERSENTATION ONLY. OBTAIN ENGINEERS APPROVAL BEFORE INSTALLATION.
3. AFTER ROADWAY AND BRIDGE CONSTRUCTION IS FINISHED, SPREAD OUT ALL ROCK FILTER DAMS TO PROVIDE SLOPE PROTECTION.



DATE SOIL DISTURBED	DATE SOIL STABILIZED

BMP #	INSTALLED	MAINTAINED	REPLACED	REMOVED	BMP #	INSTALLED	MAINTAINED	REPLACED	REMOVED	BMP #	INSTALLED	MAINTAINED	REPLACED	REMOVED

STATE OF TEXAS
ZACHARY P. HUSEN
106073
LICENSED
PROFESSIONAL ENGINEER
Zachary P. Husen, P.E.
10/24/2022

CR 232
(WILSON RANCH RD)
@ HOLLIDAY CREEK
SW3P LAYOUT

0 20 40
SCALE IN FEET

2022 Texas Department of Transportation®

CONT	SECT	JOB	HIGHWAY
0903	29	027, ETC	CR 232, ETC
DIST	COUNTY		SHEET NO.
WFS	ARCHER		68

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

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

1. N/A

☐ No Action Required ☑ Required Action

Action No.

1. The project disturbs less than one acre of surface area. The contractor is responsible for the PSL as defined in the Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges. The total disturbed acreage is the combined acreage to be disturbed on the project and the contractors PSL.
2. Prevent stormwater pollution by controlling erosion and sedimentation to the maximum extent practical. Comply with the SW3P and revise as necessary or as required by the Engineer.
3. This EPIC must be updated if the disturbed area increases to one or more acres during the course of construction.
4. It may become necessary to post a site notice and/or NOI for the project and/or PSL in a location accessible to the public and TCEQ, EPA, or other inspector if the disturbed area increases to more than 1 acre.

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

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

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

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☐ Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)

☐ Individual 404 Permit Required

☐ Other Nationwide Permit Required: NWP# _____

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

1. Draw: Flows into the North Fork of the Little Wichita River.
2. If dewatering activities are necessary, contact TcDOT Environmental Specialist at 940 720 7733.

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

Best Management Practices:

Erosion	Sedimentation	Post-Construction TSS
☑ Temporary Vegetation	☑ Silt Fence	☐ Vegetative Filter Strips
☐ Blankets/Matting	☑ Rock Filter Dams	☐ Retention/Irrigation Systems
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Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately.

☑ No Action Required ☐ Required Action

IV. VEGETATION RESOURCES

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

☐ No Action Required ☑ Required Action

Action No.

1. Vegetation disturbances should be kept to the minimum necessary to complete the project.
2. Trim rather than remove trees when possible.

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

☐ No Action Required ☑ Required Action

Action No.

Migratory Bird Treaty Act (MBTA): Migratory birds may arrive in the project area to breed during construction of the proposed project. Measures will be taken to avoid the take of migratory birds, their occupied nests, eggs, or young, in accordance with the Migratory Bird Treaty Act, through phasing of work or preventative measures. Between October 1 and February 15, the contractor would remove all old migratory bird nests from any structures that would be affected by the proposed project, and complete any bridge work/demolition and/or vegetation clearing. In addition, the contractor would be prepared to prevent migratory birds from building nests by utilizing nest prevention methods, such as bird-deterrent netting and bird-repelling sprays and/or gels, between February 15 and October 1. In the event that migratory birds are encountered on-site during project construction, adverse impacts on protect birds, active nests, eggs, and/or young would be avoided.

Amphibian and Aquatic Reptile BMPs: Contractors will be advised of potential occurrence of the Woodhouse's Toad and Strecker's chorus frog in the project area, and to avoid harming them if encountered. Project specific locations (PSLs) within state-owned ROW should be located in uplands away from aquatic features. Where work is directly adjacent to the water, minimize impacts to shoreline basking sites (e.g., downed trees, sand bars, exposed bedrock) and overwinter sites (e.g., brush and debris piles, crayfish burrows) where feasible.

Bat BMPs: If bats are present or recent signs of occupation (i.e.,piles of guano, distinct musky odor, or staining and rub marks at potential entry points) are observed contact TxDOT Environmental Coordinator (Nellie Bennett) at 940 720 7733 or nellie.bennett@txdot.gov. In all instances, avoid harm or death to bats. Bats should only be handled as a last resort and after communication with TPWD.

Mammal BMPs: Contractor will be advised of the potential occurrence of the swamp rabbit to avoid harming the species if encountered, and to avoid unnecessary impacts to dens.

Terrestrial Reptile BMPs: If erosion control blankets or mats are utilized, use products that contain no netting or contain loosely woven, natural fiber netting is preferred. Plastic netting should be avoided to the extent practicable. Visually inspect excavation areas for trapped wildlife prior to backfilling. Inform contractors that if reptiles are found on project site allow species to safely leave the project area.

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

LIST OF ABBREVIATIONS

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

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used.

Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act.

Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:

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

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

☑ Yes ☐ No

If "No", then no further action is required.
If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

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

☐ Yes ☑ No

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

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

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

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

☐ No Action Required ☑ Required Action

Action No.

VII. OTHER ENVIRONMENTAL ISSUES

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

☐ No Action Required ☑ Required Action

Action No.

1. Reduce idling of vehicles and equipment.
2. Maintain project site. Minimize dust and airborne particles to the maximum extent practical.
3. Collect sanitary waste in accordance with local regulations by a sanitary waste collector. Portable units shall not be placed in or near a waterway or drainage area
4. TxDOT EMS Policy Statement (English & Spanish) should be displayed at the construction site.
5. Collect all waste materials , trash, and debris from the construction site daily and deposite into a metal dumpter having a secure cover

Texas Department of Transportation — Design Division Standard

CR 261 (RIVER ROAD) @ DRAW EPIC

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0903	29	027, ETC	CR 232, ETC
12-12-2011 (DS)	DIST	COUNTY		SHEET NO.
05-07-14 ADDED NOTE SECTION IV.	WFS	ARCHER		69
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.				

A. GENERAL SITE DATA

1. PROJECT LIMITS: *CR 261(RIVER RD) AT DRAW*

Begin Project Coordinates : Latitude (N): 33.671198 Longitude (W): -98.666317
End Project Coordinates : Latitude (N): 33.672290 Longitude (W): -98.666603

2. PROJECT SITE MAPS:

- *Project Location Map: The Title Sheet*
- *Drainage Patterns: SW3P Layout*
- *Slopes Anticipated After Major Gradings or Areas of Soil Disturbance: Typical Sections*
- *Location of Erosion and Sediment Controls: SW3P Layout*
- *Surface Waters and Discharge Locations: SW3P Layout*
- *Project Specific Location(s) (PSL): To be determined by the project Construction Personnel. Location(s) shall be shown on SW3P Site Map (If PSL location(s) is within one mile of project) and information located in project SW3P Binder (Reference Item #10 below).*

3. PROJECT DESCRIPTION:

For the replacement of bridge and approaches.

4. MAJOR SOIL DISTURBING ACTIVITIES:

Removal of existing structure and wing walls and installation for the new abutments.

5. EXISTING CONDITION OF SOIL & VEGETATIVE COVER AND % OF EXISTING VEGETATIVE COVER:

This soil consists 54.9% Bastrop Loam, 0-7 inches thick, Sandy Clay Loam to about about 70 inches. Gently sloping (2-5%) except at creek where slope steepens. The channel section of the project consist of 28.5% Pulexas, Fine Sandy Loam to very fine sandy loam, 0-60 inches thick. The North-East and South-West section of the project consists of 16.6% Teller Loam, 0-15 inches over fine sandy loam 15-20 inches, above Sandy Clay Loam at a depth of 20-60 inches. Gently sloping (0-1% slopes).

6. TOTAL PROJECT AREA:

0.34 Acres

7. TOTAL AREA TO BE DISTURBED:

0.16 Acres (47.06%)

8. WEIGHTED RUNOFF COEFFICIENT

BEFORE CONSTRUCTION: *0.4*
AFTER CONSTRUCTION: *0.4*

9. NAME OF RECEIVING WATERS:

STORM WATER RUNNOFF IN THE PROJECT AREA FLOWS TO THE SOUTHEAST AND INTO THE NORTH FORK OF THE LITTLE WICHITA RIVER.

10. PROJECT SW3P Binder:

A. For projects disturbing one to five acres, TxDOT and the Contractor will maintain SW3P Binders at the project field office (If there is not a project field office, TxDOT's binder should be kept at the Area Office) which contains the following: Index Sheet, TCEQ Signature Authority, TCEQ Small Construction Site Notice, Contractor Certification of Compliance, SW3P Inspector Qualification Statements, Inspection and Maintenance Reports (Form 2118), EPIC Sheet, SW3P Sheet, Site Location Maps, Stored Material Lists specifying associated control measures and the Appendix which contains the TPDES Construction General Permit, MS4 Operator Notification(s) and the Construction PSL Permits per all applicable requirements.

B. For projects disturbing 5 acres or more, TxDOT and the Contractor will follow the actions listed in (10.A.) above with the addition of the following: Notice Of Intent (N.O.I.) and Fee Payment Form, TCEQ Large Construction Site Notice (to be used instead of Small Site Notice), and TPDES Permit Coverage Notice.

C. For projects disturbing less than one acre, actions described in (10.A.) and (10.B.) above are not required. Acreage is calculated by adding Total Disturbed Area within project limits (See #7 above) and the PSL(s) acreage located on or within one mile of project.

B. EROSION AND SEDIMENT CONTROLS

1. SOIL STABILIZATION PRACTICES: (Select T = Temporary or P = Permanent, as applicable)

- T TEMPORARY SEEDING
- ___ MULCHING (Hay or Straw)
- P BUFFER ZONES
- ___ PLANTING
- P SEEDING
- ___ SODDING
- T PRESERVATION OF NATURAL RESOURCES
- ___ FLEXIBLE CHANNEL LINER
- ___ RIGID CHANNEL LINER
- ___ SOIL RETENTION BLANKET
- ___ COMPOST MANUFACTURED TOPSOIL
- T VERTICAL TRACKING
- ___ OTHER:

2. STRUCTURAL PRACTICES: (Select T = Temporary or P = Permanent, as applicable)

- T SILT FENCES
- T EROSION CONTROL LOGS
- ___ EROSION CONTROL COMPOST BERMS (Low Velocity)
- T ROCK FILTER DAMS
- ___ DIVERSION, INTERCEPTOR, OR PERIMETER DIKES
- ___ DIVERSION, INTERCEPTOR, OR PERIMETER SWALES
- ___ DIVERSION DIKE AND SWALE COMBINATIONS
- ___ PIPE SLOPE DRAINS
- ___ PAVED FLUMES
- ___ ROCK BEDDING AT CONSTRUCTION EXIT
- ___ TIMBER MATTING AT CONSTRUCTION EXIT
- ___ CHANNEL LINERS
- ___ SEDIMENT TRAPS
- ___ SEDIMENT BASINS
- ___ STORM INLET SEDIMENT TRAP
- ___ STONE OUTLET STRUCTURES
- ___ CURBS AND GUTTERS
- ___ STORM SEWERS
- T VELOCITY CONTROL DEVICES
- ___ OTHER:

NOTE: TOP OF BMP'S SHOULD NOT BE HIGHER THAN ROADWAY ELEVATION AS NOT TO FLOOD ROADWAY UNLESS PRIOR APPROVAL FROM ENGINEER IS OBTAINED.

3. STORM WATER MANAGEMENT:

A. Storm water drainage will be provided by ditches which carry drainage within the R.O.W. to the lows within the roadway and project site which drains to natural facilitly, Salt Creek.

B. Other permanent erosion controls include hydraulic design to limit structure outlet velocities and grading design generally consisting of 6 :1 or flatter slopes with permanent vegetative cover.

4. STORM WATER MANAGEMENT ACTIVITIES: (Sequence of Construction)

1. *Remove existing topsoil and windrow to edge of work area. Impacts to topsoil should be kept to the minimum necessary to complete work.*
2. *Place BMPs.*
3. *Prepare area for construction of abutments by excavation and embankment.*
4. *Form up and pour concrete to create abutments.*
5. *Grade sideslopes and build v-ditch by returning topsoil to the prepared slopes.*
6. *Place permanent seeding, fertilizer, and water until vegetation is re-established.*

5. NON-STORM WATER DISCHARGES:

Filter non-storm water discharges, or hold in retention basins, before being allowed to mix with storm water. These discharges consist of, but not limited to, non-polluted ground water, spring water, foundation or footing drain water, water used for dust control or pavement washing and vehicle washwater containing no detergents.

C. OTHER REQUIREMENTS & PRACTICES

1. MAINTENANCE:

Maintain all erosion and sediment controls in good working order. Perform any necessary cleaning/repairs/replacements at the earliest possible date prior to next rain event, but no later than 7 calendar days. Ensure the surrounding ground has dried sufficiently to prevent damage from equipment. "Too Wet" is the only reason for not adhering to timeframes described. When construction activities permanently or temporarily cease and are not expected to resume for 14 or more days on a disturbed portion of the site, stabilization measures must be initiated immediately.

2. INSPECTION:

A TxDOT inspector will perform a regularly scheduled SW3P inspection every 14 calendar days. An inspection and Maintenance Report, signed by the TxDOT inspector and the Contractor, will be filed for each inspection within 24-hours following the inspection. Revise/clean/repair/replace each BMP control device in accordance with the Construction General Permit and the current Field Inspection and Maintenance Report (Form 2118) and Item 1 (Maintenance) above. On project that disturb less than one acre and do not meet the definition of a construction project, inspections are not required.

C. OTHER REQUIREMENTS & PRACTICES (CONTINUED)

3. WASTE MATERIALS:

Minimize the exposure of contruction wastes and trash on the site to precipitation and to stormwater. On a daily basis, or as may be directed, collect all waste materials, trash and debris from the construction site and deposit into a metal dumpster having a secure cover and which meets all state and local city solid waste management requirements. Minimize the exposure of waste materials by keeping waste container lids closed when not in use. For waste containers that do not have lids and could leak the permittee must provide either a cover (e.g., a tarp, plastic sheeting, temporary roof) to minimize exposure of wastes to precipitation, or a similarly effective means designed to minimize the discharge of pollutants. Empty the dumpster as required by regulation, or as may be directed, at a local approved landfill site. Do not bury construction waste on the construction project site.

4. HAZARDOUS WASTE & SPILL REPORTING:

As a minimum, any products in the following categories are considered to be hazardous: Paints, Acids, Solvents, Fuels, Asphalt Products, Chemical Additives for Soil Stabilization, and Concrete Curing Compounds or Additives. Minimize the exposure of building materials, building products, landscape materials, fertilizers, pesticides, herbicides, detergents, and other materials present on the site to precipitation and to stormwater. When storing hazardous material on the project site, or at a Project Specific Location, take all practicable precaution to prevent and/or contain any spillage of these materials. In the event of a spill, contact the spill coordinator immediately.

5. SANITARY WASTE:

Use a licensed sanitary waste management contractor to collect all sanitary waste from portable units as may be required by local regulation, or as directed. Minimize the exposure of sanitary waste present on the site to precipitation and to stormwater.

6. CONSTRUCTION VEHICLE TRACKING:

On a regular basis, or as may be directed, dampen haul roads for dust control and stabilize construction entrances/exits. Provide for a motorized broom or vacuum type sweeper to be available on a daily basis, or as may be directed, to remove sediment from paved roadways abutting or traversing the project site.

7. MANAGEMENT PRACTICES:

A. Construct disposal areas, stockpiles, haul roads and PSL's in a manner that will minimize and control the amount of sediment that may enter receiving waters. Do not locate disposal areas in any wetland, waterbody or streambed.
B. Locate construction staging areas, vehicle maintenance and PSL's areas in a manner to minimize the runoff of pollutants.
C. When working in or near a wetland, install and maintain operating soil erosion and sediment controls at all times during construction and isolate the work from the wetland.
D. Clear all waterways as soon as practicable of temporary embankment, temporary bridges, matting, falsework, piling, debris or other obstructions placed during construction operations that are not a part of the finished work.
E. Procedures and/or practices should be taken to control dust.
F. Sediment to be removed from roadways daily or when work begins after weather events if construction activities have ceased due to weather event.
G. Operators must prevent or minimize the discharge of spilled cement, aggregate (including sand or gravel), settled dust, or other significant materials from paved portions of the site that are exposed to stormwater.

STATE OF TEXAS
ZACHARY P. HUSEN
106073
LICENSED
PROFESSIONAL ENGINEER
Zach P. Husen, P.E.
10/24/2022

Texas Department of Transportation

WICHITA FALLS DISTRICT ENVIRONMENTAL
CR 261 (RIVER ROAD) @ DRAW
SW3P NARRATIVE
TEMPLATE REVISION DATE: 04/26/2016

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		CR 232, ETC
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	WFS	ARCHER	70
CHECK	CONTROL	SECTION	JOB	
	0903	29	027, ETC	

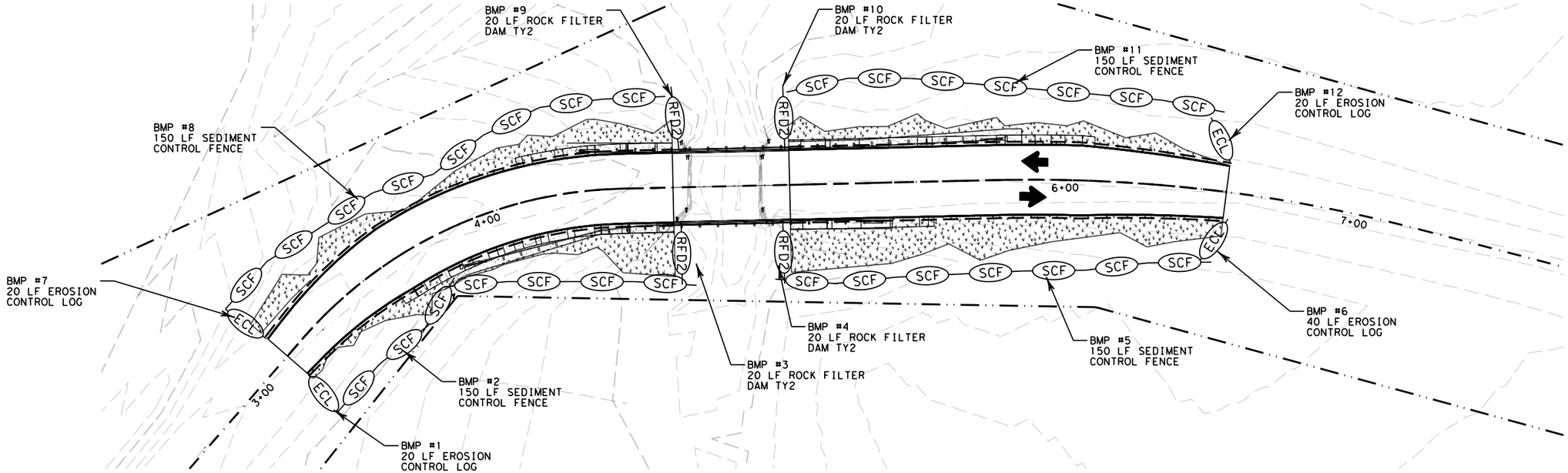
DATE: 10/24/2022 11:31:23 AM
FILE: G:\WFSDESIGN\Plans\0903-29\028\4 - Design\Plan Set\9. Environmental\CR 261 (RIVER ROAD) @ DRAW SW3P NARRATIVE.dgn

LEGEND

SYMBOL	DESCRIPTION
SCF	SEDIMENT CONTROL FENCE
ECL	EROSION CONTROL LOGS (8")
RFD2	ROCK FILTER DAM (TY 2)
	LIMITS OF SEEDING
	TRAFFIC DIRECTION
	LIMITS OF SOIL DISTURBANCE
	FLOW DIRECTION

NOTES:

1. PLACE SANDBAGS AROUND ANY MATERIAL STOCKPILE THAT ARE LEFT ON SITE OVERNIGHT. THIS WORK WILL NOT BE PAID FOR DIRECTLY BUT WILL BE SUBSIDIARY TO THE VARIOUS BID ITEMS.
2. THE LOCATIONS OF DEVICES ARE FOR GRAPHIC REPERSENTATION ONLY. OBTAIN ENGINEERS APPROVAL BEFORE INSTALLATION.
3. AFTER ROADWAY AND BRIDGE CONSTRUCTION IS FINISHED, SPREAD OUT ALL ROCK FILTER DAMS TO PROVIDE SLOPE PROTECTION.



DATE SOIL DISTURBED	DATE SOIL STABILIZED

BMP #	INSTALLED	MAINTAINED	REPLACED	REMOVED	BMP #	INSTALLED	MAINTAINED	REPLACED	REMOVED	BMP #	INSTALLED	MAINTAINED	REPLACED	REMOVED

STATE OF TEXAS
ZACHARY P. HUSEN
107063
LICENSED PROFESSIONAL ENGINEER
Zachary P. Husen, P.E.
10/24/2022

CR 261
(RIVER RD)
@ DRAW
SW3P LAYOUT

0 20 40
SCALE IN FEET

2022 Texas Department of Transportation®

CONT	SECT	JOB	HIGHWAY
0903	29	027, ETC	CR 232, ETC
DIST	COUNTY		SHEET NO.
WFS	ARCHER		71

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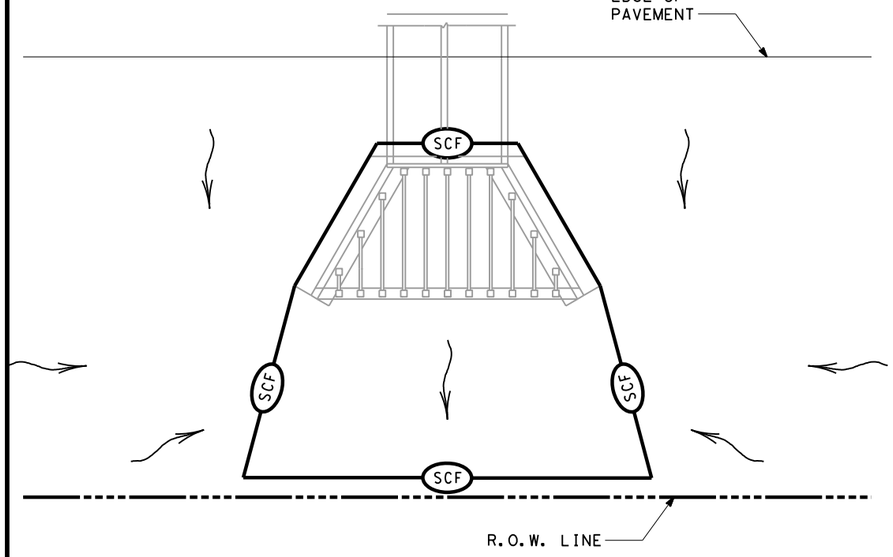
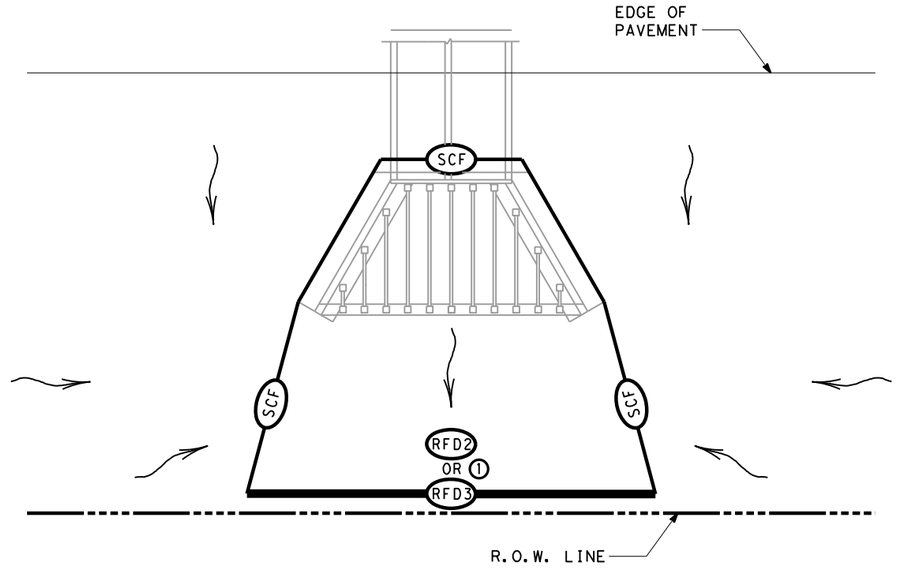


BEST MANAGEMENT PRACTICE (BMP) #5

FOR NON-404 STREAMS ONLY ~ SEDIMENT CONTROL AT EXIT OF CULVERT



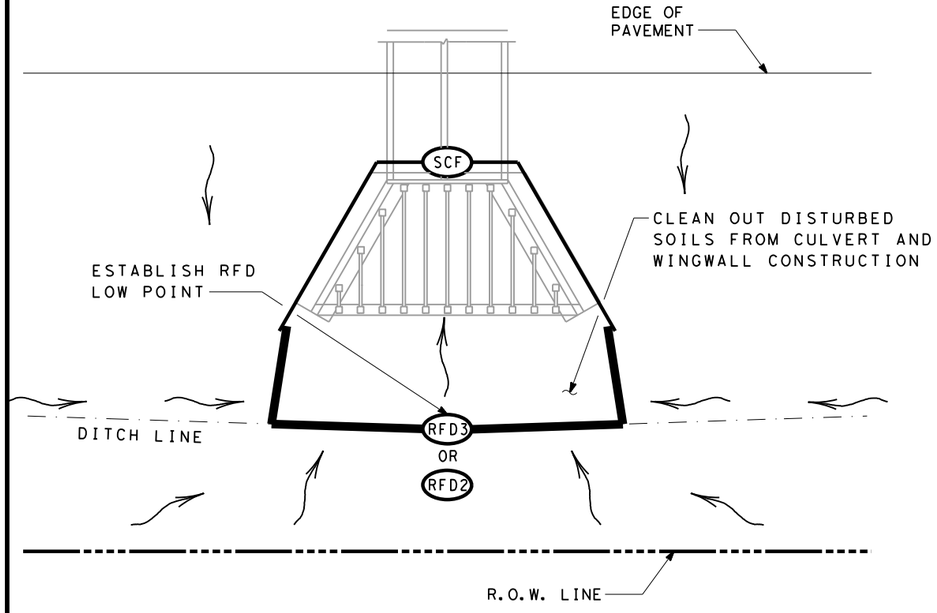
BEST MANAGEMENT PRACTICE (BMP) #6

FOR NON-404 STREAMS ONLY ~ SEDIMENT CONTROL AT EXIT OF CULVERT

SCF	SEDIMENT CONTROL FENCE
RFD2	ROCK FILTER DAM (TY 2)
RFD3	ROCK FILTER DAM (TY 3)
	DIRECTION OF FLOW

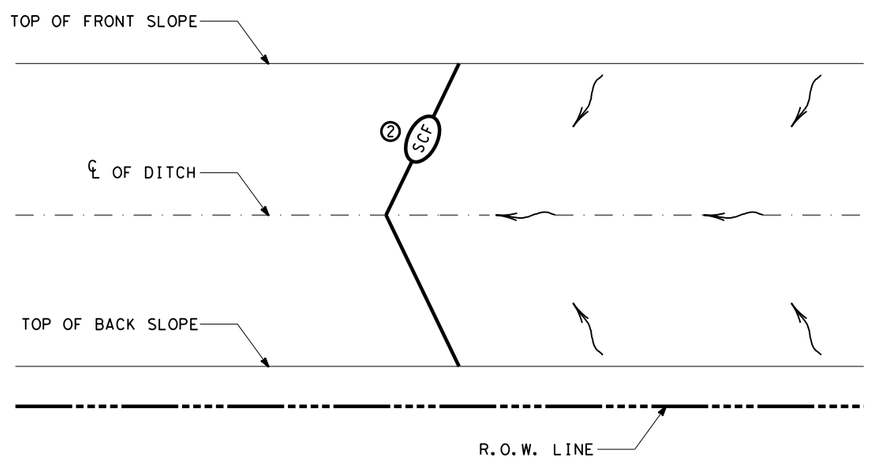
NOTES:

1. PROVIDE OVERLAP OF SILT FENCE WITH ROCK FILTER DAM.
2. ROCK FILTER DAMS OR EARTH/GRASSED EMBANKMENTS CAN BE SUBSTITUTED AS DIRECTED.



BEST MANAGEMENT PRACTICE (BMP) #7

FOR NON-404 STREAMS ONLY ~ SEDIMENT CONTROL AT ENTRANCE OF CULVERT



BEST MANAGEMENT PRACTICE (BMP) #8

BOUNDRY SEDIMENT CONTROL ~ BOTH ENDS OF CONTROL TERMINATED UP SLOPE

STATE OF TEXAS
ZACHARY PAUL HUSEN
106073
LICENSED PROFESSIONAL ENGINEER

Zach P. Husen, P.E.
10/24/2022

SCALE = NTS SHEET 1 OF 3

Texas Department of Transportation
Wichita Falls District Standard

TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

WFS-TA-BMP

FILE: BMPLAYOUTS.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT 2009	CONT	SECT	JOB	HIGHWAY
REVISIONS JULY 2019	0903	29	027, ETC	CR 232, ETC
	DIST	COUNTY		SHEET NO.
	WFS	ARCHER		72

DEPARTMENT MATERIAL SPECIFICATIONS	
PLYWOOD SIGN BLANKS	DMS-7100
FLAT SURFACE REFLECTIVE SHEETING	DMS-8300
VINYL NON-REFLECTIVE DECAL SHEETING	DMS-8320

COLOR	USAGE	REFLECTIVE SHEETING OR OTHER MATERIAL
WHITE	BACKGROUND	TYPE C (FLUORESCENT PRISMATIC)
BLACK	LEGEND & BORDERS	VINYL NON-REFLECTIVE DECAL SHEETING

SIGN GENERAL NOTES:

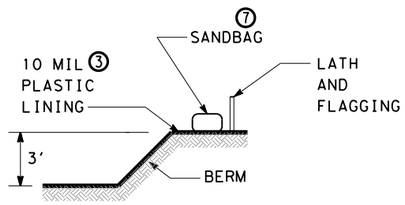
A. THE ALPHABETS AND LATERAL SPACING BETWEEN LETTERS AND NUMERALS SHALL CONFORM WITH THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS", (TMUTCD) LATEST EDITION, AND THE "COMPLIANT WORK ZONE TRAFFIC CONTROL DEVICES LIST". LATERAL SPACING OF TEXT SHALL PROVIDE A BALANCED APPEARANCE. ALL MATERIALS SHALL CONFORM TO DEPARTMENT SPECIFICATIONS.

B. LEGEND AND BORDER MAY BE APPLIED BY REVERSE SCREENING PROCESS WITH TRANSPARENT COLORED INK, CUT-OUT WHITE REFLECTIVE SHEETING APPLIED TO COLORED BACKGROUND OR COMBINATION THEREOF. BACKGROUND SHALL BE REFLECTIVE SHEETING TYPE C.

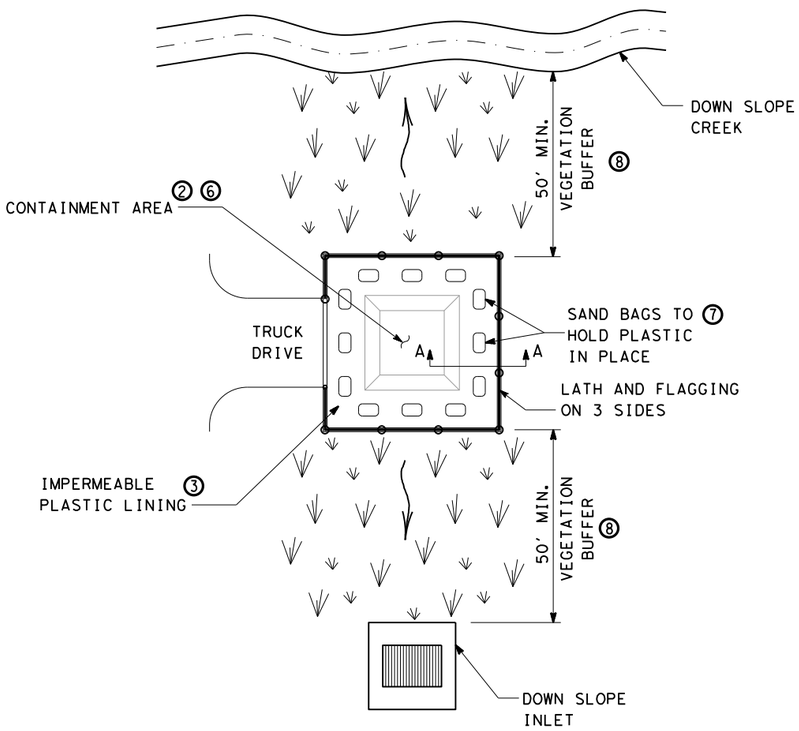
C. FINAL SIGN LOCATION SHALL BE AS APPROVED BY THE ENGINEER. IF THE SIGN CANNOT BE PLACED OUTSIDE THE CLEAR ZONE, IT MUST ADHERE TO THE TMUTCD. IF PLACED OUTSIDE THE CLEAR ZONE, SIGN MAY BE PLACED PERPENDICULAR OR PARALLEL TO ROW LINE.

D. SIGN DIMENSION IS 42" WIDE X 24" TALL WITH 5" BLACK LETTERS.

CONCRETE WASHOUT SIGN DETAIL (10)

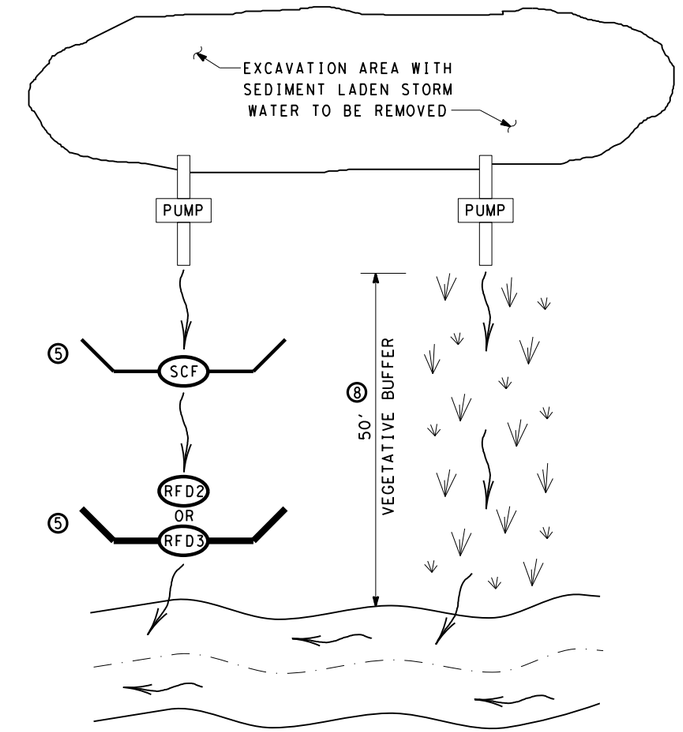


SECTION A-A



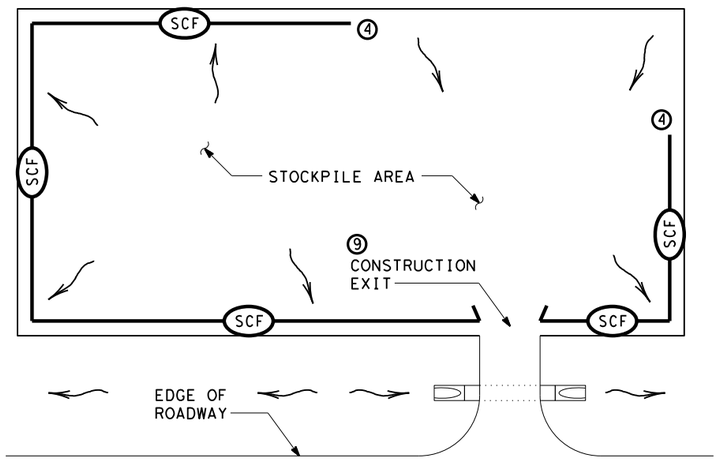
BEST MANAGEMENT PRACTICE (BMP) #12

CONCRETE TRUCK WASHOUT AREA (10)



BEST MANAGEMENT PRACTICE (BMP) #13

PUMPED STORM WATER SEDIMENT CONTROLS (1)



BEST MANAGEMENT PRACTICE (BMP) #14

STOCKPILE SEDIMENT CONTROL

	VEGETATIVE BUFFER
	DIRECTION OF FLOW
SCF	SEDIMENT CONTROL FENCE
RFD2	ROCK FILTER DAM (TY 2)
RFD3	ROCK FILTER DAM (TY 3)

NOTES:

1. PUMPED STORM WATER FROM AN EXCAVATION AREA SHOULD BE DISCHARGED IN A 50' VEGETATIVE BARRIER OR THROUGH TWO TEMPORARY SEDIMENT CONTROLS.
2. WHEN CONTAINMENT AREA REACHES 1' FREEBOARD, DISCONTINUE WASHOUT PLACEMENT AND REMOVE MATERIAL UPON SOLIDIFICATION.
3. EACH TIME SOLIDIFIED MATERIAL IS REMOVED REPLACE PLASTIC SHEETING. USE 10 MIL PLASTIC LINING MINIMUM.
4. START SEDIMENT CONTROL AT LOCATION SO ALL STORM WATER WITH SEDIMENT IS COLLECTED
5. ROCK FILTER DAMS, SEDIMENT CONTROL FENCE, OR OTHER DEVICES CAN BE SUBSTITUTED AS DIRECTED.
6. ACTUAL SIZE, LAYOUT, & LOCATION WILL BE DETERMINED IN THE FIELD.
7. AN EARTHEN BERM MAY BE USED IN LIEU OF SANDBAGS.
8. VEGETATIVE BUFFER SHOULD HAVE AT A MINIMUM 70% VEGETATIVE COVERAGE
9. PLACEMENT OF DEVICES FOR OFFSITE TRACKING AS APPLICABLE AND/OR DIRECTED BY THE ENGINEER.
10. ALL ITEMS REQUIRED FOR CONCRETE WASHOUT AND SIGN SHALL BE SUBSIDIARY TO ITEM 506.

STATE OF TEXAS
ZACHARY PAUL HUSEN
106073
LICENSED
PROFESSIONAL ENGINEER

Zach P. Husen, P.E.
10/24/2022

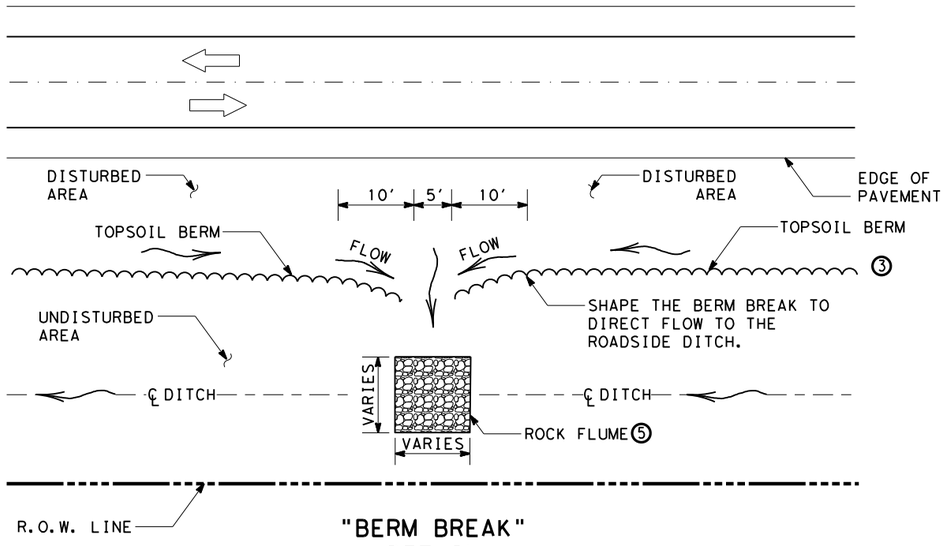
SCALE = NTS SHEET 2 OF 3

Texas Department of Transportation
Wichita Falls District Standard

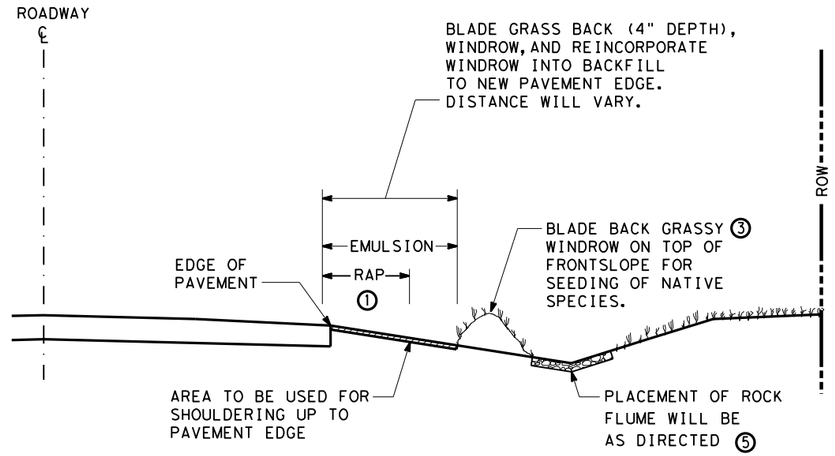
TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

WFS-TA-BMP

FILE: BMPLAYOUTS.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT 2009	CONT	SECT	JOB	HIGHWAY
REVISIONS JULY 2019	0903	29	027, ETC	CR 232, ETC
	DIST	COUNTY		SHEET NO.
	WFS	ARCHER		73



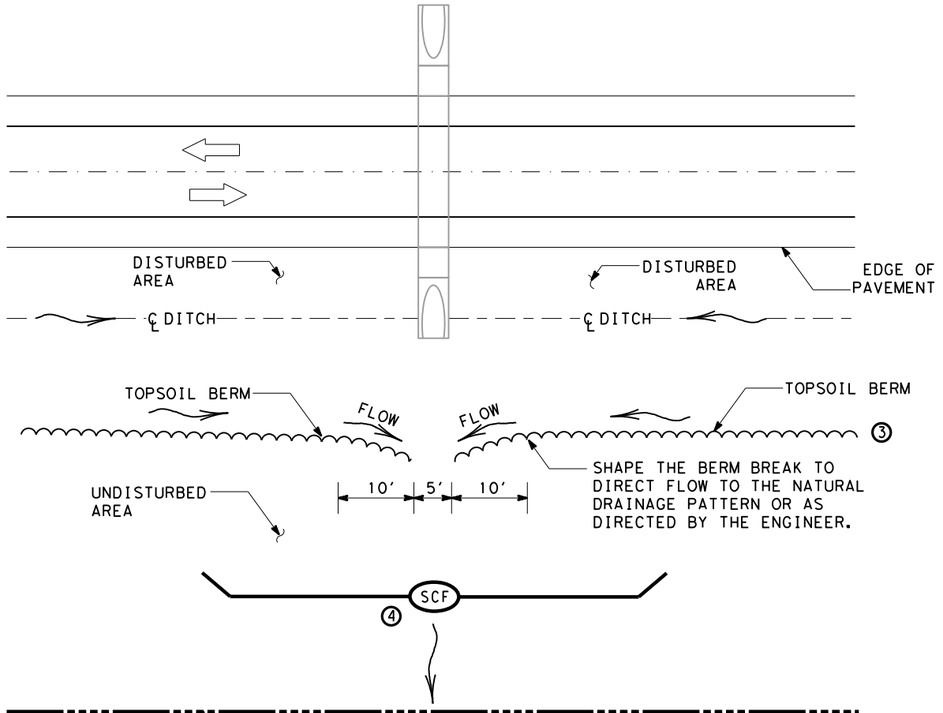
"BERM BREAK" DETAIL PLAN VIEW ②



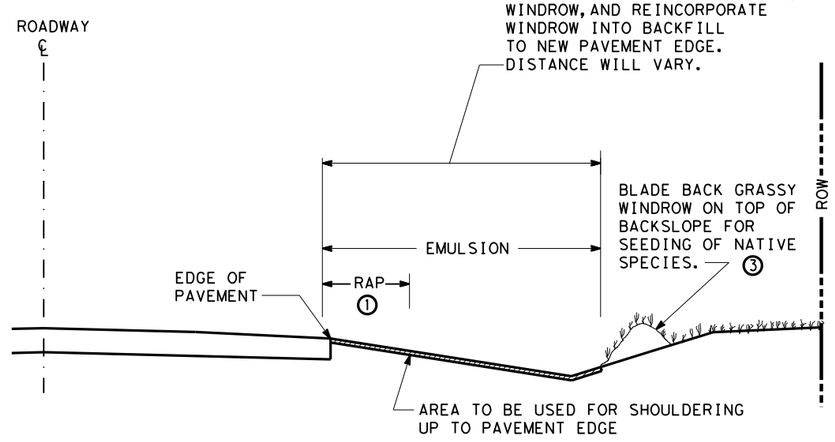
TYPICAL DITCH SECTION
SHOWING BERM/WINDROW OF TOPSOIL

BEST MANAGEMENT PRACTICE (BMP) #15

SEDIMENT CONTROL AND BERM DETAIL
WITH BERM ON FRONTSLOPE



"BERM BREAK" DETAIL PLAN VIEW ②



TYPICAL DITCH SECTION
SHOWING BERM/WINDROW OF TOPSOIL

BEST MANAGEMENT PRACTICE (BMP) #16

SEDIMENT CONTROL AND BERM DETAIL AT CROSS DRAINAGE STRUCTURE
WITH BERM ON BACKSLOPE

	FULLY GRASSED DITCH
	DISTURBED AREA
	DIRECTION OF FLOW
SCF	SEDIMENT CONTROL FENCE
	ROCK FLUME~ENERGY DISSAPATOR
	BERM

NOTES:

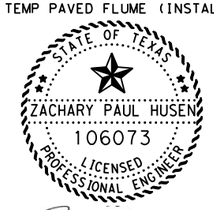
① AS DIRECTED PLACE RAP ADJACENT TO EDGE OF PAVEMENT AS A BACKFILL MATERIAL. PLACEMENT DISTANCE IS TO BE A MINIMUM OF 4' OR AS NEEDED TO ACHIEVE SMOOTH TIE IN TO EXISTING FRONT SLOPE.

② BREAK BERM SO THAT MAXIMUM FLOW LENGTH ALONG THE BERM IS LESS THAN 1000'. BREAK BERM IN LOW AREAS WHERE FLOW MAY OVERTOP THE BERM. DO NOT BREAK BERM ON HILLTOPS OR WHERE RUNOFF AND SEDIMENT FLOW DIRECTLY OFF THE ROW.

③ LOCATION OF BERM WILL VARY. BERM COULD BE PLACED ON FRONTSLOPE OR BACKSLOPE DEPENDING ON FIELD CONDITIONS. SEE SPECIFIC SW3P LAYOUT SHEET FOR MORE DETAILS ON LOCATION OF BERM.

④ ROCK FILTER DAMS, SEDIMENT CONTROL FENCE, EROSION CONTROL LOGS, ROCK FLUME, OR OTHER DEVICES CAN BE SUBSTITUTED AS DIRECTED. DEVICE MAY NOT BE NEEDED IN ALL LOCATIONS. SEE SPECIFIC SW3P LAYOUT SHEET FOR MORE DETAILS ON LOCATION OF DEVICES.

⑤ PLACE ROCK FLUME DISSAPATOR AS DIRECTED BY THE ENGINEER. SIZE AND LOCATIONS OF ROCK FLUME WILL VARY. PROVIDE ROCK OR RUBBLE WITH A 3" TO 6" AGGREGATE. SECURE ROCK WITH 20-GAUGE GALVANIZED WOVEN WIRE MESH WITH 1" DIAMTER HEXAGONAL OPENINGS. ROCK SHOULD BE PLACED ON THE MESH AND MESH SHALL BE FOLDED AT THE UPSTREAM SIDE OVER THE ROCK AND TIGHTLY SECURED TO ITSELF ON THE DOWNSTREAM SIDE USING WIRE TIES. PAYMENT WILL BE MADE BY ITEM TEMP PAVED FLUME (INSTALL).



Zac P. Husen, P.E.
10/24/2022

SCALE = NTS SHEET 3 OF 3

Texas Department of Transportation
Wichita Falls District Standard

TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

WFS-TA-BMP

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REVISIONS JULY 2019	0903	29	027, ETC	CR 232, ETC
	DIST	COUNTY		SHEET NO.
	WFS	ARCHER		74

ITEM 164 SEEDING FOR EROSION CONTROL

SEED (PERMANENT) (URBAN) (SAND or CLAY)

"WARM SEASON" PLANTING DATES	SEED MIXTURE	PURE LIVE SEED RATE & PLANT DEPTH.
PERMANENT: EARLY SPRING SEED FROM FEBRUARY 1st THROUGH May 15th. AS AREAS OF THE ROW ARE PREPARED AND DETERMINED READY FOR DRILL SEEDING.	NEW CROP: BUFFALO GRASS (Texoka) COMMON BERMUDA GRASS (HULLED) BLUE GRAMA (NATIVE)	4.0 LBS PLS / ACRE 5.0 LBS PLS / ACRE 1.5 LBS PLS / ACRE @1/4 -1/2" Soil Depth
SOIL PREPARATION EQUIPMENT AND PRACTICES: RIPPER --- DISK --- HARROW --- CULTI-PACKER .		

ITEM 164 SEEDING FOR EROSION CONTROL

SEED (TEMPORARY) (URBAN) WARM SEASON SEEDING

"WARM SEASON" PLANTING DATES	SEED MIXTURE	PURE LIVE SEED RATE & PLANT DEPTH.
TEMPORARY: LATE SPRING & SUMMER SEED FROM MAY 16th THROUGH AUGUST 31st. AS AREAS OF THE ROW ARE PREPARED AND DETERMINED READY FOR DRILL SEEDING.	NEW CROP SEED: TYPE : BUFFALOGRASS (TEXOKA) COMMON BERMUDA GRASS (UNHULLED) FOXTAIL MILLET	 3.0 LBS PLS / ACRE 4.0 LBS PLS / ACRE 15. LBS PLS / ACRE @ 1" Soil Depth
SOIL PREPARATION EQUIPMENT AND PRACTICES: RIPPER --- DISK --- HARROW --- CULTI-PACKER .		

ITEM 164 SEEDING FOR EROSION CONTROL

SEED (PERMANENT) (RURAL) (CLAY)

"WARM SEASON" PLANTING DATES	SEED MIXTURE	PURE LIVE SEED RATE & PLANT DEPTH.
PERMANENT: EARLY SPRING SEED FROM FEBRUARY 1st THROUGH May 15th. AS AREAS OF THE ROW ARE PREPARED AND DETERMINED READY FOR DRILL SEEDING.	NEW CROP: GREEN SPRANGLETOP SIDEOATS GRAMA BUFFALOGRASS BERMUDA GRASS BLACKWELL SWITCHGRASS ILLINOIS BUNDLEFLOWER	1.5 LBS PLS / ACRE 1.5 LBS PLS / ACRE 3.0 LBS PLS / ACRE 2.0 LBS PLS / ACRE 1.0 LBS PLS / ACRE 0.5 LBS PLS / ACRE @1/4 -1/2" Soil Depth
SOIL PREPARATION EQUIPMENT AND PRACTICES: RIPPER --- DISK --- HARROW --- CULTI-PACKER .		

ITEM 164 SEEDING FOR EROSION CONTROL

SEED (TEMPORARY) (RURAL) WARM SEASON SEEDING

"WARM SEASON" PLANTING DATES	SEED MIXTURE	PURE LIVE SEED RATE & PLANT DEPTH.
TEMPORARY: LATE SPRING & SUMMER SEED FROM MAY 16th THROUGH AUGUST 31st. AS AREAS OF THE ROW ARE PREPARED AND DETERMINED READY FOR DRILL SEEDING.	NEW CROP SEED: TYPE : BUFFALOGRASS (TEXOKA) BERMUDA GRASS (UNHULLED) GREEN SPRANGLETOP FOXTAIL MILLET	 3.0 LBS PLS / ACRE 4.0 LBS PLS / ACRE 2.0 LBS PLS / ACRE 20. LBS PLS / ACRE @ 1" Soil Depth
SOIL PREPARATION EQUIPMENT AND PRACTICES: RIPPER --- DISK --- HARROW --- CULTI-PACKER .		

ITEM 164 SEEDING FOR EROSION CONTROL

SEED (PERMANENT) (RURAL) (SANDY)

"WARM SEASON" PLANTING DATES	SEED MIXTURE	PURE LIVE SEED RATE & PLANT DEPTH.
PERMANENT: EARLY SPRING SEED FROM FEBRUARY 1st THROUGH May 15th. AS AREAS OF THE ROW ARE PREPARED AND DETERMINED READY FOR DRILL SEEDING.	NEW CROP: GREEN SPRANGLETOP BERMUDA GRASS SAND LOVEGRASS SAND DROPSEED WEEPING LOVEGRASS BLUE GRAMA PARTRIDGE PEAS (COMANCHE)	1.5 LBS PLS / ACRE 2.0 LBS PLS / ACRE 1.0 LBS PLS / ACRE 1.0 LBS PLS / ACRE 1.0 LBS PLS / ACRE 1.0 LBS PLS / ACRE 1.0 LBS PLS / ACRE @1/4 -1/2" Soil Depth
SOIL PREPARATION EQUIPMENT AND PRACTICES: RIPPER --- DISK --- HARROW --- CULTI-PACKER .		

NOTES:

1. SEE NOTES ON TA-VES SHEET 2 OF 2 FOR ADDITIONAL INFORMATION.

STATE OF TEXAS
ZACHARY P. HUSEN
106073
LICENSED
PROFESSIONAL ENGINEER

Zach P. Husen, P.E.
10/24/2022

SCALE = NTS SHEET 1 OF 2

Texas Department of Transportation
Wichita Falls District Standard

TYPICAL APPLICATION FOR VEGETATION ESTABLISHMENT SHEET

TA-VES

FILE: BMPLAYOUTS.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT 2009	CONT	SECT	JOB	HIGHWAY
REVISIONS JULY 2019	0903	29	027, ETC	CR 232, ETC
	DIST	COUNTY		SHEET NO.
	WFS	ARCHER		75

ITEM 164 SEEDING FOR EROSION CONTROL

SEED (TEMPORARY) (URBAN) COOL SEASON SEEDING

"COOL SEASON" PLANTING DATES	SEED MIXTURE	PURE LIVE SEED RATE & PLANT DEPTH.
TEMPORARY: EARLY FALL SEED FROM SEPTEMBER 1st THROUGH DECEMBER 1st. AS AREAS OF THE ROW ARE PREPARED AND DETERMINED READY FOR DRILL SEEDING.	NEW CROP SEED: TYPE : BUFFALOGRASS (TEXOKA) COMMON BERMUDA GRASS (UNHULLED) TALL FESCUE ANNUAL RYE GRASS	 3.0 LBS PLS / ACRE 4.0 LBS PLS / ACRE 4.0 LBS PLS / ACRE 15.0 LBS PLS / ACRE @ 1" Soil Depth
SOIL PREPARATION EQUIPMENT AND PRACTICES: RIPPER --- DISK --- HARROW --- CULTI-PACKER .		

ITEM 164 SEEDING FOR EROSION CONTROL

SEED (TEMPORARY) (RURAL) COOL SEASON SEEDING

"COOL SEASON" PLANTING DATES	SEED MIXTURE	PURE LIVE SEED RATE & PLANT DEPTH.
TEMPORARY: EARLY FALL SEED FROM SEPTEMBER 1st THROUGH DECEMBER 1st. AS AREAS OF THE ROW ARE PREPARED AND DETERMINED READY FOR DRILL SEEDING.	NEW CROP SEED: TYPE : BUFFALOGRASS (TEXOKA) BERMUDA GRASS (UNHULLED) GREEN SPRANGLETOP WESTERN WHEATGRASS CANADA WILD RYE GRASS ELBON RYE GRASS	 3.0 LBS PLS / ACRE 4.0 LBS PLS / ACRE 2.0 LBS PLS / ACRE 3.0 LBS PLS / ACRE 2.0 LBS PLS / ACRE 15.0 LBS PLS / ACRE @ 1" Soil Depth
SOIL PREPARATION EQUIPMENT AND PRACTICES: RIPPER --- DISK --- HARROW --- CULTI-PACKER .		

NOTES:

1. ALL SEED MIXTURE TYPES SHALL BE PURCHASED IN PRE- MIXED BAGS, "BY TYPE" BLENDED BY THE GROWER SHIPPER.
2. SOILS THAT ARE COMPACTED, HAVE CLODS, SHALL BE REWORKED UNTIL READY FOR SEEDING. AS DIRECTED.
3. ALL SOIL SURFACES SHALL BE LEVEL WITH NATURAL FLOWING SMOOTH GRADES. NO TIRE RUTS OR FURTHER TRAFFIC ALLOWED.
4. SOIL SURFACE SHALL BE FIRM BUT NOT COMPACTED, ALLOWING 1/4" DEPRESSION UNDER NORMAL FOOT TRAFFIC.
5. SEED 100% OF THE BED AREA. NO SKIPS OR VOID AREAS ALLOWED. EXAMPLE: AREAS AROUND SIGN POSTS AND INLETS.
6. SEED UP TO THE FIRST 6" OF THE EDGE OF PAVEMENT. AS DIRECTED, HAND RAKE ISOLATED SEEDED AREAS.
7. WEIGH ALL CALIBRATED SEED SAMPLES FOR ACCURACY AND PRESENT DOCUMENTATION TO ENGINEER.

FOR DRILL SEEDING

8. USE ONLY PROFESSIONAL NATIVE GRASS OR TURF GRASS (MULTI- 3 BIN) DRILL SEEDERS. NO DROP SEEDERS ALLOWED. OTHER TYPES OF SEEDERS AS APPROVED BY THE ENGINEER.
9. CALIBRATE DRILL SEEDER FOR SPECIFIED (PLS) PER ACRE BEFORE DRILL SEEDING.
10. DRILL SEEDER MUST BE EQUIPPED WITH THE LARGE FRONT CUTTING COULTERS DURING THE INSPECTION OF DRILL SEEDER.

FOR BROADCAST SEEDING

11. USE ONLY COMMERCIAL TYPE CYCLONE TYPE SPREADERS.
12. CALIBRATE CYCLONE SPREADER FOR 1000 Sq. Ft. (PLS) PER ACRE BEFORE SEEDING.
13. TO PREVENT SEED SEPARATION IN SPREADERS, SPREAD ALL SEED TYPES INDEPENDENTLY IN A SEPARATE APPLICATION.
14. IMMEDIATELY AFTER SEEDING, IN ONE OR TWO OPERATIONS, CULTI-PACK THE SEEDED SOILS AND FIRM SEED INTO SURFACE.
15. DISCONTINUE SEEDING IF WIND EXCEEDS 10 MPH.

ITEM 314 EMULSIFIED ASPHALT TREATMENT

TIME SCHEDULE	FUNCTIONAL USE:
IMMEDIATELY AFTER: SOIL PREPARATION OR WITHIN 24 HOURS AFTER SEEDING, APPLY THE TACK COAT TO DESIGNATED SOIL SURFACES.	SOIL EROSION CONTROL, OR MOISTURE RETENTION BARRIER.

NOTES:

1. ALL TRUCK APPLICATIONS SHALL BE COMPLETED IN ONE PASS OF THE DISTRIBUTOR. ALL TOUCH UP WORK WILL BE FINISHED BY HAND AND HOSE PROCEDURES. APPLY FROM EDGE OF PAVEMENT THROUGH THE FULL SPECIFIED AREAS.
2. ENGINEER WILL INSPECT FOR ACCURACY THE OVERALL DEPTH OF THE APPLIED TACK COAT MATERIALS.
3. FURTHER VEHICULAR TRAFFIC IS NOT ALLOWED ON LAID BY TACK COAT SURFACES. AT THE CONTRACTORS EXPENSE ALL DAMAGES TO TACK COAT SURFACES WILL BE RE -SHOT AS DIRECTED BY THE ENGINEER.
4. USE MATERIALS AS SPECIFIED FOR EROSION CONTROL ON TABLE 18 IN ITEM 300 ASPHALTS, OILS, AND EMULSIONS, AT A RATE OF 0.25 GAL/SY.

ITEM 166 FERTILIZER

TIME SCHEDULE	FUNCTIONAL USE:
AFTER TOPSOIL PLOWING PREPARATIONS ARE COMPLETED, FERTILIZE ROW SOIL SURFACES AND HARROW 2" TO 4" DEEP INTO PLACE.	PLANT NUTRIENTS FOR PLANT AND ROOT DEVELOPMENT.

FERTILIZER SHALL BE EVENLY DISTRIBUTED AT A RATE OF 100 LBS OF NITROGEN PER ACRE.
THE BREAK DOWN OF THE NITROGEN ELEMENT SHALL BE IN A 50% SLOW RELEASE FORM.
ANALYSIS OF THE (NPK) IS: 3:1:1 OR AS DIRECTED BY THE AREA ENGINEER.

ITEM 166 NOTES:

1. BROADCAST SPECIFIED FERTILIZER FROM THE EDGE OF PAVEMENT, THROUGH THE ENTIRE ROW SEED BED AREA. APPLICATIONS FOR EDGE OF PAVEMENT, CULVERTS, SIGN POST AREAS, GUARD RAILS AND ISOLATED AREAS SHALL BE APPLIED BY WALK BEHIND SPREADERS AND BY HAND. NO FERTILIZER ALLOWED ON PAVEMENT SURFACES.

2. ALL SPREADERS SHALL BE CALIBRATED BY THE CONTRACTOR AND THE ENGINEER FOR ACCURACY AND PERFORMANCE. SHALL USE UNOPENED 50# BAGS OF SPECIFIED FERTILIZER FOR DAILY CALIBRATIONS. APPLICATION SHALL BE A EVEN DISTRIBUTION OF PRODUCT ON DESIGNATED SOIL SURFACES.

3. FERTILIZER SHALL BE DELIVERED IN 50# BAGS UNLESS OTHERWISE SPECIFIED OR APPROVED PRIOR TO DELIVERY. BAGS SHALL BE CLEARLY LABELED SHOWING CONTENTS. IF BULK FERTILIZER IS APPROVED, DOCUMENTATION WILL BE REQUIRED FOR EACH LOAD OF MATERIAL DELIVERED VERIFYING AUTHENTICITY OF THE MATERIAL. CULTURAL PROCEDURES ARE UNDER THE DIRECTION OF THE TXDOT AREA ENGINEER.

STATE OF TEXAS
ZACHARY P. HUSEN
106073
LICENSED
PROFESSIONAL ENGINEER
Zach P. Husen, P.E.
10/24/2022

SCALE = NTS SHEET 2 OF 2

Texas Department of Transportation
Wichita Falls District Standard

TYPICAL APPLICATION FOR VEGETATION ESTABLISHMENT SHEET

TA-VES

FILE: BMPLAYOUTS.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
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REVISIONS JULY 2019	0903	29	027, ETC	CR 232, ETC
	DIST	COUNTY		SHEET NO.
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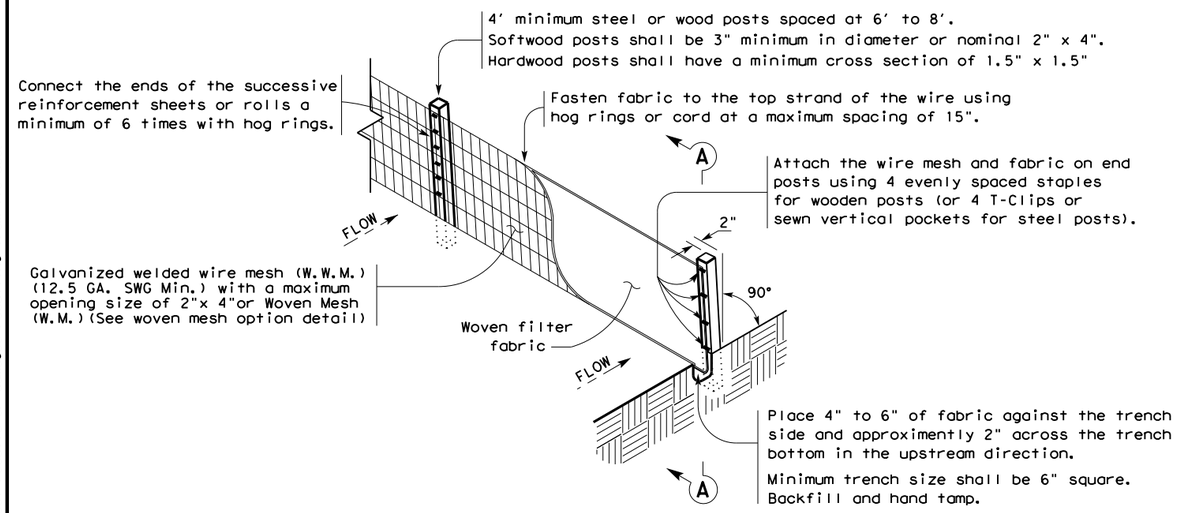
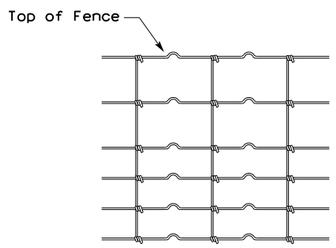
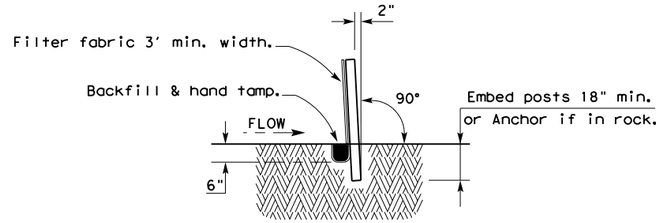


TEMPORARY SEDIMENT CONTROL FENCE

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.

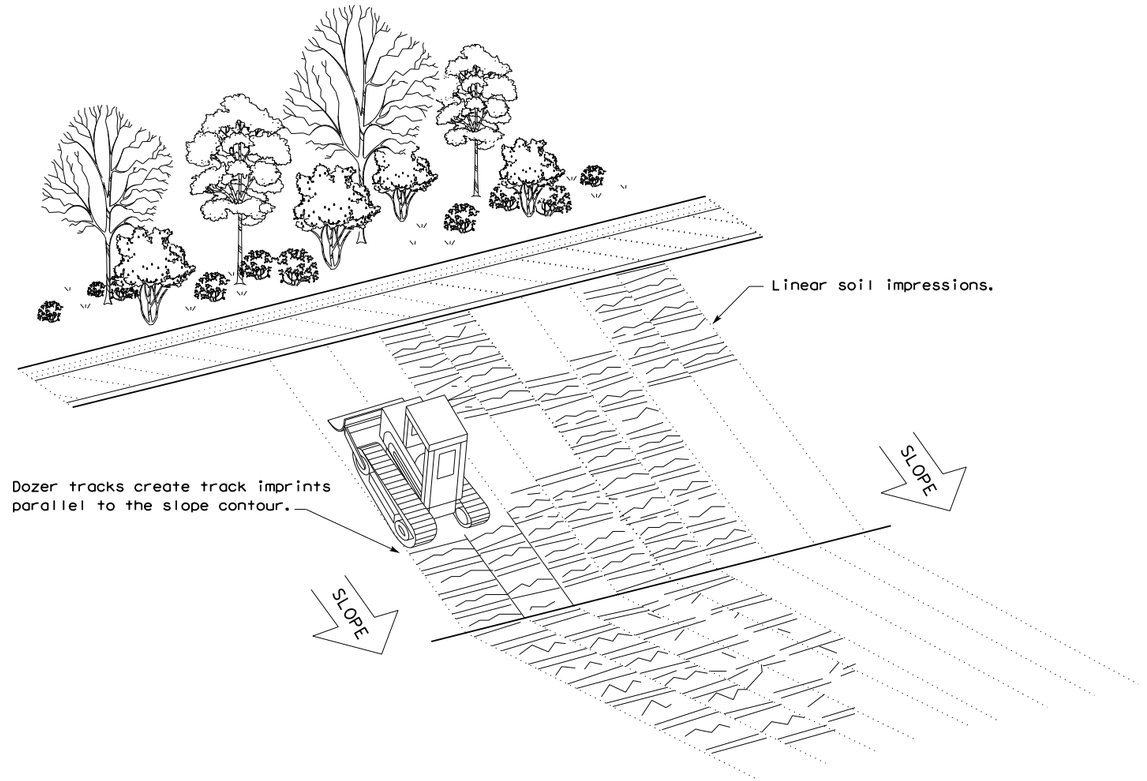
LEGEND

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	0903	29	027, ETC	CR 232, ETC
	DIST	COUNTY		SHEET NO.
	WFS	ARCHER		77

DATE: 10/24/2022
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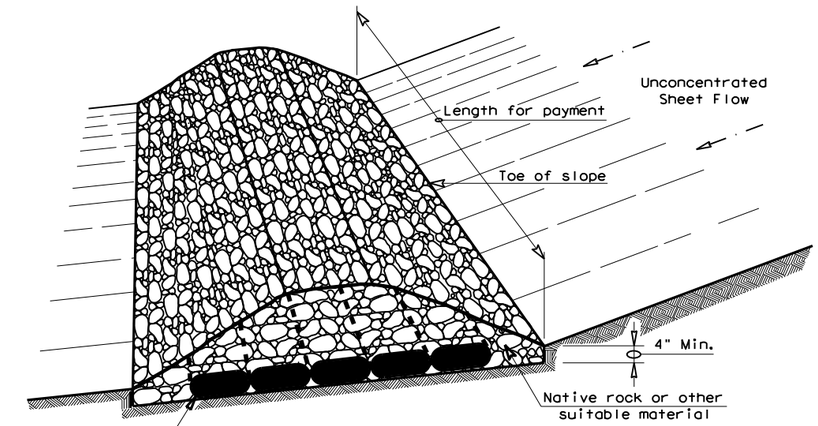
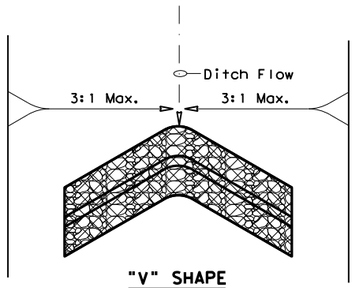
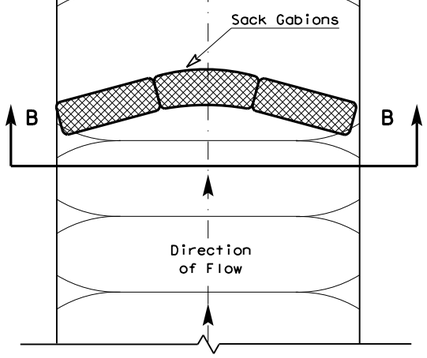


FILTER DAM AT TOE OF SLOPE

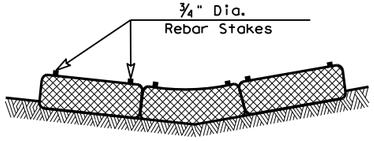
RFD1



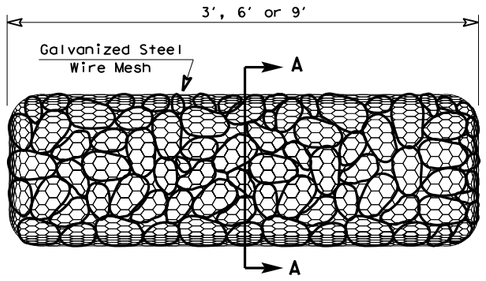
"V" SHAPE
PLAN VIEW



PLAN VIEW

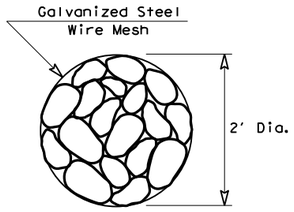


SECTION B-B

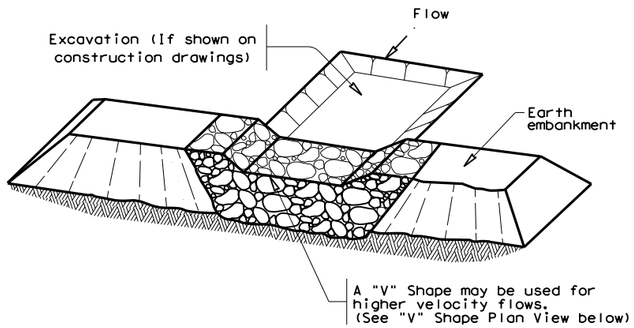


TYPE 4 (SACK GABIONS)

RFD4

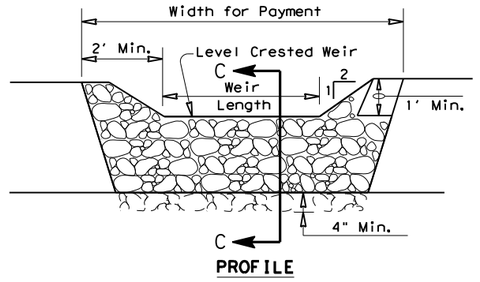


SECTION A-A

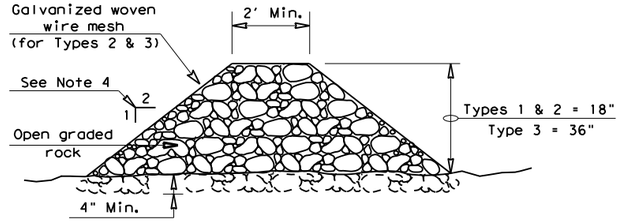


FILTER DAM AT SEDIMENT TRAP

RFD1 OR RFD2



PROFILE



SECTION C-C

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT^2 of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

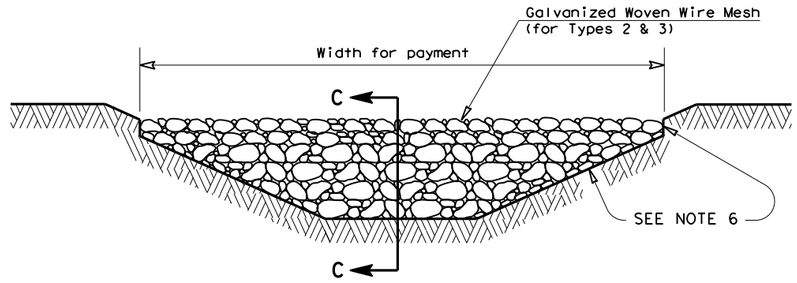
Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximently 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.



FILTER DAM AT CHANNEL SECTIONS

RFD1 OR RFD2 OR RFD3

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

PLAN SHEET LEGEND

Type 1 Rock Filter Dam	RFD1
Type 2 Rock Filter Dam	RFD2
Type 3 Rock Filter Dam	RFD3
Type 4 Rock Filter Dam	RFD4

Texas Department of Transportation — Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

EC(2)-16

FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0903	29	027, ETC	CR 232, ETC
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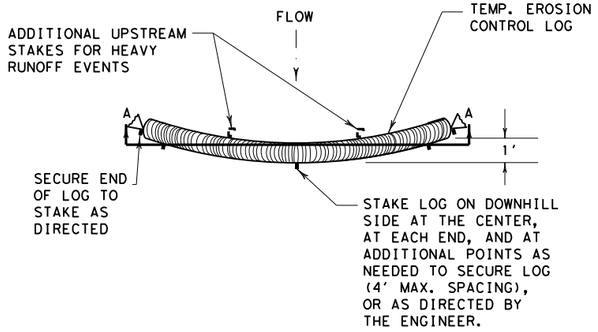
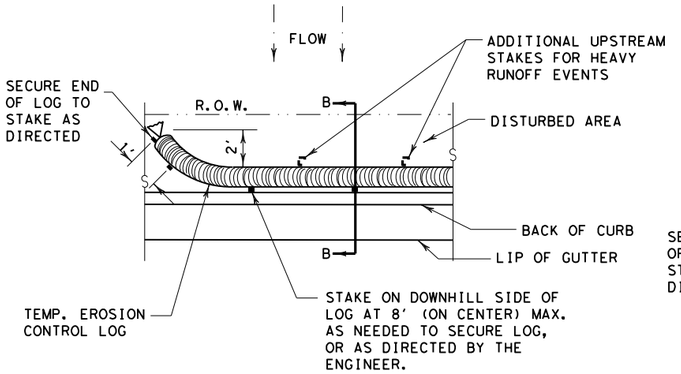
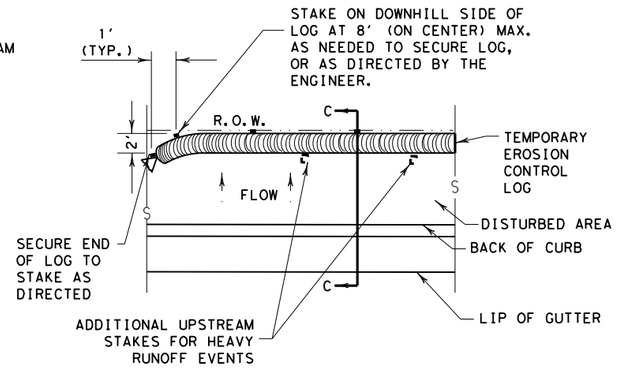


PLAN VIEW



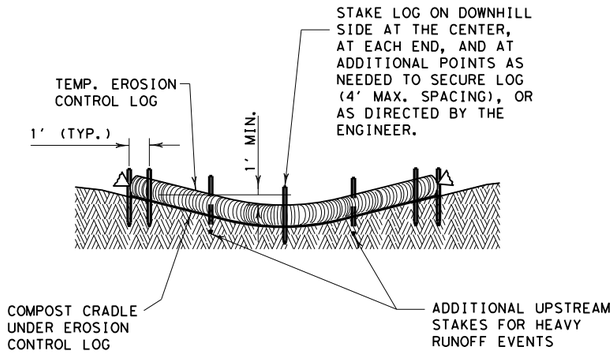
PLAN VIEW



PLAN VIEW

GENERAL NOTES:

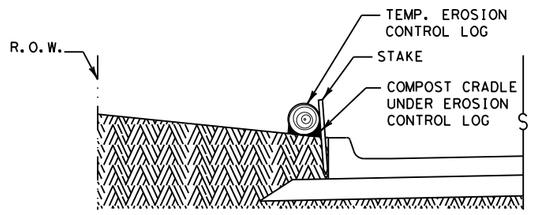
1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE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



SECTION A-A

EROSION CONTROL LOG DAM

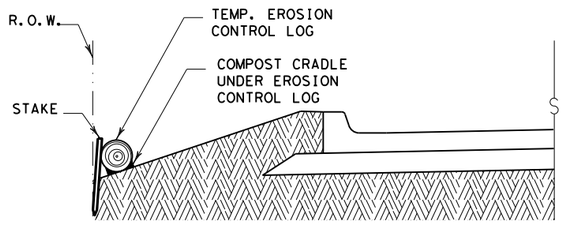
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

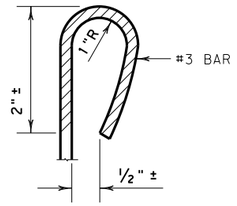
CL-BOC



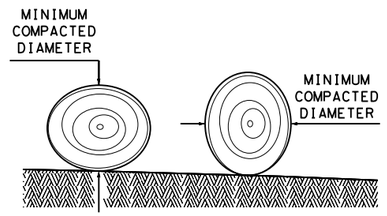
SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



REBAR STAKE DETAIL



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

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

SEDIMENT BASIN & TRAP USAGE GUIDELINES

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

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

Control logs should be placed in the following locations:

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

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

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

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT		CK: KM		DW: LS/PT		CK: LS
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	WFS	ARCHER			79		

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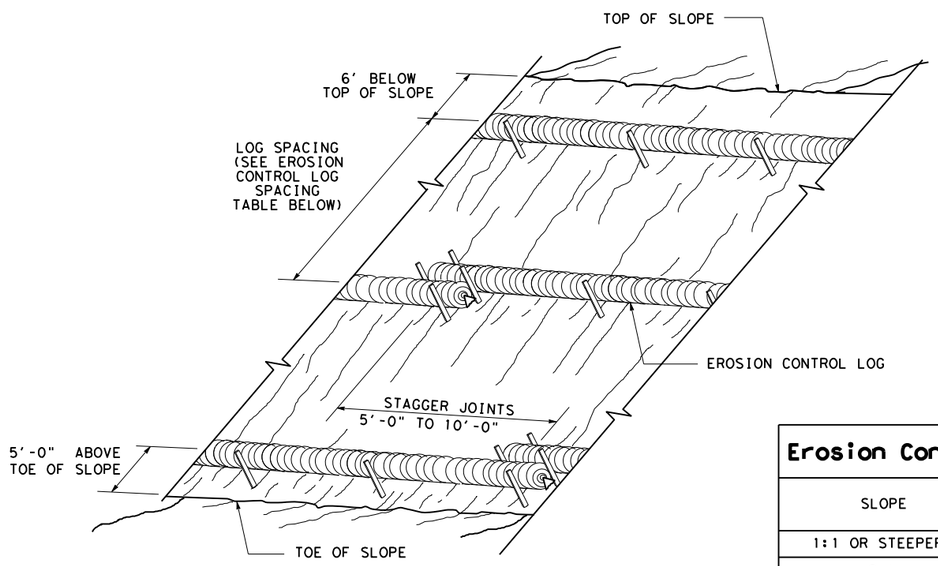
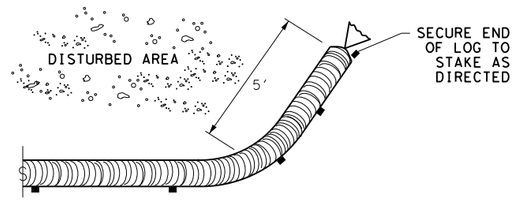


EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

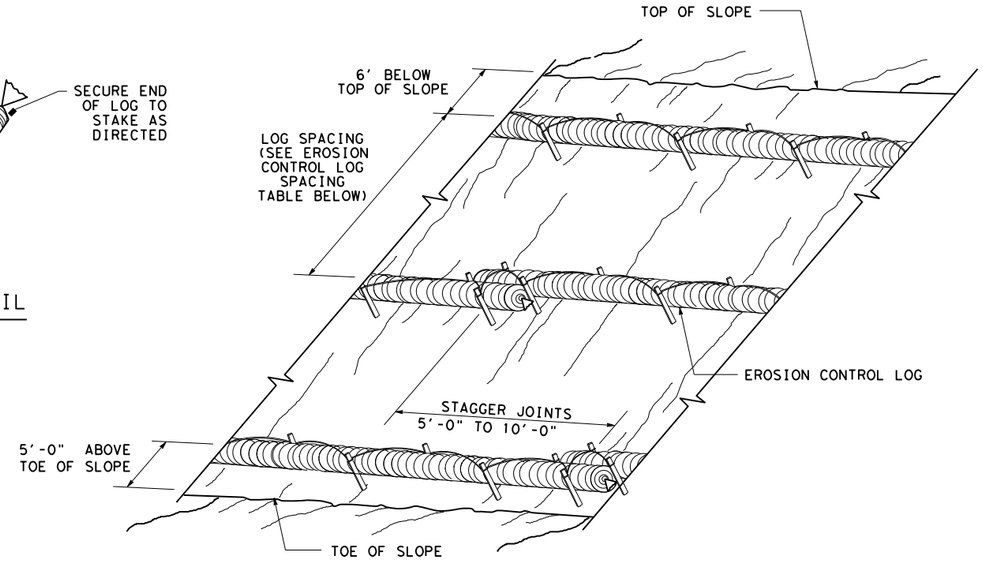
CL-SST



END SECTION RAP DETAIL

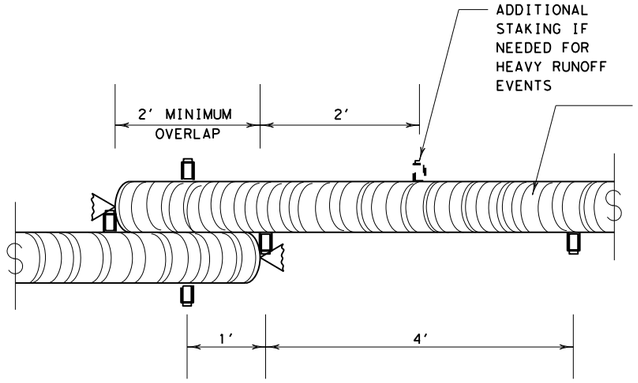
Erosion Control Log Spacing Table				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

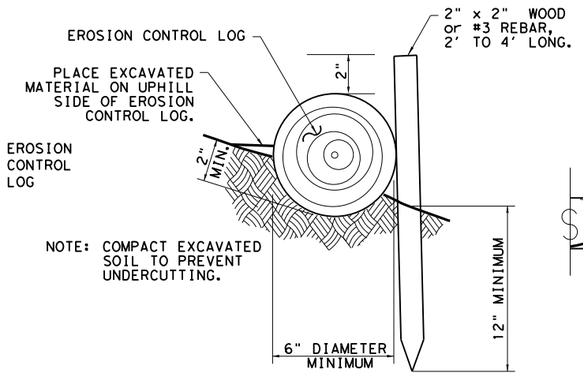
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

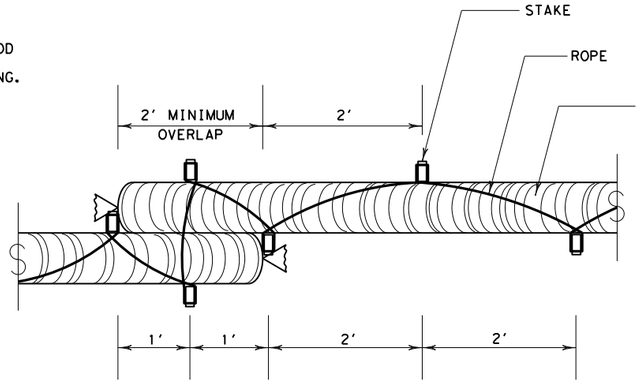


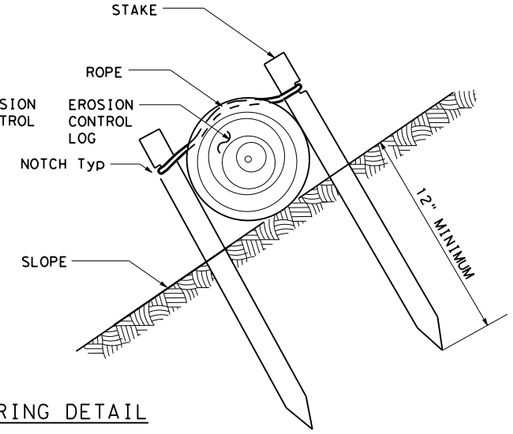


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

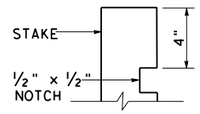
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

SHEET 2 OF 3

Texas Department of Transportation | Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec116	DN: TxDOT		CK: KM		DW: LS/PT	CK: LS
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	WFS	ARCHER			80	

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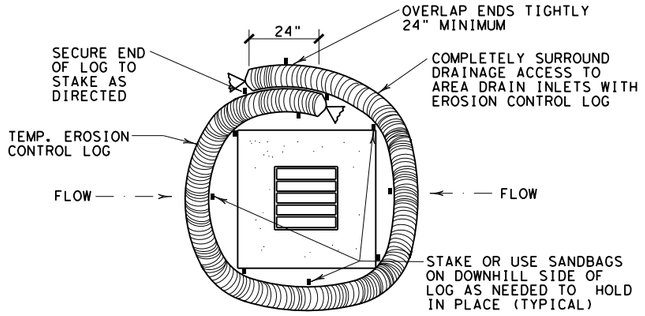
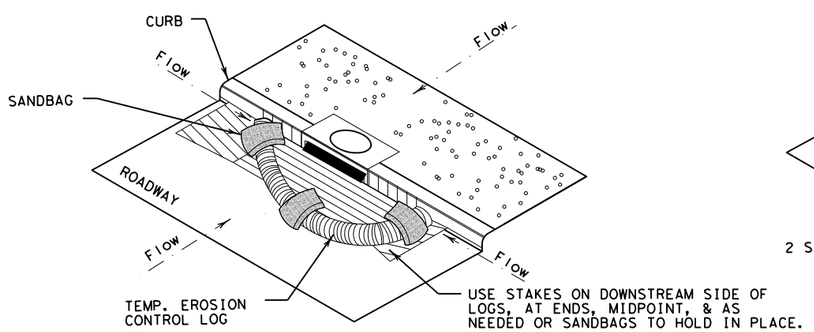


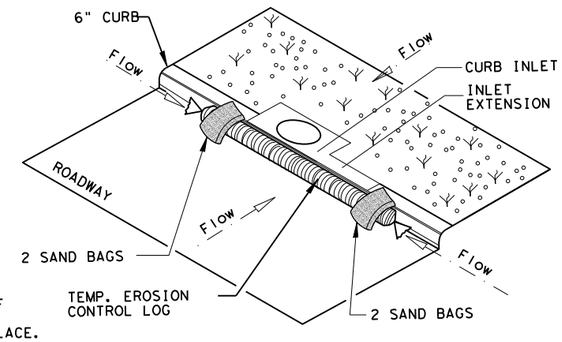
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

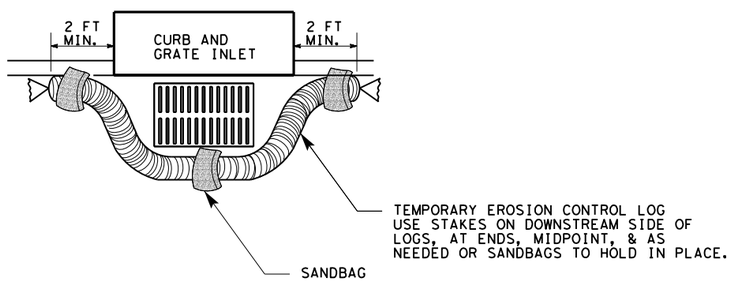
CL-CI



EROSION CONTROL LOG AT CURB INLET

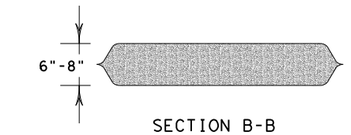
CL-CI

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

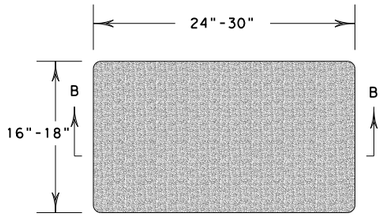


EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI



SECTION B-B



SANDBAG DETAIL

SHEET 3 OF 3

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

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